



Ricardo  
Energy & Environment



# Water Framework Directive Assessment

Severn Trent

Final Water Resources Management Plan 2019

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Final Report for Severn Trent Water Ltd

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ED62813

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**Contact:**

Liz Baker  
Ricardo Energy & Environment  
Bright Building, Manchester Science Park,  
Pencroft Way, Manchester. M15 6GZ

e: [liz.baker@ricardo.com](mailto:liz.baker@ricardo.com)

Ricardo-AEA Ltd is certificated to ISO9001 and ISO14001

**Authors:**

Scarlat, Alexandra

**Approved By:**

John Sanders

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## Executive Summary

Water companies in England and Wales are required to produce a Water Resources Management Plan (WRMP) every five years. The Plan sets out how the company intends to maintain the balance between supply and demand for water over the long-term planning horizon in order to ensure security of supply in each of the water resource zones making up its supply area.

As part of the development of the Water Resources Management Plan 2019 (WRMP19), the Water Framework Directive (WFD) assessment considers the potential effects of alternative options and programmes on WFD objectives. The WFD assessment has been undertaken in parallel with the Strategic Environmental Assessment (SEA) and Habitats Regulations Assessment (HRA) to ensure an integrated approach to environmental assessment and has been used to inform the development of the final WRMP to ensure its overall compliance with relevant legislation and national water resource planning guidance.

Severn Trent Water (Severn Trent) has assessed the potential implications of its final WRMP19 on WFD objectives, both in isolation and in-combination.

### WFD Assessment Approach

The fundamental environmental objectives of the WFD are to attain good ecological status and prevent deterioration of the status of designated water bodies. These objectives are set down in Article 4 of the WFD. Any new development (as well as existing operations) must ensure that these WFD objectives are not compromised. A series of objectives based on Article 4 of the WFD have been developed for the WRMP19 WFD assessment when considering solutions, programmes or the Plan as a whole:

**Objective 1:** To prevent deterioration between status classes of any water body

**Objective 2:** To prevent the introduction of impediments to the attainment of Good WFD status or potential for the water body. It is noted that for some water bodies, it is accepted that achievement of Good status or potential is currently technically infeasible or disproportionately costly. Where this is the case, the test is applied to the currently agreed objectives for that water body rather than against Good status/potential.

**Objective 3:** To ensure that the planned programme of measures in the River Basin Management Plan (RBMP) to help attain the WFD objectives for the water body (or the environmental objectives in the 2015 RBMPs) are not compromised

**Objective 4:** To ensure the achievement of the WFD objectives in other water bodies within the same catchment are not permanently excluded or compromised

Two further objectives are to review and document if the solution assists the meeting of WFD objectives, which is over and above a test of WFD compliance of the component:

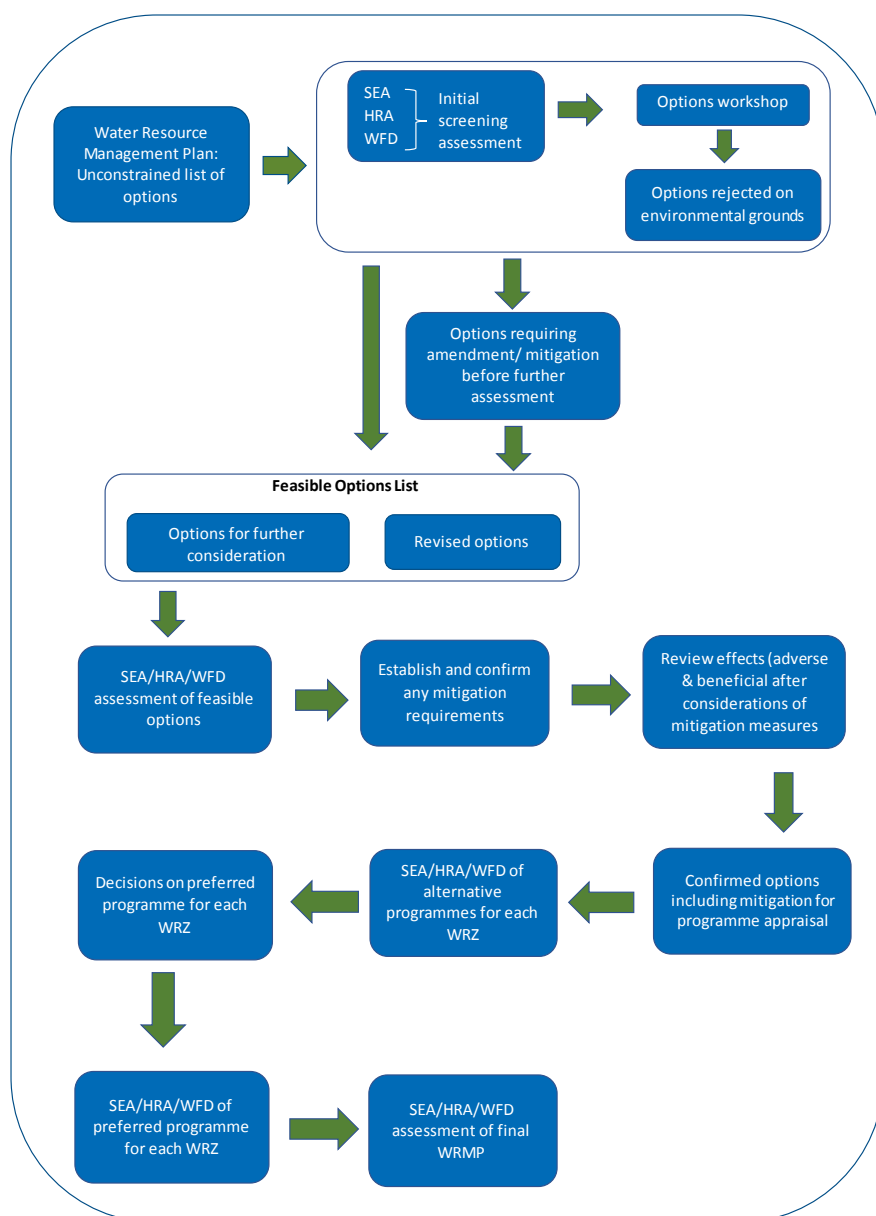
**Objective 5:** To assist the attainment of the WFD objectives for the water body

**Objective 6:** To assist the attainment of the objectives for associated WFD protected areas.

A sequential process for undertaking WFD assessments has been applied as follows:

- WFD compliance assessment screening of components
- WFD compliance assessment of feasible components
- Preferred programme WFD compliance statement
- In-combination assessment of the preferred programme with other projects, plans or programmes

The diagram below shows how the WFD assessment process has been integrated with the Strategic Environmental Assessment (SEA) and Habitats Regulations Assessment (HRA) process.



## WFD Screening

Two stages of WFD screening have been carried out for the WRMP19. Initially, a high-level screening process was carried out on the unconstrained list of options to rule out options with likely high risks of WFD status deterioration. A second stage of screening of the constrained list of components was then carried out, resulting in several options being rejected due to higher risks of WFD status deterioration. All of the remaining Feasible supply-side components were then subject to the full WFD compliance assessment process.

## WFD Compliance Assessment for Feasible Components List

A WFD compliance assessment for all Feasible components was carried out. The demand management components in the Final WRMP19 were screened out of further assessment as there is no risk of temporary or permanent deterioration in WFD status as a result of their implementation.

For the feasible supply-side components, the majority of the screened-out components involved transfers of treated water within the network, or abstractions from confined aquifers which were deemed as posing a negligible risk of deterioration to WFD water bodies. The remaining components were resource components including groundwater abstraction, surface water abstraction, reservoir capacity increase, wastewater reuse and desalination. These components were assessed in more detail for WFD compliance. The majority of the feasible components were assessed as being compliant with WFD

objectives, however, there were some uncertainties for a number of assessments as follows:

- Groundwater resources: uncertainties relating to the hydraulic connectivity between the groundwater sources and potential dependent rivers
- Reservoir capacity increase: uncertainties related to understanding the reservoir expansion strategy, lake bathymetry and the nature and sensitivity of the existing macrophytes population
- Wastewater reuse: uncertainties related to understanding the effluent quality to be transferred to the watercourses, the species assemblages in the affected river reaches.

### **WFD Compliance Assessment for Solutions Included in Final WRMP19 Preferred Programme**

The assessment has indicated that, with the exception the solutions included in the final WRMP19 preferred programme are compliant with WFD requirements. The assessment has indicated uncertainty as to the magnitude of effects on WFD water bodies for two of the solutions included in the final WRMP19 preferred programme, and therefore a risk of non-compliance with Objective 1 (risk of deterioration in status of the water body):

- The Ladyflatte groundwater abstraction solution assessment indicated potential for impacts on a surface water body. Further assessment of the hydrogeological connectivity between the groundwater source and dependant ecosystems is required in order to confirm the magnitude of any potential impact during operation which is likely to arise during most years once the component has been commissioned. Mitigation might include monitoring groundwater levels and river flow rates and reducing or stopping abstraction during times of low flow in the river.
- Thornton Reservoir abstraction solution assessments indicated potential for impacts on Rothley Brook. Further assessment is necessary in order to fully understand the magnitude of impact on the flow regime and ecology of Rothley Brook. Mitigation might include a bespoke Hands Off Flow condition, as well as increases in compensation flows, which are currently set to 1 MI/d.

Further investigations are required to confirm WFD compliance for these two solutions.

In addition, for Solution WIL05 (Site E WTW expansion and transfer main supported by raw water augmentation of the River Trent), the source of the raw water augmentation needs to be confirmed. However, based on the options under consideration and the scale of the flow augmentation, it is likely to be WFD compliant: the flow augmentation will be subject to environmental permitting which will include any necessary conditions to ensure WFD compliance. This provisional assessment conclusion will need to be confirmed once the source of the flow augmentation has been finalised.

### **Cumulative WFD Compliance Assessment**

The potential for cumulative effects between each solution within the Final WRMP19 preferred programme has also been assessed. Proposed solutions that have the potential to impact the same water bodies have been grouped and assessed.

Two water bodies were identified as potentially being at risk from cumulative operation of two or more solutions and requiring cumulative WFD compliance assessment:

- **Carsington Water**

The cumulative assessment concluded that there is a risk of adverse effects on the Carsington Water reservoir WFD heavily modified water body due to cumulative releases from the reservoir in periods of dry weather leading to lower water levels in the reservoir than historically. It should be noted that concurrent release for all four solutions would be rare and only temporary in nature. The releases will not be made on a continuous basis throughout the year and will only be required in periods of prolonged dry weather. The total volume of water released will remain within exiting abstraction licence limits for Carsington Water. Although this could lead to a risk of impacting ecological receptors, principally macrophytes, it is considered that such effects can be mitigated to prevent WFD deterioration to the ecological potential of the heavily modified water body, taking account of the water supply purpose of the water body and the absence of any designated or protected species. Further investigations will be carried out as part of the detailed design of the schemes that may affect water levels in Carsington Water, including modelling to assess the change in reservoir levels, surveys of the marginal vegetation relative to the modelled revised water level pattern, and consideration of the mitigation measures to



protect adverse effects on macrophytes and other marginal habitats. Mitigation measures could include the creation of refuge areas within the reservoir that will continue to hold water when the water levels fall below pre-determined level and the use of floating islands or rafts. Severn Trent will discuss the findings of the further investigations with the Environment Agency and agree any necessary mitigation measures prior to implementation of the full programme of solutions that will increase the use of Carsington Water. Should the investigations and consideration of mitigation measures indicate that WFD compliance cannot be achieved, Severn Trent will review the alternative options available to reduce the scale of river flow support from Carsington Water, drawing on other feasible components that have been shown to be WFD compliant and which can be implemented to address the forecast supply deficit in the water resource zone.

- **Derwent from Amber to Bottle Brook**

The WFD cumulative effects assessment concluded that there would be a low risk of adverse impact on the flow regime and ecology of the Derwent from Amber to Bottle Brook and a negligible risk of deterioration of the potential of this heavily modified water body. The cumulative impacts are mitigated by the existing abstraction licence hands-off flow conditions for abstraction from the Derwent at Ambergate such that there will be no WFD deterioration to the heavily modified water body potential. Increased releases from Carsington Water to the same water body from concurrent operation of several solutions at times of low flow conditions will not lead to any WFD deterioration to the heavily modified water body potential.

Whilst the final solution for the source of the flow augmentation of the River Trent component of Solution WIL05 has not been confirmed, it is considered unlikely (based on the options under consideration) that there would be any cumulative effects of the flow augmentation with any other solution within the final WRMP19. This assessment will need to be updated once the source of the augmentation water has been finalised.

Assessment of the potential cumulative effects with water resources management options proposed in neighbouring water companies' draft or revised draft WRMP19s (as available at March 2019) was undertaken and no cumulative impacts on WFD waterbodies were identified.

### **Final WRMP19 WFD Compliance**

The vast majority of the solutions included in Severn Trent's Final WRMP19 preferred programme, have demonstrated compliance with WFD objectives and statutory requirements. There are two proposed solutions where further investigations are required to confirm WFD compliance: the Ladyflatte groundwater abstraction solution and the Thornton Reservoir abstraction solution. These investigations will be carried out, and the findings discussed with the Environment Agency, before any applications for abstraction licences or environmental permits are sought for these solutions. Should the investigations determine that WFD compliance cannot be secured, even after development of mitigation measures, there are sufficient WFD compliant alternative solutions available to address the forecast supply deficit.

The provisional assessment of the WIL05 solution flow augmentation component indicates no WFD compliance risks are likely from the options under consideration once mitigation measures have been considered (if necessary). The flow augmentation will be subject to environmental permitting which will include any necessary conditions to ensure WFD compliance. This provisional assessment will need to be confirmed once the source of the flow augmentation has been finalised.

The cumulative effects of several components relying on flow releases from Carsington Water require further investigation in relation to potential impacts on marginal vegetation from increased water level drawdown during prolonged dry weather. Should the investigations determine that WFD compliance cannot be secured, even after development of mitigation measures, there are sufficient WFD compliant alternative solutions available to address the forecast supply deficit.

Potential risks of cumulative adverse effects between other water companies draft or revised draft WRMP19s (as available at February 2019) have been investigated and no such impacts have been identified. No cumulative effects with any other plans or projects have been identified.

# 1 Introduction

## 1.1 Background and Purpose of Water Framework Directive (WFD) Assessment

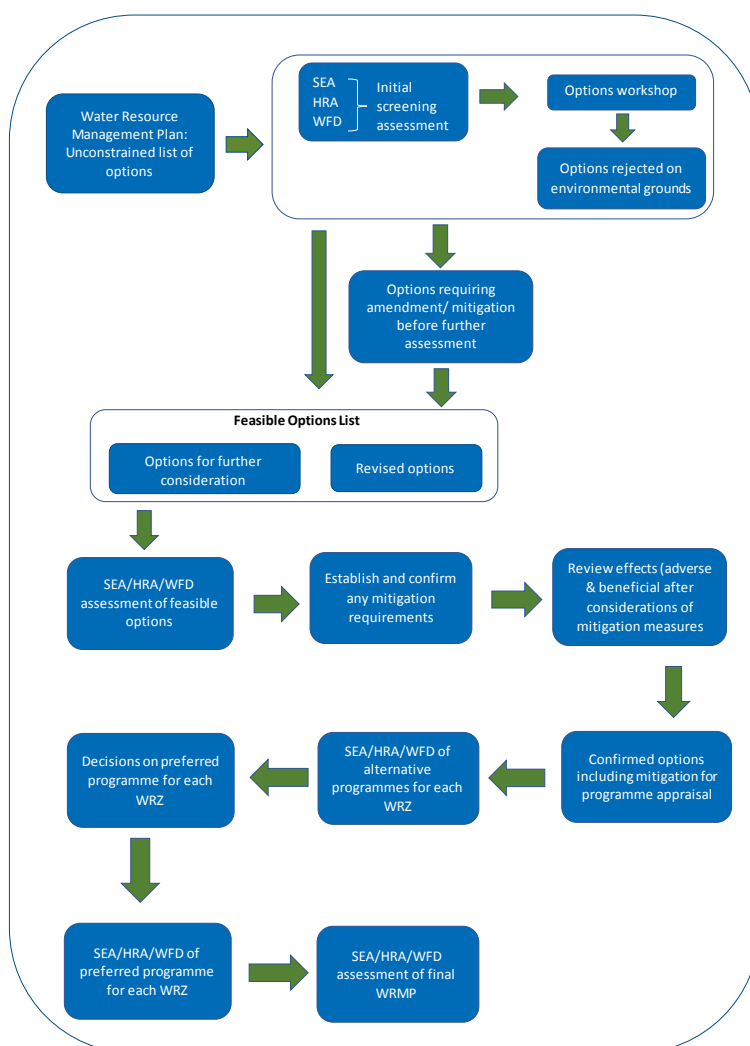
Severn Trent Water Limited (Severn Trent) has undertaken a Water Framework Directive (WFD) assessment to inform the development its Water Resources Management Plan 2019 (WRMP19).

Water companies in England and Wales are required to produce a Water Resources Management Plan (WRMP) every five years. The Plan sets out how the company intends to maintain the balance between supply and demand for water over the long-term planning horizon in order to ensure security of supply in each of the water resource zones making up its supply area.

As part of the development of the Water Resources Management Plan 2019 (WRMP19), the Water Framework Directive (WFD) assessment considers the potential effects of alternative options (or components) on WFD objectives.

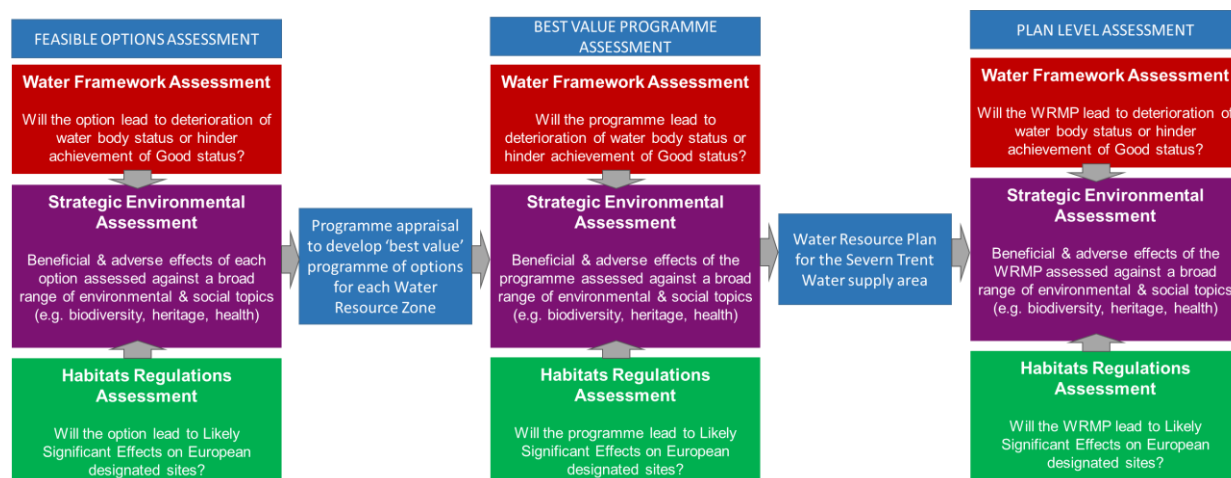
The WFD assessment has been undertaken in parallel with the Strategic Environmental Assessment (SEA) and Habitats Regulations Assessment (HRA) to ensure an integrated approach to environmental assessment and has been used to inform the development of the WRMP to ensure its overall compliance with relevant legislation. **Figures 1.1** and **1.2** show the overall process for integrating WFD assessment into the development of the WRMP.

**Figure 1.1 Integration of the WFD assessment into the Water Resource Management Plan process**





**Figure 1.2 Integration of the WFD assessment into the development of the Water Resource Management Plan.**



This document outlines the approach adopted and reports the findings from the WFD compliance assessment of WRMP components and the solutions included in the WRMP preferred programmes. The assessment involves the consideration of the likely impacts of both construction and operation of each WRMP component and solution on Water Framework Directive requirements alone and in combination with other components, programmes and plans. In particular, consideration has been given in the assessments as to whether there is a risk of deterioration in water body status between the status classes of any given WFD element. The assessment methodology was issued for consultation to the Environment Agency and wider stakeholders in 2016.

## 1.2 WFD Requirements for Water Resource Management Plan

The requirements for a WFD compliance assessment of a water company WRMP are explained in the Water Resources Planning Guideline (Box 1).

### Box 1: WRP 2018

#### Water Framework Directive Assessment of a WRMP (Section 6.11 Water Framework Directive)

*"You must take account of the **requirements of the WFD**, including the legally binding **environmental objectives in the river basin management plans**, when considering your proposed solution(s). You should consider solutions that promote the requirements of Article 7 of WFD (that seeks, as a minimum, to **prevent deterioration of water with the aim of reducing the treatment needed to produce drinking water**) and look to work in partnership with others. You should review solutions that have been identified in RBMP and this may require partnership working with others in the catchment to achieve the solution.*

*You should confirm that there is **no risk of deterioration from a potential new abstraction or from increased abstraction** at an existing source before you consider it as a **feasible option**. In addition, you should ensure that **any options do not prevent the achievement of good status (or potential)**. You should talk to the Environment Agency or Natural Resources Wales about any intended actions that may cause deterioration of status (or potential) or prevent the achievement of the water body status objectives in the river basin management plans or for new modifications the achievement of good status (or potential). You should do this as soon as possible before developing your plan and you should make a clear statement in your plan about any potential impacts.*

*Your plans should include targeted and cost-effective **implementation of restoration measures required at the catchment scale**, either working solely or in partnership with other catchment-based organisations. Given the uncertainty over the level of confidence you should consider the principles of adaptive management, with associated pre and post project monitoring.”*

These WRPG requirements reflect Defra's Guiding Principles for Water Resources Planning<sup>1</sup> (May 2016) which state that companies should take account of the government's objectives for the environment “including the appropriate parts of the EU Water Framework Directive”. Defra also expects that companies will:

- Have regard to River Basin Management Plans (RBMPs) and their objectives when making decisions that could affect the condition of the water environment
- Ensure that current abstractions and operations, as well as future plans support the achievement of environmental objectives and measures set out in RBMPs.
- Ensure plans:
  - prevent deterioration in water body status;
  - support the achievement of protected area and species objectives;
  - support the achievement of water body status objectives.
- Continue working with the Environment Agency to take a proportionate and evidence-based approach to identify the changes needed to current abstraction licences to meet environmental requirements.

Both the WRPG and the Defra Guiding Principles refer to ensuring ‘no deterioration’ of water body status. The European Court of Justice (ECJ) ruling<sup>2</sup> in 2015 clarified that ‘no deterioration’ in relation to the WFD means a deterioration between a whole ‘status class’ (e.g. ‘good’, ‘moderate’, etc.) of one or more of the relevant ‘quality elements’ (e.g. biological, physico-chemical, etc.). This definition applies equally to Artificial Water Bodies (AWB) and Heavily Modified Water Bodies (HMWB) in respect of the relevant quality elements that relate to the defined uses of these water bodies. The ECJ ruling further states that if the quality element concerned is already in the lowest class, any deterioration of that element constitutes a deterioration of the status.

References to ‘no deterioration’ in this WFD assessment align to this ECJ ruling.

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<sup>1</sup> Defra (2016) Guiding Principles for Water Resources Planning. May 2016.

<sup>2</sup> ECJ Case C-461/13: Bund für Umwelt und Naturschutz Deutschland v Bundesrepublik Deutschland  
<http://curia.europa.eu/juris/document/document.jsf?docid=178918&mode=req&pageIndex=1&dir=&occ=first&part=1&text=&doclang=EN-&cid=175124> [accessed 30.6.16]

## 2 WFD Assessment Approach

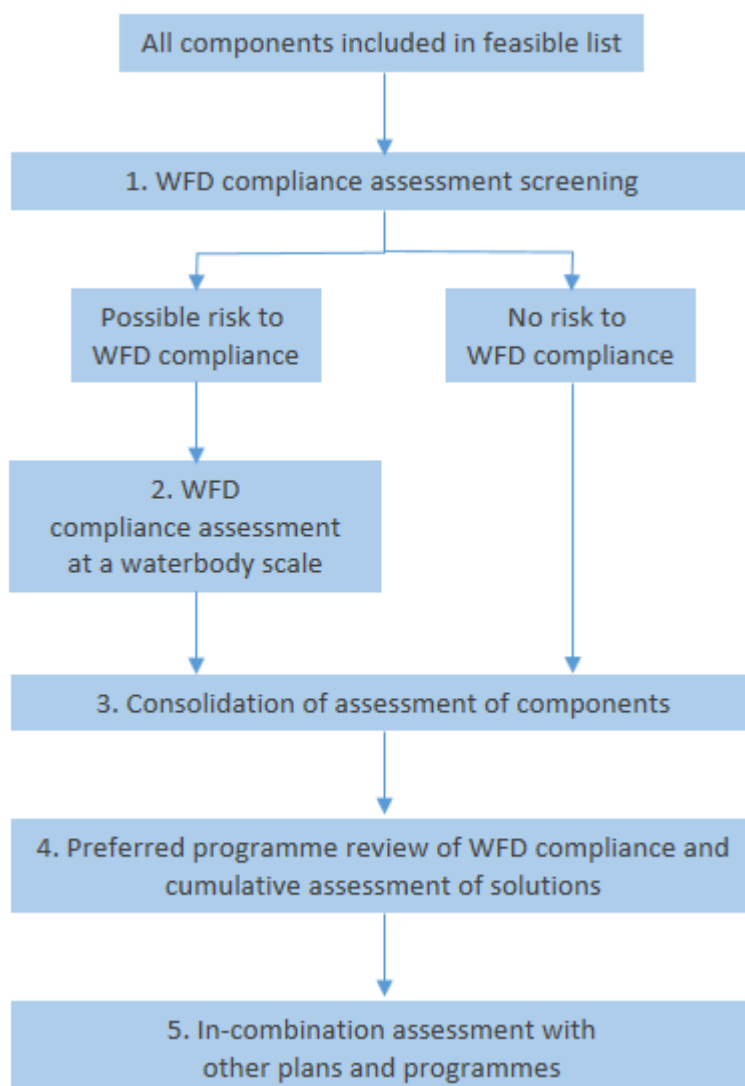
### 2.1 Methodology

#### 2.1.1 Sequential process

The WFD component assessment findings were actively used by Severn Trent in determining the 'best value' programme of solutions for each water resource zone. Where solutions (comprising one or more components) were selected for inclusion in the preferred programme strategy for each water resource zone following programme appraisal modelling, a further review was carried out of each solution, both alone and in combination with any other solutions, to ensure that the strategy was compliant with key WFD objectives. Cumulative, in-combination assessment of the preferred programmes and the WRMP as a whole with other programmes and plans was also carried out.

A sequential 5-stage process for undertaking WFD compliance assessments has been applied as follows in line with the methodology published by Severn Trent in 2016, as illustrated in Figure 2.1. The 5 stages are numbered in **Figure 2.1** and outlined below.

**Figure 2.1** WRMP WFD compliance assessment steps



A sequential 5-stage process for undertaking WFD compliance assessments has been applied as follows in line with the methodology published by Severn Trent in 2016:

- Preliminary screening of options: involves a preliminary assessment of each component and identifies whether there may be any risk of deterioration in WFD status. This is based on expert judgement. Where a risk is identified, the component is subject to the WFD compliance assessment. **Appendix A** reports on the components which were screened out of WFD compliance assessment.
- WFD compliance assessment: This involves assessment of the likely changes to hydro-morphology and water quality occurring as a result of the construction or operation of the component and the possible risks to WFD status. In addition, the potential effects on WFD protected areas are assessed. This step of the assessment was carried out for options both within and outside of the preferred programme.
- WFD compliance assessment summary: This involves summarising WFD compliance assessments of each of the components on the feasible list (from Steps 1 and 2). This step of the assessment is reported in **Appendix B** and summarised in Section 3.
- Preferred programme WFD compliance statement. This involves a statement of the compliance of the preferred programme against each of the WFD compliance objectives set out in Section 2.1.2 below. This is based on the assessment of solutions within the preferred programme, both alone and in combination with other solutions within the preferred programme. The assessment is also used to identify where multiple solutions potentially impact on the same WFD water body, and potentially downstream water bodies where appropriate. This step of the assessment is reported in Section 4.
- In-combination assessment of the preferred programme with those of other water companies WRMP19s and other plans and programmes. This step of the assessment is reported in Section 5.

It is noted that solutions promoted through the WRMP may interact with options included within the Severn Trent Drought Plan, with potential changes to the effectiveness of the drought management measure or the environmental impact. This may inform the selection of components within the preferred programme of the WRMP. Where there are potential changes to the Drought Plan, these would be updated as part of the cycle of Drought Plan updates at the time that the WRMP component is implemented, either by changing the suite of drought management measures or changing the environmental baseline for assessing the environmental effects of the drought management measure.

### 2.1.2 WFD Compliance Objectives

Fundamental environmental objectives of the WFD are to attain good ecological status and prevent deterioration of the status of water bodies. These objectives are set down in Article 4 of the WFD. Any new development (as well as existing operations) must ensure that these WFD objectives are not compromised. Article 4 on environmental objectives has been interpreted and further developed in EA (2016)<sup>3</sup>, Defra/EA (2009)<sup>4</sup>, DoE NI (2012)<sup>5</sup> and WRP (2016) to give a series of objectives to test in the WFD assessment. Based on these, the following are set out as objectives to test for in the WFD compliance assessment.

**Objective 1:** To prevent deterioration between status classes of any water body

**Objective 2:** To prevent the introduction of impediments to the attainment of Good WFD status or potential for the water body. It is noted that for some water bodies, it is accepted that achievement of Good status or potential is currently technically infeasible or disproportionately costly. Where this is the case, the test is applied to the currently agreed objectives for that

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<sup>3</sup> EA (2016) Protecting and improving the water environment – Water Framework Directive compliance of physical works in rivers. Doc No. 488\_10.

<sup>4</sup> Defra/EA (2009) WFD Expert Assessment of Flood Management Impacts. Joint Defra/ EA Flood and Coastal Erosion Risk Management R&D Programme. R&D Technical Report FD2609/TR. Report prepared by Royal Haskoning.

<sup>5</sup> Department of the Environment Northern Ireland (2012) Carrying Out a Water Framework Directive (WFD) Assessment on EIA Developments. A Water Management Unit Guidance Note. March 2012

water body rather than against Good status/potential.

**Objective 3:** To ensure that the planned programme of measures in the RBMP to help attain the WFD objectives for the water body (or the environmental objectives in the 2015 RBMPs) are not compromised

**Objective 4:** To ensure the achievement of the WFD objectives in other water bodies within the same catchment are not permanently excluded or compromised

Two further objectives are to review and document if the component assists the meeting of WFD objectives, which is over and above a test of WFD compliance of the component:

**Objective 5:** To assist the attainment of the WFD objectives for the water body

**Objective 6:** To assist the attainment of the objectives for associated WFD protected areas.

Objective 5 has been added to indicate whether the component actually assists with attaining WFD water body objectives, acknowledging that no water resource component is under any obligation to do so. Objective 6 has been added based on the specific requirement of the WRP. A “negative” answer to testing of Objectives 5 or 6 does not indicate that the component has an adverse WFD compliance assessment but does inform the assessment of that component relative to other component.

## 2.2 Supporting Information and Data Used

Information on the design, construction and operation of the component was obtained from the relevant conceptual design proformas. The WFD status and water body information has been obtained from the Environment Agency (2016)<sup>6</sup> online Catchment Data Explorer for RBMP2 for the year 2015. Water body protected areas linkages were also obtained from the Environment Agency’s online Catchment Data Explorer, these include:

- Bathing Water Directive: Bathing waters
- Drinking Water Directive: Drinking water protected area
- Conservation of Wild Birds Directive: water dependent Special Protection Areas (SPAs)
- Habitats Directive: water dependent Special area of Conservations (SACs)
- Shellfish Waters<sup>7</sup>
- Nitrates Directive: Nitrate Vulnerable Zones
- Urban Waste Water Treatment Directive: Nutrient sensitive area or eutrophication sensitive area

## 2.3 Consultation

Consultation on the Severn Trent WRMP19 was conducted with key stakeholders including the Environment Agency (EA), Natural England (NE) and Natural Resources Wales (NRW). The process started in December 2016 with a workshop focused on revising the WRMP14 screening criteria for WRMP19 and identifying potential options that may have major adverse effects (only one identified and screened out). In December 2016, a further workshop with the EA and NRW was arranged to discuss progress to date and any further investigations needed to inform the screening process. In January 2017, the constrained list of options and supporting assumptions was issued to the EA and another workshop was held to perform gap-analysis in order to ensure our list of feasible options encompassed strategic solutions that addressed the EA’s sustainability reductions targets and WINEP strategy. Fifteen more options were screened out in this process. This workshop was followed by a series of meetings to update any 3<sup>rd</sup> parties involved and sought to fulfil queries from the EA, leading to a further 10 options being excluded from the feasible list. The EA teams involved in the consultation process

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<sup>6</sup>Environment Agency (2016) WFD Status for RBMP2 for the year 2015. Available from <http://environment.data.gov.uk/catchment-planning/>. New version released 31/03/2016. Accessed 07/10/2016.

<sup>7</sup> The Shellfish Directive 2006/113/EC was repealed by the Water Framework Directive 2000/60/EC in 2013. The shellfish waters protected areas are waters designated by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. The aim is to protect and improve water quality, to support the growth of healthy shellfish (bivalve and gastropod molluscs) and contribute to good quality edible shellfish.

have provided feedback on the screening and scoping process throughout the spring (2017) and this has informed the scope and design (i.e. licence considerations, INNS, no deterioration goals, fish migration, etc) of the feasible components. The draft WRMP19 was published on 1<sup>st</sup> December 2017 and representations received from statutory and non-statutory stakeholders have been taken into account in developing the final WRMP19.



### 3 Summary of WFD Compliance Assessment of Components on the Feasible List

This section presents a summary of the WFD compliance assessment for all components included in the feasible list. It is a summary of methodological Steps 1 and 2. The summary includes those components screened out as presenting no risk of deterioration in WFD status and no risk to achieving WFD objectives (as identified in **Appendix A**), together with results of the assessment of those components passed forward to Step 2. **Appendix B** summarises the key findings of the WFD assessments for those components screened in for assessment.

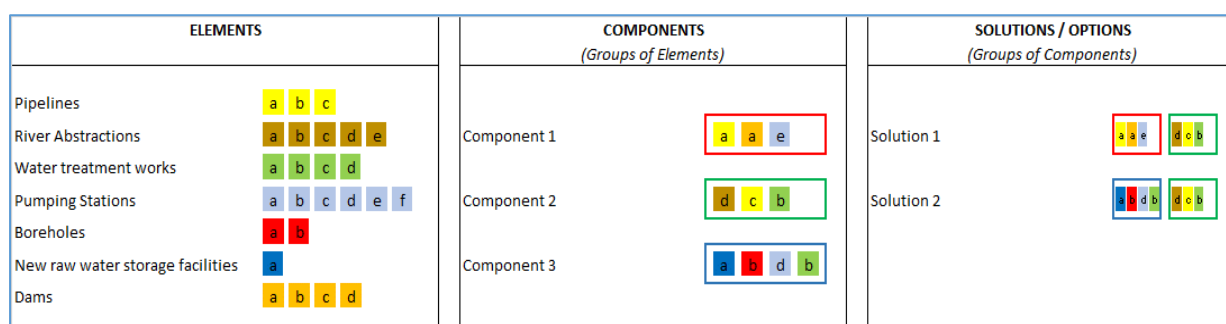
All of the demand management components were screened out for full WFD compliance assessment as they were assessed as having no adverse effects on WFD objectives and potentially having beneficial effects on WFD objectives by reducing the growth in demand for water (**Appendix A**).

#### 3.1 Screening of Options

Severn Trent initially considered WFD (and SEA and HRA) principles in moving from the 'constrained' list of options to development of its Feasible List of options. Through this process, options which were found to have unacceptable adverse effects were rejected from the 'pool' of potential options and did not reach the feasible list of options that were then subject to SEA.

From the feasible list, options were selected to create options to the forecast supply deficit. Each option could comprise one or more separate components which in turn comprise a range of individual elements (**Figure 3.1**).

**Figure 3.1 Options Development Approach for WRMP19**



WFD assessments for each component listed for all feasible options were carried out in detail for Final WRMP19 (**Table 3.2**). The below 'look up' table also provide information on how each feasible option is comprising one or more separate components for the Final WRMP19.

**Table 3.1 Loop-Up Table for List of Feasible Options for Final WRMP19**

Option Reference	Component References	Option Name	Supply-Demand Benefit (Ml/d)
<b>Demand-side Options</b>			
<b>WE003A</b>		Enhanced Household Water Efficiency Audit	0.15
<b>WE003B</b>		Enhanced Household Water Efficiency Audit	0.30
<b>WE004A</b>		Enhanced Social Housing Water Efficiency Audit	0.08
<b>WE004B</b>		Enhanced Social Housing Water Efficiency Audit	0.21

Option Reference	Component References	Option Name	Supply-Demand Benefit (Ml/d)
<b>WE005</b>		Leakage Reduction (50% reduction)	211.7
<b>WE006</b>		Increased Metering	29.9
<b>Supply-side options</b>			
<b>BAM01</b>	4	Site R WTW to Ambergate pipeline capacity increase	7.5
<b>BHS10</b>	71	Elmhurst BH asset enhancements and transfer to Site L WTW	2
<b>UNK01</b>	58	New WTW on the River Weaver near Nantwich	20
<b>BHS02</b>	159	Waverly Road BHs asset and water treatment enhancements	2
<b>GRD10</b>	108	North Staffs WRZ to Stafford WRZ transfer solution	7
<b>BHS09</b>	22	Elmhurst BH asset and water treatment enhancements	2
<b>RAW07</b>	101	Potable water import to Kinsall WRZ at Whittington	1
<b>GRD11</b>	110	Site U WTW to North Staffs WRZ transfer solution	15
<b>MEL39</b>	64 99G	BH raw water transfer to Site Q WTW with WTW enhancements	5
<b>RIV01</b>	81	Potable water import to Chesterfield	20
<b>UNK03</b>	88	Support Site L WTW from the River Weaver	20
<b>WTW29</b>	44 308	New WTW on the River Trent near Stafford, Staffordshire	22.5
<b>WTW28</b>	45Z	New WTW on the River Trent near Stoke Bardolph, Nottinghamshire	30
<b>WTW08</b>	50	New WTW on the River Severn near Ombersley, Shropshire	15
<b>WIL05</b>	7A 14B	Site E WTW expansion and transfer main supported by raw water augmentation of the River Trent	35
<b>WTW16</b>	53	New WTW on the River Severn near Buildwas, Shropshire	15
<b>LIN01</b>	142	New source and treatment at Linacre reservoir	5
<b>MEL29</b>	61B 99G	River Trent support to Site Q WTW with WTW enhancements	26
<b>BHS12</b>	30	New GW source in the Hopton GWMU	3.5
<b>GRD19</b>	16	DVA to Nottingham transfer pipeline capacity increase	15
<b>RAW08</b>	25A	Site C WTW output increase using additional and supported abstractions from the River Avon	10

Option Reference	Component References	Option Name	Supply-Demand Benefit (Ml/d)
<b>BHS11</b>	27	Haseley Spring source asset and WTW enhancement	2
<b>LIT01</b>	32	Site F WTW expansion	10
<b>DAM01</b>	84A	Stanford Reservoir capacity increase (Size A)	2.5
<b>BHS13</b>	112A	Croxtton BH output increase and transfer to distribution system	2.5
<b>MEL23</b>	61 99G	River Trent to Site Q WTW transfer with WTW enhancements	15
<b>UNK06</b>	152	Maximise outputs from shared South Staffordshire Asset	30
<b>BHS01</b>	158	Watery Lane BHs asset and water treatment enhancements	3
<b>BHS04</b>	163	Swynnerton BHs asset and water treatment enhancements	7
<b>DOR07</b>	99G	Site Q WTW enhancements	0
<b>GRD09</b>	105	Shelton WRZ to Ruyton WRZ transfer solution	1
<b>GRD12</b>	111	Site Q WTW to North Staffs WRZ transfer solution	7
<b>MEL37</b>	138 99G	Raw water augmentation of Staunton Harold Reservoir with Site Q WTW enhancements	5
<b>WTW01</b>	7A 150	New WTW on the River Trent near Little Haywood supported by raw water augmentation of the River Trent	13
<b>BHS05</b>	166	Broomleys BHs asset and water treatment enhancements	1.1
<b>CRO06</b>	54	River Soar to support Site B WTW	17
<b>DOR02</b>	99B	Site I WTW enhancements	2
<b>DOR05</b>	99E	Site C WTW enhancements	8
<b>GRD07</b>	103	Shelton WRZ to Mardy WRZ transfer solution adapting existing assets (Solution 2)	1
<b>GRD08</b>	104	Nottingham WRZ to Newark WRZ transfer solution	5
<b>CRO04</b>	134A	Blackbrook Reservoir to support Site B WTW	12
<b>CRO05</b>	135	Thornton Reservoir to support Site B WTW	8
<b>DAM05</b>	123A	Tittesworth Reservoir capacity increase (Size A)	5
<b>WTW07</b>	190	East Midlands existing raw water storage including new WTW and infrastructure	18
<b>BHS06</b>	191	Maximise deployment from Diddlebury WTW and Munslow BH	0.9

Option Reference	Component References	Option Name	Supply-Demand Benefit (Ml/d)
<b>BHS17</b>	192A	Shelton WRZ to Mardy WRZ transfer solution adapting existing assets (Solution 1)	3
<b>GRD16</b>	194A	Clungunford / Oakley Farm BH enhancements	2
<b>UNK07</b>	195	Improve Site L WTW outputs during low raw water periods	7
<b>BHS18</b>	192B	Shelton WRZ to Mardy WRZ transfer solution using new assets	3
<b>GRD17</b>	194B	Strategic Grid to Bishops Castle WRZ transfer solution	1.3
<b>CARSC01</b>	187C 128 95B 32	Carsington to Site L, J and F WTWs	100
<b>CARSC02</b>	187C 128 32 14B	Carsington to Site L, F and E WTWs	100
<b>CARSC03</b>	187C 128Z 95B 14B 32	Carsington to Site L, J, F and E WTWs	100
<b>DAM06</b>	123B	Tittesworth Reservoir capacity increase (Size B)	14
<b>BAM02</b>	4 302A	Potable water import to Site R WTW with Site R to Ambergate pipeline capacity increase	60
<b>CLYWB01</b>	186B F-120 66	Sites U and P WTW upgrades supported by River Severn raw water storage capacity increase	90
<b>RAW11</b>	120A 122A	River Severn to Draycote mutual support solution with supported River Avon abstractions - Size AA (Upper)	84.5
<b>RAW12</b>	120B 122C	River Severn to Draycote mutual support solution - Size BC (Upper)	78.5
<b>RAW13</b>	120C 122B	River Severn to Draycote mutual support solution with supported River Avon abstractions - Size CB (Mid)	79
<b>RAW14</b>	120D 122A	River Severn to Draycote mutual support solution with supported River Avon abstractions - Size DA (Lower)	64.5

Option Reference	Component References	Option Name	Supply-Demand Benefit (Ml/d)
<b>RAW15</b>	120E 122B	River Severn to Draycote mutual support solution - Size EB (Mid)	59
<b>RAW16</b>	120F 122A	River Severn to Draycote mutual support solution - Size FA (Lower)	44.5
<b>BHS15</b>	12	Birmingham BHs conversion to potable supply	9
<b>MIT01</b>	121	Site O WTW to Site K WTW raw water transfer main	15
<b>DAM07</b>	122A 310	Draycote Reservoir capacity increase (Size A) with transfer main from Site C WTW to Coventry	9
<b>BHS14</b>	112B	Croxtan BH Output Increase and transfer to distribution system	2.5
<b>DAM02</b>	84B	Lower Shustoke capacity increase (Size A)	2.5
<b>GRD15</b>	132	Whaddon (Strategic Grid WRZ) to Forest & Stroud WRZ transfer solution	5
<b>RAW17</b>	128	Carsington reservoir to Tittesworth transfer solution	10
<b>DAM03</b>	84C	Whitacre Reservoir capacity increase (Sub-option A)	2.5
<b>RAW09</b>	25B	Sites C and U WTW output increase using additional and supported abstractions from the River Avon	20
<b>BHS07</b>	198	Ladyflatte BHs asset and water treatment enhancements	2.7
<b>GRD13</b>	117	Potable water import to Peckforton and North Staffs WRZ	5
<b>GRD18</b>	200	Peckforton Group BHs asset and water treatment enhancements	36
<b>OGS01</b>	95B	Site J WTW expansion	15
<b>GRD06</b>	82	Cross Wolverhampton strategic transfer solution	15
<b>GRD22</b>	82Z	Cross Wolverhampton strategic transfer solution	10
<b>GRD05</b>	90	Leek to Stoke trunk main enhancements	5
<b>RAW01</b>	144A	Raw water import from CRT to Milford WTW	15
<b>RAW02</b>	144B	Raw water import from CRT to Site C WTW	15
<b>MEL41</b>	125A 99G	Site Q WTW enhancements with new supported abstractions from the River Derwent	15
<b>GRD01</b>	79	Site U WTW transfer to Wolverhampton and Telford WRZ	21.5
<b>SHE01</b>	33	Site M WTW Expansion	18
<b>SHE05</b>	33Z	Site M WTW expansion	10

Option Reference	Component References	Option Name	Supply-Demand Benefit (Ml/d)
<b>DAM11</b>	34 F-190	West area new raw water storage with Site U WTW enhancement and deployment infrastructure upgrades	180
<b>WTW05</b>	31C	East Midlands raw water storage including new WTW	45
<b>WTW06</b>	31D	East Midlands raw water storage including new WTW	45
<b>WIL02</b>	14B	Site E WTW expansion and transfer main	21
<b>BHS08</b>	204	New GW Source in Coven GWMU	3.5
<b>MIL01</b>	205	Milford BH output enhancements	2
<b>DOR08</b>	99D	Site B WTW enhancements	3.6
<b>WTW30</b>	66	Site P WTW expansion	15
<b>BHS03</b>	162	Preston Brockhurst BH asset and water treatment enhancements	1.5
<b>BHS16</b>	193	Much Wenlock BH treatment enhancements	0.7
<b>VYR01</b>	303 66 F-30	River Severn raw water import to Site U and P WTWs	60
<b>VYR02</b>	303 F-60	River Severn raw water import to Site U WTW	60
<b>GRD20</b>	89D20	New WTW on River Dove near Uttoxeter supported by Carsington reservoir and deploying to Stoke (Size A)	18
<b>GRD21</b>	89D30	New WTW on River Dove near Uttoxeter supported by Carsington reservoir and deploying to Stoke (Size B)	27
<b>NOT01</b>	304	Ambergate to Mid Nottinghamshire transfer solution	30
<b>NOT04</b>	305	Heathy Lea to North Nottinghamshire transfer solution	25
<b>NOT05</b>	306	Site E to South Nottinghamshire transfer solution	30
<b>SHE04</b>	309	Shared South Staffordshire Asset to Nurton Transfer (High Flow)	18
<b>SHE06</b>	309Z	Shared South Staffordshire Asset to Shelton WRZ transfer solution (Low flow)	10
<b>MEL47</b>	7A 61 99G	Site Q WTW enhancements supported by raw water augmentation of the River Trent	20
<b>BAM03</b>	312	Site R WTW to Grindleford pipeline capacity increase	7.5
<b>BAM04</b>	313	Site R WTW to Baslow pipeline capacity increase	20
<b>BAM05</b>	314	Site R WTW to Ambergate transfer solution	50



Option Reference	Component References	Option Name	Supply-Demand Benefit (Ml/d)
<b>CRO07</b>	134A 135	Blackbrook Reservoir and Thornton Reservoir to support Site B WTW	17
<b>SHE02</b>	301A	Potable water import to Shelton WRZ (localised)	12
<b>SHE03</b>	301B	Potable water import to Shelton WRZ (WRZ wide)	18
<b>DAM12</b>	303 50	New WTW on the River Severn near Ombersley with raw water imports into the River Severn	30

Temporary effects due to short-duration activities like construction or maintenance do not count as deterioration if the water body would recover in a short time without any restoration measures (EA,2016)<sup>8</sup>. Where a component was assessed as having the potential to adversely impact on WFD water bodies during the construction phase and it can be mitigated through the implementation of construction best-practice, the risk of deterioration in WFD status is considered as negligible. Therefore, components only involving impacts relating to construction activities were not assessed further as part of the second stage of the WFD compliance assessment.

The feasible component list included 114 components, 42 of which have been screened-out of further WFD assessment (**Appendix A**). The majority of the screened-out components involved transfers of treated water within the network, posing a negligible risk of deterioration to any WFD water bodies. The remainder components were resource components including groundwater, surface water abstraction, reservoir capacity increase and wastewater reuse. The majority of the feasible components were assessed as being compliant with WFD objective, however, there were some uncertainties in the assessments as follows:

- Groundwater abstractions: the uncertainties related to understanding the level of hydraulic connectivity between the groundwater sources and potential dependent rivers and/ or groundwater dependent terrestrial ecosystems (GWDTE).
- Reservoir capacity increase: the uncertainties related to understanding the reservoir expansion strategy, lake bathymetry and the nature and sensitivity of the existing macrophytes population
- Wastewater reuse: the uncertainties related to understanding the effluent quality to be transferred to the watercourses, the species assemblages in the affected river reaches as well as their sensitivity to changes in water quality and flow regime; for 3 of the components, the uncertainties were centred around the risk of invasive non-native species spread.
- New abstraction: the uncertainties related to the magnitude of impacts on the flow regime and ecology of a brook, prompted by a new abstraction from an impounding reservoir.

## 4 WFD Compliance Assessment of Preferred Programme Solutions

Step 4 in the assessment of the WFD compliance of the solutions forming the preferred programme is

<sup>8</sup> Water Framework Directive assessment: estuarine and coastal waters. Available at <https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters>. Accessed 10.09.2017

presented in Table 4.1. Where solutions (comprising one or more components), were identified as having a risk of WFD status deterioration, these solutions were discussed as part of the development of the final preferred programme for each water resource zone. Where there were a range of alternative solutions available to meet the forecast supply-demand deficit in the zone, the solution(s) was removed from further consideration in the programme appraisal modelling; where risks to the supply-demand balance necessitated the inclusion of the solution(s) in the 'best value' plan, the WFD risks have been clearly identified and additional mitigation measures considered as discussed below.

The WFD compliance assessment has indicated uncertainty as to the magnitude of effects on WFD water bodies for two solutions included in the final WRMP19 preferred programme, and therefore a risk of non-compliance with Objective 1 (risk of deterioration in status of the water body):

- The **Ladyflatte groundwater abstraction solution (BHS07)** assessment indicated a potential for impacts on a surface water body. Further assessment of the hydrogeological connectivity between the groundwater source and dependant ecosystems is required in order to confirm the magnitude of any potential impact during operation which is likely to arise during most years once the solution has been commissioned. If hydrological connectivity is determined and there is a risk of reducing flows in the river mitigation can be put in place. Mitigation might include monitoring groundwater levels and river flow rates and reducing or stopping abstraction during times of low flow in the river.

Further investigations will be undertaken if this option is selected for implementation, to ascertain the likely connectivity between the aquifer and the surface waterbody, the likely magnitude of drawdown and related reduction in flows, as well as the sensitivity of ecological receptors to changes in flow regime. The scope of these investigations is likely to include:

- A detailed review of underlying geological strata, in order to establish the connectivity of the aquifer to the Ecclesbourne catchment
- Modelling of the drawdown level likely to be experienced under the 2.7 MI/d abstraction scenario and associated impacts on flows within the Ecclesbourne Catchment.
- Determination of likely impacts on ecological receptors (review of available ecological data or expert opinion, in the absence of data) in light of the new evidence provided by the hydrogeological and hydrological investigations.

These investigations will indicate whether WFD deterioration for either or both of the waterbodies will occur under the 2.7MI/d abstraction scenario and whether any mitigation measures may be implemented to enable the option to be delivered. In the event that WFD deterioration risks cannot be mitigated, an alternative sustainable solution will be provided in order to ensure that the final WRMP remains WFD compliant whilst still meeting the needs of customers.

- The **Thornton Reservoir abstraction solution (CRO05)** assessment indicated potential for impacts on Rothley Brook. Further assessment is necessary in order to fully understand the magnitude of impact on the flow regime and ecology of the brook. Mitigation might include a bespoke hands-off flow condition, as well as increases in compensation flows, which are currently set to 1 MI/d.

Further investigations will be carried out if this option is selected for implementation, to understand the impact of the abstraction on the flow regime within Rothley Brook and determine whether these will have adverse effects on its biology. The Rothley Brook experiences issues with elevated phosphate concentrations and hence, alterations in flows may potentially lead to a further deterioration in WFD status (currently moderate). To this end, it is proposed to undertake the following:

- Cross-sectional flow surveys along Rothley Brook – to understand the changes in depth and velocity and whether these are likely to impact on ecological receptors.

- Ecological surveys – to understand the macroinvertebrate and fish species assemblages and understand whether the species present may be sensitive to the likely depth and velocity changes inferred from the cross-sectional flow surveys.

Based on the results of these investigations, mitigation measures will be developed as necessary to ensure no deterioration. If suitable mitigation measures cannot be developed, an alternative sustainable solution will be provided in order to ensure that the final WRMP remains WFD compliant whilst still meeting the needs of customers.

In addition, for the Site E WTW expansion and transfer main supported by raw water augmentation of the River Trent solution, the source of the raw water augmentation needs to be confirmed. However, based on the options under consideration and the scale of the flow augmentation, it is likely to be WFD compliant as the flow augmentation will be subject to environmental permitting which will include any necessary conditions to ensure WFD compliance. This provisional assessment conclusion will need to be confirmed once the source of the flow augmentation has been finalised.

With respect to the other WFD compliance objectives, the following conclusions are made:

- The effect of each solution individually on downstream water bodies, together with consideration of any further water bodies arising at the programme level has been included within the compliance assessment of Objectives 1-4 above.
- Aside from the demand management solutions, none of the proposed supply-side solutions in the final WRMP19 preferred programme contribute to the attainment of good status or good potential objectives for any water bodies.
- None of the proposed solutions in the final WRMP19 preferred programme contribute to the attainment of objectives for WFD protected areas.

**Table 4.1 Summary table of overall WFD assessment results for each solution included in the final WRMP19 preferred programme**

Solution Name	Solution ID	Solution component(s) ID	WFD Compliance	
			Assessment	Comments
Heathy Lea to North Nottinghamshire transfer solution	NOT04	305	Compliant	
Site J WTW expansion	OGS01	95B	Compliant	
Site C WTW enhancements	DOR05	99E	Compliant	
Site I WTW enhancements	DOR02	99B	Compliant	
Site E WTW expansion and transfer main supported by raw water augmentation of the River Trent	WIL05	7A&14B	Compliant (provisional assessment)	Compliant for all components of the solution but assessment is provisional in respect of the effects of the raw water augmentation of the River Trent. The source of the raw water augmentation needs to be confirmed, however based on the options under consideration and the scale of the flow augmentation, it is likely to be WFD compliant once any mitigation measures are considered (if necessary). The flow augmentation will be subject to environmental permitting which will include any necessary conditions to ensure WFD compliance. assessment to be confirmed once raw water source finalised.
Site F WTW expansion	LIT01	32	Compliant	
Site B WTW enhancements	DOR08	99D	Compliant	
Site E to South Nottinghamshire transfer solution	NOT05	306	Compliant	

Solution Name	Solution ID	Solution component(s) ID	WFD Compliance	
			Assessment	Comments
Improve Site L WTW outputs during low raw water periods	UNK07	195	Compliant	
Peckforton Group BHs asset and water treatment enhancements	GRD18	200	Compliant	
River Soar to support Site B WTW	CRO06	54	Compliant	
East Midlands raw water storage including new WTW	WTW05	31C	Compliant	
River Trent support to Site Q WTW with WTW enhancements	MEL29	61B&99G	Compliant	
Draycote Reservoir capacity increase (Size A) with transfer main from Site C WTW to Coventry	DAM07	122A&310	Compliant	
Site R WTW to Grindleford pipeline capacity increase	BAM03	312	Compliant	
Stanford Reservoir capacity increase (Size A)	DAM01	84A	Compliant	
Thornton Reservoir to support Site B WTW	CRO05	135	Uncertain	Uncertainty related to the effects of abstraction on the flow regime and ecology of a surface water features (Rothley Brook).
Ambergate to Mid Nottinghamshire transfer solution	NOT01	304	Compliant	
Whitacre Reservoir capacity increase (Sub-option A)	DAM03	84C	Compliant	
Ladyflatte BHs asset and water treatment	BHS07	198	Uncertain	Uncertainty surrounding hydrogeological linkage with a surface water body in the

Solution Name	Solution ID	Solution component(s) ID	WFD Compliance	
			Assessment	Comments
enhancements				Ecclesbourne Catchment.
Lower Shustoke capacity increase (Size A)	DAM02	84B	Compliant	
Maximise deployment from Diddlebury WTW and Munslow BH	BHS06	191	Compliant	
Enhanced Social Housing Water Efficiency Audit	WE003B		Compliant	
Enhanced Social Housing Water Efficiency Audit	WE004B		Compliant	
Leakage reduction	WE005		Compliant	
Increase in Metering	WE006		Compliant	

## 4.1 Cumulative effects assessment between solutions

The potential for cumulative effects between each solution within the final WRMP19 preferred programme has been assessed. Table 4.2 lists all the solutions that have the potential to impact on WFD water bodies and their WFD compliance assessment results. The solutions that have the potential for programme level in-combination effects are highlighted in grey in Table 4.2. An assessment of the hydrological impacts of the grouped solutions in combination with one another has then been carried out to determine whether risk to deterioration in WFD status. The findings from this cumulative assessment are summarised Table 4.3.

Whilst the final solution for the source of the flow augmentation of the River Trent component of Solution WIL05 has not been confirmed, it is considered unlikely (based on the options under consideration) that there would be any cumulative effects of the flow augmentation with any other solution within the final WRMP19. The flow augmentation will be subject to environmental permitting which will include any necessary conditions to ensure WFD compliance. However, this assessment will need to be updated once the final source of the augmentation water is confirmed.



Table 4.2 Summary of in-combination WFD compliance assessment of preferred programme by water body

WFD Water body			Solution Name and ID												
Type	Water body ID	Water body Name	MEL29: River Trent to Site Q WTW with WTW enhancements	DAM07: C Reservoir capacity increase with transfer main from Site C WTW to Coventry	CRO06: River Soar to support Site B WTW	WTW05: East Midlands raw water storage including new WTW	WIL05: Site E WTW expansion and transfer main supported by flow augmentation of the River Trent	LIT01: Site F WTW expansion	BHS07: Ladyflatte BHS recommissioning	DOR08: Site B WTW enhancements	CRO05: Thornton Reservoir to support Site B WTW	OGS01: Site J WTW expansion	NOT05: Site E to South Nottinghamshire transfer	GRD18: Peckforton group BHS rehabilitation and treatment enhancement	UNK07: Improve Site L WTW outputs during low raw water periods
Lake	GB30447006	Carsington Water					✓	✓				✓			
River	GB104028052670	Dove - conf R Manifold to conf R Churnet													
River	GB104028052420	Dove - R Churnet to R Trent													
Lake	GB30938250	Draycote Water		✓											
River	GB104028047211	Soar from Rothley Brook to Long Whatton Brook			✓										
River	GB104028042620	Soar from Soar Brook to Thurlaston Brook				✓									
River	GB104028047420	Trent from Dove to Derwent	✓				✓								
River	GB104028052310	Derwent from Amber to Bottle Brook					✓	✓					✓		
Groundwater	GB40402G990400	Derwent - Secondary Combined							?						
River	GB104028052720	Ecclesborne Catchment (trib of Derwent)							?						
Lake	GB30436331	Cropston Reservoir								✓					
Lake	GB30433781	Ogston Reservoir										✓			
River	GB104028046730	Rothley Brook									?				
Groundwater	GB4110G202600	Wirral and West Cheshire Permo-Triassic Sandstone Aquifers												✓	
River	GB111067052120	Aldford Brook												✓	
Reservoir	GB30433790	Tittesworth Reservoir													✓
River	GB104028052770	Churnet from Meerbrook to Leekbrook													✓

Key:

\*All WFD water bodies identified in the final WRMP19 preferred programme listed.

\*Only components screened in for further WFD assessment listed.

\*Component assessed for WFD compliance in this water body individually and assessed as: ✓ compliant; ? uncertain; ✖ not compliant

Grey highlight indicates potential for programme level in-combination effects, reviewed below.

Table 4.3 In-combination WFD compliance assessment of the final WRMP19 preferred programme

Water Body Receptor	Solution Name and ID	Solution Component ID	Assessment of Potential for Cumulative Effects	Risk Rating
Carsington Water (GB30447006)	WIL05: Site E WTW expansion and transfer main supported by raw water flow augmentation of the River Trent	14B	<p><b>Identifying sources:</b> Solutions WIL05, LIT01 and OGS01 involve releasing water from Carsington Water during their operation.</p> <p><b>Operational context:</b> Carsington Water is filled from abstraction from the River Derwent at Ambergate during the winter and provides releases back to the same WFD water body during the summer. Given the current operational pattern, Carsington Water has a significant surplus even during dry weather and therefore reservoir water levels do not fluctuate significantly.</p> <p>These solutions expand the Derwent Valley System conjunctive use scheme, with the operation of these solutions optimising the use of existing water resources. In-combination, these solutions optimise the use of existing abstraction licences, taking water from the River Derwent at Ambergate when flows are high for storage in Carsington for subsequent release in dry weather conditions to support abstractions from the River Derwent and River Dove so as to protect the river environment at times of low flow. These solutions maximise the use of the existing abstraction licence limit at Carsington Water.</p> <p><b>Potential environmental change and predicted response to change:</b> The cumulative assessment concluded that there is a risk of adverse effects on the Carsington Water reservoir WFD heavily modified water body due to cumulative releases from the reservoir in periods of dry weather leading to lower water levels in the reservoir than historically. It should be noted that concurrent release for all four solutions would be rare and only temporary in nature. The releases will not be made on a continuous basis throughout the year and will only be required in periods of prolonged dry weather. The total volume of water released will remain within exiting abstraction licence limits for Carsington Water. Although the lower reservoir levels could lead to a risk of impacting ecological receptors, principally macrophytes, it is considered that such effects can be mitigated to prevent WFD deterioration to the ecological potential of the heavily modified water body, taking account of the water supply purpose of the water body and the absence of any designated or protected species. Further investigations will be carried out as part of the detailed design of the schemes that may affect water levels in Carsington Water, including modelling to assess the change in reservoir levels, surveys of the marginal vegetation relative to the modelled revised water level pattern, and consideration of the mitigation measures to protect adverse effects on macrophytes and other marginal habitats.</p> <p><b>Uncertainty, mitigation and monitoring:</b> Further assessing the level of drawdown in the reservoir would be required to confirm this. This would include examining the water level fluctuation and the bathymetry of the reservoir as well as the sensitivity of macrophytes species. Mitigation measures may be necessary to protect sensitive macrophytes depending on the outcome of these further assessments. Mitigation measures could include the creation of refuge areas within the reservoir that will continue to hold water when the water levels fall below pre-determined level and the use of floating islands or rafts. Severn Trent will discuss the findings of the further investigations with the Environment Agency and agree any necessary mitigation measures prior to implementation of the full programme of solutions that will increase the use of Carsington Water.</p> <p><b>Overall rating of cumulative effects:</b> There is a low to moderate, but uncertain, risk of adverse impact on ecology due to the increase in drawdown as a consequence of multiple abstractions operating simultaneously. Further investigations and site surveys are required to assess the potential effects in more detail. Should the investigations and consideration of mitigation measures indicate that WFD compliance cannot be achieved, Severn Trent will review the alternative options available to reduce the scale of river flow support from Carsington Water, drawing on other feasible components that have been shown to be WFD compliant and which can be implemented to address the forecast supply deficit in the water resource zone.</p>	Low/Moderate (uncertain) Further investigation required
	LIT01: Site F WTW expansion	32		
	OGS01: Site J WTW expansion	95B		
Derwent from Amber to Bottle Brook (GB104028052310)	WIL05: Site E WTW expansion and transfer main supported by raw water flow augmentation of the River Trent	14B	<p><b>Identifying sources:</b> Solutions WIL05, OGS01, and LIT01 will involve releasing water from Carsington Water during their operation to support downstream abstraction at times of low flows, including some cumulative releases at low flows back to this WFD water body. The cumulative effects of these options operating simultaneously will lead to the consequent need to abstract more water from the Derwent at Ambergate at times of medium and high flows, to replenish the storage in Carsington Water following periods of dry weather releases from the reservoir. Solution NOT05 is a treated water transfer from the Strategic Grid to the Nottinghamshire water resource zone, which will partly be enabled through a small increase in abstraction from the River Derwent at Ambergate.</p> <p><b>Operational context:</b> Solutions, LIT01 and OGS01 expand the Derwent Valley System conjunctive use scheme, with the operation of these solutions optimising the use of existing water resources. In-combination, these solutions optimise the use of existing abstraction licences,</p>	Low
	LIT01: Site F WTW expansion	32		
	NOT05: Site E to South Nottinghamshire transfer solution	306		

	OGS01: Site J WTW expansion	95B	<p>taking water from the River Derwent at Ambergate when flows are high for storage in Carsington for subsequent release in dry weather conditions to support abstractions from the River Derwent (via releases from Carsington Water back to this water body) and the River Dove so as to protect the river environment at times of low flow. These solutions, along with Solution NOT05, maximise the use of the existing abstraction licence limit at Ambergate and will be subject to the existing hands-off flow conditions.</p> <p>It should be noted that treated water transfer solutions NOT01, NOT04 and BAM03 involve the transfer of treated water produced within the Strategic Grid Water Resource Zone which covers a large part of the Severn Trent region and is not limited to water produced from the River Derwent raw water sources. Options that enable production of additional water in the Strategic Grid WRZ have been individually assessed against WFD compliance as set out in this report. The deployable output benefit achieved from the options has been assessed using Severn Trent's Aquator water resources model. The approach to modelling included ensuring that under predicted scenarios, the existing abstraction licence conditions were not exceeded and that existing Hands-off Flow (HOF) conditions were unaffected, including the HOF for the River Derwent at Ambergate licence. As a result, Severn Trent's WRMP19 programme of transfer options provide benefit whilst ensuring the company continues to operate within its current abstraction licence conditions for raw water sources across the Strategic Grid WRZ.</p> <p><b>Potential environmental change and predicted response to change:</b></p> <p>The cumulative assessment of the effects of the concurrent additional abstraction from the River Derwent at Ambergate to replenish storage in Carsington Water has concluded that there will be no adverse effects on the WFD Derwent from Amber to Bottle Brook heavily modified water body as the abstraction will only take place when river flows are sufficiently in excess of the existing licence hands-off flow condition as well as within existing abstraction volumetric limits. Whilst abstraction volumes will be higher than the recent actual conditions, the hands-off flow condition will continue to protect the water environment of this water body. There may be some minor adverse effects from the changes to the flow regime arising from the cumulative additional abstraction to replenish storage at Carsington Water, but these are not considered to be of a magnitude that would lead to adverse effects on the WFD potential of this water body. Increased releases from Carsington Water to this water body as a result of concurrent operation of these solutions at times of low flow conditions will not lead to any WFD deterioration to the heavily modified water body potential.</p> <p><b>Uncertainty, mitigation and monitoring:</b></p> <p>Monitoring of this WFD heavily modified water body should continue to assess the environmental performance against the objectives for this water body with the additional abstraction taking place within existing licence conditions.</p> <p><b>Overall rating of cumulative effects:</b></p> <p>There is a low risk of adverse impact on ecology and hydromorphology of this WFD water body. There is a negligible risk of deterioration of the WFD potential of this water body.</p>	
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## 5 Cumulative Effects with Other Plans and Projects

### Water Company Water Resources Management Plans

Assessment of the potential cumulative effects with water resources management options proposed in neighbouring water companies' draft or draft final WRMP19s (as available at February 2019) has been undertaken. No cumulative effects have been identified for any WFD waterbody in relation to the following water company draft or revised draft WRMP19s (as available at February 2019):

- Yorkshire Water
- Hafren Dyfrdwy
- United Utilities Water
- South Staffordshire Water
- Dŵr Cymru Welsh Water
- Anglian Water
- Bristol Water
- Wessex Water
- Thames Water

### Land Use and Spatial Plans

Potential cumulative effects with development programmes contained within Local Plans have been considered. The Local Plans are relatively high-level policy documents and whilst they identify potential areas for future development and zones for particular activities, the uncertainty of future developments (including precise spatial location and timing) make it difficult to identify any potential cumulative effects with the Final WRMP19. Large areas of housing are proposed in the Charnwood Local Plan (adopted 2015) and the Broxtowe, Gedling and Nottingham Borough Aligned Core Strategies Local Plan (adopted 2014). The Final WRMP19 solutions CRO06 and NOT05 that could potentially give rise to cumulative effects with these Local Plan proposals have been assessed and no WFD implications have been identified.

As the Final WRMP19 solutions are brought forward for promotion in the future, an assessment will need to be carried out of possible construction and/or operational cumulative effects with known local developments in dialogue with the relevant local planning authorities.

### River Basin Management Plans (RBMP)

Three of the solutions included in the Final WRMP19 preferred programme (DAM07, DAM01 and BHS06) will be located within the Severn River Basin District. These solutions have been assessed and no cumulative effects with the measures in the Severn RBMP have been identified.

The remainder of the Final WRMP19 solutions are all associated with the Humber River Basin District (RBD). The solutions have been assessed and no cumulative effects with the measures in the Humber RBMP have been identified.

It is recommended that, once the WRMP19 solutions are brought forward for promotion and development in the future, a further assessment of potential cumulative effects with the latest versions of the RBMPs and associated measures is carried out as part of the WFD assessment of the relevant planning permissions and/or environmental permit applications.

### Major Projects

The potential for cumulative effects with some of the significant projects and developments identified in Severn Trent's supply area include High Speed Two (HS2); M42 Junction 6 Improvement Scheme, M54 to M6 Link Road; Avonmouth Deep Sea Container Terminal; Hinkley Point C Nuclear Power Plant and the Wednesbury to Brierley Hill Metro Extension. Cumulative effects for these projects are not considered likely as the zones of influence of these projects largely do not overlap with the Final WRMP19 solutions due to differing construction periods, or otherwise the effects have been identified as small-scale and geographically distributed. No cumulative WFD effects were identified in relation to any other programmes or plans.

## 6 Final WRMP19 WFD Compliance

For the vast majority of the solutions included in Severn Trent's final WRMP19 preferred programme, the WFD assessment has demonstrated compliance with WFD objectives and statutory requirements. A low risk of cumulative adverse WFD impact was identified on Carsington Water as a consequence of the simultaneous implementation of four solutions in the preferred programme. However, this could be mitigated if further assessment identifies the need to protect macrophyte communities in the reservoir.

There are two proposed solutions where further investigations are required to confirm WFD compliance: the Ladyflatte groundwater abstraction solution and the Thornton Reservoir abstraction solution. These investigations will be carried out, and the findings discussed with the Environment Agency, before any applications for abstraction licences or environmental permits are sought for these solutions. Should the investigations determine that WFD compliance cannot be secured, even after development of mitigation measures, there are sufficient WFD compliant alternative solutions available to address the forecast supply deficit.

The provisional assessment of the flow augmentation component of the WIL05 solution indicates no WFD compliance risks are likely from the options under consideration once mitigation measures have been considered (if necessary). The flow augmentation will be subject to environmental permitting which will include any necessary conditions to ensure WFD compliance. This provisional assessment will need to be confirmed once the source of the flow augmentation has been finalised.

Cumulative effects of several options relying on flow releases from Carsington Water reservoir requires further investigation in relation to the effects on marginal vegetation from increased water level drawdown during prolonged dry weather. Should the investigations determine that WFD compliance cannot be secured, even after development of mitigation measures, there are sufficient WFD compliant alternative solutions available to address the forecast supply deficit.

No other risks to WFD compliance have been identified in relation to the cumulative effects of various solutions being operated concurrently.

Potential risks of cumulative adverse effects between other water companies draft or revised draft WRMP19s (as available at February 2019) have been investigated and no such impacts have been identified. No cumulative effects with any other plans or projects have been identified.

## Appendix A – WFD Compliance Screening Outcomes

This appendix presents the results of the WFD compliance assessment screening outcomes for the components on the feasible list that were screened out of further assessment based on the potential risk of deterioration of WFD status. The WFD compliance assessment summary for components screened in for assessment is presented in **Appendix B**.

**Table A1. WFD Screening Summary for supply-side components screened out of further assessment**

Component Type	Component Name	Component number	Water Body Name	Water Body Code	Water Body Type	WFD assessment	Reason for screening out of further assessment:
Network transfer	Site R WTW to Ambergate pipeline capacity increase	4	N/A	N/A	N/A	Compliant	This component involves the transfer of treated water in the network. There will be no change in the existing borehole operating arrangements. Therefore, there is no risk to WFD groundwater bodies.
Network transfer	Potable water import to Kinsall WRZ at Whittington	101	N/A	N/A	N/A	Compliant	This component involves a network transfer with no new abstractions or discharge to WFD water bodies and therefore there is a negligible risk of deterioration.
Network transfer	Site U WTW to North Staffs WRZ transfer solution	110	N/A	N/A	N/A	Compliant	This component is to transfer potable water between two WRZs. No WFD water body involved, therefore there is a negligible deterioration risk.
Bulk supply	Potable water import to Chesterfield	81	N/A	N/A	N/A	Compliant	The component is a bulk import from Yorkshire Water (YW). The water could come from any source within YW supply area. As the donor, YU will be responsible for undertaking the WFD appraisal and quantification of deterioration risks.
Bulk supply	Potable water import to Shelton WRZ	301A	N/A	N/A	N/A	Compliant	The component is a 12 Ml/d transfer into the Severn Trent West Shropshire area via the existing distribution network (which already links Severn Trent's distribution



Component Type	Component Name	Component number	Water Body Name	Water Body Code	Water Body Type	WFD assessment	Reason for screening out of further assessment:
	(localised)						network to UU's WTW but does not have sufficient capacity to transfer the full 30 MI/d import). As the donor, United Utilities (UU) will be responsible for undertaking the WFD appraisal and quantification of deterioration risks.
Bulk supply	Potable water import to Shelton WRZ (WRZ wide)	301B	N/A	N/A	N/A	Compliant	The component involves the construction of a gravity pipeline to deliver the additional 18 MI/d from UU's WTW to Site M WTW. As the donor, United Utilities (UU) will be responsible for undertaking the WFD appraisal and quantification of deterioration risks.
Bulk supply	UU release from Vyrnwy	303	N/A	N/A	N/A	Compliant	This component is a bulk release of water from UU's Lake Vyrnwy into the River Severn, as far downstream as Site P. As the donor, United Utilities will be responsible for undertaking the WFD appraisal and quantification of deterioration risks to Lake Vyrnwy. This component is an 'enabler' for other components (50, 66, F-30 and F-60) for which a WFD assessment has been provided in this report.
Network transfer	DVA to Nottingham transfer pipeline capacity increase	16	N/A	N/A	N/A	Compliant	This component involves enhancing network connection. It enables groundwater sources to be rested or fully/partially substituted by increasing the supply into Nottinghamshire WRZ from the Strategic Grid WRZ, which may provide a low temporary benefit. The component will not involve any change to groundwater abstraction rates relative to



Component Type	Component Name	Component number	Water Body Name	Water Body Code	Water Body Type	WFD assessment	Reason for screening out of further assessment:
							current baseline. Additional resource for the component but it is assumed that this is not part of this component. Therefore, there is negligible risk of deterioration in the groundwater body, dependent surface water bodies or GWDTEs.
Network transfer	UU Import to Site R WTW.	302A	N/A	N/A	N/A	Compliant	This component is a joint STW and UU scheme involving a 60 MI/d import from the UU WSR to Severn Trent WSRs with the facility for a 60 MI/d transfer in reverse from Site R WTW to the UU WSR. It is understood that this transfer is enabled by surplus resources and that it does not involve any increases in abstractions from WFD waterbodies. Therefore, this option does not pose any risk of deterioration to WFD waterbodies.
Removal of Constraints	Site R WTW to Grindleford pipeline capacity increase	312	N/A	N/A	N/A	Compliant	The component will enable an increased output from Site R WTW, however the increase in abstraction from the Derwent Valley reservoirs will be constrained to the existing licenced volumes. On this basis, there are no WFD risks
Network transfer	Peasley Bank - Hanchurch Pipeline	308	N/A	N/A	N/A	Compliant	The component involves a new pipeline to provide a network transfer to enable component 44. On this basis, there are no WFD risks and component 44 has been assessed separately.
Removal of Constraints	Site R WTW to Ambergate transfer solution	314	N/A	N/A	N/A	Compliant	The component will enable an increased output from Site R WTW. This would require an increase in abstraction from the Derwent Valley reservoirs, which is

Component Type	Component Name	Component number	Water Body Name	Water Body Code	Water Body Type	WFD assessment	Reason for screening out of further assessment:
							shared with Yorkshire Water. The increase in abstraction would remain within licenced volumes for the shared abstraction licences and is subject to negotiations with Yorkshire Water. On this basis, there are no WFD risks to any of the Derwent Valley Reservoirs.
Network transfer	Site E to South Nottinghamshire transfer solution	306	N/A	N/A	N/A	Compliant	This component involves a treated water transfer from Site E WTW to South Nottinghamshire. The component will not involve any change to groundwater abstraction rates relative to current baseline. No WFD waterbodies involved, therefore no WFD risks.
Interzonal transfer	Shared South Staffordshire Asset to Nurton Transfer (High Flow)	309	N/A	N/A	N/A	Compliant	This component involves the transfer of treated water (18 MI/d) from the shared South Staffordshire Asset to Nurton. As the donor, South Staffs Water is responsible for assessing the impact of the water transfer on the River Severn, if this is sourced through additional abstraction. Therefore, the transfer component presents no WFD risks.
Interzonal transfer	Shared South Staffordshire Asset to Shelton WRZ transfer solution (Low flow)	309Z	N/A	N/A	N/A	Compliant	This component involves the transfer of treated water (10 MI/d) from the shared South Staffordshire Asset to Nurton. As the donor, South Staffs Water is responsible for assessing the impact of the water transfer on the River Severn, if this is sourced through additional abstraction

Component Type	Component Name	Component number	Water Body Name	Water Body Code	Water Body Type	WFD assessment	Reason for screening out of further assessment:
							Therefore, the transfer component presents no WFD risks.
Reservoir capacity	Stanford Reservoir capacity increase (Size A)	84A	Stanford Reservoir	Lake	GB30937864	Compliant	The component is to increase capacities of raw water reservoirs which would involve only minor work to spillways, wave walls and limited (if any) crest raising. It is assumed that the component will not require an increase to the existing licences (which are sustainable) and will just make optimal use of resources. On this basis, there is a negligible risk of WFD deterioration.
Removal of Constraints	Site Q WTW enhancements	99G	N/A	N/A	N/A	Compliant	The component does not seek to resolve issues with raw water availability to the head of the works. As there are no new abstractions or discharges, the risk of WFD deterioration is negligible.
Network transfer	Shelton WRZ to Ruyton WRZ transfer solution	105	Severn Uplands - PT Sandstone Knockin	GW	GB40901G202300	Compliant	This component involves a network transfer with no new abstractions or discharge to WFD water bodies and therefore there is negligible risk of deterioration.
Network transfer	Site Q WTW to North Staffs WRZ transfer solution	111	N/A	N/A	N/A	Compliant	It is assumed that that no increase in abstraction is required and that that the import will be sustainable. On this basis, there is negligible risk of WFD deterioration.
Network transfer	Leek to Stoke trunk main enhancements	90	N/A	N/A	N/A	Compliant	This component is to enhance the flexibility of the trunk main system to enable more demand to be re-zoned off Tittesworth Reservoir during drought

Component Type	Component Name	Component number	Water Body Name	Water Body Code	Water Body Type	WFD assessment	Reason for screening out of further assessment:
							periods. On this basis, there is no WFD deterioration risks.
Removal of Constraints	Site I WTW enhancements	99B	N/A	N/A	N/A	Compliant	The component does not seek to resolve issues with raw water availability to the head of the works. As there are no new abstractions or discharges, the risk of WFD deterioration is negligible.
Removal of Constraints	Site C WTW enhancements	99E	N/A	N/A	N/A	Compliant	The component does not seek to resolve issues with raw water availability to the head of the works. As there are no new abstractions or discharges, the risk of WFD deterioration is negligible.
Network transfer	Shelton WRZ to Mardy WRZ transfer solution adapting existing assets (Solution 2)	103	N/A	N/A	N/A	Compliant	The component does not involve any additional abstractions or discharges and therefore there is a negligible risk of deterioration in WFD status.
Interzonal transfer	Nottingham WRZ to Newark WRZ transfer solution	104	N/A	N/A	N/A	Compliant	The component involves an interzonal transfer. It is assumed that that no increase in abstraction is required and that that transfer will be a network one. On this basis, there is a negligible risk of WFD deterioration.
Licence transfer/SW abstraction	East Midlands existing raw water storage including new WTW and infrastructure	190	Existing Storage	Lake	Confidential	Compliant	This component involves the transfer of an existing industrial abstraction licence. It is assumed that it is a sustainable licence and therefore a negligible risk to WFD deterioration.

Component Type	Component Name	Component number	Water Body Name	Water Body Code	Water Body Type	WFD assessment	Reason for screening out of further assessment:
Removal of Constraints	Maximise deployment from Diddlebury WTW and Munslow BH	191	N/A	N/A	N/A	Compliant	This component involves removal of network constraints with no new abstractions or discharge to WFD water bodies and therefore there is negligible risk of deterioration.
Interzonal transfer	Shelton WRZ to Mardy WRZ transfer solution adapting existing assets (Solution 1)	192A	N/A	N/A	N/A	Compliant	The component involves an interzonal transfer. It is assumed that that no increase in abstraction is required and that that transfer will be a network one. On this basis, there is negligible risk of WFD deterioration.
Interzonal transfer	Shelton WRZ to Mardy WRZ transfer solution using new assets	192B	N/A	N/A	N/A	Compliant	The component involves an interzonal transfer. It is assumed that that no increase in abstraction is required and that that transfer will be a network one. On this basis, there is no risk of WFD deterioration.
Network transfer/ SW abstraction	Site O WTW to Site K WTW raw water transfer main	121	N/A	N/A	N/A	Compliant	Transfer raw water from the River Severn that is within abstraction licence (for Site O WTW) to Site K WTW during restricted flow periods on the Wye. Site O is licensed for 120Ml/d and abstracted flow is supported by releases from the EA's Severn Regulation scheme. The component makes use of existing licences that are sustainable and therefore there is negligible risk of WFD deterioration.
Reservoir capacity	Lower Shustoke capacity increase (Size	84B	Shustoke Reservoir	Lake	GB30437497	Compliant	The component is to increase capacities of raw water reservoirs which would involve only minor work to spillways, wave walls and limited (if any) crest raising. It is

Component Type	Component Name	Component number	Water Body Name	Water Body Code	Water Body Type	WFD assessment	Reason for screening out of further assessment:
	A)						assumed that the component will not require an increase to the existing licences (which are sustainable) and will just make optimal use of resources. On this basis, there is negligible risk of WFD deterioration.
Network transfer	Whaddon (Strategic Grid WRZ) to Forest & Stroud WRZ transfer solution	132	N/A	N/A	N/A	Compliant	This component involves the transfer of treated water in the network. It is assumed there will be no change in abstraction. Therefore, there is negligible risk to WFD water bodies.
Network transfer	Strategic Grid to Bishops Castle WRZ transfer solution	194B	N/A	N/A	N/A	Compliant	This component involves the transfer of treated water in the network. It is assumed there will be no change in abstraction. Therefore, there is negligible risk to WFD water bodies.
Reservoir capacity	Whitacre Reservoir capacity increase (Sub-option A)	84C	N/A	N/A	N/A	Compliant	The component is to increase raw water reservoir capacity which would involve only minor work to spillways, wave walls and limited (if any) crest raising. It is assumed that the component will not require an increase to the existing licences (which are sustainable) and will make optimal use of resources. This reservoir is not a WFD water body and therefore there is no risk of deterioration.
Bulk supply	Potable water import to Peckforton and North Staffs WRZ	117	N/A	N/A	N/A	Compliant	This component is a bulk supply of water from UU's Vyrnwy aqueduct. As the donor, United Utilities will be responsible for undertaking the WFD appraisal and quantification of deterioration risks.

Component Type	Component Name	Component number	Water Body Name	Water Body Code	Water Body Type	WFD assessment	Reason for screening out of further assessment:
Network transfer	Cross Wolverhampton strategic transfer solution	82	N/A	N/A	N/A	Compliant	This component involves the transfer of treated water in the network. As this is assumed there will only be minor changes to the operational pattern of abstractions. Therefore, there is a negligible risk to WFD water bodies.
Network transfer	Cross-Wolverhampton Strategic Link Main	82Z	N/A	N/A	N/A	Compliant	This component involves the transfer of treated water in the network. As this is assumed there will only be minor changes to the operational pattern of abstractions. Therefore, there is a negligible risk to WFD water bodies.
Network transfer	Site U 190MI/d	F-190	N/A	N/A	N/A	Compliant	This component involves the transfer of treated water in the network. As this is assumed there will only be minor changes to the operational pattern of abstractions. Therefore, there is a negligible risk to WFD water bodies.
Network transfer	Site U WTW transfer to Wolverhampton and Telford WRZ	79	N/A	N/A	N/A	Compliant	This component involves the transfer of treated water in the network. As this is assumed there will only be minor changes to the operational pattern of abstractions. On this basis, there is negligible risk of WFD deterioration.
Network transfer	Transfer main from Site C WTW to Coventry	310	N/A	N/A	N/A	Compliant	The component involves the construction of a new 450mm diameter pipeline with a total length of 10.6km to convey water from Site C WTW to Coventry. There is one water course crossing. On this basis, there is negligible risk of WFD deterioration.



Component Type	Component Name	Component number	Water Body Name	Water Body Code	Water Body Type	WFD assessment	Reason for screening out of further assessment:
Network transfer	Ambergate to Mid Nottinghamshire transfer solution	304	N/A	N/A	N/A	Compliant	This component involves the transfer of treated water in the network. As this is assumed there will only be minor changes to the operational pattern of abstractions. On this basis, there is negligible risk of WFD deterioration.
Network transfer	Heathy Lea to North Nottinghamshire transfer solution	305	N/A	N/A	N/A	Compliant	This component involves the construction of a new link main from the Strategic Grid WRZ into the Nottinghamshire WRZ. It involves the construction of a new pipeline and pumping station. On this basis, there is negligible risk of WFD deterioration.
Network transfer	Site R WTW to Baslow pipeline capacity increase	313	N/A	N/A	N/A	Compliant	The component will enable an increased output from Site R WTW. This would require an increase in abstraction from the Derwent Valley reservoirs, which is shared with Yorkshire Water. The increase in abstraction would remain within licenced volumes for the shared abstraction licences and is subject to negotiations with Yorkshire Water. On this basis, there are no WFD risks to any of the Derwent Valley Reservoirs.

**Table A2. WFD Screening Summary for demand options screened out of further assessment**

Option Type	Option Name	Option number	Scheme Description	Reason for screening out of further assessment:
Water Efficiency Audit	Enhanced Household Water Efficiency Audit	WE003A	This water efficiency option involves a detailed audit household water efficiency. The option is reliant on the customer taking up the recommendations from the audits. The visit will also provide information on behavioural change and impact on water use. The programme will start in 2020 for 15 years,	The option does not involve any increase in abstractions and will help to reduce the pressure on the environment by reducing demand and will have beneficial effects. Therefore, there is no risk of deterioration in WFD status.
Water Efficiency Audit	Enhanced Household Water Efficiency Audit	WE003B	This water efficiency option involves a detailed audit of household water efficiency. The option is reliant on the customer taking up the recommendations from the audits. The visit will also provide information on behavioural change and impact on water use. The programme will start in 2020 for 15 years.	The option does not involve any increase in abstractions and will help to reduce the pressure on the environment by reducing demand and will have beneficial effects. Therefore, there is no risk of deterioration in WFD status.
Water Efficiency Audit	Enhanced Social Housing Water Efficiency Audit	WE004A	This water efficiency option involves a detailed audit of social household water efficiency. The option is reliant on the customer taking up the recommendations from the audits. The visit will also provide information on behavioural change and impact on water use. The programme will start in 2020 for 15 years.	The option does not involve any increase in abstractions and will help to reduce the pressure on the environment by reducing demand and will have beneficial effects. Therefore, there is no risk of deterioration in WFD status.
Water Efficiency Audit	Enhanced Social Housing Water Efficiency Audit	WE004B	This water efficiency option involves a detailed audit social household water efficiency. The option is reliant on the customer taking up the recommendations from the audits. The visit will also provide information on behavioural change and impact on water use. The programme will start in 2020 for 15 years.	The option does not involve any increase in abstractions and will help to reduce the pressure on the environment by reducing demand and will have beneficial effects. Therefore, there is no risk of deterioration in WFD status.

## Appendix B - WFD Compliance Assessment Summary for Components

This section presents the outcomes of the WFD compliance assessment for those components included in the feasible list.

**Table B1. WFD compliance assessment summary for all feasible components**

Component Name	Component ID	WFD Compliance	
		Assessment	Reason for component not being confirmed as compliant
Supply Side Components			
Site R WTW to Ambergate pipeline capacity increase	4	Compliant	
DVA to Nottingham transfer pipeline capacity increase	16	Compliant	
Site U WTW transfer to Wolverhampton and Telford WRZ	79	Compliant	
Potable water import to Chesterfield	81	Compliant	
Cross Wolverhampton strategic transfer solution	82	Compliant	
Cross-Wolverhampton Strategic Link Main	82Z	Compliant	
Stanford Reservoir capacity increase (Size A)	84A	Compliant	
Lower Shustoke capacity increase (Size A)	84B	Compliant	
Whitacre Reservoir capacity increase (Sub-option A)	84C	Compliant	
Site I WTW enhancements	99B	Compliant	
Site C WTW enhancements	99E	Compliant	
Site Q WTW enhancements	99G	Compliant	
Potable water import to Kinsall WRZ at Whittington	101	Compliant	
Shelton WRZ to Mardy WRZ transfer solution adapting existing assets (Solution 2)	103	Compliant	
Nottingham WRZ to Newark WRZ transfer solution	104	Compliant	
Shelton WRZ to Ruyton WRZ transfer solution	105	Compliant	
Site U WTW to North Staffs WRZ transfer solution	110	Compliant	
Site Q WTW to North Staffs WRZ transfer solution	111	Compliant	

Component Name	Component ID	WFD Compliance	
		Assessment	Reason for component not being confirmed as compliant
Potable water import to Peckforton and North Staffs WRZ	117	Compliant	
Site O WTW to Site K WTW raw water transfer main	121	Compliant	
Whaddon (Strategic Grid WRZ) to Forest & Stroud WRZ transfer solution	132	Compliant	
Use Thornton reservoir to support Site B WTW	135	Compliant	
Raw water import from CRT to Milford WTW	144A	Compliant	
East Midlands existing raw water storage including new WTW and infrastructure	190	Compliant	
Maximise deployment from Diddlebury WTW and Munslow BH	191	Compliant	
Shelton WRZ to Mardy WRZ transfer solution adapting existing assets (Solution 1)	192A	Compliant	
Shelton WRZ to Mardy WRZ transfer solution using new assets	192B	Compliant	
Improve Site L WTW outputs during low raw water periods	195	Compliant	
Peckforton Group BHs asset and water treatment enhancements	200	Compliant	
Site U 190MI/d	F-190	Compliant	
River Trent Augmentation	7A	Compliant (provisional assessment)	Source of raw water for flow augmentation to be finalised but considered unlikely to lead to any WFD compliance risk once mitigation measures have been considered (if necessary). The flow augmentation will be subject to environmental permitting which will include any necessary conditions to ensure WFD compliance. Assessment to be confirmed once raw water source finalised.
Site Q (Dove) Conjunctive Use	17	Compliant	

Component Name	Component ID	WFD Compliance	
		Assessment	Reason for component not being confirmed as compliant
Elmhurst BH asset and water treatment enhancements	22	Compliant	
Site C WTW output increase using additional and supported abstractions from the River Avon	25A	Uncertain	Potential adverse impacts on the flow regime and ecology of the River Sowe.
Haseley Spring source asset and WTW enhancement	27	Uncertain	Potential adverse impact on the flow regime and ecology of Finham Brook.
New GW source in the Hopton GWMU	30	Uncertain	Potential adverse impacts on the flow regime and ecology of River Sow.
Site F WTW expansion	32	Compliant	
New river WTW nr. Stafford	44	Compliant	
New WTW on the River Trent near Stoke Bardolph, Nottinghamshire	45z	Compliant	
New WTW on the River Severn near Ombersley, Shropshire	50	Compliant	
New WTW on the River Severn near Buildwas, Shropshire	53	Compliant	
New WTW on the River Weaver near Nantwich	58	Compliant	
River Trent to Site Q	61 & 61B	Compliant	
Stanton/Milton to Supply at Site Q	64	Uncertain	Potential adverse impacts on flow regime and ecology of Milton Brook.
Elmhurst BH raw transfer to Site L	71	Compliant	
Support Site L WTW from the River Weaver	88	Compliant	
North Staffs WRZ to Stafford WRZ transfer solution	108	Uncertain	Potential adverse impacts on the flow regime and ecology of River Trent.
Croxton BH output increase and transfer to distribution system	112A	Compliant	
Packington Reuse	138	Uncertain	Potential adverse impacts on the water quality of Carr-New Brook.
Maximise outputs from Site N WTW	152	Compliant	
Watery Lane BHs asset and water treatment enhancements	158	Uncertain	Potential adverse impacts on the flow regime and ecology of River Sowe.

Component Name	Component ID	WFD Compliance	
		Assessment	Reason for component not being confirmed as compliant
Waverly Road BHs asset and water treatment enhancements	159	Uncertain	Potential adverse impacts on the flow regime and ecology of River Sherbourne.
Expand Clywedog	186B	Compliant	
Swynnerton BHs asset and water treatment enhancements	163	Uncertain	Potential adverse impacts on the flow regime and ecology of River Trent.
Birmingham BHs conversion to potable supply	12	Uncertain	Potential adverse impacts on the flow regime and ecology of River Rea.
Sites C and U WTW output increase using additional and supported abstractions from the River Avon	25B	Uncertain	Potential adverse impacts on the flow regime and ecology of River Sowe.
Site M WTW Expansion	33 and 33z	Compliant	
Longdon Marsh Reservoir	34	Compliant	
River Soar to support Site B WTW	54	Compliant	
Leek to Stoke trunk main enhancements	90	Compliant	
Site J WTW expansion	95B	Compliant	
Croxton BH Output Increase and transfer to distribution system	112B	Compliant	
Middle Severn to Draycote	120A	Uncertain	Potential adverse impacts on the water quality of River Avon.
Middle Severn to Draycote	120C	Uncertain	Potential adverse impacts on the water quality of River Avon.
Middle Severn to Draycote	120D	Uncertain	Potential adverse impacts on the water quality of River Avon.
Middle Severn to Draycote	120B	Compliant	.
Middle Severn to Draycote	120E	Compliant	
Middle Severn to Draycote	120F	Compliant	
Raise water level at Draycote Reservoir (6% (1400MI))	122A	Compliant	
Raise water level at Draycote Reservoir (25% (5800MI))/ Raise water level at Draycote Reservoir (50% (11500MI))	122B/122C	Uncertain	Potential adverse impacts on the ecology of C Draycote Water.
Tittesworth Reservoir capacity increase (Size A and Size B)	123A and 123B	Compliant	
Unlock unused Carsington storage /Lower Derwent to Site Q / Site F/ Site E.	125A	Compliant	
Carsington reservoir to Site L transfer solution	128	Compliant	

Component Name	Component ID	WFD Compliance	
		Assessment	Reason for component not being confirmed as compliant
Carsington to Site L main	128z	Compliant	
Blackbrook Reservoir to support Site B WTW	134A	Compliant	
New source and treatment at Linacre reservoir	142	Compliant	
Raw water import from CRT to Site C WTW	144B	Compliant	
Little Haywood new WTW on Upper Trent incl main to Meir	150	Compliant	
Broomleys BHs asset and water treatment enhancements	166	Compliant	
Expand Carsington - 10500MI / Expand Carsington - 16900MI/ Expand Carsington - 25000MI	187C	Compliant	
Clungunford / Oakley Farm BH enhancements	194A	Uncertain	Potential adverse impacts on the flow regime and ecology of River Clun.
Strategic Grid to Bishops Castle WRZ transfer solution	194B	Compliant	
Ladyflatte BHs asset and water treatment enhancements	198	Uncertain	Potential adverse impacts on the flow regime and ecology of the Ecclesbourne Catchment.
Site E WTW expansion and transfer main	14B	Compliant	
East Midlands raw water storage including new WTW	31C	Compliant	
East Midlands raw water storage including new WTW	31D	Compliant	
Site P WTW expansion	66	Compliant	
New WTW on River Dove near Uttoxeter supported by Carsington reservoir and deploying to Stoke (Size A)	89D20	Compliant	
New WTW on River Dove near Uttoxeter supported by Carsington reservoir and deploying to Stoke (Size B)	89D30	Compliant	
Site B WTW enhancements	99D	Compliant	
Preston Brockhurst BHs asset and water treatment enhancements	162	Compliant	



Component Name	Component ID	WFD Compliance	
		Assessment	Reason for component not being confirmed as compliant
Much Wenlock BH treatment enhancements	193	Uncertain	Potential adverse impacts on the flow regime and ecology of Much Wenlock-Farley Brook.
New GW Source in Coven GWMU	204	Compliant	
Milford BH output enhancements	205	Uncertain	Potential adverse impacts on the flow regime and ecology of River Sow.
Potable water import to Shelton WRZ (localised)	301A	Compliant	
Potable water import to Shelton WRZ (WRZ wide)	301B	Compliant	
UU Import to Site R WTW	302A	Compliant	
UU release from Vyrnwy	303	Compliant	
Ambergate to Mid Nottinghamshire transfer solution	304	Compliant	
Heathy Lea to North Nottinghamshire transfer solution	305	Compliant	
Site E to South Nottinghamshire Link	306	Compliant	
Peasley Bank - Hanchurch Pipeline	308	Compliant	
Draycote Reservoir capacity increase (Size A) with transfer main from Site C WTW to Coventry	310	Compliant	
Site R WTW to Baslow pipeline capacity increase	313	Compliant	
Shared South Staffordshire Asset to Nurton Transfer (High Flow)	309	Compliant	
Shared South Staffordshire Asset to Shelton WRZ transfer solution (Low flow)	309Z	Compliant	
Site R WTW to Grindleford pipeline capacity increase	312	Compliant	
Site R WTW to Ambergate transfer solution	314	Compliant	
Site U 60MI/d	F-60	Compliant	
Site U 30MI/d	F-30	Compliant	
Site U -120	F-120	Compliant	

Demand Side Components			
Enhanced Social Housing Water Efficiency Audit	WE003B	Compliant	
Enhanced Social Housing Water Efficiency Audit	WE004B	Compliant	
Leakage reduction	WE005	Compliant	
Increase in Metering	WE006	Compliant	
Enhanced Social Housing Water Efficiency Audit	WE003A	Compliant	
Enhanced Social Housing Water Efficiency Audit	WE004A	Compliant	



Ricardo  
Energy & Environment

The Gemini Building  
Fermi Avenue  
Harwell  
Didcot  
Oxfordshire  
OX11 0QR  
United Kingdom  
t: +44 (0)1235 753000  
e: [enquiry@ricardo.com](mailto:enquiry@ricardo.com)

[ee.ricardo.com](http://ee.ricardo.com)