ACWG
ALL COMPANY WORKING GROUP

The Regulators' Alliance for Progressing Infrastructure Development (RAPID) is a partnership between the three water regulators Ofwat, Environment Agency and Drinking Water Inspectorate, formed in 2019 to help accelerate the development of new water infrastructure and design future regulatory frameworks. RAPID was set up to identify and address issues relevant to the development of joint infrastructure projects and to analyse the feasibility of nationally strategic supply schemes. These Strategic Resource Options (SROs) are being developed by different water companies in partnership and are following RAPID's gated process to identify strategic water resource solutions to help meet the water needs of the future. The gated process relates to the funding of investigations and development of SROs from April 2020 until March 2024.

The All Company Working Group (ACWG) was set up to ensure that water companies with SROs were using a consistent approach where possible. The ACWG has commissioned a number of studies to identify where consistencies need to be made and how approaches can be aligned between different companies and SROs. A review of the approaches adopted across the SROs identified key areas in which consistency was needed, including cost, water quality, environmental assessments, deployable output, carbon and the design of schemes. The output reports from these studies are available for review on the WRSE website in the document library, and have been adopted by SROs and also by companies for their draft water resource management plans and the regional water resource planning groups.

In 2020, the Environment Agency published the first National Framework for Water Resources to transform how we plan future water supplies; requiring water companies and other large water users to collaborate across boundaries and develop plans that consider their region's water needs. These regional water resources plans should then fit together to provide a joined up national solution. There are five regional groups which together include all the water companies operating in England. Each regional group is producing a strategic water resources plan to assess the future need for water and identify the set of options that present the best value to customers, society and the environment to secure long-term resilience. In addition to the ACWG consistency reports, there are also regional planning related reports available to review on the WRSE website, including the reconciliation of regional plans reports (for both the emerging and draft regional plans) and a materiality paper regarding data changes through the gated process.

Any queries relating to the ACWG reports can be directed to contact@wrse.org.uk.

Quality

MOTT MACDONALD

All Company Working Group

Water Framework Directive: Consistent framework for undertaking no deterioration assessments

November 2020

Issue and Revision Record

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1 Introduction

As the population, pressures from climate change and environmental aspirations all increase, it is vital that water resource infrastructure remains resilient. In order to meet the changing demands for water, the Water Services Regulation Authority (Ofwat) expects water companies to work together in jointly developing a series of cross company strategic water resource options (SRO's) for the future. Government and regulators have identified the need for a more integrated planning approach – with the National Framework[1] setting out requirements for five regional plans across England. The aim is to identify best value plans at a regional level that include ambitious demand management, take advantage of local surpluses that may be available and identify the best value SROs for implementation.

Ofwat's Final Determination (2019)[2] identified that to achieve this objective it will be important that key inputs to the regional planning processes are consistent. It therefore set out requirements in the submission for conceptual design reports "*using comparable methodologies and consistent assumptions*" including in relation to costs, deployable outputs, environmental and water quality assessments

The group of Water Companies involved in developing SROs (known as the All Company Working Group, ACWG), have been working together to increase consistency in approaches to SRO development across the country. Mott MacDonald have been commissioned by the ACWG to develop an environmental assessment method for SROs which is aligned to the draft Water Resources Planning Guideline (WRPG): Working Version for Water Resource Management Plan 2024 (WRMP24) to increase the consistency of environmental assessment and the evaluation of impacts on environmental water quality in particular.

This document discusses the development of a consistent framework for undertaking Water Framework Directive (WFD) no deterioration assessments and presents this new framework.

1.1 Strategic Resource Options

As part of the All Company Working Group, the feasibility of 17 proposed strategic resource options (SROs) is to be investigated. The solutions have been proposed by nine UK water companies, and include a mixture of source and transfer options, such as new storage reservoirs, effluent reuse, transfers utilising rivers and canals and pipeline routes.

For each option an environmental assessment will be required, which will include the need for WFD no deterioration assessments. Ofwat's Final Determination set out a gated process for development of SROs. The new Regulators' Alliance for Progressing Infrastructure Development (RAPID) will oversee the gated process. RAPID consists of representatives from Ofwat, the Environment Agency and Drinking Water Inspectorate. Four gateways (between 2020 to 2025) will be used to determine how, and if, solutions continue through the approval process. These gates are:

- Gate 1: Initial concept design and decision making
- Gate 2: Detailed feasibility, concept design and multi-solution decision making
- Gate 3: Developed design, finalised feasibility, pre-planning investigations and planning applications

[1] Environment Agency (2020), Meeting our Future Water Needs: a National Framework for Water Resources

[2] Ofwat (2019), PR19 Final Determinations, Strategic regional water resource solutions appendix

- Gate 4: Planning applications, procurement and land purchase

1.2 WFD compliance assessments

As part of the SRO assessment process, it must be demonstrated that an option will not cause the deterioration in status of any waterbodies, as measured and defined in the Water Framework Directive (WFD). This assessment should include and consider any mitigation methods that would be put in place to protect a waterbody status.

The Natural Resource Wales (NRW) current WRMP24 guidance states that any option that **could** cause a risk of deterioration should not be included in a feasible list of options. NRW have been asked to clarify how this would be applied in practice but this was not available at the time of writing. Any further clarification or guidance provided by NRW should be considered for options which include waterbodies in Wales.

Currently, each water company follows its own method for WFD compliance assessments. In order to assess and compare the proposed SROs, which may be shared by multiple water companies, a unified method is needed for the SRO WFD compliance assessments.

A new UKWIR WFD user manual is being written (currently unpublished). In discussion with the authors we have agreed that the objectives of the WFD assessment are:

- To prevent deterioration between WFD status class of any element in the waterbody as set out in WFD Article 4.1 (a)
- To prevent new impediments to attaining 'Good' WFD status or potential for the waterbody, or any assessed element, as set out in WFD Article 4.1 (a)ii and iii. In some waterbodies it is accepted that it is currently technically infeasible or disproportionately costly to achieve Good status or potential. If this is the case then the test is applied to current agreed objectives for the waterbody.
- To ensure that the planned programme of measures in the current cycle of River Basin Management Plans (RBMP), to help attain the WFD objectives from the waterbody, are not compromised.

As well as these legally binding WFD objectives, other objectives set out in the RBMP should be reviewed to see if the options can assist in meeting the objectives:

- Does the option assist in attaining the WFD objectives for the waterbody?
- Does the option assist in attaining the objectives associated with WFD protected areas?
- Does the option reduce treatment needed to produce drinking water and look to work in partnership with others; promoting the requirements of Article 7 of the WFD?

2 The Water Framework Directive

2.1 Introduction

The Water Framework Directive (WFD) 2000/60/EC of October 2000 is European Union legislation under which there is the obligation to meet targets for the ecological and chemical status of waterbodies. It was introduced into UK law in 2003 (The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003).

The WFD's key objectives are general protection of the aquatic ecology, specific protection of unique and valuable habitats, protection of drinking water resources, and protection of bathing water. All objectives are integrated for each river basin, and the last three to specific bodies of water that are designated for drinking water abstraction, those supporting special wetlands, and bathing areas. Ecological protection should apply to all waters.

The environmental objectives of the Water Framework Directive (WFD) are the core of this EU legislation providing for long-term sustainable water management on the basis of a high level of protection of the aquatic environment. Within the directive Article 4(1) sets out the "environmental objectives" for natural surface and groundwater bodies, artificial and heavily modified water bodies (HMWBs). Natural surface water bodies must, by 2015, adhere to good ecological and chemical status and groundwater bodies to good quantitative and chemical status. Artificial and HMWBs must achieve good ecological potential and good chemical status. Article 4(1) also sets out the principal of no deterioration, providing protection from the deterioration of water status/potential. In Article 4(3) the criteria for the designation of artificial or heavily modified water bodies are described.

Exemptions are defined within Article 4, outlining the conditions under which the achievement of good status or potential may be phased or not be achieved, or under which deterioration may be allowed. Article 4(4), 4(5), 4(6) and 4(7) describe these distinct conditions. In summary:

- Article 4(4) allows an extension of the time limit so that good status or potential is, under certain conditions, achieved only after 2015;
- Article 4(5) allows the achievement of less stringent objectives under certain conditions;
- Article 4(6) allows the temporary deterioration of status in case of natural causes or "force majeure";
- Article 4(7) allows for deterioration of status or non-achievement of good status or potential under certain distinct conditions.

2.2 Application in the UK

In England and Wales all waterbodies have been assessed and are included within the local River Basin Management Plan (RBMP). There are 11 RBMPs in England and Wales and they include the entire river system including rivers, lakes, transitional (estuaries) and coastal water (up to 1 nautical mile from the coast) as well as groundwater. The RBMPs are updated every 5 years. The latest reports are from 2015, with the latest update due at the end of 2021 (update delayed due to Covid-19 restrictions).

The Water Framework Directive requires all waterbodies (both surface and groundwater) to achieve 'good status'. The Directive also requires that no such waterbodies experience no deterioration in status. Good status is a function of good ecological status and good chemical status.

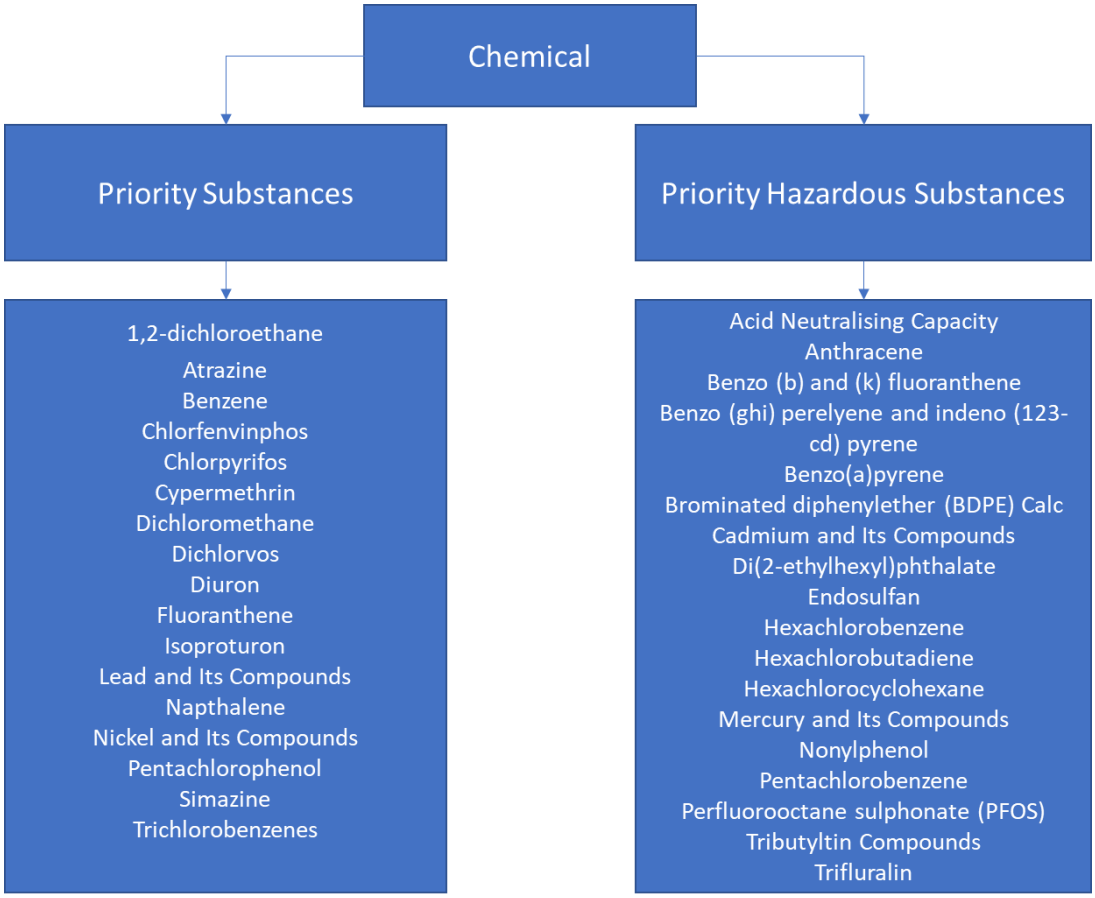
2.3 Waterbody status

In surface water the overall waterbody status is defined by the chemical status and the ecological status. The Water Framework Directive works on the one-out all-out policy, meaning that if an individual quality element is not achieving good status for a particular watercourse then the entire waterbody is classified as failing.

2.3.1 Chemical status

The chemical status is assessed against two categories of quantifiable quality elements; Priority substances and Priority hazardous substances, as shown in Figure 2.1. Chemical status is assessed on a pass / fail basis.

Figure 2.1: Chemical status



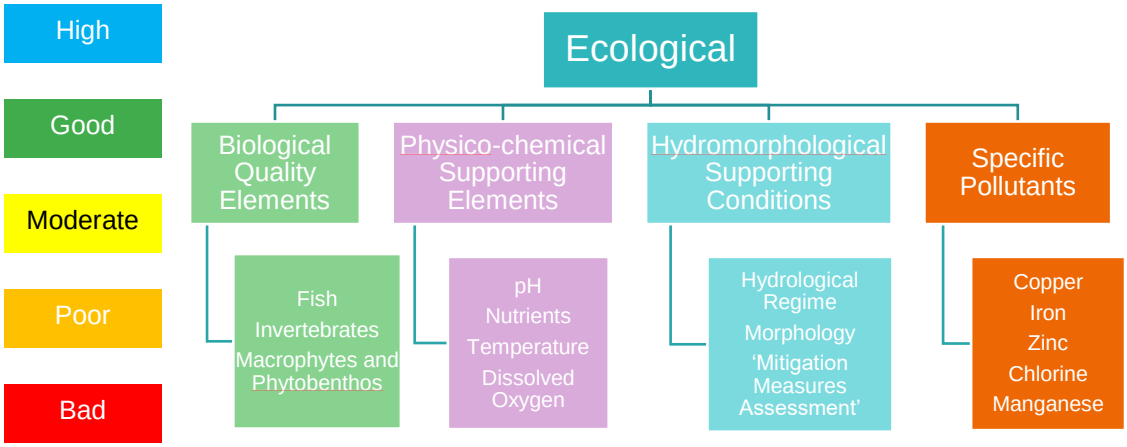
2.4 Ecological Status

As shown in Figure 2.2 ecological status is assessed against four categories:

- Biological – fish, invertebrates, macrophytes, etc
- Hydromorphological – channel morphology, channel planform, lateral connectivity, etc
- Physio-chemical – phosphate, nitrate, dissolved oxygen, etc
- Specific pollutants – pollutants, heavy metals, etc

Ecological status of each of the specific quality elements is assessed as high, good, moderate, poor or bad.

Figure 2.2: Ecological status



2.5 Article 4(7) derogation

If an option fails the WFD assessment due to a risk of deterioration, then Article 4(7) of the WFD sets out the conditions where derogation of WFD can be acceptable. Article 4(7) states that

"Member States will not be in breach of the WFD when:

- *failure to achieve good groundwater status, good ecological status or, where relevant, good ecological potential or to prevent deterioration in the status of a body of surface water or groundwater is the result of new modifications to the physical characteristics of a surface waterbody or alterations to the level of bodies of groundwater, or*
- *failure to prevent deterioration from high status to good status of a body of surface water is the result of new sustainable human development activities."*

This will only apply when the following conditions have been met

- Test (a) - All practicable steps are taken to mitigate the adverse impact on the status of the body of water;
- Test (b) - The reasons for those modifications or alterations are specifically set out and explained in the river basin management plan required under Article 13 and the objectives are reviewed every six years;
- Test (c) - The reasons for those modifications or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives set out in paragraph 1 are outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development, and
- Test (d) - The beneficial objectives served by those modifications or alterations of the waterbody cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option.

Therefore, if an option is considered to be the best for a variety of other reasons and assuming all of the above conditions can be met then an Article 4(7) derogation application could be considered.

3 Framework development and testing

3.1 Review of current approaches to WFD assessment

In order to support the development of the SRO environmental assessment method, a review was undertaken of the Water Companies' WRMP 2019 to understand

- WFD approach, tools and datasets used; and
- Scoring criteria.

The aim of this is to ensure that the assessment methodology used for SRO's is comparable with that in the WRMPs, to allow easy inclusion of SRO's into later WRMPs if necessary.

The findings of the review on the WFD approaches, tools and data sets and scoring criteria is presented in Appendix A. In addition, the methodology for WFD assessments for a selection of other projects have also been reviewed for best practice approaches.

3.2 Approach to framework development

The approach taken in designing the framework has been to combine the best aspects from the approaches currently taken by water companies, as outlined in their WRMPs. The framework design also considers all the SROs which have been proposed, ensuring that it is applicable to all options.

Our approach has considered the following questions:

- What assessments need to be considered;
- How to make the framework proportionate to the gated scheme;
- How do we take into account the varying level of data available, flag if more is needed and how appropriate is a precautionary approach; and
- How do we allow for any mitigation measures applied to the scheme.

This framework has been constructed in response to these questions.

During the creation of this framework discussions were held with Ricardo to ensure that this framework is in line with the UKWIR WFD user manual which is currently being written. All effort has been made to ensure that this framework is in line with the future UKWIR guidance.

3.3 Framework outline

The basic structure of the assessment is:

1. Level 1 basic screening for impact
   a. Identification of affected waterbodies;
   b. Identification of possible impacts;
   c. Identification of embedded mitigation measures; and
   d. Screening to remove waterbodies where there are no/minor localised impacts
2. Level 2 detailed screening for impact
   a. Waterbody scale detailed assessment of impacts to each WFD quality element for each activity
   b. Assessment of data confidence level and design certainty

c. Identification of further mitigation needs
d. Assessment of impacts after mitigation

3. Cumulative assessment of SRO with other possible options

The WFD framework focuses on surface water and transitional waterbodies. Whilst this does not explicitly discuss the assessment of groundwater or coastal water, the same principles can be applied.

3.3.1 Impact scoring system

Table 3.1 shows the scoring system used in this assessment, ranging from -2, 'Very beneficial', to 3, 'high impact'. These scores can be applied at various stages during assessment, including:

- The likely impact of an activity involved with constructing/operating an SRO on the WFD status of a whole waterbody
- The likely impact of an activity involved with constructing/operating an SRO on the status of a WFD element of a waterbody
- The overall likely impact of constructing/operating an SRO on the WFD status of a whole waterbody

When separately assessing multiple components involved in construction/operation of an SRO and/or multiple WFD elements of a waterbody, the scores given may be combined for the overall SRO and/or waterbody, both by taking the mean impact score, and the max impact score.

Table 3.1: Impact scoring system for the assessments

Impact	Score	Description
Very beneficial	-2	Impacts that, taken on their own, have the potential to lead to the improvement in the ecological status or potential of a WFD quality element for the entire waterbody
Beneficial	-1	Impacts that, when taken on their own, have the potential to lead to a minor localised or temporary improvement that does not affect the overall WFD status of the waterbody or any quality elements
No/minimal	0	No measurable change in the quality of the water environment or the ability for target WFD objectives to be achieved.
Low	1	Impacts that, when taken on their own, have the potential to lead to a minor localised, short-term and fully reversible effects on one or more of the quality elements but would not result in the lowering of WFD status. Impacts would be very unlikely to prevent any target WFD objectives from being achieved.

Medium	2	Impacts that, when taken on their own, have the potential to lead to a widespread or prolonged effect on the quality of the water environment that may result in the temporary reduction in WFD status. Impacts have the potential to prevent target WFD objectives from being achieved.
High	3	Impacts when taken on their own have the potential to lead to a significant effect and permanent deterioration of WFD status. Potential for high impact on preventing target WFD objectives from being achieved.

3.3.2 Level 1 basic screening

Figure 3.1 shows the flow chart for the level one screening process, setting out the activities, using the level 1 scoring system shown in Table 3.1.

The process involves the identification of all activities involved in construction, operation and decommissioning for the SRO and identification of all WFD waterbodies which these activities may affect. We recognise that SRO may be at different stages of development and in the early stages some assumptions may need to be made on the activities and the assessment updated when further information becomes available. The baseline WFD data (status, objectives, reasons for not achieving good) is then collated for these waterbodies.

Following this, each activity is automatically assigned an impact score using the level 1 scoring system shown in Table 3.2. The scoring set out in Table 3.2 assumes some embedded mitigation is applied. If these mitigation measures do not apply or further measures are in place then the impact score can be reassessed and the score manually updated. The mean and maximum impact score for the SRO is then calculated for each waterbody. If the maximum impact is one or less, then the waterbody is not to be considered further and no further action is needed. If the maximum impact score is greater than 1 then the waterbody is taken forward into level 2 screening.

Figure 3.1: Flowchart for level 1 screening process

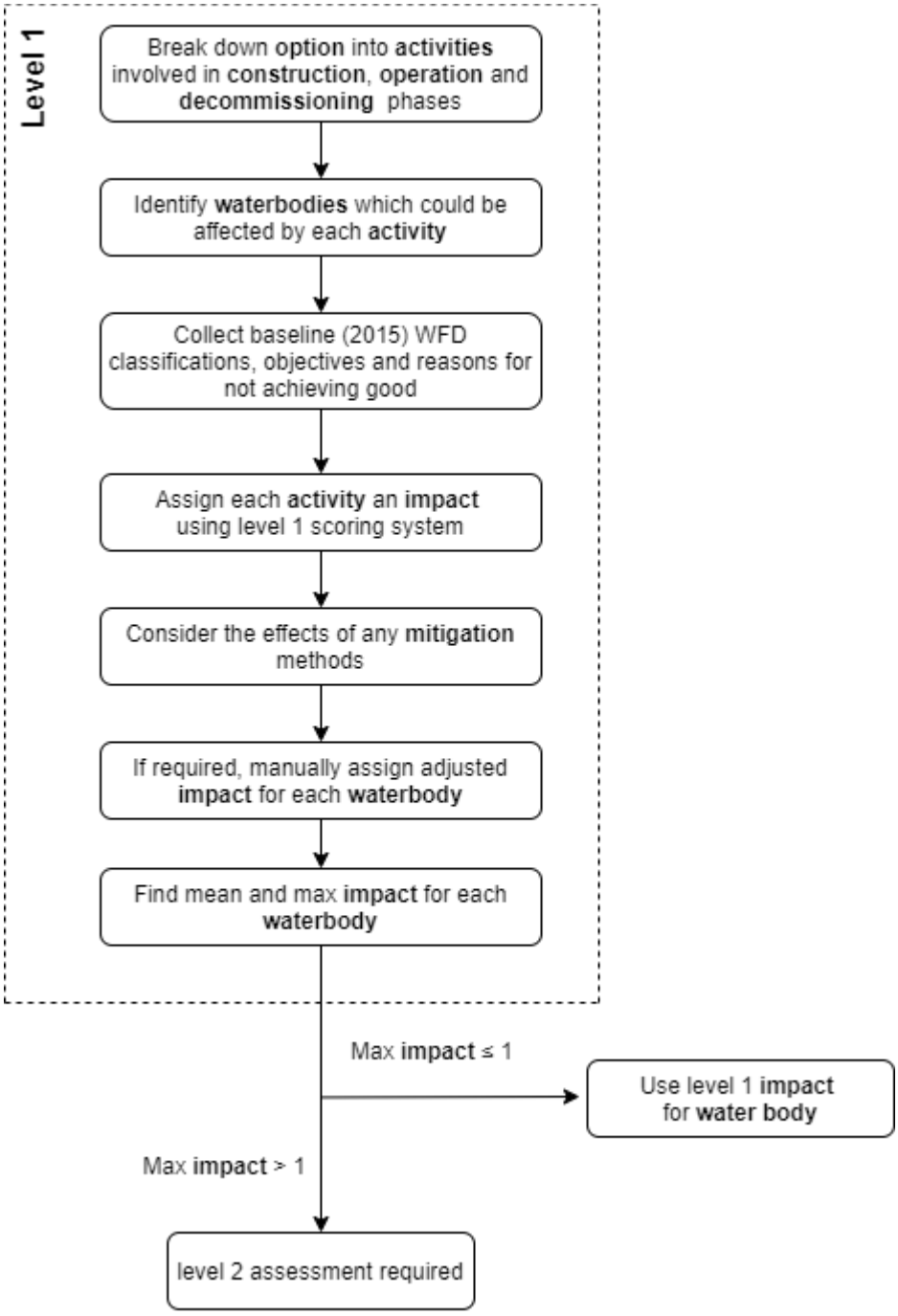


Table 3.2: Level 1 activity scoring system

Component	Activity	Activity type	Impact score
Below ground	Construction/repair of new tunnels and conduits	Construction	1
	Construction of below ground structures (shaft/retaining wall) with associated dewatering, with **no** sensitive groundwater feature within 500m	Construction	1
	Presence of new underground structure (tunnel/shaft/retaining wall), with **no** sensitive groundwater feature within 500m	Operation	1
	Construction of below ground structures (shaft/retaining wall) with associated dewatering, within 500m of a sensitive groundwater feature	Construction	2
	Presence of new underground structure (tunnel/shaft/retaining wall) within 500m of a sensitive groundwater feature	Operation	2
	Construction of new cutting with external dewatering with **no** sensitive groundwater feature within 500m	Construction	1
	Construction of new cutting with external dewatering within 500m of a sensitive groundwater feature	Construction	2
	Construction of new culvert	Construction	1
Culvert	Construction of new inverted siphon or drop inlet culvert	Construction	1
	Presence of new culvert, in headwaters or on drainage ditches	Operation	1
	Presence of new culvert mid or lower catchment	Operation	2
	Presence of new inverted siphon or drop inlet culvert	Operation	3
	Removal of significant in channel watercourse structure (such as impassable weir)	Decommissioning	-2
	Removal of existing culverts or other in channel watercourse structure	Decommissioning	-1
Discharge	High volume discharge of water with a quality element of higher WFD status than the receiving water body	Operation	-2
	High volume discharge of water with a quality element of a lower WFD status than the receiving water body	Operation	3
	Low volume discharge of water with a quality element of the same or higher WFD status than the receiving water body	Operation	-1
	Low volume discharge of water with a quality element of a lower WFD status than the receiving water body	Operation	2
	Low volume discharge of water with a quality element of the same WFD status as the receiving water body	Operation	0
	High volume discharge of water with a quality element of the same WFD status as the receiving water body	Operation	1
	New WTW discharge to watercourse	Operation	1
	Transfer of water via a river, canal or aqueduct	Operation	2
	New discharge of highly saline water to a coastal or transitional waterbody	Operation	3
	New discharge of highly saline water to a surface waterbody or groundwater	Operation	3

Component	Activity	Activity type	Impact score
Groundwater	Construction of a new abstraction borehole headworks and associated infrastructure	Construction	0
	Refurbishment of existing boreholes	Construction	0
	Drilling new abstraction boreholes	Construction	0
	Maintenance and use of abstraction borehole infrastructure	Operation	0
Habitat	Creation of significant areas of riparian habitats	Construction	-2
	Minor habitat creation	Construction	-1
	Daylighting of existing culverts	Construction	-1
	Channel realignment with natural bed substrate and good riparian connections	Operation	-1
	Channel realignment with artificial banks/base	Operation	1
Intake	Construction or modification of a new pumping station and/or intake from river or coastal waters	Construction	1
	Maintenance and use of river intakes	Operation	1
	Maintenance and use of coastal intakes	Operation	1
Licence	Use of existing ground and surface water abstraction licences, within licence conditions and recent abstraction patterns	Operation	0
	Use of existing surface water and groundwater abstraction licences, within existing licence conditions but outside of the recent actual rates	Operation	2
	Emergency or drought use of existing surface water or groundwater abstraction outside of licence conditions	Operation	2
	New or increased surface water abstraction	Operation	3
	New or increased groundwater abstraction	Operation	3
	Increase in surface water and groundwater abstraction licences	Operation	2
	New coastal or transitional waterbody abstraction licence	Operation	3
	Reduction of coastal or transitional waterbody abstraction licence	Operation	-1
	Increase of coastal or transitional waterbody abstraction licence	Operation	2
Outfall	Construction of a new outfall structure to a watercourse, coastal waters, transitional waters or reservoir	Construction	1
	Cessation of existing discharge to a watercourse	Construction	2
	Removal of existing WTW and associated discharge	Decommissioning	-1
	Maintenance and use of river, coastal or transitional water outfall	Operation	0

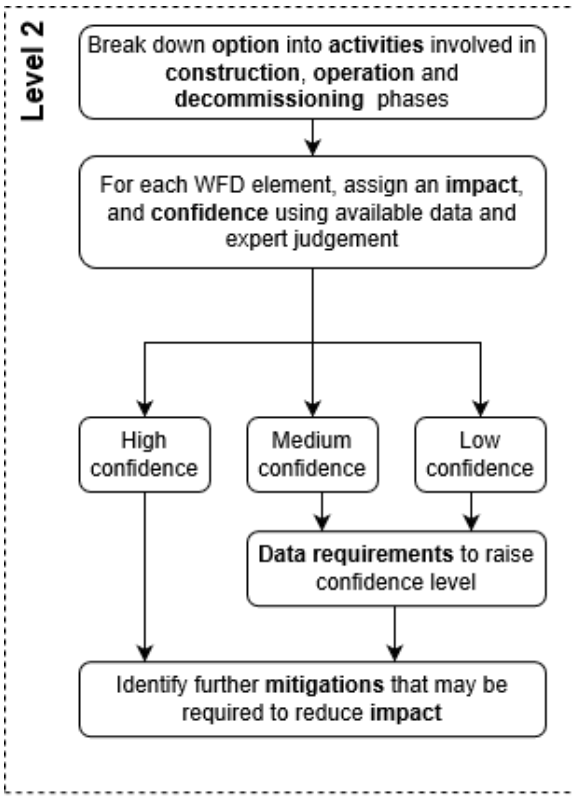
Component	Activity	Activity type	Impact score
Pipelines	Trenching and laying of pipelines within the interfluves of a catchment (no watercourse crossings)	Construction	0
	Trenching and laying of pipelines involving watercourse crossings	Construction	1
	Trenching and laying of pipelines involving large watercourse crossings with in channel modifications	Construction	2
	Maintenance of pipelines	Operation	0
	Draining of pipelines for maintenance	Operation	1
	removal / decommissioning of existing pipeline (no watercourse crossings)	Decommissioning	0
	removal / decommissioning of existing pipeline (involving watercourse crossings)	Decommissioning	0
	New above ground pipelines (crossing watercourse)	Construction	2
	New above ground pipelines (not crossing watercourse)	Construction	0
reservoir	Construction of reservoir (set back from watercourse)	Construction	0
	Construction of new impounding reservoir (in line/next to watercourse - within 500m)	Construction	3
	Modification of an existing storage reservoir	Construction	3
	Presence of new reservoir or modified existing storage reservoir	Operation	3
	Modification of an existing service reservoir adjacent in close proximity to watercourse	Construction	1
	Presence of new reservoir or modified existing service reservoir in close proximity to watercourse	Operation	1
	Modification of an existing service reservoir not in close proximity to watercourse	Construction	0
	Presence of new reservoir or modified existing service reservoir not in close proximity to watercourse	Operation	0
Transfer agreement	New or continuation of contractual agreement between companies to continue providing transfer with no change to abstraction licence associated	Operation	0
	Contractual agreement between companies to continue providing transfer with decrease in abstraction licence associated	Operation	-1
	Contractual agreement between companies to continue providing transfer with increase in abstraction licence associated	Operation	2
Water Quality	Catchment management schemes	Operation	-1
WTW	Modification of an existing WTW	Construction	0
	Construction of a new WTW (set back from a watercourse)	Construction	0
	Maintenance and use of pumping stations and WTW	Operation	0
	Construction or modification of a desalination plant	Construction	1

Component	Activity	Activity type	Impact score
	Maintenance and use of desalination plant	Operation	0
	removal of existing WTW discharge outlet structure	Decommissioning	0

3.3.3 Level 2 detailed screening

The level 2 assessment, shown in Figure 3.2, is carried out on all watercourses that have been identified as having more than a low potential for impact on WFD resulting from the SRO. At this level, the process relies on expert judgement, with the availability of data on WFD elements and the planned option used to give a confidence level to each assessment.

Figure 3.2: Flowchart for level 2 assessment



As in level 1, the process begins with the identified actives involved in the construction, operation and decommissioning of an SRO. The list of activities is detailed in Table 3.3.

Table 3.3: Level 2 assessment SRO activities

Activity	Construction, Operation or Decommissioning
Viaduct or overbridge	Construction and operation
Viaduct or overbridge with footings in water course	Construction and operation
New culvert	Construction and operation
New drop inlet culvert, inverted siphon or other in channel obstruction	Construction and operation
Extension of existing culvert	Construction and operation
Watercourse realignment or diversion	Construction and operation
Removal of existing culverts or other in channel watercourse structure	Decommissioning
Below ground structures (shaft/retaining wall) with associated dewatering	Construction

Activity	Construction, Operation or Decommissioning
New tunnels or conduits	Construction
Aqueduct	Construction and operation
Creation of significant areas of riparian habitats	Construction and operation
Minor habitat creation	Construction and operation
Daylighting of existing culverts	Construction and operation
New pipelines within the interfluves of a catchment (no watercourse crossings)	Construction
New pipelines involving watercourse crossings with no in-channel modifications	Construction and operation
New pipelines involving watercourse crossings with in-channel modifications	Construction and operation
Modification of an existing WTW	Construction and operation
New WTW (set back from a watercourse)	Construction
New discharge/transfer to a watercourse or reservoir	Operation
New abstraction borehole headworks and associated infrastructure	Construction
New small storage reservoir (set back from watercourse)	Construction
New or modified pumping station and/or river intake	Construction
Refurbishment of existing boreholes	Construction and operation
New abstraction boreholes	Construction and operation
New open cutting (with external dewatering)	Construction and operation
New impounding reservoir (in line/next to watercourse, or large compared to watercourse) - excluding abstraction/discharge	Construction and operation
Modification of an existing reservoir	Construction and operation
Catchment management schemes	Operation
Maintenance of pipelines (including draining pipeline)	Operation
Use of existing groundwater abstraction licences, within existing licence conditions and recent actual abstraction patterns	Operation
Use of existing surface water abstraction licences, within existing licence conditions and recent actual abstraction patterns	Operation
New or increased surface water abstraction	Operation
New or increased groundwater abstraction	Operation
Cessation of existing discharge to a watercourse	Decommissioning

Each of these activities are then automatically assigned potential impact types which could affect WFD status:

- Changes in channel footprint;
- Changes in flow velocity and volume;
- Changes in sediment deposition;
- Noise and vibration;
- Shading;
- Changes to waterbody hydromorphology leading to changes in river processes and habitats upstream and downstream;

- Change in water quality due to discharge of groundwater to a surface waterbody;
- Change in water quality due to new or changes to existing discharge of surface water into surface waterbody;
- Change in INNS present in surface waterbody; and
- Creation of new habitats

Each potentially impacted waterbody is then assessed. Assessment is carried out on each activity and each impact type against each separate WFD element. A score is given for each based on professional judgement using the scores set out in Table 3.1. Once each activity and impact type has been assessed the waterbody is given an overall impact score. This is largely based on the maximum score given, but the overall score can be increase if there are numerous lower scoring impacts in the waterbody. For example, in one waterbody there may be 20 new culverts added which individually have an impact score of 1. However, when taken in combination at a waterbody scale the overall impact score may be raised to 2. Alongside this waterbody scale impact score, a pair of confidence levels are assigned for each assessment, based on the quality and availability of both physical data and design information about the SRO, as detailed in Table 3.4.

Table 3.4: Confidence levels used in level 2 assessment

Confidence level	Description
Low	Limited data and evidence available, based mainly or completely on expert judgement with many assumptions. Preliminary design information only, detailed information on location/routes, construction methods etc not yet available.
Medium	Some data and evidence available, based partially on expert judgement with some assumptions Design progressed but some assumptions made on construction methods etc.
High	Lots of good data and evidence available, minimal assumptions Design advanced minimal assumptions needed.

For impact scores with a confidence level of medium or low, the requirements for further data or design information in order to raise this confidence level for future gates should be listed. For any option with an impact score greater than zero, further mitigation measures that could reduce this impact should also be detailed. The waterbody impact score after the application of these mitigation measures is then provided.

3.3.4 Cumulative assessment

If more than one option may affect the same waterbody, a cumulative assessment of impact must be made. This is facilitated using the developed tool, where the detailed impacts of more than one option can be combined in the level 2 assessment. The waterbody scale impacts scores can then be reassessed using expert judgement and informed by the already identified single option scores.

3.3.5 Framework progression through gates

As progress is made through the gated process the WFD compliance framework remains the same, but the options should be reassessed as further information becomes available. In order to pass through each gate, the confidence level in the data and design must reach an appropriate level as set out in Table 3.5 below.. The additional data required will be identified in the previous gate. Measures should be implemented immediately after assessment and the

need identified to collect this data, whether from environmental sampling or computational modelling.

Table 3.5: Confidence required for each gate

Gate		Confidence needed
1	Initial concept design and decision making	No requirements
2	Detailed feasibility, concept design and multi-solution decision making	All confidence levels should aim to be medium
3	Developed design, finalised feasibility, pre-planning investigations and planning applications	All confidence levels should aim be high
4	Planning applications, procurement and land purchase	All confidence levels must be high

3.4 Framework assessment tool

3.4.1 Overview

A framework assessment tool was developed in excel to enable all members of the ACWG to produce WFD compliance assessments using the same template. The assessment tool gives a two level assessment on a WFD waterbody scale, with the results of the level 1 assessment informing which waterbodies should be carried forward for a more thorough level 2 assessment.

The level 1 assessment is mostly automated with the user required to detail the waterbodies potentially impacted by the SRO and select from a predetermined list the activities likely to occur within each waterbody.

From this, an impact score is calculated between -2 and 3 as described in Table 3.1, with waterbodies scoring greater than 1 carried through to the level 2 assessment as those with a potential medium or high impact on the WFD compliance.

The template for the level 2 assessment can be used to semi-automatically set up a level 2 assessment for each waterbody once a further list of potential activities occurring as a result of the SRO in each waterbody is determined. Using WFD data from the catchment explorer in combination with the likely impacts caused by a particular activity, the tool sets up the template with cells grey out that are not required for assessment.

The level 2 assessment can then be completed using expert judgement, with due consideration of the WFD data sets pulled across into the tool.

At this time the tool can only be used for surface water and transitional waterbodies, and coastal waters or groundwater will need to be assessed separately. The tool provided allows for the manual addition of conclusions from any groundwater or coastal water assessments to be added to the summary tabs to provide a complete record of each option.

3.4.2 Baseline data

The tool draws on baseline WFD data downloaded from the catchment explorer in August 2020.[3] The baseline data includes WFD objectives and classifications, reasons for not achieving good status and the program of measures for each waterbody. These datasets are pulled into the assessment if relevant for the waterbodies potentially impacted by the SRO.

[3] This is based on the Cycle 2 2015 assessment data. When the Cycle 3 data is available at the end of 2021, all the background information in the tool will need to be updated and the assessments re-run.

3.4.3 User guide

It is recommended that a copy of the spreadsheet tool is completed for the compliance assessment for each SRO. This will keep the original tool free from any alterations should it be required for multiple SROs, however if the tool is required to be cleared for the assessment to be restarted, a button can be found in the sheet titled “1. List relevant waterbodies”. This will reset the document except for any additional sheets that were created such as those named after the waterbodies in the level 2 assessment. These will require manual deletion.

Before starting the assessment, ensure to complete title page with the option name, assessor information and groundwater assessment tick box.

Once this is complete follow the actions as listed in Table 3.6. The action list can also be found in the excel tool.

Table 3.6: Excel tool user actions

Action number	Action	Action location (Sheet name)
Level 1 assessment		
1	List all the potentially impacted waterbody ID’s	1. List relevant waterbodies
2	Select the button to set up the assessment based on the list of waterbodies	1. List relevant waterbodies
3	Assign "YES" to each activity that may impact each waterbody	2. Level 1 activities
4	Select the button to score level 1 assessment	2. Level 1 activities
Level 2 assessment		
5	Select button to set up level 2 assessment	3. Level 1 summary
6	Assign "YES" to each activity that may impact each waterbody	4. Assign Level 2 WB impacts
7	Select button to go to next step	4. Assign Level 2 WB impacts
8	Type one of the waterbody ID's carried to level 2 into cell B8	5. Level 2 assessment template
9	Find the column for the selected waterbody in "level2assignedimpacts". Filter to show only "yes".	Level 2 assigned impacts
10	Copy column A and C from level2assignedimpacts, paste values transposed into row 8 and 10 respectively in Level 2 assessment template	Level 2 assigned impacts and 5. Level 2 assessment template
11	Populate the RNAG and PoM table at the bottom of the sheet using the filter in column c of the background RNAGPoM sheet. There may not be any matches	5. Level 2 assessment template
12	Select button to copy the assessment into a new tab, named after the waterbody and clear the template ready for the next waterbody	5. Level 2 assessment template
13 - repeating	Repeat steps 8 - 12 until all waterbodies requiring a level 2 assessment have their own assessment sheet. This can be checked in Level 2 summary, column B	
14	Using expert judgement, fill in each of the sheets named after the waterbodies. The scoring assigned will be summarised in the level 2 summary.	Created as a result of step 12. Sheet named after waterbody ID
15	Complete the level 2 summary	6. Level 2 summary

3.4.4 Cumulative assessments

Once the tool has been used to complete the WFD compliance assessments for each SRO, the level 2 assessments from each option can easily be combined and analysed to see which waterbodies might be impacted by more than one SRO. This cumulative score should be

considered at each gate to understand if any waterbodies may be severely impacted as a result of multiple SROs.

3.5 Framework testing

3.5.1 Beckton Reuse Scheme

Beckton Reuse Scheme, an SRO being considered by Thames Water, was used as an example of what the WFD compliance assessment would look like through use of the excel tool described in section 3.4.

This option would pump treated effluent to an existing raw water transfer to be discharged either to a watercourse or storage reservoir.

Five waterbodies would potentially be impacted by the SRO, four rivers and one transitional water.

The list of 56 activities were considered, and 13 were identified as having potential to impact each of the waterbodies. Following this, the level 1 assessment was automatically populated.

The results of the level 1 assessment can be seen below in Figure 3.3.

Figure 3.3: Beckton Reuse example of a level 1 assessment summary

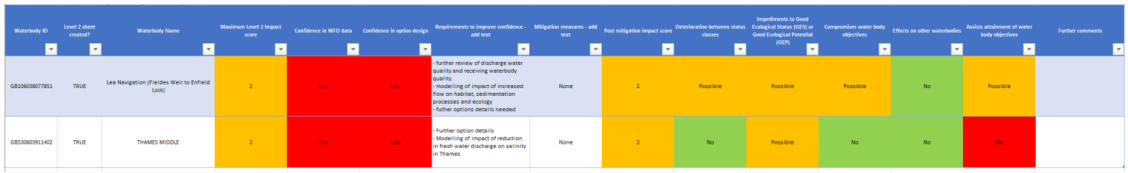
Impacted Waterbody ID	Impacted Waterbody Name	Waterbody type	Overall waterbody Classification	Overall waterbody Objective	Number of activities assessed	Count of activities scoring major benefit score	Count of activities scoring minor benefit score	Count of activities scoring minimal impact score	Count of activities scoring minor local impact score	Count of activities scoring medium impact score	Count of activities scoring high impact score	Level 1 max score	Level 1 mean score	Carry through to level 2 assessment?
GB106038027910	Pymmes and Salmon Brooks - Deephams S	River	Moderate in 201	Moderate by 2015	7	0	0	2	5	0	0	1	0.71	NO
GB106038027950	Lea Navigation Enfield Lock to Tottenham L	River	Bad in 2016	Bad by 2015	8	0	0	2	6	0	0	1	0.75	NO
GB106038077851	Lea Navigation (Fieldes Weir to Enfield Loc	River	Poor in 2016	Moderate by 2015	4	1	0	1	1	1	0	2	0.25	YES
GB106038077852	Lee (Tottenham Locks to Bow Locks/Three M	River	Bad in 2016	Moderate by 2027	7	0	0	2	5	0	0	1	0.71	NO
GB530603911402	THAMES MIDDLE	Transitional	Moderate in 201	Moderate by 2015	1	0	0	0	0	1	0	2	2.00	YES

The two waterbodies with a level 1 maximum score of 2 are to be carried through into the level 2 assessment.

34 further activities were then considered from the predetermined list and four activities may impact GB106038077851 whilst two activities may impact GB530603911402. Assessment tabs for each of these two waterbodies were set up and completed based on expert judgement. An example of each of these can found in Appendix B.

The level 2 summary is shown in Figure 3.4. This summary shows that there is low confidence in the WFD data and in the SRO design, since this assessment was completed at a high level. As the option continues through the gated process, this tool can be updated, when more information is gathered, actioning mitigation measures and increasing the confidence in the data and option design.

Figure 3.4: Beckton Reuse example of a Level 2 summary



The level 2 summary also highlights whether there is likely to be deterioration of the WFD classification, impediment to good ecological status, impacts that might compromise waterbody objectives, and whether any of the activities might assist in the waterbody objectives. This gives a good overview of the WFD compliance and if it can be achieved with the SRO assessed.

Figure 3.5 presents the final summary, which gives an overview of all waterbodies that could be potentially impacted by the SRO.

Figure 3.5: Beckton Reuse example final summary

Strategic Resource Option surface water assessment for:	**Beckton Reuse Scheme - Phase 3**
Is a groundwater assessment required?	**No**

Waterbody ID	Waterbody name	Waterbody type	Maximum Impact score level 1	Maximum Impact score level 2	Maximum post mitigation impact score level 2	Deterioration between status classes	Impediments to GES/GEP	Compromises water body objectives	Effects on other waterbodies	Assists attainment of water body objectives
GB106038027910	Pymmes and Salmon Brooks - Deephams STW to Tottenham Locks	River	1	Level 2 assessment not required	Level 2 assessment not required	No	No	No	No	No
GB106038027950	Lea Navigation Enfield Lock to Tottenham Locks	River	1	Level 2 assessment not required	Level 2 assessment not required	No	No	No	No	No
GB106038077851	Lea Navigation (Fieldes Weir to Enfield Lock)	River	2	2	2	Possible	Possible	Possible	No	Possible
GB106038077852	Lee (Tottenham Locks to Bow Locks/Three Mills Locks)	River	1	Level 2 assessment not required	Level 2 assessment not required	No	No	No	No	No
GB530603911402	THAMES MIDDLE	TransitionalWater	2	2	2	No	Possible	No	No	No

4 Future framework and tool development

This initial scoping work has allowed the development of a simple framework and associated spreadsheet tool which may be used to assess the potential impact on WFD deterioration in surface water and transitional water which may be caused by the implementation of the proposed SROs. Future work should focus on further development and refinement of the framework and tool, as detailed below.

4.1 Areas for improvement

The current framework and tool is only designed for assessing surface and transitional waterbodies. Additional options and background data are required to suite the assessment of groundwaters and coastal waters and further development of the tool could allow for this.

The current tool refines which WFD components are assessed depending on which activities are likely to be undertaken in the operation, construction and decommissioning of the SRO. This could be further improved by refining this to element level, as currently all elements within each component are screened in.

Currently the WFD baseline data, RNAG, PoMs etc presented in the SRO WFD framework tool are taken from RBMP 2 (2015). The RBMP3 are in the process of being updated and are due to be released at the end of 2021. When the RBMP3 is released, the WFD data utilised in the framework tool must be updated.

4.2 Data collection and visualisation tool development

The assessment tool currently runs in an excel spreadsheet. However, accompanying data must currently be collected and assembled from a variety of sources, including WFD status, NRFA flow data, EA water quality data and ecological data. As an alternative to the excel spreadsheet, a tool could be developed which allows for this data to be pulled in automatically using Application Programming Interfaces (APIs) for a selected area, and then visualised using interactive mapping.

Several options exist for this, but it is suggested that an R Shiny application would be most suitable. R Shiny apps can be run either online or locally, providing the user has installed R and RStudio (both freely available), and no coding knowledge is needed. Advanced interactive mapping and analyses can be easily incorporated, and apps are highly customisable. If required, this tool could also incorporate a predictive modelling feature, allowing water quality needs to be determined for waterbodies, based on selected downstream treatment options.

A. Review of WRMP and non-water company WFD assessments

As outlined in Section 3.1, a review of the approach to WFD assessments in WRMPs and non-water company projects was undertaken. The key findings of which are presented below.

The eight water companies that provided WFD methodology reports all employed either AECOM, Amec Foster Wheeler Environment & Infrastructure UK or Ricardo Energy & Environment to conduct their WFD compliance assessments (see Table A.1). The approaches taken by each of these companies are summarised briefly below.

Assessment by	Water Company
AECOM limited	Affinity Water
Amec Foster Wheeler Environment & Infrastructure UK Limited	Bristol Water
	United Utilities
	Anglian Water
Ricardo Energy & Environment	Severn Trent Water
	Southern Water
	Thames Water
	Yorkshire Water
Not received	South West Water
	Wessex Water

Table A.1: External companies used to conduct WFD compliance assessments

4.3 Overview of current approaches

4.3.1 AECOM

WFD compliance assessment uses a spreadsheet tool to assess the potential effects of the options on each WFD element at the waterbody scale.

The effects are assessed qualitatively at this stage, identifying those where surveying or a quantitative assessment may be needed in future to reach design stage. The strategic screening of options considers the likely impacts of construction and operation of the options that might result in a deterioration of the waterbody status or compromise the achievement of good ecological status.

4.3.2 Amec Foster Wheeler Environment & Infrastructure UK Limited

A five-stage process for WFD compliance assessments follows these steps:

1. Data collection

- Identify all water bodies that the option may affect, using the description of the option and the spatial extent of the WFD water bodies.
- Collect the baseline (2015) WFD data for each of these water bodies.

2. Level 1 Screening

- Break down each option into constituent parts for both the construction and operational phases.
- Consider the impacts of each of these constituent part activities on each waterbody, and assign a level based on predetermined levels for each activity. Impact levels are classed as: Minimal, Minor, Medium or High.
- If a water body may be subject to a medium or high risk for any activity, the waterbody is carried forward to level 2 screening.

3. Level 2 Screening

- Collect additional baseline data from the EAs Abstraction Licensing Strategies. These assign all surface and ground water units a resource availability as: water available, restricted water available, or water not available.
- Estimate the likely effects of new/changed abstractions and discharges on water availability.
- Break down each option into constituent parts for both the construction and operational phases.
- Consider the impacts of each of these constituent part activities on each waterbody and consider each activity separately against each WFD element (grouping where appropriate).
- Use available data where possible, otherwise assess likely impact using expert opinion. If uncertainty exists, use a worst-case scenario.
- Assign an impact level for each activity on each waterbody, based on the worst level for any activity. Impact levels are classed as: Minimal, Minor, Medium or High.
- Assign a confidence level to each assessment. Levels may be low confidence (very limited data, expert judgement), medium confidence (some data available, some expert judgement) of high confidence (good level of data, minimal expert judgement).

For preferred options only:

4. Cumulative assessment

- If two of more options are located in the same waterbody or operational catchment, assess for cumulative effects on WFD objectives.
- Assessed using expert knowledge.

5. Protected areas assessment

- If an option is located in a waterbody linked to a protected area, assess whether the option would impact on the protected area.

- Review habitats present in protected areas, include only protected areas where habitats may be water dependent: inland water bodies, bogs, marshes, water fringed vegetation and fens.
- Assess whether a hydrological pathway exists between protected area and option.
- Assess likely impacts of option, informed by expert judgement.

4.3.3 Ricardo Energy & Environment

A five-stage process for WFD compliance assessments follows these steps:

1. **WFD compliance assessment screening**:

- A preliminary assessment of each option
- Identifies whether there may be any risk of deterioration in WFD status
- This is based on expert judgement.
- Where a risk is identified, the option is subject to the WFD compliance assessment.

2. **WFD compliance assessment**:

- Assessment of the likely changes to hydro-morphology and water quality occurring as a result of the construction or operation of the option and the possible risks to WFD status.
- In addition, the potential effects on WFD protected areas are assessed.

3. **Option level WFD compliance assessment**:

- Summarising WFD compliance assessments of each of the options on the feasible list (from Steps 1 and 2).

4. **Preferred programme WFD compliance statement:**

- A statement of the compliance of the preferred programme against each of the WFD compliance objectives set out in the ‘WFD compliance objectives’ section below.
- Assessment of the set of options within the programme, both alone and in combination with other options within the programme.
- Used to identify where multiple options potentially impact on the same WFD waterbody, and potentially downstream water bodies where appropriate.

5. **In-combination assessment of the preferred programme with those of other water companies WRMP19.**

- An in-combination assessment will be included once other companies preferred programmes, and regulatory feedback are known.

4.4 WFD compliance assessments used on other projects

As well as considering the current WFD compliance assessments in use by the partner water companies, three additional frameworks have been reviewed and are summarised below for comparison.

4.4.1 HS2 High Speed 2

A two-part screening process is used, as follows:

1. **WFD compliance assessment screening**
    a. A preliminary assessment to identify any risk of deterioration in WFD status associated with specific asset types

    b. Likely affected WFD status elements for each scheme components identified on each watercourse within each waterbody. Review of watercourses which should be considered in each waterbody.

    c. Identify any relevant RNAG and PoM - high level scoping of potential effects of option in order to flag those measures potential at risk.

    d. Identification of HWB mitigation measures - high level scoping of potential effects of option in order to flag those measures potential at risk.

2. **WFD detailed assessment**
    a. Identification of effects of individual scheme components on the current status of each WFD quality elements

    b. Identification of cumulative effects from scheme components located in other water bodies

    c. Identification of "in combination" overall effect of all relevant scheme components on the current status of each WFD quality elements

    d. Identification of additional mitigation requirements and residual effects

    e. Identification of compliance outcome and any requirements for Article 4.7 assessment

4.4.2 National Grid

This assessment was developed by Wood Environment and Infrastructure Solutions and is broken down into five stages:

- Stage 1: Screening
- Stage 2: Scoping
  - To identify activities with potential to impact WFD elements. Waterbodies with no impact are scoped out at this stage
- Stage 3: Detailed assessment
  - Understand sources, pathways and receptors for each WFD waterbody type. Evaluate the effectiveness of existing control measures

If required:

- Stage 4: Identification and evaluation of measures
  - Details of mitigation measures that could lead to compliance.
- Stage 5: Article 4.7 considerations
  - Where compliance is not achievable through mitigation and no suitable alternatives are possible, Article 4.7 of the WFD should be invoked.

4.4.3 Marine Energy Test Area (META)

This assessment was developed by the RPS group, and is broken into three stages:

- Stage 1: Screening
  - Screening identifies which activities undertaken in the META do not need to go through the scoping or impact assessment stages
  - Low risk activities are excluded at this stage
- Stage 2: Scoping
  - This stage identifies the waterbodies or receptors that are potentially at risk from the activities, what the current WFD objectives are and therefore which need an impact assessment
- Stage 3: Impact assessment
  - Here potential impacts and mitigations are identified before presenting is the activity may cause deterioration or jeopardise achieving good status

B. Beckton Reuse Scheme

B.1 Level 2 detailed assessment of GB106038077851

Option	Beckton Reuse Scheme - Phase 3	Go to RNAG/PoM table at bottom of the page
Waterbody ID	GB106038077851	
Waterbody name	Lea Navigation (Fieldes Weir to Enfield Lock)	
Waterbody type	River	
Hydromorphological designation	heavily modified	Action: Obtain HMWB measures information from the Environment Agency to add to the RNAG/PoM table.
Overall status	Poor in 2016	
Overall status objective	Moderate by 2015	

Activity	New discharge/transfer to a watercourse or reservoir					New or increased surface water abstraction					New pipe lines involving watercourse crossings with no in channel modifications	
Construction, Operation or Decommissioning activity	Operation	Operation	Operation	Operation	Operation	Operation	Operation	Operation	Operation	Operation	Construction and operation	Construction and operation
Potential Impacts of asset (following consideration of embedded mitigation)	Changes to channel footprint	Changes in flow velocity and volume (increase or decrease)	Changes in sedimentation deposition	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Change in water quality due to new or changes to existing discharge of surface water into surface water body	Changes to channel footprint	Changes in flow velocity and volume (increase or decrease)	Changes in sedimentation deposition	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Change in water quality due to new or changes to existing discharge of surface water into surface water body	Changes in sedimentation deposition	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream
Biological Effects	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Hydromorphological supporting elements	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Physicochemical Effects	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✗	✗
Chemical effects	✔	✔	✔	✔	✔	✗	✗	✗	✗	✗	✗	✗

WFD status Component	WFD quality element	Method of checking compliance	Classification	Objective		Impact score	Data confidence	Design certainty	Deterioration between status classes (Does the component comply with WFD objectives)	Impediments to GES/GEP	Compromises water body objectives	Mitigation applied	Post mitigation impact score
Biological quality elements	Fish		Good in 2016	Good by 2015		2	Low	Low	Possible	Possible	Possible		2
	Invertebrates	Guidance document available	Good in 2016	Good by 2015		2	Low	Low	Possible	Possible	Possible		2
	Macrophytes and Phytobenthos Combined	Calculator available	Poor in 2016	Good by 2015		2	Low	Low	Possible	Possible	Possible		2
Hydromorphological Supporting Elements	Hydrological Regime		Does Not Support Good in 2016	Does Not Support Good by 2015		-1	Low	Low	No	No	No		-1
	Mitigation Measures Assessment		Moderate or less in 2016	Good by 2027			Low	Low					
Physico-chemical quality elements	Ammonia (Phys-Chem)		High in 2016	Good by 2015		1	Low	Low	Possible	Possible	Possible		1
	Biochemical Oxygen Demand (BOD)	Numerical limits for classes	High in 2014	No objective		1	Low	Low	Possible	Possible	Possible		1
	Dissolved oxygen	Numerical limits for classes	High in 2016	Good by 2015		1	Low	Low	Possible	Possible	Possible		1
	pH		High in 2016	Good by 2015		1	Low	Low	Possible	Possible	Possible		1
	Phosphate	Calculator available	Poor in 2016	Poor by 2015		1	Low	Low	Possible	Possible	Possible		1
	Temperature	Numerical limits for classes	High in 2016	Good by 2015		1	Low	Low	Possible	Possible	Possible		1
Priority hazardous substances	Benzo (b) and (k) fluoranthene	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Benzo (ghi) perelyene and indeno (123-cd) pyrene	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Benzo(a)pyrene	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Cadmium and Its Compounds	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Di(2-ethylhexyl)phthalate (Priority hazardous)	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Endosulfan	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Hexachlorobenzene	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Hexachlorobutadiene	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Hexachlorocyclohexane	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Mercury and Its Compounds	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Nonylphenol	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Tributyltin Compounds	EQS directive	Fail in 2016	Good by 2027		2	Low	Low	Possible	Possible	Possible		2
Priority substances	1,2-dichloroethane	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Atrazine	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Benzene	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Diuron	EQS directive	Fail in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Fluoranthene	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Lead and Its Compounds	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Napthalene	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Nickel and Its Compounds	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Pentachlorophenol	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Simazine	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Trichlorobenzenes	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Trichloromethane	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
Specific pollutants	2,4-dichlorophenol		High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Arsenic		High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Copper		High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Dimethoate	EQS directive	High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Iron		High in 2016	No objective		2	Low	Low	Possible	Possible	Possible		2
	Linuron		High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Mecoprop		High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Permethrin		High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Tetrachloroethylene		Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Toluene		High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Triclosan		High in 2016	High by 2015		2	Low	Low	Possible	Possible	Possible		2
	Zinc		High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
Other chemicals	1-1-1-trichloroethane	EQS directive	High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	1-1-2-trichloroethane	EQS directive	High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	2,4-dichlorophenoxyacetic acid	EQS directive	High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	2-chlorophenol	EQS directive	High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	4-chloro-3-methylphenol	EQS directive	High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Aldrin, Dieldrin, Endrin & Isodrin	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Bentazone	EQS directive	High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Biphenyl	EQS directive	High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Carbon Tetrachloride	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Chloronitrotoluenes CALC	EQS directive	High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	DDT Total	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Fenitrothion	EQS directive	High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Malathion	EQS directive	High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Trichloroethylene	EQS directive	Good in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2
	Xylene	EQS directive	High in 2014	No objective		2	Low	Low	Possible	Possible	Possible		2

WFD quality element	Comment of the impact of 'Changes to channel footprint' on each element	Comment of the impact of 'Changes in flow velocity and volume (increase or decrease)' on each element	Comment of the impact of 'Changes in sedimentation deposition' on each element	Comment of the impact of 'Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream' on each element	Comment of the impact of 'Change in water quality due to new or changes to existing discharge of surface water into surface water body' on each element	Comment of the impact of 'Changes to channel footprint' on each element	Comment of the impact of 'Changes in flow velocity and volume (increase or decrease)' on each element	Comment of the impact of 'Changes in sedimentation deposition' on each element	Comment of the impact of 'Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream' on each element	Comment of the impact of 'Change in water quality due to new or changes to existing discharge of surface water into surface water body' on each element	Comment of the impact of 'Changes in sedimentation deposition' on each element	Comment of the impact of 'Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream' on each element
Fish	Localised adverse effect anticipated when balanced against embedded mitigation. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	Major increases in flow can disrupt normal patterns of velocity and depth and impact upon resident biological elements such as macroinvertebrates, fish and macrophytes. In this case, where hydrological processes are already substantially altered and where the river is a designated HMWB, it is difficult to predict the potential impact of the major change in flow on the biology elements with a high degree of certainty. Further assessment is required to better understand the potential magnitude of the impact on these receptors particularly during times of low flow.	Increase in flow is likely to change the sedimentation deposition characteristics and hydromorphology in the watercourse downstream of the discharge. This may lead to the loss of some types of habitat which currently support to good status. Further investigation needed.		Possible reduction in water quality due to increased inflow of treated effulent could lead to a deterioration in status. Further investigation needed	Localised adverse effect anticipated when balanced against embedded mitigation. However, no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	The abstraction will result in a net no change in flow downstream. Therefore, negligible impact and no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	Although there will be no net change in flow downstream, increased flow upstream of the abstraction could lead to increase sedimentation deposition downstream of the abstraction location. This may lead to the loss of some types of habitat which currently support to good status. Further investigation needed.	The abstraction will result in a net no change in flow downstream. Therefore, negligible impact and no deterioration in status of quality element anticipated at the water body scale. Additional mitigation not required.	Possible reduction in water quality due to increased inflow of treated effulent could lead to a deterioration in status. Further investigation needed	Temporary short term changes in sedimentation may be possible during construction but as no permanent in channel modifications are expected no change in status class is expected. No additional mitigation needed.	Localised short term impacts on hydromorphology may be expected during construction but no long term changes in status class are expected.
Invertebrates												
Macrophytes and Phytobenthos Combined			Macrophyes and phytobentos are currently at Poor status due to pollution from waste water and are not likely to be significantly impacted by sedimentation deposition and hydromoprhology changes		Macrophyes and phytobentos are currently at Poor status due to pollution from waste water and the introduction of additional treated effulent could lead to further deterioration within class or between classes			Macrophyes and phytobentos are currently at Poor status due to pollution from waste water and are not likely to be significantly impacted by sedimentation deposition		Macrophyes and phytobentos are currently at Poor status due to pollution from waste water and the introduction of additional treated effulent could lead to further deterioration within class or between classes		
Hydrological Regime		Increase in flow, would lead to increases in velocity and depth which could help to provide hydrological support to a short section of the watercourse	N/A	N/A	N/A			N/A	N/A	N/A	N/A	N/A
Mitigation Measures Assessment												
Ammonia (Phys-Chem)	N/A	N/A	N/A	N/A	The discharge will be treated to tertiary standards for ammonia, phosphate and BOD. Therefore, there will be a low risk of impacting the physico-chemical quality elements of this water body. However, further analysis of the receiving water body quality and the impact of the discharge is recommended.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Biochemical Oxygen Demand (BOD)						N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dissolved oxygen						N/A	N/A	N/A	N/A	N/A	N/A	N/A
pH						N/A	N/A	N/A	N/A	N/A	N/A	N/A
Phosphate						N/A	N/A	N/A	N/A	N/A	N/A	N/A
Temperature						N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo (b) and (k) fluoranthene	N/A	N/A	N/A	N/A	Discharge of treated effulent could have an impact on the Priority hazardous substances in the receiving water body. Further analysis/modelling of water quality in discharge and effect in water quality in the waterbody is needed.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo (ghi) perelyene and indeno (123-cd) pyrene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(a)pyrene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium and Its Compounds	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Di(2-ethylhexyl)phthalate (Priority hazardous)	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Endosulfan	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hexachlorobenzene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hexachlorobutadiene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hexachlorocyclohexane	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mercury and Its Compounds	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nonylphenol	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tributyltin Compounds	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,2-dichloroethane	N/A	N/A	N/A	N/A	Discharge of treated effulent could have an impact on the Priority substances in the receiving water body. Further analysis/modelling of water quality in discharge and effect in water quality in the waterbody is needed.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Atrazine	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Diuron	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fluoranthene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lead and Its Compounds	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Napthalene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nickel and Its Compounds	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pentachlorophenol	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Simazine	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Trichlorobenzenes	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Trichloromethane	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
2,4-dichlorophenol	N/A	N/A	N/A	N/A	Discharge of treated effulent could have an impact on the specific pollutants in the receiving water body. Further analysis/modelling of water quality in discharge and effect in water quality in the waterbody is needed.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Copper	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dimethoate	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Iron	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Linuron	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mecoprop	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Permethrin	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tetrachloroethylene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Toluene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Triclosan	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
1-1-1-trichloroethane	N/A	N/A	N/A	N/A	Discharge of treated effulent could have an impact on the other chemicals in the receiving water body. Further analysis/modelling of water quality in discharge and effect in water quality in the waterbody is needed.	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1-1-2-trichloroethane	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
2,4-dichlorophenoxyacetic acid	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
2-chlorophenol	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
4-chloro-3-methylphenol	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aldrin, Dieldrin, Endrin & Isodrin	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bentazone	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Biphenyl	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Carbon Tetrachloride	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chloronitrotoluenes CALC	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
DDT Total	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fenitrothion	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Malathion	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Trichloroethylene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Xylene	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Note: Merge columns if activity appears multiple times

RNAG/PoM/HHWMM	Id	Relevant WFD Quality Element (RNAG) / Measure category 1 (PoM)	Category (RNAG)/Lead organisation (PoM)	National Swmi Header (RNAG) / Title (PoM)	Is this measure potential impacted by the scheme? (Yes/No)	Impact score assessment	Data confidence	Design certainty	Assists attainment of water body objectives (Does the component comply with WFD objectives)	Impediment to GES/GEP	Compromises water body objectives	Mitigation applied	Post mitigation impact score (-2 to 3)	New discharge/transfer to a watercourse or reservoir	New or increased surface water abstraction	New pipe lines involving watercourse crossings with no in channel modifications
Reasons for Not Achieving Good (RNAG)	496164	Phosphate	Urban and transport	Pollution from towns, cities and transport	No											
Reasons for Not Achieving Good (RNAG)	496161	Phosphate	Water Industry	Pollution from waste water	Yes	1	Low	Low	No	Possible	Possible		1	The discharge will be treated to tertiary standards for ammonia, phosphate and BOD. Therefore, there will be a low risk of impacting the physico-chemical quality elements of this water body. However, further analysis of the receiving water body quality and the impact of the discharge is recommended.		
Reasons for Not Achieving Good (RNAG)	496157	Phosphate	Water Industry	Pollution from waste water	Yes	1	Low	Low	No	Possible	Possible		1			
Reasons for Not Achieving Good (RNAG)	496177	Phosphate	Domestic General Public	Pollution from towns, cities and transport	No											
Reasons for Not Achieving Good (RNAG)	496114	Hydrological Regime	Water Industry	Changes to the natural flow and levels of water	Yes	2	Low	Low	No	Possible	Possible		2	Major increases in flow can disrupt normal patterns of velocity and depth and impact upon resident biological elements such as macroinvertebrates, fish and macrophytes. In this case, where hydrological processes are already substantially altered and where the river is a designated HMWB, it is difficult to predict the potential impact of the major change in flow on the biology elements with a high degree of certainty. Further assessment is required to better understand the potential magnitude of the impact on these receptors particularly during times of low flow.		
Reasons for Not Achieving Good (RNAG)	479351	Mitigation Measures Assessment	Local and Central Government	Physical modifications	No											
Reasons for Not Achieving Good (RNAG)	479350	Mitigation Measures Assessment	Recreation	Physical modifications	No											
Reasons for Not Achieving Good (RNAG)	496160	Macrophytes and Phytobenthos Combined	Water Industry	Pollution from waste water	Yes	2	Low	Low	No	Possible	Possible		2	The discharge will be treated to tertiary standards for ammonia, phosphate and BOD. However, there is the risk that additional waste water discharge could restrict the improvement of this water course. Further analysis of the receiving water body quality and the impact of the discharge is recommended.		
Reasons for Not Achieving Good (RNAG)	496156	Macrophytes and Phytobenthos Combined	Water Industry	Pollution from waste water	Yes	2	Low	Low	No	Possible	Possible		2			
Reasons for Not Achieving Good (RNAG)	496176	Macrophytes and Phytobenthos Combined	Domestic General Public	Pollution from towns, cities and transport	No											
Reasons for Not Achieving Good (RNAG)	496163	Macrophytes and Phytobenthos Combined	Urban and transport	Pollution from towns, cities and transport	No											
Reasons for Not Achieving Good (RNAG)	496187	Macrophytes and Phytobenthos Combined	Navigation	Physical modifications	No											
Reasons for Not Achieving Good (RNAG)	496188	Macrophytes and Phytobenthos Combined	No sector responsible	Non-native invasive species	No											
Reasons for Not Achieving Good (RNAG)	517560	Invertebrates	No sector responsible		No											
Reasons for Not Achieving Good (RNAG)	516649	Tributyltin Compounds	Navigation	Pollution from towns, cities and transport	No											
Reasons for Not Achieving Good (RNAG)	516676	Tributyltin Compounds	Urban and transport	Pollution from towns, cities and transport	No											

B.2 Level 2 detailed assessment of GB530603911402

Option	Beckton Reuse Scheme - Phase 3	Go to RNAG/PoM table at bottom of the page
Waterbody ID	GB530603911402	
Waterbody name	THAMES MIDDLE	
Waterbody type	TransitionalWater	
Hydromorphological designation	heavily modified	Action: Obtain HMWB measures information from the Environment Agency to add to the RNAG/PoM table.
Overall status	Moderate in 2016	
Overall status objective	Moderate by 2015	

Activity	Cessation of existing discharge to a watercourse				
Construction, Operation or Decommissioning activity	Decommissioning	Decommissioning	Decommissioning	Decommissioning	Decommissioning
Potential Impacts of asset (following consideration of embedded mitigation)	Changes to channel footprint	Changes in flow velocity and volume (increase or decrease)	Changes in sedimentation deposition	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Change in water quality due to new or changes to existing discharge of surface water into surface water body
Biological Effects	✔	✔	✔	✔	✔
Hydromorphological supporting elements	✔	✔	✔	✔	✔
Physicochemical Effects	✔	✔	✔	✔	✔
Chemical effects	✔	✔	✔	✔	✔

WFD status Component	WFD quality element	Method of checking compliance	Classification	Objective		Impact score	Data confidence	Design certainty	Does the component comply with WFD objectives: Deterioration between status classes	Impediments to GES/GEP	Compromises water body objectives	Mitigation applied	Post mitigation impact score
Biological quality elements	Angiosperms		Moderate in 2016	Moderate by 2015		2	Low	Low	Possible	Possible	No		2
	Fish		Good in 2016	Good by 2015		2	Low	Low	Possible	Possible	No		2
	Invertebrates	Guidance document available	Good in 2016	Good by 2015		2	Low	Low	Possible	Possible	No		2
	Macroalgae	Guidance document available	Good in 2016	Good by 2015		2	Low	Low	Possible	Possible	No		2
	Phytoplankton	Calculator available	Good in 2016	Good by 2015		2	Low	Low	Possible	Possible	No		2
Hydromorphological Supporting Elements	Hydrological Regime		Does Not Support Good in 2009	No objective		2	Low	Low	No	Possible	No		2
	Mitigation Measures Assessment		Moderate or less in 2016	Good by 2027									
Physico-chemical quality elements	Ammonia (Phys-Chem)		High in 2010	No objective		0	Low	Low	No	No	No		0
	Dissolved Inorganic Nitrogen		Moderate in 2016	Moderate by 2015		0	Low	Low	No	No	No		0
	Dissolved oxygen	Numerical limits for classes	Moderate in 2016	Good by 2027		0	Low	Low	No	No	No		0
Priority hazardous substances	Anthracene	EQS directive	Good in 2016	No objective		0	Low	Low	No	No	No		0
	Benzo (b) and (k) fluoranthene	EQS directive	Good in 2016	No objective		0	Low	Low	No	No	No		0
	Benzo (ghi) perelyene and indeno (123-cd) pyrene	EQS directive	Good in 2016	No objective		0	Low	Low	No	No	No		0
	Benzo(a)pyrene	EQS directive	Good in 2016	No objective		0	Low	Low	No	No	No		0
	Cadmium and Its Compounds	EQS directive	Good in 2016	Good by 2015		0	Low	Low	No	No	No		0
	Di(2-ethylhexyl)phthalate (Priority hazardous)	EQS directive	Good in 2016	No objective		0	Low	Low	No	No	No		0
	Endosulfan	EQS directive	Good in 2015	Good by 2015		0	Low	Low	No	No	No		0
	Hexachlorobenzene	EQS directive	Good in 2014	No objective		0	Low	Low	No	No	No		0
	Hexachlorobutadiene	EQS directive	Good in 2014	No objective		0	Low	Low	No	No	No		0
	Hexachlorocyclohexane	EQS directive	Good in 2015	Good by 2015		0	Low	Low	No	No	No		0
	Mercury and Its Compounds	EQS directive	Good in 2016	Good by 2015		0	Low	Low	No	No	No		0
	Nonylphenol	EQS directive	Good in 2016	Good by 2015		0	Low	Low	No	No	No		0
	Tributyltin Compounds	EQS directive	Fail in 2016	No objective		0	Low	Low	No	No	No		0
	Trifluralin (Priority hazardous)	EQS directive	Good in 2016	Good by 2015		0	Low	Low	No	No	No		0
Priority substances	1,2-dichloroethane	EQS directive	Good in 2016	Good by 2015		0	Low	Low	No	No	No		0
	Atrazine	EQS directive	Good in 2016	Good by 2015		0	Low	Low	No	No	No		0
	Benzene	EQS directive	Good in 2016	Good by 2015		0	Low	Low	No	No	No		0
	Chlorfenvinphos	EQS directive	Good in 2016	No objective		0	Low	Low	No	No	No		0
	Chlorpyrifos	EQS directive	Good in 2016	No objective		0	Low	Low	No	No	No		0
	Dichloromethane	EQS directive	Good in 2016	No objective		0	Low	Low	No	No	No		0
	Dichlorvos (Priority)	EQS directive	Fail in 2014	No objective		0	Low	Low	No	No	No		0
	Diuron	EQS directive	Good in 2016	No objective		0	Low	Low	No	No	No		0
	Fluoranthene	EQS directive	Good in 2016	No objective		0	Low	Low	No	No	No		0
	Isoproturon	EQS directive	Good in 2016	No objective		0	Low	Low	No	No	No		0
	Lead and Its Compounds	EQS directive	Good in 2016	Good by 2015		0	Low	Low	No	No	No		0
	Napthalene	EQS directive	Good in 2016	Good by 2015		0	Low	Low	No	No	No		0
	Nickel and Its Compounds	EQS directive	Good in 2016	Good by 2015		0	Low	Low	No	No	No		0
	Pentachlorophenol	EQS directive	Good in 2016	Good by 2015		0	Low	Low	No	No	No		0
	Simazine	EQS directive	Good in 2016	Good by 2015		0	Low	Low	No	No	No		0
	Trichlorobenzenes	EQS directive	Good in 2016	Good by 2015		0	Low	Low	No	No	No		0
	Trichloromethane	EQS directive	Good in 2016	Good by 2015		0	Low	Low	No	No	No		0
Specific pollutants	2,4-dichlorophenol		High in 2016	High by 2015		0	Low	Low	No	No	No		0
	Arsenic		High in 2016	High by 2015		0	Low	Low	No	No	No		0
	Copper		High in 2016	High by 2015		0	Low	Low	No	No	No		0
	Diazinon		High in 2016	No objective		0	Low	Low	No	No	No		0
	Dimethoate	EQS directive	High in 2016	High by 2015		0	Low	Low	No	No	No		0
	Iron		High in 2016	High by 2015		0	Low	Low	No	No	No		0
	Linuron		High in 2016	High by 2015		0	Low	Low	No	No	No		0
	Mecoprop		High in 2016	High by 2015		0	Low	Low	No	No	No		0
	Permethrin		High in 2015	High by 2015		0	Low	Low	No	No	No		0
	Phenol		High in 2016	No objective		0	Low	Low	No	No	No		0
	Tetrachloroethylene		Good in 2016	Good by 2015		0	Low	Low	No	No	No		0
	Toluene		High in 2016	High by 2015		0	Low	Low	No	No	No		0
	Triclosan		High in 2016	No objective		0	Low	Low	No	No	No		0
Other chemicals	Zinc		Moderate in 2016	High by 2027		0	Low	Low	No	No	No		0
	1-1-1-trichloroethane	EQS directive	High in 2014	No objective		0	Low	Low	No	No	No		0
	1-1-2-trichloroethane	EQS directive	High in 2014	No objective		0	Low	Low	No	No	No		0
	2,4-dichlorophenoxyacetic acid	EQS directive	High in 2016	High by 2015		0	Low	Low	No	No	No		0
	2-chlorophenol	EQS directive	High in 2014	No objective		0	Low	Low	No	No	No		0
	4-chloro-3-methylphenol	EQS directive	High in 2014	No objective		0	Low	Low	No	No	No		0
	Aldrin, Dieldrin, Endrin & Isodrin	EQS directive	Good in 2015	Good by 2015		0	Low	Low	No	No	No		0
	Bentazone	EQS directive	High in 2014	No objective		0	Low	Low	No	No	No		0
	Biphenyl	EQS directive	High in 2014	No objective		0	Low	Low	No	No	No		0
	Carbon Tetrachloride	EQS directive	Good in 2016	Good by 2015		0	Low	Low	No	No	No		0
	Chloronitrotoluenes CALC	EQS directive	High in 2014	No objective		0	Low	Low	No	No	No		0
	DDT Total	EQS directive	Good in 2016	Good by 2015		0	Low	Low	No	No	No		0
	Fenitrothion	EQS directive	High in 2014	No objective		0	Low	Low	No	No	No		0
	Malathion	EQS directive	High in 2014	No objective		0	Low	Low	No	No	No		0
	Trichloroethylene	EQS directive	Good in 2016	Good by 2015		0	Low	Low	No	No	No		0
	Xylene	EQS directive	High in 2014	No objective		0	Low	Low	No	No	No		0

WFD quality element	Comment of the impact of 'Changes to channel footprint' on each element	Comment of the impact of 'Changes in flow velocity and volume (increase or decrease)' on each element	Comment of the impact of 'Changes in sedimentation deposition' on each element	Comment of the impact of 'Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream' on each element	Comment of the impact of 'Change in water quality due to new or changes to existing discharge of surface water into surface water body' on each element
Angiosperms	No change in channel footprint in this case as only reduction in water quantity discharged not complete removal of discharge	Decrease in freshwater inflow of up to 300Ml/d during full operation. However, this is considered to be insufficient to impact on flow velocity in this part of the river which is heavily controlled by tidal influences. Unlikely to cause deterioration in status	Decrease in freshwater inflow of up to 300Ml/d during full operation. However, this is considered to be insufficient to impact on sedimentation in this part of the river which is heavily controlled by tidal influences. Unlikely to cause deterioration in status	Decrease in freshwater inflow of up to 300Ml/d during full operation. However, this is considered to be insufficient to impact on hydromorphology in this part of the river which is heavily controlled by tidal influences. Unlikely to cause deterioration in status	Reduction in volume of treated effulent from Beckton STW into the Middle Thames. Initial calculations suggest this could be a reduction of 15-20% in the total freshwater inputs to Middle Thames, which could see a notable change in the salinity regime. A prolonged period of salinity could result in changes to the community structure including fish and invertebrates. This could result in deterioration within WFD status.
Fish					
Invertebrates					
Macroalgae					
Phytoplankton					
Hydrological Regime		Reduction in volume of treated effulent from Beckton STW into the Middle Thames. Initial calculations suggest this could be a reduction of 15-20% in the total freshwater inputs to Middle Thames. This would further reduce the flow in the river which is already at its lowest status class.			N/A
Mitigation Measures Assessment					
Ammonia (Phys-Chem)		N/A	N/A	N/A	Reduction in ammonia and nitrogen likely as the quantity of discharge is reduced, although this is considered insufficient (due to dilution and dispersion) to change the current status. No risk of deterioration
Dissolved Inorganic Nitrogen		N/A	N/A	N/A	
Dissolved oxygen		N/A	N/A	N/A	Reduction in chemical loading should help to reduce oxygen demand on water and therefore potential help to support dissolved oxygen levels, however this is considered insufficient to improve the status class of this element due to dilution and dispersion.
Anthracene		N/A	N/A	N/A	Reduction in volume of treated effulent from Beckton would be accompanied by a reduction in the quantity of chemicals discharged. This is unlikely to changed to status class of these chemicals once diluted and dispersed. Therefore, no risk to WFD chemical status.
Benzo (b) and (k) fluoranthene		N/A	N/A	N/A	
Benzo (ghi) perelyene and indeno (123-cd) pyrene		N/A	N/A	N/A	
Benzo(a)pyrene		N/A	N/A	N/A	
Cadmium and Its Compounds		N/A	N/A	N/A	
Di(2-ethylhexyl)phthalate (Priority hazardous)		N/A	N/A	N/A	
Endosulfan		N/A	N/A	N/A	
Hexachlorobenzene		N/A	N/A	N/A	
Hexachlorobutadiene		N/A	N/A	N/A	
Hexachlorocyclohexane		N/A	N/A	N/A	
Mercury and Its Compounds		N/A	N/A	N/A	
Nonylphenol		N/A	N/A	N/A	
Tributyltin Compounds		N/A	N/A	N/A	
Trifluralin (Priority hazardous)		N/A	N/A	N/A	
1,2-dichloroethane		N/A	N/A	N/A	
Atrazine		N/A	N/A	N/A	
Benzene		N/A	N/A	N/A	
Chlorfenvinphos		N/A	N/A	N/A	
Chlorpyrifos		N/A	N/A	N/A	
Dichloromethane		N/A	N/A	N/A	
Dichlorvos (Priority)		N/A	N/A	N/A	
Diuron		N/A	N/A	N/A	
Fluoranthene		N/A	N/A	N/A	
Isoproturon		N/A	N/A	N/A	
Lead and Its Compounds		N/A	N/A	N/A	
Napthalene		N/A	N/A	N/A	
Nickel and Its Compounds		N/A	N/A	N/A	
Pentachlorophenol		N/A	N/A	N/A	
Simazine		N/A	N/A	N/A	
Trichlorobenzenes		N/A	N/A	N/A	
Trichloromethane		N/A	N/A	N/A	
2,4-dichlorophenol		N/A	N/A	N/A	
Arsenic		N/A	N/A	N/A	
Copper		N/A	N/A	N/A	
Diazinon		N/A	N/A	N/A	
Dimethoate		N/A	N/A	N/A	
Iron		N/A	N/A	N/A	
Linuron		N/A	N/A	N/A	
Mecoprop		N/A	N/A	N/A	
Permethrin		N/A	N/A	N/A	
Phenol		N/A	N/A	N/A	
Tetrachloroethylene		N/A	N/A	N/A	
Toluene		N/A	N/A	N/A	
Triclosan		N/A	N/A	N/A	
Zinc		N/A	N/A	N/A	
1-1-1-trichloroethane		N/A	N/A	N/A	
1-1-2-trichloroethane		N/A	N/A	N/A	
2,4-dichlorophenoxyacetic acid		N/A	N/A	N/A	
2-chlorophenol		N/A	N/A	N/A	
4-chloro-3-methylphenol		N/A	N/A	N/A	
Aldrin, Dieldrin, Endrin & Isodrin		N/A	N/A	N/A	
Bentazone		N/A	N/A	N/A	
Biphenyl		N/A	N/A	N/A	
Carbon Tetrachloride		N/A	N/A	N/A	
Chloronitrotoluenes CALC		N/A	N/A	N/A	
DDT Total		N/A	N/A	N/A	
Fenitrothion		N/A	N/A	N/A	
Malathion		N/A	N/A	N/A	
Trichloroethylene		N/A	N/A	N/A	
Xylene		N/A	N/A	N/A	

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Note: Merge columns if activity appears multiple times

RNAG/PoM/HHWMM	Id	Relevant WFD Quality Element (RNAG) / Measure category 1 (PoM)	Category (RNAG)/Lead organisation (PoM)	National Swmi Header (RNAG) / Title (PoM)	Is this measure potential impacted by the scheme? (Yes/No)	Impact score assessment	Data confidence	Design certainty	Does the component comply with WFD objectives: Assists attainment of water body objectives	Impediment to GES/GEP	Compromises water body objectives	Mitigation applied	Post mitigation impact score (-2 to 3)	Cessation of existing discharge to a watercourse
Reasons for Not Achieving Good (RNAG)	481366	Mitigation Measures Assessment	Local and Central Government	Physical modifications	Yes	0	Low	Low	No	No	No	none	0	No change to the physical modifications in the waterbody as this is a reduction in discharge not a complete removal
Reasons for Not Achieving Good (RNAG)	481367	Mitigation Measures Assessment	Local and Central Government	Physical modifications	Yes	0	Low	Low	No	No	No	none	0	No change to the physical modifications in the waterbody as this is a reduction in discharge not a complete removal
Reasons for Not Achieving Good (RNAG)	508599	Tributyltin Compounds	Industry	Pollution from towns, cities and transport	No									
Reasons for Not Achieving Good (RNAG)	529002	Phytoplankton	No sector responsible		No									
Reasons for Not Achieving Good (RNAG)	526798	Zinc	Sector under investigation		No									
Reasons for Not Achieving Good (RNAG)	518354	Angiosperms	Local and Central Government	Physical modifications	No									
Reasons for Not Achieving Good (RNAG)	508601	Tributyltin Compounds	Waste treatment and disposal	Pollution from towns, cities and transport	No									
Reasons for Not Achieving Good (RNAG)	508602	Tributyltin Compounds	Water Industry	Pollution from waste water	Yes	-1	Low	Low	Possible	No	No	none	-1	Reduction in chemical loading due to reduced discharge so may help to reduce this chemical loading
Reasons for Not Achieving Good (RNAG)	508591	Dissolved oxygen	Water Industry	Pollution from waste water	Yes	-1	Low	Low	Possible	No	No	none	-1	Reduction in chemical loading should help to reduce oxygen demand on water and therefore potential help to support dissolved oxygen levels
Reasons for Not Achieving Good (RNAG)	508592	Dissolved oxygen	Water Industry	Pollution from waste water	Yes	-1	Low	Low	Possible	No	No	none	-1	
Reasons for Not Achieving Good (RNAG)	508594	Tributyltin Compounds	Urban and transport	Pollution from towns, cities and transport	No									
Reasons for Not Achieving Good (RNAG)	508595	Tributyltin Compounds	Urban and transport	Pollution from towns, cities and transport	No									
Reasons for Not Achieving Good (RNAG)	508597	Tributyltin Compounds	Navigation	Pollution from towns, cities and transport	No									