

# **Essex & Suffolk Water - Water Resources Management Plan 2024 Environmental Report**

Appendix G - Water Framework Directive (WFD)  
Assessment

October 2023



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# Issue and Revision Record

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# 1 Introduction

## 1.1 Overview

Water companies have a statutory obligation to produce a Water Resources Management Plan (WRMP), which sets out how a company intends to maintain the balance between supply and demand for water over a minimum 25-year period. The plans must be prepared every five years and reviewed annually. Essex & Suffolk Water's WRMP 2024 (WRMP24) renews the previous WRMP first published in 2019<sup>1</sup>. In the development of a WRMP, water companies must follow the Environment Agency (EA) Water Resources Planning Guideline<sup>2</sup> and consider broader government policy objectives. WRMPs should ensure a secure and sustainable supply of water, focus on efficiently delivering the outcomes that customers want, while reflecting the value that society places on the environment.

The Essex & Suffolk Water (ESW) supply area is situated within the Water Resources East (WRE) regional planning area. Therefore, some of the water resource options considered as part of the Essex and Suffolk Water's WRMP 2024 (WRMP24) will be sourced from the existing selected options for this regional plan. Therefore, efficiencies between the regional planning and WRMP process can be achieved. For the Essex & Suffolk Water WRMP24 the Water Framework Directive (WFD) assessments will focus on the local scale, drawing on the higher-level work previously completed for the regional plans where applicable.

As part of the environmental assessment process to support the development of the WRE Regional Plans and Essex & Suffolk Water's WRMP24, WFD Level 1 and where needed, Level 2 assessments have been completed. Assessment of the water resource options has been undertaken to identify potential option impacts on the water environment while also considering potential mitigation measures.

The WFD process was undertaken alongside the development of the Essex and Suffolk WRMP24 to inform the decision-making process and integrate environmental considerations. The WFD for the draft WRMP24 (dWRMP24) was presented in a WFD appendix which was issued for consultation from December 2022 to March 2023. Comments received from the consultation process were reviewed and have been addressed where appropriate within this WFD Report. The dWRMP24 has been updated to the revised draft WRMP24 (rdWRMP24), reflecting additional modelling work undertaken to optimise the plan as well as consultation feedback. This appendix is the WFD Report for the Essex and Suffolk rdWRMP24 and forms part of the Essex and Suffolk rdWRMP24 documentation.

## 1.2 Essex and Suffolk Water rdWRMP24

The rdWRMP24 is an adaptive plan to deal with uncertainties and future scenarios that will require further investment (e.g. further future sustainability reductions). As part of the regional plan and WRMP processes, a Best Value Plan (BVP), which forms the preferred WRMP, and three alternative plans (a Least Cost Plan (LCP), Ofwat Core Plan and Best Environmental and Societal Plan (BESP)) were developed in line with the Water Resources Planning Guidelines (WRPG)

An adaptive planning approach was used to take account of future uncertainties. WRE and Essex and Suffolk Water, in line with this approach, have also provided four adaptive

<sup>1</sup> Essex and Suffolk Water / Northumbrian Water Group (2019). Water Resources Management Plan 2019. Available at: [Water Resources Management Plan \(nwg.co.uk\)](https://www.nwg.co.uk)

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

programmes (High Environmental Destination (HED) Programme, High PCC Programme, North Suffolk Reservoir (NSR) Programme and Habitat Regulations Sustainability Reductions (HRSR) Programme). These programmes were derived based on different environmental and social drivers, as alternatives to the best value plan (BVP). Some adaptive programmes utilise smaller variations of options considered in this report. For each option, the largest variation, and therefore the variation with the largest impact, has been assessed to present a potential “worst-case” scenario for impact. It is suggested that once a programme has been selected, further study is undertaken to confirm impacts based on the actual size of options considered.

WFD Level 1 assessments have been undertaken for all Essex and Suffolk Water feasible options, including transfers, effluent reuse, groundwater source, desalination and treatment upgrade options. Where options were selected for the rdWRMP24, three alternative plans and four adaptive programmes, Level 2 WFD assessments were undertaken where required (see Section 1.3.4 below).

Table 1.1 summarises the 17 feasible options scoped in for WFD Level 1 screening, providing a general overview of the activities associated with each of them.

**Table 1.1: Essex and Suffolk Water WRMP24 Options**

Option name	Description overview
ESW-ABS-003C	New Linford WTW. Reinstatement of abandoned artesian well, no network upgrade should be required. 10 MI/d provided overall.
ESW-TRA-001	Transfer from Barsham WTW to Saxmundham Water Tower. Transfer consists of multiple sections: A. Barsham WTW to Shadingfield Tower – construction of new pipeline next to an existing main, length approximately 5.6km. Micro-tunnelling required for one railway crossing. B. Shadingfield Tower to Holton WTW - length approximately 7.4km. Tunnelling not required. C. Holton WTW to Saxmundham Tower - length approximately 19.2km. Tunnelling (micro-tunnelling/horizontal directional drilling) likely to be required as route passes under one railway, three major roads (A144, A1120, A12), three minor roads (B1124, B1123, B1119), two river crossings (River Blyth, River Yox), and two drainage channels. The route also runs along roads (B1119) for the last section to reach Saxmundham Tower. D. Connection to Walpole WTW, taken off Transfer C - approximate length of 1.4km. This transfer joins Transfer C not long after the railway crossing. No tunnelling required.
ESW-TRA-019	Transfer from Holton WTW to Eye Airfield. Transfer approximately 30.6km long. Transfer mainly follows roads. Critical crossings include a railway crossing in Halesworth (route follows road bridge therefore trenchless techniques not possible), and the river Dove.
ESW-NIT-004	Nitrate treatment extension on Barsham WTW's existing site. Additional electro dialysis reversal nitrate removal plant plus a discharge stream pipeline.
ESW-NIT-005	Nitrate treatment extension on Langford WTW's existing site. Additional electro dialysis reversal nitrate removal plant plus a discharge stream pipeline.

Option name	Description overview
ESW-UVC-001	Langford UV (Crypto). Additional Ultraviolet treatment contactors to treat for cryptosporidium.
ESW-NIT-006	Nitrate treatment extension on Langham WTW's existing site. Additional electro dialysis reversal nitrate removal plant plus a discharge stream pipeline.
ESW-PMP-001A	Langford WTW upgrade + Abberton RWPS Pump Replacement. Replacement, enhanced pumping capacity of two existing pumps, motors, and controls at Abberton Reservoir Raw Water Pumping Station. Upgrade the treatment at Langford WTW to accommodate the introduction of source water from Abberton raw water reservoir.
ESW-TRA-023	Broome to Barsham Transfer. New raw water main from Broome to Barsham Bores Works. The transfer pipeline is approximately 6.04km long and has an outside diameter of 225mm
ESW-TRA-018	Transfer from Bungay Wells to Broome WTW. Transfer is approximately 3.6km long. Route follows roads.
03b0478B	16.4MI/d Effluent reuse at Caister pump lane Waste recycling centre (WRC) transfer via River Wensum to Heigham WTW.
ESW-EFR-002A	Effluent Reuse Plant (11.1MI/d DO). Intake from Lowestoft/Corton WRC (Anglian Water owned asset), discharge to point near Ellingham Mill. Three transfers required: Lowestoft/Corton WRC to new effluent reuse plant (Transfer 1, length approximately 200m), new effluent reuse plant to Ellingham Mill on the River Waveney (Transfer 2, length approximately 26.3km), and a transfer of treated water from Barsham to Holton (Transfer 3, length approximately 12.5km).
ESW-RES-002C1	New winter storage reservoir to be built. Intake comes from the River Waveney when there's no spare capacity at Barsham WTW. When supplies are short at Barsham WTW, water is taken from the reservoir and transferred to the WTW. Two transfer pipelines are required: River Waveney to reservoir (2.32km), reservoir to Barsham WTW (3.5km). There are three potential flow rates for both transfer pipelines: 16.2 MI/d, 18.5 MI/d, 19.9 MI/d. Option also includes additional treatment capacity provided by an 16MI/d extension at the existing Barsham WTW. The additional treatment capacity can easily be located within the existing site boundary. The option proposed allows additional treatment trains be accommodated and located next to, and as an extension of, to the existing processes.
ESW-DES-004	Seawater desalination plant. Service reservoir located off site. Two transfers required: Transfer 1 from beach infiltration galleries to desalination plant, length: 1.8km. Transfer 2 from desalination plant to Barsham WTW, length: approx. 37km. Tunnelling/trenchless techniques likely to be required.
ESW-DES-008	Seawater Desalination Plant. Abstraction from beach wells to a desalination plant. Transfer to discharge to Barsham WTW.
ESW-DES-001	Abstraction from the Thames Estuary with discharge to Hanningfield Service Reservoir. Transfer length between plant

Option name	Description overview
ESW-EFR-001	<p>and reservoir approximately 20.7km. Tunnelling (micro-tunnelling/horizontal directional drilling) likely to be required as route passes under three railway lines, multiple major roads (A130, A13, A127, A129, A132), one minor road (B1464), eight river crossings (including the river Crouch) and five drainage channel crossings. First part of the route passes through Canvey Wick Nature Reserve however has been routed to avoid as much of this area as possible. An extension to the pipeline to Holton is under consideration (EFR-002A) but was not available at time of writing. This assessment will be updated in the final plan.</p> <p>Intake from Southend-on-Sea WRC (Anglian Water owned asset), discharge to Hanningfield Service Reservoir. Two transfers required: Southend-on-Sea WRC to new effluent reuse plant (Transfer 1), new effluent reuse plant to Hanningfield reservoir (Transfer 2). Transfer 1: Transfer length approximately 991m. Route runs under an industrial estate road, no need for tunnelling. Pump station required at existing STW – located where the two existing outfalls meet. Transfer 2: Transfer length approximately 23.1km. Tunnelling (micro-tunnelling/horizontal directional drilling) required as route passes under one railway line, multiple major roads (A130, A132), two large river/estuary crossing (River Roach and River Crouch), three smaller river crossings, and one drainage channel crossing.</p>

## 1.3 Methodology

### 1.3.1 The Water Framework Directive

The WFD was introduced into UK law (England and Wales) in 2003. The latest regulations are set out in The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017<sup>3</sup> (known as the WFD Regulations). These regulations require all water bodies (both surface water and groundwater) to achieve 'good' status.

For surface water bodies good status is a function of good ecological status (biological, physico-chemical, hydromorphological elements and specific pollutants) and good chemical status (Priority Substances and Priority Hazardous Substances). For groundwater good status is a function of quantitative (surface water, groundwater dependent terrestrial ecosystems (GWDTes), saline intrusion and water balance) and chemical status (dependent surface water body, drinking water protected areas, GWDTes, Saline intrusion and general chemical).

The WFD Regulations require that the water bodies experience no deterioration in status and no impediment is introduced which could prevent the achievement of future water body objectives and good status. The WFD Regulations promotes long-term sustainable water management, with the key objectives of providing a high level of protection to the aquatic environment, including:

1. aquatic ecology
2. unique and valuable habitats
3. drinking water resources

<sup>3</sup> The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. Available online at: <https://www.legislation.gov.uk/uksi/2017/407/contents/made>

#### 4. bathing water

All the key objectives are integrated for each river basin with objectives 2, 3 and 4 above reflecting specific bodies of water that are designated for drinking water abstraction, supporting special wetlands, or bathing areas.

The WFD Regulations Part 5 Regulation 13 sets out the "environmental objectives" for natural surface and groundwater bodies. Natural surface water bodies must, by 2021, adhere to good ecological and chemical status and groundwater bodies to good quantitative and chemical status. Regulation 13 also sets out the principle of no deterioration, providing protection from the deterioration of water status/potential. The WFD Regulations, Regulation 15 sets out the criteria for the designation of artificial water bodies (AWB) or heavily modified water bodies (HMWBs). AWB and HMWBs must achieve GEP and good chemical status.

Regulations 8 to 10 set out the protection of specific areas for the protection of areas used for drinking water, shellfish water and protected areas respectively.

Exemptions are defined within the WFD Regulations, with 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".
- Regulation 19 allows for deterioration of status or non-achievement of good status or potential under certain distinct conditions. If options within the rdWRMP lead to a risk of deterioration, and cannot be mitigated, then a Regulation 19 derogation application would be needed. Where a Regulation 19 exemption application is needed, various tests must be passed including:
  - The benefits of the option cannot be achieved by a significantly better environmental option.
  - All practicable steps have been taken to mitigate the adverse effects on the water body.
  - The reasons for the modifications or alterations are explicitly set out in the RBMP.
  - There is an overriding public interest in the proposed development and/or its benefits outweigh the benefits of the WFD objectives.

The objectives of the WFD assessment are:

- To ensure there is no deterioration between WFD status class of any element in the water body as set out in WFD Regulation 13.
- To ensure no new impediments to attaining 'Good' WFD status or potential for the water body, or any assessed element, as set out in Regulation 13. In some water bodies it is accepted that it is currently technically infeasible or disproportionately costly to achieve good status or potential. If this is the case, the test is applied to current agreed objectives for the water body.
- To ensure that the planned programme of measures in the current cycle of RBMPs, to help attain the WFD objectives from the water body, are not compromised.

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

- Does the option assist in attaining the WFD objectives for the water body?
- Does the option assist in attaining the objectives associated with WFD protected areas?
- Does the option reduce treatment needed in the production of drinking water and look to work in partnership with others, promoting the requirements of Regulation 8?

### 1.3.2 Approach to WFD assessment of WRMP24 Options

The All Company Working Group (ACWG) has developed a consistent framework for undertaking WFD Regulations assessments<sup>4</sup> to ensure that the WRMP supports the achievement of environmental objectives for water resources in the RBMPs by preventing deterioration and supporting achievement of protected area and water body status objectives, as well as not preventing a water body from reaching 'good' or 'good potential' status in the future. The assessment considers mitigation that would need to be put in place to protect water body status and WFD future objectives.

Two stages of assessment are completed under the ACWG WFD approach, an initial Level 1 basic screening (see Section 2) and a Level 2 detailed impact screening (see Section 3). These are completed using a spreadsheet assessment tool. Level 1 outcomes are automated based on option information and Level 2 outcomes are based on expert judgment. Further information on WFD classification and the approach adopted can be found in the ACWG WFD framework<sup>4</sup>.

This framework was developed to ensure consistency in environmental assessment across water companies for Strategic Resource Option (SRO) development across England and Wales. To ensure consistent comparison between WRMP options, the same framework has been used for the assessment of all WRMP options.

### 1.3.3 Level 1 – basic screening

The first stage of WFD assessment was completed for all supply-side options on the constrained list. The Level 1 assessments follow the methodology set out below:

- The supply-side option is reviewed.
- Possible impacts of the supply-side option are identified.
- Embedded mitigation measures (those already included in the scheme design) are applied.
- A screening score is calculated, using a six-point scale from -2 to 3 (please refer to Table 1.2). When the screening score identified water bodies and supply-side options with a maximum score of -2 to 1, these are 'screened out' and do not proceed to further assessment. If the maximum impact score is greater than 1, then the water body is 'screened in' and assessed at Level 2. This is known as detailed impact screening.

The scoring system used is set out in below.

**Table 1.2: Impact scoring system used for WFD assessments**

Impact	Score	Description
Improvement anticipated at water body scale	-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.
Negligible	0	No measurable change in the quality of the water environment or the ability for target WFD objectives to be achieved.
Minor (not significant at 1 water body scale)	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

<sup>4</sup> All Company Working Group (Nov 2020), WFD: Consistent framework for undertaking no deterioration assessments.

Impact	Score	Description
		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.
Potential deterioration risk	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 reduction in WFD status. Impacts have the potential to prevent target WFD objectives from being achieved.
Permanent deterioration risk	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.

Assumed embedded mitigation, such as the use of trenchless river crossings or construction of trenches such that they will not form a preferential pathway for flow of groundwater, are set out in the Level 1 assessment tables (See Appendix G.1).

The WFD Level 1 screening outcomes for the Essex and Suffolk Water WRMP24 options are summarised in Section 2 and Appendix G.1. Where water bodies and option impacts were ‘screened in’, they have been taken forward to Level 2 assessment.

### 1.3.4 Level 2 – detailed impact screening

The second stage of WFD assessment is more detailed. These Level 2 assessments have been completed for supply-side options that were screened in at Level 1. The Level 2 assessment includes the following steps:

- For each water body where a risk of deterioration has been identified in Level 1, a detailed assessment is undertaken to refine the potential for impacts on each WFD quality element, from each activity proposed as part of the option.
- An assessment of confidence in the assessment is given for the WFD baseline data and the design certainty. These confidence levels are assigned based on the quality and availability of baseline data, and on the amount of design information for the option at the time of assessment (note, confidence/certainty is expected to be low during this initial WRMP assessment and will increase over time at the project level). For options where the confidence levels are medium or low, the requirements for further data collection or design detail in order to raise the confidence level in the future are identified.
- Further design and mitigation requirements are identified.
- A ‘post mitigation’ impact score is assigned, based on professional judgement of the impact once proposed further mitigation, or suitable alternatives, have been included in the design.
- Where the assessment certainty is medium or low, further investigations are identified which would improve the certainty of the assessment outcomes. These may be completed at a project level and fed back into the plan at future updates.

The outcomes of the Level 2 assessments are summarised in Section 3 and Annex G.2.

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 achieved by increasing the level of detail available during option development and the pre-application design process when development consent is sought. In-combination assessments are also required and consist of interdependent option delivery.

### 1.3.5 Cumulative effects assessment

The Level 2 assessment process, described in Section 1.3.4, is designed to identify where an individual option contained within the rdWRMP24 would lead to a direct risk of WFD deterioration to a specific water body. The potential risk posed by the rdWRMP24 also needs to be considered in its entirety. This includes the need to identify whether two or more options included in the rdWRMP24 could lead to an increase in deterioration risk over and above those

reported for the individual options. As such, an additional cumulative assessment was undertaken to identify whether any water bodies are considered to be potentially at risk from multiple options included within the plan.

The water bodies that were listed as potentially impacted under more than one option within a plan are identified. The proposed activities associated with all options within each water body were reviewed to determine if there is an increased risk of WFD status deterioration in cumulation. If a water body is identified to be at an increased risk of WFD status deterioration; all option activities are assessed together, and a new impact score assigned to the water body. The assessment is based on the WFD Level 1 and 2 assessment outcomes as they are presented in this report.

The cumulative effects assessment for the rdWRMP have been carried out on the BVP in full. Additionally, the differences in cumulative effects between the BVP and the alternative plans and adaptive programmes, set out in Section 1.2.

### 1.3.6 In-combination effects assessment

The in-combination assessment has been undertaken to determine the combined impact of BVP option activities, along with any relevant planning projects and / or other water company options identified.

All planning allocations, large existing or emerging planning applications as well as Nationally Significant Infrastructure Projects (NSIPs) within the Essex & Suffolk operating area. Any planning projects where no risk of deterioration is identified have been discounted from the assessment. For each planning project, assessment is made on whether the project could lead to impacts on WFD water bodies depending on the information available:

- For larger NSIPs the review makes use of any existing WFD assessments that have been conducted for the planning application.
- For other planning allocations or applications where no WFD assessment has been conducted, professional judgement has been used to identify potential for impacts on WFD.

The in-combination effects assessment also considers the potential for in-combination effects from other water companies' WRMP24 options. The published draft WRMP24 options from all the water companies which bound the Essex and Suffolk Water region have been considered in this assessment. It is acknowledged that other water companies are likely to be in the process of producing a rdWRMP24. The cumulative assessment of all the latest rdWRMP24 for the various water companies will be considered further under the regional projects (as part of WRE).

Where one or more rdWRMP24 option, other water company option and/or relevant planning projects occur within the same water body, the corresponding option assessments and planning project information have been reviewed. The aim of this review is to determine if in-combination impacts from all 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 in-combination WFD assessment is completed, and a new impact score assigned.

## 1.4 Limitations and assumptions

The impact scoring system used in this assessment is derived from the ACWG document and focusses on screening at a project level. The limitations of this scoring system to assess WFD compliance at the plan/strategic level therefore need to be acknowledged. However, this system has been used to guide this WFD assessment in the manner explained below.

As the options set out in the WRMP are in the early stages of design development, a precautionary approach has been exercised in the derivation of WFD compliance risk scoring, following the Level 2 assessment approach. If insufficient evidence was available at the time of assessment to rule out a potential risk of deterioration and/or meeting WFD objectives that has been reflected in the tables provided with this assessment in the maximum impact score column, which reflects the impact scoring system which contains a category of potential deterioration risk.

The assessment also includes consideration of potential available mitigation, and these measures are taken into account in a further column which reflects the scoring of 'post-mitigation' impact. This scoring includes an assumption that project level design development (including assessment of any project-level alternatives for different components) will be in line with WFD objectives and subject to ongoing WFD compliance assessment review prior to and as part of application for consent. This scoring approach has considered where a potential deterioration risk is identified whether an adjustment should be made to the impact score taking into account the mitigation measures.

Given that this assessment is at a strategic plan level the scoring has been undertaken based on reasonable professional judgment at this stage. The mitigation identified at this stage is generic or best practice in nature, so is understood to have a reasonable level of confidence that it can be applied at a project level.

Detailed investigations and mitigation measures have been clearly set out in this assessment, and the conclusions on WFD compliance of the options at a plan level 'post mitigation' assume these investigations will have been concluded and sufficient mitigation will be in place.

Clearly more detailed WFD assessments will need to be undertaken at the project-level design development stage.

The WFD assessment has been undertaken using the following general assumptions:

- The assessment has used WFD 2019 baseline classification data, which is the current officially reported baseline in the Cycle 3 RBMP.
- All assessments have been based on a precautionary approach where limited data or design certainty is identified, noting the points around future project above.
- Assessments have been undertaken to ascertain water availability constraints for options with new or increased abstractions. For example, Environment Flow Indicators (EFI) have been used to set 'Hands off Flows' (HoFs) for new abstractions. This effectively assumes that flow after the abstraction cannot go below the stated limit. Measurement of flows at downstream gauging stations will provide information to maintain and control abstractions in line with new licensed limits.
- Assessment assumes pipelines are underground (directionally drilled or pipe-jacked beneath any larger watercourses, roads or railways, and using pumped bypass and trenching under small roads and watercourses) and therefore will not cross watercourses above ground or cause direct impacts.
- The geographical extent of the WFD assessment has been generally limited to the water bodies where abstractions take place. There is potential for some effects continuing downstream of abstraction points, although it is assumed these would become increasingly

limited and 'negligible' with distance. High level review is conducted on a case-by-case basis. Where downstream impacts are considered plausible, these water bodies 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 WFD)

This section presents a summary outcome of the WFD Level 1 screening assessments for all options assessed during the WRMP24 process. The full assessments are presented in Annex A.

### 2.1 Borehole abstraction

#### 2.1.1 New Linford WTW (10MI/d Option) (ESW-ABS-003C)

The Level 1 WFD assessment covered four water bodies of the option. The outcome for the two river water bodies 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 these two water bodies. The outcome for two groundwater bodies indicated further assessment would be necessary for the option, because the types of activities present a risk to WFD status or objectives for these water bodies.

**Table 2.1: WFD Level 1 assessment outcomes for ESW-ABS-003C**

ESW-ABS-003C	
<b>Option ID</b>	ESW-ABS-003C
<b>Option Description</b>	Recommissioning of borehole at existing site. Raw water transfer from existing borehole site to new WTW site. Run to waste to location watercourse.
<b>Number of water bodies passing WFD assessment</b>	2
<b>Water bodies passing WFD assessment</b>	GB530603911402: Thames Middle GB106037028200: Mardyke
<b>Number of water bodies requiring further WFD assessment</b>	2
<b>Water bodies failing WFD assessment</b>	GB40503G000400: Essex Gravels GB40602G401000: South Essex Lower London Tertiaries

### 2.2 Transfers

#### 2.2.1 Barsham to Blyth Transfer Main (ESW-TRA-001)

The Level 1 WFD assessment covered 10 water bodies of the option. The outcome for all water bodies 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 ESW-TRA-001**

Barsham to Blyth Transfer Main	
<b>Option ID</b>	ESW-TRA-001
<b>Option Description</b>	Transfer from Barsham WTW to Saxmundham Water Tower.
<b>Number of water bodies passing WFD assessment</b>	10
<b>Water bodies passing WFD assessment</b>	GB105034045903: Waveney (Ellingham Mill - Burgh St. Peter) GB105035046251: Lothingland Hundred

Barsham to Blyth Transfer Main	
	GB105035046300: Wang
	GB105035046290: Blyth (d/s Halesworth)
	GB105035046030: Blyth (Hevingham Hall - d/s Halesworth)
	GB105035046010: Wenhaston Watercourse
	GB105035046270: Minsmere Old River
	GB105035045980: Fromus
	GB40501G400300: Broadland Rivers Chalk & Crag
	GB40501G400600: Waveney and East Suffolk Chalk and Crag
<b>Number of water bodies requiring further WFD assessment</b>	0

### 2.2.2 Transfer from Bungay Well to Broome WTW (ESW-TRA-018)

The Level 1 WFD assessment covered three water bodies of the option. The outcome for the two river water bodies 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 these water bodies. The outcome for the one groundwater body indicated further assessment would be necessary for the option, due to a potential increase in abstraction from the Bungay Wells above recent actual abstraction (although within licence).

**Table 2.3: WFD Level 1 assessment outcomes for ESW-TRA-018**

Bungay Wells to Broome WTW transfer	
Option ID	ESW-TRA-018
Option Description	Transfer from Bungay Wells to Broome WTW
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB105034045930: Broome Beck GB105034045902: Waveney (Starston Brook - Ellingham Mill)
Number of water bodies requiring further WFD assessment	1
Water bodies failing WFD assessment	GB40501G400300: Broadland Rivers Chalk & Crag

### 2.2.3 Transfer from Holton WTW to Eye Airfield (ESW-TRA-019)

The Level 1 WFD assessment covered 12 water bodies of the option. The outcome for all water bodies 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 ESW-TRA-019**

Transfer from Holton WTW to Eye Airfield	
Option ID	ESW-TRA-019
Option Description	Transfer from Holton WTW to Eye Airfield.
Number of water bodies passing WFD assessment	12
Water bodies passing WFD assessment	GB105035046290: Blyth (d/s Halesworth) GB105035046070: Blyth (u/s Halesworth) GB105035046040: Blyth (New Reach through Halesworth) GB105035046050: Chediston Watercourse GB105034045810: Metfield Stream GB105034045741: Tributary of Waveney GB105034045690: Chickering Beck

Transfer from Holton WTW to Eye Airfield	
	GB105034045901: Waveney (R Dove - Starston Brook)
	GB105034045710: Dove;
	GB105034045670: Dove trib - Eye
	GB40501G400600: Waveney and East Suffolk Chalk and Crag
	GB40501G400300: Broadland Rivers Chalk & Crag
<b>Number of water bodies requiring further WFD assessment</b>	<b>0</b>

### 2.2.4 Broome to Barsham Transfer (ESW-TRA-023)

The Level 1 WFD assessment covered four water bodies of the option. The outcome for all water bodies 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 ESW-TRA-023**

Broome to Barsham Transfer	
<b>Option ID</b>	ESW-TRA-023
<b>Option Description</b>	Transfer from Broome WTW to Barsham WTW.
<b>Number of water bodies passing WFD assessment</b>	<b>4</b>
<b>Water bodies passing WFD assessment</b>	GB105034045930: Broome Beck; GB105034045902: Waveney (Starston Brook - Ellingham Mill); GB105034045903: Waveney (Ellingham Mill - Burgh St. Peter); GB40501G400300: Broadland Rivers Chalk & Crag
<b>Number of water bodies requiring further WFD assessment</b>	<b>0</b>

## 2.3 Effluent reuse

### 2.3.1 Southend-on-Sea Effluent Re-use (max capacity) (ESW-EFR-001)

The Level 1 WFD assessment covered seven water bodies of the option. The outcome for four water bodies 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 **these four** water bodies. The outcome for three water bodies indicated further assessment would be necessary for the option, because the types of activities present a risk to WFD status or objectives for **these three** water bodies.

**Table 2.6: WFD Level 1 assessment outcomes for ESW-EFR-001**

Southend-on-Sea Effluent Re-use (max capacity)	
<b>Option ID</b>	ESW-EFR-001
<b>Option Description</b>	Intake from Southend-on-Sea WRC (Anglian Water owned asset), discharge to Hanningfield Service Reservoir.
<b>Number of water bodies passing WFD assessment</b>	<b>4</b>
<b>Water bodies passing WFD assessment</b>	GB105037028630: Sandon Brook (West arm) GB30541427: Hanningfield Reservoir GB105037028730: Prittle Brook GB105037028560: Rettendon Brook
<b>Number of water bodies requiring further WFD assessment</b>	<b>3</b>
<b>Water bodies failing WFD assessment</b>	GB530603911401: Thames Lower

**Southend-on-Sea Effluent Re-use (max capacity)**

GB520503704100: Crouch  
 GB40503G000400: Essex Gravels

**2.3.2 Lowestoft Water Reuse (transfer to River Waveney) (ESW-EFR-002A)**

The Level 1 WFD assessment covered seven water bodies of the option. The outcome for seven water bodies 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 ESW-EFR-002A**

<b>Lowestoft Water Reuse (transfer to River Waveney)</b>	
<b>Option ID</b>	ESW-EFR-002A
<b>Option Description</b>	Effluent Reuse Plant (11.1Ml/d DO). Intake from Lowestoft/Corton WRC (Anglian Water owned asset), discharge to point near Ellingham Mill.
<b>Number of water bodies passing WFD assessment</b>	7
<b>Water bodies passing WFD assessment</b>	GB510503410700: Bure & Waveney & Yare & Lothing GB105034045903: Waveney (Ellingham Mill - Burgh St. Peter) GB40501G400300: Broadland Rivers Chalk & Crag GB105035046251: Lothingland Hundred GB105035046300: Wang GB105035046290: Blyth (d/s Halesworth) GB40501G400600: Waveney and East Suffolk Chalk and Crag
<b>Number of water bodies requiring further WFD assessment</b>	0

**2.3.3 Caister Water Reuse and Ormesby Transfer (03b0478B)**

The Level 1 WFD assessment covered three water bodies of the option. The outcome for two water bodies 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 these two water bodies. The outcome for **one transitional water body** indicated further assessment would be necessary for the option, because the types of activities present a risk to WFD status or objectives for this water body.

**Table 2.8: WFD Level 1 assessment outcomes for 03b0478B**

<b>03b0478B</b>	
<b>Option ID</b>	03b0478B
<b>Option Description</b>	Effluent reuse at Caister pump lane WRC transfer via River Wensum to Heigham WTW.
<b>Number of water bodies passing WFD assessment</b>	2
<b>Water bodies passing WFD assessment</b>	GB105034050860: Muck Fleet GB40501G400300: Broadland Rivers Chalk & Crag
<b>Number of water bodies requiring further WFD assessment</b>	1
<b>Water bodies failing WFD assessment</b>	GB510503410700: Bure & Waveney & Yare & Lothing

## 2.4 Reservoirs

### 2.4.1 Winter storage reservoir and Barsham WTW upgrade (ESW- RES-002C1)

The Level 1 WFD assessment covered three water bodies of the option. The outcome for one groundwater body 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 the water body. The outcome for two water bodies indicated further assessment would be necessary for the option, because the types of activities present a risk to WFD status or objectives for these two water bodies.

**Table 2.9: WFD Level 1 assessment outcomes for ESW-RES-002C1**

Barsham WTW upgrade + RES-002	
<b>Option ID</b>	ESW- RES-002C1
<b>Option Description</b>	New winter storage reservoir to be built. Intake comes from the river Waveney when there is no spare capacity at Barsham WTW. When supplies are short at Barsham WTW, water is taken from the reservoir and transferred to the WTW.
<b>Number of water bodies passing WFD assessment</b>	1
<b>Water bodies passing WFD assessment</b>	GB40501G400300: Broadland Rivers Chalk & Crag (GW)
<b>Number of water bodies requiring further WFD assessment</b>	2
<b>Water bodies failing WFD assessment</b>	GB105034045902: Waveney (Starston Brook - Ellingham Mill) GB105034045903: Waveney (Ellingham Mill - Burgh St. Peter)

## 2.5 Water treatment works upgrade

### 2.5.1 Langford WTW upgrade + Abberton RWPS Pump Replacement (ESW-PMP-001A)

The Level 1 WFD assessment covered two water bodies of the option. The outcome for these water bodies 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 these water bodies.

**Table 2.10: WFD Level 1 assessment outcomes for ESW-PMP-001A**

Langford WTW upgrade + Abberton RWPS Pump Replacement	
<b>Option ID</b>	ESW-PMP-001A
<b>Option Description</b>	Replacement, enhanced pumping capacity of two existing pumps, motors, and controls at Abberton Reservoir Raw Water Pumping Station. Upgrade to Langford WTW to accommodate introduction of source water from Abberton raw water reservoir.
<b>Number of water bodies passing WFD assessment</b>	2
<b>Water bodies passing WFD assessment</b>	GB105037034130: Layer Brook GB30540418: Abberton Reservoir
<b>Number of water bodies requiring further WFD assessment</b>	0

## 2.6 Nitrate treatment

### 2.6.1 Barsham EDR Nitrate Removal + Pipeline (ESW-NIT-004)

The Level 1 WFD assessment covered two water bodies of the option. The outcome for both water bodies 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 ESW-NIT-004**

Barsham EDR Nitrate Removal + Pipeline	
Option ID	ESW-NIT-004
Option Description	Additional electro dialysis reversal nitrate removal plant plus a discharge stream pipeline.
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB40501G400300: Broadland Rivers Chalk & Crag GB105034045903: Waveney (Ellingham Mill - Burgh St. Peter)
Number of water bodies requiring further WFD assessment	0

### 2.6.2 Langford EDR Nitrate removal and pipeline (ESW-NIT-005)

The Level 1 WFD assessment covered four water bodies of the option. The outcome for three water bodies 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 these water bodies. The outcome for one groundwater body indicated further assessment would be necessary for the option, because the types of activities present a risk to WFD status or objectives for this water body.

**Table 2.12: WFD Level 1 assessment outcomes for ESW-NIT-005**

Langford EDR Nitrate Removal + Pipeline	
Option ID	ESW-NIT-005
Option Description	Additional electro dialysis reversal nitrate removal plant plus a discharge stream pipeline.
Number of water bodies passing WFD assessment	3
Water bodies passing WFD assessment	GB105037033530: Chelmer (d/s confluence with Can) GB105037041160: Blackwater (Combined Essex) GB520503714000: Blackwater
Number of water bodies requiring further WFD assessment	1
Water bodies failing WFD assessment	GB40503G000400: Essex Gravels

### 2.6.3 Langham EDR Nitrate removal and pipeline (ESW-NIT-006)

The Level 1 WFD assessment covered six water bodies of the option. The outcome for all six water bodies 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 ESW-NIT-006**

Langham EDR Nitrate Removal + Pipeline to Colchester	
Option ID	ESW-NIT-006

<b>Option Description</b>	Additional electro dialysis reversal nitrate removal plant plus a discharge stream pipeline. New EDR treatment will be located at the existing Lanham WTW site. New waste stream discharge pipeline to the Anglian Water Colchester STW. Pipeline is approximately 14.5km long.
<b>Number of water bodies passing WFD assessment</b>	6
<b>Water bodies passing WFD assessment</b>	GB105037041330: Colne (d/s Doe's Corner) GB105037041320: Salary Brook GB105036041000: Stour (d/s R. Brett) GB105036040942: Stour (Lamarsh - R. Brett) GB520503713800: Colne GB40503G000400: Essex Gravels
<b>Number of water bodies requiring further WFD assessment</b>	0

## 2.7 Desalination

### 2.7.1 Canvey Island Terrestrial Desalination (Max Capacity) (ESW-DES-001)

The Level 1 WFD assessment covered seven water bodies of the option. The outcome for five water bodies 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 these water bodies. The outcome for two water bodies indicated further assessment would be necessary for the option, because the types of activities present a risk to WFD status or objectives for these water bodies.

**Table 2.14: WFD Level 1 assessment outcomes for ESW-DES-001**

Canvey Island Terrestrial Desalination	
<b>Option ID</b>	ESW-DES-001
<b>Option Description</b>	Abstraction from the Thames Estuary, discharge to Hanningfield Service Reservoir.
<b>Number of water bodies passing WFD assessment</b>	5
<b>Water bodies passing WFD assessment</b>	GB105037028550: Crouch (d/s Wickford) GB105037028560: Rettendon Brook GB105037028630: Sandon Brook (West arm) GB520503704100: Crouch GB30541427: Hanningfield Reservoir
<b>Number of water bodies requiring further WFD assessment</b>	2
<b>Water bodies failing WFD assessment</b>	GB530603911401: Thames Lower GB40503G000400: Essex Gravels

### 2.7.2 California Caister Beach Desalination (ESW-DES-004)

The Level 1 WFD assessment covered six waterbodies of the option. The outcome for three waterbodies 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 waterbodies. The outcome for the remaining three waterbodies indicated further assessment would be necessary for the option, because the types of activities present a risk to WFD status or objectives for any waterbodies.

**Table 2.15: WFD Level 1 assessment outcomes for California Caister Beach Desalination**

California Caister Beach Desalination	
<b>Option ID</b>	ESW-DES-004

<b>Option Description</b>	Seawater desalination plant. Service reservoir located off site. Two transfers required: Transfer 1 from beach infiltration galleries to desalination plant, length: 1.8km. Transfer 2 from desalination plant to Barsham WTW, length: approx. 37km. Tunnelling/trenchless techniques likely to be required.
<b>Number of waterbodies passing WFD assessment</b>	3
<b>Waterbodies passing WFD assessment</b>	GB105034050860: Muck Fleet GB105034051370: Yare (Wensum to tidal) GB105034045903: Waveney (Ellingham Mill - Burgh St. Peter)
<b>Number of waterbodies requiring further WFD assessment</b>	3
<b>Waterbodies failing WFD assessment</b>	GB650503520003: Norfolk East GB510503410700: BURE & WAVENEY & YARE & LOTHING GB40501G400300: Waveney and East Suffolk Chalk & Crag

### 2.7.3 Corton Beach Well Desalination (ESW-DES-008)

The Level 1 WFD assessment covered four water bodies of the option. The outcome for two water bodies 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 these water bodies. The outcome for two water bodies indicated further assessment would be necessary for the option, because the types of activities present a risk to WFD status or objectives for these two water bodies.

**Table 2.16: WFD Level 1 assessment outcomes for ESW-DES-008**

Corton beach well desalination	
<b>Option ID</b>	ESW-DES-008
<b>Option Description</b>	Seawater Desalination Plant. Abstraction from beach wells to a desalination plant. Transfer to Barsham WTW.
<b>Number of water bodies passing WFD assessment</b>	2
<b>Water bodies passing WFD assessment</b>	GB105034045903: Waveney (Ellingham Mill - Burgh St. Peter) GB510503410700: Bure & Waveney & Yare & Lothing
<b>Number of water bodies requiring further WFD assessment</b>	2
<b>Water bodies failing WFD assessment</b>	GB650503520003: Norfolk East GB40501G400300: Waveney and East Suffolk Chalk & Crag

## 2.8 UVC

### 2.8.1 Langford UV (Crypto) (ESW-UVC-001)

The Level 1 WFD assessment covered two water bodies of the option. The outcome for both water bodies 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 of these water bodies.

**Table 2.17: WFD Level 1 assessment outcomes for ESW-UVC-001**

Langford UV (Crypto)	
<b>Option ID</b>	ESW-UVC-001
<b>Option Description</b>	Additional Ultraviolet treatment contactors to treat for cryptosporidium.

<b>Number of water bodies passing WFD assessment</b>	<b>2</b>
<b>Water bodies passing WFD assessment</b>	GB105037041160: Blackwater (Combined Essex) GB40503G000400: Essex Gravels
<b>Number of water bodies requiring further WFD assessment</b>	<b>0</b>

## 3 Framework Directive findings (Level 2 WFD)

In **nine** of the WRMP24 options the Level 1 screening has identified water bodies which require further WFD assessment to assess potential significant effects. Of these **nine**, four feature within the Best Value Plan and **Least Cost Plan** (see Section 4.1), three in the **OFWAT Core plan** (see Section 4.3) and six in the **Best Environmental and Societal Plan** (see Section 4.4). One of the nine options feature only in the adaptive programme plans (see Sections 4.5 to 4.8). Further information on WFD classification and the approach adopted can be found in Section 1.3.

A summary of the WFD Level 2 detailed assessment for each of these nine options is presented in Sections 3.1 to 3.8 below.

### 3.1 New Linford WTW (10MI/d Option) (ESW-ABS-003C)

For this option, two water bodies were identified at Level 1 as requiring further assessment: **GB40503G000400**: Essex Gravels and **GB40602G401000**: South Essex Lower London Tertiaries groundwater bodies. A summary of the Level 2 WFD assessment is included in **Table 3.1** and detailed outputs are presented in **Annex B**.

The Level 2 WFD assessment for Essex Gravels and South Essex Lower London Tertiaries groundwater body identified **minor localised effects (impact score 1)** to quantitative status elements (dependent surface water bodies test and water balance test), largely due to the **implementation of a** new groundwater abstraction licence. The Environment Agency have indicated an additional groundwater abstraction licence of up to 6.6MI/d could be granted for a borehole at this location. Therefore, although the impact is uncertain and further assessment is required to understand the potential impact, it is not anticipated that this increase in abstraction would lead to a WFD deterioration.

The 'reasons for not achieving good' (RNAG) status for these water bodies relate to:

- **Chemical drinking water protected area and general chemical test due to 'pollution from rural areas'; and**
- **Trend assessment due to 'no sector responsible / sector under investigation'.**

The assessment is not anticipated to affect any of the above stated RNAGs and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Mitigation is proposed in the form of discharging construction dewatering into nearby streams to help maintain flow, pre-construction monitoring and considering compensation flow if deemed necessary.

It is recommended that further investigations are carried out on the below:

- **Hydroecological assessment of the impacts of abstraction on groundwater levels and therefore flow and ecology in the watercourses, potentially including scenario modelling.**
- **Investigate whether a connection exists between Essex Gravels and South Essex Lower London Tertiaries**
- **Further information about option.**

These investigations can also help identification of further mitigation measures.

Overall, this assessment concludes that this option does not lead to a deterioration or an impediment to reaching future objectives and is therefore compliant under WFD provided recommended investigations are undertaken and recommended mitigation in place.

**Table 3.1: New Linford WTW (10MI/d Option) (ESW-ABS-003C) Level 2 WFD summary**

Water body ID and name	Confidence in WFD data / option design	Maximum impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score
GB40503G000400: Essex Gravels	Low / Low	1	No	No	No	Hydroecological assessment of the impacts of abstraction on groundwater levels and therefore flow and ecology in the watercourses, potentially including scenario modelling.  Further information about option.  If deemed appropriate, implement compensation/augmentation flow.	Any dewatering to be discharged to local watercourse to help maintain flow (if water quality not of concern).  Restricting upstream use and, if deemed appropriate, implement compensation/augmentation flow.	1
GB40602G401000: South Essex Lower London Tertiaries	Low / Low	1	No	No	No	Hydroecological assessment of the impacts of abstraction on groundwater levels and therefore flow and ecology in the watercourses, potentially including scenario modelling.  Further information about option.  If deemed appropriate, implement compensation/augmentation flow.	Any dewatering to be discharged to local watercourse to help maintain flow (if water quality not of concern).  Restricting upstream use and, if deemed appropriate, implement compensation/augmentation flow.	1

### 3.2 Bungay Well to Broome WTW transfer (ESW-TRA-018)

The Level 1 assessment identified one water body as requiring further assessment:

GB40501G400300: Broadland Rivers Chalk and Crag groundwater body. A summary of the Level 2 WFD assessment is included in Table 3.2 and detailed outputs are presented in Annex B.

This option would potentially lead to an increase in abstraction outside of current recent actual rates, although within existing licence quantities. The Level 2 WFD assessment has not identified and risk of deterioration to the groundwater body. The assessment for RBMP 2021 indicates the Broadland Rivers Chalk and Crag groundwater balance test is 'Good' (with High Confidence) meaning neither recent actual nor fully licence abstractions are expected to lead to deterioration. The Bungay Wells abstraction is associated with the Waveney (Starston Brook - Ellingham Mill) surface water body. Modelling carried out as part of the AMP7 WINEP investigation into abstractions in the Broadland Rivers Chalk & Crag area made use of the Environment Agency's North-East Anglian Chalk regional groundwater model. This investigation showed that the Waveney (Starston Brook - Ellingham Mill) surface water body is compliant with the environmental flow indicators under low flow conditions at both recent actual and fully licensed abstraction. Therefore, no further work is required at this time.

The RNAG status for these water bodies relate to:

- Trend assessment and chemical drinking water protected area due to 'no sector responsible / sector under investigation; and
- Quantitative Ground Water Dependent Terrestrial Ecosystems (GWDTE) test due to 'agricultural and rural land management'.

The assessment is not anticipated to affect any of the above stated RNAGs and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

It is anticipated the WFD compliance risk will be minor localised (impact score 1), and this option is considered to be WFD compliant.

**Table 3.2: Bungay Well to Broome WTW transfer (ESW-TRA-018) Level 2 WFD summary**

Water body ID and name	Confidence in WFD data / option design	Maximum impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB40501G400300: Broadland Rivers Chalk and Crag	Low / Low	1	No	No	No	None required	None required	1	None

### 3.3 Southend-on-Sea Effluent Re-use (max capacity) (ESW-EFR-001)

Three water bodies were identified as requiring further assessment: GB530603911401: Thames Lower and GB520503704100: Crouch transitional water bodies, in addition to the GB40503G000400: Essex Gravels groundwater body. A summary of the Level 2 WFD assessment is included in Table 3.3 and detailed outputs are presented in Annex B.

The Level 2 WFD assessment for the Thames Lower identified pre-mitigation precautionary deterioration risks (impact score 2) to biological elements due to changes in water quality as a result of a cessation of an existing discharge. This cessation of discharge would reduce the freshwater flow into this transitional water body, potentially impacts on biology and protected sites, conversely, the cessation of nutrient rich water could be beneficial for water quality and thus biology.

The Habitats Regulations Assessment (HRA) considers the implications of the works on the estuarine/marine protected areas and has concluded that the rdWRMP24 contains measures that would ensure compliance with the policies of the marine plan. Further details can be found in Appendix F Habitats Regulation Assessment of this rdWRMP24.

The RNAG status for these water bodies relate to:

- Tributyltin compounds, due to 'contaminated water body bed sediments, contaminated land, use of restricted substance, continuous sewage discharge and landfill leaching'.
- Angiosperms and mitigation measures assessment due to 'physical modifications'; and
- Benzo(g-h-i)perylene, cypermethrin (priority), dissolved inorganic nitrogen, polybrominated diphenyl ethers (PBDE), mercury and its compounds and phytoplankton due to 'no sector responsible / sector under investigation'

The option has potential to affect biological elements in the above stated RNAGs and therefore this option has potential to impede reaching GEP but is not anticipated to compromise water body objectives.

Mitigation measures were provided in the form of maintaining a percentage discharge to support freshwater flows.

It is recommended that further investigations are carried out on the below:

- Water quality modelling of impact of reduced freshwater inflow from ceased discharge on water quality and therefore biology.
- Review of all baseline ecological WFD data, including results of any surveys already undertaken for this scheme.
- Hydroecological assessment of the impacts of cessation of discharge on flow in the watercourses, and potential influence on Sites of Special Scientific Interest (SSSIs), with focus on impacts on biology.
- Further information about option, including current discharge volumes into the estuary.

These investigations can also help identify further mitigation measures.

Following these further investigations, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk can be reduced to minor localised (post-mitigation impact score 1) and therefore, for this water body, this option would be WFD compliant.

For the Essex Gravels groundwater body, pre-mitigation precautionary deterioration risks (impact score 2) were identified on quantitative GWDTE status element due to possible impacts of construction dewatering within 500m of a GWDTE.

The RNAG status for this water body relate to:

- Chemical drinking water protected area and general chemical test due to 'pollution from rural areas'; and
- Trend assessment due to 'no sector responsible / sector under investigation'.

The assessment is not anticipated to affect any of the above stated RNAGs and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Mitigation measures were provided in the form of dewatering discharge returned to ground through recharge trenches and use of clay stanks in pipelines route.

It is recommended that further investigation is carried out on the below:

- Investigation into impact on groundwater levels of dewatering for construction and consideration of requirement to return water to the ground (through recharge trenches) to help minimise the impact of construction, if required.
- Additional groundwater monitoring to understand groundwater levels and how they interact with the scheme.
- Further information about option.

This investigation can also help identification of further mitigation measures.

Following these further investigations, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk can be reduced to minor localised (post-mitigation impact score 1) and therefore, for this water body, this option would be WFD compliant.

Minor localised effects (impact score 1) were identified on the Crouch transitional water body due primarily to construction impacts on river flow and quality. For this water body no compliance risks or risks to achieving water body objectives were identified due to option activities.

The RNAG status for this water body relate to:

- Dissolved inorganic nitrogen due to 'agriculture and rural land management' and 'sewage discharge (continuous)'; and
- Mercury and its compounds and PBDE due to 'no sector responsible / sector under investigation'.

The assessment is not anticipated to affect any of the above stated RNAGs and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Mitigation measures were provided in the form of any dewatering needed for the construction will be discharged to the river to help maintain flow, movement of shafts needed for river crossing these should be located outside of the SSSI/SAC and provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourse.

It is recommended that further investigation is carried out on the below:

- Review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme
- Hydroecological assessment of the impacts of temporary dewatering abstraction on flow in the watercourses, and potential influence on SSSIs, with focus on impacts on biology.
- Further information about option.

This investigation can also help identification of further mitigation measures.

Following these further investigations, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk can be reduced to minor localised (post-mitigation impact score 1) for the Thames Lower and Essex Gravels water bodies, therefore this option would be WFD compliant.

**Table 3.3: Southend-on-Sea Effluent Re-use (max capacity) ESW-EFR-001 Level 2 WFD summary**

Water body ID and name	Confidence in WFD data / option design	Maximum impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB530603911401:Thames Lower	Low / Low	2	Possible	No	No	WQ modelling of impact of reduced freshwater inflow from ceased discharge on water quality and therefore biology.  Review of all baseline ecological WFD data, including results of any surveys already undertaken for this scheme.  Hydroecological assessment of the impacts of cessation of discharge on flow in the watercourses, and potential influence on SSSIs, with focus on impacts on biology.  Further information about option, including current discharge volumes into the estuary.	Maintaining a percentage discharge to support freshwater flows.	1	
GB520503704100:Crouch	Low / Low	1	No	No	No	Review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme  Hydroecological assessment of the impacts of temporary dewatering abstraction on flow in the watercourses, and potential influence on SSSIs, with focus on impacts on biology.  Further information about option.	Any dewatering needed for the construction will be discharged to the river to help maintain flow.  If shafts needed for river crossing these should be located outside of the SSSI/SAC  Provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourse.	1	Assumed major river crossings will be carried out using HDD or pipejacking.  Assumes clay stanks will be used in pipeline route where potential for

Water body ID and name	Confidence in WFD data / option design	Maximum impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
									interaction with groundwater.  Assumes dewatering discharge to groundwater or surface water to help maintain flows.
GB40503G000400:Essex Gravels	Low / Low	2	Possible	No	No	Additional groundwater monitoring to understand groundwater levels and how they interact with the scheme.  Further information about option.	Consideration of requirement to return water to the ground (through recharge trenches) to help minimise the impact of construction, if required.  Use of Clay Stanks in pipeline route where groundwater potentially encountered.  If shafts needed for estuary crossings these should be located outside of the SSSI.	1	Assumed major river crossings will be carried out using HDD or pipejacking.  Assumes clay stanks will be used in pipeline route where potential for interaction with groundwater.  Assumes dewatering discharge to groundwater or surface water to help maintain flows.

### 3.4 Effluent Reuse at Caister and transfer to Ormesby (03b0478B)

One water body was identified at Level 1 as requiring further assessment: GB510503410700: Bure & Waveney & Yare & Lothing transitional water body. A summary of the Level 2 WFD assessment is included in Table 3.4 and detail outputs are presented in Annex B.

The Level 2 WFD assessment for Bure & Waveney & Yare & Lothing transitional water body identified precautionary pre-mitigation deterioration risks (impact score 2) to biological elements and hydrological regime, due to changes in flow velocity as a result of a cessation of an existing discharge. This cessation of discharge would reduce the freshwater flow into this transitional water body, potentially impacts on biology and protected sites, conversely, the cessation of nutrient rich water could be beneficial for water quality and thus biology. On a precautionary basis this assessment has concluded a potential adverse effect on the basis of a reduction in freshwater flow, pending further investigation. Potential risk to achieving water body objectives for biological elements was identified, although provided recommended mitigation is implemented, a risk is not expected to be retained. This option could also help the achievement of a water body objective for dissolved inorganic nitrogen through the reduced contribution of nutrient rich water.

The 'reasons for not achieving good' (RNAG) status for these water bodies relate to:

- Dissolved inorganic nitrogen due to 'sewage discharge (continuous)'; and
- Angiosperms, PBDE and mercury and its compounds due to 'no sector responsible / sector under investigation'.

The assessment is not anticipated to affect any of the above stated RNAGs and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives. There is potential for a beneficial effect which could help achieve good status for dissolved inorganic nitrogen.

Mitigation measures were provided in the form of maintaining a percentage discharge to support freshwater flows.

It is recommended that further investigation is carried out on the below:

- Hydroecological assessment of the impacts of the reduction in discharge on flows, water quality and biology within the estuary.
- Review of baseline ecological WFD data, including results of any surveys already undertaken for this scheme.
- Further information about option.

This investigation can also help identification of further mitigation measures.

Following further investigation, design and mitigation development, it is anticipated the WFD non-compliance risk can be reduced to minor localised (impact score 1), and this option would be considered to be WFD compliant.

**Table 3.4: Effluent Reuse at Caister and transfer to Ormesby (03b0478B) Level 2 WFD summary**

Water body ID and name	Confidence in WFD data / option design	Maximum impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score
GB510503410700:Low / Low Bure and Waveney and Yare and Lothing		2	Possible	Possible	Possible	<p>Review of all baseline ecological WFD data, including results of any surveys already undertaken for this scheme.</p> <p>Hydroecological assessment of the impacts of discharge cessation on flow, hydromorphology, water quality and biology.</p> <p>Further information about option, including details on discharge conditions (HOF etc.).</p>	Maintain percentage of discharge to this water body to maintain flows if required.	1

### 3.5 Barsham WTW upgrade + RES-002 (ESW-RES-002C1)

Two water bodies were identified as requiring further assessment: GB105034045903: Waveney (Ellingham Mill – Burgh St. Peter) river water body and GB105034045902: Waveney (Starston Brook - Ellingham Mill) river water body. A summary of the Level 2 WFD assessment is included in Table 3.5 and detail outputs are presented in Annex B.

The Level 2 WFD assessment for the Waveney (Ellingham Mill – Burgh St. Peter) identified precautionary pre-mitigation deterioration risks (impact score 2) to biological elements, hydrological regime and physico-chemical quality elements, due to changes in flow velocity, flow volume, and sedimentation as a result of new surface water abstraction.

The RNAG status for these water bodies relate to:

- Phosphate due to 'agriculture and rural land management' and 'sewage discharge (continuous)'; and
- Mitigation measures assessment and PBDE due to 'no sector responsible / sector under investigation'.

The option has potential to affect physico-chemical elements in the above stated RNAGs and therefore this option has potential to impede reaching GEP and could compromise water body objectives.

Mitigation measures were provided in the form of changing abstraction conditions to minimise changes to hydrological regime (if possible).

It is recommended that further investigation is carried out on the below:

- Review of all baseline ecological WFD data, including results of any surveys already undertaken.
- Hydroecology and hydrology assessment of the impacts of abstraction on flow, hydromorphology, water quality / concentration of key physicochemical parameters, especially total phosphorus / phosphate and therefore on biology.
- Further information about the length of reach impacted by the new storage reservoir.
- Further information about option.

This investigation can also help identification of further mitigation measures.

For the Waveney (Starston Brook - Ellingham Mill) water body a precautionary pre-mitigation deterioration risk (impact score 2) was identified to fish due to the new river intake. Minor localised effects (impact score 1) were also identified for biological elements, hydrological regime and physico-chemical elements due to new intake and reservoir construction.

The assessment is not anticipated to affect any of the above stated RNAGs and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Mitigation measures were provided in the form of fish and eel screening at the new intake.

Further investigations are required to confirm this assessment including:

- Detailed review of all baseline ecological WFD data, including results of any surveys already undertaken
- Further information about the length of reach impacted by the new storage reservoir.
- Further information about option.

Following further investigation, design and mitigation development, it is anticipated the WFD non-compliance risk can be reduced to minor localised (impact score 1) for all water bodies, and this option would be considered to be WFD compliant.

**Table 3.5: Barsham WTW upgrade + RES-002 (RES-002C1) Level 2 WFD summary**

Water body ID and name	Confidence in WFD data / option design	Maximum impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score
GB105034045903:Low / Waveney (Ellingham – Burgh St. Peter) Medium		2	Possible	Possible	No	<p>Review of all baseline ecological WFD data, including results of any surveys already undertaken for this option.</p> <p>Hydroecology assessment of the impacts of abstraction on flow, hydromorphology, water quality / concentration of key physicochemical parameters, especially TP / Phosphate and therefore on biology.</p> <p>Further information about the length of reach impacted by the new storage reservoir.</p> <p>Further information about option.</p>	<p>Abstraction conditions to be set to minimise changes to hydrological regime that could cause deterioration of biological and physicochemical WFD elements.</p>	1
GB105034045902:Low / Waveney (Starston Brook - Ellingham Mill) Medium		2	Possible	No	No	<p>Review of all baseline ecological WFD data, including results of any surveys already undertaken.</p> <p>Further information about the length of reach impacted by the new storage reservoir.</p> <p>Further information about option.</p>	<p>Fish and eel screening at intake</p>	1

### 3.6 Langford EDR Nitrate Removal + Pipeline (ESW-NIT-005)

One water body was identified as requiring further assessment: GB40503G000400: Essex Gravels groundwater body. A summary of the Level 2 WFD assessment is included in Table 3.6 and detail outputs are presented in Annex B.

The Level 2 WFD assessment for the Essex Gravels identified precautionary pre-mitigation deterioration risks (impact score 2) to quantitative GWDTE test due to the dewatering associated with the construction of below-ground structures, which may produce temporary and localised impacts on the Blackwater Estuary SSSI (a GWDTE).

The RNAG status for these water bodies relate to:

- Chemical drinking water protected area and general chemical test due to 'pollution from rural areas'; and
- Trend assessment due to 'no sector responsible / sector under investigation'.

The assessment is not anticipated to affect any of the above stated RNAGs and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Mitigation measures were provided in the form of including the use of clay stanks in pipeline route, and the sealing of shafts to prevent groundwater egress, are recommended.

It is recommended that further investigation is carried out on the below:

- Additional groundwater monitoring to understand groundwater levels and how they interact with the scheme.
- Further investigation into impact on groundwater levels of dewatering for construction and consideration of requirement to return water to the ground (through recharge trenches) to help minimise the impact of construction, if required.
- Further information about option.

This investigation can also help identification of further mitigation measures.

Following further investigation, design and mitigation development, it is anticipated the WFD non-compliance risk can be reduced to minor localised (impact score 1), and this option would be considered to be WFD compliant.

**Table 3.6: Langford EDR Nitrate Removal + Pipeline (ESW-NIT-005) Level 2 WFD summary**

Water body ID and name	Confidence in WFD data / option design	Maximum impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score
GB40503G000400:Essex gravels	Low / Low	2	Possible	Possible	No	Additional groundwater monitoring to understand groundwater levels and how they interact with the scheme.  Further investigation into impact on groundwater levels of dewatering for construction and consideration of requirement to return water to the ground (through recharge trenches) to help minimise the impact of construction, if required.  Further information about option.	Use of Clay Stanks in pipeline route where groundwater potentially encountered.  If possible, works should be moved further away from SSSI sites.  Shafts to be sealed to ensure minimal groundwater egress after construction.	1

### 3.7 Canvey Island Terrestrial Desalination (Max Capacity) (ESW-DES-001)

Two water bodies were identified as requiring further assessment: GB530603911401: Thames Lower transitional body and GB40503G000400: Essex Gravels groundwater body. A summary of the Level 2 WFD assessment is included in Table 3.7 and detail outputs are presented in Annex B.

The Level 2 WFD assessment for the Thames Lower identified precautionary pre-mitigation deterioration risks (impact score 2) to biological quality elements, and physico chemical elements due to the new surface water abstraction and new discharge.

The 'reasons for not achieving good' (RNAG) status for these water bodies relate to:

- Tributyltin compounds, due to 'contaminated water body bed sediments, contaminated land, use of restricted substance, continuous sewage discharge and landfill leaching'.
- Angiosperms and mitigation measures assessment due to 'physical modifications'; and
- Benzo(g-h-i)perylene, cypermethrin (priority), dissolved inorganic nitrogen, PBDE, mercury and its compounds and phytoplankton due to 'no sector responsible / sector under investigation'

The option has potential to affect physico chemical elements in the above stated RNAGs and therefore this option has potential to impede reaching GEP and has potential to compromise water body objectives.

Mitigation measures were provided in the form of including setting abstraction limits to minimise changes of hydromorphology and selecting a discharge location to maximise the dilution and dispersion and minimise impacts of the transitional environment.

It is recommended that further investigation is carried out on the below:

- Investigation into the impact of new intake and discharge on hydromorphology and physical modification pressures in this water body.
- Review of mitigation measures assessment for this waterbody to identify whether additional structures will lead for impacts on mitigation.
- Hydroecological study on impact of intakes and outfall on biology and water quality, particularly the impact of saline discharge, this could include hydrodynamic modelling.
- Further details on design and construction methodology, particularly with regards to the construction of the intake and outfall pipelines.

This investigation can also help identification of further mitigation measures.

The Level 2 WFD assessment for Essex Gravels identified minor localised risks (impact score 1) to quantitative and chemical status elements due to dewatering associated with the construction of below-ground structures, which may produce temporary and localised impacts on the Hanningfield Reservoir SSSI (a GWDTE).

The HRA considers the implications of the works on the marine protected areas and has concluded that the rdWRMP24 contains measures that would ensure compliance with the policies of the marine plan. Further details can be found in Sub-report A Habitats Regulation Assessment of this rdWRMP24.

The 'RNAG status for these water bodies relate to:

- Chemical drinking water protected area and general chemical test due to 'pollution from rural areas'; and
- Trend assessment due to 'no sector responsible / sector under investigation'.

The assessment is not anticipated to affect any of the above stated RNAGs and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Mitigation measures were provided in the form of sealing any shafts to prevent groundwater egress, are recommended.

It is recommended that further investigation is carried out on the below:

- Assessment of scale of water balance impacts.
- Scenario modelling.
- Further information about option.

This investigation can also help identification of further mitigation measures.

Following further investigation, design and mitigation development, it is anticipated the WFD non-compliance risk can be reduced to minor localised (impact score 1) for the Thames Lower water body, and therefore the option would be considered to be WFD compliant.

**Table 3.7: Canvey Island Terrestrial Desalination (Max Capacity) (ESW-DES-001) Level 2 WFD summary**

Water body ID and name	Confidence in WFD data / option design	Maximum impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB530603911401:Thames Lower	Low / Low	2	Possible	Possible	No	<p>Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme.</p> <p>Further information about how the option will be operated.</p> <p>Hydrodynamic modelling of impacts of discharge into transitional waterbody on flow, sedimentation, bathymetry and water quality.</p> <p>Review of mitigation measures assessment for this waterbody to identify whether additional structures will lead for impacts on mitigation.</p>	<p>Fish and eel screening at new intake.</p> <p>Limitations on frequency of discharge of highly saline water into transitional WB.</p> <p>Further investigation of exact impact saline discharge will have on other physiochemical parameters.</p> <p>Further investigation into the impact of new intake and discharge on physical modification pressures in this waterbody.</p>	1	-
GB40503G000400:Essex Gravels	Low / Low	1	No	No	No	<p>Assessment of scale of water balance impacts.</p> <p>Scenario modelling.</p> <p>Further information about option.</p>	<p>Any dewatering to be discharged to reservoir / local watercourses to help maintain flow (if water quality not of concern).</p> <p>Pre-construction monitoring and modelling scenarios to establish impact on GW body, and its quality elements.</p> <p>Further investigation into impact on groundwater levels of dewatering for construction and consideration of requirement to return water to</p>	1	-

Water body ID and name	Confidence in WFD data / option design	Maximum impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
							the ground (through recharge trenches) to help minimise the impact of construction, if required.  If deemed absolutely necessary, implement compensation / augmentation flow to maintain level of reservoir.		

### 3.8 California Caister beach desalination (ESW-DES-004)

Three water bodies were identified as requiring further assessment: GB650503520003: Norfolk East coastal water body, GB510503410700: Bure & Waveney & Yare & Lothing transitional water body and GB40501G400300: Broadland River Chalk & Crag groundwater body.

The Level 2 assessment for the Norfolk East coastal water body identified temporary minor localised effects (impact score 1) to biological quality elements and physico-chemical quality elements due to the construction of beach wells and pipelines. While these temporary construction impacts will be short term there is the potential for changes in water quality which could lead to implications on the Marine Protected Area (designated as a Special Protected Area (SPA)). The HRA considers the implications of the works on the marine protected areas and has concluded that the rdWRMP24 contains measures that would ensure compliance with the policies of the marine plan. Further details can be found in Sub-report A Habitats Regulation Assessment of this rdWRMP24.

The Level 2 WFD assessment for the Bure & Waveney & Yare & Lothing transitional water body identified precautionary pre-mitigation deterioration risks (impact score 2) to biological quality elements and physicochemical elements due to the discharge of a highly saline brackish water (via the Caister waste recycling centre (WRC)).

The RNAG status for these water bodies relate to:

- Dissolved inorganic nitrogen due to 'pollution from waste water'; and
- Angiosperms with reason unknown - 'sector under investigation'.

This option has potential to affect dissolved inorganic nitrogen in the above RNAG and therefore this option has potential to impede reaching GEP and has potential to compromise water body objectives.

Mitigation measures are provided in the form of dilution to an acceptable standard prior to discharge into the water body, and further investigation to ascertain the impact of the discharge on biological and physicochemical parameters.

It is recommended that further investigation is carried out on the below:

- Review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme.
- Review of Caister WRC's capacity to dilute saline water prior to discharge.
- Hydrodynamic modelling of impacts of discharge on flow, morphology, water quality and particularly how this could affect the marine protection area discharge is assumed to be released into.

This investigation can also help identification of further appropriate mitigation measures.

The Level 2 assessment for the Broadland River Chalk & Crag groundwater body highlights a precautionary pre-mitigation deterioration risk (impact score 2) on quantitative status elements (quantitative dependent surface water body status and quantitative saline intrusion) due to the proposed new groundwater abstractions from the shallow marine beach deposits aquifer, which could be in hydraulic connection with the deeper WFD aquifer.

The RNAG status for these water bodies relate to:

- Trend assessment and chemical drinking water protected area due to 'Suspect data' and
- Quantitative GWDTE test due to 'groundwater abstraction from agriculture and rural land management'.

The assessment is not anticipated to affect any of the above stated RNAGs and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Mitigation measures are provided in the form of adjustment to location of beach wells to minimise the impact on deeper WFD waterbody, consideration of the requirement to return water to the ground (through recharge trenches to help minimise the impact of construction), and use of clay bunds in pipeline route where groundwater is potentially encountered.

It is recommended that further investigation is carried out on the below:

- Investigation into the nature of the geology in the area of the infiltration galleries or beach wells, and the connection between shallow saline groundwaters in the superficial deposits and the deeper fresh water aquifer.
- Assessment of scale of impacts on saline intrusion and surface water flows due to abstraction from the shallow saline aquifer.
- If surface water flows could be affected then hydroecological assessment of the impacts of abstraction on flow in the watercourses and groundwater levels, including scenario modelling if appropriate.
- Further information about option.

These investigations can also help identification of further appropriate mitigation measures.

Following further investigation, design and mitigation development, it is anticipated the WFD non-compliance risk can be reduced to minor localised (impact score 1) for both the Bure & Waveney & Yare & Lothing and Broadland Rivers Chalk and Crag waterbodies, and therefore the option would be considered to be WFD compliant.

ESW-DES-004 is an option which only appears in benign scenarios and in one adverse scenario "slow technology" which has not been previously considered as an alternative plan nor an adaptive path.

### 3.9 Corton beach well desalination (ESW-DES-008)

Two water bodies were identified as requiring further assessment: GB650503520003: Norfolk East coastal water body and GB40501G400600: Waveney and East Suffolk Chalk & Crag groundwater body. A summary of the Level 2 WFD assessment is included in Table 3.8 and detail outputs are presented in Annex B.

The Level 2 WFD assessment for the Norfolk East identified precautionary pre-mitigation deterioration risks (impact score 2) to biological quality elements and physicochemical elements due to the discharge of a highly saline brackish water.

The RNAG status for these water bodies relate to:

- Dissolved inorganic nitrogen due to 'agriculture and rural land management' and 'sewage discharge (continuous)'; and
- Dissolved inorganic nitrogen, PBDE and mercury and its compounds due to 'no sector responsible / sector under investigation'.

The option has potential to affect physico chemical elements in the above stated RNAGs and therefore this option has potential to impede reaching GEP and has potential to compromise water body objectives.

Mitigation measures are provided in the form of limiting the frequency of discharge into the water body, and further investigation to ascertain the impact of the discharge on physicochemical parameters.

It is recommended that further investigation is carried out on the below:

- 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.
- Hydrodynamic modelling of impacts of discharge into coastal water body on flow, sedimentation, bathymetry and water quality and particularly how this could affect the marine protection area discharge is assumed to be released into (Outer Thames estuary SPA).
- Review of mitigation measures assessment for this water body to identify whether additional structures will lead for impacts on mitigation measures assessment.

This investigation can also help identification of further mitigation measures.

The Waveney and East Suffolk Chalk & Crag groundwater body consists of a confined chalk aquifer, but in some areas, there are known to be shallower aquifers in continuity with surface water which also form part of this water body. Until the nature of the geology is fully understood in the area around the abstraction, on a precautionary basis it is assumed that a shallow aquifer in continuity with surface water is present in this area. This assessment highlights a precautionary pre-mitigation deterioration risk (impact score 2) on quantitative status elements (quantitative dependent surface water body status, quantitative saline intrusion and quantitative water balance) due to the proposed new groundwater abstractions.

The HRA considers the implications of the works on the marine protected areas and has concluded that the rdWRMP24 contains measures that would ensure compliance with the policies of the marine plan. Further details can be found in Sub-report A Habitats Regulation Assessment of this rdWRMP24.

The RNAG status for these water bodies relate to:

- Trend assessment, general chemical test, chemical drinking water protected area, quantitative water balance due to 'agriculture and rural land management'.

The assessment is not anticipated to affect any of the above stated RNAGs and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Mitigation measures are provided in the form of selection of location of beach wells to ensure no impact on deeper WFD waterbody, consideration of requirement to return water to the ground (through recharge trenches) to help minimise the impact of construction, and use of clay bunds in pipeline route where groundwater potentially encountered.

It is recommended that further investigation is carried out on the below:

- Investigation into the nature of the geology in the area of the infiltration galleries or beach wells, and the connection between shallow saline groundwaters in the superficial deposits and the deeper fresh water aquifer.
- Assessment of scale of water balance impacts due to abstraction from the shallow saline aquifer.
- Hydroecological assessment of the impacts of abstraction on flow in the watercourses and groundwater levels, including scenario modelling if appropriate.
- Further information about option.

These investigations can also help identification of further mitigation measures.

Following further investigation, design and mitigation development, it is anticipated the WFD non-compliance risk can be reduced to minor localised (impact score 1) for both water bodies, and therefore the option would be considered to be WFD compliant.

**Table 3.8: Corton desalination (ESW-DES-008) Level 2 WFD summary**

Water body ID and name	Confidence in WFD data / option design	Maximum impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB650503520003:Low / Low Norfolk East		2	Possible	Possible	No	<p>Review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme.</p> <p>Further information about how the option will be operated.</p> <p>Hydrodynamic modelling of impacts of discharge into coastal water body on flow, sedimentation, bathymetry and water quality and particularly how this could affect the marine protection area discharge is assumed to be released into (Outer Thames estuary SPA).</p> <p>Review of mitigation measures assessment for this water body to identify whether additional structures will lead for impacts on mitigation measures assessment.</p>	<p>Limitations on frequency of discharge of highly saline water into Norfolk east coastal WB.</p> <p>Discharge to be designed to maximise dilution and dispersion and avoid sensitive areas.</p>	1	-
GB40501G400600:Low / Low Waveney and East Suffolk Chalk & Crag		2	Possible	Possible	No	<p>Assessment of scale of water balance impacts.</p> <p>Hydroecological assessment of the impacts of abstraction on flow in the watercourses and groundwater levels, including scenario modelling if appropriate.</p> <p>Further information about option.</p>	<p>Pre-construction monitoring and modelling scenarios to establish impact on GW body, and its quality elements.</p> <p>Restricting upstream use and, if deemed appropriate, implement compensation/augmentation flow.</p>	1	-

Water body ID and name	Confidence in WFD data / option design	Maximum impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
							<p>Further investigation into impact on groundwater levels of dewatering for construction and consideration of requirement to return water to the ground (through recharge trenches) to help minimise the impact of construction, if required.</p> <p>Use of Clay Stanks in pipeline route where groundwater potentially encountered.</p> <p>Where possible ensure shafts for HDD launch and reception are located further from the SSSI.</p>		

## 4 Cumulative and in combination effects

For WFD cumulative and in combination effects considers the additional impact on a water body caused by multiple options constructed and/or operating within it, along with the potential for cumulative impacts from other planning applications, allocations or major projects planned in the Essex and Suffolk area.

For the three preferred plans (Best Value Plan, Ofwat Core Plan, and Best Environmental and Social Plan) and the four adaptive programmes (HED, High PCC, NSR and HRSR) cumulative effects within these plans have been assessed. In the case of some of the adaptive programmes, smaller variants of options are selected. In each case, the largest variant has been assessed to provide a “worst case scenario”

The major planning applications, allocations and major projects have also been reviewed to identify if any water bodies impacted by these are common with those impacted by options within the Best Value Plan and could therefore, lead to any potential in combination effects.

This assessment will show whether changes to overall risk of WFD deterioration will occur when considering the fully encapsulated impact of the Essex and Suffolk plans along with the planning projects on the water environment.

### 4.1 Best Value plan

#### 4.1.1 Options selected

Both cumulative and in combination effects have been assessed for options which fall under the Best Value Plan (BVP) laid out by Essex & Suffolk Water. The options selected as part of the BVP for the Essex & Suffolk Water WRMP24 are presented in Table 4.1.

**Table 4.1: Essex and Suffolk Water WRMP24 BVP options**

Option ID	Option title	Brief description	Year selected
ESW-ABS-003C	New Linford WTW (10MI/d Option)	Reinstatement of abandoned artesian well, no network upgrade should be required. 10 MI/d provided overall.	2027-2028
ESW-TRA-001	Barsham to Blyth Transfer Main	8 MI/d transfer from Barsham WTW to Saxmundham Water Tower.	2028-2029
ESW-TRA-019	Transfer from Holton WTW to Eye Airfield	8.5 MI/d transfer from Holton WTW to Eye Airfield.	2028-2029
ESW-NIT-004	Barsham EDR Nitrate Removal + Pipeline	Additional Electrolysis Reversal nitrate removal plant plus a discharge stream pipeline.	2029-2030
ESW-NIT-005	Langford EDR Nitrate Removal + Pipeline	Additional Electrodialysis Reversal nitrate removal plant plus a discharge stream pipeline.	2029-2030
ESW-NIT-006	Langham EDR Nitrate Removal + Pipeline	Additional Electrodialysis Reversal nitrate removal plant plus a discharge stream pipeline.	2029-2030
ESW-UVC-001	Langford UV (Crypto)	Additional Ultraviolet treatment contactors to treat for cryptosporidium.	2029-2030
ESW-TRA-018	Bungay Wells to Broome WTW transfer	Transfer from Bungay Wells to Broome WTW. Transfer is approximately 3.6 km long, with 1 MI/d max capacity.	2030-2031
ESW-TRA-023	Broome to Barsham Transfer	Bungay raw water well and transfer pipeline (1MI/d) and Broome WTW capacity upgrade.	2030-2031
ESW-PMP-001A	Langford WTW upgrade + Abberton RWPS Pump Replacement	Replacement, enhanced pumping capacity of two existing pumps, motors, and controls at Abberton	2030-2031

		Reservoir Raw Water Pumping Station and upgrading Langford WTW storage.
ESW-EFR-002A	Lowestoft water reuse (transfer to River Waveney)	Effluent Reuse Plant (11.1 MI/d DO). Intake from 2032-2033 Lowestoft/Corton WRC (Anglian Water owned asset), discharge to point near Ellingham Mill.
ESW-RES-002C1	North Suffolk winter storage reservoir + Barsham River Works Upgrade	New winter storage reservoir to be built. Intake 2040-2041 from the River Waveney.

#### 4.1.2 Cumulative effects assessment

Table 4.2 below, identifies water bodies which are impacted by more than one of the BVP options but where the cumulative effect assessment shows that there will not be any change to the currently identified risk of WFD deterioration at a water body scale, due to multiple BVP options.

**Table 4.2: Water bodies where cumulative effects from the BVP are not anticipated to lead to a risk of WFD deterioration.**

Water body ID	Water body name	Options	Comments
GB105034045902	Waveney (Starston Brook - Ellingham Mill)	<ul style="list-style-type: none"> <li>• ESW-RES-002C1</li> <li>• ESW-TRA-023</li> <li>• ESW-TRA-018</li> </ul>	All options involve installation of below-ground pipelines, involving watercourse crossings in this water body. ESW-RES-002C1 and ESW-TRA-023 involve other below ground construction activities. Option ESW-RES-002C1 involves the construction of a new winter storage reservoir in this water body, which could lead to a change in flow regime downstream of the reservoir intake in this watercourse. This option also involves the construction of a new intake structure and modification of a WTW. ESW-TRA-018 and ESW-TRA-023 are selected during same period. Cumulative effects of these options are unlikely to be significant at a water body scale so no change to impact score expected outside of what is described in the ESW-RES-002C1 Level 2 assessment. Risk to water body <b>remains as minor localised effect</b> (impact score of 1) as per post mitigation scoring of ESW-RES-002C1 Level 2 assessment.
GB105034045903	Waveney (Ellingham Mill - Burgh St. Peter)	<ul style="list-style-type: none"> <li>• ESW-RES-002C1</li> <li>• ESW-TRA-023</li> <li>• ESW-TRA-001</li> <li>• ESW-NIT-004</li> <li>• ESW-EFR-002A</li> </ul>	All options excluding ESW-RES-002C1 involve below-ground construction activity and the installation of new below-ground pipelines. Option ESW-RES-002C1 involves the construction of a new winter storage reservoir, which could lead to a change in flow regime of the watercourse downstream of the reservoir intake, as well as a new surface water abstraction to support the new reservoir. ESW-TRA-023 also involves construction of a new SR (Service Reservoir) and modification of a WTW. ESW-NIT-004 involves a minor increase in peak abstraction within licence conditions and modification of a WTW. ESW-EFR-002A involves a new WTW discharge construction of a new outfall and intake as well as use of an existing surface water abstraction within existing licence conditions but outside of recent actual rates. ESW-TRA-001, ESW-NIT-004 and ESW-TRA-023 are selected during the same period. Cumulative effects of these options are unlikely to be significant at a water body scale so no change to impact score expected outside of what is described in the ESW-RES-002C1 Level 2 assessment.

Water body ID	Water body name	Options	Comments
GB105034045930	Broome Beck	<ul style="list-style-type: none"> <li>• ESW-TRA-018</li> <li>• ESW-TRA-023</li> </ul>	Both options include installation of below-ground pipelines. ESW-TRA-023 also involves below ground construction activity in this water body. Despite being selected in the same period (2030-2031), cumulative effects are unlikely to be significant at a water body scale, so no change to impact score expected. Risk to water body <b>remains as minor localised effect</b> (impact score of 1).
GB105035046251	Lothingland Hundred	<ul style="list-style-type: none"> <li>• ESW-TRA-001</li> <li>• ESW-EFR-002A</li> </ul>	Both options involve below-ground construction activity and installation of below-ground pipelines which do not involve watercourse crossings. Options are selected three years apart and cumulative effects are unlikely to be significant at a water body scale so no change to impact score expected. Risk to water body remains as <b>minor localised effect</b> (impact score of 1).
GB105035046290	Blyth (d/s Halesworth)	<ul style="list-style-type: none"> <li>• ESW-TRA-001</li> <li>• ESW-TRA-019</li> <li>• ESW-EFR-002A</li> </ul>	All options involve the installation of below-ground pipelines involving watercourse crossings as well as modification of a WTW / PS (Pumping Station). ESW-TRA-001 and ESW-EFR-002A also involve below-ground construction activity. ESW-TRA-001 and ESW-TRA-019 are selected in the same period (2028-2029). Cumulative effects are not expected to be significant at a water body scale and the impact remains <b>minor localised effect</b> (impact score of 1).
GB105035046300	Wang	<ul style="list-style-type: none"> <li>• ESW-EFR-002A</li> <li>• ESW-TRA-001</li> </ul>	Both options involve the installation of below-ground pipelines which do not involve watercourse crossings. Options are selected three years apart and cumulative effects are unlikely to be significant at a water body scale so no change to impact score expected. Risk to water body <b>remains as minor localised effect</b> (impact score of 1).
GB105037041160	Blackwater (Combined Essex)	<ul style="list-style-type: none"> <li>• ESW-NIT-005</li> <li>• ESW-UVC-001</li> </ul>	Both options involve below-ground construction activity, the installation of new below-ground pipeline and modification of a WTW. ESW-NIT-005 also involves the construction of a new PS. Options are selected in the same period (2029-2030), but cumulative effects are unlikely to be significant at a water body scale so no change to impact score expected. Risk to water body <b>remains as minor localised effect</b> (impact score of 1).
GB40501G400300	Broadland Rivers Chalk & Crag (GW)	<ul style="list-style-type: none"> <li>• ESW-TRA-001</li> <li>• ESW-TRA-019</li> <li>• ESW-TRA-023</li> <li>• ESW-NIT-004</li> <li>• ESW-EFR-002A</li> <li>• ESW-RES-002C1</li> <li>• ESW-TRA-018</li> </ul>	All options will require below ground construction activity associated with installation of new below-ground pipelines (with and without watercourse crossings) and / or modification of a WTW. ESW-TRA-018 also involves use of existing groundwater abstraction within licence conditions but outside of recent actual rates. Options are selected during same period for all options excluding ESW-EFR-002A and ESW-RES-002C1. Despite this, cumulative effects are unlikely to be significant at a water body scale so no change in impact score above what is already described in the Level 2 assessment carried out for ESW-TRA-018. Risk to water body <b>remains as minor localised effect</b> (impact score of 1) as per post-mitigation scoring of ESW-TRA-018 Level 2 assessment.
GB40501G400600	Waveney and East Suffolk	<ul style="list-style-type: none"> <li>• ESW-TRA-001</li> <li>• ESW-TRA-019</li> <li>• ESW-EFR-002A</li> </ul>	All options involve below-ground construction activity and the installation of below-ground pipelines. ESW-TRA-001 and ESW-TRA-019 are

Water body ID	Water body name	Options	Comments
	Chalk and Crag (GW)		selected in the same period (2028-2029). Cumulative effects are unlikely to be significant at a water body scale so no change to impact score expected. Risk to water body <b>remains as minor localised effect</b> (impact score of 1).
GB40503G000400	Essex Gravels	<ul style="list-style-type: none"> <li>• ESW-NIT-005</li> <li>• ESW-ABS-003C</li> <li>• ESW-NIT-006</li> <li>• ESW-UVC-001</li> </ul>	All options involve below-ground construction activity and the installation of below-ground pipelines in this water body. Option ESW-NIT-005 involves below ground construction activity within 500m of a GWDTE, construction of a new PS and modification of a WTW. ESW-ABS-003C also involves refurbishment of existing boreholes and drilling of a new borehole alongside construction of a new PS and modification of a WTW. In addition to this, ESW-ABS-003C also involves a new groundwater abstraction licence in the underlying Chalk aquifer. Options are selected during the same period for all excluding ESW-ABS-003C. Provided the recommended mitigation measures and further investigations outlined in ESW-NIT-005 and ESW-ABS-003C Level 2 assessments are implemented, the risk to the water body is expected to <b>remain as minor localised effect</b> (impact score of 1).

**Table 4.3: Water bodies where cumulative effects from the BVP could lead to a risk of WFD deterioration.**

Water body ID	Water body name	Options	Comments
GB105034045903	Waveney (Ellingham Mill - Burgh St. Peter)	<ul style="list-style-type: none"> <li>• ESW-RES-002C1</li> <li>• ESW-TRA-023</li> <li>• ESW-TRA-001</li> <li>• ESW-NIT-004</li> <li>• ESW-EFR-002A</li> </ul>	All options excluding ESW-RES-002C1 involve below-ground construction activity and the installation of new below-ground pipelines. Option ESW-RES-002C1 involves the construction of a new winter storage reservoir, which could lead to a change in flow regime of the watercourse downstream of the reservoir intake, as well as a new surface water abstraction to support the new reservoir. ESW-TRA-023 also involves construction of a new SR (Service Reservoir) and modification of a WTW. ESW-NIT-004 also involves a minor increase in peak abstraction within licence conditions and modification of a WTW. ESW-EFR-002A also involves a new WTW discharge construction of a new outfall and intake as well as use of an existing surface water abstraction within existing licence conditions but outside of recent actual rates. ESW-TRA-001, ESW-NIT-004 and ESW-TRA-023 are selected during the same period. There is potential for a cumulative effect <b>on this water body</b> . Following further investigation, design and mitigation development, it is anticipated the WFD non-compliance risk can be reduced to minor/localised (impact score 1) for this water body, and that this cumulative effect will be removed to ensure WFD compliance.

#### 4.1.3 In-combination effects assessment

The relevant planning applications, major projects or planning allocations which may have impacts on the same water bodies as the BVP have been identified. These are set out in Table 4.2.

**Table 4.4: Local planning applications, allocations, and major development projects impacting the same water bodies included in the BVP option**

Project title	Water bodies interacted with	BVP options in same water bodies
<b>Major Developments</b>		
Sizewell C	GB105035046270: Minsmere Old River	ESW-EFR-002A
	GB40501G400600: Waveney and East Suffolk Chalk & Crag	ESW-TRA-001
		ESW-TRA-019
Longfield Solar Farm	GB40503G000400: Essex Gravels	ESW-ABS-003C
		ESW-NIT-005
		ESW-NIT-006
East Anglia TWO Offshore Windfarm	GB105035045980: Fromus	ESW-EFR-002A
	GB40501G400600: Waveney and East Suffolk Chalk & Crag	ESW-TRA-001
	GB105035046270: Minsmere Old River	ESW-TRA-019
Lower Thames Crossing	GB40503G000400: Essex Gravels	ESW-ABS-003C
	GB40602G401000: South Essex Lower London Tertiaries	ESW-NIT-005
	GB106037028200: Mardyke	ESW-NIT-006
	GB530603911402: Thames Middle	
<b>Local Planning Applications / Allocations (LPA)</b>		
Rivenhall	GB105037041160: Blackwater (Combined Essex)	ESW-NIT-005
Slough Farm, Ardleigh	GB105037041320: Salary Brook	ESW-NIT-006
Barham Quarry	GB40501G400600: Waveney and East Suffolk Chalk & Crag	ESW-EFR-002A
		ESW-TRA-001
		ESW-TRA-019
Belstead Quarry	GB40501G400600: Waveney and East Suffolk Chalk & Crag	ESW-ABS-003C
	GB40503G000400: Essex Gravels	ESW-NIT-005
		ESW-NIT-006
		ESW-EFR-002A
		ESW-TRA-001
	ESW-TRA-019	
Sandon	GB40503G000400: Essex Gravels	ESW-ABS-003C
		ESW-NIT-005
		ESW-NIT-006
Bellhouse Landfill Site	GB40503G000400: Essex Gravels	ESW-ABS-003C
		ESW-NIT-005
		ESW-NIT-006
Dollymans Farm	GB40503G000400: Essex Gravels	ESW-ABS-003C
		ESW-NIT-005
		ESW-NIT-006
Sunnymead, Elmstead & Heath Farms	GB40503G000400: Essex Gravels	ESW-ABS-003C
		ESW-NIT-005
		ESW-NIT-006

Table 4.5 below, identifies water bodies which are impacted by more than one of the BVP options and/or planning projects, but where the high-level in-combination effect assessment has shown that it is unlikely that the multiple BVP options and planning projects will lead to a risk of WFD deterioration at the water body scale.

**Table 4.5: Water bodies where in-combination effects are unlikely to be a risk of WFD deterioration.**

Water body ID	Water body name	Options	Comments
GB106037028200	Mardyke	• ESW-ABS-003C	The BVP option involves below-ground construction activity and the installation of below-ground pipelines in this water body.

Water body ID	Water body name	Options	Comments
		<ul style="list-style-type: none"> <li>Major development: Lower Thames crossing</li> </ul>	<p>ESW-ABS-003C also involves a temporary discharge of water with a lower water quality than receiving watercourse via a new outfall. Other option activities include a Major Development in the Lower Thames Crossing which proposes watercourse realignment, construction of structures spanning watercourses (crossings / viaducts) and operational road drainage. These activities will likely have minor implications on this water body although separate project WFD assessment of the scheme has been put forward for Stage 4 WFD reporting, which is expected to outline the necessary measures to prevent WFD non-compliance. The in-combination effects are not expected to be significant at a water body scale and the impact <b>remains as minor localised effect</b> (impact score of 1).</p>
GB105034045901	Waveney (R Dove - Starston Brook)	<ul style="list-style-type: none"> <li>ESW-TRA-019</li> <li>Anglian Water: BCTTW 67</li> </ul>	<p>Both the BVP option and Anglian Water option BCTTW 67 involve installation of new below-ground pipelines. In-combination effects are unlikely to be significant at a water body scale so no change to impact score expected. Risk to water body <b>remains as minor localised effect</b> (impact score of 1).</p>
GB105035045980	Fromus	<ul style="list-style-type: none"> <li>ESW-TRA-001</li> <li>Major Development: East Anglia TWO Offshore Windfarm</li> </ul>	<p>The BVP option ESW-TRA-001 involves installation of new below-ground pipeline and modification of a WTW in this water body. This water body was screened out of further assessment in the East Anglian TWO offshore windfarm WFD assessment<sup>5</sup> as there are no direct mechanism by which it could be impacted by construction or operational activities associated with the development. The in-combination effects are not expected to be significant at a water body scale and the impact <b>remains as minor localised effect</b> (impact score of 1).</p>
GB105036040942	Stour (Lamarsh - R. Brett)	<ul style="list-style-type: none"> <li>ESW-NIT-006</li> <li>Anglian Water: BCTTW 174</li> </ul>	<p>Both the BVP option and Anglian Water option BCTTW 174 include below-ground construction activity and the installation of below-ground pipelines. The BVP option also involves construction of a PS and modification of a WTW alongside a minor increase in peak abstraction within licence conditions but outside of recent actual rates. The in-combination effects are not expected to be significant at a water body scale and the impact <b>remains minor localised effect</b> (impact score of 1).</p>
GB105037034130	Layer Brook	<ul style="list-style-type: none"> <li>ESW-PMP-001A</li> <li>Affinity Water: AFF-EFF-WRZ8-1320 Colchester eff reuse</li> </ul>	<p>Both the BVP option and the Affinity Water option, AFF-EFF-WRZ8-1320 Colchester eff reuse, involve below ground construction activity. The BVP option includes the modification of a PS and AFF-EFF-WRZ8-1320 Colchester eff reuse involves the installation of new below-ground pipelines. The in-combination effects are not expected to be significant at a water body scale and the impact <b>remains minor localised effect</b> (impact score of 1).</p>

<sup>5</sup> Scottish Power Renewables. East Anglian TWO Offshore Windfarm. Environmental Statement, Volume 3. Appendix 20.4 Water Framework Directive Compliance Assessment. Available online at: [EN010078-001516-6.3.20.4 EA2 ES Appendix 20.4 Water Framework Directive Compliance Assessment.pdf \(planninginspectorate.gov.uk\)](https://www.planninginspectorate.gov.uk/wp-content/uploads/2023/07/EN010078-001516-6.3.20.4 EA2 ES Appendix 20.4 Water Framework Directive Compliance Assessment.pdf)

Water body ID	Water body name	Options	Comments
GB105037041160	Blackwater (Combined Essex)	<ul style="list-style-type: none"> <li>• ESW-NIT-005</li> <li>• ESW-UVC-001</li> <li>• LPA: Rivenhall</li> </ul>	Both options involve below-ground construction activity, the installation of new below-ground pipeline and modification of a WTW. ESW-NIT-005 also involves the construction of a new PS. Rivenhall will have a minor localised effect on this water body as a result of waste incineration activities. In-combination effects are unlikely to be significant at a water body scale so no change to impact score expected. Risk to water body <b>remains as minor localised effect</b> (impact score of 1).
GB105037041320	Salary Brook	<ul style="list-style-type: none"> <li>• ESW-NIT-006</li> <li>• LPA: Slough Farm, Ardleigh</li> <li>• Anglian Water: RW-219-B</li> <li>• Anglian Water: DES-16</li> <li>• Affinity Water: AFF-EFF-WRZ8-1320 Colchester eff reuse</li> </ul>	The BVP option, Anglian Water option RW-219-B and Affinity Water option AFF-EFF-WRZ8-1320 Colchester eff reuse all involve below-ground construction activity. All options require installation of new below-ground pipelines. The Affinity Water option also involves construction of a new PS, a new surface water abstraction and downstream implications of new discharge. Slough Farm will have a minor localised effect on this water body as a result of waste management activities. The in-combination effects are not expected to increase impact to water body described in Affinity Water option assessment. Impact to water body <b>remains</b> as per post mitigation scoring of the Affinity Water option AFF-EFF-WRZ8-1320 Colchester eff reuse Level 2 assessment.
GB105037041330	Colne (d/s Does Corner)	<ul style="list-style-type: none"> <li>• ESW-NIT-006</li> <li>• Anglian Water: DES-16</li> <li>• Anglian Water: BCTTW_166, BCTTW_167, BCTTW_168</li> <li>• Anglian Water: BCTTW_174</li> <li>• Affinity Water: AFF-EFF-WRZ8-1320 Colchester eff reuse</li> </ul>	All options involve installation of below-ground pipelines. All options excluding BCTTW_166_167_168 involve below-ground construction activity. Option AFF-EFF-WRZ8-1320 Colchester eff reuse and DES-16 involve new discharges. DES-16 also involves modification of a WTW and construction of a new WTW. AFF-EFF-WRZ8-1320 Colchester eff reuse also involves a new intake and a new surface water abstraction. The in-combination effects are not expected to increase impact to water body described in Affinity Water option assessment. Impact to water body <b>remains as minor localised effect</b> (impact score of 1) as per post mitigation scoring of the Affinity Water option AFF-EFF-WRZ8-1320 Colchester eff reuse Level 2 assessment.
GB40501G400600	Waveney and East Suffolk Chalk and Crag (GW)	<ul style="list-style-type: none"> <li>• ESW-TRA-019</li> <li>• ESW-TRA-001</li> <li>• ESW-EFR-002A</li> <li>• Major Development: Sizewell C</li> <li>• Major Development: East Anglia TWO Offshore Windfarm</li> <li>• LPA: Barham Quarry</li> <li>• LPA: Belstead Quarry</li> <li>• Anglian Water: 11a-0603</li> </ul>	All BVP options and Anglian Water option, 11a-0603, involve below-ground construction activity and the installation of below-ground pipelines. Barham and Belstead Quarries / mineral extraction options will have a dewatering impact on this water body as a result of quarrying activities. The East Anglia TWO project will not prevent water body status from being achieved in the future and is therefore considered to be compliant. No non-temporary impacts on the status of any river or transitional waterbodies are anticipated as a result of the Sizewell C project. The in-combination effects are unlikely to be significant at a water body scale so no change to impact score expected. Risk to water body <b>remains as minor localised effect</b> (impact score of 1).

Water body ID	Water body name	Options	Comments
GB40503G000400	Essex Gravels	<ul style="list-style-type: none"> <li>• ESW-ABS-003C</li> <li>• ESW-NIT-005</li> <li>• ESW-NIT-006</li> <li>• ESW-UVC-001</li> <li>• BCTTW 174</li> <li>• Affinity Water: AFF-EFF-WRZ8-1320 Colchester eff reuse</li> <li>• Affinity Water: AFF-DES-WRZ8-1332 Holland on Sea Desalination to Horsley Cross</li> <li>• Major Development: Longfield Solar Farm</li> <li>• Major Development: Lower Thames Crossing</li> <li>• LPA: Sandon</li> <li>• LPA: Belstead Quarry</li> <li>• LPA: Bellhouse Landfill Site</li> <li>• LPA: Dollymans Farm</li> <li>• LPA: Sunnymead, Elmstead, 7 Heath Farms</li> </ul>	<p>All BVP options and Affinity Water option AFF-EFF-WRZ8-1320 Colchester effluent reuse involves below-ground construction activity and the installation of below-ground pipelines in this water body. Option ESW-NIT-005 involves below ground construction activity within 500m of a GWDTE, construction of a new PS and modification of a WTW. ESW-ABS-003C also involves refurbishment of existing boreholes and drilling of a new borehole alongside construction of a new PS and modification of a WTW. In addition to this, ESW-ABS-003C also involves a new groundwater abstraction licence. Affinity Water option AFF-DES-WRZ8-1332 Holland on Sea Desalination to Horsley Cross involves below-ground construction activity within 500m of a GWDTE associated with construction of a new desalination plant. Barham and Belstead Quarries / mineral extraction options will have a dewatering impact on this water body as a result of quarrying activities. Longfield Solar Farm is compliant with the WFD objectives, and no deterioration in WFD status is anticipated. Another major development, Lower Thames Crossing involves temporary dewatering as a result of below ground construction activity, creation of embankments and cuttings and ground treatment for stability in advance of tunnel boring machine (TBM) interventions. These activities will likely have minor implications at water body scale although separate project WFD assessment of the scheme has been put forward for Stage 4 WFD reporting, which is expected to outline the necessary measures to prevent WFD non-compliance. Provided the recommended mitigation measures and further investigations outlined in ESW-NIT-005 and ESW-ABS-003C Level 2 assessments are implemented, the risk to the water body is expected to <b>remain as minor localised effect</b> (impact score of 1).</p>
GB520503713800	Colne	<ul style="list-style-type: none"> <li>• ESW-NIT-006</li> <li>• Affinity Water: AFF-EFF-WRZ8-1320 Colchester eff reuse</li> </ul>	<p>Both the BVP option and Affinity Water option AFF-EFF-WRZ8-1320 Colchester eff reuse, involve below-ground construction activity and installation of below-ground pipelines. Affinity Water option AFF-EFF-WRZ8-1320 Colchester eff reuse also involves a reduction in discharge in this water body affecting dilution and water levels, potentially harming water quality and biology. The in-combination effects are unlikely to be significant at a water body scale so no change to impact score expected outside of what is already described in the Affinity Water AFF-EFF-WRZ8-1320 Colchester eff reuse Level 2 assessment. Risk to water body <b>remains as</b> per post mitigation scoring of the Affinity Water option AFF-EFF-WRZ8-1320 Colchester eff reuse Level 2 assessment.</p>
GB530603911402	Thames Middle	<ul style="list-style-type: none"> <li>• ESW-ABS-003C</li> <li>• Thames Water: TWU_LON_HI-TFR_LON_ALL_hampton-battersea</li> </ul>	<p>The BVP option involves below-ground construction activity, installation of new below-ground pipelines, modification of a WTW, construction of a new PS, refurbishment of existing boreholes, drilling</p>

Water body ID	Water body name	Options	Comments
		<ul style="list-style-type: none"> <li>Thames Water: TWU_LON_HI-GRW_ALL_ALL_s'flect lic disagg</li> <li>Major Development: Lower Thames Crossing</li> </ul>	of new boreholes, a new outfall and temporary discharge of low-quality water. Thames Water option, TWU_LON_HI-GRW_ALL_ALL_s'flect lic disagg involves a new WTW as well as maintenance of an existing borehole. Both Thames Water options also involve the installation of pipelines within this transitional water body. The Major Development Lower Thames Crossing project also impacts this water body. Proposed activities include receipt of discharges of operational discharges from tunnel drainage, replacement jetty construction and noise and vibrational implications. These activities will likely have minor implications at water body scale although separate project WFD assessment of the scheme has been put forward for Stage 4 WFD reporting, which is expected to outline the necessary measures to prevent WFD non-compliance. The in-combination effects are unlikely to be significant at a water body scale so no change to impact score expected. Risk to water body <b>remains as minor localised effect</b> (impact score of 1).
GB40602G401000:	South Essex Lower London Tertiaries	<ul style="list-style-type: none"> <li>ESW-ABS-003C</li> <li>Major Development: Lower Thames Crossing</li> </ul>	The BVP option involves below-ground construction activity, installation of new below-ground pipelines, modification of a WTW, refurbishment of existing boreholes, drilling of new boreholes, and a new groundwater abstraction. Other option activities include a Major Development in the Lower Thames Crossing project which involves temporary dewatering as a result of below ground construction activity and creation of embankments and cuttings. These activities will likely have minor implications at water body scale although separate project WFD assessment of the scheme has been put forward for Stage 4 WFD reporting, which is expected to outline the necessary measures to prevent WFD non-compliance. The in-combination effects are unlikely to be significant at a water body scale so no change to impact score expected. Provided the recommended mitigation measures and further investigations outlined in ESW-ABS-003C Level 2 assessments are implemented, the risk to the water body is expected to <b>remain as minor localised effect</b> (impact score of 1).

Table 4.6 below, identifies water bodies which have been assessed as possibly having potential for in-combination effects from multiple BVP options and other major projects under a precautionary approach. This could lead to a risk of WFD deterioration at a water body scale. Additional assessment will be required once additional major development information has been reviewed.

**Table 4.6: BVP water bodies where in combination could lead to WFD deterioration risk**

Water body ID	Water body name	Options	Comments
GB105035046270	Minsmere Old River	<ul style="list-style-type: none"> <li>ESW-TRA-001</li> </ul>	The option ESW-TRA-001 involves construction of a pipeline in this water body. East Anglia TWO

Water body ID	Water body name	Options	Comments
		<ul style="list-style-type: none"> <li>Major Development: Sizewell C</li> <li>Major Development: East Anglia TWO Offshore Windfarm</li> </ul>	Offshore Windfarm has little potential for impact of this water body and was screened out of further WFD assessment as part of the major development's environmental assessment. Part of this water body is within the construction area for Sizewell C though, and the Sizewell C WFD assessment <sup>6</sup> sets out potential impacts on water quality and therefore biology in the tidal sections of this water body. The impacts from the two projects do not overlap directly within the water body and the combination of these options has small potential of an in-combination effect, however, without further assessment this cannot be definitively confirmed. Following further investigation, design and mitigation development, it is anticipated the WFD non-compliance risk can be reduced to minor localised (impact score 1) for this water body, and that this in-combination effect will be removed to ensure WFD compliance.

## 4.2 Least Cost plan

Least Cost Plan (LCP) contains same options and selection dates as the BVP. As such there are no different or additional options or water bodies affected by this plan. Please refer to Section 4.1.2 above for cumulative effects assessment of BVP (and LCP) options.

## 4.3 Ofwat core plan

### 4.3.1 Options selected

The Ofwat Core plan laid out by Essex & Suffolk Water WRMP24 has been compared to the BVP. The Ofwat Core plan contains no new options which are not already included in the BVP. However, the BVP contains 1 option which are not included in the Ofwat Core plan. The differences between the two plans are set out in Table 4.7.

**Table 4.7: Differences in the options included in the BVP Plan and alternative Ofwat Core Plan**

Options included in Ofwat Core Plan but not in BVP	Options included in BVP but not in Ofwat Core Plan
:	ESW-RES-002C1

### 4.3.2 Cumulative effects assessment

The Ofwat Core plan does not include any options not already considered in the BVP and therefore no additional cumulative effects on any water bodies are anticipated.

## 4.4 Best Environmental and Societal plan

### 4.4.1 Options selected

The BES plan laid out by Essex and Suffolk Water WRMP24 has been compared to the BVP. The BES plan contains four new options which are not already included in the BVP. In addition,

<sup>6</sup> EDF Energy and SZC. The Sizewell C Project: 8.14 Water Framework Direct Compliance Assessment Report Part 4 of 4 Available online at: [SZC\\_Bk8\\_8.14\\_Water\\_Framework\\_Directive\\_Part\\_4\\_of\\_4.pdf \(sizewellcdco.co.uk\)](https://www.sizewellcdco.co.uk/SZC_Bk8_8.14_Water_Framework_Directive_Part_4_of_4.pdf)

the BVP contains four options which are not included in the BES plan. The differences between the two plans are set out in Table 4.8.

**Table 4.8: Differences in the options included in the BVP and alternative BES plan**

Options included in BES but not in BVP	Options included in BVP but not in BES
ESW-DES-001	ESW-RES-002C1
03b0478B	ESW-NIT-005
ESW-EFR-001	ESW-UVC-001
ESW-DES-008	ESW-NIT-006

#### 4.4.2 Cumulative effects assessment

The preferred plan (BVP) contains four options which are not included in the BES plan. Therefore, the cumulative effects reported for the following water bodies are not applicable for the BES plan.

- GB105037041160: Blackwater (Combined Essex)
- GB105037041320: Salary Brook

Due to the differences in the options selected for the BVP and BES plan, the below water bodies identified in the BVP cumulative effects assessment are impacted by different or additional options:

- GB105034045902: Waveney (Starston Brook - Ellingham Mill)
- GB105034045903: Waveney (Ellingham Mill - Burgh St. Peter)
- GB40501G400300: Broadland Rivers Chalk & Crag
- GB40501G400600: Waveney and East Suffolk Chalk and Crag (GW)
- GB40503G000400: Essex Gravels

However, upon review of the above water bodies, there are no changes to the cumulative effects reported in the BVP, and no additional risk of deterioration in cumulation has been identified. As such these water bodies have been excluded from reporting.

Six additional water bodies have been identified for the BES plan as compared to the BVP as a result of the inclusion of four alternative options:

- GB105037028560: Rettendon Brook
- GB105037028630: Sandon Brook (West arm)
- GB30541427: Hanningfield Reservoir
- GB510503410700: Bure & Waveney & Yare & Lothing
- GB520503704100: Crouch
- GB530603911401: Thames Lower

A list of water bodies that are impacted by more than one of the BESP options are reported in Table 4.9, where cumulative effects are unlikely to lead to WFD deterioration. No water bodies were identified as having potential for cumulative effects that could lead to WFD deterioration.

**Table 4.9: Water bodies where potential additional cumulative effects may occur for the BES Plan compared to the BVP and are not anticipated to lead to a risk of WFD deterioration.**

Water body ID	Water body name	Options	Comments
GB105037028560	Rettendon Brook	<ul style="list-style-type: none"> <li>• ESW-DES-001</li> <li>• ESW-EFR-001</li> </ul>	Both options involve the installation of new below-ground pipelines. ESW-EFR-001 also

Water body ID	Water body name	Options	Comments
			involves the installation of new below-ground pipelines. Options are selected four years apart. Cumulative effects are unlikely to be significant at a water body scale so no change to impact score expected. Risk to water body remains as <b>minor localised effect</b> (impact score of 1)
GB105037028630	Sandon Brook (West arm)	<ul style="list-style-type: none"> <li>• ESW-DES-001</li> <li>• ESW-EFR-001</li> </ul>	Both options involve the installation of new below-ground pipelines. ESW-DES-001 also involves modification of a WTW. Options are selected four years apart. Cumulative effects are unlikely to be significant at a water body scale so no change to impact score expected. Risk to water body remains as <b>minor localised effect</b> (impact score of 1).
GB30541427	Hanningfield Reservoir	<ul style="list-style-type: none"> <li>• ESW-DES-001</li> <li>• ESW-EFR-001</li> </ul>	ESW-DES-001 involves implementation of a new low volume discharge of water with the same or higher quality of the receiving water body, which is expected to provide a beneficial effect to Hanningfield Reservoir. ESW-EFR-001 involves a new WTW discharge, construction of new outfall and a new abstraction from the reservoir (abstracting the same quantity as discharged as part of option). Options are selected four years apart. Cumulative effects are unlikely to be significant at a water body scale so no change to impact score expected. Risk to water body remains as <b>minor localised effect</b> (impact score of 1).
GB510503410700	Bure & Waveney & Yare & Lothing	<ul style="list-style-type: none"> <li>• 03b0478B</li> <li>• ESW-DES-008</li> <li>• ESW-EFR-002A</li> </ul>	All options involve installation of new below-ground pipelines. ESW-DES-008 and ESW-EFR-002A both involve below-ground construction activity construction of a new desalination plant and new WTW / PS respectively. ESW-EFR-002A also involves modification of a WTW. 03b0478B also involves cessation of an existing discharge in this water body. Options are not selected in the same period. Cumulative effects are unlikely to be significant at a water body scale so no change to impact score expected provided mitigation measures outlined in 03b0478B (Level 2 WFD assessment) are implemented. Risk to the water body is expected to <b>remain as minor localised effect</b> (impact score of 1) as per post mitigation scoring of 03b0478B Level 2 assessment.
GB520503704100	Crouch	<ul style="list-style-type: none"> <li>• ESW-DES-001</li> <li>• ESW-EFR-001</li> </ul>	Both options involve below-ground construction activity and installation of new below-ground pipelines. ESW-EFR-001 involves below ground construction activity within 500m of a GWDTE. Options are selected four years apart. Cumulative effects are unlikely to be significant at a water body scale so no change to impact score expected provided mitigation measures outlined in <b>ESW-EFR-001</b> (Level 2 WFD assessment) are implemented. Risk to the water body is expected to <b>remain as minor localised effect</b> (impact score of 1) as per post mitigation scoring of ESW-EFR-001 Level 2 assessment.

**Table 4.10: Water bodies where potential additional cumulative effects may occur for the BES Plan compared to BVP could lead to a risk of WFD deterioration.**

Water body ID	Water body name	Options	Comments
GB530603911401	Thames Lower	<ul style="list-style-type: none"> <li>• ESW-DES-001</li> </ul>	ESW-EFR-001 involves cessation of an existing discharge which could decrease dilution and

Water body ID	Water body name	Options	Comments
		<ul style="list-style-type: none"> <li>ESW-EFR-001</li> </ul>	<p>lower water levels, harming water quality and biology. ESW-DES-001 involves new discharge of saline water, a new outfall, a new desalination, a new pumping station, and a new transitional abstraction licence. Options are selected four years apart.</p> <p>There is potential for a cumulative effect on this water body. Further investigation, design and mitigation development, is required, and it is anticipated that with further mitigation the WFD non-compliance risk can be reduced to minor localised (impact score 1) for this water body.</p>

## 4.5 High environmental destination adaptive programme

### 4.5.1 Options selected

A WFD assessment has been carried out on four adaptive programmes, including the high environmental destination (HED) adaptive programme. The HED adaptive programme contains four options that are not included in the BVP. One option is included in the BVP but not the HED adaptive programme. Differences between the BVP and the HED adaptive programme are set out in Table 4.11.

**Table 4.11: Differences in the options included in the BVP and the high environmental destination adaptive programme**

Options included in HED adaptive programme but not in BVP	Options included in the BVP but not the HED adaptive programme
ESW-DES-001	ESW-RES-002C1
03b0478B	
ESW-EFR-001	
ESW-DES-008	

### 4.5.2 Cumulative effects assessment

All water bodies identified in the BVP cumulative effects assessment are also identified for the HED adaptive programme. Due to the differences in options selected for the BVP and HED programme (Table 4.11), the below water bodies identified in the BVP cumulative effects assessment are impacted by different or additional options:

- GB105034045902: Waveney (Starston Brook - Ellingham Mill)
- GB105034045903: Waveney (Ellingham Mill - Burgh St. Peter)
- GB40501G400300: Broadland Rivers Chalk & Crag
- GB40501G400600: Waveney and East Suffolk Chalk and Crag (GW)
- GB40503G000400: Essex Gravels

However, upon review of the above water bodies, there are no changes to the cumulative effects reported in the BVP, and no additional risk of deterioration in cumulation has been identified. As such these water bodies have been excluded from reporting.

Six additional water bodies have been identified for the HED adaptive programme as compared to the BVP, as a result of the inclusion of four alternative options:

- GB105037028560: Rettendon Brook
- GB105037028630: Sandon Brook (West arm)

- GB30541427: Hanningfield Reservoir
- GB510503410700: Bure & Waveney & Yare & Lothing
- GB520503704100: Crouch
- GB530603911401: Thames Lower

A list of water bodies that are impacted by more than one of the High PCC adaptive programme options are reported in Table 4.12, where cumulative effects are unlikely to lead to WFD deterioration. No water bodies were identified as having potential for cumulative effects that could lead to WFD deterioration.

**Table 4.12: Water bodies where potential cumulative effects for the HED adaptive programme are unlikely to lead to an increased risk of WFD deterioration**

Water body ID	Water body name	Options	Comments
GB105037028560	Rettendon Brook	<ul style="list-style-type: none"> <li>• ESW-DES-001</li> <li>• ESW-EFR-001</li> </ul>	Both options involve the installation of new below-ground pipelines. ESW-EFR-001 also involves the installation of new below-ground pipelines. Options are selected four years apart. Cumulative effects are unlikely to be significant at a water body scale so no change to impact score expected. Risk to water body <b>remains as minor localised effect</b> .
GB105037028630	Sandon Brook (West arm)	<ul style="list-style-type: none"> <li>• ESW-DES-001</li> <li>• ESW-EFR-001</li> </ul>	Both options involve the installation of new below-ground pipelines. ESW-DES-001 also involves modification of a WTW. Options are selected four years apart. Cumulative effects are unlikely to be significant at a water body scale so no change to impact score expected. Risk to water body <b>remains as minor localised effect</b> .
GB30541427	Hanningfield Reservoir	<ul style="list-style-type: none"> <li>• ESW-DES-001</li> <li>• ESW-EFR-001</li> </ul>	ESW-DES-001 involves implementation of a new low volume discharge of water with the same or higher quality of the receiving water body, which is expected to provide a beneficial effect to Hanningfield Reservoir. ESW-EFR-001 involves a new WTW discharge, construction of new outfall and a new abstraction from the reservoir (abstracting the same quantity as discharged as part of option). Options are selected four years apart. Cumulative effects are unlikely to be significant at a water body scale so no change to impact score expected. Risk to water body <b>remains as minor localised effect</b> .
GB510503410700	Bure & Waveney & Yare & Lothing	<ul style="list-style-type: none"> <li>• 03b0478B</li> <li>• ESW-DES-008</li> <li>• ESW-EFR-002A</li> </ul>	All options involve installation of new below-ground pipelines. ESW-DES-008 and ESW-EFR-002A both involve below-ground construction activity construction of a new desalination plant and new WTW / PS respectively. ESW-EFR-002A also involves modification of a WTW. 03b0478B also involves cessation of an existing discharge in this water body. Options are not selected in the same period. Cumulative effects are unlikely to be significant at a water body scale so no change to impact score expected provided mitigation measures outlined in 03b0478B (Level 2 WFD assessment) are implemented. Risk to the water body is expected to <b>remain as minor localised effect</b> as per post mitigation scoring of 03b0478B Level 2 assessment.
GB520503704100	Crouch	<ul style="list-style-type: none"> <li>• ESW-DES-001</li> <li>• ESW-EFR-001</li> </ul>	Both options involve below-ground construction activity and installation of new below-ground pipelines. ESW-EFR-001 involves below ground construction activity within 500m of a GWDTE. Options are selected four years apart. Cumulative effects are unlikely to be significant at a water body scale so no change to impact score expected provided mitigation measures outlined in <b>ESW-EFR-001</b> (Level 2 WFD assessment) are implemented. Risk to the water body is expected to <b>remain as minor localised effect</b> as per post mitigation scoring of ESW-EFR-001 Level 2 assessment.

**Table 4.13: Water bodies where potential additional cumulative effects may occur for the HED adaptive programme compared to BVP could lead to a risk of WFD deterioration.**

Water body ID	Water body name	Options	Comments
GB530603911401	Thames Lower	<ul style="list-style-type: none"> <li>• ESW-DES-001</li> <li>• ESW-EFR-001</li> </ul>	<p>ESW-EFR-001 involves cessation of an existing discharge which could decrease dilution and lower water levels, harming water quality and biology. ESW-DES-001 involves new discharge of saline water, a new outfall, a new desalination, a new pumping station, and a new transitional abstraction licence. Options are selected four years apart.</p> <p>There is potential for a cumulative effect on this water body. Further investigation, design and mitigation development, is required, and it is anticipated that with further mitigation the WFD non-compliance risk can be <b>reduced to a minor localised effect</b> for this water body.</p>

## 4.6 High PCC (low water efficiency) adaptive programme

### 4.6.1 Options selected

A WFD assessment has been carried out on four adaptive programmes, including the high PCC (low water efficiency) adaptive programme. The high PCC adaptive programme contains two options that are not included in the BVP. One option is included in the BVP but not the high PCC adaptive programme. Differences between the BVP and the high PCC adaptive programme are set out in Table 4.14.

**Table 4.14: Differences in the options included in the BVP and the high PCC adaptive programme**

Options included in High PCC adaptive programme but not in BVP	Options included in the BVP but not the High PCC adaptive programme	Option included in both the BVP and High PCC adaptive programme but with a different capacity
03b0478B	ESW-RES-002C1	ESW-EFR-001 (lower capacity variant)
ESW-DES-008		

### 4.6.2 Cumulative effects assessment

All water bodies identified in the BVP cumulative effects assessment are also identified for the High PCC adaptive programme. Due to the differences in options selected for the BVP and High PCC programme (Table 4.15), the below water bodies identified in the BVP cumulative effects assessment are impacted by different or additional options:

- GB105034045902: Waveney (Starston Brook - Ellingham Mill)
- GB105034045903: Waveney (Ellingham Mill - Burgh St. Peter)
- GB40501G400300: Broadland Rivers Chalk & Crag
- GB40501G400600: Waveney and East Suffolk Chalk and Crag (GW)

However, upon review of the above water bodies, there are no changes to the cumulative effects reported in the BVP, and no additional risk of deterioration in cumulation has been identified. As such these water bodies have been excluded from reporting.

One additional water body has been identified for the High PPC adaptive programme as compared to the BVP:

- GB510503410700: Bure & Waveney & Yare & Lothing

A list of water bodies that are impacted by more than one of the High PCC adaptive programme options are reported in Table 4.15, where cumulative effects are unlikely to lead to WFD deterioration. No water bodies were identified as having potential for cumulative effects that could lead to WFD deterioration.

**Table 4.15: Water bodies where potential cumulative effects for high PCC adaptive programme may differ from the BVP**

Water body ID	Water body name	Options	Comments
GB510503410700	Bure & Waveney & Yare & Lothing	ESW-EFR-002A 03b0478B ESW-DES-008	All options involve installation of new below-ground pipelines. ESW-DES-008 and ESW-EFR-002A both involve below-ground construction activity construction of a new desalination plant and new WTW / PS respectively. ESW-EFR-002A also involves modification of a WTW. 03b0478B also involves cessation of an existing discharge in this water body. Options are not selected in the same period. Cumulative effects are unlikely to be significant at a water body scale so no change to impact score expected provided mitigation measures outlined in 03b0478B (Level 2 WFD assessment) are implemented. Risk to the water body is expected to <b>remain as minor localised effect</b> as per post mitigation scoring of 03b0478B Level 2 assessment.

## 4.7 North Suffolk reservoir adaptive programme

### 4.7.1 Options selected

A WFD assessment has been carried out on four adaptive programmes, including the North Suffolk reservoir (NSR) adaptive programme. The NSR adaptive programme contains one option that is not included in the BVP. One option is also included in the BVP but not the NSR adaptive programme. Differences between the BVP and the NSR adaptive programme are set out in Table 4.16.

**Table 4.16: Differences in the options included in the BVP and the NSR adaptive programme**

Options included in NSR adaptive programme but not in BVP	Options included in the BVP but not the NSR adaptive programme	Option included in both the BVP and High PCC adaptive programme but with a different capacity
03b0478B (lower capacity variant)	ESW-EFR-002A	ESW-RES-002C1 (lower capacity variant)

### 4.7.2 Cumulative effects assessment

Where multiple options occur in a water body a cumulative effects assessment has been carried out. This assessment is based on the WFD L1 and L2 assessment outcomes (Sections 2 and 3). In this section only differences with the BVP are reported.

The core BVP contains one option which is not included in the NSR programme. Therefore, the cumulative effects reported for the following water bodies are not applicable for the NSR programme.

- GB105035046251: Lothingland Hundred
- GB105035046300: Wang.

Due to the differences in the options selected for the BVP and NSR programme, the below water bodies identified in the BVP cumulative effects assessment are impacted by different or additional options:

- GB105034045903: Waveney (Ellingham Mill - Burgh St. Peter)
- GB105035046290: Blyth (d/s Halesworth)
- GB40501G400300: Broadland Rivers Chalk & Crag
- GB40501G400600: Waveney and East Suffolk Chalk and Crag (GW)

However, upon review of the above water bodies, there are no changes to the cumulative effects reported in the BVP, and no additional risk of deterioration in cumulation has been identified. As such these water bodies have been excluded from reporting.

No additional water bodies were identified following cumulative effects assessment of the NSR adaptive programme.

## 4.8 Habitat Regulations sustainability reductions adaptive programme

### 4.8.1 Options selected

A WFD assessment has been carried out on four adaptive programmes, including the Habitat Regulations sustainability reductions (HRSR) adaptive programme. The HRSR adaptive programme contains one option that is not included in the BVP. One option is also included in the BVP but not the HRSR adaptive programme. Differences between the BVP and the HRSR adaptive programme are set out in Table 4.17.

**Table 4.17: Differences in the options included in the BVP and the Habitat Regulations SRs adaptive programme**

Options included in HRSR adaptive programme but not in BVP	Options included in the BVP but not the HRSR adaptive programme	Option included in both the BVP and High PCC adaptive programme but with a different capacity
03b0478B	ESW-RES-002C1	ESW-RES-002C1 (lower capacity variant)

### 4.8.2 Cumulative effects assessment

All water bodies identified in the BVP cumulative effects assessment are also identified for the HRSR adaptive programme. Due to the differences in the options selected for the BVP and HRSR programme, the below water bodies identified in the BVP cumulative effects assessment are impacted by different or additional options:

- GB40501G400300: Broadland Rivers Chalk & Crag.

However, upon review of the above water body, there are no changes to the cumulative effects reported in the BVP, and no additional risk of deterioration in cumulation has been identified. As such these water bodies have been excluded from reporting.

One additional water body has been identified for the HRSR adaptive programme as compared to the BVP:

- GB510503410700: Bure & Waveney & Yare & Lothing.

A list of water bodies that are impacted by more than one of the HRSR adaptive programme options are reported in Table 4.18, where cumulative effects are unlikely to lead to WFD deterioration. No water bodies were identified as having potential for cumulative effects that could lead to WFD deterioration.

**Table 4.18: Water bodies where potential cumulative effects for HRSR adaptive programme may differ from the BVP**

Water body ID	Water body name	Options	Comments
GB510503410700	Bure & Waveney & Yare & Lothing	<ul style="list-style-type: none"> <li>• ESW-EFR-002A</li> <li>• 03b0478B</li> </ul>	Both options involve installation of new below-ground pipelines. ESW-EFR-002A involves below-ground construction activity, construction of a new WTW / PS. ESW-EFR-002A also involves modification of a WTW. 03b0478B also involves cessation of an existing discharge in this water body. Options are not selected in the same period. Cumulative effects are unlikely to be significant at a water body scale so no change to impact score expected provided mitigation measures outlined in 03b0478B (Level 2 WFD assessment) are implemented. Risk to the water body is expected to <b>remain as minor localised effect</b> as per post mitigation scoring of 03b0478B Level 2 assessment.

## 5 Conclusions

This report (Appendix G) presents the findings of the WFD assessments on the Essex & Suffolk Water WRMP supply options. It supports the Environment Assessment Report (EAR) that accompanies the Essex and Suffolk Water WRMP submission to regulators. The ACWG approach to WFD has been applied and a summary of the Level 1 screenings and Level 2 detailed water body assessments is presented below in addition to a summary of the WRMP cumulative effects and in-combination effects assessments.

### 5.1 Level 1 Summary

For the Essex & Suffolk Water WRMP, 17 options have been subject to a WFD assessment. The Level 1 WFD assessments indicated that eight options are anticipated to have low risks of being non-compliant with WFD objectives, and do not require further assessment:

- Barsham WTW to Blyth Transfer (ESW-TRA-001)
- Transfer from Holton WTW to Eye Airfield (ESW-TRA-019)
- Broome to Barsham Transfer (ESW-TRA-023)
- Lowestoft Water Reuse to Ellingham Mill (ESW-EFR-002A)
- Langford WTW upgrade + Abberton RWPS Pump Replacement (ESW-PMP-001A)
- Barsham EDR Nitrate Removal + Pipeline (ESW-NIT-004)
- Langham EDR Nitrate Removal + Pipeline (ESW-NIT-006)
- Langford UV (Crypto) (ESW-UVC-001)

### 5.2 Level 2 Summary

Level 2 assessments were required for nine options. These options are:

- New Linford WTW (10MI/d Option) (ESW-ABS-003C)
- Bungay Wells to Broome WTW transfer (ESW-TRA-018)
- Southend-on-Sea Effluent Re-use (max capacity) (ESW-EFR-001)
- Effluent Reuse at Caister and transfer to Ormesby (03b0478B)
- North Suffolk winter storage reservoir + Barsham River Works Upgrade (ESW-RES-002C1)
- Langford EDR Nitrate Removal + Pipeline (ESW-NIT-005)
- Canvey Island Terrestrial Desalination (Max Capacity) (ESW-DES-001)
- California Caister beach desalination (ESW-DES-004)
- Corton beach well desalination (ESW-DES-008)

The majority of the options assessed as part of the four core plans (BVP, LCP, Ofwat core plan and BESP) and four adaptive programmes (HED, High PCC, NSR and HRSR programme) have only been subject to high level design and if they are taken forward would require additional design and assessment as they progress to next stage of optioneering. Due to this, the confidence in the option design has been rated as low throughout all of the Level 2 assessments undertaken.

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). 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.

For groundwater bodies, deterioration risks were primarily associated with changes to quantitative surface water dependent status elements or water balance, as a result of new or increased groundwater abstractions, or construction of below ground works, particularly within close proximity of a GWDTE.

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.

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, but moderate/amber risks have been maintained until option designs and assessments are further progressed. 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 assessments

Subject to their progression through the approvals process, of the BVP options which have been assessed at Level 2, further WFD mitigation and assessment would be required for the two options set out in Table 5.1. At this stage the Level 2 assessments have assessed a 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. It is expected that after these further investigations are carried out, appropriate mitigation measures will be identified and risk of WFD non-compliance will be removed.

**Table 5.1: ESW rdWRMP24 Level 2 assessed options which require further investigation**

Option ID	Option title	Water bodies currently at risk of deterioration
ESW-RES-002C1	Barsham WTW upgrade + RES-002	GB105034045903: Waveney (Ellingham – Burgh St. Peter)
ESW-DES-001	Canvey Island Terrestrial Desalination (Max Capacity)	GB530603911401: Thames Lower

### 5.4 Cumulative and in-combination effects

The cumulative effects assessment for the rdWRMP24 BVP has identified 10 water bodies which are impacted by more than one BVP option. Of these water bodies, one, GB105034045903: Waveney (Ellingham Mill - Burgh St. Peter), was assessed to have potential to increase risk of WFD deterioration due to cumulation of multiple options.

In addition to the BVP options which form the rdWRMP24, other planning applications, allocations, major developments and other water company WRMP options could lead to potential for in-combination effects to some water bodies. The in-combination effects assessment identified 14 water bodies where multiple options and other plans occur. The in-combination effects assessment identified one water body (GB105035046270: Minsmere Old River) is at potential risk of further WFD deterioration due to the combination of options and planning projects. Further information on the planning projects, delivery dates and any overlap between options in this water body would be required to quantify the in-combination effects.

## 5.5 Alternative plans and adaptive programmes

### 5.5.1 Least Cost plan

As mentioned in Section 4.2 there is no difference in option selection and delivery time between the LCP and the BVP.

### 5.5.2 Ofwat Core plan

The BVP contains one option which is not included in the Ofwat Core plan. As such no additional risk of deterioration to any already identified or new water bodies was identified. The cumulative effects assessment has not identified any additional water bodies at increased risk of WFD deterioration due to these combinations of options.

### 5.5.3 Best Environmental and Societal plan

The BES plan contains four new options which are not already included in the BVP. In addition, the BVP contains five options which are not included in the BES plan. As a result, six additional water bodies were identified in the cumulative effects when compared to the BVP. The cumulative effects assessment identified one additional water bodies at an increased risk of WFD deterioration due to these combinations of options, GB530603911401: Thames Lower.

### 5.5.4 High environmental destination adaptive programme

The HED adaptive programme contains four options that are not included in the BVP. One option is included in the BVP but not the HED adaptive programme. As a result, six additional water bodies were identified in the cumulative effects when compared to the BVP. The cumulative effects assessment identified one additional water bodies at an increased risk of WFD deterioration due to these combinations of options, GB530603911401: Thames Lower

### 5.5.5 High PCC (low water efficiency) adaptive programme

The high PCC adaptive programme contains two options that are not included in the BVP. One option is included in the BVP but not the high PCC adaptive programme. As a result, one additional water body was identified in the cumulative effects assessment when compared to the BVP. The cumulative effects assessment has not identified any additional water bodies at an increased risk of WFD deterioration due to these combinations of options.

### 5.5.6 North Suffolk reservoir adaptive programme

The NSR adaptive programme contains two options that are not included in the BVP. One option is included in the BVP but not the NSR adaptive programme. No additional risk of deterioration to any already identified or new water bodies was identified. The cumulative effects assessment has not identified any additional water bodies at increased risk of WFD deterioration due to these combinations of options.

### 5.5.7 Habitat Regulations sustainability reductions adaptive programme

The HRSR adaptive programme contains two options that are not included in the BVP. One option is included in the BVP but not the HRSR adaptive programme. As a result, one additional water body was identified in the cumulative effects assessment when compared to the BVP. The cumulative effects assessment has not identified any additional water bodies at an increased risk of WFD deterioration due to these combinations of options.

## 5.6 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 HMWB measures, programme of measures and mitigation measures assessments 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 Essex & Suffolk Water long term WFD and water quality monitoring data within the relevant water bodies, and targeted baseline surveys being undertaken specifically for the option assessments;
- Development of conceptual models linking together how potential hydrological changes 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 assessment and investigations as set recommended in individual WFD assessments;
- Further information on the design and operation of the options;
- Assessment of the combined potential WFD effects/risks of inter-reliant options; and,
- Update to Level 2 WFD assessments to incorporate any additional information.

## **G.1. WFD Level 1 output tables**

The Essex & Suffolk Water outputs can be provided upon request.

## **G.2. Further assessment Level 2 output tables**

The Essex & Suffolk outputs can be provided upon request.

