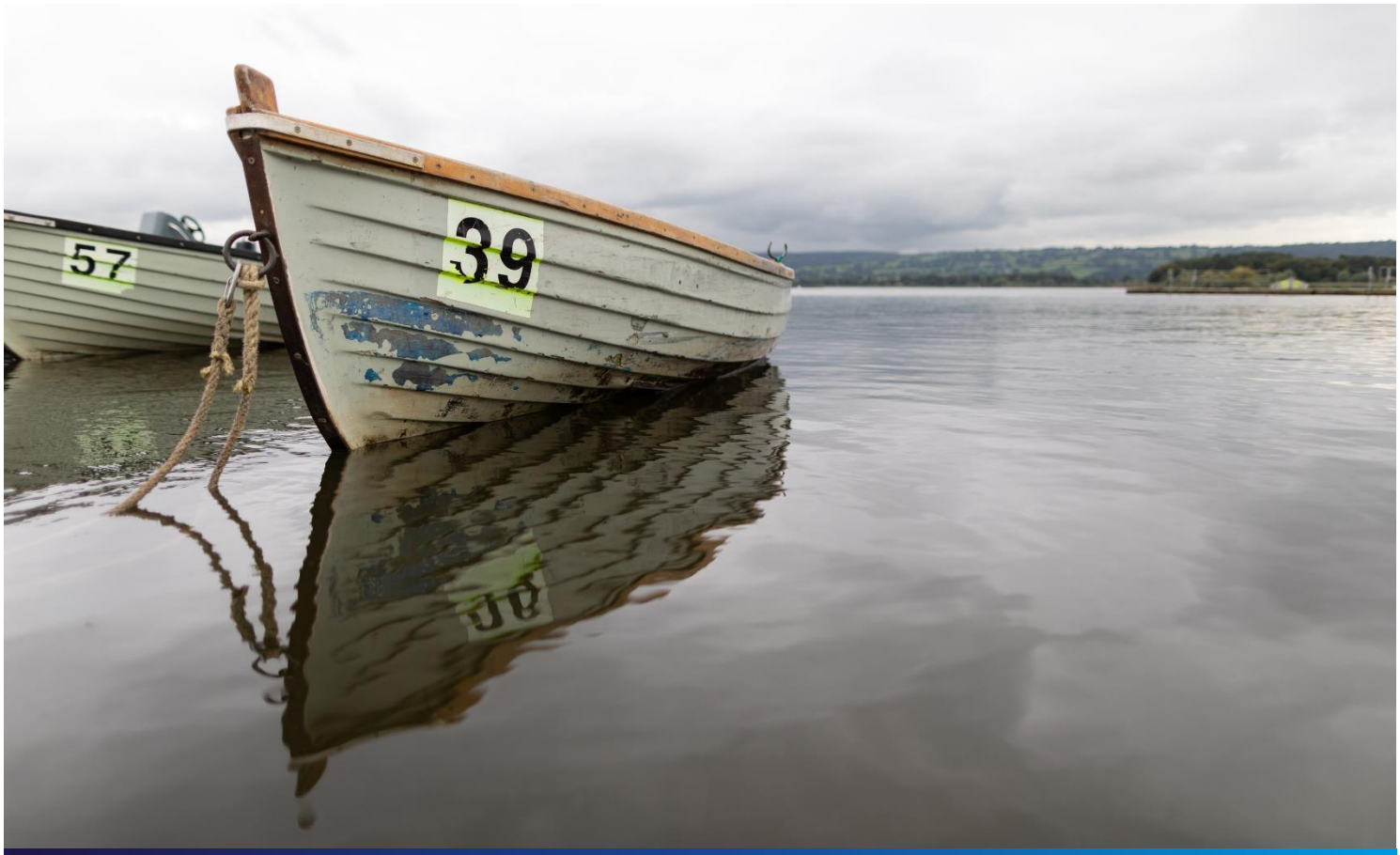

BRISTOL WATER – WATER RESOURCES MANAGEMENT PLAN 2024

Water Framework Directive Regulations Compliance Assessment

Report for: Bristol Water

Ref. WRMP24 WFD Compliance Assessment Report

Ricardo ref. ED15765 Issue: 3 18/10/2024

Ricardo Energy & Environment, Gemini Building, Fermi Avenue, Harwell, Oxfordshire, OX11 0QR, UK | +44(0)1235 75 3000 | ee.ricardo.com
Registered company no. 08229264 | VAT no. GB 212 8365 24

Customer:
Bristol Water

Customer reference:
3500077343

Contact:
Dr Stuart Ballinger, Ricardo Energy & Environment, First Floor North, 21 Prince Street, Bristol, BS1 4PH UK

T: +44 (0) 1235 753 353
E: stuart.ballinger@ricardo.com

Author:
Will Twigg, Bruce Munroe

Approved by:
Trevor Wade

Signed

Date:
18/10/2024

Ref: ED13785

Table of Contents

1. INTRODUCTION

This section sets out the background and purpose of this report (Section 1.1), explains the Water Framework Directive (Section 1.2) and its context in Water Resource Management Plans (Section 1.3).

1.1 BACKGROUND AND PURPOSE OF REPORT

Water companies in England and Wales have a statutory requirement to prepare a Water Resources Management Plan (WRMP) every five years. The latest Water Resource Planning Guideline (WRPG) produced by the regulatory bodies[1] (Ofwat, The Environment Agency and Natural Resources Wales) advises that it is the water companies' requirement to have regard to River Basin Management Plans (RBMPs) and Water Framework Directive regulations in their WRMPs. This report is driven by this requirement and will demonstrate how Bristol Water have met this requirement in the assessment of their WRMP24 feasible options and preferred plan.

1.2 THE WATER FRAMEWORK DIRECTIVE

The Water Framework Directive[2] is an EU Directive establishing a framework for Community action in the field of water policy which aims to protect and improve the water environment. The Directive was brought into UK law in 2003 and subsequently revoked by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 in England and Wales. From this point forward "WFD" refers to the legislation applicable to England and Wales, not the EU Directive.

1.3 WFD REQUIREMENTS FOR WRMPS

The purpose of a WRMP is to set out how a water company will achieve a secure supply of water for its customers whilst protecting the environment and is resilient to a range of future challenges (more extreme droughts, climate change, population growth).

As part of the WRMP, water companies must demonstrate that they have considered a range of environmental legislation, including the WFD regulations. The requirements for a WFD assessment of a water company WRMP are outlined in the 2023 WRPG (Box 1).

Box 1: WRPG 2023

Section 8.2.2. Assessing environmental constraints

"A. River Basin Management Plan and Water Framework Directive

River Basin Management Plan (RBMP) and the Water Framework Directive environmental objectives are a constraint on your options. You should screen out any options that have unacceptable environmental impacts that cannot be overcome.

You should ensure 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. Alternatively if investigations are yet to be completed, you should set out what your alternative options would be should those investigations demonstrate that there will be an unacceptable environmental impact.

You should also assess new supply options against the RBMP measures and objectives for each water body and meet your obligations to avoid future deterioration. You should ensure that your feasible options do not compromise the achievement of RBMP objectives.

You should talk to the Environment Agency about any intended actions that may:

- *cause deterioration of status (or potential)*
- *prevent the achievement of the water body status objectives in the river basin management plans*

[1] Ofwat, NRW & EA (2023), Water Resources Planning Guideline – Updated 14 April 2023
[2] European Union (2000) Directive 2000/60/EC of the European Parliament and of the Council

● *prevent the achievement of water body status (or potential) for new modifications*

You should do this as soon as possible before developing your plan. You should make a clear statement in your plan about any potential impacts."

The WRPG refers to ensuring 'no deterioration' of water body status. European Court of Justice (ECJ) ruling[3] clarified that 'no deterioration' 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, phyisco-chemical, etc.). This definition applies equally to Artificial Water Bodies and Heavily Modified Water Bodies 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 methodology align to this ECJ ruling.

It is noted, though not specifically linked to WFD, The Welsh Government Guiding Principles for Developing Water Resources Management Plans (WRMP's) for 2020[4] outlines that water companies should have regard to Section 6 and Section 7 of the Environment (Wales) Act 2016 when producing their WRMPs. The obligations of this Act are covered in the SEA and Natural Capital/Environmental Resilience assessments which will be undertaken in parallel to the WFD assessment.

[3] ECJ Case C‑461/13: Bund für Umwelt und Naturschutz Deutschland v Bundesrepublik Deutschlandhttp://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]

[4] Welsh Government (2016), The Welsh Government Guiding Principles for Developing Water Resources Management Plans (WRMP's) for 2020, April 2016

2. WFD COMPLIANCE ASSESSMENT METHODOLOGY

The purpose of this section is to set out the approach used when assessing the WFD compliance of the feasible options and preferred programme (and alternative programmes) of Bristol Water WRMP24. Section 2.1 identifies the WFD Assessment Objectives used throughout the WRMP process. Section 2.2 describes the proportionate level of detail for the assessments.

The assessment approach presented here has been applied to the feasible list of options and preferred programme (along with any alternative programmes). All schemes have been through a form of high-level WFD screening prior to being included in the feasible list of options. As a result, any options where there are any unalterable WFD constraints, therefore not suitable for promotion, are either not included or are flagged in the feasible list.

All assessments will be undertaken for the reporting unit of a WFD water body. The appropriate baseline information for water bodies status and targets is as published in the third cycle of RBMPs (RBMP3) – listed as the 2019 WFD status (RBMP3 metrics).

2.1 WFD ASSESSMENT OBJECTIVES FOR TESTING COMPLIANCE

This section provides the WFD Assessment Objectives used as a test of constraint when testing WFD compliance at an individual potential option-level (Section 2.1.1) as set out in WRPG (2023)[5]. This section also provides the additional, progressive WFD Assessment Objectives that have been assessed at a plan-level (Section 2.1.2).

2.1.1 Option-level WFD Assessment Objectives

Principally, the WFD acts as an indicator of constraint and determines where the WRMP or options within do not meet WFD Objectives set out in Regulation 13 of the WFD Regulations. In line with WRPG (2023) and UKWIR (2021) guidance the principle WFD Assessment Objectives that the WRMP (both feasible options and programmes) has been tested against are:

1. To prevent deterioration[6] of any WFD element of any water body - in line with Regulation 13(2)(a) and 13(5)(a).
2. To prevent the introduction of impediments to the attainment of 'Good' WFD status or potential for any water body in line with Regulation 13(2)(b) and 13(5)(c)[7].
3. To ensure that the planned programme of water body measures in RBMP3 to protect and enhance the status of water bodies are not compromised[8].

If an option has been assessed to definitively not comply with the WFD Assessment Objectives set out above then the option has been reported as WFD non-compliant and removed from the WRMP process. This only applies to options for which a clear and obvious conclusion around non-compliance can be reached, and for which no mitigation to provide compliance is possible.

If an option is assessed to potentially not comply with the WFD Assessment Objectives set out above then the option has been reported as potentially WFD non-compliant. If an option is reported as potentially WFD non-compliant it has remained in the WRMP process as it may be appropriate to consider the option further where it is considered that additional evidence to improve confidence in the assessment and/or enhanced design could mitigate the potentially WFD non-compliant issues. It is at

[5] Specifically set out in WRPG 2023 (updated 14 April 2023) at Section 8.2.2

[6] As defined in Section 1.3

[7] WRPG (2023) states that this a test to identify any options that 'prevent the achievement of the water body status objectives in the river basin management plan'. At present this is RBMP2. Discussion with EA and through review of EA internal guidance[#1] identified that the EA consider 'less stringent objectives are not permanent and the assessment of any new activity or project must take into account the need to continue to aim for good status. The new activity or project must not jeopardise the achievement of good status in the future, irrespective of whether a less stringent objective was set in RBMP2'.

[#1] EA (2021) Supporting implementation of river basin management plans position. LIT 14339. 01/2021

[8] To date, measures to be delivered in RBMP3, at a water body scale, have not been published and cannot be included in the assessment.

the discretion of Bristol Water as to whether a potentially WFD non-compliant option continues to progress through the WRMP process; however, if a potentially WFD non-compliant option is progressed it has been discussed and agreed by the water company with the relevant regulatory body.

2.1.2 Plan-level WFD Assessment Objectives

The WFD Assessment Objectives in Section 2.1.1 are the fundamental WFD Assessment Objectives that have been tested against at **both** the option-level and plan-level.

There are a number of further WFD Assessment Objectives, set out in the WRPG, which have been tested against at a plan-level. These further tests have only been applied to a Plan containing options which pass WFD Assessment Objectives 1-3. These are considered as progressive WFD Assessment Objectives rather than tests of constraint and do not lead to WFD non-compliance where they are not achieved. These are as follows:

4. To assist the attainment of the WFD Objectives for the water body – in line with Regulation 13(2)(b) and 13(2)(c)
5. To assist the attainment of the objectives for associated WFD protected areas – in line with Regulation 13(6)
6. To reduce the treatment needed to produce drinking water and look to work in partnership with others; promoting the requirements of Article 7 of the WFD[9].

Furthermore, with reference to plans which include schemes which potentially impact water bodies in Wales, additional WFD Assessment Objectives have been identified as appropriate from OGN72[10]. Again, these are progressive WFD Assessment Objectives rather than tests of constraint and have been tested against at a plan level. These are as follows:

7. To promote the sustainable use of water as a natural resource
8. To conserve habitats and species that depend directly on water
9. To progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment
10. To progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants
11. To contribute to mitigating the effects of floods and droughts.

A negative answer to the WFD Assessment Objectives above does not determine that the plan has WFD constraints; however, they can be used in decision making by the water company.

Where WFD Assessment Objectives 1, 2 and/or 3 are not met by a programme or plan then, unless there is no reasonable alternative, that plan has not been progressed as the preferred plan without discussion with the relevant regulatory body. Discussion with the regulatory body includes:

- If a plan is reported as potentially WFD non-compliant it may be appropriate to consider an adaptive plan where it is considered that additional evidence to improve confidence in assessment and enhanced design could mitigate the potentially WFD non-compliant issues.
- Where a plan is assessed as WFD non-compliant, in circumstances where there is an over-riding public interest or the benefits of achieving the WFD Assessment Objectives are outweighed by benefits to human health, human safety or sustainable development there is scope to apply for a Regulation 19 exemption as to why these WFD Assessment Objectives are not achieved.

2.2 PROPORTIONATE LEVEL OF DETAIL FOR ASSESSMENTS

Throughout the WRMP process WFD compliance has been tested at relevant stages parallel to the wider WRMP programme. The approach taken to test WFD compliance for feasible options and consequent programmes of options is as follows:

[9] Specifically set out in WRPG 2023 (updated 14 April 2023) at Section 9.4.5
[10] NRW. (2020). Guidance for assessing activities and projects for compliance with the Water Framework Directive. Operation Guidance Note 72

1) Option-level Assessment – As set out in Section 2.2.1, this is a full assessment that covers the feasible list of options.
2) Programme level assessment – As set out in Section 2.2.2, the cumulative effects of the options that make up any Programmes have been assessed.
3) Preferred WRMP programme assessment – As set out in Section 2.2.3, the preferred WRMP programme for Bristol Water has been assessed for impacts with other water companies draft WRMPs and regional plans.

In order to ensure the WFD assessment is proportionate for each stage an outline of the assessment for each stage is provided in this section.

2.2.1 Stage 1 Option-level assessment

Stage 1 is where there is scope for the most detailed assessments. As advocated in the UKWIR (2021) guidance, each option has gone through a process to determine if it is compliant with the three principle WFD Assessment Objectives (as set out in Section 2.1). For proportionality of option assessment there are 4 steps with each step becoming increasingly detailed. Where there is sufficient confidence in an assessment's conclusions the option has not progressed onto the next step. The four steps are as follows:

- Step 1 Screening based on activities - to either exclude options from further assessment where it could be reasonably expected that the option would not have an influence on any WFD status elements or supporting elements, or identify which activities require progressing to Steps 2 or 3 assessment and in which water bodies (Section 2.2.1.1).
- Step 2 Screening based on magnitude of hydrogeological/hydrological impact and water body context- to either exclude options from assessment where they are negligible or low impact, or identify which activities require progressing to Step 3 assessment and in which water bodies (Section 2.2.1.2).
- Step 3 Impact assessment – either using existing assessments or an expert judgement approach based on source-pathway-receptor to establish likelihood of compliance with agreed WFD Assessment Objectives in all relevant water bodies. A confidence rating has been given to all assessments to reflect the amount of uncertainty in the design, environmental baseline and magnitude of impact (Section 2.2.1.3).
- Step 4 Detailed impact assessment - specific to the option using measured baseline data, including additional bespoke collected evidence, and detail on design and operating pattern. None of the options in this WRMP have been subject to this level assessment. This level of assessment is not normally proportionate at a WRMP level.

Further detail on how these steps have been assessed is set out below for the option-level assessment.

2.2.1.1 Step 1: Screening based on activities

All options in the feasible list have been subject to this step. Where an option is screened as WFD compliant at this stage it has been accompanied by a robust explanation as to why this assessment can be made without the need to progress the option to Step 2. Instances where there is considered no risk to WFD compliance are identified as:

- Demand management activities;
- Supply options which have passed a sustainability assessment[11] at an abstraction rate up to the proposed option rate;
- Network constraint (i.e. improving infrastructure to achieve greater deployable output) options that do not result in additional abstraction (in comparison to recent abstraction rates), or where

[11] e.g. Surface water options WRGIS Band 1, 2 and 3 pass at fully licensed; groundwater options passing WFD groundwater tests; WINEP investigation are identified as sustainable by EA (UKWIR, 2021).

that additional abstraction has been identified as sustainable[12]; provided the construction does not affect WFD protected areas or increase the risk of the transfer of INNS.

At this stage, the majority of construction activities can be screened out of further assessment with these activities being mitigatable assuming best practice construction techniques and only being short-term impacts (i.e. will not cause deterioration over the 6-year RBMP cycle).

Where an option is concluded as not compliant with the WFD Assessment Objectives after Step 1 screening, the option has been progressed to Step 2 screening.

2.2.1.2 Step 2: Screening based on magnitude of hydrogeological/hydrological impact and water body context

Step 2 screening identifies the water body name, ID and type of any water bodies that could potentially be impacted. The potential impacts are determined by the type of option. The UKWIR (2021) guidance identifies a range of option types and their potential impacts (Table 2-1).

Table 2-1 Potential effects to screen in to WFD assessment by option type

Option type	Impact type to test
New groundwater abstraction, increase in licence rate	• Change in groundwater quantity • Impact on groundwater dependent terrestrial ecosystems • Impact on connected surface waters (flow change effects on ecology and water quality dilution) • Likelihood of saline ingress into aquifer
Aquifer recharge/ aquifer storage and recovery	• Effects specific to source water used for recharge
Reservoir	• Impact on connected surface waters (flow change effects on ecology and water quality dilution)
Run-off river abstraction	• Flow change effects on ecology and water quality dilution
River regulation	• Flow change effects on ecology and water quality dilution in regulated reach
Reuse	• Flow and water quality change effects on ecology and chemical status in receiving watercourse • Flow and water quality change effects on ecology and chemical status in water course previously receiving discharge
Desalination	• Hydrodynamic changes on ecology in abstracted water body, including through pathways of salinity and sedimentation pattern change
Inter-basin transfer	• Flow change effects on ecology and water quality dilution in donor watercourse • Direct ecological effects from introduction of invasive non-native species • Flow and water quality change effects on ecology and chemical status in receiving watercourse

At this stage the context of the water body will be considered to identify any additional constraints i.e. any protected areas, any planned water body measures in RBMP3.

For any options that are sourced from groundwater a hydrogeologist has determined any local surface water bodies that are hydraulically connected. The impact on both the groundwater water body and the surface water bodies has been assessed. Similarly, any links between lake water bodies and river water bodies have been taken into consideration when assessing options that impact lake water bodies.

[12] *ibid*

Impacts are not confined to the water body where the option is located as the impacts of an option can transverse multiple water bodies. In these instances, assessments have been conducted against each water body in the flow pathway until no WFD compliance risk is identified.

In England & Wales, hydrology is a supporting element to WFD status and is not a status element that contributes directly to WFD ecological status. Regulators' hydrogeological/hydrological assessment tools and their outputs can provide suitable information from which to assess the magnitude of effect. Hydrogeological/hydrological appraisal tasks that have been undertaken are:

- Review the regulatory position[13] on water available for abstraction in an aquifer, reach or catchment, based on modelling tools. The available quantity can be compared with the increase in abstraction associated with an option. These assessments often include an indication of water availability under different flow conditions which adds specificity to potential operational considerations such as hands-off flow conditions.
- Review the regulatory position on WFD hydrology, including the pass forward flow from rivers to transitional waters[14].
- Review the regulatory position on the extent of influence of flow on status elements failing their targets, including biological status elements, physico-chemical status elements, hydro-morphology and groundwater quantitative status[15].
- For surface waters, review the likely changed river flow regime against measured river flows from nearby gauging stations long-term records held on the National River Flow Archive[16] to inform the magnitude of change in flow.

Where the hydrogeological/hydrological appraisal identifies operational activities that are considered with confidence to be low impact these will be concluded as WFD compliant, subject to review of local WFD protected areas.

2.2.1.3 Step 3: Impact assessment

Where a WFD assessment has not identified an option as WFD compliant through the screening processes of Step 1 and Step 2 the option has been subject to impact assessment.

For each option the construction and operational activities which have been screened in to Step 3 impact assessment are identified. A source-pathway-receptor approach to identifying effects on WFD Assessment Objectives has been undertaken. Using that approach, the source of change is the construction or operational activity. The pathway includes physical environment changes such as water level change, flow velocity change, morphological change. The receptor is the WFD status element or the WFD protected area.

For a proportionate assessment, WFD status elements have been screened for those at risk of change from water resource plan options. These have been used as the basis of the assessment for deterioration and target impediment WFD Assessment Objectives, with other elements included on a case-by-case basis. Where the pathway of option impact is physical environment changes only (e.g. not to water quality), the sensitive biological status elements (to flow and morphology) are as follows:

- River water bodies: macrophytes, invertebrates, fish
- Lake water bodies: macrophytes
- Transitional water bodies: fish, benthic invertebrate (extent), sea grass (extent)
- Coastal water bodies: benthic invertebrate (extent), sea grass (extent).

---

[13] Environment Agency Abstraction Licensing Strategy datasets: https://data.gov.uk/dataset/b1f5c467-ed41-4e8f-89d7-f79a76645fd6/water-resource-availability-and-abstraction-reliability-cycle-2 (April 2021) https://data.gov.uk/dataset/54181453-b5bd-4694-96b2-a1b5d40985b5/groundwater-management-units-coloured-according-to-water-resource-availability-colours (September 2020)

[14] In England this is reported by the EA through the RNAG assessment (Reasons for Not Achieving Good status/potential)

[15] *ibid*

[16] https://nrfa.ceh.ac.uk/data/search

Further pathways are dependent on local conditions and local environmental quality pressures such as changes in dilution of point or diffuse pollution pressures, changes in fish passability at structures. Under these circumstances the assessment also considers WFD compliance impacts to physico-chemical water quality, particularly sanitary and nutrient quality which are the main supporting water quality elements to ecological quality, as well as the associated biological status elements to nutrient and water quality pressures. In exceptional circumstances, where there are known discharges of specific pollutants or substances regulated through WFD chemical status, the dilution change of these has been included in the assessment.

Water quality changes are often associated with river flow reductions as a result of the change of dilution of water quality pressures. Existing known pressures are listed by the Environment Agency/Natural Resources Wales' Reasons for Not Achieving Good (RNAG) datasets and these are reviewed for their level of influence.

The impact assessments have been undertaken using expert judgement by a hydroecologist, working with any other appropriate disciplines required, which is considered to be the most appropriate Step 3 impact assessment, utilising a level of confidence indicator.

For groundwater bodies, a hydrogeologist has advised on the outcome of the four quantitative tests and the relevant linked surface water bodies, as well as any of the qualitative tests screened into the assessment. These assessments utilise existing reports or modelling (including regulators regional groundwater models) where readily available or, failing that, expert judgement (noting that no additional modelling has been conducted at this step).

A confidence rating has been assigned to all assessments to reflect the amount of uncertainty in the option design, environmental baseline and magnitude of impact. The confidence level categories that have been used are presented in Table 2-2.

Table 2-2 WFD compliance assessment confidence level categories

Confidence category	Description
Low	Known WFD compliance risks/ failures and potential pathways from option's activities - where assessment based on expert judgement alone
Medium	Reasonable levels of evidence for at risk activities. Some assumptions and expert opinion required around risk areas.
High	Good level of evidence with minimal assumptions or low risk activity

2.2.2 Stage 2: Programme level assessment

In order to support programme development, the potential for cumulative effects of different combinations of constrained options has been highlighted. The programme level assessment of WFD compliance contains a list of the options included in the programme, their construction start date and implementation date (to define overlaps in the construction period). Informed through the option-level assessments which already have been set out per water body, a list of all WFD water bodies assessed for the individual options was assimilated. Where more than one option was assessed for the same water body a cumulative assessment has been undertaken of the multiple options, against the agreed set of WFD Assessment Objectives using the methodologies for the option-level assessment. This required the revision of the high level hydrological and/or hydrogeological assessment which underpins the testing of the WFD Assessment Objectives. It is noted that the programme level assessments include any additional linked water bodies which are impacted by the cumulative effect of options (in addition to those that are identified in the option-level assessment) – either downstream surface water bodies, or additional surface water bodies linked to groundwater bodies.

An overall WFD compliance statement for each programme has been prepared setting out compliance with each of the agreed WFD Assessment Objectives and the level of confidence in the assessment.

The results from this level of WFD assessment have been used to inform the preferred water resource plan.

2.2.3 Stage 3: Assessment of the Preferred WRMP

The cumulative impact of the whole WRMP, regional plan and with draft WRMPs for other water companies has been assessed following a similar process to that identified in Section 2.2.2.

A compliance statement of the preferred programme has been presented. This sets out compliance with each of the agreed WFD Assessment Objectives and the level of confidence in the assessment.

2.3 CONSULTATION

A WFD Compliance Assessment Method Statement[17] was issued to the Environment Agency as part of the enhanced WRMP pre-consultation process. The Method Statement set out the methodology to follow when undertaking the Water Framework Directive Regulations[18] (WFD) Compliance Assessment for the Bristol Water WRMP in the WRMP24 cycle.

The WFD Regulations Compliance Assessment Report was issued as part of the evidence base to support the consultation on the Draft WRMP24. The consultation was run for a period of 12 weeks from 28th November 2022 to 17th February 2023. Feedback from the consultation has been considered by Bristol Water and incorporated into a formal Statement of Response, setting out how the feedback has been used in the finalisation of the WRMP24 and where relevant in this updated WFD Regulations Compliance Assessment Report. The Statement of Response was published in August 2023. A revised draft WRMP24 (rdWRMP24) and updated supporting environmental assessments, including this WFD compliance assessment, was submitted to the regulators in April 2024. Bristol Water received permission to publish its plan as final in a letter from Defra dated 21 August 2024. This WFD Compliance Assessment Report supports the Final WRMP24 which will be published in October 2024.

[17] Ricardo (2022) Bristol Water - Water Resources Management Plan 2024: Water Framework Directive Method Statement. Consultancy report, March 2022.
[18] Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. SI 2017 No. 407

3. OPTION-LEVEL (STAGE 1) WFD ASSESSMENT OUTCOMES

This section outlines:

- The options in the feasible list for the Bristol Water WRMP24 that have been subject to WFD compliance assessment.
- The final outcomes of the WFD compliance assessment at an option-level for each of the options in the feasible list for the Bristol Water WRMP24.

3.1 FEASIBLE OPTIONS INCLUDED IN THE WFD COMPLIANCE ASSESSMENT

Through an extensive optioneering process, considering a wide range of potential options to balance future supply and demand, Bristol Water has selected the most suitable options to make up the feasible options list. This list includes both demand side and supply side options, of which only the latter require a WFD Compliance Assessment. The supply side options are presented in Table 3-1.

Table 3-1 list of the Bristol Water WRMP24 feasible options which have been subject to a WFD Compliance Assessment

Option Category	WRMP24 Ref.	Option Name
Water Treatment Works capacity increase	P01-01	Increase performance of existing sources to increase DO (deployable output) near to licensed quantity
Water Treatment Works capacity increase	P01-02	Increase performance of existing sources to increase DO near to licensed quantity
Transfer	R005	Cheddar 2 Source and Transfer SRO (Strategic Resource Option)[19]
Other	P06	Catchment Management of the Mendip Lakes (Chew, Blagdon and Cheddar) to manage outage risk from algal blooms
Transfer	R007	Pumped Refill of Chew Valley Reservoir
Water Treatment Works capacity increase	P08	Increase performance of existing sources (Alderley WTW (Water Treatment Works)) to increase deployable output
Transfer	R08-02	New water sources within Bristol Water CAMS (Catchment Abstraction Management Strategy) area for the location Middle River Avon at Bathford
Other	R08-03	New water sources within Bristol Water CAMS area for the location Bristol Frome at Frenchay
Effluent reuse	R014	Avonmouth WWTW (Wastewater Treatment Works) Direct Effluent Re-use
Transfer	R016	Huntspill transfer
Groundwater	R024	Bring Honeyhurst source back into supply

[19] Since the Draft WRMP24, it has been shown that there is not the need, in Bristol Water's supply area for an additional reservoir at the present time and as a result the option has been removed from Bristol Water's feasible options list. However, this option has been selected as a preferred option within the WCWR regional plan and is being developed within Bristol Water's supply area to serve the wider region as part of the RAPID gated process. Information concerning the Cheddar 2 option as assessed at the Draft WRMP24 stage has been retained in this report for reference.

3.2 OPTION LEVEL WFD COMPLIANCE ASSESSMENT

This section presents a summary of the option level WFD Compliance Assessment for all options included in the feasible list. It is the outcome of methodological Stage 1; a summary of the screening (methodological Step 1 and Step 2) and impact assessment (methodological Step 3) which are reported in Appendix A and Appendix B respectively. The option level WFD Compliance Assessment summary is presented in Table 3-2. The summary includes those options screened as without risk of deterioration in WFD status and without risk to achieving WFD objectives (as identified in Appendix A) together with results of the assessment of those options passed forward to Step 3 (as assessed in Appendix B).

Table 3-2 Option-level WFD Compliance Assessment Summary

Option Name	WRMP24 Ref.	Outcome	Reason, if not confirmed as compliant
Increase performance of existing sources to increase DO near to licensed quantity	P01-01	Non-compliant (low conf.)	Non-compliant in the Mendips (GB40901G804600) groundwater body due to the potential for deterioration in the dependent surface water body status. Non-compliant in the Cheddar Yeo - source to conf Stubbingham Rhyne (GB109052021540) surface water body due to the potential for deterioration in the fish, invertebrates and macrophytes and phytobenthos status. Also potential for introduction of impediments to the attainment of Good WFD status for macrophytes and phytobenthos. Further investigations are required into the extent of flow regime changes as a result of the increased groundwater abstraction and the sensitivity of the biological receptors to the change in order to improve the confidence in this assessment.
Increase performance of existing sources to increase DO near to licensed quantity	P01-02	Uncertain	The extent of the flow reduction achieved in the Sheppey (GB108052021221) surface water body as a result of the capture of the spring water and additional borehole abstraction associated with this option is unknown. Further investigations are required into the extent of flow regime change in the River Sheppey as a result of this option and the sensitivity of the biological receptors to this flow change in order to improve confidence in this assessment.
Cheddar 2 Source and Transfer SRO	R005	Non-compliant (med conf.)	This assessment is based on the Gate 2 Cheddar 2 Source and Transfer SRO WFD compliance assessment. It is worth noting that the assessment for the SRO is not directly comparable to this WRMP option as it uses a operational profile based on Wessex Water demand. Non-compliant in the Cheddar Yeo - source to conf Stubbingham Rhyne (GB109052021540) surface water body due to the potential for deterioration in the fish and invertebrate status. Also potential for introduction of impediments to the attainment of Good WFD status for macrophytes and phytobenthos and phosphate. Non-complaint in the Axe - Cocklake to Brean Cross Sluice surface water body due to the potential for deterioration and the impediment to Good status for phosphate.
Catchment Management of the Mendip Lakes (Chew, Blagdon and Cheddar) to manage outage risk from algal blooms	P06	Compliant (high conf)	

Option Name	WRMP24 Ref.	Outcome	Reason, if not confirmed as compliant
Pumped Refill of Chew Valley Reservoir	R007	Compliant (high conf.)	
Increase performance of existing sources (Alderley WTW) to increase deployable output	P08	Non-compliant (low conf.)	Non-compliant in the Ozleworth Bk – source to conf Little Avon R (GB109054026610) surface water body due to the potential for deterioration in the fish, invertebrates and macrophytes/phytobenthos status. Non-compliant in the Little Avon – Ozleworth Bk to conf Tortworth Bk (GB109054026600) surface water body due to potential for deterioration in the fish, invertebrates, macrophytes/phytobenthos and phys-chem water quality status. Also, there is the potential for the impediment to Good phys-chem water quality status, in particular Phosphate status. Further investigations are required into the sensitivity of the receptors to the proposed reduction in flow.
New water sources within Bristol Water CAMS area for the location Middle River Avon at Bathford	R08-02	Compliant (high conf.)	
New water sources within Bristol Water CAMS area for the location Bristol Frome at Frenchay	R08-03	Compliant (high conf.)	
Avonmouth WWTW Direct Effluent Re-use	R014	Compliant (high conf.)	
Huntspill transfer	R016	Compliant (low conf.)	
Bring Honeyhurst source back into supply	R024	Compliant (med. conf.)	

4. PROGRAMME-LEVEL (STAGE 2) WFD ASSESSMENT

This section presents the programme-level cumulative assessment of the Bristol Water WRMP preferred programme, along with cumulative assessment of any alternative programmes that include supply side options. The majority of the alternative programmes developed by Bristol Water only involve leakage reduction and demand policy delivery-based options with no supply side options selected. The 'High demand' scenario and the 'Plausible worst case climate change and demand' scenario contain supply options so have been assessed for cumulative impacts in this section.

4.1 PREFERRED PROGRAMME

The preferred programme for the Bristol Water WRMP includes one supply side option: P06 - Catchment Management of Mendip Lakes. This option is already in operation and would be a continuation of the catchment management work that is currently undertaken by Bristol Water. The option alone (see Section 3.2), is assessed as WFD compliant (high confidence). With this being the only supply side option within the preferred programme, a cumulative assessment with other options in the programme is not applicable. As a result, the preferred programme when considered alone is deemed compliant against the three core WFD Assessment Objectives (see Section 2.1.1).

Option P06 would also meet the progressive WFD Assessment Objectives set out in Section 2.1.2. The option would reduce diffuse pollution of nutrients into three lake water bodies (Blagdon Lake - GB30943135, Chew Valley Lake - GB30943096 and Cheddar Reservoir – GB30943348), all of which have objectives to improve the total nitrogen and/or total phosphorus status to Good status, as well as associated biological status elements. This option would assist with the delivery of these water body objectives, in line with WFD Assessment Objective 4.

Further, both Blagdon Lake and Chew Valley Lake are considered as protected areas (Nitrate Vulnerable Zones) under the Nitrates Directive. By reducing the nutrient inputs to these water bodies it would assist with the aims of the Nitrates Directive. Further, both these reservoirs are also Drinking Water Protected Areas so reducing the nutrient concentrations of the water abstracted from these reservoirs may also reduce any treatment needs. As such, this option would also have progressive impacts in line with WFD Assessment Objectives 5 and 6 (see Section 2.1.2).

4.2 'HIGH DEMAND' PROGRAMME

The 'High demand' scenario (due to high population growth) results in the need for additional supply options (to those included in the preferred programme) by 2069. These are listed below with the year of implementation provided in brackets:

- P06 - Catchment Management of Mendip Lakes (2025)
- P08 - Alderley WTW (increased production) (2069)
- R014 - Avonmouth WWTW direct effluent reuse (2073)
- R24 - Bring Honeyhurst Well source back into supply. (2078)
- P01-02 - Forum WTW (increased production) (2079).

Of these options, the option-level assessments are presented in Section 3.2. Based on the impacted water bodies identified through the option-level assessments, there is a potential cumulative impact on the Wells groundwater body (GB40902G804700) associated with Option R24 and Option P01-02 (Cumulative HD1). The WFD screening and impact assessments for the programme-level cumulative assessments are presented in Appendix C and Appendix D, respectively. No additional water bodies have been assessed as a result of the cumulative impact that are not identified in the option-level assessment. As described in Section 4.1, Option P06 would meet the progressive WFD Assessment Objectives set out in Section 2.1.2..

4.3 'PLAUSIBLE WORST CASE CLIMATE CHANGE AND DEMAND' PROGRAMME

The 'Plausible worst case climate change and demand' scenario is represented by a future under the high climate change scenario, resulting in less water available in the environment, and Bristol Water are unable to deliver the leakage and per capita consumption reduction targets by 2050 (with the assumption that 50% delivery of the target is achieved). The options that are likely to be required under this scenario are listed below with the year of implementation provided in brackets:

- P06 - Catchment Management of Mendip Lakes (2025)
- P08 - Alderley WTW (increased production) (2068)
- R014 - Avonmouth WWTW direct effluent reuse (2073).
- R24 - Bring Honeyhurst Well source back into supply (2078).

Of these options, the option-level assessments are presented in Section 3.2. None of these options impact the same water body, as such, there would be no cumulative impacts expected. As described in Section 4.1, Option P06 would meet the progressive WFD Assessment Objectives set out in Section 2.1.2..

5. PREFERRED WRMP (STAGE 3) WFD ASSESSMENT AGAINST OTHER PLANS AND PROJECTS

This section identifies any options in other water companies WRMPs that would have cumulative impacts with the preferred programme for the Bristol Water WRMP. The supply-side option (P06) within the preferred programme Bristol Water WRMP is a catchment management option that would only lead to minor changes in abstraction from existing sources exclusively within the Bristol Water operational area and not adjoining any other water companies. The option would primarily lead to water quality improvement in several catchments that feed these existing sources, with the catchment management option reducing the nutrient contributions from diffuse sources. With the option primarily improving the water quality within catchments, there is not a pathway for cumulative impacts with other plans and projects to be assessed here.

6. WFD COMPLIANCE SUMMARY OF THE BRISTOL WATER WRMP24

The Bristol Water preferred programme for the WRMP24 has been tested against the three core WFD Assessment Objectives (Objectives 1 – 3) and the progressive WFD Assessment Objectives (Objectives 4 – 11). Overall, the Bristol Water WRMP24 has been deemed as compliant, both on its own and assessed cumulatively with other plans and projects, against each of the core WFD Assessment Objectives with the preferred programme only containing a single supply option which has been assessed as WFD compliant (high confidence). The option is a catchment management option and would reduce the nutrient input to several lake water bodies in order to reduce outage. The decrease in nutrients into these water bodies would help assist the water bodies to achieve their objectives and assist the attainment of the objectives for associated WFD protected areas (Nitrate Vulnerable Zones and Drinking Water Protected Areas) thus meeting the progressive WFD Assessment Objectives 4 and 5. The reduction in nutrients would also reduce the treatment needs for the treatment works that abstract from these water bodies, thus meeting the WFD Assessment Objective 6.

APPENDICES

Appendix A: Option-level screening

This appendix presents the results of the WFD compliance assessment screening outcomes (methodological Step 1 and Step 2) for all of the options included in the feasible list and indicates whether they were screened in for an impact assessment (methodological Step 3) based on the potential risk of deterioration of WFD status. Where an option has been screened in for an impact assessment, the water bodies that were screened in have also been identified. The outcomes of the screening steps are displayed in Table A-1 The impact assessment for the options and water bodies scoped in for further assessment are presented in Appendix B.

Demand side options have been screened out for WFD compliance assessment; these options may have beneficial effects on WFD objectives by improving the local water environment through land-use management and reducing the growth in demand for water.

Table A-1 Option-level WFD screening outcomes

Option name	WRMP24 Ref.	Water body name	Water body ID	Type	Screened as WFD compliant	Reason screened as compliant
Increase performance of existing sources to increase DO near to licensed quantity	P01-01	Mendips	GB40901G804600	Groundwater	No	
		Cheddar Yeo - source to conf Stubbingham Rhyne	GB109052021540	River	No	
Increase performance of existing sources to increase DO near to licensed quantity	P01-02	Wells	GB40902G804700	Groundwater	No	
		Sheppey	GB108052021221	River	No	
Cheddar 2 Source and Transfer SRO	R005	Cheddar Yeo - source to conf Stubbingham Rhyne Water Body	GB109052021540	River	No	
		Axe - Cocklake to Brean Cross Sluice	GB109052021570	River	No	
Catchment Management of the Mendip Lakes (Chew, Blagdon and Cheddar) to manage outage risk from algal blooms	P06	Chew Valley Lake	GB30943096	Lake	Yes	The catchment management activities would reduce the risk of outage at Bristol Water WTWs, therefore, would allow abstraction from their lake sources more reliably. These lake sources are heavily modified water bodies and the ecology within is accustomed to a variable abstraction/lake level regime. As such, there is no risk to WFD compliance in the lake water bodies. The additional abstraction would not significantly alter the spill regime from the Chew Valley Lake or Blagdon Lake and each of these reservoirs has a compensation flow release to protect low flows in the downstream rivers. As such, there is no risk to WFD compliance in the downstream water bodies.
		Chew - Chew Valley Lake to conf Winford Brook	GB109053021852	River	Yes	
		Blagdon Lake	GB30943135	Lake	Yes	
		Yeo - source to conf Congresbury Yeo	GB109052021640	River	Yes	
		Cheddar Reservoir	GB30943348	Lake	Yes	
Pumped Refill of Chew Valley Reservoir	R007	Bristol Avon (By Bk to Netham Weir)	GB109053027371	River	No	
		Chew Valley Reservoir	GB30943096	Lake	No	
Increase performance of existing sources (Alderley WTW) to	P08	Ozleworth Bk - source to conf Little Avon R	GB109054026610	River	No	
		Little Avon - Ozleworth Bk to conf Tortworth Bk	GB109054026600	River	No	

Option name	WRMP24 Ref.	Water body name	Water body ID	Type	Screened as WFD compliant	Reason screened as compliant
increase deployable output		Little Avon - conf Tortworth Bk to mouth	GB109054026620	River	No	
New water sources within Bristol Water CAMS area for the location Middle River Avon at Bathford	R08-02	Bristol Avon (By Bk to Netham Weir)	GB109053027371	River	Yes	This option would abstract water from the River Avon upstream of Bathford. The increase in abstraction by 1.4 Ml/d would account for a 0.7% reduction in Q95 flows on the River Avon at the abstraction point. This is deemed to be a minor hydrological change that would not be sufficient to impact any WFD elements. As such, the operation of this option is deemed to be WFD compliant.
New water sources within Bristol Water CAMS area for the location Bristol Frome at Frenchay	R08-03	Frome (Brist) - Bradley Bk to conf Floating Hbr	GB109053027840	River	Yes	This option would abstract water from the River Frome at Frenchay. The increase in abstraction by 1.1 Ml/d would account for a 7% reduction in Q95 flows on the River Frome at the abstraction point. This is deemed to be a minor hydrological change that would not be sufficient to impact any WFD elements. As such, the operation of this option is deemed to be WFD compliant.
Avonmouth WWTW Direct Effluent Re-use	R014	Severn Lower	GB530905415401	Transitional	Yes	This option would reduce the discharge of treated effluent from Avonmouth WwTW to the Severn Estuary by 10Ml/d. In the context of the Seven Estuary, this reduction in flow is negligible and would be insufficient to impact any WFD elements. As such, the operation of this option is deemed to be WFD compliant.
Huntspill transfer	R016	Huntspill	GB108052021210	River	No	
		Cheddar Reservoir	GB30943348	Lake	No	
	R024	Wells	GB40902G804700	Groundwater	Yes	

Option name	WRMP24 Ref.	Water body name	Water body ID	Type	Screened as WFD compliant	Reason screened as compliant
Bring Honeyhurst source back into supply		Axe - Cocklake to Brean Cross Sluice	GB109052021570	River	Yes	A WINEP investigation has been undertaken into the sustainability of the abstraction from the Honeyhurst Well and Wellhead Springs sites. A notational solution was selected that advocated that abstraction could occur from these sources subject to: - continued environmental monitoring to develop baseline data -environmental flow assessment to characterise the relationship of ecology to flow - signal test to constrain understanding of likely influence of Honeyhurst Well on Stoke Brook - develop HOF framework Subject to the conditions above, this option is deemed to be WFD compliant.

Appendix B: Option-level impact assessment

This appendix presents the impact assessment (methodological Step 3) for the options that were screened in for more detailed assessment through the screening steps (as set out in Appendix A). An impact assessment table has been completed for each water body for each option that has been identified through the screening process.

Option	P01-01 Increase performance of existing sources to increase DO near to licensed quantity	Sources & pathways of potential effect: This water body has been screened for an impact assessment due to the additional groundwater abstraction that would occur from the Charterhouse Boreholes as a result of the recommissioning of the Chaterhouse WTW. This could reduce groundwater levels in this water body and potentially increase concentrations of any point source groundwater pollutants.
Water body type	Groundwater	
Water body ID	GB40901G804600	
Water body name	Mendips	

	Baseline Status		**Assessment of option**		
Status element	Draft RBMP3 Status	**Reasons for not achieving good status**	Assessment	Potential for deterioration	Potential for introduction of impediments
Dependent surface water body status			There are known links between groundwater and surface water flows in the River Yeo with the source of the water body being the Cheddar Springs. The following page contains an impact assessment of the Cheddar Yeo - source to conf Stubbingham Rhyne water body (GB109052021540) which found the impact to be potentially non-compliant (low confidence).	Non-compliant (low conf.)	n/a
Ground water dependent terrestrial ecosystem test			The groundwater abstractions are situated in close proximity to the Cheddar Complex SSSI GWDTE. The citation for this SSSI notes features that are predominantly not groundwater supported. As such, it is unlikely that deterioration would occur at this site.	Compliant (med. conf.)	n/a
Saline intrusion			There is no increased risk of saline intrusion as a result of the additional abstraction from this water body.	Compliant (med. conf.)	n/a
Water balance			On a water body scale, the amount of water abstracted from this water body will be negligible. As such, there is little risk of deterioration in the water balance status of this water body.	Compliant (med. conf.)	n/a
Chemical (overall)		Poor for the dependent surface water body status and drinking water protected area	Despite this, due to the relatively small increase in abstraction, it is unlikely that the additional abstraction would cause deterioration in water quality on a water body scale	Compliant (low conf.)	Compliant (low conf.)
RBMP3 water body measures		**Not available**	RBMP3 water body measures not currently published	n/a	n/a
			Overall assessment of WFD Regulations compliance of the option in this water body	Non-compliant (low conf.)	

Option	P01-01 Increase performance of existing sources to increase DO near to licensed quantity
Water body type	River
Hydromorph designation	Not designated artificial or heavily modified
Water body ID	GB109052021540
Water body name	Cheddar Yeo - source to conf Stubbingham Rhyne

Sources & pathways of potential effect:
This water body has been screened in for further assessment due to the capture of spring water in the headwaters of the River Yeo and additional groundwater abstraction from the Mendips water body. Each of these sources would lead to a reduction in flow in this water body potentially impacting the in-channel habitats and water quality within this water body.

	Baseline Status	**Reasons for not achieving good status**					**Assessment of option**		
Status element	Draft RBMP3 status	Flow	Morphology	Sanitary water quality	Nutrients	Other	Assessment	Potential for deterioration	Potential for introduction of impediments
Fish	High						The source of the River Yeo is the Cheddar Springs and there are few other flow contributions in this water body. The Cheddar Springs emerge from the same groundwater source as the additional abstraction would occur from. The additional abstraction may alter the recharge rate of this source, potentially leading to a change in the flow regime of the River Yeo. Though the low flows in this water body are protected by a hands-off flow conditions, the increased recharge time may increase the duration that flows are at hands-off flow value. It is unclear how significant the flow regime change would be however there is the potential that it could have impacts on the in-channel habitats, particularly in the upper, flow dependent reach of the River Yeo that currently supports the high fish/invertebrate status. There is the possibility that this could cause deterioration in the biological status elements. Further investigations are advocated into the extent of flow regime change as a result of the increased groundwater abstraction and the sensitivity of the biological receptors to the change.	Non-compliant (low conf.)	n/a
Invertebrates	High							Non-compliant (low conf.)	n/a
Macrophytes/ phytobenthos						Suspect data		Non-compliant (low conf.)	Non-compliant (low conf.)
Phys-chem water quality (in support of ecological status)		Poor for phosphate due to poor livestock management and continuous sewage discharge.					It is unlikely that there would be any deterioration in phys-chem water quality as the lowest flows in this water body are protected by the compensation release from Cheddar Ponds. Further investigations should be undertaken into the potential change in water quality dilution downstream of point source pressures as a result of the potential change in flow regime.	Compliant (low conf.)	Compliant (low conf.)
Chemicals		Fail for benzo(g-h-i)perylene, mercury, PBDE and lead					It is unlikely that this option would cause any deterioration to the chemical elements in this water body.	Compliant (med. conf.)	Compliant (med. conf.)
RBMP3 water body measures		**Not available**					RBMP3 water body measures not currently published	n/a	n/a

Overall assessment of WFD Regulations compliance of the option in this water body	Non-compliant (low conf.)

Option	P01-02 Increase performance of existing sources to increase DO near to licensed quantity	Sources & pathways of potential effect: This water body has been screened for an impact assessment due to the additional groundwater abstraction that would occur from the boreholes that supply Forum WTW as a result of the WTW upgrades. This could reduce groundwater levels in this water body and potentially increase concentrations of any point source groundwater pollutants.
Water body type	Groundwater	
Water body ID	GB40902G804700	
Water body name	Wells	

	Baseline Status		**Assessment of option**		
Status element	Draft RBMP3 Status	**Reasons for not achieving good status**	Assessment	Potential for deterioration	Potential for introduction of impediments
Dependent surface water body status			The is potential hydrological connectivity between this water body and the River Sheppey. The following page contains an impact assessment of the Sheppey water body (GB108052021221) which found the impact to be uncertain.	Uncertain	n/a
Ground water dependent terrestrial ecosystem test			The groundwater abstraction is situated in close proximity to the Windsor Hill Marsh (SSSI) GWDTE however the SSSI is underlain by the Black Rock Limestone Subgroup therefore, it is unlikely that the abstraction (from the Langport Member and Blue Lias Formation) would impact this GWDTE.	Compliant (low conf.)	n/a
Saline intrusion			There is no increased risk of saline intrusion as a result of the additional abstraction from this water body.	Compliant (med. conf.)	n/a
Water balance			On a water body scale, the amount of water abstracted from this water body will be negligible. As such, there is little risk of deterioration in the water balance status of this water body.	Compliant (med. conf.)	n/a
Chemical (overall)			Due to the relatively small increase in abstraction, it is unlikely that the additional abstraction would cause deterioration in water quality on a water body scale	Compliant (med. conf.)	n/a
RBMP3 water body measures	**Not available**		RBMP3 water body measures not currently published	n/a	n/a
			Overall assessment of WFD Regulations compliance of the option in this water body	Uncertain	

Option	P01-02 Increase performance of existing sources to increase DO near to licensed quantity
Water body type	River
Hydromorph designation	Heavily modified
Water body ID	GB108052021221
Water body name	Sheppey

Sources & pathways of potential effect:
This water body has been screened in for further assessment due to the capture of spring water in the headwaters of the River Sheppey and additional groundwater abstraction from the Wells water body. Each of these sources would lead to a reduction in flow in this water body potentially impacting the in-channel habitats and water quality within this water body.

	Baseline Status	**Reasons for not achieving good status**					**Assessment of option**		
Status element	Draft RBMP3 status	Flow	Morphology	Sanitary water quality	Nutrients	Other	Assessment	Potential for deterioration	Potential for introduction of impediments
Fish			Confirmed	Confirmed	Confirmed		The extent of the flow reduction achieved in this water body as a result of the capture of the spring water and additional borehole abstraction is uncertain. Though the CAMS for the area indicates that there is water available for abstraction in this water body, there is little hydrological data to use as a baseline for assessing flow change. There is also little known about the groundwater-surface water interaction in this water body so the extent of potential flow reduction is unclear. Further investigations are required to understand the extent of flow change in the River Sheppey as a result of this option and the sensitivity of the biological receptors to this flow change.	Uncertain	n/a
Invertebrates	High							Uncertain	n/a
Macrophytes/ phytobenthos	Not assessed							Uncertain	n/a
Phys-chem water quality (in support of ecological status)		Poor for phosphate due to continuous sewage discharge.					More understanding of the potential flow change in the River Sheppey is required. Further investigations should be undertaken into the potential change in water quality dilution downstream of point source pressures as a result of the potential reduction in flows.	Uncertain	Uncertain
Chemicals		Fail for benzo(g-h-i)perylene, mercury and PBDE					It is unlikely that this option would cause any deterioration to the chemical elements in this water body.	Compliant (med. conf.)	Compliant (med. conf.)
RBMP3 water body measures		**Not available**					RBMP3 water body measures not currently published	n/a	n/a
							Overall assessment of WFD Regulations compliance of the option in this water body	Uncertain	

Option	R005 Cheddar 2 Source and Transfer SRO
Water body type	River
Hydromorph designation	not designated artificial or heavily modified
Water body ID	GB109052021540
Water body name	Cheddar Yeo - source to conf Stubbingham Rhyne Water Body

Sources & pathways of potential effect:
This water body has been progressed due to the additional abstraction from Cheddar Ponds to fill Cheddar 2 Reservoir. This has potential to change the flow regime in the River Yeo, which may impact river habitats, flow velocities, and trigger morphological changes. There may also be changes to water quality from reduced dilution, particularly downstream of Cheddar Water Recycling Centre (WRC).

	Baseline Status	**Reasons for not achieving good status**					**Assessment of option**		
Status element	Draft RBMP3 status	Flow	Morphology	Sanitary water quality	Nutrients	Other	Assessment	Potential for deterioration	Potential for introduction of impediments
Fish	High						This assessment draws on the WFD compliance assessment as completed as part of the Gate 2 Cheddar 2 Source and Transfer SRO. It is worth noting that the outputs of the SRO assessment are not directly compare to this option assessment as the SRO assessment is driven by Wessex Water's demand profile rather than Bristol Water's. The SRO assessment conduced that there is the potential for deterioration in both fish and invertebrates status. With the macrophyte and phytobenthos status at Moderate status, it is unlikely that there would be deterioration in this element. There would be an introduction of an impediment to Good macrophyte/phytobenthos status.	Non-compliant (low conf.)	n/a
Invertebrates	High							Non-compliant (med. conf.)	n/a
Macrophytes/ phytobenthos						Suspect data		Compliant (med. conf.)	Non-compliant (med. conf.)
Phys-chem water quality (in support of ecological status)		Poor for phosphate due to continuous sewage discharge and poor livestock management					The SRO assessment concluded: The current status of phosphate is poor, it has been identified as low risk in potential for deterioration however the reduction in flow associated with the SRO would impede phosphate from achieving Good status. The assessment also outlined potential dissolved oxygen sags that could be worsened by the loss of high flow events.	Compliant (high conf.)	Non-compliant (med. conf.)
Chemicals		Fail for Benzo(g-h-i)perylene, Mercury, Polybrominated diphenyl ethers (PBDE), and Lead.					It is not expected that this option would impact any chemical elements in this water body.	Compliant (high conf.)	Compliant (high conf.)
RBMP3 water body measures		**Not available**					RBMP3 water body measures not currently published	n/a	n/a
							Overall assessment of WFD Regulations compliance of the option in this water body	Non-compliant (med. conf.)	

Option	R005 Cheddar 2 Source and Transfer SRO
Water body type	River
Hydromorph designation	not designated artificial or heavily modified
Water body ID	GB109052021570
Water body name	Axe - Cocklake to Brean Cross Sluice

Sources & pathways of potential effect:
This water body has been progressed due to the additional abstraction from the Brinscombe River Axe intake used to fill Cheddar 2 reservoir. This has the potential to modify the flow regime in the River Axe. The water quality may be negatively impacted due to the reduced dilution of point source inputs. There may also be increased ponding behind the existing physical modification pressures in the water body.

	Baseline Status	**Reasons for not achieving good status**					**Assessment of option**		
Status element	Draft RBMP3 status	Flow	Morphology	Sanitary water quality	Nutrients	Other	Assessment	Potential for deterioration	Potential for introduction of impediments
Fish	Not assessed						This assessment draws on the WFD compliance assessment as completed as part of the Gate 2 Cheddar 2 Source and Transfer SRO. It is worth noting that the outputs of the SRO assessment are not directly comparable to this option assessment as the SRO assessment is driven by Wessex Water's demand profile rather than Bristol Water's. The SRO assessment found that it is unlikely that there would be deterioration in any of the biological status elements. It is also unlikely that there would be an introduction of an impediment to Good invertebrate or macrophyte/phytobenthos status.	Compliant (low conf.)	n/a
Invertebrates			Confirmed					Compliant (low conf.)	Compliant (low conf.)
Macrophytes/ phytobenthos						unknown		Compliant (low conf.)	Compliant (low conf.)
Phys-chem water quality (in support of ecological status)		Moderate for phosphate due to continuous sewage discharge and poor livestock management, moderate for DO% due to physical modification					The SRO assessment found that there is the possibility for the deterioration and impediment to Good status for phosphate in this water body. The assessment also outlined potential dissolved oxygen sags that could be worsened by the loss of high flow events.	Non-compliant (low conf.)	Non-compliant (med. conf.)
Chemicals		Fail for Mercury, Perfluorooctane sulphonate (PFOS), Polybrominated diphenyl ethers (PBDE), and Lead.					It is not expected that this option would impact any chemical elements in this water body.	Compliant (high conf.)	Compliant (high conf.)
RBMP3 water body measures		**Not available**					RBMP3 water body measures not currently published	n/a	n/a
							Overall assessment of WFD Regulations compliance of the option in this water body	Non-compliant (med. conf.)	

Option	R007 Pumped Refill of Chew Valley Reservoir	Sources & pathways of potential effect:
Water body type	River	This water body has been screened for an impact assessment due to the proposed river abstraction of 90 Ml/d during November to February from this water body. This would reduce flow in this water body and potentially increase concentrations of any point source pollutants.
Hydromorph designation	Heavily modified	
Water body ID	GB109053027371	
Water body name	Bristol Avon (By Bk to Netham Weir)	

	Baseline Status	**Reasons for not achieving good status**					**Assessment of option**		
Status element	Draft RBMP3 status	Flow	Morphology	Sanitary water quality	Nutrients	Other	Assessment	Potential for deterioration	Potential for introduction of impediments
Fish	Not assessed						The latest CAMS assessment indicates that water is available in this catchment for abstraction under Q95, Q70, and Q50 conditions indicating that there is not flow pressure in the reach. The abstraction of 90Ml/d occurs during the winter months when the flow is high, meaning that the abstraction will not reduce low flows. As such, it is unlikely that the option would significantly change in-river habitats and, as such, would not lead to deterioration. With this being a new abstraction, suitable hands-off flow conditions will be required to ensure that there is no deterioration caused in the water body due to abstraction in low-flows, i.e. water is only abstracted at times when there is sufficient water in the system for abstraction and the ecology.	Compliant (med. conf.)	n/a
Invertebrates								Compliant (med. conf.)	n/a
Macrophytes/ phytobenthos								Compliant (med. conf.)	n/a
Phys-chem water quality (in support of ecological status)		Moderate for phosphate associated with continuous sewage discharge (conf.).					Due to the seasonal restrictions on the abstraction, it is unlikely that this option would lead to deterioration in the phys-chem water quality in this water body.	Compliant (med. conf.)	Compliant (med. conf.)
Chemicals		Fail for Mercury, PFOS and, PBDE					It is unlikely that this option would lead to deterioration in chemical water quality in this water body.	Compliant (med. conf.)	Compliant (med. conf.)
RBMP3 water body measures		**Not available**					RBMP3 water body measures not currently published	n/a	n/a
							Overall assessment of WFD Regulations compliance of the option in this water body	Compliant (med. conf.)	

Option	R007 Pumped Refill of Chew Valley Reservoir	Sources & pathways of potential effect: During November - February, 90Ml/d is transported through a pipeline from the River Avon to Chew Valley Reservoir via Stowey pre-treatment plant. This would change the level regime within the reservoir and potentially change the concentration of water quality elements.
Water body type	Lake	
Hydromorph designation	Heavily modified	
Water body ID	GB30943096	
Water body name	Chew Valley Reservoir	

	Baseline Status		**Assessment of option**		
Status element	Draft RBMP3 status	**Reasons for not achieving good status**	Assessment	Potential for deterioration	Potential for introduction of impediments
Phytoplankton		Associated with poor nutrient management (prob.)	The water body is an artificial reservoir with a variable water level. The ecology in this water body will be suited to a variable level regime. The input of 90Ml/d during winter is unlikely to cause any deterioration in any of the status elements in this water body. The water is also treated for nutrients before being discharged into the reservoir.	Compliant (med. conf.)	n/a
Invertebrates	Not assessed			Compliant (med. conf.)	n/a
Macrophytes/ phytobenthos		Associated with continuous sewage discharge (conf) and poor livestock management (conf.)		Compliant (med. conf.)	n/a
Phys-chem water quality (in support of ecological status)		Poor for total phosphorus associated with continuous sewage discharge (conf.)and poor livestock management (conf.)	The water will be treated for nutrients before being discharged into the reservoir. Therefore, the discharge of water into this water body would not cause deterioration in the phys-chem water quality elements in this water body.	Compliant (med. conf.)	Compliant (med. conf.)
Chemicals		Fail for mercury, PFOS and PBDE	It is not expected that this option would impact the status of any chemical elements in this water body.	Compliant (med. conf.)	Compliant (med. conf.)
RBMP3 water body measures		**Not available**	RBMP3 water body measures not currently published	n/a	n/a
			Overall assessment of WFD Regulations compliance of the option in this water body	Compliant (med. conf.)	

Option	P08 - Increase performance of existing sources (Alderley WTW) to increase deployable output
Water body type	River
Hydromorph designation	Not designated artificial or heavily modified
Water body ID	GB109054026610
Water body name	Ozleworth Bk - source to conf Little Avon R

Sources & pathways of potential effect:
This water body has been progressed to step 3 impact assessment due to the uncertainty regarding the flows at the point of flow change. There is little gauge data to quantify the hydrological impact. A reduction in flow has the potential to change in-channel habitats and water quality in this water body.

	Baseline Status	**Reasons for not achieving good status**					**Assessment of option**		
Status element	Draft RBMP3 status	Flow	Morphology	Sanitary water quality	Nutrients	Other	Assessment	Potential for deterioration	Potential for introduction of impediments
Fish	not assessed						Though the proposed flow reduction is small, the CAMS assessment indicates that under Q95 and Q70 flow conditions there is no water available for abstraction and restricted water available under Q50 flow conditions in this water body. This indicates a significant flow pressure in this water body and, as such, any further reduction in flow may cause deterioration in the biological status elements. In order to improve the confidence in the assessment, further investigation is needed into the sensitivity of the receptors to the proposed reduction in flow.	Non-compliant (low conf.)	n/a
Invertebrates	High							Non-compliant (low conf.)	n/a
Macrophytes/ phytobenthos	High							Non-compliant (low conf.)	n/a
Phys-chem water quality (in support of ecological status)	High						With no point source water quality pressures identified in this water body it is unlikely that there will be deterioration in any of the phys-chem water quality elements as a result of flow reduction	Compliant (med. conf.)	n/a
Chemicals		Fail for mercury and PBDE					It is unlikely that this option would impact any of the chemical status elements in this water body.	Compliant (med. conf.)	Compliant (med. conf.)
RBMP3 water body measures	**Not available**						RBMP3 water body measures not currently published	n/a	n/a
							Overall assessment of WFD Regulations compliance of the option in this water body	Non-compliant (low conf.)	

Option	P08 - Increase performance of existing sources (Alderley WTW) to increase deployable output
Water body type	River
Hydromorph designation	Not designated artificial or heavily modified
Water body ID	GB109054026600
Water body name	Little Avon - Ozleworth Bk to conf Tortworth Bk Water Body

Sources & pathways of potential effect:
This water body has been progressed to step 3 impact assessment due to the uncertainty regarding the flows at the point of flow change. There is little gauge data to quantify the hydrological impact. A reduction in upstream flow has the potential to change in-channel habitats and water quality concentrations in this water body.

	Baseline Status	**Reasons for not achieving good status**					**Assessment of option**		
Status element	Draft RBMP3 status	Flow	Morphology	Sanitary water quality	Nutrients	Other	Assessment	Potential for deterioration	Potential for introduction of impediments
Fish	Not assessed						Though the proposed flow reduction is small, the CAMS assessment indicates that under Q95 and Q70 flow conditions there is no water available for abstraction and restricted water available under Q50 flow conditions in this water body. This indicates a significant flow pressure in this water body and as such any further reduction in flow may cause deterioration in the biological status elements. In order to improve the confidence in the assessment, further investigation is needed into the sensitivity of the receptors to the proposed reduction in flow.	Non-compliant (low conf.)	n/a
Invertebrates								Non-compliant (low conf.)	n/a
Macrophytes/ phytobenthos								Non-compliant (low conf.)	n/a
Phys-chem water quality (in support of ecological status)		Phosphate achieved poor classification (2019)					There is a point source sewage discharge within this water body that may be exacerbated as a result of the flow reduction. This could cause deterioration and impede Good status for phosphate.	Non-compliant (low conf.)	Non-compliant (low conf.)
Chemicals		Mercury & Its Compounds, Polybrominated diphenyl ethers both failed (2019)					It is unlikely that this option would impact any of the chemical status elements in this water body.	Compliant (med. conf.)	Compliant (med. conf.)
RBMP3 water body measures	**Not available**						RBMP3 water body measures not currently published	n/a	n/a
							Overall assessment of WFD Regulations compliance of the option in this water body	Non-compliant (low conf.)	

Option	P08 - Increase performance of existing sources (Alderley WTW) to increase deployable output
Water body type	River
Hydromorph designation	Heavily modified
Water body ID	GB109054026620
Water body name	Little Avon - conf Tortworth Bk to mouth

Sources & pathways of potential effect:
This water body has been progressed to step 3 impact assessment due to the uncertainty regarding the flows at the point of flow change. There is little gauge data to quantify the hydrological impact. A reduction in upstream flow has the potential to change in-channel habitats and water quality concentrations in this water body.

	Baseline Status	**Reasons for not achieving good status**					**Assessment of option**		
Status element	Draft RBMP3 status	Flow	Morphology	Sanitary water quality	Nutrients	Other	Assessment	Potential for deterioration	Potential for introduction of impediments
Fish							The CAMS assessment indicates that under Q95 flow conditions there is restricted water available for abstraction and under Q70 and Q50 flow conditions, surface water is available. According to flows at Little Avon at Berkeley Kennels (54088), this abstraction would cause a flow reduction in Q95 of ~10%. This reduction is unlikely to cause a negative impact on aquatic habitats or lead to significant water quality changes. As such, this option would be unlikely to cause deterioration in the biological status elements of this water body.	Compliant (low conf.)	n/a
Invertebrates								Compliant (low conf.)	n/a
Macrophytes/ phytobenthos	Not assessed							Compliant (low conf.)	n/a
Phys-chem water quality (in support of ecological status)		Phosphate achieved poor classification (2019)					It is unlikely that a ~10% reduction in Q95 flows would result n significant changes to phys-chem water quality in this water body.	Compliant (low conf.)	Compliant (low conf.)
Chemicals		Mercury & Its Compounds, Polybrominated diphenyl ethers both failed (2019)					It is unlikely that this option would impact any of the chemical status elements in this water body.	Compliant (med. conf.)	Compliant (med. conf.)
RBMP3 water body measures	**Not available**						RBMP3 water body measures not currently published	n/a	n/a
							Overall assessment of WFD Regulations compliance of the option in this water body	Compliant (low conf.)	

Option	R016 Huntspill Transfer
Water body type	River
Hydromorph designation	Artificial
Water body ID	GB108052021210
Water body name	Huntspill

Sources & pathways of potential effect:
This water body has been progressed to stage 3 assessment due to additional abstraction associated with this option. A reduction in flow due to the winter abstraction has the potential to change in-channel habitats and water quality concentrations in this water body.

	Baseline Status	**Reasons for not achieving good status**					**Assessment of option**		
Status element	Draft RBMP3 status	Flow	Morphology	Sanitary water quality	Nutrients	Other	Assessment	Potential for deterioration	Potential for introduction of impediments
Fish	Not assessed						There is no flow gauge data for this water body. The most recent CAMS assessment indicates that there is water available for this water body at Q95, Q70, and Q50 flows. The River Huntspill is an artificial river and does not flow. With this being a new abstraction, suitable hands-off flow conditions will be required to ensure that there is no deterioration caused in the water body, i.e. water is only abstracted at times when there is sufficient water in the system for abstraction and the ecology.	Compliant (low conf.)	n/a
Invertebrates								Compliant (low conf.)	n/a
Macrophytes/ phytobenthos	Not assessed							Compliant (low conf.)	n/a
Phys-chem water quality (in support of ecological status)		Phosphate achieved moderate classification (2019)					A suitable hands-off flow/level condition is required in order to prevent deterioration in water quality as a result of this option. With this assumed, there will not be deterioration in the phys-chem water quality in this water body.	Compliant (low conf.)	Compliant (low conf.)
Chemicals		Benzo(g-h-i)perylene, Mercury & Its Compounds, Polybrominated diphenyl ethers all failed (2019)					This option is unlikely to lead to deterioration in chemical water quality in this water body.	Compliant (med. conf.)	Compliant (med. conf.)
RBMP3 water body measures	**Not available**						RBMP3 water body measures not currently published	n/a	n/a
							Overall assessment of WFD Regulations compliance of the option in this water body	Compliant (low conf.)	

Option	R016 Huntspill Transfer	Sources & pathways of potential effect:
Water body type	Lake	During winter, 20Ml/d is transported through a pipeline from Huntspill River to Cheddar Reservoir via Axebridge Treatment Centre. This increase in input to the reservoir would lead to a variation in the level regime.
Hydromorph designation	Artificial	
Water body ID	GB30943348	
Water body name	Cheddar Reservoir	

	Baseline Status		**Assessment of option**		
Status element	Draft RBMP3 status	**Reasons for not achieving good status**	Assessment	Potential for deterioration	Potential for introduction of impediments
Phytoplankton			The water body is an artificial reservoir with a variable water level, as such, the ecology is well suited to a variable level regime. The input of 20Ml/d is unlikely to cause any deterioration in any of the biological status elements in this water body.	Compliant (med. conf.)	n/a
Invertebrates	Not assessed			Compliant (med. conf.)	n/a
Macrophytes/ phytobenthos	Not assessed			Compliant (med. conf.)	n/a
Phys-chem water quality (in support of ecological status)		Total Nitrogen achieved poor (2019)	The water from the Huntspill River will be pre-treated prior to its input into Cheddar Reservoir. As such, there is not expected to be deterioration in the phys-chem status elements.	Compliant (med. conf.)	Compliant (med. conf.)
Chemicals		Fail for mercury and PBDE	This option is unlikely to lead to deterioration in chemical water quality in this water body.	Compliant (med. conf.)	Compliant (med. conf.)
RBMP3 water body measures		**Not available**	RBMP3 water body measures not currently published	n/a	n/a
			Overall assessment of WFD Regulations compliance of the option in this water body	Compliant (med. conf.)	

Appendix C: Option-level screening

This Appendix presents the results of the WFD compliance assessment screening outcomes for the cumulative impacts associated with the preferred plan and alternative programmes. The cumulative reference convention is presented in Section 4. The outcomes of the screening steps are displayed in Table C-1. The cumulative impact assessment for the water bodies scoped in for further assessment are presented in Appendix D.

Table C-1 Programme-level WFD screening outcomes

Cumulative number	Water body name	Water body ID	Type	Screened as WFD compliant	Reason screened as compliant
Cumulative HD1	Wells	GB40902G804700	Groundwater	No	-

Appendix D: Option-level impact assessment

This appendix presents the impact assessment for the water bodies that were screened in Appendix C for more detailed assessment through the cumulative impact screening step. An impact assessment table has been completed for each water body for each cumulative impact that has been identified through the screening process. The cumulative reference convention is presented in Section 4.

Cumulative	Cumulative HD1	Sources & pathways of potential effect: This water body has been screened for an impact assessment due to the additional abstraction that would occur from the boreholes that supply Forum WTW as a result of the WTW upgrades (Option P01-02) and addition abstraction from the Honeyhurst Well source (Option R24) . Both these abstractions could reduce groundwater levels in this water body and potentially increase concentrations of any point source groundwater pollutants and change the water balance of the groundwater body.
Water body type	Groundwater	
Water body ID	GB40902G804700	
Water body name	Wells	

	Baseline Status		**Assessment of option**		
Status element	Draft RBMP3 Status	**Reasons for not achieving good status**	Assessment	Potential for deterioration	Potential for introduction of impediments
Dependent surface water body status			There is potential hydrological connectivity between this water body and the River Sheppey which may be impacted as a result of Option P01-02. An impact assessment of the Sheppey water body (GB108052021221) as a result of Option P01-02 is available in Appendix B which found the impact to be uncertain (driving the uncertain assessment here). Surface water impacts as a result of Option R24 were screened as WFD compliant, though subject to a set of caveats (See Appendix A).	Uncertain	n/a
Ground water dependent terrestrial ecosystem test			The groundwater abstraction associated with Option P01-02 is situated in close proximity to the Windsor Hill Marsh (SSSI) GWDTE however the SSSI is underlain by the Black Rock Limestone Subgroup therefore, it is unlikely that the abstraction (from the Langport Member and Blue Lias Formation) would impact this GWDTE. The AMP7 WINEP investigation into the sustainability of the Honeyhurst Well abstraction did not identify any risks to GWDTEs as a result of further abstraction from this source.	Compliant (low conf.)	n/a
Saline intrusion			There is no increased risk of saline intrusion as a result of the additional abstraction from this water body.	Compliant (med. conf.)	n/a
Water balance			On a water body scale, the amount of water abstracted from this water body will not be significant. As such, there is little risk of deterioration in the water balance status of this water body as a result of this cumulative impact.	Compliant (med. conf.)	n/a
Chemical (overall)			Due to the relatively small increase in abstraction, it is unlikely that the additional abstraction would cause deterioration in water quality on a water body scale	Compliant (med. conf.)	n/a
RBMP3 water body measures		**Not available**	RBMP3 water body measures not currently published	n/a	n/a
			Overall assessment of WFD Regulations compliance of the option in this water body	Uncertain	

T: +44 (0) 1235 753000

E: enquiry@ricardo.com

W: ee.ricardo.com