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Anglian Water Draft WRMP24 - Water Framework Directive Assessment

Environmental Assessment Report - Sub Report B

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Anglian Water Services Limited

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Environmental Assessment Report - Sub Report B

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1 Introduction

1.1 Overview

Water companies in England and Wales are required to produce a Water Resources Management Plan (WRMP) every five years. The WRMP sets out how a company intends to achieve a secure supply of water for customers while protecting and enhancing the environment over a minimum 25-year period. The plans must be prepared every 5 years and reviewed annually. Anglian Water's WRMP 2024 (WRMP24) renews the previous WRMP published in 2019[1]. In the development of a WRMP water companies must follow the Environment Agency (EA) Water Resources Planning Guideline[2] and consider broader government policy objectives; ensuring the plan sets out how the company intends to maintain the balance between supply and demand for water over the long-term planning horizon, increasing security of supply in each of the water resource zones making up its supply area.

The Anglian Water Services Limited (AWS) supply area is situated mostly within the Water Resources East (WRE) regional planning area. Therefore, some of the water resource options considered as part of the AWS Water Resource Management Plan 2024 (WRMP24) will be sourced from the existing selected options as part of the regional plan. Therefore, efficiencies between the regional planning and WRMP process can be achieved. For the AWS WRMP24 the Water Framework Directive (WFD) assessments will focus on the local scale, drawing on the higher-level work previously completed for the regional plan where applicable.

For the AWS WRMP24, Water Framework Directive (WFD) Level 1 have been completed or reviewed and updated from WRE and where needed, Level 2 assessments have been completed. This report supports the Environment Assessment Report (EAR) that accompanies the Anglian Water Services (AWS) draft Water Resource Management Plan (WRMP) submission to regulators. The report presents the findings of a Water Framework Directive (WFD) assessment[3] applied to the AWS WRMP options.

1.2 Anglian Water Services WRMP options

As part of the WRMP process, hundreds of options representing new water supplies or new transfer pipelines – including variations in the size of such options – are considered to identify a constrained list of options from which those to be included in the draft plan are selected. The plan-making process also includes scenarios of combined packages of demand management options – coverage different levels of leakage control, and approaches to managing consumer demand – and activity in specific catchments to improve water abstraction related environmental problems – know as WINEP schemes. The demand management and WINEP options, have not been considered within this assessment; however, as they either do not have a sufficiently defined geography that allows for assessment of potential effects to a specific water body, or as there focus the result of studies that are deigned to develop actions to improve the environmental context related to an existing abstraction/s related to a particular watercourse.

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[1] Anglian Water (2019). Water Resources Management Plan 2019. Available at: wrmp-report-2019.pdf (anglianwater.co.uk).

[2] Environment Agency, Natural Resources Wales, Office for Water Services (2022). Water resources planning guideline. Available at: Water resources planning guideline - GOV.UK (www.gov.uk).

[3] Gov (2017). The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. Available at: The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (legislation.gov.uk)

As such, the assessment of AWS's draft WRMP has focussed on the consequences of the approximately 300 new supply related options, including transfers, included on its constrained list of supply options. As described in the draft WRMP, and within the main EAR, the plan-making process and related modelling considers many potential combinations of supply options to solve the supply demand balance across the 25 year lifetime of the plan. While alternative options to the draft WRMP have been identified, and their initial WFD risks are considered as discussed in Section 1.3.2 and presented in Appendix A, only options selected in the Draft Plan have been further assessed to present the core findings of this report. This document therefore summarises findings from the 31 options that form the AWS WRMP24 Best Value Plan (BVP) as this is draft Plan we are consulting on. Table 1.1 summarises these 31 options, providing a general overview of the activities associated with each of them.

Table 1.1: AWS WRMP Options

Option ID	Description overview
RTC3	Ruthamford South to Ruthamford Central potable transfer (20 Ml/d)
NBR6	Fenland to Norfolk Bradenham potable transfer (50 Ml/d)
NTB10	Norfolk Bradenham to Norwich and the Broads potable transfer (20 Ml/d)
NWY2	Norwich and the Broads to Norfolk Wymondham potable transfer (15 Ml/d)
NAY1	Norwich and the Broads to Aylsham potable transfer (3 Ml/d)
NED2	Norfolk Bradenham to Norfolk East Dereham potable transfer (10 Ml/d)
NNC4	Norfolk East Dereham to North Norfolk Coast potable transfer (10 Ml/d)
NHL4	Norfolk East Harling to Norfolk Harleston potable transfer (5 Ml/d)
NEH5	Suffolk Thetford to Norfolk East Harling potable transfer (15 Ml/d)
SUT5	Norfolk Bradenham to Suffolk Thetford (15 Ml/d)
FND16	Ruthamford South to Fenland potable transfer (20 Ml/d)
RTN13	Ruthamford North to Ruthamford North potable transfer (100 Ml/d)
RTS11	Ruthamford North to Ruthamford North potable transfer (50 Ml/d)
CAM4	Ruthamford South to Cambridge Water potable transfer (50 Ml/d)
SWC8	Cambridge Water to Cambs and West Suffolk (50 Ml/d)
EXC15	Cambs & West Suffolk to Essex Central potable transfer (10 Ml/d)
LNB1	Ruthamford North to Bourne potable transfer (20 Ml/d)
EXS18	Cambs & West Suffolk to Essex Central potable transfer (10 Ml/d)
LNC25	Lincolnshire East to Lincolnshire Central potable transfer (29 Ml/d)
SUI1	Transfer using existing pipeline but reversing the flow. No additional works needed, therefore no WFD assessments are required for this works, and it has not been considered further.
EXS10	Holland on Sea desalination (seawater) 25 Ml/d
LNE6	Mablethorpe desalination Seawater (63 Ml/d)
NTB20	Desalination (seawater) plant in the Caister area (25 Ml/d)
SUE5	Felixstowe desalination (seawater) 25 Ml/d
SUE23	Modification of Raydon WTW to reduce the minimum treatment capacity from 8Ml/d to 2Ml/d
RTS21	Extension of Clapham WTW from 25Ml/d to 36Ml/d
LNE12	Increasing the utilisation of existing surface water licence at Covenham Reservoir
LNC10	Extension /new reservoir at Hall - conjunctive with new treatment
RTN17	Strategic Resource Option (SRO): Earth embanked winter storage reservoir located in the south Lincolnshire area. Abstraction will be from the River Trent, with a transfer via the River Witham.
FND21	Strategic Resource Option (SRO): Earth embanked reservoir with a storage capacity 50 million cubic metres, located in the fens. Abstraction will be from the River Great Ouse.
EXS19	Colchester WRC direct to Ardleigh Reservoir (no additional treatment)

1.3 Methodology

1.3.1 Approach to WFD assessment for WRMP24 options

The WFD requires all water bodies (both surface and groundwater) to achieve 'good status'. The Directive also requires that the water bodies experience no deterioration in status. Good status is a function of good ecological status (biological, physico-chemical and hydromorphological elements and specific pollutants) and good chemical status (Priority Substances and Priority Hazardous Substances).

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

The environmental objectives of the Water Framework Directive (WFD) are the core of this UK legislation providing for long-term sustainable water management on the basis of a high level of protection of the aquatic environment. Within the directive Part 5 Regulation 13 sets out the "environmental objectives" for natural surface and groundwater bodies, artificial and heavily modified water bodies (HMWBs). Natural surface water bodies must, by 2015, adhere to good ecological and chemical status and groundwater bodies to good quantitative and chemical status. Artificial and HMWBs must achieve good ecological potential and good chemical status. Regulation 13 also sets out the principal of no deterioration, providing protection from the deterioration of water status/potential. In Regulation 15 the criteria for the designation of artificial or heavily modified water bodies are described.

Exemptions are defined within Regulations 16 to 19, outlining the conditions under which the achievement of good status or potential may be phased or not be achieved, or under which deterioration may be allowed. Regulation 16 to 19 describe these distinct conditions. In summary:

- Regulation 16 allows an extension of the time limit so that good status or potential is, under certain conditions, achieved only after 2015;
- Regulation 17 allows the achievement of less stringent objectives under certain conditions;
- Regulation 18 allows the temporary deterioration of status in case of natural causes or "force majeure"; and
- Regulation 19 allows for deterioration of status or non-achievement of good status or potential under certain distinct conditions.

The All Company Working Group (ACWG) has developed a consistent framework for undertaking WFD assessments to demonstrate that options will not cause deterioration in status of any WFD water bodies. The assessment considers mitigation that would need to be put in place to protect water body status. The assessment also considers WFD future objectives.

Two stages of assessment are completed under the ACWG WFD approach, an initial Level 1 basic screening and a Level 2 detailed impact screening. These are conducted/reported using a spreadsheet assessment tool which is automated based on option information for Level 1 and expert judgment based for Level 2. Further information on WFD classification and the approach adopted can be found in *ACWG, WFD: Consistent framework for undertaking no deterioration assessments, Nov 2020.*

1.3.2 Level 1 – basic screening

The first stage of WFD assessment was completed for all supply options on the AWS's constrained list. Level 1 assessment follows these steps:

- Identify affected water bodies;
- Review supply option;
- Identify possible impacts;
- Apply 'embedded' mitigation measures; and
- Calculate a screening score (using a 6-point scale from -2 to 3) to 'screen out' water bodies and options with no or very minor potential impacts from further assessment. If the maximum impact score is greater than 1 (minor localised impact) then the water body will need to be taken forward into level 2 screening.

The scoring system used is set out in below.

Table 1.2: Impact scoring system used for WFD assessments

Impact	Score	Description
Very beneficial	-2	Impacts that, taken on their own, have the potential to lead to the improvement in the ecological status or potential of a WFD quality element for the entire water body.
Beneficial	-1	Impacts that, when taken on their own, have the potential to lead to a minor localised or temporary improvement that does not affect the overall WFD status of the water body or any quality elements.
No/minimal	0	No measurable change in the quality of the water environment or the ability for target WFD objectives to be achieved.
Low	1	Impacts that, when taken on their own, have the potential to lead to a minor localised, short-term and fully reversible effects on one or more of the quality elements but would not result in the lowering of WFD status. Impacts would be very unlikely to prevent any target WFD objectives from being achieved.
Medium	2	Impacts that, when taken on their own, have the potential to lead to a widespread or prolonged effect on the quality of the water environment that may result in the temporary reduction in WFD status. Impacts have the potential to prevent target WFD objectives from being achieved.
High	3	Impacts when taken on their own have the potential to lead to a significant effect and permanent deterioration of WFD status. Potential for high impact on preventing target WFD objectives from being achieved.

The WFD Level 1 screening outcomes for the AWS WRMP24 options are summarised in Chapter 2 and Appendix A. Where water bodies and option impacts were 'screened in' and that option was selected in AWS's Best Value Plan (draft WRMP) they have been taken forward to Level 2 assessment.

1.3.3 Level 2 – detailed impact screening

The second stage of WFD assessment is more detailed – as set out below – and has therefore only been completed for options that were screened in at Level 1 and are selected in AWS's Draft Plan. The level 2 assessment includes the following the steps:

- Water body scale detailed assessment of impacts to each WFD quality element for each activity proposed as part of an option;
- Assessment of data confidence level and design certainty – confidence levels are assigned for each assessment, based on the quality and availability of both physical data and design information about the option at the time of assessment *(note, confidence/certainty expected to be low during this initial WRMP assessment and increase over time).* Where the confidence levels are medium or low, the requirements for further data or design information in order to raise this confidence level for future gates will be listed*;*
- Identification of further mitigation needs;
- Assessment of impacts after mitigation (scoring on a 6-point scale); and

- Identification of activities to improve certainty of assessment outcomes.

The outcomes of the Level 2 assessments are summarised in Chapter 3 and Appendix B.

Where water bodies and option impacts have been identified, recommendations have been made for increasing the confidence in the assessment. This is expected to be through increasing the level of detail available during later stages of option development if the relevant options are included in the final WRMP and then subsequently progressed as part of a pre-application design process as they seek to gain development consent. In combination assessments where different option delivery is interdependent would also be required. Recommendations are included in Section 5.5.

1.3.4 Cumulative effects assessment

For WFD, a cumulative effects assessment has been carried out for the AWS WRMP24 BVP options. The cumulative effects assessment aims to identify and assess any additional, cumulative risk of deterioration in WFD status on water bodies caused by activities from multiple options taking place within them. All water bodies scoped in and assessed for each option at Level 1 are compiled to inform this.

For this assessment the following has been defined as follows: major planning developments and local planning allocations within a 500m buffer of the BVP options, scoped in using professional judgement, have been used in tandem with WFD assessment outputs to produce an intra-plan and inter-plan effects assessment.

Methodology for each assessment is outlined below.

1.3.4.1 Intra-plan effects assessment

The intra-plan effects assessment identifies and assesses any risk of deterioration on water bodies which are potentially impacted by more than one BVP option. The water bodies identified in the Level 1 assessments of all BVP options are collated, and then sorted to identify where more than one BVP option potentially impacts on the same water body. For each water body where this occurs, a review is carried out of all activities occurring within the water body. This determines if the impact of the proposed activities associated with all options could lead to an increased risk of WFD deterioration. Where a water body is identified to be at an increased risk of WFD deterioration, a new cumulative WFD assessment is completed where all option activities are assessed together, and a new impact score assigned. The cumulative effects assessment is based on the WFD Level 2 assessment outcomes as they are presented in this report. As further investigations are carried out and design information becomes available, the level 2 WFD assessments will be updated. Following these adjustments, updates to the intra-plan cumulative effects assessments will be required.

1.3.4.2 Inter-plan effects assessment

The inter-plan effects assessment is carried out to determine the cumulative impact of the BVP option activities along with any relevant planning projects identified on impacted water bodies.

All planning allocations, planning applications and major project DCOs etc, within 500m have been identified. For each planning project, assessment is made on whether the project could lead to impacts on WFD waterbodies. For larger DCOs etc this review makes use of any existing WFD assessments which have been carried out for the planning application. For other planning allocations or applications where no WFD assessment has been carried out professional judgement is used to identify potential for impacts on WFD. Any planning projects where no risk of deterioration is identified has been discounted from the assessment, and the relevant planning projects passed into the next stage of the review.

Any water body where one or more BVP option and one or more relevant planning projects occur within the same water body has the corresponding option assessments and planning project information reviewed to determine if the cumulative impact of the proposed activities could lead to an increased risk of WFD deterioration. Where a water body is identified to be at an increased risk of WFD deterioration, a new cumulative WFD assessment is completed where all option activities and planning project activities are assessed together, and a new impact score assigned. The cumulative effects assessment is based on the WFD Level 2 assessment outcomes as they are presented in this report. As further investigations are carried out and design information becomes available, the level 2 WFD assessments will be updated. Following these adjustments, updates to the inter-plan cumulative effects assessments will be required.

It is acknowledged that cumulative effects could also occur between different water company WRMP options, and these are considered further under the WRSE and WRE projects.

1.3.5 Limitations and assumptions

As the options set out in the WRMP are still in the early stages of design development a precautionary approach has been exercised because of residual uncertainty. The WFD assessment has the following limitations and assumptions:

- The ACWG approach uses WFD 2015 data, as it is the current officially reported baseline in the 2015-2021 Cycle 2 RBMP. The RBMPs are anticipated to be updated at the end of 2022. The 2019 WFD baseline data was released in late 2020 but will not form the legal baseline until the RBMPs are released. To ensure consistency, the 2015 data has been used in this assessment, but acknowledge that this will need to be updated to the 2019 status once the RBMPs are published.
- Assessment assumes pipelines are underground (directionally drilled or pipe-jacked beneath any larger watercourses, roads or railways and by bypass and trenching under small roads and watercourses) and therefore will not cross watercourses above ground or cause direct impacts.
- This assessment has only considered the impacts associated directly with the options at this stage, and does not include the impacts of options included in the draft WRMP of other water companies as this information is not available; however, an initial view of potential risks is presented in section 4.3.
- The geographical extent of the WFD assessment is generally limited to the water bodies where abstractions take place. There is potential for some effects continuing downstream of the abstraction point, although it is assumed these would become increasingly limited to ‘negligible’ with distance. High level review is carried out on a case-by-case basis to ensure impacts in downstream waterbodies are negligible. Where downstream impacts are possible, these waterbodies have been included in the relevant assessments. This assumption will need to be reviewed as additional hydrological studies are undertaken.

2 Water Framework Directive findings (Level 1)

2.1 Independent Transfers

2.1.1 Ruthamford South to Ruthamford Central potable transfer (20 Ml/d) (RTC3)

The Level 1 WFD assessment covered six water bodies of the option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any water bodies.

Table 2.1: WFD Level 1 assessment outcomes for RTC3

Option ID	RTC3
Option Description	Ruthamford South to Ruthamford Central potable transfer (20 Ml/d)
Number of water bodies passing WFD assessment	6
Water bodies passing WFD assessment	GB105033037660: Running Waters-Steppingley; GB105033038010: Harrowden Brook; GB105033038050: Elstow Brook (US Shortstown); GB105033037930: Broughton Brook; GB105033037971: Ouzel US Caldecote Mill; GB40501G402200: Upper Bedford Ouse Woburn Sands
Number of water bodies requiring further WFD assessment	0

2.1.2 Fenland to Norfolk Bradenham potable transfer (50 Ml/d) (NBR6)

The Level 1 WFD assessment covered seven water bodies of the option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any water bodies.

Table 2.2: WFD Level 1 assessment outcomes for NBR6

Option ID	NBR6
Option Description	Fenland to Norfolk Bradenham potable transfer (50 Ml/d)
Number of water bodies passing WFD assessment	7
Water bodies passing WFD assessment	GB205033047665: Relief Channel; GB205033000040: Cut-off Channel; GB105033047810: Stringside Stream; GB105033047820: Old Carr Stream; GB105033047880: Gadder; GB105033047890: Wissey - Upper; GB105034051020: Wendling Beck
Number of water bodies requiring further WFD assessment	0

2.1.3 Norfolk Bradenham to Norwich and the Broads potable transfer (20 Ml/d) (NTB10)

The Level 1 WFD assessment covered ten water bodies of the option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any water bodies.

Table 2.3: WFD Level 1 assessment outcomes for NTB10

Option ID	NTB10
Option Description	Norfolk Bradenham to Norwich and the Broads potable transfer (20 Ml/d)
Number of water bodies passing WFD assessment	10
Water bodies passing WFD assessment	GB105033047890: Wissey - Upper; GB105034051020: Wendling Beck; GB105034051000: Tud; GB105034051270: Yare (u/s confluence with Tiffey - Upper); GB105034051290: Yare (u/s confluence with Tiffey - Lower); GB105034051281: Yare (Tiffey to Wensum); GB105034055882: Wensum DS Norwich; GB105034051370: Yare (Wensum to tidal) GB40501G400300:Broadland Rivers Chalk & Crag (GW); GB40501G400500:Cam and Ely Ouse Chalk (GW)
Number of water bodies requiring further WFD assessment	0

2.1.4 Norwich and the Broads to Norfolk Wymondham potable transfer (15 Ml/d) (NWY2)

The Level 1 WFD assessment covered four water bodies of the option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any water bodies.

Table 2.4: WFD Level 1 assessment outcomes for NWY2

Option ID	NWY2
Option Description	Norwich and the Broads to Norfolk Wymondham potable transfer (15 Ml/d)
Number of water bodies passing WFD assessment	4
Water bodies passing WFD assessment	GB105034051281: Yare (Tiffey to Wensum); GB105034051282: Tiffey; GB105034051180: Tiffey (u/s Wymondham STW); GB40501G400300: Broadland Rivers Chalk & Crag (GW)
Number of water bodies requiring further WFD assessment	0

2.1.5 Norwich and the Broads to Aylsham potable transfer (3 Ml/d) (NAY1)

The Level 1 WFD assessment covered seven water bodies of the option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any water bodies.

Table 2.5: WFD Level 1 assessment outcomes for NAY1

Option ID	NAY1
Option Description	Norwich and the Broads to Aylsham potable transfer (3 Ml/d)
Number of water bodies passing WFD assessment	7
Water bodies passing WFD assessment	GB105034055882: Wensum DS Norwich; GB105034050970: Spixworth (and Dobbs) Beck; GB105034050931: Bure (Horstead Mill to St Benet's Abbey); GB105034050870: Hevingham Watercourse; GB105034050900: Mermaid Stream; GB105034050932: Bure (Scarrow Beck to Horstead Mill); GB40501G400300: Broadland Rivers Chalk & Crag (GW)
Number of water bodies requiring further WFD assessment	0

2.1.6 Norfolk Bradenham to Norfolk East Dereham potable transfer (10 Ml/d) (NED2)

The Level 1 WFD assessment covered four water bodies of the option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any water bodies.

Table 2.6: WFD Level 1 assessment outcomes for NED2

Option ID	NED2
Option Description	Norfolk Bradenham to Norfolk East Dereham potable transfer (10 Ml/d)
Number of water bodies passing WFD assessment	4
Water bodies passing WFD assessment	GB105033047890: Wissey - Upper; GB105034051020: Wendling Beck; GB40501G400300: Broadland Rivers Chalk & Crag; GB40501G400500: Cam and Ely Ouse Chalk
Number of water bodies requiring further WFD assessment	0

2.1.7 Norfolk East Dereham to North Norfolk Coast potable transfer (10 Ml/d) (NNC4)

The Level 1 WFD assessment covered eight water bodies of the option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any water bodies.

Table 2.7: WFD Level 1 assessment outcomes for NNC4

Option ID	NNC4
Option Description	Norfolk East Dereham to North Norfolk Coast potable transfer (10 Ml/d)
Number of water bodies passing WFD assessment	8
Water bodies passing WFD assessment	GB105034051020: Wendling Beck; GB105034051050: Blackwater (Wendling Beck); GB105034055881: Wensum US Norwich; GB105034055860: Little Ryburgh Tributary; GB105034055840: Stiffkey; GB105034055770: Gunthorpe Stream; GB40501G400300: Broadland Rivers Chalk & Crag; GB40501G400100: North Norfolk Chalk
Number of water bodies requiring further WFD assessment	0

2.1.8 Norfolk East Harling to Norfolk Harleston potable transfer (5 Ml/d) (NHL4)

The Level 1 WFD assessment covered seven water bodies of the option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any water bodies.

Table 2.8: WFD Level 1 assessment outcomes for NHL4

Option ID	NHL4
Option Description	Norfolk East Harling to Norfolk Harleston potable transfer (5 Ml/d)
Number of water bodies passing WFD assessment	7
Water bodies passing WFD assessment	GB105033043390: Whittle; GB105034045840: Frenze Beck; GB105034045850: Dickleburgh Stream; GB105034045901: Waveney (R Dove - Starston Brook); GB105034045880: Starston Brook; GB40501G400300: Broadland Rivers Chalk and Crag (GW); GB40501G400500: Cam and Ely Ouse Chalk (GW)
Number of water bodies requiring further WFD assessment	0

2.1.9 Suffolk Thetford to Norfolk East Harling potable transfer (15 Ml/d) (NEH5)

The Level 1 WFD assessment covered four water bodies of the option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any water bodies.

Table 2.9: WFD Level 1 assessment outcomes for NEH5

Option ID	NEH5
Option Description	Suffolk Thetford to Norfolk East Harling potable transfer (15 Ml/d)
Number of water bodies passing WFD assessment	4
Water bodies passing WFD assessment	GB105033043400: Little Ouse River; GB105033043190: Thet (DS Swangey Fen); GB105033043390: Whittle; GB40501G400500: Cam and Ely Ouse Chalk (GW)
Number of water bodies requiring further WFD assessment	0

2.1.10 Norfolk Bradenham to Suffolk Thetford (15 Ml/d) (SUT5)

The Level 1 WFD assessment covered eight water bodies of the option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any water bodies.

Table 2.10: WFD Level 1 assessment outcomes for SUT5

Option ID	SUT5
Option Description	Norfolk Bradenham to Suffolk Thetford (15 Ml/d)
Number of water bodies passing WFD assessment	8
Water bodies passing WFD assessment	GB105033047890: Wissey - Upper; GB105034051260: Blackwater (Yare); GB105033047870: Watton Brook;

	GB105033047860: Stow Bedon Stream; GB105033043420: Larling Brook; GB105033043190: Thet (DS Swangey Fen); GB105033043400: Little Ouse River; GB40501G400500: Cam and Ely Ouse Chalk
Number of water bodies requiring further WFD assessment	0

2.1.11 Ruthamford South to Fenland potable transfer (20 Ml/d) (FND16)

The Level 1 WFD assessment covered nine water bodies of the option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any water bodies.

Table 2.11: WFD Level 1 assessment outcomes for FND16

Option ID	FND16
Option Description	Ruthamford South to Fenland potable transfer (20 Ml/d)
Number of water bodies passing WFD assessment	9
Water bodies passing WFD assessment	GB105031050595: Brook Drain (including Marholm Brook); GB105031050560: Folly River (including Werrington and Marholm Brooks); GB205031050685: Welland - conf Greatford Cut to tidal; GB205032050395: North Level Main Drain; GB205032050385: North Level Pumped Areas 2 and 3; GB530503200200: Nene; GB205033000050: Middle Level; GB530503300300: Great Ouse; GB205033047665: Relief Channel
Number of water bodies requiring further WFD assessment	0

2.1.12 Ruthamford North to Ruthamford North potable transfer (100 Ml/d) (RTN13)

The Level 1 WFD assessment covered five water bodies of the option. The outcomes indicated further assessment would be necessary for three water bodies; GB105032050381: Nene - Islip to tidal river water body, GB40502G402400: Nene Mid Lower Jurassic Unit groundwater body, and GB40501G445500: Northampton Sands groundwater body.

Table 2.12: WFD Level 1 assessment outcomes for RTN13

Option ID	RTN13
Option Description	Ruthamford North to Ruthamford North potable transfer (100 Ml/d)
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB105031050595: Brook Drain (including Marholm Brook); GB105032050330:Billing Brook
Number of water bodies requiring further WFD assessment	3
Water bodies requiring further WFD assessment	GB105032050381:Nene - Islip to tidal; GB40502G402400:Nene Mid Lower Jurassic Unit (GW); GB40501G445500:Northampton Sands (GW)

2.1.13 Ruthamford North to Ruthamford North potable transfer (50 Ml/d) (RTS11)

The Level 1 WFD assessment covered ten water bodies of the option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any water bodies.

Table 2.13: WFD Level 1 assessment outcomes for RTS11

Option ID	RTS11
Option Description	Ruthamford North to Ruthamford North potable transfer (50 Ml/d)
Number of water bodies passing WFD assessment	10
Water bodies passing WFD assessment	GB105032050381: Nene - Islip to tidal; GB105032050330: Billing Brook; GB105032050340: Stanground Lode; GB205033000050: Middle Level; GB105033042820: Alconbury Brook; GB105033042810: Cock Brook; GB105033042870: Ellington Brook; GB105033042830: Ellington Brook (Trib); GB105033043310: Diddington Brook; GB40502G402400: Nene Mid Lower Jurassic Unit (GW)
Number of water bodies requiring further WFD assessment	0

2.1.14 Ruthamford South to Cambridge Water potable transfer (50 Ml/d) (CAM4)

The Level 1 WFD assessment covered four water bodies of the option. The outcomes indicated no further assessment would be necessary for the option, as the types of activities do not present a risk to WFD status or objectives for any water bodies.

Table 2.14: WFD Level 1 assessment outcomes for CAM4

Option ID	CAM4
Option Description	Ruthamford South to Cambridge Water potable transfer (50 Ml/d)
Number of water bodies passing WFD assessment	12
Water bodies passing WFD assessment	GB105033043310: Diddington Brook GB105033042790: Alconbury and Brampton Brooks GB105033047921: Ouse (roxton to Earith) GB105033042730: West Brook GB105033042740: Fen Drayton Drain GB105033042770: Swavesey Drain GB205033043375: Old West River GB105033042690: Bourn Brook GB105033042680: Bin Brook; GB105033042750: Cam; GB105033037620: Hobson's Brook; GB105033042670: Cherry Hinton Brook
Number of water bodies requiring further WFD assessment	0

2.1.15 Cambridge Water to Cambs and West Suffolk (50 Ml/d) (SWC8)

The Level 1 WFD assessment covered nine water bodies of the option. The outcomes indicated further assessment would be necessary for one water body; GB40501G400500: Cam and Ely Ouse Chalk groundwater body.

Table 2.15: WFD Level 1 assessment outcomes for SWC8

Option ID	SWC8
Option Description	Cambridge Water to Cambs and West Suffolk (50 Ml/d)
Number of water bodies passing WFD assessment	9
Water bodies passing WFD assessment	GB105036040970: Glem - Lower GB105036046400: Glem – Upper GB105033042990: Kennett-Lee Brook GB105036040980: Stour (u/s Wixoe) GB105033042710: Swaffham - Bulbeck Lode GB105033042700: Bottisham Lode - Quy Water GB105033037620: Hobson's Brook GB105033042670: Cherry Hinton Brook GB40501G400700: North Essex Chalk (GW)
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further assessment	GB40501G400500: Cam and Ely Ouse Chalk (GW)

2.1.16 Cambs & West Suffolk to Essex Central potable transfer (10 Ml/d) (EXC15)

The Level 1 WFD assessment covered seventeen water bodies of the option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any water bodies.

Table 2.16: WFD Level 1 assessment outcomes for EXC15

Option ID	EXC15
Option Description	Cambs & West Suffolk to Essex Central potable transfer (10 Ml/d)
Number of water bodies passing WFD assessment	17
Water bodies passing WFD assessment	GB40501G400700: North Essex Chalk; GB40502G400900: North Essex Lower London Tertiaries; GB40503G000400: Essex Gravels; GB105036040990: Chad Brook; GB105036040970: Glem – Lower; GB105036046400: Glem – Upper; GB105036040960: Chilton Brook; GB105036040980: Stour (u/s Wixoe); GB105036040950: Stour Brook; GB105036040941: Stour (Wixoe - Lamarsh); GB105036040910: Bumpstead Brook; GB105037041290: Colne (u/s Gt. Yeldham); GB105037041250: Toppesfield Brook; GB105037041280: Stambourne Brook; GB105037041260: Colne (Gt. Yeldham - Doe's Corner); GB105036040710: Belchamp Brook; GB105037041330: Colne (d/s Doe's Corner).
Number of water bodies requiring further WFD assessment	0

2.1.17 Ruthamford North to Bourne potable transfer (20 Ml/d) (LNB1)

The Level 1 WFD assessment covered six water bodies of the option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any water bodies.

Table 2.17: WFD Level 1 assessment outcomes for LNB1

Option ID	LNB1
Option Description	Ruthamford North to Bourne potable transfer (20 Ml/d)
Number of water bodies passing WFD assessment	6
Water bodies passing WFD assessment	GB105031050595: Brook Drain (including Marholm Brook); GB205031050595: Maxey Cut; GB105031050600: Welland - conf Gwash to conf Greatford Cut; GB205031050685: Welland - conf Greatford Cut to tidal; GB205031050705: Vernatt's Drain; GB105031050720: Glen.
Number of water bodies requiring further WFD assessment	0

2.1.18 Cambs & West Suffolk to Essex Central potable transfer (10 Ml/d) (EXS18)

The Level 1 WFD assessment covered six water bodies of the option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any water bodies.

Table 2.18: WFD Level 1 assessment outcomes for EXS18

Option ID	EXS18
Option Description	Cambs & West Suffolk to Essex Central potable transfer (10 Ml/d)
Number of water bodies passing WFD assessment	7
Water bodies passing WFD assessment	GB40501G400700: North Essex Chalk (GW); GB40503G000400: Essex Gravels (GW); GB40502G400900: North Essex Lower London Tertiaries GB105036040941: Stour (Wixoe - Lamarsh); GB105037041330: Colne (d/s Doe's Corner); GB105036040942: Stour (Lamarsh - R. Brett); GB105037034150: Roman River
Number of water bodies requiring further WFD assessment	0

2.1.19 Lincolnshire East to Lincolnshire Central potable transfer (29 Ml/d) (LNC25)

The Level 1 WFD assessment covered seven water bodies of the option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any water bodies.

Table 2.19: WFD Level 1 assessment outcomes for LNC25

Option ID	LNC25
Option Description	Lincolnshire East to Lincolnshire Central potable transfer (29 Ml/d)
Number of water bodies passing WFD assessment	7
Water bodies passing WFD assessment	GB104029067530: Laceby Beck / River Freshney Catchment (to N Sea); GB104029067540: Mawnbridge Drain; GB104029067575: North Beck Drain; GB104029067655: Skitter Beck / East Halton Beck; GB104029067605: Barrow Beck; GB104029067520: Ancholme from Bishopbridge to the Humber;

	GB40401G401500: North Lincolnshire Chalk Unit
Number of water bodies requiring further WFD assessment	0

2.2 Desalination

2.2.1 Holland on Sea desalination (seawater) 25 Ml/d (EXS10)

The Level 1 WFD assessment covered seven water bodies of the option. The outcomes indicated further assessment would be necessary for two water bodies; GB650503520001: Essex Coastal water body and GB105037077810: Holland Brook river water body.

Table 2.20: WFD Level 1 assessment outcomes for EXS10

Option ID	EXS10
Option Description	Holland on Sea desalination (seawater) 25 Ml/d
Number of water bodies passing WFD assessment	6
Water bodies passing WFD assessment	GB105037077810: Holland Brook GB520503713800: COLNE GB105037041310: Tenpenny Brook GB105037041320: Salary Brook GB105036041000: Stour (d/s R. Brett) GB105037041330: Colne (d/s Doe's Corner)
Number of water bodies requiring further WFD assessment	2
Water bodies requiring further assessment	GB650503520001:Essex; GB40503G000400: Essex Gravels

2.2.2 Mablethorpe Desalination Seawater (63 Ml/d) (LNE6)

The Level 1 WFD assessment covered ten water bodies of the option. The outcomes indicated further assessment would be necessary for two water bodies; GB640402492000: Lincolnshire coastal water body and GB40501G401600: South Lincolnshire Chalk Unit groundwater body.

Table 2.21: WFD Level 1 assessment outcomes for LNE6

Option ID	LNE6
Option Description	Mablethorpe desalination seawater (63 Ml/d)
Number of water bodies passing WFD assessment	8
Water bodies passing WFD assessment	GB105029061640: Trusthorpe Pump Drain (upper end) GB105029061660: Great Eau (downstream of South Thoresby); GB105029061670: Long Eau; GB105029061680: South Dike and Grayfleet Drain GB104029062150: Seven Towns South Eau; GB104029061990: Louth Canal; GB104029062010: Poulton Drain Catchment (trib of Louth Canal); GB40401G401500: North Lincolnshire Chalk Unit.
Number of water bodies requiring further WFD assessment	2
Water bodies requiring further assessment	GB640402492000: Lincolnshire; GB40501G401600: South Lincolnshire Chalk Unit.

2.2.3 Desalination (Seawater) Plant in the Caister area (25 Ml/d) (NTB20)

The Level 1 WFD assessment covered eight water bodies of the option. The outcomes indicated further assessment would be necessary for one water body; GB650503520003: Norfolk East coastal water body.

Table 2.22: WFD Level 1 assessment outcomes for NTB20

Option ID	NTB20
Option Description	Desalination (seawater) plant in the Caister area (25 Ml/d)
Number of water bodies passing WFD assessment	7
Water bodies passing WFD assessment	GB105034050860: Muck Fleet GB510503410700: BURE & WAVENEY & YARE & LOTHING GB105034050931: Bure (Horstead Mill to St Benet's Abbey) GB105034051310: Witton Run GB105034051370: Yare (Wensum to tidal) GB105034055882: Wensum DS Norwich GB40501G400300: Broadland Rivers Chalk & Crag
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further assessment	GB650503520003: Norfolk East

2.2.4 Felixstowe Desalination (Seawater) 25 Ml/d (SUE5)

The Level 1 WFD assessment covered seven water bodies of the option. The outcomes indicated further assessment would be necessary for two water bodies; GB650503520002: Suffolk coastal water body and GB520503613601: Orwell transitional water body.

Table 2.23: WFD Level 1 assessment outcomes for SUE5

Option ID	SUE5
Option Description	Felixstowe desalination (seawater) 25 Ml/d
Number of water bodies passing WFD assessment	5
Water bodies passing WFD assessment	GB520503503900: Deben; GB105035040280: Bucklesham Mill River; GB105035040440: Belstead Brook; GB40501G401800: Felixstowe Peninsula Crag & Chalk; GB40501G400600: Waveney and East Suffolk Chalk & Crag.
Number of water bodies requiring further WFD assessment	2
Water bodies requiring further assessment	GB650503520002: Suffolk; GB520503613601: Orwell.

2.3 WTW upgrades

2.3.1 Modification of Raydon WTW to reduce the minimum treatment capacity from 8Ml/d to 2Ml/d (SUE23)

The Level 1 WFD assessment covered three water bodies of the option. The outcomes indicated no further assessment would be necessary for the option because the types of activities do not present a risk to WFD status or objectives for any water bodies.

Table 2.24: WFD Level 1 assessment outcomes for SUE23

Option ID	SUE23
Option Description	Modification of Raydon WTW to reduce the minimum treatment capacity from 8Ml/d to 2Ml/d
Number of water bodies passing WFD assessment	3
Water bodies passing WFD assessment	GB105036040930: Brett; GB40503G000400: Essex Gravels; GB40502G400900: North Essex Lower London Tertiaries
Number of water bodies requiring further WFD assessment	0

2.3.2 Extension of Clapham WTW from 25Ml/d to 36Ml/d (RTS21)

The Level 1 WFD assessment covered one water body of the option. The outcomes indicated further assessment would be necessary for one water body; GB105033047923: Ouse (Newport Pagnell to Roxton) river water body.

Table 2.25: WFD Level 1 assessment outcomes for RTS21

Option ID	RTS21
Option Description	Extension of Clapham WTW from 25Ml/d to 36Ml/d
Number of water bodies passing WFD assessment	1
Water bodies passing WFD assessment	GB40501G445600: Upper Bedford Ouse Principal Oolite 2
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further assessment	GB105033047923: Ouse (Newport Pagnell to Roxton)

2.3.3 Increasing the utilisation of existing surface water licence at Covenham Reservoir (LNE12)

The Level 1 WFD assessment covered five water bodies of the option. The outcomes indicated further assessment would be necessary for three water bodies; GB104029061990: Louth Canal water body, GB105029061660: Great Eau (downstream of South Thoresby) river water body and GB30432209: Covenham Reservoir lake water body.

Table 2.26: WFD Level 1 assessment outcomes for LNE12

Option ID	LNE12
Option Description	Increasing the utilisation of existing surface water licence at Covenham Reservoir
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB40401G401500: North Lincolnshire Chalk Unit (GW) GB104029062010: Poulton Drain Catchment (trib of Louth Canal)
Number of water bodies requiring further WFD assessment	3
Water bodies requiring further assessment	GB104029061990: Louth Canal GB105029061660: Great Eau (downstream of South Thoresby) GB30432209: Covenham Reservoir

2.4 Reservoirs

2.4.1 Extension /new reservoir at Hall - conjunctive with new treatment (LNC10)

The Level 1 WFD assessment covered four water bodies of the option. The outcomes indicated further assessment would be necessary for two water bodies; GB104028058480: Trent from Carlton-on-Trent to Laughton Drain river water body and GB105030062390: Skellingthorpe Main Drain river water body.

Table 2.27: WFD Level 1 assessment outcomes for LNC10

Option ID	LNC10
Option Description	Extension /new reservoir at Hall - conjunctive with new treatment
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB104028058300: Sewer Drain Catchment (trib of Trent); GB40402G990300: Lower Trent Erewash - Secondary Combined
Number of water bodies requiring further WFD assessment	2
Water bodies requiring further assessment	GB104028058480: Trent from Carlton-on-Trent to Laughton Drain GB105030062390: Skellingthorpe Main Drain

2.4.2 Strategic Resource Option (SRO): Earth embanked winter storage reservoir located in the south Lincolnshire area. Abstraction will be from the River Trent, with a transfer via the River Witham (RTN17)

The WFD assessment for this SRO was carried out as part of the wider SLR SRO project. A summary of the level 1 findings is presented here for completeness.

The Level 1 WFD assessment covered twenty-three water bodies of the option. The outcomes indicated further assessment would be necessary for seven water bodies; GB105030056520: South Beck river water body, GB105030056515: Swaton Drains river water body, GB104028053110: Trent from Soar to The Beck river water body, GB105030056780: Witham - conf Cringle Bk to conf Brant river water body, GB105030062370: Witham - conf Brant to conf Catchwater Drain river water body, GB205030062425: Witham - conf Catchwater Drain to conf Bain river water body and GB205030062426: Lower Witham - conf Bain to Grand Sluice river water body.

Table 2.28: WFD Level 1 assessment outcomes for RTN17

Option ID	RTN17
Option Description	Strategic Resource Option (SRO): Earth embanked winter storage reservoir located in the south Lincolnshire area. Abstraction will be from the River Trent, with a transfer via the River Witham.
Number of water bodies passing WFD assessment	16
Water bodies passing WFD assessment	GB104028053111: Slough Dyke Catchment (trib of Trent); GB104028053430: The Fleet Upper Catchment (trib of Trent); GB205030051515: Black Sluice IDB draining to the South Forty Foot Drain; GB105030056490: Ousemere Lode; GB105030056480: Billingborough Lode; GB105030051555: Pointon Lode; GB105030051540: Old Beck;

	GB105031050720: Glen; GB205031050705: Vernatt's Drain; GB105031050600: Welland - conf Gwash to conf Greatford Cut; GB205031050595: Maxey Cut; GB105031050595: Brook Drain (including Marholm Brook); GB205031050685: Welland - conf Greatford Cut to tidal; GB40502G445000: Cornbrash; GB40402G990300: Lower Trent Erewash - Secondary Combined; GB40502G401400: Witham Lias;
Number of water bodies requiring further WFD assessment	7
Water bodies requiring further assessment	GB105030056520: South Beck GB105030056515: Swaton Drains GB104028053110: Trent from Soar to The Beck GB105030056780: Witham - conf Cringle Bk to conf Brant GB105030062370: Witham - conf Brant to conf Catchwater Drain GB205030062425: Witham - conf Catchwater Drain to conf Bain GB205030062426: Lower Witham – conf Bain to Grand Sluice

2.4.3 Strategic Resource Option (SRO): Earth embanked reservoir with a storage capacity 50 million cubic metres, located in the fens. Abstraction will be from the River Great Ouse (FND21)

The WFD assessment for this SRO was carried out as part of the wider Fens reservoir SRO project. A summary of the level 1 findings is presented here for completeness.

The Level 1 WFD assessment covered thirteen water bodies of the option. The outcomes indicated further assessment would be necessary for three water bodies; GB205033000050: Middle Level river water body, GB105033047921: Ouse (Roxton to Earith) river water body and GB205033000060: Old Bedford River / River Delph (inc The Hundred Foot Washes) river water body.

Table 2.29: WFD Level 1 assessment outcomes for FND21

Option ID	FND21
Option Description	Strategic Resource Option (SRO): Earth embanked reservoir with a storage capacity 50 million cubic metres, located in the fens. Abstraction will be from the River Great Ouse.
Number of water bodies passing WFD assessment	10
Water bodies passing WFD assessment	GB530503300300: GREAT OUSE GB205033000010: Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain) GB205033000020: Counter Drain (Manea and Welney IDB) GB205033043375: Old West River GB105033042770: Swavesey Drain GB105033042680: Bin Brook GB205033047665: Relief Channel GB205033000030: Counter Drain (Upwell and Outwell IDB) GB40501G400400: North West Norfolk Sandringham Sands GB40501G445700: Cam and Ely Ouse Woburn Sands
Number of water bodies requiring further WFD assessment	3
Water bodies requiring further assessment	GB205033000050: Middle Level GB105033047921: Ouse (Roxton to Earith);

Option ID	FND21
	GB205033000060: Old Bedford River / River Delph (inc The Hundred Foot Washes).

2.5 Water Reuse

2.5.1 Colchester WRC direct to Ardleigh Reservoir (no additional treatment) (EXS19)

The Level 1 WFD assessment covered three water bodies of the option. The outcomes indicated further assessment would be necessary for one water body; GB520503713800: Colne transitional water body.

Table 2.30: WFD Level 1 assessment outcomes for EXS19

Option ID	EXS19
Option Description	Colchester WRC direct to Ardleigh Reservoir (no additional treatment)
Number of water bodies passing WFD assessment	3
Water bodies passing WFD assessment	GB105037041320: Salary Brook; GB30539944: Ardleigh Reservoir; GB40503G000400: Essex Gravels (GW)
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further assessment	GB520503713800: COLNE

3 Level 2 Water Framework Directive Assessments

In twelve of the WRMP24 BVP options the Level 1 screening has identified water bodies which require further WFD assessment to assess potential significant effects. Further information on WFD classification and the approach adopted can be found in Section 1.3.

Section 3.1 to Section 3.5 provide an overview of the Level 2 WFD assessments undertaken for these twelve options. Section 3.6 provides a summary table for each option assessed.

3.1 Independent Transfers

3.1.1 Ruthamford South to Ruthamford Central potable transfer (20 Ml/d) (RTN13)

Three water bodies were identified as requiring further assessment: Nene - Islip to tidal river water body, Nene Mid Lower Jurassic Unit groundwater body and Northampton Sands groundwater body.

The Level 2 WFD assessment for the two groundwater bodies identified deterioration risks to quantitative GWDTE (Ground Water Dependent Terrestrial Ecosystems) test due to temporary changes to groundwater flow and levels as a result of new pipeline crossings within 500m of GWDTE's. It also identified possible impediments to meeting Good Ecological Status, for quantitative GWDTE status.

The Level 2 assessment for the Nene – Islip to tidal river water body identified possible minor localised impacts to fish, invertebrates, hydrological regime and physico chemical quality elements. This is primarily due to potential impacts from construction dewatering during below ground works

A summary of the Level 2 WFD assessment is included in Table 3.1 and detail outputs are presented in Appendix B.

3.1.2 Cambridge Water to Cambs and West Suffolk (50 Ml/d) (SWC8)

One water body was identified as requiring further assessment: Cam and Ely Ouse Chalk groundwater body.

The Level 2 WFD assessment identified possible deterioration risks to quantitative and chemical status elements. This is primarily due to temporary changes to groundwater flow and levels as a result of new pipeline crossings within 500m of GWDTE's.

A summary of the Level 2 WFD assessment is included in Table 3.2 and detail outputs are presented in Appendix B.

3.2 Desalination

3.2.1 Holland on Sea desalination (seawater) 25 Ml/d (EXS10)

Two water bodies were identified as requiring further assessment: Essex coastal water body and Essex Gravels groundwater body.

For the Essex coastal water body, the Level 2 WFD assessment identified possible deterioration risks to biological quality elements, physico-chemical elements and hydro-morphological supporting elements. This is largely due to changes in flow/morphology from the new

abstraction and changes in water quality/morphology from the discharge of highly saline water from the desalination plant . It also identified possible impediments to meeting Good Ecological Status, for the hydro-morphological supporting elements.

For the Essex Gravel groundwater body the Level 2 assessment identified possible deterioration risks to quantitative GWDTE status test. This is primarily due to temporary changes to groundwater flow and levels as a result of new pipeline crossing of the Orwell estuary (which is a GWDTE).

A summary of the Level 2 WFD assessment is included in Table 3.3 and detail outputs are presented in Appendix B.

3.2.2 Mablethorpe Desalination Seawater (63Ml/d) (LNE6)

Two water bodies were identified as requiring further assessment: Lincolnshire coastal water body and South Lincolnshire Chalk Unit groundwater body.

For the Lincolnshire coastal water body, the Level 2 WFD assessment identified possible deterioration risks to biological quality elements, physico-chemical elements and hydro-morphological supporting elements. This is largely due to changes in flow/morphology from the new abstraction and changes in water quality/morphology from the discharge of highly saline water from the desalination plant. It also identified possible impediments to meeting Good Ecological Status, for the hydro-morphological supporting elements.

For the South Lincolnshire Chalk Unit groundwater body the Level 2 assessment identified possible deterioration risks to quantitative GWDTE and saline intrusion status tests. This is primarily due to temporary changes to groundwater flow and levels as a result of new pipeline crossing of the Salfleetby-Theddlethorpe Dunes SSSI (which is a GWDTE) and due to potential requirements for dewatering during construction of the intake and outfall structures.

A summary of the Level 2 WFD assessment is included in Table 3.4 and detail outputs are presented in Appendix B.

3.2.3 Desalination (Seawater) Plant in the Caister Area (25 Ml/d) (NTB20)

One water body was identified as requiring further assessment: Norfolk East coastal waterbody.

The Level 2 WFD assessment identified possible deterioration risks to biological quality elements, hydro-morphological supporting elements and physico-chemical quality elements. This is primarily due to possible short-term changes in temperature and water quality, due to the construction of below ground structures and changes in flow and sedimentation associated with draining pipelines. It also identified possible impediments to meeting Good Ecological Status, for the physico-chemical and biological quality elements.

A summary of the Level 2 WFD assessment is included in Table 3.5 and detail outputs are presented in Appendix B.

3.2.4 Felixstowe Desalination (Seawater) 25 Ml/d (SUE5)

Two water bodies were identified as requiring further assessment: Suffolk coastal water body and Orwell transitional water body.

For the Suffolk coastal water body, the Level 2 WFD assessment identified possible deterioration risks to biological quality elements, physico-chemical elements and mitigation measures supporting elements. This is largely due to changes in flow/morphology from the new abstraction, changes in water quality/morphology from the discharge of highly saline water from the desalination plant. It also identified possible impediments to meeting Good Ecological Status, for the hydro-morphological supporting elements.

The Level 2 assessment for the Orwell transitional waterbody identified possible minor localised impacts to biological quality elements and hydrological regime. This is primarily due to temporary changes to flow velocity, flow volume and sediment deposition due to the construction of the pipeline and permanent impacts from shading.

A summary of the Level 2 WFD assessment is included in Table 3.6 and detail outputs are presented in Appendix B.

3.3 WTW upgrades

3.3.1 Extension of Clapham WTW from 25Ml/d to 36Ml/d (RTS21)

One water body was identified as requiring further assessment: Ouse (Newport Pagnell to Roxton) river water body.

The Level 2 WFD assessment identified possible deterioration risks to biological quality elements and hydro morphological supporting elements. This is predominantly due to changes in widespread flow velocity, flow volume and sedimentation as a result of surface water abstraction. It also identified possible impediments to meeting Good Ecological Status, for the biological quality elements and hydrological regime.

A summary of the Level 2 WFD assessment is included in Table 3.7 and detail outputs are presented in Appendix B.

3.3.2 Increasing the utilisation of existing surface water licence at Covenham Reservoir (LNE12)

Three water bodies were identified as requiring further assessment: Louth Canal water body, Great Eau (downstream of South Thoresby) river water body and Covenham Reservoir lake water body.

This assessment has been carried out using a precautionary modelled abstraction scenario (based on a 1 in 200 year drought plus climate change abstraction scenario). This modelled scenario therefore identifies the worst case increase in abstraction rate, over and above the current recent actual abstraction for this existing site. The assessment assumes that the additional abstraction will be taken from both watercourses to minimise the potential impact of the scheme, on hydrological regimes. It is noted that the maximum abstraction presented in this assessment remains with the abstraction licence for the Covenham site.

The Level 2 WFD assessment for the Louth Canal and Great Eau identified potential precautionary deterioration risks to biological quality elements, hydro morphological supporting elements and physico-chemical quality elements. This is predominantly due to changes in flow velocity, flow volume and sedimentation as a result of the increases to surface water abstraction (within licence) with particular implications on hydrological regime. It also identified possible impediments to meeting Good Ecological Status, for the biological quality elements, as well as hydrological regime.

For the Covenham reservoir, the level 2 assessment potential minor localised impacts to biological quality elements due to increased discharge and abstraction from the water body.

A summary of the Level 2 WFD assessment is included in Table 3.8 and detail outputs are presented in Appendix B.

3.4 Reservoirs

3.4.1 Extension /new reservoir at Hall - conjunctive with new treatment (LNC10)

Two water bodies were identified as requiring further assessment: Trent from Carlton-on-Trent to Laughton Drain and Skellingthorpe Main Drain River water bodies.

The Level 2 WFD assessment for the River Trent identified possible deterioration risks to biological quality elements, hydromorphological supporting elements and physico-chemical quality elements. This is predominantly due to changes in widespread flow velocity, flow volume and sedimentation as a result of abstraction and reduced habitat due to new river bank reinforcement. It also identified possible impediments to meeting Good Ecological Status, for the biological quality elements and physico-chemical quality elements.

For Skellingthorpe Main Drain the assessment identified potential minor localised impacts from the presence of the new reservoir, which will lead to the loss of some open channels (largely managed field ditches).

A summary of the Level 2 WFD assessment is included in Table 3.9 and detail outputs are presented in Appendix B.

3.4.2 Strategic Resource Option (SRO): Earth embanked winter storage reservoir located in the south Lincolnshire area. Abstraction will be from the River Trent, with a transfer via the River Witham (RTN17)

The WFD assessment for this SRO was carried out as part of the wider SLR SRO project. A summary of the level 2 findings is presented here for completeness. Seven river water bodies were identified as requiring further assessment: South Beck, Swaton Drains, Trent from Soar to The Beck, Witham - conf Cringle Bk to conf Brant, Witham - conf Brant to conf Catchwater Drain, Witham - conf Catchwater Drain to conf Bain and Lower Witham – conf Bain to Grand Sluice.

The Level 2 assessment for the River Trent identified potential deterioration risks to biological and physico-chemical quality elements, due to reduction in flow leading to changes in water quality (from reduced dilution downstream) caused by the new abstraction required to support the reservoir. It also identified potential impediments to meeting Good Ecological Status, for the biological and physico-chemical quality elements due to the reduction in these flows.

The Level 2 assessment for the four River Witham river waterbodies all identified potential deterioration risks to biological, physico-chemical and hydromorphology supporting elements, due to the discharge and transfer of water from the River Trent (for abstraction in the Lower Witham to supply the reservoir). It also identified possible impediments to meeting Good Ecological Status, for the physico-chemical status elements.

For Swaton Drains the Level 2 assessment identified deterioration risks to biological status elements and hydromorphology supporting elements due to the loss of open channel habitat and flow from the presence of the reservoir (which covers 28% of the catchment). It also identified possible impediments to meeting Good Ecological Status, for the physico-chemical status elements and hydrological regime. Minor localised effects were identified on the South Beck catchment (where the reservoir covers around 2% of the catchment).

A summary of the Level 2 WFD assessment is included in Table 3.10 and detail outputs are presented in Appendix B.

3.4.3 Strategic Resource Option (SRO): Earth embanked reservoir with a storage capacity 50 million cubic metres, located in the fens. Abstraction will be from the River Great Ouse (FND21)

The WFD assessment for this SRO was carried out as part of the wider FR SRO project. A summary of the level 2 findings is presented here for completeness. Three river water bodies were identified as requiring further assessment: Middle Level, Ouse (Roxton to Earith) and Old Bedford River / River Delph (inc The Hundred Foot Washes).

Minor localised effects were identified on the Middle Level catchment due to loss of open channel and flow as the reservoir covers around 1% of the catchment.

The Level 2 WFD assessment for the Ouse (Roxton to Earith) and Old Bedford River / River Delph (inc The Hundred Foot Washes) identified possible deterioration risks to biological quality elements and hydrological regime. This is predominantly due to changes in flow velocity, flow volume, and sedimentation as a result of a new abstractions to supply the reservoir.

A summary of the Level 2 WFD assessment is included in Table 3.11 and detail outputs are presented in Appendix B.

3.5 Water Reuse

3.5.1 Colchester WRC direct to Ardleigh Reservoir (no additional treatment) (EXS19)

One water body was identified as requiring further assessment: Colne transitional water body.

The Level 2 WFD assessment identified possible deterioration risks to the hydrological regime, due to changes in flow velocity, flow volume, and sedimentation as a result of a cessation of an existing discharge. It also identified possible impediments to meeting Good Ecological Status, for the physico chemical quality elements and hydrological regime .

A summary of the Level 2 WFD assessment is included in Table 3.12 and detail outputs are presented in Appendix B.

3.6 Summary tables

Table 3.1: Ruthamford North to Ruthamford North potable transfer (100 Ml/d) (RTN13) Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data / confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB105032050381	**Nene - Islip to tidal**	**Low / Low**	**1**	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Further information about how the option will be operated. Review and update based on latest RBMP WFD data (Cycle 3 when available).	Provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourse.	**No**	**No**	**No**	
GB40502G402400	**Nene Mid Lower Jurassic Unit**	**Low / Low**	**2**	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme Detailed hydroecological assessment of the impacts of abstraction on flow in the watercourses, and potential influence on SSSIs Further information about option.	Any dewatering needed for the construction will be discharged to the river to help maintain flow. Provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourse.	**Possible**	**No**	**No**	

Water body ID	Water body name	Confidence in WFD data / confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
				Review and update based on latest RBMP WFD data (Cycle 3 when available).					
GB40501G445500	**Northampton Sands**	**Low / Low**	**2**	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme Detailed hydroecological assessment of the impacts of abstraction on flow in the watercourses, and potential influence on SSSIs Further information about option. Review and update based on latest RBMP WFD data (Cycle 3 when available).	Any dewatering needed for the construction will be discharged to the river to help maintain flow. Provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourse.	**Possible**	**No**	**No**	

Table 3.2: Cambridge Water to Cambs and West Suffolk (50 Ml/d) (SWC8) Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data / confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB40501G400500	**Cam and Ely Ouse Chalk**	**Low / Low**	**1**	Additional groundwater monitoring to understand groundwater levels at GWDTE and how they interact with the scheme Further information about option.	Dewatering discharge to surface water courses to maintain flow. Shafts to be sealed to ensure minimal groundwater egress after construction.	**No**	**No**	**No**	Assumed main watercourse crossings will be carried out using trenchless techniques, and will be installed below ground.

Table 3.3: Holland on Sea Desalination (Seawater) 25 Ml/d (EXS10) Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data / confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB650503520001	**Essex**	**Low / Low**	**2**	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Further investigation of exact impact saline discharge will have on other physiochemical parameters. Further information about how the option will be operated. Review and update based on latest RBMP WFD data (Cycle 3 when available).	Fish and eel screening at new intake. Minimisation of changes to hydrological regime through adjustment of abstraction conditions. Limitations on frequency of discharge of highly saline water into Essex coastal water body.	**Possible**	**Possible**	**No**	

Water body ID	Water body name	Confidence in WFD data / confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB40503G000400	**Essex Gravels**	**Low / Low**	**2**	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Further investigation into potential dependency of SSSI on groundwater Further information about how the option will be operated. Review and update based on latest RBMP WFD data (Cycle 3 when available).	Use of Clay Stanks in pipeline route where groundwater potentially encountered. Where possible ensure shafts for HDD launch and reception are located outside of the SSSI. Shafts to be sealed to ensure minimal groundwater egress after construction.	**Possible**	**Possible**	**No**	

Table 3.4: Mablethorpe Desalination Seawater (63 Ml/d) (LNE6) Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data / confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB640402492000	**Lincolnshire**	**Low / Low**	**2**	Further investigation into the impact of new intake and discharge on hydro morphology and physical modification pressures in this water body. Detailed hydro ecological study on impact of intakes and outfall on biology and water quality, particularly the impact of highly saline discharge. Further details on design and construction methodology, particularly with regards to the construction of the intake and outfall pipelines.	Fish and eel screening at new intake.	**Possible**	**Possible**	**No**	

Water body ID	Water body name	Confidence in WFD data / confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB40501G401600	**South Lincolnshire Chalk Unit**	**Low / Low**	**2**	Further details on design and construction methodology, particularly with regards to the construction of the intake and outfall pipelines Hydrogeological investigation into the impact of temporary dewatering on saline intrusion, particularly focussing on the area beneath the SSSI.	Minimise requirement for dewater in and around the SSSI	**Possible**	**Possible**	**No**	

Table 3.5: Desalination (Seawater) Plant in the Caister area (25 Ml/d) (NTB20) Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data / confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB650503520003	**Norfolk East**	**Low / Low**	**2**	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Further information about how the option will be operated. Review and update based on latest RBMP WFD data (Cycle 3 when available). Hydrodynamic modelling of impacts of abstraction and discharge into coastal water body on flow, sedimentation, bathymetry and water quality. Review of mitigation measures assessment for this water body to identify whether additional structures will lead for impacts on mitigation measures assessment.	Fish and eel screening at new intake. Minimisation of changes to hydrological regime through adjustment of abstraction conditions. Limitations on frequency of discharge of highly saline water into Essex coastal WB.	**Possible**	**No**	**No**	

Table 3.6: Felixstowe Desalination (Seawater) 25 Ml/d (SUE5) Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data / confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB650503520002	**Suffolk**	**Low / Low**	**2**	Detailed hydrodynamic assessment of the impacts of 25Ml/d abstraction and brine dispersion on water quality, biology and concentration of key physicochemical parameters within the coastal environment. Further information about option.	Abstraction conditions to be set to minimise changes to hydrological regime that could cause deterioration of biological and physicochemical WFD elements. Discharge to be diluted/treated to a level which minimises disruption to the coastal environment	**Possible**	**Possible**	**No**	A precautionary approach has been followed throughout because of the complexity and uncertainty associated with this project (lack of scientific study, esp. modelling) and scheme detail. Construction impacts should be mitigable through mechanisms such as sediment management, as part of a Construction Environment Management Plan (CEMP).
GB520503613601	**Orwell**	**Low / Low**	**1**	Further information about option.	Affix the pipeline to the existing A14 bridge for the crossing of the Orwell estuary and SSSI.	**No**	**No**	**No**	Assumed that pipeline will be affixed to the existing A14 bridge crossing of the Orwell estuary, so no impact on the Orwell estuary SSSI.

Table 3.7: Extension of Clapham WTW from 25Ml/d to 36Ml/d (RTS21) Level 2 WFD summary

Water body ID	Water body Name	Confidence in WFD Data / Confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB105033047923	**Ouse (Newport Pagnell to Roxton)**	**Low / Low**	**2**	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Further assessment of impact of new abstraction WQ and on biology. Further information about how the option will be operated. Review and update based on latest RBMP WFD data (Cycle 3 when available).	Adjustment of abstraction conditions to limit impact on hydrological regime.	**Possible**	**Possible**	**No**	Assumes upgrade in WTW capacity will require increase in abstraction rate (assumes within licence but above recent actual rates.

Table 3.8: Increasing the utilisation of existing surface water licence at Covenham Reservoir (LNE12) Level 2 WFD summary

Water body ID	Water body Name	Confidence in WFD Data / Confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB104029061990	**Louth Canal**	**Low / Low**	**3**	Further information on the split of abstraction between the Louth Canal and the Great Eau. Further information on seasonal abstraction profile Detailed hydroecological study on impact of abstraction on flow, biology and water quality (due to reduction in dilution).	Minimise abstraction during low flow periods and consider use of HOF.	**Possible**	**Possible**	**No**	Assumes no new pipelines required to transfer water from watercourses to reservoir.
GB105029061660	**Great Eau (downstream of South Thoresby)**	**Low / Low**	**3**	Further information on the split of abstraction between the Louth Canal and the Great Eau. Further information on seasonal abstraction profile Detailed hydroecological study on impact of abstraction on flow, biology and water quality (due to reduction in dilution).	Minimise abstraction during low flow periods and consider use of HOF.	**Possible**	**Possible**	**No**	Assumes no new pipelines required to transfer water from watercourses to reservoir.

Water body ID	Water body Name	Confidence in WFD Data / Confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB30432209	**Covenham Reservoir**	**Low / Low**	**1**	Hydroecological assessment of impact of changes in water level on reservoir habitat (focussing on phytoplankton).	Some of the mitigation identified in the PoM (inclusion of fish screens on intake from Louth Canal, Habitat refuge creation along Louth canal near PWS intake) could be included in this scheme to help improve the water body.	**No**	**No**	**Possible**	Assumes that some of the mitigation identified in the PoM could be included in this scheme to help improve the water body.

Table 3.9: Extension /new reservoir at Hall - conjunctive with new treatment (LNC10) Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data / Confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB104028058480	**Trent from Carlton-on-Trent to Laughton Drain**	**Low / Low**	**2**	Detailed hydrological assessment of the impacts of abstraction from watercourse on flow, hydromorphology and water quality / concentration of key physicochemical parameters, especially TP / Phosphate Detailed review of all baseline ecological WFD data, including results of any surveys already undertaken for this scheme Further information about option, including details on abstraction conditions (HOF etc).	Minimisation of changes to hydrological regime, particularly during lower flow conditions through adjustment of abstraction conditions.	**Possible**	**Possible**	**No**	Abstraction from the river will probably be subject to a HOF and will not occur during dry periods but assessment assumes abstraction at any time on a precautionary basis until this is confirmed.
GB105030062390	**Skellingthorpe Main Drain**	**Low / Low**	**1**	On-going refinement of the design. Land drainage and site drainage design to understand which watercourses will be diverted/realigned and which are lost. Hydrology study to understand potential reduction in catchment area		**No**	**No**	**No**	

Water body ID	Water body name	Confidence in WFD data / Confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
				Request for further specific details of mitigation measures assessment and RBMP measures (including A/HWMB measures where relevant) from EA Review and update based on latest RBMP WFD data (Cycle 3 when available).					

Table 3.10: Strategic Resource Option (SRO): Earth embanked winter storage reservoir located in the south Lincolnshire area. Abstraction will be from the River Trent, with a transfer via the River Witham (RTN17) Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data / Confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB105030056520	**South Beck**	**Low / Low**	**1**	On-going refinement of the design. Land drainage and site drainage design to understand which watercourses will be diverted/realigned and which are lost. hydrology study to understand potential reduction in catchment area (and impacts on flow) request for further specific details of mitigation measures assessment and RBMP measures (including A/HWMB measures where relevant) from EA Review and update based on latest RBMP WFD data (Cycle 3 when available).	Any large watercourses should be realigned to provide lost habitat and flow into the main rivers Further details on mitigation measures assessment from EA to understand impact of the scheme and also to identify opportunities to improve the water body as part of the scheme.	**No**	**No**	**No**	
GB105030056515	**Swaton Drains**	**Low / Low**	**3**	On-going refinement of the design. Land drainage and site drainage design to understand which	The reservoir will lead to the loss of approximately 28% of the catchment and therefore a	**Yes**	**Yes**	**No**	

Water body ID	Water body name	Confidence in WFD data / Confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
				watercourses will be diverted/realigned and which are lost. Hydrology study to understand potential reduction in catchment area (and impacts on flow) Request for further specific details of mitigation measures assessment and RBMP measures (including A/HWMB measures where relevant) from EA Review and update based on latest RBMP WFD data (Cycle 3 when available).	reduction in flows in both channels. Need to offset loss of in-channel habitat and/or watercourse length Flow support release of water from the reservoir could be considered to support flows, but would need consideration of water quality. Further details on mitigation measures assessment from EA to understand impact of the scheme and also to identify opportunities to improve the water body as part of the scheme.				

Water body ID	Water body name	Confidence in WFD data / Confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB104028053110	**Trent from Soar to The Beck**	**Low / Low**	**2**	On-going refinement of the design. Hydrology study to understand potential impact of reduced flow in the catchment on hydrological regime and water quality (including both continuous and spot sample water quality monitoring) request for further specific details of mitigation measures assessment and RBMP measures (including A/HWMB measures where relevant) from EA Review and update based on latest RBMP WFD data (Cycle 3 when available).	Implementation of best practice mitigation measures for the intake structure. Further water quality modelling and monitoring (both continuous and spot sampling) is required to determine the extent of impacts on the biological quality elements. This will help determine appropriate mitigation measures.	**No**	**No**	**No**	
GB105030056780	**Witham - conf Cringle Bk to conf Brant**	**Low / Low**	**3**	On-going refinement of the design. Hydrology study to understand the impact of increased flow in the catchment on hydrological regime and biological status elements,	INNS treatment has been provided between the River Trent abstraction and the transfer to the River Witham	**Yes**	**Yes**	**Yes**	

Water body ID	Water body name	Confidence in WFD data / Confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
				Water quality modelling and monitoring (both continuous and spot sampling) to understand the impact of changes in water quality and therefore biology due to the discharge Request for further specific details of mitigation measures assessment and RBMP measures (including A/HWMB measures where relevant) from EA Review and update based on latest RBMP WFD data (Cycle 3 when available). Hydraulic modelling to understand the impact on flow and velocity as a result of the abstraction.	Further water quality modelling (both continuous and spot sampling) is required to determine the extent of impacts within this catchment. This will help determine appropriate mitigation measures.				
GB105030062370	**Witham - conf Brant to conf Catchwater Drain**	**Low / Low**	**3**	On-going refinement of the design. Hydrology study to understand the impact of increased flow in the catchment on hydrological regime and biological status elements,	INNS treatment has been provided between the River Trent abstraction and the transfer to the River Witham Further water quality	**Yes**	**Yes**	**Yes**	

Water body ID	Water body name	Confidence in WFD data / Confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
				Water quality modelling and monitoring (both continuous and spot sampling) to understand the impact of changes in water quality and therefore biology due to the discharge, Request for further specific details of mitigation measures assessment and RBMP measures (including A/HWMB measures where relevant) from EA Review and update based on latest RBMP WFD data (Cycle 3 when available). Hydraulic modelling to understand the impact on flow and velocity as a result of the abstraction.	modelling (both continuous and spot sampling) is required to determine the extent of impacts within this catchment. This will help determine appropriate mitigation measures.				
GB205030062425	**Witham - conf Catchwater Drain to conf Bain**	**Low / Low**	**3**	On-going refinement of the design. Hydrology study to understand the impact of increased flow in the catchment on hydrological regime and biological status elements	INNS treatment has been provided between the River Trent abstraction and the transfer to the River Witham Further water quality	**Yes**	**Yes**	**Yes**	

Water body ID	Water body name	Confidence in WFD data / Confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
				Water quality modelling and monitoring (both continuous and spot sampling) to understand the impact of changes in water quality and therefore biology due to the discharge Request for further specific details of mitigation measures assessment and RBMP measures (including A/HWMB measures where relevant) from EA Review and update based on latest RBMP WFD data (Cycle 3 when available). Hydraulic modelling to understand the impact on flow and velocity as a result of the abstraction.	modelling (both continuous and spot sampling) is required to determine the extent of impacts within this catchment. This will help determine appropriate mitigation measures.				
GB205030062426	**Lower Witham – conf Bain to Grand Sluice**	**Low / Low**	**3**	On-going refinement of the design. Hydrology study to understand the impact of increased flow in the catchment on hydrological regime and biological status elements,	INNS treatment has been provided between the River Trent abstraction and the transfer to the River Witham Implementation of best	**Yes**	**Yes**	**Yes**	Assumes that abstraction from this water body will be timed to coincide with the discharges into the upstream water body (GB105030056780) to ensure no net loss in flow downstream of abstraction point.

Water body ID	Water body name	Confidence in WFD data / Confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
				Water quality modelling and monitoring (both continuous and spot sampling) to understand the impact of changes in water quality and therefore biology due to the discharge. Request for further specific details of mitigation measures assessment and RBMP measures (including A/HWMB measures where relevant) from EA Review and update based on latest RBMP WFD data (Cycle 3 when available). Hydraulic modelling to understand the impact on flow and velocity as a result of the abstraction.	practice mitigation measures for the intake structure. Further water quality modelling (both continuous and spot sampling) is required to determine the extent of impacts within this catchment. This will help determine appropriate mitigation measures.				

Table 3.11: Strategic Resource Option (SRO): Earth embanked reservoir with a storage capacity 50 million cubic metres, located in the fens. Abstraction will be from the River Great Ouse (FND21) Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data / Confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB205033000050	**Middle Level**	**Low / Low**	**1**	On-going refinement of the design. Land drainage and site drainage design to understand which watercourses will be diverted/realigned and which are lost. Hydrology study to understand potential reduction in catchment area (and impacts on flow) Request for further specific details of mitigation measures assessment and RBMP measures (including A/HWMB measures where relevant) from EA Review and update based on latest RBMP WFD data (Cycle 3 when available).	Any large watercourses should be realigned to re-provide lost habitat and flow into the main rivers. Further details on mitigation measures assessment from EA to understand impact of the scheme and also to identify opportunities to improve the water body as part of the scheme.	**No**	**No**	**No**	
GB105033047921	**Ouse (Roxton to Earith)**	**Low / Low**	**2**	On-going refinement of the design. Hydraulic modelling to understand the impact on	Implementation of best practice mitigation measures for the intake structure.	**Possible**	**Possible**	**No**	Assumes pipeline crossings are trenchless under large watercourses.

Water body ID	Water body name	Confidence in WFD data / Confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
				flow and velocity as a result of the abstraction Water quality modelling and monitoring (both continuous and spot sampling) to understand the impact of changes in water quality and therefore biology due to the abstraction. Hydraulic modelling is required to determine the impact of abstraction on downstream flow regime. Request for further specific details of mitigation measures assessment and RBMP measures (including A/HWMB measures where relevant) from EA Review and update based on latest RBMP WFD data (Cycle 3 when available).	Further water quality modelling (both continuous and spot sampling) is required to determine the extent of impacts within this catchment. This will help determine appropriate mitigation measures.				
GB205033000060	**Old Bedford River / River Delph (inc The Hundred Foot Washes)**	**Low / Low**	**2**	On-going refinement of the design. Hydraulic modelling to understand the impact on flow and velocity as a result of the abstraction Water quality modelling and monitoring (both continuous	Implementation of best practice mitigation measures for the intake structure. Further water quality modelling	**Possible**	**Possible**	**No**	Assumes pipeline crossings are trenchless under large watercourses.

Water body ID	Water body name	Confidence in WFD data / Confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
				and spot sampling) to understand the impact of changes in water quality and therefore biology due to the abstraction. Hydraulic modelling is required to determine the impact of abstraction on downstream flow regime. Request for further specific details of mitigation measures assessment and RBMP measures (including A/HWMB measures where relevant) from EA Review and update based on latest RBMP WFD data (Cycle 3 when available).	(both continuous and spot sampling) is required to determine the extent of impacts within this catchment. This will help determine appropriate mitigation measures.				

Table 3.12: Colchester WRC direct to Ardleigh Reservoir (no additional treatment) (EXS19) Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data / Confidence in option design	Maximum impact score	Requirements to improve confidence	Mitigation measures	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB520503713800	**COLNE**	**Low / Low**	**2**	Detailed review of all baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Further hydro-ecological assessment of impact to watercourse of reduction in flow, and changes in water quality from new RO concentrate discharge. Further information about option.	None identified at this stage - further investigations needed	**Possible**	**Possible**	**No**	

4 Cumulative effects assessment

4.1 Intra-plan effects

Where the same water bodies are identified as being impacted by more than one BVP option, these water bodies have been compiled and assessed to identify if an increased risk of WFD deterioration might occur from the combination of multiple options. Where cumulative abstraction impacts are identified, further assessment of impact on downstream waterbodies has been considered. The cumulative effects assessment is based on the WFD Level 2 assessment outcomes as they are presented in this report. As further investigations are carried out and design information becomes available, the level 2 WFD assessments will be updated. Following these adjustments, updates to the intra-plan cumulative effects assessments will be required.

4.1.1 Cumulative effects leading to no risk of deterioration

Table 4.1 below, presents a list of water bodies which are impacted by more than one of the BVP options presented in this study. The cumulative effects assessment has shown that for the following water bodies, cumulative BVP option activities are unlikely to lead to an increased risk of WFD deterioration.

Table 4.1: BVP water bodies where intra plan effects are unlikely to lead to an increased risk of WFD deterioration

Water body ID and name	Options	Comments
GB104029062010 Poulton Drain Catchment (trib of Louth Canal)	• LNE6 • LNE12	Both options require below ground construction activities, however, the activity is assumed to have low impact on the water environment in this water body. Cumulative intra-plan effects are unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, especially as activities are brought forward 10 years apart. Risk to water body **remains as minor localised effect**.
GB105031050595 Brook Drain (including Marholm Brook)	• RTN17 • FND16 • RTN13 • LNB1	All options involve the installation of pipeline and below ground activities associated with crossings andRTN13 and LNB1 include modifications of a WTW in this water body. The cumulative intra-plan effects are unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, despite proposed construction overlap. Risk to water body **remains as minor localised effect**.
GB105031050600 Welland – conf Gwash to conf Greatford Cut	• RTN17 • LNB1	Both options involve the installation of new pipelines and below ground structures associated with crossings within this water body. The cumulative intra-plan effects of the multiple pipelines are unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, despite proposed construction overlap. Risk to water body **remains as minor localised effect**.
GB105031050720 Glen	• RTN17 • LNB1	Both options involve the installation of new pipelines and below ground structures associated with crossings within this water body. The cumulative intra-plan effects of the multiple pipelines are unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, despite proposed construction overlap. Risk to water body **remains as minor localised effect**.
GB105032050330 Billing Brook	• RTN13 • RTS11	Both options involve the installation of new pipelines and below ground structures associated with crossings within this water body. The cumulative intra-plan effects of the multiple pipelines

Water body ID and name	Options	Comments
		are unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, despite proposed construction overlap. Risk to water body **remains as minor localised effect**.
GB105033037620 Hobson's Brook	• CAM4 • SWC8	Both options involve the installation of new pipelines and watercourse crossings within this water body. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, despite proposed construction overlap. Risk to water body **remains as minor localised effect**.
GB105033042670 Cherry Hinton Brook	• CAM4 • SWC8	Both options involve the installation of new pipelines and watercourse crossings within this water body. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, despite proposed construction overlap. Risk to water body **remains as minor localised effect**.
GB105033042680 Bin Brook	• FND21 • CAM4	Both options involve the installation and maintenance of pipelines within this water body. The cumulative intra-plan effects of multiple pipelines are unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, especially as proposed construction is 5 years apart. Risk to water body **remains as minor localised effect**.
GB105033042770 Swavesey Drain	• FND21 • CAM4	Both options involve the installation and maintenance of pipelines within this water body. The cumulative intra-plan effects of multiple pipelines are unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, especially as proposed construction is 5 years apart. Risk to water body **remains a**s **minor localised effect**.
GB105033043190 Thet (DS Swangey Fen)	• NEH5 • SUT5	Both options involve the installation of new pipelines and watercourse crossings within this water body. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, especially as proposed construction is 5 years apart. Risk to water body **remains as minor localised effect**.
GB105033043310 Diddington Brook	• CAM4 • RTS11	CAM4 option involves the installation of new pipelines in addition to the modification of an SR at Grafham WTW site. RTS11 also involves the installation of new pipelines as well as associated below ground activities due to new watercourse crossings. The cumulative intra-plan effects of multiple pipelines, reservoir adjustments and new crossings are unlikely to lead to an increased risk of WFD deterioration, especially as proposed construction is 10 years apart. Risk to water body **remains as minor localised effect**.
GB105033043390 Whittle	• NHL4 • NEH5	Both options involve the installation of new pipelines and watercourse crossings within this water body. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, despite proposed construction overlap. Risk to water body **remains as minor localised effect.**
GB105033043400 Little Ouse River	• SUT5 • NEH5	Both options involve the installation of new pipelines along the same route, leading to the same new / modified service reservoir. As the pipelines within this water body and activities associated with SR at the reservoir, cumulative intra-plan effects are assumed to not lead to an increased risk of WFD deterioration. Assumed as NEH5 is scheduled for construction first and that SUT5 will join already installed pipeline to SR at a later date. Risk to water body **remains as minor localised effect.**

Water body ID and name	Options	Comments
GB105033047890 Wissey - Upper	• NBR6 • NTB10 • SUT5 • NED2	All options meet at West Bradenham WTW in this water body, involving the installation of new pipelines and below ground structures associated with crossings and the modification of the WTW (to facilitate new transfers). The cumulative intra-plan effects of the multiple pipelines and below ground activities are unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected. Two options are scheduled for installation 5 years prior to the remaining two. Risk to water body **remains as minor localised effect**.
GB105034050931 Bure (Horstead Mill to St Benet's Abbey)	• NTB20 • NAY1	Both options involve the installation of new pipelines and below ground activities within this water body. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, especially as proposed construction of options is 10 years apart. Risk to water body **remains as minor localised effect**.
GB105034051020 Wendling Beck	• NBR6 • NTB10 • NNC4 • NED2	All the options involve the installation of new pipelines and below ground activities associated with crossings and modification of WTW within this water body. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected (especially as two options are proposed to be implemented 5 years before the other two). Risk to water body **remains as minor localised effect**.
GB105034051281 Yare (Tiffey to Wensum)	• NTB10 • NWY2	Both options involve the installation of new pipelines and below ground activities associated with crossings and modification of WTW within this water body. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, especially as options are scheduled for construction 10 years apart. Risk to water body **remains as minor localised effect**.
GB105034051370 Yare (Wensum to tidal)	• NTB10 • NTB20	Both options involve the installation of new pipelines and below ground activities associated with crossings, modification of an existing Mousehold WTW and construction of new treatment components associated with new desalination operation, within this water body. The cumulative intra-plan effects of multiple pipelines and below ground activities assumed unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, especially as options are scheduled for construction 10 years apart. Risk to water body **remains as minor localised effect**.
GB105034055882 Wensum DS Norwich	• NTB10 • NAY1 • NTB20	All options involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, especially as desalination option is scheduled for construction 10 years later than two transfers. Risk to water body **remains as minor localised effect**.
GB105036040941 Stour (Wixoe - Lamarsh)	• EXC15 • EXS18	Both options involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, even though proposed construction overlap. Risk to water body **remains as minor localised effect**.
GB105036040970 Glem - Lower	• SWC8 • EXC15	Both options involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. The cumulative intra-plan effects of multiple pipelines

Water body ID and name	Options	Comments
		and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, even though proposed construction overlaps with both options. Risk to water body **remains as minor localised effect**.
GB105036040980 Stour (u/s Wixoe)	• SWC8 • EXC15	Both options involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, even though proposed construction overlaps. Risk to water body **remains as minor localised effect**.
GB105036046400 Glem – Upper	• SWC8 • EXC15	Both options involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, even though proposed construction overlaps. Risk to water body **remains as minor localised effect**.
GB105037041320 Salary Brook	• EXS10 • EXS19	Both options involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, especially as proposed construction does not overlap, scheduled to be 7 years apart. Risk to water body **remains as minor localised effect**.
GB105037041330 Colne (d/s Doe's Corner)	• EXC15 • EXS18 • EXS10	Both transfer options (EXC15 and EXS18) involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. EXS10 also involves below ground structures and new pipelines, in addition to modification of an existing and construction of a new WTW. This option also features a discharge of water of higher quality into the nearby watercourse which is anticipated to provide some benefits within the water body. Therefore, it is assumed that cumulative intra-plan effects of multiple pipelines, crossings and other listed activities is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, especially as desalination option is scheduled for construction 10 years after transfers. Risk to water body **remains as minor localised effect.**
GB205031050595 Maxey Cut	• RTN17 • LNB1	Both options involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. SLR option features a new pumping station in this water body. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, despite options scheduled for installation in same period. Risk to water body **remains as minor localised effect**.
GB205031050685 Welland - conf Greatford Cut to tidal;	• RTN17 • LNB1 • FND16	All options involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected. Risk to water body **remains as minor localised effect**.
GB205031050705 Vernatt's Drain	• RTN17 • LNB1	Both options involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected. Risk to water body **remains as minor localised effect**.

Water body ID and name	Options	Comments
GB205033043375 Old West River	• CAM4 • FND21	Both options involve the installation of new pipelines. The cumulative intra-plan effects of multiple pipelines are unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, especially since options are scheduled to be implemented for installation 5 years apart. Risk to water body **remains as minor localised effect**.
GB205033047665 Relief Channel	• FND21 • FND16 • NBR6	All options involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. NBR6 also features modification of the Bexwell SR. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected. Risk to water body **remains as minor localised effect.**
GB40401G401500 North Lincolnshire Chalk Unit	• LNE6 • LNC25 • LNE12	All options involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, especially as LNE6 is scheduled for installation 10 years after LNC25/ LNE12. Risk to water body **remains as minor localised effect.**
GB40402G990300 Lower Trent Erewash - Secondary Combined	• RTN17 • LNC10	Both options involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, especially as New Hall reservoir is scheduled for construction 7 years later than SLR. Risk to water body **remains as minor localised effect.**
GB40501G400700 North Essex Chalk	• SWC8 • EXC15 • EXS18	All options involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected. Risk to water body **remains as minor localised effect.**
GB40502G400900 North Essex Lower London Tertiaries	• EXC15 • EXS18 • SUE23	All options involve below ground activities associated with new watercourse and other crossings as well as modifications to existing WTW. SUE23 includes the refurbishment and operation of existing groundwater sources. The cumulative intra-plan effects of multiple pipelines, below ground activity and borehole operation is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected. Risk to water body **remains as minor localised effect.**
GB530503300300 GREAT OUSE	• FND21 • FND16	Both options involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. The cumulative intra-plan effects of multiple pipelines and crossings is unlikely to be significant at a water body scale so no increased risk of WFD deterioration expected, particularly since FND21 construction is planned 4 years before FND16. Risk to water body **remains as minor localised effect.**
GB104029061990 Louth Canal	• LNE12 • LNE6	LNE12 involves increased abstraction (outside RA's) leading to a loss of flow volume and velocity in watercourse. However, LNE6, involves installation of new pipeline and associated below ground structures. It is therefore anticipated that the cumulative intra-plan effects will not lead to an increased risk of WFD deterioration outside of what is detailed in the Covenham / Lincolnshire assessment. Risk to water body **remains as major adverse effect**.
GB105029061660	• LNE12 • LNE6	LNE12 involves increased abstraction (outside RA's) leading to a loss of flow volume and velocity in watercourse. However, LNE6,

Water body ID and name	Options	Comments
Great Eau (downstream of South Thoresby)		involves installation of new pipeline and associated below ground structures. It is therefore anticipated that the cumulative intra-plan effects will not lead to an increased risk of WFD deterioration outside of what is detailed in the LNE12 assessment. Risk to water body **remains as major adverse effect**.
GB105032050381 Nene - Islip to tidal	• RTN13 • RTS11	The assumed impact from RTN13 is the installation of new pipelines with associated below ground construction activities within 500m of a sensitive groundwater feature (Castor Flood Meadows SSSI / GWDTE). Loss of habitat especially on fish and biology associated with river and associated floodplain (SSSI site) is a risk posed to the water body by this. RTS11 has below ground structures also as part of the connection to Chesterton SR. The section of pipeline within this water body assessed for the RTS11 option is shared with RTN13's route. Therefore, cumulative intra-plan effects will not lead to an increased risk of WFD deterioration outside of what is already assessed against in the RTN13 Level 1 and Level 2 WFD assessments. Risk to water body **remains as minor localised effect.**
GB105033047921 Ouse (Roxton to Earith)	• FND21 • CAM4	As part of the FR option, a new abstraction is proposed which is assessed to impact this water body alongside watercourse crossings. For CAM4, the installation of new pipelines with associated crossings is the only activity from this option impacting this water body. It is therefore assumed that cumulative intra-plan effects will not lead to an increased risk of WFD deterioration, particularly since construction of CAM4 will commence 5 years before FR. Risk to water body **remains as** amber adverse effect as outlined in FR assessment.
GB205033000050 Middle Level	• FND21 • FND16 • RTS11	Both the FND16 and RTS11 options involve the installation of new pipelines in this water body and would be brought forward at the same time. The FND21 option is proposed to be constructed within this water body and is due to be brought forward at the same time. Anticipated that cumulative intra-plan effects will not lead to any additional risk of WFD deterioration other than what is outlined in the FR WFD assessment. Risk **to remain as minor effect** assuming appropriate mitigationis in place.
GB40501G400300 Broadland Rivers Chalk & Crag	• NTB20 • NED2 • NNC4 • NTB10 • NWY2 • NAY1 • NHL4	All options involve below ground structures associated with new pipelines, crossings and modifications to a WTW. Three options (NTB10, NAY1 and NHL4) would be brought forward at the same time, as would NED2 and NNC4 and then lastly as would NWY2 and NTB20. Cumulatively the impacts of these below ground structures will lead to no additional risk of WFD deterioration due to differing times of delivery of each transfer, the shallow nature of the works and the relative size of the groundwater body. Risk to water body will **remain as minor localised effect**.
GB40501G400500 Cam and Ely Ouse Chalk (GW)	• NED2 • NTB10 • SWC8 • SUT5 • NHL4 • NEH5	All options involve below ground structures associated with new pipelines, crossings and modifications to a WTW. One option (SWC8) flagged this GW body for below ground structures within 500m of a GWDTE. Cumulatively the impacts of these below ground structures will lead to no additional risk of WFD deterioration (additional to what is already assessed) due to the shallow nature of the works and the relative size of the groundwater body. Risk to water body will **remain as a minor localised effect**.
GB40502G402400 Nene Mid Lower Jurassic Unit (GW)	• RTN13 • RTS11	Both options involve the installation of pipelines and associated below ground activities within this water body. RTS11 has below ground structures within 500m of a GWDTE associated with watercourse crossing. Cumulatively the impacts of these below ground structures will lead to no additional risk of WFD deterioration due to the shallow nature of the works and the

Water body ID and name	Options	Comments
		relative size of the groundwater body. Risk to water body will **remain as minor localised effect**.
GB40503G000400 Essex Gravels	• EXC15 • EXS10 • EXS18 • SUE23 • EXS19	All options involve below ground activities associated with new watercourse (and other) crossings as well as modifications to existing WTW. Raydon WTW option includes the refurbishment and operation of existing groundwater sources. EXS10 features a proposed crossing within very close proximity of a GWDTE. Cumulatively the impacts of these below ground structures will lead to no additional risk of WFD deterioration (additional to what is already assessed) due to differing times of delivery of each option, each pipeline being placed within shallow trenches and the relative size of the groundwater body. Risk to water body will **remain** as amber adverse effect as per EXS10.
GB520503713800 COLNE	• EXS10 • EXS19	Both options involve the installation of new pipelines and associated below ground structures within this water body. EXS19 also involves the cessation of an existing discharge into the watercourse, which has additional flow implications. Cumulatively the impacts of these below ground structures, pipelines and discharge cessation activities will lead to no additional risk of WFD deterioration due to differing times of delivery of each option. Risk to water body will **remain as** amber adverse effect as per the EXS19 assessment.

4.1.2 Cumulative effects leading to potential risk of deterioration

The cumulative effects assessment has shown that none of the water bodies assessed as part of the AWS BVP intra-plan effects assessment, would lead to a potential increased risk of WFD deterioration. The cumulative effects assessment is based on the WFD Level 2 assessment outcomes as they are presented in this report. As further investigations are carried out and design information becomes available, the level 2 WFD assessments will be updated. Following these adjustments, updates to the inter-plan cumulative effects assessments will be required. For example, it is likely that cumulative impacts could occur on the River Trent due to SLR and New Hall reservoir option.

It is likely that cumulative impacts could occur on the River Trent due to SLR and New Hall reservoir option which both include new or increased abstraction from the River Trent. Further investigation is required into the combined effect of these two options.

There is also the potential for cumulative effects in the downstream water body of the Wash Inner (GB530503311300) and Wash Outer (GB640523160000) transitional water bodies due to combined impacts from SLR and FR options. A separate study is currently underway to provide a better understanding of the potential combined effects of these options on the Wash. This study will be carried out as part of these SROs assessment for Gate 3 of the Regulators' Alliance for Progressing Infrastructure Development (RAPID) process and was not available at the time of writing.

4.2 Inter-plan effects

The inter-plan effects assessment reviews the cumulative effects of both BVP options along with other relevant planning allocations and applications.

Where the same water body is identified as being impacted by more than one BVP option and/or one or more relevant planning allocation/application, these water bodies have been compiled NS assessed to identify if an increased risk of WFD deterioration might occur from the combination of multiple options (see Section 1.3.4.2 for methodology).

Table 4.2 lists the various relevant planning projects that have been included in the below inter-plan cumulative effects assessment, as they occur and have the potential to impact on the same waterbodies as one or more BVP options.

Table 4.2: Planning projects included within same water bodies as BVP options

Project Name	Description
Local Planning Allocations	
Bare Fen & West Fen, Willingham/ Over (minerals and waste)	Potential sand and gravel extraction proposed at site across 240.5 hectares of land in the Bare and West fen area.
Baston No.2 Quarry Phase 2, Langtoft	Hanson Aggregates Quarry with proposed 2025 extension of existing site for 37 additional hectares of sand and gravel extraction.
Chear Fen, Cottenham (Minerals and waste)	Potential sand and gravel extraction proposed at site across 36 hectares of land in Chear Fen area.
Gores Farm, Thorney (minerals and waste)	Potential sand and gravel extraction proposed at site across 84 hectares of land in Thorney.
Land at Grange Farm, Spixworth	The allocation would be worked as a 48 hectare extension to the current site which is to the south west of proposed extension.
Land off Fakenham Road, Beetley	This site would form a 44.4 hectare site extension to the existing East Bilney Quarry.
Land off Main Road, Maxey	Potential sand and gravel at site across 33 hectares of land in Maxey.
Land to the east of South Runcton	Allocated as an Area of Search for silica sand extraction across 47 hectares in South Ructon.
Land to the north of Shouldham	Allocated area of search covers 815 hectares adjacent to areas of previous and current mineral workings and close to a sand and gravel allocation.
Land to the north of Stow Bardolph	Allocated as an Area of Search for silica sand extraction at two parcels of land covering approximately 31 and 30 hectares respectively.
MIN 102 Shropham and Snetterton	This site is one of a number of ‘extensions’ to the current Shropham Quarry covering 58.2 hectares.
Mitchell Hill Farm South, Cottenham (minerals and waste)	Potential sand and gravel at site across 114 hectares of land in Cottenham.
West Deeping Development Brief	36.1 hectare extension of existing King Street Quarry for 2027.
Willow Hall Farm, Thorney (minerals and waste)	Potential sand and gravel at site across 106 hectares in Thorney.
Block Fen / Langwood Fen Master Plan	The Block Fen/ Langwood Fen Master Plan to improve recycling of construction waste materials, as well as creating wet grassland habitats and increasing flood risk management measures adjacent to the Ouse Washes.
Large Scale Developments	
A428 Black Cat to Caxton Gibbet Road Improvement Scheme	The proposal is to upgrade the A428 between A1/A421 Black Cat Junction and A428/A1198 Caxton Gibbet Junction to high quality dual carriageway. Construction will include 19km of new Dual Carriageway, and Grade separated junctions.
Cambridge South Station	Application for a new railway station in South Cambridge.
A47 North Tuddenham to Easton	Dualling of the single carriageway section of the A47 between Norwich and Dereham, linking together two existing sections of dual carriageway. The scheme will provide a new route to the south of Hockering and to the north of Honningham and include new junctions with locations yet to be determined.
A47 Blofield to North Burlingham	Dualling of the A47 to fill a gap in the dual carriageway section between Norwich and Acle Straight Includes two junctions at the schemes extent and is approximately 4km in length.
Great Yarmouth Third River Crossing	A new highway crossing of River Yare, Great Yarmouth, connecting Harfrey’s Roundabout to the west of the River Yare with South Denes Road to the east of the River Yare.
Viking Link	Electrical interconnecter with an approximate capacity of 1400 megawatts (MW) extending from Revising, Jutland (Denmark) to Bicker Fen, Lincolnshire(United Kingdom). Works include installations of up to six onshore high voltage cables, link pillars along the cable rout, drainage mitigation and fibre optic cable.
The Sizewell C Project	New nuclear power station.

4.2.1 Cumulative effects leading to no risk of deterioration

Table 4.3 below, identifies water bodies which are impacted by one or more BVP options and one or more planning projects, but where the cumulative effects assessment has shown that the combination of project activities is not anticipated to lead to an increased risk of WFD deterioration at a water body scale.

Table 4.3: Waterbodies where cumulative effects are unlikely to lead to an increased risk of WFD deterioration

Water body ID and name	Options	Comments
GB105033037620 Hobson's Brook	• CAM4 • SWC8 • Cambridge South Station	Both BVP options involve the installation of new pipelines and watercourse crossings within this water body. Other activities include the construction of a new train station in the south of Cambridge. Cumulatively, this large scale development and the two proposed BVP options will have associated dewatering impacts due to below ground activities associated with option construction but impact is assumed unlikely to have an increased risk of deterioration on the water environment following individual WFD assessment; if appropriate mitigation measures are in place. Risk to water body **remains as minor localised effect.**
GB105033042690 Bourn Brook	• CAM4 • A428 Black Cat at Caxton Gibbet	This BVP option involves the installation of a new pipeline in this water body. Other activities within this water body include the A428 Black Cat at Caxton Gibbit road improvement project. Cumulatively, this large scale development and the proposed BVP option will have associated dewatering impacts due to below ground activities associated with option construction but impact is assumed unlikely to have an increased risk of deterioration on the water environment following individual WFD assessment; if appropriate mitigation measures are in place. Risk to water body **remains as minor localised effect**.
GB105033042730 West Brook	• CAM4 • A428 Black Cat at Caxton	This BVP option involves the installation of new pipelines in this water body. Other activities within this water body include a large scale development in the A428 Black Cat at Caxton project. Cumulatively, this large scale development and the proposed BVP option will have associated dewatering impacts due to below ground activities associated with option construction. The CAM4 option will be brought forward for construction in 2025-2026, and the A428 project has planning permission. Therefore, construction works could occur concurrently. However, assuming that suitable mitigation is put in place (such as returning dewatering discharge into the river to help maintain flow) cumulative construction effects from dewatering are not anticipated. Risk to water body **remains as minor localised effect**.
GB105033042770 Swavesey Drain	• FND21 • CAM4 • Bare Fen & West Fen, Willingham / Over (minerals and waste)	Both BVP options involve the installation and maintenance of pipelines within this water body. Other activities within the water body include one mineral extraction option (new quarry site). Cumulatively, this mineral extraction option and the two proposed BVP options will have associated dewatering impacts due to below ground activities. The two BVP options are unlikely to the constructed concurrently. Therefore, cumulative impact is unlikely to lead to an increased risk of deterioration on the water environment. Risk to water body **remains as minor localised effect**.
GB105033043190 Thet (DS Swangey Fen)	• NEH5 • SUT5 • MIN 102 Shropham and Snetterton	Both BVP options involve the installation of new pipelines and watercourse crossings within this water body. Other activities within the water body include one mineral extraction option (new quarry site). Cumulatively, this mineral extraction option and the two proposed BVP options will have associated

Water body ID and name	Options	Comments
		dewatering impacts due to below ground activities. The two BVP options will be brought forward in 2031 and 2025 and are unlikely to the constructed concurrently. Therefore, cumulative impact is unlikely to lead to an increased risk of deterioration on the water environment. Risk to water body **remains as minor localised effect**.
GB105033047921 Ouse (Roxton to Earith)	• FND21 • CAM4 • A428 Black Cat to Caxton Gibbet	As part of the FND21 option, a new abstraction is proposed to impact this water body alongside pipeline watercourse crossings. For CAM4, the installation of new pipelines with associated crossings is the only activity from this option impacting this water body. Other activities within this water body include a large scale development in the A428 Black Cat at Caxton Gibbet project. Construction on both CAM4 (selected in 2025) and A428 (which has development consent granted) are likely to occur prior to operation of the Fens reservoir. concurrent construction of CAM4 and A428 is not anticipated to lead to cumulative effects, assuming appropriate mitigation is in place (such as returning dewatering discharge into the river to help maintain flow). Therefore, cumulative impacts are not anticipated to lead to an increased risk of deterioration on the water environment.
GB105034050931 Bure (Horstead Mill to St Benet's Abbey)	• NTB20 • NAY1 • A47 Blofield to North Burlingham	Both BVP options involve the installation of new pipelines and below ground activities within this water body. Other activities within this water body include a large-scale development in the A47 Blofield to North Burlingham project. Cumulatively, this large scale development and the proposed BVP options will have associated dewatering impacts due to below ground activities associated with option construction. NTB20 is selected in 2033, while NAY1 is selected in 2025, and A47 works have development consent granted. Therefore construction of A47 and NAY1 could occur simultaneously. This is not anticipated to lead to cumulative effects, assuming appropriate mitigation is in place (such as returning dewatering discharge into the river to help maintain flow). Therefore, **no increased risk of deterioration** on the water environment is anticipated.
GB105034050970 Spixworth (and Dobbs) Beck	• NAY1 • Land at Grange farm, Spixworth	The BVP options involve the installation of new pipelines and watercourse crossings within this water body. Other activities within the water body include one mineral extraction option (new quarry site). Cumulatively, this mineral extraction option and the proposed BVP option will have associated dewatering impacts due to below ground activities but given the short-term nature of the construction dewatering for NAY1 and assuming appropriate mitigation is applied (discharge of dewatering to the surface water course) the cumulative impact is not anticipated to lead to an increased risk of deterioration on the water environment if options are constructed during same time period.
GB105034051000 Tud	• NTB10 • A47 North Tuddenham to Easton	The BVP option involves the installation of new pipelines and watercourse crossings within this water body. Other activities within this water body include a large-scale development in the A47 North Tuddenham to Easton project. Cumulatively, this road scheme and the proposed BVP option will have associated dewatering impacts due to below ground activities but given the short-term nature of the construction dewatering for NTB10 and assuming appropriate mitigation is applied (discharge of dewatering to the surface water course) the cumulative impact is not anticipated to lead to an increased risk of deterioration on the water environment if options are constructed during same time period.

Water body ID and name	Options	Comments
GB105034051050 Blackwater (Wendling Beck)	• NNC4 • Land off Fakenham Road, Beetley	The BVP option involves the installation of new pipelines and watercourse crossings within this water body. Other activities within the water body include one mineral extraction option (new quarry site). Cumulatively, this mineral extraction option and the proposed BVP option will have associated dewatering impacts due to below ground activities but given the short-term nature of the construction dewatering for NNC4 and assuming appropriate mitigation is applied (discharge of dewatering to the surface water course) the cumulative impact is not anticipated to lead to an increased risk of deterioration on the water environment if options are constructed during same time period.
GB105034051281 Yare (Tiffey to Wensum)	• NTB10 • NWY2 • A47 North Tuddenham to Easton	The BVP options involve the installation of new pipelines and watercourse crossings within this water body. Other activities within this water body include a large-scale development in the A47 North Tuddenham to Easton project. These options will all involved dewatering impacts due to below ground activities associated with option construction. Construction of NTB10 (due for construction in 2025) and NWY2 (construction commences in 2036) will not occur simultaneously. If one of these options is construction concurrently with the A47 works, given the short-term nature of the construction dewatering and assuming appropriate mitigation is applied (discharge of dewatering to the surface water course) no cumulative impacts are anticipated, and therefore no increased risk of deterioration on the water environment.
GB105034051310 Witton Run	• NTB20 • A47 Blofield to North Burlingham	The BVP option involves the installation of new pipelines and watercourse crossings within this water body. Other activities within this water body include a large-scale development in the A47 Blofield to North Burlingham project. This large-scale development and the proposed BVP options will include associated dewatering impacts due to below ground activities associated with option construction. However, the NTB20 option will not be brought forward until 2033, and the A428 project has development consent. Therefore, construction works unlikely to happen concurrently. No increased risk of deterioration on the water environment is anticipated for the combination of these options.
GB105034055882 Wensum DS Norwich	• NTB10 • NAY1 • NTB20 • A47 North Tuddenham to Easton	All BVP options involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. Other activities within this water body include a large-scale development in the A47 North Tuddenham to Easton project. This large-scale development and the proposed BVP options will have associated dewatering impacts due to below ground activities associated with option construction. Construction of NTB10, NAY1 and A47 could occur in the same time period. However, given the short-term nature of the construction dewatering and assuming appropriate mitigation is applied (discharge of dewatering to the surface water course) the cumulative impact is not anticipated to lead to an increased risk of deterioration on the water environment if options are constructed during same time period. NTB20 is selected eight years after the other options, and therefore no cumulative construction effect anticipated. No increased risk of deterioration on the water environment is anticipated if appropriate mitigation measures are in place.
GB205032050385 North Level Pumped Areas 2 and 3	• FND16 • Gores Farm, Thorney (minerals and waste)	The BVP option involves the installation of new pipelines and watercourse crossings within this water body. Other activities within the water body include two potential mineral extraction options (new quarry sites). Cumulatively, these mineral

Water body ID and name	Options	Comments
	• Willow Hall Farm, Thorney (minerals and waste)	extraction options and the proposed BVP option will have associated dewatering impacts due to below ground activities. Given the short-term nature of construction dewatering, it is anticipated that the BVP option would not increase the risk of deterioration on the water environment over that from the two potential mineral extraction options.
GB205033043375 Old West River	• CAM4 • FND21 • Bare Fen & West Fen, Willingham / Over (minerals and waste) • Chear Fen, Cottenham (Minerals and waste) • Mitchell Hill Farm South, Cottenham (minerals and waste)	Both options involve the installation of new pipelines. Other activities within the water body include three potential mineral extraction options (new quarry sites). Cumulatively, these mineral extraction options and the two proposed BVP options will have associated dewatering impacts due to below ground activities. Construction of CAM4 (selected in 2025) and FND21 (operational 2036) is unlikely to occur simultaneously. Therefore, it is anticipated that the BVP options would not increase the risk of deterioration on the water environment over that from the three potential mineral extraction options.
GB205033047665 Relief Channel	• FND21 • FND16 • NBR6 • Land to the north of Stow Bardolph	All options involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. NBR6 option also features modification of Bexwell SR. Other activities within the water body include a potential mineral extraction option (new quarry site). The three BVP options will be selected five years apart and therefore construction is unlikely to occur simultaneously. Therefore, due to the short-term nature of construction dewatering, and assuming suitable mitigation is in place, the cumulative impacts of these options are not expected to increase the risk of deterioration on the water environment over that from the potential mineral extraction option.
GB40501G400300 Broadland Rivers Chalk & Crag	• NTB20 • NED2 • NNC4 • NTB10 • NWY2 • NAY1 • NHL4 • A47 North Tuddenham to Easton • A47 Blofield to North Burlingham • Great Yarmouth Third River Crossing • Land at Grange Farm, Spixworth	All options involve below ground structures associated with new pipelines, crossings and modifications to a WTW. The three options, NTB10, NAY1 and NHL4, would commence construction in 2025, two options in 2031 (NED2 and NNC4), on in 2033 ((NTB20) and one in 2036 (NWY2). Other activities within the water body include one potential mineral extraction option (new quarry site) and three major projects in the A47 North Tuddenham to Easton, A47 Blofield to North Burlingham and Great Yarmouth Third River Crossing. Due to differing times of delivery of each transfer, the shallow nature of the works and the relative size of the groundwater body it is anticipated that there is no additional risk of WFD deterioration due to the cumulative impacts of these projects.
GB40501G400600 Waveney and East Suffolk Chalk & Crag	• SUE5 • Sizewell C	The BVP option is anticipated to involve below ground structures associated with new pipelines. Other activities in this water body include a new major development in Sizewell C. Cumulatively, this large-scale development option and the proposed BVP option will have associated dewatering impacts due to assumed below ground activities. However, the impact is anticipated not the lead to an increased risk of deterioration on the water environment even if options are constructed during same time period. This is primarily due to the shallow nature of the BVP option works and the relative size of the groundwater body.

4.2.2 Cumulative effects leading to potential risk of deterioration

Table 4.4 below, identifies water bodies which have been potential for a cumulative impact as a result of BVP options and planning project activities occurring, which could lead to an increased risk of WFD deterioration at a water body scale. Further information on the planning projects would be required to quantify cumulative effects on these water bodies.

Table 4.4: BVP water bodies where in combination and cumulative effects could lead to an increased risk of WFD deterioration

Water body ID and name	Options	Comments
GB105031050600 Welland – conf Gwash to conf Greatford Cut	• RTN17 • LNB1 • West Deeping Development Brief	Both BVP options involve the installation of new pipelines and below ground structures associated with crossings within this water body. Other activities within the water body include one mineral extraction option (new quarry site extension). Cumulatively, this mineral extraction option and the two proposed BVP options will have associated dewatering impacts due to below ground activities, and therefore could lead to cumulative effects on river flows (due to reduced baseflow from groundwater) if options are construction when the new quarry site is in operation. Further information is required on the mineral extraction options to confirm this.
GB205030051515 Black Sluice IDB draining to the South Forty Foot Drain	• RTN17 • Viking Link	The BVP option (SLR SRO) involves the installation of new pipelines within this waterbody. Viking Link cables intersect the RTN17 pipeline route between the River Witham and the A17. The Environmental Impact Assessment for this project states the construction of the cables will involve trenchless activities (i.e Horizontal Directional Drilling) of the watercourse crossings. The activities associated with this construction method could lead to an increase in turbid run-off and spillages/leaks of fuel, oil or other pollutants; with the potential to impact on the water quality in the receiving the watercourses. Additionally, there could be an increase in soil erosion, along the exposed cable trenches. This has the potential to turbid (sediment laden) run-off affecting the nearby watercourses. Mitigation for The Viking Link Project includes areas of risk of spillage to be bunded or otherwise isolated to minimise the risk of hazardous substances entering the local watercourses, any surface water flowing into the trenches, will be pumped via settling tanks to remove sediment and potential contaminants before being discharged back into the watercourse, as well Environment Agency standard best practice measures (such as PPGs). Use of this mitigation would lead to minor adverse effects that are not significant. It is anticipated with effective mitigation from both the preferred site and the development, this will have a minor localised risk (no increased risk of deterioration) on the affected waterbody / watercourses in combination. Further option design information is required to confirm this.
GB205030062426 Lower Witham - conf Bain to Grand Sluice	• RTN17 • Viking Link	The BVP option (SLR SRO) involves potential for changes in flow and water quality as a result of a new discharge in an upstream catchment. A new surface water abstraction will also be located within this catchment. Viking Link cables intersect the pipeline route between the River Witham between the SLR abstraction and discharge locations. The Environmental Impact Assessment for this project states the construction of the cables will involve trenchless activities (i.e Horizontal Directional Drilling) of the watercourse crossings. The activities associated with this construction method could lead to an increase in turbid run-off and spillages/leaks of fuel, oil or other pollutants; with the potential to impact on the water quality in the receiving the watercourses. Additionally, there could be an increase in soil erosion, along the exposed cable trenches. This has the potential to turbid (sediment laden) run-off affecting the nearby watercourses. Mitigation for The

Water body ID and name	Options	Comments
		Viking Link Project includes areas of risk of spillage to be bunded or otherwise isolated to minimise the risk of hazardous substances entering the local watercourses, any surface water flowing into the trenches, will be pumped via settling tanks to remove sediment and potential contaminants before being discharged back into the watercourse, as well Environment Agency standard best practice measures (such as PPGs). Use of this mitigation would lead to minor adverse effects that are not significant. It is anticipated with effective mitigation from both the preferred site and the development, this will have a minor localised risk (no increased risk of deterioration) on the affected waterbody / watercourses in combination. Further option design information is required to confirm this and further investigation of the proximity between the cable crossing and the RTN17 option abstraction and discharge activities.
GB205031050595 Maxey Cut	• RTN17 • LNB1 • Land of Main Road Maxey	Both BVP options involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. SLR option also features a new pumping station in this water body. Other activities within the water body include one potential mineral extraction option (new quarry site). The mineral extraction option and the two proposed BVP options will have associated dewatering impacts due to below ground activities. Therefore, impacts could lead to cumulative effects on river flows (due to reduced baseflow from groundwater) if options are construction when the new quarry site is in operation. Further information is required on the mineral extraction options to confirm this.
GB205031050705 Vernatt's Drain	• RTN17 • LNB1 • Baston No.2 Quarry Phase 2, Langtoft	Both BVP options involve the installation of new pipelines and below ground activities associated with new watercourse and other crossings. SLR option also features a new pumping station in this water body. Other activities within the water body include one potential mineral extraction option (new quarry site). The mineral extraction option and the two proposed BVP options will have associated dewatering impacts due to below ground activities. Therefore, impacts could lead to cumulative effects on river flows (due to reduced baseflow from groundwater) if options are construction when the new quarry site is in operation. Further information is required on the mineral extraction options to confirm this.
GB650503520002 Suffolk	• SUE5 • Sizewell C	The BVP option involves the installation of new pipelines, a new coastal discharge and coastal intake and abstraction within this water body. Other activities within the water body include one major development in the Sizewell C project, which is anticipated to involve below ground structures and likely abstraction or discharge of water for cooling. Cumulatively, this major development option and the proposed BVP option could lead to increased risk of deterioration on the water environment, due to the operation impacts of the scheme, despite large distance between options. Further information and assessment of the combined effects of the two schemes would be required.
GB40501G400400 North West Norfolk Sandringham Sands	• FND21 • Land to the east of South Ructon • Land to the north of Shouldham • Land to the north of Stow Bardolph	This water body is impacted by the Fens Reservoir option due to the installation of new pipelines. In addition to this, three potential new mineral extraction options are identified within this water body. These proposed extraction options and the Fens Reservoir will have associated dewatering impacts. The combined impacts of these options could lead to an increased risk of deterioration if the BVP option was constructed at the same time as the three potential mineral extraction sites were operational. The cumulative inter-plan effect anticipates a potential risk of WFD deterioration. Further information is required on the mineral extraction options to confirm this.

4.3 In-Combination Risks with other Water Resource Management Plans

Anglian have been attending regional steering groups with other water companies, where discussions about potential in-combination effects have been highlighted. The latest information was provided by Anglian Water on the 28th September 2022 and is summarised below.

Anglian Water recognise there is the potential for in-combination effects to water bodies and ground water dependent ecosystems from its draft WRMP24 and the options selected in other water companies draft WRMPs. At the time of undertaking and writing this part of the assessment it was not possible to confirm the detail of options contained within the draft WRMP of relevant water companies, which include:

- Affinity Water
- Cambridge Water
- Essex and Suffolk
- Severn Trent
- Yorkshire Water

Anglian Water's draft WRMP has the potential to generate in-combination risks with other draft WRMP in relation to water bodies protected under the Water Framework Directive with following draft WRMP set out below. Further assessment will be needed – once information in other draft WRMP and details from their environmental assessments become available - to identify and assess the potential for in-combination effects between these draft plans.

- Severn-Trent Water (and potentially Affinity Water) supply options that identify they could pose operational risks to the river Trent, including the Minworth SRO, in-combination with the Anglian BVP schemes that have identified such risks within this report, including: RTN17 (South Lincolnshire Reservoir) and LNE10 (New Hall Reservoir).
  - Note: Anglian Water is aware that the RAPID process for the South Lincolnshire Reservoir SRO and Minworth SRO has conducted a more detailed investigation on hydrology and hydro-ecology risks in relation to the river Trent. This document had not been finalised at the time of writing this report, and will be assessed in more depth at Gate 3 of the RAPID process.
- Cambridge Water supply options that identify they could pose operational risks to water bodies that have downstream connections to water bodies that the Anglian BVP schemes that have identified such risks within this report. No specific Anglian Water schemes have been able to be identified at this time, but those within the same catchments will be considered once Cambridge Water's draft WRMP becomes available.
- Essex and Suffolk Water (ESW) supply options that identify they could pose operational risks to water bodies that have downstream connections to water bodies that the Anglian BVP schemes that have identified such risks within this report. Anglian Water is aware of a potential for in-combination risk related to its Caister desalination scheme and its WFD findings related to marine waters, with the potential for an ESW Caister re-use option – as identified in WRE's draft Regional Plan.
- Affinity Water supply options that that identify they could pose operational risks to water bodies that have downstream connections to water bodies that the Anglian BVP schemes, or vice versa, that have identified such risks within this environmental assessment report. No specific Anglian Water schemes have been able to be identified at this time, but those within the same catchments will be considered once Affinity Water's draft WRMP becomes available.

Further assessment is needed to identify and assess the potential for in-combination effects between Anglian Water's draft Plan and other water company draft WRMPs. This work will also need to seek to identify ways to respond to any changes of selected options between draft and final plan, which may not prove to be straight forward due to the dynamic nature of plan-making and different organisations being responsible for each WRMP. The results of this work may demonstrate potential risks are not manifest into predicted effects on the environment, or that with appropriate mitigation likely significant effects can be ruled out. They could, however, also identify that risks do exist, and changes may then be needed to one or more plans, or they could find that at the strategic plan-making scale the information available is simply insufficient to be conclusive and that more detailed investigations are needed. If further investigations were found to be needed around inter-plan cumulative effects related to Anglian Water's WRMP24 they would be likely to need to progress as a partnership activity with one, or more, other water companies and the relevant statutory environmental bodies.

5 Conclusions

5.1 Level 1 Summary

For the AWS WRMP BVP, 31 options were selected. Of these two are SRO projects. The WFD assessment for these SRO was carried out as part of the wider SRO project and a summary of the assessments has been provided in this report for completeness. One option (SUT1) utilises existing infrastructure and therefore no WFD assessment has been completed for this option.

The remaining 28 options have been subject to a WFD assessment, under WRMP. The Level 1 WFD assessments indicated that 18 options have potentially very low risks of impacting on WFD objectives, and thus do not merit further assessment at this point (as shown in Table 5.1).

Table 5.1: AWS WRMP24 BVP options which require no additional assessment

Option ID	Option title
RTC3	Ruthamford South to Ruthamford Central potable transfer (20 Ml/d)
NBR6	Fenland to Norfolk Bradenham potable transfer (50 Ml/d)
NTB10	Norfolk Bradenham to Norwich and the Broads potable transfer (20 Ml/d)
NWY2	Norwich and the Broads to Norfolk Wymondham potable transfer (15 Ml/d)
NAY1	Norwich and the Broads to Aylsham potable transfer (3 Ml/d)
NED2	Norfolk Bradenham to Norfolk East Dereham potable transfer (10 Ml/d)
NNC4	Norfolk East Dereham to North Norfolk Coast potable transfer (10 Ml/d)
NHL4	Norfolk East Harling to Norfolk Harleston potable transfer (5 Ml/d)
NEH5	Suffolk Thetford to Norfolk East Harling potable transfer (15 Ml/d)
SUT5	Norfolk Bradenham to Suffolk Thetford (15 Ml/d)
FND16	Ruthamford South to Fenland potable transfer (20 Ml/d)
RTS11	Ruthamford North to Ruthamford North potable transfer (50 Ml/d)
CAM4	Ruthamford South to Cambridge Water potable transfer (50 Ml/d)
EXC15	Cambs & West Suffolk to Essex Central potable transfer (10 Ml/d)
LNB1	Ruthamford North to Bourne potable transfer (20 Ml/d)
EXS18	Cambs & West Suffolk to Essex Central potable transfer (10 Ml/d)
LNC25	Lincolnshire East to Lincolnshire Central potable transfer (29 Ml/d)
SUE23	Modification of Raydon WTW to reduce the minimum treatment capacity from 8Ml/d to 2Ml/d

5.2 Level 2 summary

WFD Level 2 assessments were completed for the remaining 12 options that make the BVP. Two of these were carried out under the relevant SRO projects and findings are summarised in this report for completeness. These are set out in Table 5.2.

Table 5.2: AWS WRMP24 BVP options which required additional assessment at Level 2

Option ID	Option title
RTN13	Ruthamford North to Ruthamford North potable transfer (100 Ml/d)
SWC8	Cambridge Water to Cambs and West Suffolk (50 Ml/d)
EXS10	Holland on Sea desalination (seawater)
LNE6	Mablethorpe desalination Seawater (63 Ml/d)
NTB20	Desalination (seawater) plant in the Caister area (25 Ml/d)
SUE5	Felixstowe desalination (seawater) 25 Ml/d
RTS21	Extension of Clapham WTW from 25Ml/d to 36Ml/d
LNE12	Increasing the utilisation of existing surface water licence at Covenham Reservoir
LNC10	Extension /new reservoir at Hall - conjunctive with new treatment
EXS19	Colchester WRC direct to Ardleigh Reservoir (no additional treatment)

RTN17	Strategic Resource Option (SRO): Earth embanked winter storage reservoir located in the south Lincolnshire area. Abstraction will be from the River Trent, with a transfer via the River Witham
FND21	Strategic Resource Option (SRO): Earth embanked reservoir with a storage capacity 50 million cubic metres, located in the fens. Abstraction will be from the River Great Ouse

The majority of the options assessed as part of the BVP have only been prepared using high level design information, and if they are taken forward would require additional refinements and assessment as they progress to next stage of optioneering. As a result, confidence in the options design has been rated as low throughout all of the Level 2 assessments undertaken. For the SRO options, WFD assessments have been undertaken using the Gate 2 designs and therefore design is assessed as medium confidence.

The findings indicate that there are precautionary WFD compliance risks associated primarily with the operation of additional/new abstractions and new or ceased discharges (see summaries provided in Section 3.6). The potential hydrological effects of these activities, among several other varying impacts, could conflict with achieving WFD status objectives. This is particularly the case where hydrology/river flow is an existing limiting factor, recorded in WFD baseline data as a 'reason for not achieving good'. The potential biological effects, particularly on fish, and physio-chemical changes (for example, reduced dilution as a result of a new or increased abstraction) would require further assessment to improve certainty of the scale of effects.

Deterioration risks on coastal waterbodies where generally attributed to the intake and discharge of water for desalination projects, leading to changes in biological status elements, morphology and water quality. For groundwater bodies deterioration risks were primarily associated with either changes to quantitative and chemical saline intrusion and chemical drinking water protected area status, as a result of new groundwater abstractions, or construction of below ground structures close to GWDTE.

For new or modified intakes, it is recognised that appropriate fish and eel screening would be required to prevent entrainment. At this stage, this has been considered as likely mitigation. The same approach has been taken with other likely mitigation such as using trenchless methods to cross larger watercourses where feasible or discharging construction dewatering into a watercourse to maintain flow.

5.3 Further investigations and assessment

Subject to their progression through the approvals process, of those BVP options which have been assessed at Level 2, further WFD mitigation and assessment would be required for the options set out in Table 5.2. At this stage the Level 2 assessments have assessed potential risk of deterioration to some water bodies due to these options. Additional investigations and information are required to improve the certainty of WFD risk and these are set out in detail in Section 3.

Table 5.3: AWS WRMP24 BCP Level 2 assessed options which require further investigation

Option ID	Option title	Water bodies currently at risk of deterioration
RTN13	Ruthamford North to Ruthamford North potable transfer (100 Ml/d)	GB40502G402400: Nene Mid Lower Jurassic Unit GB40501G445500: Northampton Sands
EXS10	Holland on Sea desalination (seawater)	GB650503520001: Essex
LNE6	Mablethorpe desalination Seawater (63 Ml/d)	GB640402492000: Lincolnshire GB40501G401600: South Lincolnshre Chalk unit
NTB20	Desalination (seawater) plant in the Caister area (25 Ml/d)	GB650503520003: Norfolk East
RTS21	Extension of Clapham WTW from 25Ml/d to 36Ml/d	GB105033047923: Puse (Newport Pagnell to Roxton)

Option ID	Option title	Water bodies currently at risk of deterioration
LNE12	Increasing the utilisation of existing surface water licence at Covenham Reservoir	GB104029061990: Louth Canal GB105029061660: Great Eau (downstream of South Thoresby)
LNC10	Extension /new reservoir at Hall - conjunctive with new treatment	GB104028058480: Trent from Carlton-on-Trent to Laughton Drain
EXS19	Colchester WRC direct to Ardleigh Reservoir (no additional treatment)	GB520503713800: COLNE
RTN17	Strategic Resource Option (SRO): Earth embanked winter storage reservoir located in the south Lincolnshire area. Abstraction will be from the River Trent, with a transfer via the River Witham	GB105030056515: Swaton Drains GB104028053110: Trent from Soar to The Beck GB105030056780: Witham – conf Cringle Bk to conf Brant GB105030062370: Witham - conf Brant to conf Catchwater Drain GB205030062425: Witham - conf Catchwater Drain to conf Bain GB205030062426: Lower Witham – conf Bain to Grand Sluice
FND21	Strategic Resource Option (SRO): Earth embanked reservoir with a storage capacity 50 million cubic metres, located in the fens. Abstraction will be from the River Great Ouse	GB105033047921: Ouse (Roxton to Earith) GB205033000060: Old Bedford River / River Delph (inc The Hundred Foot Washes)

5.4 Intra-plan and inter-plan effects summary

5.4.1 Intra-plan effects

The Intra-plan cumulative effects assessment has identified 45 water bodies which are impacted by more than one BVP option. Of these water bodies, all waterbodies assessed indicate that there is no risk of cumulative impacts (i.e. multiple options do not lead to a change in risk of WFD deterioration).

5.4.2 Inter-plan effects

The Inter-plan cumulative effects assessment identified 25 water bodies which are impacted by more than one BVP option and one or more planning project. Of these, seven waterbodies were identified as being at increased risk of deterioration: GB105031050600: Welland – conf Gwash to conf Greatford Cut, GB205030051515: Black Sluice IDB draining to the South Forty Foot Drain, GB205030062426:Lower Witham - conf Bain to Grand Sluice, GB205031050595: Maxey Cut, GB205031050705: Vernatt's Drain, GB650503520002: Suffolk and GB40501G400400 North west Norfolk Sandringham Sands. Further information on the planning projects and proposed delivery dates would be required to quantify the cumulative effects on these water bodies.

5.5 Next steps

Areas for future focus for any options carried forward include:

- Consultation with the Environment Agency to present and discuss key WFD risks and proposed approach to improving certainty of assessments;
- Collation and review of Heavily Modified Water body (HMWB) measures information from the Environment Agency for inclusion into the assessment of potential impediment to obtaining Good Ecological Potential (GEP);
- Collation and review of detailed baseline data concerning WFD biological, physicochemical and hydromorphological elements identified as being at yellow, amber, or red risk in the Level 2 assessments. This may include existing Environment Agency and AWS long term WFD and water quality monitoring data within the relevant water bodies, and targeted baseline surveys being undertaken specifically for the option assessments;
- Further development of conceptual models linking together how potential hydrological changes (from abstractions or discharges) could influence water quality and the sensitivity of

aquatic communities to those changes. This will include a diagrammatic/visual presentation of linkages between abstraction impacts and the direct and indirect effects on physico-chemical and biological WFD status elements, indicating thresholds of WFD classes or tolerance to change. This step would aid consultation and discussion with stakeholders and the requirement for/scoping of any detailed modelling;

- Further information on the design and operation of the options;
- Update to Level 2 WFD assessments to incorporate additional information;
- Assessment of the combined potential WFD effects/risks of inter-reliant multiple options; and
- Update to Level 2 WFD assessments to incorporate additional information.

It is noted that the Cycle 3 River Basin Management Plans (RBMPs) are also due to be published in late 2022, which may bring about changes in the baseline status and objectives for water bodies. Where necessary, changes will need to be accounted for in updates to the WFD assessments at the next stage.

A. Level 1 assessments

Provided separately

B. Level 2 assessments

Provided separately