MOTT MACDONALD

Strategic Environmental Assessment (RAPID Gate Two)

Fens Reservoir

November 2022

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Mott MacDonald
Floor 1 Greenside
12 Blenheim Place
Edinburgh EH7 5JH
United Kingdom

T +44 (0)131 221 2300
mottmac.com

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1 Introduction

1.1 Overview

This appendix supports the Environmental Appraisal Report (EAR) that accompanies the gate two submission to the Regulatory Alliance for Progressing Infrastructure Development (RAPID) for the Fens Reservoir (FR). This appendix presents the findings of a Strategic Environmental Assessment (SEA) applied to the whole FR scheme that has been assessed as part of Anglian Water's draft Water Resources Management Plan 2024 (dWRMP24).

It should be noted that the FR SEA is not a formal SEA under The Environmental Assessment of Plans and Programmes Regulations 2004 as it is a project not a plan/programme and is therefore, outside the scope of the SEA Regulations[1]. The SEA has been carried out as best practice and this report is not an Environmental Report under the Regulations and therefore, doesn't contain all of the information as set out in Schedule 2.

1.2 Background

A new strategic reservoir in Cambridgeshire, referred to as the FR, has been proposed for development as one of several nationally strategic water resource options (SRO) required to address increasing deficits in public water supply. The scheme is promoted by Anglian Water and Cambridge Water and is being progressed through the fast-tracked delivery framework overseen by RAPID.

The FR has previously progressed through gate one in 2021, the first opportunity to check progress on investigations and development of solutions in the gate process and is now at gate two. Gate two is intended to look at solutions in more detail, with a focus on ensuring that funding for continued investigation and development of solutions is aligned to water resources planning.

The FR environmental assessments carried out as part of the gate one submission considered three potential scheme concepts, which were selected from a longer list of potential solutions in consultation with stakeholders. The gate one assessments carried out included an informal Habitat Regulations Assessment (HRA), a Water Framework Directive (WFD) assessment, a SEA, an Invasive Non-Native Species (INNS) risk assessment, and an analysis of natural capital and Biodiversity Net Gain (BNG).

This report is a technical document prepared to support the gate two submission to the RAPID for the FR SRO.

[1] UK Government (2004). The Environmental Assessment of Plans and Programmes Regulations 2004. Available at: https://www.legislation.gov.uk/uksi/2004/1633/contents/made

2 Scheme Description

2.1 Scheme overview

The FR scheme includes the development of a new embanked raw water reservoir for water storage for public water supply. It also comprises abstractions from the River Great Ouse and River Delph, raw water transfers, treatment works, and distribution into supply.

Key scheme parameters include:

- River Great Ouse maximum abstraction and transfer flow to reservoir: 300Ml/d
- River Delph maximum abstraction and transfer flow to reservoir: 400Ml/d
- Reservoir total capacity: 55Mm^3
- Reservoir usable volume: 50Mm^3
- Treatment distribution flow [2]: 150Ml/d
  - Fens Reservoir to Anglian Water
  - Fens Reservoir to Cambridge Water (North)Fens Reservoir to Cambridge Water (South)

2.1.1 Reservoir overview

The proposed reservoir site is shown in Figure 2.1 located within the Fenland district of Cambridgeshire. The proposed site is between Chatteris and March, near to Doddington, Wimblington and Manea. The Forty Foot Drain, the Sixteen Foot Drain and the A141 surround the site on three sides.

An indicative concept plan has been developed for the scheme. This indicative concept has been established to provide reference for cost and carbon estimation in gate two. The summary provisional details are provided below, but much work is still required to develop the scheme and the final details would develop accordingly.

The provisional reservoir parameters are:

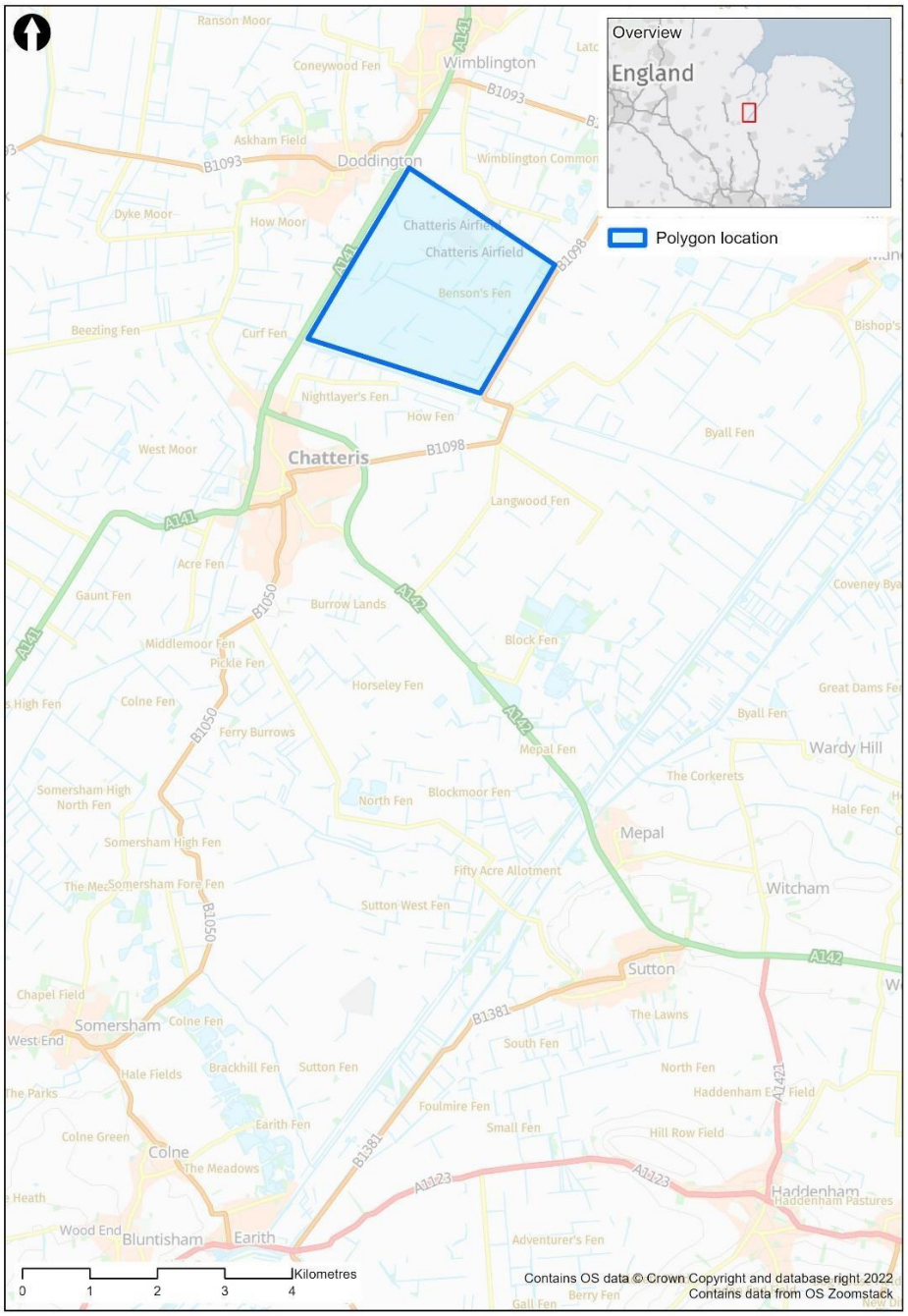
- At its greatest dimensions the reservoir is about 2.6km wide and 2.4km long to the embankment toe.
- The embankment crest is estimated at 12.5mAOD (above ordnance datum) making the embankment an average of 12m above the typical existing ground level at the toe. This is with approximate relative embankment elevations of maximum 15m and a minimum of 4m above existing ground levels.
- The total perimeter length of the crest is about 8.5km and the estimated reservoir surface area is about 4.4km^2.

The reservoir would include key infrastructure necessary for its safe operation, including intake and outtake structures; drawdown facilities; a spillway and water sampling facilities. The reservoir would also be expected to provide benefits beyond public water supply. Opportunities to incorporate facilities to enable recreation (such as a visitor centre and parking), infrastructure to improve health and wellbeing (such as multi-use footpaths, quiet areas and leisure opportunities) and careful design to enhance and encourage biodiversity are planned and would

[2] The proposed capacity of the water treatment works and transfer pipelines has been updated since this assessment was completed. The figures quoted in the gate two report include a scheme deployable output of 87Ml/d and works capacity up to 100Ml/d. These changes are not anticipated to have any material impact on the completed assessments.

be developed further, with the features that would deliver these wider benefits being subject to further assessment and consultation. Landscaping would be carefully designed surrounding the reservoir to minimise the visual impact of the reservoir whilst ensuring it sits within the existing landscape and delivers wider recreational and biodiversity benefits.

Figure 2.1: Site context map



2.1.2 Raw water abstraction and transfers

It is proposed that water is abstracted from the River Great Ouse at an intake located south of Earith and transferred to the reservoir via approximately 18km of 1500mm diameter steel pipeline. An additional abstraction point is also proposed from the River Delph, with water transferred to the reservoir by about 6km of 1600mm diameter steel pipeline. The precise abstraction location would be identified following further detailed work (including stakeholder engagement) for gate three.

The proposed abstraction rate from the River Great Ouse is up to 300Ml/d and from the River Delph up to 400Ml/d when flows allow. This is subject to further assessment to be undertaken in collaboration with the Environment Agency (EA) to develop an abstraction rate which is licensable. The associated abstraction licences are expected to stipulate a minimum flow and water level requirement at the point of abstraction below which it would not be possible to abstract. Abstraction to fill the reservoir would only be possible during high flow periods.

Further work is planned for the next stage to confirm locations for the abstraction points and routes for the transfers involving landowner engagement, environmental surveys, and preliminary ground investigations. The opportunity for the transfer conveyance to be open channel is still being investigated and would be confirmed during the next stage of project development. The information provided in this report and accompanying appendices are assumptions based on indicative locations only at this stage. The indicative transfer routes are shown in Figure 2.2.

The abstraction facilities are expected to comprise an intake structure, a transfer pumping station (TPS) and pipeline.

2.1.3 Water treatment and potable transfers

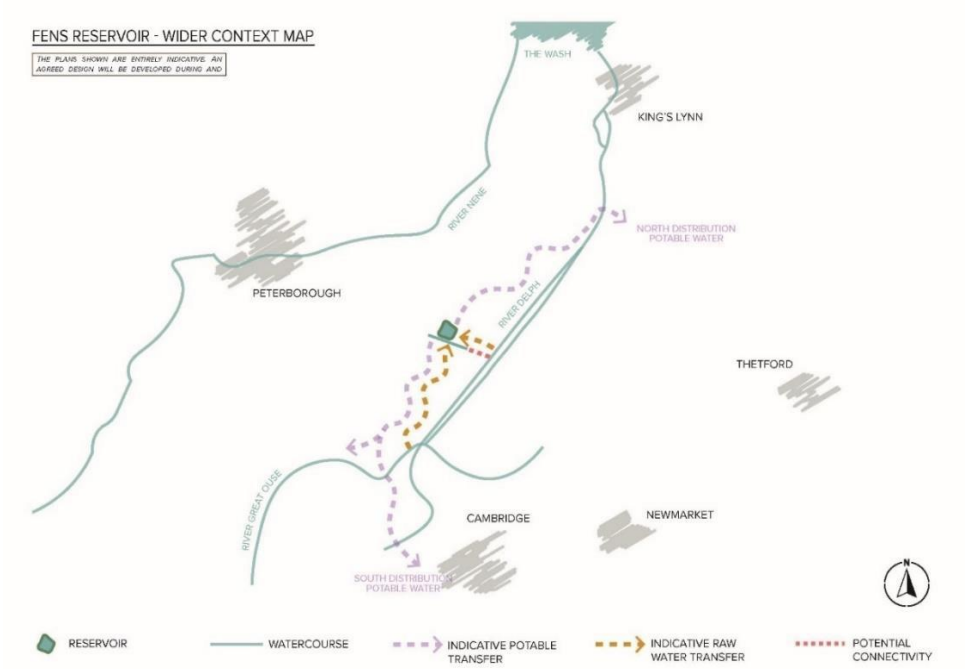
Stored water would subsequently be abstracted from the reservoir and treated to a potable quality. It is proposed that a WTW is located on land adjacent to the reservoir with a peak throughput capacity of 100Ml/d.

It is proposed that the treated water would be transferred by an approximate 32km 900mm diameter steel pipeline to an existing Anglian Water Service Reservoir (SR). The Cambridge Water connection would include about 12km 900mm steel pipeline to one take-off point, and approximately 22km 700mm steel pipeline spur to a second take-off point. The reservoir is to supply over 250,000 homes in Cambridgeshire.

Further work is planned for the next stage to confirm the routes for the transfers involving landowner engagement, environmental surveys, and preliminary ground investigations. The information provided in this report and accompanying appendices are assumptions based on indicative locations only at this stage.

See Figure 2.2 for an illustration of indicative proposed transfer corridor locations.

Figure 2.2: Proposed transfer corridors



2.1.4 Summary of operation and use

Development and operation of the reservoir would be subject to the Reservoirs Act 1975 (as amended by the Floods and Water Management Act 2010). The embankments and associated water retaining elements of the reservoir would need to be maintained and supervised in accordance with the Act to maintain public safety.

Provision of EDD must be designed in accordance with the Reservoirs Act. The proposed solution at this stage is to discharge to the Forty Foot Drain, but this is to be further modelled and confirmed as part of the next stage of development. Although the risk of needing to fully drawdown the reservoir is very low, there is a need for regular testing and maintenance to confirm functionality. This would involve the opening and testing of relevant valves and gates. Test flows are envisaged to be held in a pond to avoid disruption and to enable water to be returned back to the reservoir.

The operation and maintenance of the water treatment works and the distribution water supply system inclusive of distribution pump stations are expected to be in constant regular use according to water supply demand. The water supply components would need regular inspections and maintenance activities in accordance with the requirements of the respectively installed equipment.

2.1.5 Associated infrastructure and features

It is proposed that there would be a need for associated infrastructure and other features such as environmental mitigation to minimise the impacts of the reservoir, as well as enhancement opportunities. The location and design of the additional infrastructure has not been established and would therefore need to be confirmed at the next phase of scheme development.

3 Methodology

3.1 SEA Process

3.1.1 SEA Objectives and assessment criteria

The assessment methodology used for the FR was aligned to that which was implemented for the dWRMP24 and WRE regional plan.

The SEA process forms the basis for predicting and assessing the effects arising from the implementation of the FR reservoir as part of the Anglian Water dWRMP24 and the wider WRE regional planning process. An overarching set of SEA objectives and assessment questions were developed in conjunction with stakeholder consultation to guide the assessment of all the options considered for the regional plan and the dWRMP24 as shown in Table 3.1. These are linked to the SEA Regulations topics. The results of the HRA, and WFD and INNS assessments have been incorporated into the SEA objectives on biodiversity and water, as outlined in Table 3.2. The EAR has also been used to inform the SEA.

The SEA assessment also considers the impacts on natural capital stocks that cannot be incorporated within the natural capital metric due to uncertainty in the accuracy of monetisation of benefits. These impacts have been assessed qualitatively and incorporated into the score for the relevant SEA objective.

The overarching objectives have also been used as a framework for dWRMP24. This would allow for a consistent approach tailored to individual water companies where objectives could be scoped in or out of the WRMP process but also be aligned to the regional plan. It is recognised that certain objectives or sub-themes would involve water company wide considerations rather than just option specific, for example how water companies are sourcing power from renewables. This detail would be considered at the dWRMP24 level and agreed assumptions used for the regional plan.

Table 3.1 WRMP and WRE SEA objectives and assessment

SEA Topic	SEA Objective(s)	Assessment Questions / Sub-Themes
Biodiversity, flora and fauna	1. To protect Designated Sites and their qualifying features. 2. To protect and enhance biodiversity, priority species and vulnerable habitats such as chalk rivers. 3. To avoid and, where required, manage invasive and non-native species (INNS). 4. To meet WFD objectives relating to biodiversity.	• Is the option likely to affect the conservation status of any Special Protection Area (SPA), Special Area of Conservation (SAC), Ramsar sites, Site of Special Scientific Interest (SSSI) or locally Designated Sites? • Would the option protect and enhance aquatic and habitats and species, including freshwater fisheries and chalk rivers? • Would the option affect the marine environment, habitats and species (including MCZs and MPAs)? • Is the option likely to affect ancient woodland, Section 41 of the NERC act habitats and species of principal importance for the purpose of conserving biodiversity? • Would the option affect any habitats that support legally protected species or species of conservation concern? • Is there potential for contribution to achieving 'favourable' conservation status or for creation of new Section 41 of the NERC act habitats? • Is the option likely to have an impact on a current or future Nature Recovery Network? • Are there any opportunities for habitat creation or restoration? • Would the option contribute to the loss or gain in habitat connectivity? • Is there a possibility for INNS to be spread/ introduced or for algal blooms to occur? • Is there an opportunity to improve biodiversity value through removal of INNS?
Population and Human Health	5. To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing. 6. To secure resilient water supplies for the health and wellbeing of customers. 7. To increase access and connect customers to the natural environment, provide education or information resources for the public.	• Does the option promote water efficiency and encourage a reduction in water consumption? • Would the option secure resilient water supplies for the health and wellbeing of customers? • Would the option allow for economic development? • Would the option allow for economic diversity? • Would the option have an effect on active lifestyles, such as impacts on active travel through disruption to pedestrian and cycle routes? • Would the option affect Public Rights of Way? • Would the option affect road or rail infrastructure? • Would the option minimise disturbance from noise, light, visual, and transport? • Would the local communities have been actively engaged to foster an inclusive environment and participate in decision making?
	8. Maintain and enhance tourism and recreation	• Would the option maintain or enhance tourism? • Does the option improve access to the natural environment for recreation, including those living within deprived areas? • Would the option have an effect on freshwater fisheries for recreational purposes? • Would the option have an effect on marine fisheries for recreational purposes?

SEA Topic	SEA Objective(s)	Assessment Questions / Sub-Themes
Water	9. To reduce or manage flood risk, taking climate change into account.	• Is the option vulnerable to flood risk? • Would the option contribute to the risk of flooding?
	10. To enhance or maintain surface water quality, flows and quantity. 11. To enhance or maintain groundwater quality and resources. 12. To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	• Would the option affect surface water quality or quantity? • Would the option affect ground water quality or quantity? • Is the option likely to contribute to or conflict with the achievement of WFD objectives? • Would the option affect bathing waters? • Would the option affect shellfish water protected areas? • Would the option affect chalk rivers and streams? • Would the option affect raw water quality? • Would the option reduce the flashy nature of surface waters? • Would the option slow the flow in upper catchments and reduce soil losses to river systems?
	13. To increase water efficiency and increase resilience of Public Water Supply (PWS) and natural systems to droughts.	• Does the option provide a reliable and sustainable water supply which meets changing demand? • Would the option protect and enhance the environmental resilience of the water environment to climate change, flood risk and drought?
Soil	14. Protect and enhance the functionality, quantity and quality of soils	• Would the option affect high grade agricultural land? • Would the option promote the efficient use of land? • Would the option prevent soil erosion and retain soil stocks as a natural resource? • Would the option promote soil health? • Would the option involve use of brownfield or greenfield land? • Would the option prevent mineral sterilisation? • Would the option affect soil contamination or involve remediation? • Is the option likely to affect geodiversity, including SSSIs of geological importance?
Air	15. To reduce and minimise air emissions during construction and operation.	• Is the option in an air quality management area (AQMA)? • Would the option affect local air quality?
Climatic Factors	16. To reduce embodied and operational carbon emissions.	• Would the option affect carbon or other greenhouse gas (GHG) emissions? • Is there potential for the option to incorporate climate mitigation measures to reduce its carbon footprint, such as lower embodied carbon or incorporating renewable energy?

SEA Topic	SEA Objective(s)	Assessment Questions / Sub-Themes
		• Would the option affect carbon sequestration?
	17. To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	• Is the option vulnerable to climate change effects? • Does the option include climate resilience measures? • Would the option create catchment resilience to drought?
Historic Environment	18. To conserve, protect and enhance the historic environment, including archaeologically important sites.	• Would the option affect designated or non-designated historic assets, sites and features? • Would the option affect the setting and/or significance of a historic asset? • Would the option affect archaeology (including unknown archaeology)? • Would the option affect heritage assets at risk? • Would the option affect conservation areas or historic landscape/townscape areas?
Landscape	19. To conserve, protect and enhance landscape, townscape and seascape character and visual amenity	• Would the option have an effect on the character of the landscape, townscape or seascape, including tranquillity and views? • Would the option improve access to the countryside? • Would the option create or improve green infrastructure which contributes to access to the landscape? • Would the option protect and enhance designated landscapes and features?
Material Assets	20. To minimise resource use and waste production	• Would the option reuse existing infrastructure? • Would the option minimise the use of resources? • Would the option reduce the production of waste?
	21. Avoid negative effects on built assets and infrastructure	• Would the option affect built assets and infrastructure, including transport infrastructure?

Table 3.2 Overlap with other environmental assessments

SEA Objective		Overlap with the other environmental assessments required for water resource planning
1.	To protect Designated Sites and their qualifying features.	Results from the HRA would be used for Natura 2000 sites but other Designated Sites such as SSSI and National Nature Reserves (NNR) would also be included under this objective and assessed under the SEA.
2.	To protect and enhance biodiversity, priority species and vulnerable habitats such as chalk rivers.	This objective would be partially informed by the outputs of the assessment on the natural capital baseline, particularly priority habitat.
3.	To avoid and, where required, manage invasive and non-native species (INNS).	This objective would use the INNS risk assessment.
4.	To meet WFD objectives relating to biodiversity.	This objective would use the WFD assessment.
5.	To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	This objective would be partially informed by the natural capital assessment on the impacts on green space.
6.	To maintain and enhance tourism and recreation.	This objective would be partially informed by the natural capital assessment on the impacts on recreation and amenity value as defined by the Outdoor Recreation Valuation (OrVAL) tool.
7.	To secure resilient water supplies for the health and wellbeing of customers.	Delivered through the WRMP and assessed through SEA.
8.	To increase access and connect customers to the natural environment, provide education or information resources for the public.	Delivered through the WRMP and assessed through SEA.
9.	To reduce or manage flood risk, taking climate change into account.	This objective would be partially informed by the natural capital assessment under natural hazard regulation.
10.	To enhance or maintain groundwater quality and resources.	This objective would be largely delivered through the results of the WFD assessment and natural capital assessment on the impacts on water purification.
11.	To enhance or maintain surface water quality, flows and quantity.	This objective would be largely delivered through the results of the WFD assessment and natural capital assessment on the impact on water purification. The INNS assessment may also contribute.
12.	To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	This objective would use the WFD assessment.
13.	To increase water efficiency and increase resilience of Public Water Supply (PWS) and natural systems to droughts.	This objective would be partially informed by the natural capital assessment on the impacts on water regulation.
14.	To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	This objective would be partially informed by the natural capital assessment on the impacts on food provision.
15.	To reduce and minimise air emissions during construction and operation.	This objective would be partially informed by the natural capital assessment on the impacts on air pollutant removal.
16.	To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	Delivered through the SEA
17.	To reduce embodied and operational carbon emissions.	This objective would be partially informed by the natural capital assessment on the impacts on climate regulation (carbon sequestration).
18.	To conserve/protect and enhance historic environment and heritage assets, and their setting, including archaeologically important sites.	Delivered through the SEA
19.	To conserve, protect and enhance landscape and townscape character and visual amenity.	Delivered through the SEA
20.	To minimise resource use and waste production.	Delivered through the SEA

SEA Objective		Overlap with the other environmental assessments required for water resource planning
21.	To avoid negative effects on built assets / infrastructure.	Delivered through the SEA

3.2 SEA Scoring Criteria

The scoring key presented in Table 3.3 was used to qualitatively assess the FR using a neutral and minor, moderate, major positive and negative scale. Each SEA objective had a defined set of datasets and scoring criteria as presented in Table 3.4. This was also used for the assessments for all options considered within the dWRMP24 and the draft WRE regional plan.

Table 3.3: Scoring key

Effect	Description
+++	Major Positive
++	Moderate Positive
+	Minor Positive
0	Neutral
-	Minor Negative
--	Moderate Negative
---	Major Negative
?	Uncertain

Table 3.4: Scoring Criteria

SEA Topic	Datasets	Effect		Description
Biodiversity, flora and fauna	SPA SAC Ramsar site SSSIs MPA MCZ NNR Local Nature Reserve (LNR) Priority habitats and species Non-Designated Sites Terrestrial, aquatic and marine habitats, species and protected sites Green networks and corridors (e.g. foraging areas and commuting routes, migration routes, hibernation areas etc. at all scales)	+++	Major Positive	The option would result in a major enhancement on the quality of designated habitats due to changes in flow or groundwater levels, water quality or habitat quality and availability. The option would result in a major increase in the population of a priority species. Effects could be caused by beneficial changes in water flows/water quality, or large amounts of creation or enhancement of habitat, promoting a major increase in ecosystem structure and function.
		++	Moderate Positive	The option would result in a moderate enhancement on the quality of designated and/or non-designated habitats due to changes in flow or groundwater levels, water quality or habitat creation and enhancement measures. The option would result in a moderate increase in the population of a priority species. Effects could be caused by beneficial changes in water flows/water quality, or moderate amounts of creation or enhancement of habitat, promoting a moderate increase in ecosystem structure and function.
		+	Minor Positive	The option would result in a minor enhancement of the quality of designated and/or non-designated habitats due to changes in flow or groundwater levels, water quality or habitat creation and enhancement measures. The option would result in a minor increase in the population of a priority species. Effects could be caused by beneficial changes in water flows/water quality, or small amounts of creation or enhancement of habitat, promoting a minor increase in ecosystem structure and function.
		0	Neutral	The option would not result in any effects on designated or non-designated habitats and/or species).
		-	Minor Negative	The option would result in a minor negative effect on the quality of designated and/or non-designated habitats due to changes in flow or groundwater levels, water quality or habitat loss or degradation. The option would result in a minor decrease in the population of a priority species. Effects could be caused by detrimental changes in flows/water quality, or small losses or degradation of habitat leading to a minor loss of ecosystem structure and function.
		--	Moderate Negative	The option would result in a moderate negative effect on the quality of designated and/or non-designated habitats due to changes in flow or groundwater levels, water quality or habitat loss or degradation. The option would result in a moderate decrease in the population of a priority species. Effects could be caused by detrimental changes in flows/water quality, or moderate loss or degradation of habitat leading to a moderate loss of ecosystem structure and function.
		---	Major Negative	The option would result in a major negative effect on the quality of designated and/or non-designated habitats due to changes in flow or groundwater levels, water quality or habitat loss or degradation. The option would result in a major decrease in the population of a priority species. Effects could be caused by detrimental changes in flows/water quality, or large losses or degradation of habitat leading to a major loss of ecosystem structure and function.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain
Soil	Agricultural Land Classification Landfill sites – authorised and historic	+++	Major Positive	The option would result in a major enhancement on the quality of soils as a result of remediation.
		++	Moderate Positive	The option would result in a moderate enhancement on the quality of soils as a result of remediation.
		+	Minor Positive	The option is located on a brownfield site and has no effect on soils or existing land use. The option results in the remediation of contaminated land.
		0	Neutral	The option would not result in any effects on soils or land use.
		-	Minor Negative	The option is not located on a brownfield site and/or results in a minor loss of best and most versatile agricultural land or is in conflict with existing land use. The option results in land contamination.
		--	Moderate Negative	The option would result in a moderate loss of best and most versatile agricultural land or is in substantial conflict with existing land use.
		---	Major Negative	The option would result in a major loss of best and most versatile agricultural land or is in substantial conflict with existing land use. The option results in land contamination.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain
Water	Environment Agency Flood Defences Environment Agency Main Rivers Flood Zones 2 and 3 Surface Water Features WFD River Waterbody Catchments WFD River Waterbodies Cycle 2 Bathing Waters (for desal options) Shellfish Waters (desal options) Source Protection Zones	+++	Major Positive	The option results in addressing failure of WFD Good Ecological Status / Good Ecological Potential.
		++	Moderate Positive	The option achieves savings through demand management and does not require abstraction to achieve yield. The option contributes to addressing failure of WFD Good Ecological Status / Good Ecological Potential.
		+	Minor Positive	The option achieves savings through demand management and does not require abstraction to achieve yield.
		0	Neutral	The option would have no discernible effect on river flows or surface/coastal water quality or on groundwater quality or levels.
		-	Minor Negative	The option would result in minor decreases in river flows. River and/or coastal water quality may be affected and lead to short term or intermittent effects on receptors (e.g. designated habitats, protected species or recreational users of rivers and the coastline) that could not be avoided but could be mitigated. The option would result in minor decreases in groundwater quality or levels.
		--	Moderate Negative	The option would result in moderate decreases in river flows. River and/or coastal water quality may be affected and lead to long term or continuous effects on receptors (e.g. designated habitats, protected species or recreational users of rivers and the coastline) that could not reasonably be mitigated. The option results in the likely deterioration of WFD classification. The option would result in moderate decreases in groundwater quality or levels
		---	Major Negative	The option would result in major decreases in river flows. River and/or coastal water quality may be affected and lead to long term or continuous effects on receptors (e.g. designated habitats, protected species or recreational users of rivers and the coastline) that could not reasonably be mitigated.

	WFD Groundwater bodies			The option results in the deterioration of WFD classification. The option would result in major decreases in groundwater quality or levels
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain
Air	Air Quality Management Areas Air quality monitoring sites	+++	Major Positive	The option would result in a major enhancement of the air quality within one or more AQMAs
		++	Moderate Positive	The option would result in a moderate enhancement of the air quality within one or more AQMAs
		+	Minor Positive	The option would result in an enhancement of the air quality
		0	Neutral	The option would not result in any effects on Air Quality and AQMAs.
		-	Minor Negative	The option would result in a decrease of the air quality
		--	Moderate Negative	The option would result in a decrease of the air quality within one or more AQMAs
		---	Major Negative	The option would result in a major decrease in the air quality within one or more AQMAs
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain
Climate Factors	Option Carbon data UKCP18 climate data Sea level rise projections	+++	Major Positive	The option would reduce operational carbon emissions by more than 1,000 tonnes CO2e/year
		++	Moderate Positive	The option would result in a sustained decrease in greenhouse gas emissions and would increase resilience/decrease vulnerability to climate change effects. The option would reduce operational carbon emissions by between 100 and 1,000 tonnes CO2e/year
		+	Minor Positive	The option would result in a sustained decrease in greenhouse gas emissions and would increase resilience/decrease vulnerability to climate change effects. The option would reduce operational carbon emissions by up to 100 CO2e/year
		0	Neutral	The option would have no discernible effect on greenhouse gas emissions, nor would the option increase resilience/decrease vulnerability to climate change effects.
		-	Minor Negative	The option would have a minor impact on resilience/decrease vulnerability to climate change effects. The option would generate carbon emissions of between 100 and 500 tonnes CO2e during construction. The option would generate operational carbon emissions of between 100 and 500 tonnes CO2e/year.
		--	Moderate Negative	The option would have a moderate impact on resilience/significantly decrease vulnerability to climate change effects. The option would generate carbon emissions of greater than of between 500 and 1000 tonnes CO2e during construction. The option would generate operational carbon emissions of between 500 and 1000 CO2e/year.
		---	Major Negative	The option would have a major impact on resilience/significantly decrease vulnerability to climate change effects. The option would generate carbon emissions of greater than 1,000 tonnes CO2e during construction. The option would generate operational carbon emissions of more than 1,000 tonnes CO2e/year.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain
Landscape	Areas of Outstanding Natural Beauty National Character Areas Green Belt land	+++	Major Positive	The option results in new, above ground infrastructure that significantly enhances the local landscape, townscape or seascape.
		++	Moderate Positive	The option results in new, above ground infrastructure that has a moderate positive effect on the local landscape, townscape or seascape.
		+	Minor Positive	The option results in new, above ground infrastructure that has a minor positive effect on the local landscape, townscape or seascape.
		0	Neutral	The option would not result in any effects on the local landscape, townscape or seascape
		-	Minor Negative	The option results in new, above ground infrastructure that has a minor negative effect on the local landscape, townscape or seascape.
		--	Moderate Negative	The option would have a moderate negative effect on a designated landscape or feature (i.e. significant visually intrusive infrastructure) whose effects could not be reasonably mitigated. The option results in new, above ground infrastructure that has a moderate negative effect on the local landscape, townscape or seascape.
		---	Major Negative	The option would have a negative effect on a designated landscape or feature (i.e. significant visually intrusive infrastructure) whose effects could not be reasonably mitigated. The option results in new, above ground infrastructure that has a major negative effect on the local landscape, townscape or seascape.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain
Historic Environment	Listed buildings: Grade I listed structures; Grade II* listed structures; and Grade II listed structures Registered Parks and Gardens: Grade I Registered Parks and Gardens; Grade II* Registered Parks and Gardens; and Grade II Registered Parks and Gardens Protected Wreck Registered Battlefields	+++	Major Positive	The option would result in enhancements to designated heritage assets and/or their setting, fully realising the significance and value of the asset, such as: Securing repairs or improvements to heritage assets, especially those identified in the Historic England Buildings/Monuments at Risk Register; Improving interpretation and public access to important heritage assets.
		++	Moderate Positive	The option would result in enhancements to designated heritage assets and/or their setting. Improving interpretation and public access to important heritage assets.
		+	Minor Positive	The option would result in enhancements to non-designated heritage assets and/or their setting.
		0	Neutral	The option would have no effect on cultural heritage assets or archaeology.
		-	Minor Negative	The option would result in the loss of significance of undesignated heritage assets and/or their setting, notwithstanding remedial recording of any elements affected. There would be limited damage to known, undesignated archaeology important sites with a consequent loss of significance only partly mitigated by archaeological investigation.
		--	Moderate Negative	The option would result in the loss of significance of undesignated heritage assets and/or their setting, notwithstanding remedial recording of any elements affected. The option would diminish of significance of designated heritage assets and/or their setting, notwithstanding remedial recording of any elements affected.
		---	Major Negative	The option would diminish the significance of designated heritage assets and/or their setting such as:

	Scheduled Monuments Conservation Areas World Heritage Sites			Demolition or further deterioration in the condition of designated heritage assets especially those identified in the Historic England Buildings/Monuments at Risk Register; Loss of public access to important heritage assets and lack of appropriate interpretation. There would be major damage to known, designated archaeology important sites with a consequent loss of significance only partly mitigated by archaeological investigation.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain
Population, Human Health	Noise action important area Indices of Multiple Deprivation 2015	+++	Major Positive	The option leads to major positive effect on the health of local communities and would ensure that surface water and bathing water quality is maintained within statutory limits. The option creates new, and significantly enhances existing, recreational facilities within the operational area.
	Functional site: Schools Medical facilities OS Greenspace dataset: Allotments Bowling green Cemetery Golf course Sports facility Play space Playing field Public park or garden Religious grounds Tennis courts Natural England - Country Parks National Parks Section 15 open access areas CRoW S4 Conclusive Registered Common Land Transport: Major roads – A roads Major roads – motorway Railway line National cycle route National trails	++	Moderate Positive	The option leads to positive effect on the health of local communities and would ensure that surface water and bathing water quality is maintained within statutory limits. The option enhances existing, recreational facilities within the operational area
		+	Minor Positive	The option has a temporary positive effect on the health of local communities and would ensure that surface water and bathing water quality is maintained within statutory limits
		0	Neutral	The option would not result in any effects on human health and existing recreational facilities.
		-	Minor Negative	The option has a temporary effect on human health (e.g. noise or air quality). The option reduces the availability and quality of existing recreational facilities within the operational area.
		--	Moderate Negative	The option results in the permanent removal of existing recreational facilities within the operational area
		---	Major Negative	The option has a significant long-term effect on human health (e.g. noise or air quality). The option results in the removal of existing recreational facilities within the operational area.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain
Material Assets	Option information from option database	+++	Major Positive	The option involves reducing leakage from the supply network or is a water efficiency option with a yield of >5 Ml/d.
		++	Moderate Positive	The option would re-use or recycle substantial quantities of waste materials and any new infrastructure would incorporate substantial sustainable design measures and materials. There would be no increase in energy consumption. The option involves reducing leakage from the supply network or is a water efficiency option with a yield of <5 Ml/d.
		+	Minor Positive	The option involves reducing leakage from the supply network or is a water efficiency option with a yield of <5 Ml/d.
		0	Neutral	The option would not result in any effects on material assets.
		-	Minor Negative	The option would require new infrastructure with only limited opportunities for the re-use or recycling of waste materials. There are limited opportunities for sustainable design or the use of sustainable materials. The option results in a minor increase in energy consumption.
		--	Moderate Negative	The option would require new infrastructure with only limited opportunities for the re-use or recycling of waste materials. The option results in a moderate increase in energy consumption.
		---	Major Negative	The option would require significant new infrastructure that cannot be provided through the re-use or recycling of waste materials. There are no opportunities for sustainable design or the use of sustainable materials. The option results in a major increase in energy consumption
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain

4 WRE and dWRMP24 SEA Findings

4.1 Overview

This chapter presents the outputs of the SEA for the FR. The discussion of the effects and mitigation identified for each of the SEA topics is presented in Sections 4.2 to 4.10. The SEA scoring for each of the SEA objectives is summarised in Section 4.11 at the end of the chapter.

4.2 Biodiversity, flora and fauna

The HRA Stage 1 Screening, undertaken for the dWRMP24 and regional plan, concluded that the scheme is likely to result in Likely Significant Effects on the following European Designated Sites:

- Ouse Washes SPA (UK9008041)
- Ouse Washes Ramsar (UK11051)
- Ouse Washes SAC (UK0013011)
- The Wash SPA (UK9008021)
- The Wash Ramsar (UK11072)
- The Wash and North Norfolk Coast SAC (UK0017075) (approximately 35km east of site 37A)

Subsequent HRA Appropriate Assessment (AA) indicates that residual effects after mitigation remain for both the construction and operation phases of the proposed option at all of the Designated Sites identified in the HRA Stage 1 Screening. Mitigation measures are set out in the informal HRA report and include further assessment of the population present at risk of disturbance and sensitive timing of construction. The timeframes and measures indicated would require agreement with Natural England, which would require further consideration during detailed design.

Ultimately, a strong and robust evidence base would be required to conclude that there would be no adverse effects on the integrity of any Designated Site as a result of the construction or operation of the scheme. The level of detail available at this stage (which is considered proportionate) means that such effects cannot be ruled out at this stage. As a result, this would need further consideration and assessment as part of the next stages of design development to conclude what the effects (if any) of the scheme on Designated Sites would be and any further work required by the HRA process.

The proposed option may have additional impacts on nationally Designated Sites, ancient woodland and priority habitats which are also considered in relation to biodiversity, flora and fauna and may require mitigations to be implemented.

4.2.1 Reservoir and associated infrastructure

Ouse Washes SPA, SAC and Ramsar

Construction phase

Residual effects on the Ouse Washes SPA, SAC an Ramsar site as a result of the construction phase of the proposed reservoir cannot be ruled out. The proposed reservoir lies approximately 200m outside of Natural England's *Goose and Swan Functional Land Impact Risk Zone (IRZ)* for the Ouse Washes SPA, representing land beyond the Designated Site's boundary which may provide important functional habitat for qualifying bird species including geese and swans.

Biological disturbances during the construction phase may result in adverse effects on the qualifying bird species.

In addition, physical habitat loss, fragmentation and degradation of functionally linked land are expected results of land clearance during construction. Combined with the use of vehicles, machinery and the movement of personnel within the Designated Site, noise and light pollution may disturb qualifying bird species, potentially impacting upon adult survival and breeding success if birds are displaced from preferred foraging areas or reducing the extent of functional linked habitat used by the qualifying species.

The reservoir site is hydrologically connected to the Ouse Washes Designated Sites via the River Great Ouse, constituting a potential pathway for effects during construction, including pollution events. Changes in water quality due to pollution events including toxic and non-toxic contamination during construction may also lead to changes in turbidity and increased sedimentation which can also have negative effects on the life cycle of the qualifying species. The effects of non-toxic contamination are considered to be temporary and localised, assuming that directional drilling is employed at main river crossings and small tributaries.

Operation phase

The new reservoir would be lined with clay and therefore not hydrologically connected to any Designated Sites during operation, apart from situations where a drawdown would be required. In the unlikely event the proposed reservoir embankments were to fail in an uncontrolled manner, there is a residual risk of flooding. Should emergency drawdown be implemented, high flood discharge via the Forty Foot Drain could result in adverse effects to Designated Site integrity including habitat loss or degradation, and changes in turbidity and increased sedimentation impacting the life cycle of qualifying species. More detailed dam breach modelling would be undertaken at a later Gateway stage.

There is potential for net gain in terms of eventually providing additional connected habitats for waders (planned floating islands to increase riparian habitat) associated with the Ouse Washes SPA/Ramsar Site.

The Wash SPA, Ramsar Site and The Wash and Norfolk Coast SAC

Construction phase

The Wash SPA, Ramsar Site and The Wash and Norfolk Coast SAC are located approximately 35km from the proposed reservoir construction area, sufficiently distant to exclude adverse effects on the qualifying species due to noise, vibration, visual or human disturbance. Additionally, there is no potential for the physical loss, degradation or fragmentation of supporting habitats due to construction activities associated with the reservoir.

Operation phase

There would be requirement for emergency drawdown however this is currently subject to investigation and consultation and would be finalised for gate three. The new reservoir would be lined with clay and therefore not hydrologically connected to any Designated Sites during operation. As mentioned before the proposed option for managing drawdown in an emergency situation would be to discharge to the Forty Foot Drain.

At this stage, adverse effects cannot be ruled out as a result of changes in water levels and flows. Emergency drawdowns into the Forty Foot Drain can lead to changes in turbidity and increased sedimentation may result in changes in intertidal habitats that support bird species. Effects are uncertain due to the distance (approximately 35km) and therefore further dam breach modelling analysis are recommended to understand the potential effects on The Wash estuarine system.

4.2.2 Transfers and associated infrastructure

4.2.2.1 River Great Ouse to FR

Ouse Washes SPA, SAC and Ramsar

The Stage 2 AA concluded that there would be no residual adverse effects on the Ouse Washes SPA, SAC and Ramsar site as a result of the indicative transfer route. Physical loss and damage of functionally linked land (FLL) would occur temporarily during construction and would be reinstated following construction of the pipeline.

The Wash SPA, Ramsar Site and The Wash and Norfolk Coast SAC

The Wash SPA, Ramsar Site and The Wash and Norfolk Coast SAC are located approximately 35km from the transfer route construction corridor. It is sufficiently distant to exclude adverse effects on the qualifying features due to noise, vibration, visual or human disturbance during the construction phase.

However, the Wash Designated Sites are hydrologically connected to the scheme via the River Great Ouse. Changes in water quality may result from pollution events at the intake construction, or from increased turbidity and sedimentation due to abstraction and associated changes to water levels and flows. This may impact natural estuarine-coastal processes downstream, saltmarshes, wading birds and coastal lagoons. Therefore, further studies and modelling are needed to determine the impact of abstraction on the sites and qualifying features. Residual adverse effects cannot be ruled out.

Nationally Designated Sites

There is one biological SSSI located approximately 70m east of the transfer route, Berry Fen, and an additional SSSI located approximately 1.1km east of the transfer route, Ouse Washes. Although the route has no direct effect or encroachment on the SSSIs, potential impacts include hydrological changes, invasive species, and air pollution during construction. Given the distance of the scheme to these sites and absence of works within or adjacent, introduction or spread of invasive species or impacts due to air quality changes at the site are considered unlikely, however a comprehensive construction environmental management plan (CEMP) would be developed through further investigation.

There is hydrological connectivity of the River Delph (Roxton to Earith) and Counter Drain (Sutton and Mepal Internal Drainage Board (IDB), including Cranbrook Drain) waterbodies to Berry Fen SSSI. An abstraction is located on the River Great Ouse and the transfer route would be constructed in close proximity, requiring implementation of best practice working methods to prevent contamination, as well as measures to mitigate change to water levels or flow within the waterbodies.

The scheme is located within multiple SSSI IRZs.

Overall, construction and operational effects on nationally Designated Sites and their qualifying features would need further investigation once the scheme is finalised and construction methodologies are defined.

Ancient Woodlands and Priority Habitats

There are no ancient woodlands, NNRs, or LNRs within 500m of the proposed transfer route. No likely effects are therefore considered likely on Designated Sites beyond this extent. These are considered neutral environmental constraints to the development of the scheme.

There are a large number of priority habitats within 500m of the proposed transfer route. There would be some minor permanent loss of coastal and floodplain grazing marsh habitat

associated with the pipeline and intake infrastructure. Coastal and floodplain grazing marsh is not considered irreplaceable habitat and with application of best practice construction measures and reinstatement of habitat, the overall effect of other Designated Sites comprises a minor environmental constraint to the development of the scheme.

4.2.2.2 River Delph (Ouse Washes) to FR

Ouse Washes SPA, SAC and Ramsar

The option's abstraction point and subsequently the indicative route is situated within the Ouse Washes SPA, SAC and Ramsar site boundaries. The route also intersects land beyond the SPA/Ramsar boundaries within Natural England's Goose and Swan Functional Land IRZ which may provide important functional habitat for qualifying bird species, specifically geese and swans.

Construction would result in the permanent loss of habitats including modified riparian bankside and lowland grassland. In addition, disturbance including noise, light and personnel during construction may impact the adult survival or breeding success of qualifying species.

Adverse effects cannot be ruled out even when considering mitigation measures at this stage of scheme design.

The Wash SPA, Ramsar Site and The Wash and Norfolk Coast SAC

The Wash SPA, Ramsar Site and The Wash and Norfolk Coast SAC are located approximately 35km from the transfer route construction corridor. It is sufficiently distant to exclude adverse effects on the qualifying features due to noise, vibration, visual or human disturbance during the construction phase.

However, the Wash Designated Sites are hydrologically connected to the scheme via the River Great Ouse. Changes in water quality may result from pollution events at the intake construction, or from increased turbidity and sedimentation due to abstraction and associated changes to water levels and flows. This may impact natural estuarine-coastal processes downstream, saltmarshes, wading birds and coastal lagoons. Therefore, further studies and modelling are needed to determine the impact of abstraction on the sites and qualifying features. Residual adverse effects cannot be ruled out.

Nationally Designated Sites

The abstraction and route falls inside the Ouse Washes SSSI. The route would have a direct effect and encroachment on the SSSI, with physical loss or damage to habitats, and other potential impacts including hydrological changes, invasive species, and air pollution during construction.

As works are proposed within and adjacent to the Designated Site, the introduction or spread of invasive species at the site is potentially likely. Bio-security measures must be in place and adoption of best construction practices would be important.

There is hydrological connectivity of the Counter Drain (Manea and Welney IDB) waterbody to Ouse Washes SSSI. The scheme would most likely utilise tunnelling technologies to intersect the waterbody thereby minimising potential contamination, however, as the abstraction and sections of the transfer would be constructed within the Designated Site, best practice working methods to prevent contamination must be implemented, as well as measures to minimise changes to water levels or flow within the waterbodies.

There is potential for air quality effects due to the works occurring within and adjacent to the Designated Site. Best management practices should be implemented to reduce generation of dust and air pollution on the site.

The transfer route is located within SSSI IRZs, as such the local planning authority would be required to consult Natural England on likely risks from the transfer route.

Ancient Woodlands and Priority Habitats

There are a large number of priority habitats within 500m of the proposed transfer route. There would be some minor permanent loss of coastal and floodplain grazing marsh habitat associated with the pipeline and intake infrastructure. Coastal and floodplain grazing marsh is not considered irreplaceable and with application of best practice construction measures and reinstatement of habitat, the overall effect of other Designated Sites comprises a minor environmental constraint to the development of the scheme.

4.2.2.3 FR to Cambridge Water (North)

Ouse Washes SPA, SAC and Ramsar

The Stage 2 AA concluded that there would be no residual adverse effects on the Ouse Washes SPA, SAC and Ramsar site as a result of the indicative transfer route.

The Wash SPA, Ramsar Site and The Wash and Norfolk Coast SAC

The Wash SPA, Ramsar Site and The Wash and Norfolk Coast SAC are located approximately 35km from the transfer route construction corridor. It is sufficiently distant to exclude adverse effects on the qualifying features due to noise, vibration, visual or human disturbance during the construction phase.

However, the Wash Designated Sites are hydrologically connected to the scheme via the River Great Ouse. Changes in water quality may result from pollution events at the intake construction, or from increased turbidity and sedimentation due to abstraction and associated changes to water levels and flows. This may impact natural estuarine-coastal processes downstream, saltmarshes, wading birds and coastal lagoons. Therefore, further studies and modelling are needed to determine the impact of abstraction on the sites and qualifying features. Residual adverse effects cannot be ruled out.

Nationally Designated Sites

The Ouse Washes SSSI is located approximately 1.6km east of the route, and Berry Fen SSSI is located approximately 1.5km east of the route. Although the route has no direct effect or encroachment on the SSSIs, potential impacts include hydrological changes, invasive species, and air pollution during construction.

There is hydrological connectivity of the River Delph (Roxton to Earith) and Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain) waterbodies to the Berry Fen SSSI and Ouse Washes SSSI.

The transfer route is located within multiple SSSI IRZ, as such the local planning authority would be required to consult Natural England on likely risks from the transfer route.

Ancient Woodlands and Priority Habitats

There are a number of priority habitats within 500m of the proposed transfer route, but none are directly impacted by the route.

4.2.2.4 FR to Cambridge Water (South)

Ouse Washes SPA, SAC and Ramsar

The Stage 2 AA concluded that there would be no residual adverse effects on the Ouse Washes SPA, SAC and Ramsar site as a result of the indicative transfer route.

The Wash SPA, Ramsar Site and The Wash and Norfolk Coast SAC

The Wash SPA, Ramsar Site and The Wash and Norfolk Coast SAC are located approximately 35km from the transfer route construction corridor. It is sufficiently distant to exclude adverse effects on the qualifying features due to noise, vibration, visual or human disturbance during the construction phase.

However, the Wash Designated Sites are hydrologically connected to the scheme via the River Great Ouse. Changes in water quality may result from pollution events at the intake construction, or from increased turbidity and sedimentation due to abstraction and associated changes to water levels and flows. This may impact natural estuarine-coastal processes downstream, saltmarshes, wading birds and coastal lagoons. Therefore, further studies and modelling are needed to determine the impact of abstraction on the sites and qualifying features. Residual adverse effects cannot be ruled out.

Nationally Designated Sites

The scheme route intersects the Ouse Washes SSSI. Adverse effects on linkages and qualifying features are considered likely without mitigation, and there is potential for other impacts including hydrological changes, invasive species, and air pollution during construction.

As works are proposed within and adjacent to the Designated Site, the introduction or spread of invasive species at the site is potentially likely. Bio-security measures must be in place and adoption of best construction practices would be important.

There is hydrological connectivity of the Counter Drain (Manea and Welney IDB) waterbody to Ouse Washes SSSI. The pipeline would utilise tunnelling technologies to intersect the waterbody thereby minimising potential contamination, however, as sections of the pipeline would be constructed within and adjacent to the Designated Site, best practice working methods to prevent contamination must be implemented, as well as measures to minimise changes to water levels or flow within the waterbodies.

There is potential for air quality effects due to the works occurring within and adjacent to the Designated Site. Best management practices should be implemented to reduce generation of dust and air pollution on the site.

The transfer route is located within multiple SSSI IRZ, as such the local planning authority would be required to consult Natural England on likely risks from the transfer route.

Ancient Woodlands and Priority Habitats

There are a large number of priority habitats within 500m of the scheme route, with coastal and floodplain grazing marsh being intersected by the route. This habitat is primarily located within the Ouse Washes SPA, SAC, Ramsar, and SSSI where with appropriate mitigation it as anticipated there would be no permanent loss of this habitat. There are several other areas of habitat along the route, however, reduced working width in these locations would prevent any direct permanent loss. Implementing best practices near these habitats (e.g., locating compounds and materials storage away from these habitats) would mitigate potential indirect adverse effects. This habitat comprises a minor/neutral environmental constraint to the development of the scheme. Further site-specific ecological assessments and discussions with regulators would be required to help inform the detailed design of the scheme.

4.2.2.5 FR to Anglian Water

Ouse Washes SPA, SAC and Ramsar

The Stage 2 AA concluded that there would be no residual adverse effects on the Ouse Washes SPA, SAC and Ramsar site as a result of the indicative transfer route.

The Wash SPA, Ramsar Site and The Wash and Norfolk Coast SAC

The Wash SPA, Ramsar Site and The Wash and Norfolk Coast SAC are located approximately 35km from the transfer route construction corridor. It is sufficiently distant to exclude adverse effects on the qualifying features due to noise, vibration, visual or human disturbance during the construction phase.

However, the Wash Designated Sites are hydrologically connected to the scheme via the River Great Ouse. Changes in water quality may result from pollution events at the intake construction, or from increased turbidity and sedimentation due to abstraction and associated changes to water levels and flows. This may impact natural estuarine-coastal processes downstream, saltmarshes, wading birds and coastal lagoons. Therefore, further studies and modelling are needed to determine the impact of abstraction on the sites and qualifying features. Residual adverse effects cannot be ruled out.

Nationally Designated Sites

Ouse Washes SSSI is located approximately 100m east of the route. Although the route has no direct effect or encroachment on the SSSIs, potential impacts include hydrological changes, invasive species, and air pollution during construction. Once the exact location of the route is finalised further assessment of any potential impacts would be undertaken.

There is hydrological connectivity of the Great Ouse waterbodies to Ouse Washes SSSI. Best practice working methods to prevent contamination, as well as measures to mitigate change to water levels or flow within the waterbodies, should be implemented.

The transfer route is located within multiple SSSI IRZ, consultation with Natural England would be required on likely risks from the transfer route.

Overall, construction and operational effects on nationally Designated Sites and their qualifying features are considered to be a moderate constraint to the scheme.

Nationally Designated Sites, Ancient Woodland and Priority Habitats

There are a number of priority habitats within 500m of the proposed transfer route, but none are directly impacted by the route, more specifically, there are no chalk rivers anticipated to be affected by the option. The scheme has significant opportunities for benefits for ecology, however, further site-specific ecological assessments and discussions with regulators would be required to help inform the detailed design of the scheme.

Implementing best practices near these habitats (e.g. locating compounds and materials storage away from these habitats) would mitigate potential indirect adverse effects. These are considered a minor environmental constraint to the development of the scheme.

Transfers are potentially adjacent to, and pass through, small parcels of Biodiversity Action Plan (BAP) Priority Habitat including coastal and floodplain grazing marsh. This option is expected to cause the loss of BNG units due to habitat clearance associated with construction. However, there is likely to be a gain due to the creation of new open water habitat. The percentage change is anticipated at a loss of -1%. However, this would be addressed and brought up to 10% through in-site habitat creation.

4.2.3 Mitigation

4.2.3.1 Reservoir and associated infrastructure:

Indicative mitigation measures are set out in the FR HRA Report (Mott Macdonald, October 2022). A CEMP would be developed prior to construction, including measures to ensure that the risk of uncontrolled discharges from construction is reduced (including sediment management)

and detailing an Emergency Response Plan in the event of a pollution incident. This plan must be prepared for all works and should include the industry best practice measures listed above and any targeted mitigation measures identified during the formal HRA. Monitoring should be carried out and appropriate mitigation measures should be implemented at the intake and outlet. Best practice methods should be implemented to minimise disturbance effects and habitat loss including refining transfer alignment to avoid sensitive habitats. Habitat should be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. Ecological Method Statements and in person ecology monitoring for operational effects.

Update the HRA as the design progresses at gate three. Investigate opportunities for nature-based solutions and BNG such as creation of high value habitat, habitat creation or improvement works within habitat network zones to support nature recovery network and create wildlife corridors. The HRA would influence the design to ensure robust mitigation is incorporated.

Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining transfer alignment or using trenchless techniques to avoid woodland habitat, in particular Ancient Woodland and BAP Priority Habitat. Habitat to be reinstated on completion, or if irreplaceable avoided. Ecology surveys would be required at future design stages to determine effects and mitigation required. It should be noted that Ancient Woodland is irreplaceable. Unless it can be avoided easily, there would be a residual effect. Woodland habitats can be replaced or compensated but would take time to establish. This is taken into account in the BNG scores.

The scheme has opportunities for benefits for ecology through the creation of new habitat.

4.2.3.2 Transfers and associated infrastructure:

River Great Ouse to FR

The mitigation measures are set out in the HRA report and include further assessment of the population present at risk of disturbance and sensitive timing of construction. The timeframes and measures indicated above would require agreement with Natural England, which would require further consideration during detailed design. Given the distance of the proposed transfer route to Berry Fen SSSI, consideration should be given at detailed design stage to reducing working width where the route is in close proximity to the site. Best practice working methods to prevent contamination, as well as measures to mitigate change to water levels or flow within the waterbodies, should be implemented.

Trenchless tunnelling to protect priority habitats should be further assessed and confirmed at detailed design. Further site-specific ecological assessments and discussions with regulators would be required to help inform the detailed design of the scheme.

River Delph (Ouse Washes) to FR

The mitigation measures are set out in the HRA report and include further assessment of the population present at risk of disturbance and sensitive timing of construction. The timeframes and measures indicated above would require agreement with Natural England, which would require further consideration during detailed design. Appropriate screening at the intake point to protect spined loach is also recommended as a measure to reduce adverse effects.

As there is a direct impact on European and nationally Designated Sites, as well as priority habitats. Levels of bespoke compensation/habitat creation/habitat enhancement required are likely to be so significant that BNG targets are extremely difficult to meet in the absence of further mitigation measures.

Trenchless tunnelling to protect priority habitats should be further assessed and confirmed at detailed design. Further site-specific ecological assessments and discussions with regulators would be required to help inform the detailed design of the scheme.

FR to Cambridge Water (North)

The mitigation measures are set out in the HRA report and include further assessment of the population present at risk of disturbance and sensitive timing of construction. The timeframes and measures indicated above would require agreement with Natural England, which would require further consideration during detailed design. The implementation of best practice working methods to prevent contamination, as well as measures to mitigate change to water levels or flow within the waterbodies would be required.

Further site-specific ecological assessments and discussions with regulators would be required to help inform the detailed design of the scheme. Implementing best practices near priority habitats (e.g., locating compounds and materials storage away from these habitats) would mitigate potential indirect adverse effects.

FR to Cambridge Water (South)

The mitigation measures are set out in the HRA report and include further assessment of the population present at risk of disturbance and sensitive timing of construction. The timeframes and measures indicated above would require agreement with Natural England, which would require further consideration during detailed design. Overall, construction and operational effects on European Designated Sites and their qualifying features are considered to be a moderate constraint to the scheme.

Implementing best practices near priority habitats (e.g., locating compounds and materials storage away from these habitats) would mitigate potential indirect adverse effects on these habitats. Further site-specific ecological assessments and discussions with regulators would be required to help inform the detailed design of the scheme.

FR to Anglian Water

The mitigation measures are set out in the HRA report and include further assessment of the population present at risk of disturbance and sensitive timing of construction. The timeframes and measures indicated above would require agreement with Natural England, which would require further consideration during detailed design. Overall, construction and operational effects on European Designated Sites and their qualifying features are considered to be a moderate constraint to the scheme.

Further site-specific ecological assessments and discussions with regulators would be required to help inform the detailed design of the scheme. Implementing best practices near priority habitats (e.g., locating compounds and materials storage away from these habitats) would mitigate potential indirect adverse effects.

4.2.4 INNS

There is a possibility that the abstractions on the River Great Ouse and River Delph would have an impact on the INNS currently recorded at these locations. Due to the abstractions at these locations, there may be potential for decreases in water levels and flow velocity, which could have associated changes in temperature, water quality and turbidity. Some of the INNS identified prefer these conditions and therefore the abstractions have the potential to increase the suitability of this habitat to these species.

The transfers FR to Cambridge Water (North), FR to Anglian Water and FR to Cambridge Water (South) would be treated water transfers and have a very low risk of INNS transmission. The

transfers to the reservoir from the River Delph and River Great Ouse which involve raw water have a higher risk of INNS transmission.

The creation and operation of new assets was mostly found to be low risk and unlikely to create a new pathway for INNS introduction.

Biosecurity measures should be considered to reduce the risk of INNS introduction at the site due to the transfer of raw water from the River Great Ouse and River Delph (Ouse Washes).

4.2.4.1 Mitigation

To ensure that the option does not lead to a transfer of invasive species, appropriate filtration systems must be in place. Treatment at the upgraded WTW would prevent any non-native species being transferred further.

4.2.5 WFD objectives relating to biodiversity

4.2.5.1 Reservoir and associated infrastructure

The WFD Stage 2 assessment results show there would be a moderate risks for ecology during construction and operation. Abstraction rates are expected to reduce the flow volume and velocity within Old Bedford River/River Delph (incl. the Hundred Foot Washes), as well as (Roxton to Earith). This is likely to impede fish migration and may cause deterioration to aquatic habitat. Loss of watercourses could also impact on habitat, flow and hydromorphology within Middle Level where the option elements are proposed to be located.

Hydroecology assessment indicates the abstraction at Earith would result in less frequent and lower flows entering the Ouse Washes. In combination with the second abstraction occurring from the Ouse Washes, this would drive lower water levels across the Designated Sites / flood storage area (FSA), which would primarily occur in winter when sufficient flows are passing through the system that trigger both abstractions. There is the potential impact on 18 protected species (i.e. six fish species, six aquatic invertebrate species and six macrophyte species). The six fish species were assigned a Provisional Risk Rating of ‘high’ due to sensitivity to changes in flow. For both the six aquatic invertebrate and six macrophyte species all were assigned a Provisional Risk Rating of ‘low’; and for aquatic communities the impacts are considered ‘limited’ on the macroinvertebrate community biological indices.

4.2.5.2 Transfers and associated infrastructure:

The Stage 1 WFD assessment presented has demonstrated at this design stage, the proposed scheme would satisfy the relevant criteria for compliance with WFD. Therefore, the proposed scheme can be said to:

- Not result in a deterioration of current surface water ecological status.
- Not cause failure to maintain surface water Good Ecological Status (GES) by the target timeframe.

4.2.5.3 Mitigation

Best practice construction methods and pollution prevention measures should be implemented for transfers. This could include the use of directional drilling or other trenchless technique where the transfer crosses watercourses. In the short term there is potential for effects. With mitigation, no effects are predicted as a result of construction.

4.3 Soil

4.3.1 Reservoir and associated infrastructure

There are no geological SSSIs within 1km of the reservoir site. Provisional mapping indicates that Grade 2 is the most extensive agricultural land grade soil throughout the site, although a band of Grade 1 land is depicted running from northeast to southwest through the eastern portion of the site. Construction would be required to avoid permanent loss of Grade 1 agricultural land. A small area of Grade 3 agricultural land is also mapped on the northern boundary. Construction of the reservoir and associated infrastructure would result in permanent loss of soil with a Grade 2 agricultural land. There is one historic landfill that intersects with the proposed WTW buffer. A comprehensive agricultural land classification survey would be undertaken for gate three.

4.3.2 Transfers and associated infrastructure

4.3.2.1 River Great Ouse to FR

There are no geological SSSIs within 1km of the route. No likely effects are considered, and this is a neutral environmental constraint to the development of the scheme.

Approximately 32% of the proposed transfer route passes through Grade 1 agricultural land, 48% through Grade 2, 20% through Grade 3, and less than 1% through Grade 4. There would be permanent loss of Grade 3 agricultural land where permanent limited infrastructure is developed, however, this would be of a minor scale. There would be temporary loss of Grade 1, 2, and 4 agricultural land, however, the potential effects on these soils would be temporary and reversible with the application of best construction practices. The pipeline would also be constructed in phases, to reduce impacts. Overall, construction and operational effects on agricultural land is considered to be minor constraint to the scheme.

There are multiple historic landfills within 500m of the route, with the closest approximately 350m west. There are also a number of authorised landfills within 500m, with the closest approximately 320m west. Due to the distance, disturbance of the landfill sites during construction or operation is unlikely. Construction and operational effects on landfill sites are considered to be a minor constraint to the scheme.

4.3.2.2 River Delph (Ouse Washes) to FR

There are no geological SSSIs within 1km of the route. No likely effects are considered, and this is a neutral environmental constraint to the development of the scheme.

Approximately 54% of the transfer route passes through Grade 1 agricultural land, 37% through Grade 2, 7% through Grade 3, and less than 4% through Grade 4. There would be permanent loss of Grade 4 agricultural land where permanent limited infrastructure is developed, however, this would be of a minor scale. There would be temporary loss of Grade 1, 2, and 3 agricultural land, however, the potential effects on these soils would be temporary and reversible with the application of best construction practices. The pipeline would also be constructed in phases, to reduce impacts. Overall, construction and operational effects on agricultural land is considered to be minor constraint to the scheme. The route does not lie within 500m of an authorised or historic landfill site. Construction and operational effects on landfill sites are therefore considered to be a neutral constraint to the scheme.

4.3.2.3 FR to Cambridge Water (North)

There are no geological SSSIs within 1km of the route. No likely effects are considered, and this is a neutral environmental constraint to the development of the scheme.

Approximately 29% of the transfer route passes through Grade 1 agricultural land, 58% through Grade 2, and 13% through Grade 3. There would be permanent loss of agricultural land where permanent limited infrastructure is developed, however, this would be of a minor scale. There would be temporary loss of Grade 1, 2, and 3 agricultural land, however, the potential effects on these soils would be temporary and reversible with the application of best construction practices. The transfer would also be constructed in phases, to reduce impacts. Overall, construction and operational effects on agricultural land is considered to be minor constraint to the scheme.

The route lies within 500m of several authorised and historic landfill site. The closest authorised landfill is located approximately 320m northwest, and the closest historic landfill is located approximately 360m west of the route. Due to the distance, disturbance of the landfill sites during construction or operation is highly unlikely. Consideration may be given to reducing working width near these sites to increase this distance further. Construction and operational effects on landfill sites are considered to be a minor constraint to the scheme.

4.3.2.4 FR to Cambridge Water (South)

There are no geological SSSIs within 1km of the route. No likely effects are considered, and this is a neutral environmental constraint to the development of the scheme.

Approximately 16% of the transfer route passes through Grade 1 agricultural land, 61% through Grade 2, 21% through Grade 3, and less than 2% through Grade 4. There would be permanent loss of Grade 4 agricultural land where permanent limited infrastructure is developed, however, the potential effects on these soils would be temporary and reversible with the application of best construction practices. The pipeline would also be constructed in phases, to reduce impacts. Overall, construction and operational effects on agricultural land is considered to be a minor constraint to the scheme.

The route lies within 500m of an authorised landfill site, located approximately 320m northwest. Due to the distance, disturbance of the landfill sites during construction or operation is highly unlikely. Consideration may be given to reducing working width near these sites to increase this distance further. Construction and operational effects on landfill sites are considered to be a minor constraint to the scheme. There are no historic landfills within 500m of the route, therefore a neutral constraint to the scheme.

4.3.2.5 FR to Anglian Water

There are no geological SSSIs within 1km of the route. No likely effects are considered, and this is a neutral environmental constraint to the development of the scheme.

Approximately 59% of the transfer route passes through Grade 1 agricultural land, 30.7% through Grade 2, and 10.3% through Grade 3. There would be permanent loss of agricultural land where permanent limited infrastructure is developed, however, this would be of a minor scale. There would be temporary loss of Grade 1, 2, and 3 agricultural land, however, the potential effects on these soils would be temporary and reversible with the application of best construction practices. The pipeline would also be constructed in phases, to reduce impacts. Overall, construction and operational effects on agricultural land is considered to be minor constraint to the scheme.

The route does not lie within 500m of an authorised or historic landfill site. Construction and operational effects on landfill sites are therefore considered to be a neutral constraint to the scheme.

4.3.3 Mitigation

4.3.3.1 Reservoir and associated infrastructure:

To mitigate against these potential impacts, construction methodologies should seek to incorporate Soil Management Plans to promote sustainable handling during construction and ensure reuse wherever possible. Reusing site soils within landscaping and ecological plans, for instance, represents an opportunity to maximise sustainability. Correct soil handling also ensures that carbon loss from the soil is minimised. Sustainable reuse (e.g., landscaping) has the potential to promote greater carbon storage than current agricultural practices. Best practice techniques to prevent disturbance of contaminated material during construction should be implemented.

4.3.3.2 Transfers and associated infrastructure:

Potential effects on soils would be temporary and reversible with the application of best construction practices. Consideration may be given to reducing working width near landfill sites to increase this distance further.

4.4 Water

4.4.1 Flood Risk

4.4.1.1 Reservoir and associated infrastructure

The reservoir was found to have residual flood risk from potential breach of fluvial flood defences and the Ouse Washes FSA. The proposed development would lead to a displacement of floodwaters if the flood defences along the left bank of the Sixty Foot Drain or left bank of Forty Foot Drain in the vicinity of the reservoir were to fail. Emergency planning should be updated to reflect this change in risk.

4.4.1.2 Transfers and associated infrastructure

River Great Ouse to FR

Approximately 58% of the proposed transfer route directly intersects flood risk zones 2 and 3. There would also be some limited direct permanent land take from these flood risk zones from the construction of the limited infrastructure near the abstraction site. With limited permanent works and the majority of construction effects being temporary with the pipeline being constructed in phases, this proposed development is considered a minor environmental constraint to the development of the scheme. Further flood risk assessment would be required as the scheme design progresses.

River Delph (Ouse Washes) to FR

Approximately 72% of the transfer route directly intersects flood risk zones 2 and 3. There would also be some limited direct permanent land take from these flood risk zones from the construction of the limited infrastructure near the abstraction site. With limited permanent works and the majority of construction effects being temporary with the pipeline being constructed in phases, this proposed development is considered a minor environmental constraint to the development of the scheme.

FR to Cambridge Water (North)

Approximately 60% of the transfer route directly intersects flood risk zones 2 and 3 sections. There would also be some limited direct permanent land take from these flood risk zones from the construction of the limited infrastructure. Further mitigation measures would be defined as

part of applications for environmental permits, as required when working in close proximity to main rivers. If groundwater table levels are high, then dewatering may be required to enable construction in these areas. With limited permanent works and the majority of construction effects being temporary with the pipeline being constructed in phases, this proposed development is considered a minor environmental constraint to the development of the scheme.

FR to Cambridge Water (South)

Approximately 61% of the transfer route directly intersects flood risk zones 2 and 3. There would also be some limited direct permanent land take from these flood risk zones from the construction of the limited infrastructure. Further mitigation measures would be defined as part of applications for environmental permits, as required when working in close proximity to main rivers. If groundwater table levels are high, then dewatering may be required to enable construction in these areas. With limited permanent works and the majority of construction effects being temporary with the pipeline being constructed in phases, this proposed development is considered a minor environmental constraint to the development of the scheme.

FR to Anglian Water

Approximately 88% of the transfer route directly intersects flood risk zones 2 and 3 sections. There would also be some limited direct permanent land take from these flood risk zones from the construction of the limited infrastructure. Further mitigation measures would be defined as part of applications for environmental permits, as required when working in close proximity to main rivers. If groundwater table levels are high, then dewatering may be required to enable construction in these areas. With limited permanent works and the majority of construction effects being temporary with the pipeline being constructed in phases, this proposed development is considered a minor environmental constraint to the development of the scheme.

4.4.1.3 Mitigation

Measures to reduce the impact on flooding during the final design construction phases should be implemented. Flood risk during construction may still occur so short term flood risk effects may remain.

Flood Risk Assessment (FRA) to be undertaken and above ground infrastructure to be designed to be flood resilient. Floodplain compensation may be required.

Further mitigation measures would be defined as part of applications for environmental permits, as required when working in close proximity to main rivers. If groundwater table levels are high, then dewatering may be required to enable construction in these areas. Further flood risk assessments would be undertaken to inform final scheme design.

4.4.2 Surface water quality, flows and quantity

4.4.2.1 Reservoir and associated infrastructure

One WFD waterbody (GB205033000050 – Middle Level) was identified as having potential adverse risk as a result of the new reservoir and associated infrastructure.

A potential minor localised risk to the Middle Level (ID: GB205033000050) Channel was identified from the loss of open watercourses (mostly maintained field drains), and loss of up to 1.1% of the catchment for this waterbody due to the presence of the reservoir. This loss of catchment and watercourses could impact on habitat, flow and hydromorphology within this waterbody catchment.

4.4.2.2 Transfers and associated infrastructure

River Great Ouse to FR

Trenchless tunnelling could be implemented for two main river crossings to avoid in-river construction and associated effects on water quality. For other waterbodies that are not main rivers, mitigation measures could include driven sheet pile cofferdams with pumping. Adoption of construction best practice including use of buffer strips and straw bales to stop sediment from the site running off-site along with minimising the time period of works across watercourses would minimise impacts on water quality. Given the scale of the construction activities required, some temporary impacts on water quality are expected.

The waterbodies would be assessed against WFD criteria and suitable mitigation recommended. A geomorphology walkover would be required to understand the watercourses better in order to include suitable mitigation. The recommended mitigation would need to be appropriate to the watercourse and the effect caused. Mitigation to prevent damage to groundwater or plants may be required, and like-for-like replacement may be required. Standoff zones may be required during construction near these waterbodies, and potential monitoring may be required at sites, which would require consultation with Natural England.

At the next stages of the project, further surveys would dictate whether more watercourses can be crossed via trenchless methods.

This is considered a moderate environmental constraint to the development of the scheme.

There are four WFD classified water bodies along the route, however, the transfer only interacts with two of these directly through use of trenchless technologies. These are the Cranbrook Drain and Forty Foot Drain. The route is approximately 9km north of the nearest groundwater management catchment (Cam and Ely Ouse Woburn Sands water body).

River Delph (Ouse Washes) to FR

No in-river construction activities would take place in major rivers for this option. Trenchless tunnelling is currently being proposed for two main river crossings to avoid in-river and construction and associated effects on water quality.

There are two WFD classified water bodies along the route, of which the transfer only interacts with these through use of trenchless technologies. These are the Sixteen Foot Bank and Counter Drain. The route is approximately 12km north west of the nearest groundwater management catchment (Cam and Ely Ouse Woburn Sands water body).

This is considered a moderate environmental constraint to the development of the scheme.

FR to Cambridge Water (North)

In-river construction activities would not take place in major rivers. Trenchless tunnelling is currently being proposed for multiple main river crossings to avoid in-river and construction and associated effects on water quality.

For other waterbodies that are not main rivers, mitigation measures could include driven sheet pile cofferdams with pumping.

Adoption of construction best practice including use of buffer strips and straw bales to stop sediment from the site running off-site along with minimising the time period of works across watercourses would minimise impacts on water quality. Given the scale of the construction activities required, some temporary impacts on water quality are expected. There are three WFD classified water bodies along the route, however, where the transfer interacts with these,

trenchless technologies are to be utilised. These include the Cranbrook Drain and the Forty Foot Drain.

The waterbodies would be assessed against WFD criteria and suitable mitigation recommended. A geomorphology walkover would be required to understand the watercourses better in order to include suitable mitigation. The recommended mitigation would need to be appropriate to the watercourse and the effect caused. Mitigation to prevent damage to groundwater or plants may be required, and like-for-like replacement may be required. Standoff zones may be required during construction near these waterbodies, and potential monitoring may be required at sites, which would require consultation with Natural England.

At the next stages of the project, further surveys would dictate whether more watercourses can be crossed via trenchless methods.

FR to Cambridge Water (South)

In-river construction activities would not take place in major rivers. Trenchless tunnelling is currently being proposed for multiple main river crossings to avoid in-river and construction and associated effects on water quality.

For other waterbodies that are not main rivers, mitigation measures could include driven sheet pile cofferdams with pumping. Adoption of construction best practice including use of buffer strips and straw bales to stop sediment from the site running off-site along with minimising the time period of works across watercourses would minimise impacts on water quality. Given the scale of the construction activities required, some temporary impacts on water quality are expected.

There are six WFD classified water bodies along the route, however, where the transfer interacts with these, trenchless technologies are to be utilised. These include the Cranbrook Drain and a number of other rivers.

There is one groundwater water body along the route: Cam and Ely Ouse Woburn Sands water body.

The waterbodies would be assessed against WFD criteria and suitable mitigation recommended. A geomorphology walkover would be required to understand the watercourses better in order to include suitable mitigation. The recommended mitigation would need to be appropriate to the watercourse and the effect caused. Mitigation to prevent damage to groundwater or plants may be required, and like-for-like replacement may be required. Standoff zones may be required during construction near these waterbodies, and potential monitoring may be required at sites, which would require consultation with Natural England.

At the next stages of the project, further surveys would dictate whether more watercourses can be crossed via trenchless methods.

FR to Anglian Water

In-river construction activities would not take place in major rivers. Trenchless tunnelling is currently being proposed for multiple main river crossings to avoid in-river and construction and associated effects on water quality.

For other waterbodies that are not main rivers, mitigation measures could include driven sheet pile cofferdams with pumping. Adoption of construction best practice including use of buffer strips and straw bales to stop sediment from the site running off-site along with minimising the time period of works across watercourses would minimise impacts on water quality. Given the scale of the construction activities required, some temporary impacts on water quality are expected.

There are five WFD classified water bodies along the route, however, where the transfer interacts with these, trenchless technologies are to be utilised. These include the Sixteen Foot Bank and other rivers.

There is one groundwater water body along the route: North West Norfolk Sandringham Sands Water Body.

The waterbodies would be assessed against WFD criteria and suitable mitigation recommended. A geomorphology walkover would be required to understand the watercourses better in order to include suitable mitigation. The recommended mitigation would need to be appropriate to the watercourse and the effect caused. Mitigation to prevent damage to groundwater or plants may be required, and like-for-like replacement may be required. Standoff zones may be required during construction near these waterbodies, and potential monitoring may be required at sites, which would require consultation with Natural England. At the next stages of the project, further surveys would dictate whether more watercourses can be crossed via trenchless methods.

4.4.3 Proposed Mitigation

4.4.4 Transfers and associated infrastructure

The following mitigation is proposed for the transfers and associated infrastructure:

- Best practice construction methods and pollution prevention measures to be implemented.
- Approaches to mitigation could include standoff zones during construction, and the specific monitoring of sites. Consultation with Natural England would be required.
- At this stage of project development, WFD waterbodies and main rivers are to be crossed using trenchless techniques. At the next stages of the project, further surveys would dictate whether more watercourses can be crossed via trenchless methods. Other techniques such as coffer dams can also be utilised. A geomorphology walkover should be undertaken at future project stages to understand the status of each watercourse, so as to provide suitable mitigation. For watercourses not being crossed via trenchless techniques, measures should be identified to ensure there would be no impact on downstream waterbodies. All potential mitigation measures need to be relevant to the conditions of the individual watercourses. For watercourses not being crossed via trenchless techniques, measures should be identified to minimise impacts on downstream waterbodies. All potential mitigation measures need to be relevant to the conditions of the individual watercourses.

4.4.5 Groundwater quality and resources

4.4.5.1 Reservoir and associated infrastructure

No Source Protection Zones are within the option footprint. Additionally, preliminary WFD assessment found minimal potential risk to ground water sources.

Best practice construction methods and pollution prevention measures to be implemented. With mitigation, no effects are predicted as a result of construction.

4.4.5.2 Transfers and associated infrastructure

No Source protection zones are within the option footprint. Additionally, WFD assessment found minimal potential risk to ground water sources.

Best practice construction methods and pollution prevention measures to be implemented. With mitigation, no effects are predicted as a result of construction.

4.4.6 WFD objectives and objectives set out in River Basin Management Plans

4.4.6.1 Reservoir and associated infrastructure:

WFD assessment identified no activities that would assist attainment of waterbody objectives.

The following potential risk of deterioration resulting from operation of reservoir were identified:

An potential amber adverse risk (potential risk of deterioration) to biological quality elements within the River Great Ouse (Roxton to Earith) was identified as a result of the new surface water abstraction. Abstraction rates are expected to reduce the flow volume and velocity. This change is likely to impede fish migration and cause deterioration to the habitat. A minor localised risk on the hydrological regime and water quality are also anticipated. Further investigation is required to determine the full extent of the impacts.

An potential amber adverse risk (potential risk of deterioration) to the Old Bedford River/River Delph (including The Hundred Foot Washes) was identified as a result of the new surface water abstraction. Abstraction rates are expected to reduce the water levels and flow velocity. This reduction in level could lead to a deterioration in hydrological regime from the current High status. Additionally, this change could impede fish migration and cause deterioration to the habitat. A minor localised risk on the hydrological regime and water quality are therefore anticipated. Further investigation is required to determine the full extent of the impacts.

At this stage of assessment, it is anticipated that suitable mitigation can be found for the risks identified above. However, It is, therefore, it is possible that an exemption would need to be sought under Regulation 19 of the Water Environment (Water Framework Directive) (England & Wales) Regulations 2017, as set in ,as a result of the preferred scheme. Further investigation would be undertaken to determine the need and requirements for any potential exemption. Once a more detailed design is available for the scheme the assessment should be re-visited to ensure impact scores are accurate and based on the most up to date information. WFD level 1 assessments also identified that the WFD Regulation groundwater bodies in which the proposed scheme interacts does are not adversely impacted by the activities and the impact assessment. Therefore, no further assessment is required at this stage.

4.4.6.2 Mitigation

Trenchless tunnelling is currently being proposed for main river crossings to avoid in-river and construction and associated effects on water quality.

For other waterbodies that are not main rivers, mitigation measures could include driven sheet pile cofferdams with pumping. Adoption of construction best practice including use of buffer strips and straw bales to stop sediment from the site running off-site along with minimising the time period of works across watercourses would minimise impacts on water quality. The waterbodies would be assessed against WFD criteria and suitable mitigation recommended. A geomorphology walkover would be

required to understand the watercourses better in order to include suitable mitigation. The recommended mitigation would need to be appropriate to the watercourse and the effect caused. Mitigation to prevent damage to groundwater or plants may be required, and like-for-like replacement may be required. Standoff zones may be required during construction near these waterbodies, and potential monitoring may be required at sites, which would require consultation with Natural England.

At the next stages of the project, further surveys would dictate whether more watercourses can be crossed via trenchless methods.

4.4.7 Water efficiency and resilience of Public Water Supply (PWS) and natural systems to droughts.

During normal operation, this option could combat the effect of extreme temperatures and drought on water resilience of supplies by providing an additional reservoir to supply drinking water, where water has been taken from strained water resources prior to drought conditions.

The source of water for the new reservoir would be a pumped water transfer from two sources: the River Great Ouse and the Ouse Washes , the reservoir would be vulnerable to longer drought situations where lower flows in the rivers mean the reservoir cannot be filled/topped up.

The option is unlikely to affect the local environment's resilience to hazards such as flood risk, temperatures extremes, storms, and gales, but may assist in managing resilience of surrounding flora and fauna to drought.

4.5 Air

4.5.1 Reservoir and associated infrastructure

There are no AQMA's in proximity to the proposed option. There may be some minor air quality effects during construction associated with dust. There may be some operational effects associated with the new WTW, however this is anticipated to be low therefore neutral effects identified for operation phase.

4.5.2 Transfers and associated infrastructure

There are no AQMA's in proximity to the proposed option routes. There may be some minor air quality effects during construction associated with dust, minor negative effects identified.

4.5.3 Mitigation

Best practice mitigation measures implemented during construction such as communication and site management, monitoring, preparing and maintaining the site.

4.6 Climatic Factors

4.6.1 Reservoir and associated infrastructure

The site selection carbon appraisal identified that emissions associated with creation of the reservoir are likely to be dominated by earthworks activities. The total capital carbon emissions for earthworks activities at the site was estimated as 58,818 tonnes of carbon dioxide equivalent (CO2e). A further 3,061 tCO2e of capital carbon emissions was estimated for enabling works, and 6,190 tCO2e for roads and ancillary works.

The site selection carbon appraisal estimated the capital carbon emissions associated with the WTW and finishing works as 8,264 tCO2e. Peaty soils are present at the reservoir site, and carbon emissions from disturbed peat have been considered as operational emissions.

Emissions of greenhouse gases would be associated with materials used to construct the reservoir (embodied carbon), construction activities, and operation of the reservoir.

4.6.2 Transfers and associated infrastructure

The site selection carbon appraisal estimated the capital carbon emissions associated with the transfers the scheme is presented as 353,482 tCO_2e (82% of the total capital carbon).

4.6.3 Mitigation

Investigate use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon. Carbon footprint study could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy would be available. Opportunities to offset the net loss of natural capital stock(s) (ecosystem service).

4.6.4 Climate resilience of assets and natural systems

The option is unlikely to affect the local environment's resilience to hazards such as flood risk, temperature extremes, storms, and gales, but may assist in managing resilience of surrounding flora and fauna to drought.

Qualitative assessment of the unmitigated predicted impacts on the provision of water flow regulation indicate the loss of contributing stocks has the potential to impede water flow on site. The addition of a reservoir would regulate flows, control water movement and maintain water supplies in dry periods, enabling a resilient supply of water to consumers.

4.7 Landscape

4.7.1 Reservoir and associated infrastructure

The entire option footprint is located within the Fens National Character Area (NCA). It is likely that there would be visually intrusive impacts and permeant alteration to the landscape form resulting from construction of the reservoir as well as above ground infrastructure associated with the new WTW, visitor centres, pumping stations and vehicle access bridges. There is likely to be a reduction in landcover value from vegetation removal, change to landscape character in proximity to the Ouse, change to the setting of the landscape, reduction in tranquillity.

4.7.2 Transfers and associated infrastructure

There are no Areas of Outstanding Natural Beauty (AONB), or National Parks located in the vicinity of the indicative transfer routes. The proposed routes do not pass through any greenbelt designated land. This constraint can therefore be considered to be neutral or minor.

Good practice measures would likely be implemented to minimise effects during construction and operation such strategic planting and other landscaping between to soften the visual impact, however moderate and temporary impacts may remain. Adjust transfer route to avoid vegetation removal, retain vegetation where possible and replace removed vegetation, and avoid construction of permanent structures on undeveloped land. Land reinstated upon completion where possible.

4.8 Historic Environment

4.8.1 Reservoir and associated infrastructure

Moated bishops' palace at Manor Farm Scheduled monument is adjacent to the reservoir site approximately 190m north-west of the reservoir waterbody. The reservoir, adjacent car park and visitor centre have the potential to permanently and adversely alter the setting of historic assets; moderate potential construction effects identified. There may also be operational impacts on historic setting resulting from increased noise pollution, traffic and potential tourism. Within 1km of the proposed reservoir footprint, 23 designated heritage assets have been identified. These include two Grade I Listed Buildings of high value, one Grade II* Listed Building of high value, 141 Grade II Listed Buildings of high value, three Scheduled Monuments of high values, and one Conservation Area of medium value. In addition, eight non-designated assets are recorded

on the HER within the reservoir footprint, and five within 100m of the boundary. Excavation of reservoir has potential to impact on archaeology, if present.

4.8.2 Transfers and associated infrastructure

4.8.2.1 River Great Ouse to FR

There are a number of listed buildings (Grade I, II*, and II) within 500m of the route, which are primarily situated within Cambridge Water (North), Colne, and Earith. A reduced working width can be utilised near these assets to minimise disturbance, which would only be temporary during construction. The operation of the transfer would not affect statutory designated heritage assets as it would be below ground level with the ground reinstated following completion of works. The majority of assets are located over 300m from the proposed transfer, with hedgerows, treelines, or urban areas block views of the temporary construction works, thereby limiting impacts on the settings of heritage assets.

There are no scheduled monuments or world heritage sites located within 500m of the proposed transfer route. Construction and operational effects on statutory designated heritage assets are considered to be a minor constraint to the scheme.

There are two conservation areas located within 500m of the proposed transfer route The operation of the transfer would not affect the conservation areas as it would be below ground level with the ground reinstated following completion of works.

There are no registered parks gardens or battlefields within 500m of the transfer route.

Construction and operational effects on other statutory designated heritage assets are considered to be a minor constraint to the scheme.

River Delph (Ouse Washes) to FR - There are a number of scheduled monuments within 500m of the proposed route. There would be no direct effect on sites and a reduced working width can be utilised near these assets to minimise disturbance, which would only be temporary during construction. The use of qualified archaeologists to provide a watching brief during the construction is a mitigation measure that could be utilised in proximity to sensitive receptors. Impacts on setting would only be experienced during the temporary construction period.

The operation of the transfer would not affect statutory designated heritage assets as it would be below ground level with the ground reinstated following completion of works.

There are no listed buildings or world heritage sites located within 500m of the transfer route.

Construction and operational effects on statutory designated heritage assets are considered to be a minor constraint to the scheme.

4.8.2.2 FR to Cambridge Water (North)

There are a number of Listed Buildings (primarily Grade II) within 500m of the proposed route, the closest approximately 200m east.

There would be no direct effect on these sites and a reduced working width can be utilised near these assets to minimise disturbance, which would only be temporary during construction. The operation of the transfer would not affect statutory designated heritage assets as it would be below ground level with the ground reinstated following completion of works. The majority of assets are screened by hedgerows, treelines, or urban areas blocking views of the temporary construction works, thereby limiting minor impacts on setting.

There are no scheduled monuments or world heritage sites located within 500m of the transfer route.

Construction and operational effects on statutory designated heritage assets are considered to be a minor constraint to the scheme.

There is one conservation area potentially within 500m, located approximately 430m east (Cambridge Water (North) Conservation Area). The conservation area is a significant distance from the route, with hedgerows and treelines screening the majority of the temporary construction works.

There is likely to be minor effects on setting, which can be mitigated through use of screening. Operation of the transfer would have no effect on this asset. As such, construction and operational effects on other statutory designated heritage assets are considered to be a minor constraint to the scheme.

There are no registered parks and gardens or registered battlefields located within 500m of the transfer route.

4.8.2.3 FR to Cambridge Water (South)

There are a number of listed buildings (primarily Grade II) within 500m of the route, the closest located 230m north, and the others are over 300m. There are two scheduled monuments within 500m of the route, including: Three bowl barrows 450m and 570m east of New England, part of the Haddenham round barrow cemetery, is located approximately 160m west; and two bowl barrows 370m and 505m south of New England, part of the Haddenham round barrow cemetery, is located approximately 250m west.

There would be no direct effect on these sites and a reduced working width can be utilised near these assets to minimise disturbance, which would only be temporary during construction. The operation of the transfer would not affect statutory designated heritage assets as it would be below ground level with the ground reinstated following completion of works. The majority of assets are screened by hedgerows, treelines, or urban areas blocking views of the temporary construction works, thereby limiting minor impacts on setting.

There are no world heritage sites located within 500m of the transfer route. Construction and operational effects on statutory designated heritage assets are considered to be a minor constraint to the scheme.

There is one registered parks and gardens within 500m, located approximately 440m north (Cambridge Water (South) Hall). The asset is a significant distance from the route, with hedgerows and treelines screening the majority of the temporary construction works. There is likely to be minor effects on setting, which can be mitigated through use of screening. Operation of the transfer would have no effect on this asset. As such, construction and operational effects on other statutory designated heritage assets are considered to be a minor constraint to the scheme.

There are no battlefields, or conservation areas within 500m of the transfer route.

4.8.2.4 FR to Anglian Water

There are a number of Listed Buildings (primarily Grade II) within 500m of the route, the closest approximately 460m east. There is one scheduled monument within 500m of the route located approximately 300m south east (Romano-British settlement near Honeybridge).

There would be no direct effect on these sites and a reduced working width can be utilised near these assets to minimise disturbance, which would only be temporary during construction. The operation of the transfer would not affect statutory designated heritage assets as it would be below ground level with the ground reinstated following completion of works. The majority of

assets are screened by hedgerows, treelines, or urban areas blocking views of the temporary construction works, thereby limiting minor impacts on setting.

There are no world heritage sites located within 500m of the transfer route.

There is one conservation area within 500m, located approximately 65m north (Wimbotsham Conservation Area). A reduced working width can be utilised near these areas to minimise disturbance, which would only be temporary during construction. Hedgerows and treelines, partially block views of the temporary construction works, thereby limiting minor impacts on setting. There is likely to be minor effects on setting, which can be mitigated through use of screening. The operation of the transfer would not affect the conservation areas as it would be below ground level with the ground reinstated following completion of works. This is considered a minor constraint for the scheme.

There are no registered parks and gardens or registered battlefields located within 500m of the transfer route.

4.8.3 Mitigation

Preferred mitigation for the Registered Park and Gardens and conservation areas could be to re-route the transfer or minimise the working width; however, if this is not possible then careful construction and reinstatement to its original condition with no detrimental effect on the character, appearance, or design of the RPG or conservation area should be implemented.

Best practice measures to be implemented to minimise setting effects for other heritage assets during construction.

Incorporate measures to reduce setting impact of the reservoir and embankment e.g. planting of trees as screening and reducing the height of any embankment. However, although design features would likely reduce the setting impact, there may be residual effects.

Further work would be required to determine significance of effect, depending on the presence or absence of buried archaeology. Residual effects may remain due to potential loss of archaeological remains. A reduced working width can be utilised near historic assets to minimise disturbance, which would only be temporary during construction. The use of qualified archaeologists to provide a watching brief during the construction is a mitigation measure that could be utilised in proximity to sensitive receptors. Screening mitigation measures should be considered where applicable during this phase.

4.9 Population and Human Health

4.9.1 Reservoir and associated infrastructure

The reservoir footprint intersects Chatteris airfield, an active site for general aviation. Construction of reservoir may require land take and have direct impacts on the site. There are several functional sites within 2km of the reservoir site. There is potential for disturbance impacts during construction, there may also be a change in environmental conditions during operation for residential and private properties and businesses in proximity to the proposed location as a result of a combination of noise, air quality, visual impacts or presence of HGV vehicles and an increase in tourism. There may be minor benefits to local community as the reservoir may generate jobs.

The scheme is within 500m of public parks and gardens, schools, playing fields, religious grounds, and other community facilities. There is potential for disruption to the local community and users of these community facilities during the construction phase. There may be a temporary change in environmental conditions as a result of a combination of noise, air quality,

visual impacts or presence of HGV vehicles during construction as a result of all aspects of the option. It is not expected that the new WTW would have major impact during operation.

The reservoir footprint intersects Chatteris airfield and North London Skydiving Centre, land take could be required. The reservoir however may provide new tourist opportunities.

4.9.2 Transfers and associated infrastructure

4.9.2.1 River Great Ouse to FR

There are four urban areas (Cambridge Water (North), Earith, Colne, and Chatteris) within 500m of the transfer route, however, there would be no loss of property, recreational, or community assets. There are no Noise Important Areas located within 500m of the transfer route.

Construction working hours would be limited, traffic management plans would be adopted and use would be made of modern equipment in good condition in order to mitigate against excess dust and noise levels. Temporary construction compounds, including cabins and car parks, would be located away from sensitive receptors and residential areas where feasible. Overall, having regard to scale and temporary duration of works within and in close proximity to built-up areas, the effects on the health, amenity and wellbeing of local communities from construction and operation are considered a minor constraint.

The proposed transfer route does not cross or disrupt any national trails, cycle routes or country parks. The route crosses several other PRoW and comes within 500m of a number of open access land. Overall, the level of constraint to the development of the scheme from recreational activities and tourism is considered to be limited and a minor constraint

4.9.2.2 River Delph (Ouse Washes)

There are no urban areas within 500m of the transfer route, and there would be no loss of property, recreational, or community assets.

There are no Noise Important Areas located within 500m of the transfer route. Overall, having regard to scale and temporary duration of works within and in close proximity to built-up areas, the effects on the health, amenity and wellbeing of local communities from construction and operation are considered a minor constraint.

The proposed transfer route does not cross or disrupt any national trails, cycle routes or country parks, and there is no open access land within 500m. The route potentially crosses two other PRoW.

Overall, the level of constraint to the development of the scheme from recreational activities and tourism is considered to be limited and a minor constraint.

4.9.2.3 FR to Cambridge Water (North)

There is one urban areas within 500m of the transfer route (Cambridge Water (North)), however, there would be no loss of property, recreational, or community assets. It is proposed that construction working hours would be agreed with the Local Authority and best practice be implemented such as use of modern equipment in good condition in order to mitigate against excess noise levels, and that any temporary construction compounds, including cabins and car parks, would not be located near sensitive receptors where feasible.

Approved traffic routes and new access roads would be applied where necessary to minimise impacts on local roads surrounding any construction works. Dust would also be minimised and controlled through dampening earthworks to mitigate air quality impacts for sensitive receptors

in close proximity to the construction working areas. Overall, having regard to scale and temporary duration of works within and in close proximity to built-up areas, the effects on the health, amenity and wellbeing of local communities from construction and operation are considered a minor constraint.

There are no Noise Important Areas located within 500m of the transfer route.

The proposed transfer route does not cross or disrupt any national trails or cycle routes, and is not within 500m of a country park. The route crosses a number of PRoW, and comes within 500m of a number of open access land.

Measures would be made to avoid temporary closure of the public right of way with diversions being provided where needed in consultation with the Local Planning Authority. Any public rights of way affected during construction would be reinstated following completion of works, thus effects during operation would be negligible. Overall, the level of constraint to the development of the scheme from recreational activities and tourism is considered to be limited and a minor constraint.

4.9.2.4 FR to Cambridge Water (South)

There are urban areas within 500m of the transfer route (Chatteris, Hardwick, Bar Hill, Longstanton, and Wouldingham), however, there would be no predicted loss of property, recreational, or community assets. It is assumed construction working hours would be limited as well as the use of modern equipment in good condition in order to mitigate against excess noise levels, and that any temporary construction compounds, including cabins and car parks, would not be located near sensitive receptors.

Approved traffic routes and new access roads would be applied where necessary to minimise impacts on local roads surrounding any construction works. Dust would also be minimised and controlled through dampening earthworks to mitigate air quality impacts for sensitive receptors in close proximity to the construction working areas. Overall, having regard to scale and temporary duration of works within and in close proximity to built-up areas, the effects on the health, amenity and wellbeing of local communities from construction and operation are considered a minor constraint.

There are no Noise Important Areas located within 500m of the transfer route.

The proposed transfer route does not cross or disrupt any national trails, and is not within 500m of a country park. The route intersects one cycle route (National Cycle Network (NCN) and crosses a number of other PRoW, and comes within 500m of a number of open access land. Measures would be made to avoid temporary closure of the public right of way with diversions being provided where needed. Any public rights of way affected during construction would be reinstated following completion of works, thus effects during operation would be negligible. Overall, the level of constraint to the development of the scheme from recreational activities and tourism is considered to be limited and a minor constraint.

4.9.2.5 FR to Anglian Water

There is one urban area within 500m of the transfer route (Downham Market), however, there would be no loss of property, recreational, or community assets. Construction working hours would be limited and the use of modern equipment in good condition would be adopted in order to mitigate against excess noise levels, and any temporary construction compounds, including cabins and car parks, would not be located near sensitive receptors where feasible.

Approved traffic routes and new access roads would be applied where necessary to minimise impacts on local roads surrounding any construction works. Dust would also be minimised and controlled through dampening earthworks to mitigate air quality impacts for sensitive receptors

in close proximity to the construction working areas. Overall, having regard to scale and temporary duration of works within and in close proximity to built-up areas, the effects on the health, amenity and wellbeing of local communities from construction and operation are considered a minor constraint.

There is one Noise Important Area located within 500m of the transfer route, approximately 360m south east (ID 11360). The area is a significant distance from the scheme, and the implementation of mitigation measures would minimise noise effects: Construction and operational effects on Noise Important Areas are considered to be a minor constraint to the scheme.

The proposed transfer route does not cross or disrupt any national trails, and is not within 500m of a country park or open access land. The route intersects one cycle route and crosses a number of PRoW. Measures would be made to avoid temporary closure of the public right of way with diversions being provided where needed. Any public rights of way affected during construction would be reinstated following completion of works, thus effects during operation would be negligible. Overall, the level of constraint to the development of the scheme from recreational activities and tourism is considered to be limited and a minor constraint.

4.9.3 Mitigation

Best practice mitigation measures for construction examples:

- Noise management through timing of works, community engagement and air quality management. The above ground assets should have landscaping, air quality and noise mitigation included in their design, in order to limit the potential indirect impacts from noise and air pollution on properties. However, minor and temporary effects are likely to still occur.
- Construction working hours would be limited, traffic management plans would be adopted and use would be made of modern equipment in good condition in order to mitigate against excess dust and noise levels. Temporary construction compounds, including cabins and car parks, would be located away from sensitive receptors and residential areas where feasible.
- There could be potential to enhance the cycleways as part of the works (e.g. during re-instatement).
- Incorporate education and information resources within the reservoir design e.g. trails, information boards etc.
- Direct land take of recreational sites to be avoided where reasonably practicable and land to be reinstated. However, temporary effects are likely to still occur during construction.
- Direct land take of recreational sites to be avoided where possible and land to be reinstated. However, temporary effects are likely to still occur during construction.
- Measures would be taken to avoid temporary closures of the public rights of way with diversions being provided where needed. Any public rights of way affected during construction would be reinstated following completion of works. There are unlikely to be permanent diversions arising from transfers.

4.10 Material Assets

4.10.1 Reservoir and associated infrastructure

New infrastructure is required for the option which would use materials and generate waste. Large quantities materials required for reservoir embankment.

There may be construction and operational effects to roads that would connect the reservoir, with an increase in HGVs from deliveries and potential increase in traffic from visitors, this may impact some A roads but no landtake from roads is needed.

4.10.2 Transfers and associated infrastructure

4.10.2.1 River Great Ouse to FR

New infrastructure is required for the option which would use materials and generate waste. This option requires the construction of 5.6km of transfer. The proposed transfer route crosses a number of built assets and transportation routes. These infrastructural assets would be impacted during construction of the pipeline however trenchless techniques can be adopted to reduce major effects. Trenchless tunnelling would likely be utilised on 'A' roads, with temporary disruption potentially experienced on minor roads and lanes where this technique is not practicable. Overall, the effects on built assets and infrastructure from the construction and operation of this option are considered a minor constraint.

4.10.2.2 River Delph (Ouse Washes) to FR

New infrastructure is required for the option which would use materials and generate waste. This option requires the construction of 5.6km of pipeline. The transfer route crosses a number of built assets and transportation routes. These infrastructure assets would be impacted during construction of the pipeline however techniques such as tunnelling can be adopted to reduce major effects. Trenchless tunnelling would be utilised where practicable with temporary disruption experienced on minor roads and lanes where this technique is not feasible. Overall, the effects on built assets and infrastructure from the construction and operation of this option are considered a minor constraint.

4.10.2.3 FR to Cambridge Water (North)

New infrastructure is required for the option which would use materials and generate waste. This option requires the construction of 5.1km of pipeline. The transfer route crosses a number of built assets and transportation routes. Overall, the effects on built assets and infrastructure from the construction and operation of this option are considered a minor constraint.

4.10.2.4 FR to Cambridge Water (South)

New infrastructure is required for the option which would use materials and generate waste. This option requires the construction of 31.4km of pipeline. The transfer route crosses a number of built assets and major transportation routes including a number of other roads or lanes. Overall, the effects on built assets and infrastructure from the construction and operation of this option are considered mitigatable and minor.

4.10.2.5 FR to Anglian Water

New infrastructure is required for the option which would use materials and generate waste. The pipeline route crosses a number of built assets and transportation routes. These infrastructural assets would be impacted during construction of the pipeline however techniques such as tunnelling can be adopted to reduce major effects. Overall, the effects on built assets and infrastructure from the construction and operation of this option are considered a minor constraint.

4.10.3 Mitigation

Best practice measures including a Traffic Management Plan to be implemented to minimise disturbance during construction. However, temporary effects are likely to still occur.

Trenchless techniques can be adopted where appropriate to reduce major effects. Approved traffic routes for construction traffic would be identified during detailed design work to minimise impacts on local roads.

4.11 SEA Scoring Summary

A summary of the scoring for each of the SEA objectives is presented in Table 4.1. The table shows the pre and post mitigation scoring for the construction and operational phases against each of the SEA objectives. Sections 4.2 to 4.10 present the narrative of the effects and mitigation identified for each of the SEA objectives.

Table 4.1: SEA Scoring Summary of environmental effects

		Pre-mitigation				Post-mitigation			
		Construction		Operation		Construction		Operation	
SEA Topic	**SEA Objective(s)**	**Positive**	**Negative**	**Positive**	**Negative**	**Positive**	**Negative**	**Positive**	**Negative**
Biodiversity, flora and fauna	To protect Designated Sites and their qualifying features.	0	---	+	---	0	---	+	---
	To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers.	0	--	+	0	0	--	+	0
	To avoid spreading and, where required, manage invasive and non-native species (INNS).	0	-	0	-	0	-	0	-
	To meet WFD objectives relating to biodiversity.	0	--	0	---	0	--	0	---
Soil	To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	0	---	0	-	0	---	0	-
Water	To reduce or manage flood risk, taking climate change into account.	0	---	0	0	0	---	0	0
	To enhance or maintain surface water quality, flows and quantity.	0	--	0	--	0	--	0	--
	To enhance or maintain groundwater quality and resources.	0	0	0	0	0	0	0	0
	To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	0	0	0	--	0	0	0	--
	To increase water efficiency and increase resilience of water supplies and natural systems to droughts.	0	0	+	0	0	0	+	0

		Pre-mitigation				Post-mitigation			
		Construction		Operation		Construction		Operation	
SEA Topic	**SEA Objective(s)**	**Positive**	**Negative**	**Positive**	**Negative**	**Positive**	**Negative**	**Positive**	**Negative**
Air	To reduce and minimise air emissions during construction and operation.	0	-	0	0	0	-	0	0
Climatic Factors	To minimise/reduce embodied and operational carbon emissions	0	-	0	-	0	-	0	-
	To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	0	0	0	0	0	0	+	0
Landscape	To conserve, protect and enhance landscape and townscape character and visual amenity.	0	---	0	0	0	--	0	0
Historic Environment	To conserve/protect and enhance historic environment and heritage assets, and their setting, including archaeologically important sites.	0	--	0	-	0	--	0	-
Population and Human Health	To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	+	-	+	0	+	-	+	0
	To secure resilient water supplies for the health and wellbeing of customers.	0	0	0	0	0	0	0	0
	To increase access and connect customers to the natural environment, provide education or information resources for the public.	0	0	+	0	0	0	+	0
	Maintain and enhance tourism and recreation	0	--	+	0	0	--	+	0
Material Assets	Maintain and enhance tourism and recreation	0	--	0	0	0	--	0	0

SEA Topic	SEA Objective(s)	Pre-mitigation				Post-mitigation			
		Construction		Operation		Construction		Operation	
		Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
	Minimise resource use and waste production	0	--	0	--	0	-	0	--

4.12 Cumulative effects assessment

An initial SEA cumulative assessment and initial in-combination HRA and WFD assessments have been undertaken as part of the gate two process. These assessments are presented in the Environmental Appraisal Report. It is understood that if the scheme is selected as an option in the WRE Regional Plan and Anglian Water dWRMP24 and Cambridge Water dWRMP24 it would be subject to further in-combination effects assessments with the other selected options, neighbouring water company plans and neighbouring regional plans. Until the WRE Best Value Regional Plan has been developed and agreed, it is not known when the scheme would be implemented, and therefore which other developments it could act in-combination with.

Assumptions were therefore made about other plans, programmes and projects that could act in-combination with the FR scheme, and the following were considered within the in-combination effects assessments these assumptions were based on scale, type of development or plan, and temporal and spatial location:

- Other SROs – SLR
- Local Development Frameworks
- Development Consent Orders (DCOs) for Nationally Significant Infrastructure Projects
- Hybrid Bills
- Relevant Transport and Works Act Orders
- Relevant planning applications (only where there is the potential for cumulative effects on the future baseline)

Please refer to the main body of the Environmental Appraisal Report which presents the cumulative and in-combination assessments in full.