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Thames to Southern Transfer (T2ST)

Strategic Environmental Assessment

28 June 2021

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Contents

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Glossary

Acronym	Definition
ACWG	All Companies Working Group
AONB	Area of Outstanding Natural Beauty
BPT	Break Pressure Tank
EAR	Environmental Assessment Report
GWDTE	Groundwater Dependent Terrestrial Ecosystems
HRA	Habitats Regulation Assessment
INNS	Invasive Non-Native Species
NCA	National Character Area
PS	Pumping Station
RAPID	Regulators' Alliance for Progressing Infrastructure Development
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SESRO	South East Strategic Reservoir Option
SEW	South East Water
SPA	Special Protection Area
SPZ	Source Protection Zone
SRO	Strategic resource option
SSSI	Site of Special Scientific Interest
STT	Severn Thames Transfer
T2ST	Thames to Southern Transfer
WFD	Water Framework Directive
WRMP	Water Resources Management Plan
WRSE	Water Resources South East
WSR	Water supply reservoir
WTW	Water Treatment Works

Executive summary

This Strategic Environmental Assessment (SEA) Annex supports the Environmental Assessment Report (EAR) that accompanies the Gate 1 submission to the Regulators' Alliance for Progressing Infrastructure Development (RAPID) for the Thames to Southern Transfer (T2ST). This Annex presents the findings of a SEA applied to the options for the T2ST pipeline route options.

Water Resources South East (WRSE) undertook an SEA in January 2021, and updated in March 2021, using data from the T2ST Options Appraisal (ref: T2ST SRO, Option Appraisal, 3 November 2020, 5201578/9.1/DG/004), and following the methodology in the WRSE Regional Plan Environmental Assessment Methodology Guidance, July 2020.

Based on the WRSE SEA outputs for residual effects (post mitigation), the six pipeline options are predicted to result in similar positive, neutral or negative effects across all the SEA objectives during construction and operation, with the following exceptions:

- Biodiversity: All options intersect designated sites (SSSI and SAC). The residual effects on designated sites during construction are likely to be greater for Options 1,2,5 and 6 (moderate negative) than for Options 3 and 4 (minor negative) as these options intersect a greater number of designated sites.
- Population and Human Health: All options have some intersection with community facilities at some point on the route. The residual effects on community facilities during construction are likely to be greater for Options 3, 4 and 6 (moderate negative) than for Options 1, 2 and 5 (minor negative) as these options intersect a greater number of community facilities.

Additional assessment, considering local level data, habitat improvement data and land requirement for additional scheme components, has been undertaken in-line with the methodology in the All Companies Working Group (ACWG) Water Resources Management Plan (WRMP) environmental assessment guidance and applicability with SROs, October 2020. For the additional assessment:

- Local level data findings show that each of the options intersect or lie within 200m of a number of local wildlife sites and conservation areas. However, mitigation can be put in place in order to reduce the potential effects on these areas.
- The habitat improvement data findings show that Options 5 and 6 require land that is located to the south of the Manor House Farm habitat creation area, a scheme which is creating approx. 69ha of grazing marsh (see map in Appendix C).
- All options intersect SSSI and SAC river restoration areas, and construction may cause disturbance effects to these river restoration areas.
- The scheme component data shows that all additional components would result in some additional effects on some of the SEA objectives. The Otterbourne, Reading and Testwood sites show the most additional effects, with effects likely for five SEA topics. The Otterbourne site is required for Options 1, 2, 3 and 4. The Reading site is required for Options 3, 4 and 6, and the Testwood site is required for Options 5 and 6.

Based on the information and methods at this time, it is likely that of the six options, Options 1 and 2 will result in the fewest negative effects based on the findings from the SEA.

1 Introduction

1.1 Overview

This Annex supports the Environmental Assessment Report (EAR) that accompanies the Gate 1 submission to the Regulators' Alliance for Progressing Infrastructure Development (RAPID) for the Thames to Southern Transfer (T2ST). This Annex presents the findings of a Strategic Environmental Assessment (SEA) applied to the options for the T2ST pipeline route options.

1.2 Thames to Southern Transfer Options

The outputs of the initial route options appraisal identified six unconstrained options for transferring water from the Thames Water region to the Southern Water region. These options include raw water and potable water options as shown in Table 1.1. Further details on the options are set out in Section 2: Scheme Description.

Table 1.1: T2ST options

Option ref	Option name
1	Potable water transfer from Culham to Otterbourne North Water Treatment Works (WTW) (50, 80 and 120Ml/d)
2	Raw water transfer from Culham to Otterbourne North WTW (50, 80 and 120Ml/d)
3	Raw water transfer from the River Thames at Reading to Otterbourne North WTW (50, 80 and 120Ml/d)
4	Potable water transfer from the River Thames at Reading to Otterbourne North WTW (50, 80 and 120Ml/d)
5	Raw water transfer from Culham to Testwood
6	Raw water transfer from the River Thames at Reading to Testwood

1.3 Methodology

This document presents the SEA of the T2ST options. There are two parts to the SEA:

a) The Water Resources South East (WRSE) SEA Findings. The WRSE SEA has been undertaken in-line with the methodology found in the WRSE Regional Plan Environmental Assessment Methodology Guidance, July 2020. The outputs of this assessment are described in Section 3 and the output tables received from WRSE are contained in Appendix A.
b) Additional assessment. Additional assessment, considering local level data, habitat recreation data and land requirement for additional scheme components, has been undertaken in-line with the methodology found in the All Companies Working Group (ACWG) Water Resources Management Plan (WRMP) environmental assessment guidance and applicability with SROs, October 2020. The outputs of this assessment are described in Section 4 and data reviewed is in Appendix B.

In all cases, the findings presented in this document follow the methodologies above and the principles of SEA.

This SEA does not include an in-combination assessment with other SROs, water company capital investments or third-party development plans or projects. The SEA will be reviewed at Gate 2 stage to include potential in-combination effects.

1.4 Assumptions and limitations

This SEA does not include an in-combination assessment with other SROs, water company capital investments or third-party development plans or projects.

The WRSE outputs discussed in Section 3 do not include an assessment for the additional components described in Section 4.4.

The WRSE outputs discussed in Section 3 do not take into consideration the additional regulatory assessments which have been completed for HRA and WFD as part of the Gate 1 submission to RAPID (see Section 4.5).

The assumptions made within the WRSE outputs discussed in Section 3 are based on assumptions and limitations as per the WRSE methodology and guidance described in the WRSE Regional Plan Environmental Assessment Methodology Guidance, July 2020.

Mitigation measures included in the WRSE outputs in Section 3 are listed below. The same mitigation measures have been included in Section 4.

- Biodiversity, flora and fauna:
  - Investigate the feasibility of directional drilling under the designated river sites;
  - Undertake detailed ecological surveys and assessment;
  - Introduce habitat compensation, creation and/or species relocation schemes where required; and
  - Undertake an INNS assessment.
- Soil:
  - Implement pollution prevention and control measures to reduce the likelihood of contaminants leaching through soil and entering groundwater.
- Water:
  - Implement pollution prevention and control measures to reduce the likelihood of contaminants leaching through soil and entering groundwater;
  - Design bedding material so as not to form a preferential pathway for groundwater; and
  - Use directional drilling where possible.
- Air:
  - Implement best practice mitigation measures during construction phase
- Climatic factors:
  - Investigate the use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon;
  - Consider undertaking a carbon footprint study to help identify areas for carbon savings or alternative materials; and
  - Use greener energy as and when it becomes available.
- Landscape:
  - Include best practice measures to reduce visual impact during construction;
  - Conduct construction in phases so visual disturbance will be temporary at each location;
  - Screen above ground structures for landscape effects.
- Historic environment:
  - Re-route pipeline around heritage assets such as registered parks and gardens.
  - Implement best practice measures during construction and site pumping stations and other permanent above ground infrastructure away from historic assets; and
- Population and Human Health:

  - Re-route pipeline around community assets such as sports facilities;
  - Implement best practice construction methods to reduce amenity effects for the community;
  - Explore potential opportunities to enhance the local areas when reinstating land in order to achieve positive effects; and
  - Implement best practice construction methods to minimise disruption and appropriate use of diversions and signage.
- Material assets
  - Implement sustainable design measures,
  - Source materials locally where possible; and
  - Use directional drilling where possible to minimise disruption on road and rail infrastructure.

The additional assessment undertaken in Section 4 does not change or update the WRSE scores in Section 3.

The local level data in Section 4.2 has been compiled using the websites as listed in Table 5.2 and as such may contain omissions and/or errors.

2 Scheme Description

2.1 Overview

The aim of the T2ST study is to investigate options for transferring available water from either the Severn Thames Transfer (STT) or the South East Strategic Reservoir Option (SESRO) at Culham from the Thames Water supply zone to Southern Water's Hampshire area.

It should be noted that the SESRO is a proposed reservoir and therefore is not shown on existing baseline maps.

A full scheme description can be found in the RAPID Gate 1 Report, however a summary of the main aspects of the options are included below.

2.2 Option descriptions

For Gate 1, there are 6 unconstrained options for T2ST as described in Table 2.1. A map of the options is shown in Figure 2.1..

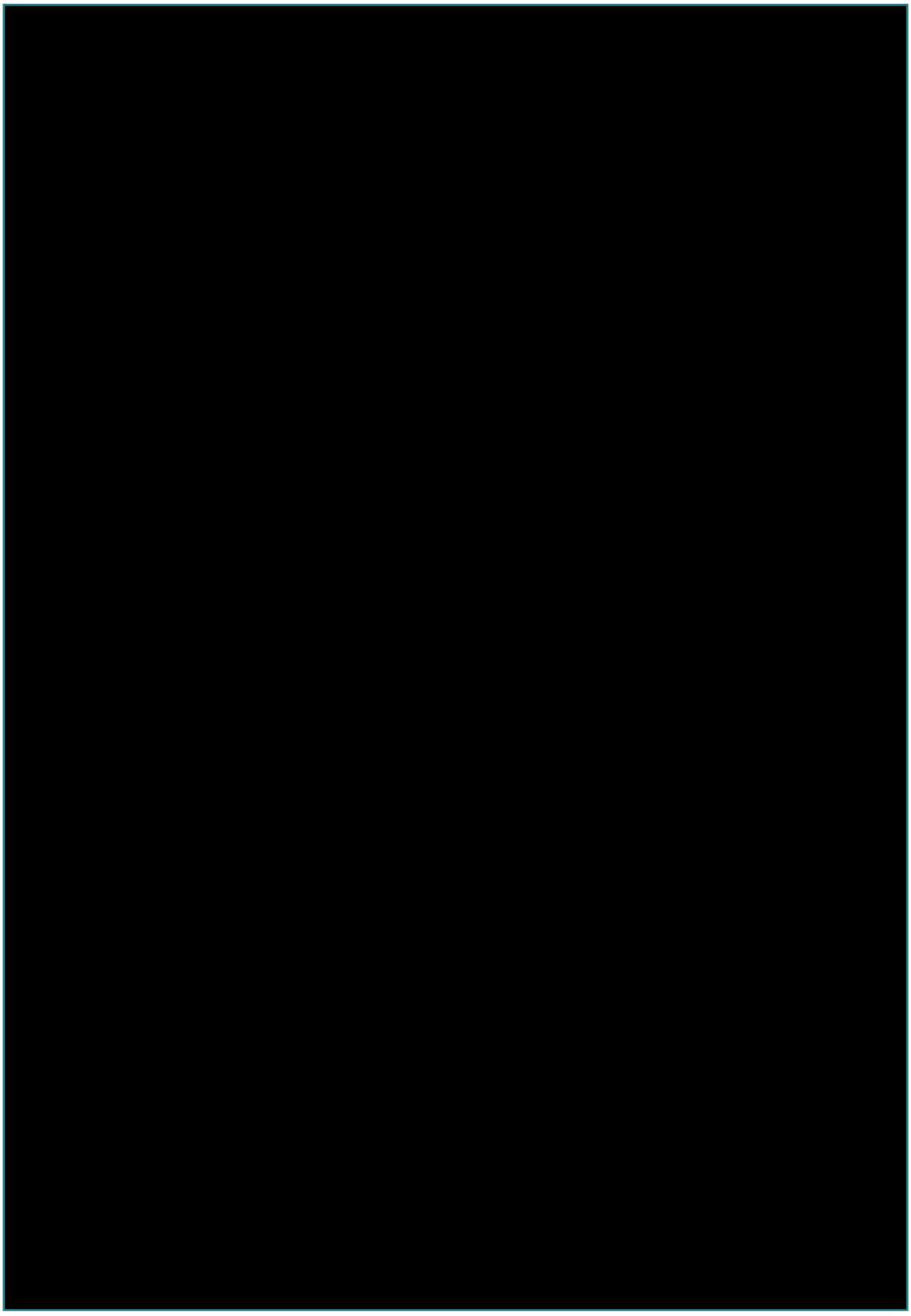
Table 2.1: T2ST Gate 1 unconstrained options description

Option ref	Option name	Option description
1	Potable water transfer from Culham to Otterbourne North WTW (50, 80 and 120Ml/d)	Transfer of potable water from the River Thames at Culham near Abingdon to Otterbourne. Water provided from either STT or SESRO. Water treatment will be required at Culham and potable water will be transferred to Otterbourne North WTW, a new WTW which will be located between South Winchester and Otterbourne North. This option includes offtakes for delivery of potable water as follows: • 10Ml/d offtake to Kingsclere Water supply reservoir (WSR) • 10Ml/d offtake to Micheldever WSR • 10-20Ml/d offtake to the South East Water (SEW) Basingstoke supply zone at Northgate WSR • 50 – 120 Ml/d to a new WTW at Otterbourne North – treated water will be delivered to a new storage tank for distribution into the supply network. A new WTW will be required at Culham. A new WTW will be required at Otterbourne North. Service reservoir extensions will be required at Kingsclere WSR and Micheldever WSR. New pumping stations (PS) will be required at: • Culham WTW • Newton Common New break pressure tanks (BPT) will be required at: [redacted] An alternative option for the Andover connection is being considered where potable water is received at Upper Enham WSR rather than Micheldever WSR.
2	Raw water transfer from Culham to Otterbourne North WTW (50, 80 and 120Ml/d)	Transfer of raw water from the River Thames at Culham near Abingdon to Otterbourne. Water provided from either STT or SESRO. The transferred raw water will require treatment at new WTW sites at Otterbourne, Kingsclere and Andover. This option includes offtakes for delivery of raw water as follows: • 10Ml/d offtake to a new WTW at Kingsclere • 10Ml/d offtake to a new WTW at Andover • 10-20Ml/d offtake to SEW at Northgate WTW • 50 – 120 Ml/d to a new WTW at Otterbourne North

Option ref	Option name	Option description
		New WTW will be required at: • Kingsclere • Andover • Otterbourne North New PS will be required at: • Culham WTW [redacted] New BPT will be required at: • [redacted]
3	Raw water transfer from the River Thames at Reading to Otterbourne North WTW (50, 80 and 120Ml/d)	Transfer of raw water from the River Thames at Reading [redacted] to Otterbourne. Water provided from either STT or SESRO. The transferred raw water will require treatment at new WTW sites at Otterbourne, Kingsclere and Andover . This option includes offtakes for delivery of raw water as follows: • 10Ml/d offtake to a new WTW at Kingsclere • 10Ml/d offtake to a new WTW at Andover • 10-20Ml/d offtake to SEW at Northgate WTW • 50 – 120 Ml/d to a new WTW at Otterbourne North A new river abstraction intake and pumping station will be required at Reading at the abstraction point. New WTW will be required at: • Kingsclere • Andover • Otterbourne North A new PS will be required at [redacted] A new BPT will be required at: • [redacted]
4	Potable water transfer from the River Thames at Reading to Otterbourne North WTW (50, 80 and 120Ml/d)	Transfer of potable water from [redacted] Reading to Otterbourne. Water provided from either the Severn to Thames Transfer or SESRO. Water treatment will be required [redacted] and potable water will be transferred to Otterbourne WTW. This option includes offtakes for delivery of potable water as follows: • 10Ml/d offtake to Kingsclere WSR • 10Ml/d offtake to Micheldever WSR • 10-20Ml/d offtake to SEW at Northgate WSR • 50 – 120 Ml/d to a new WTW at Otterbourne North –treated water will be delivered to a new storage tank for distribution into the supply network A new river abstraction intake and pumping station will be required at Reading at the abstraction point. Service reservoir extensions will be required at Kingsclere WSR and Micheldever WSR. New WTW will be required at: • Otterbourne North A new PS will be required at [redacted] A new BPT will be required at: [redacted] An alternative option for the Andover connection is being considered where potable water is received at Upper Enham WSR rather than Micheldever WSR.
5	Raw water transfer from Culham to Testwood	As Option 2, except raw water is treated at Testwood not Otterbourne. Transfer of raw water from the River Thames at Culham near Abingdon to Testwood. Water provided from either STT or SESRO. The transferred raw water will require treatment at new WTW sites at Testwood, Kingsclere and Andover.

Option ref	Option name	Option description
		This option includes offtakes for delivery of raw water as follows: • 10Ml/d offtake to a new WTW at Kingsclere • 10Ml/d offtake to a new WTW at Andover • 10-20Ml/d offtake to SEW at Northgate WTW • 50 – 120 Ml/d to a new WTW as an extension to the existing Testwood WTW. New WTW will be required at: • Kingsclere • Andover • Testwood New PS will be required at: • Culham WTW • [redacted] New BPT will be required at: [redacted] • [redacted]
6	Raw water transfer from the River Thames at Reading to Testwood	As Option 3, except raw water is treated at Testwood not Otterbourne. Transfer of raw water from the River Thames at Reading [redacted] to Testwood. Water provided from either STT or SESRO. The transferred raw water will require treatment at new WTW sites at Testwood, Kingsclere and Andover. This option includes offtakes for delivery of raw water as follows: • 10Ml/d offtake to a WTW works at Kingsclere • 10Ml/d offtake to a new WTW at Andover • 10-20Ml/d offtake to SEW at Northgate WTW • 50 – 120 Ml/d to a new WTW as an extension to the existing Testwood WTW. A new river abstraction intake and pumping station will be required at Reading at the abstraction point. New WTW will be required at: • Kingsclere • Andover • Testwood A new PS will be required at [redacted] A new BPT will be required at [redacted]

Figure 2.1: Map of the T2ST options



3 WRSE SEA Findings

3.1 Overview

An options appraisal was undertaken for the T2ST SRO in November 2020 (ref: Thames to Southern Transfer (T2ST) SRO, Option Appraisal, 3 November 2020, 5201578/9.1/DG/004). The data from the options appraisal was sent to WRSE who undertook the SEA for the options in January 2021, and updated in March 2021, following the methodology in the WRSE Regional Plan Environmental Assessment Methodology Guidance, July 2020.

The WRSE SEA outputs for each pipeline option are summarised in Table 3.1 and Table 3.2 and discussed in the following sections. The full WRSE SEA outputs are presented in Appendix A.

For each option, the tables show ratings for Construction and Operation phases against each of the SEA objectives. Table 3.1 shows the ratings before any mitigation is applied and Table 3.2 shows the ratings after mitigation is applied. The applicable mitigation for each SEA objective is described in the following sections.

It should be noted that the WRSE outputs do not include an assessment for any of the additional scheme components that have been considered in the RAPID Gate 1 Report. In addition, the following section does not report the additional regulatory assessments have been completed as part of the Gate 1 submission to RAPID for HRA and WFD. These additional assessments are described in Section 4.

3.2 Comparison of WRSE outputs

Based on the WRSE SEA outputs for residual effects (post mitigation), the six options are rated the same across the SEA objectives, with the following exceptions:

- Biodiversity: Options vary in the construction phase only. Options 3 and 4 perform better than Options 1,2,5 and 6.
- Population and Human Health: Options vary in the construction phase only. Options 1,2 and 5 perform better than Options 3,4 and 6.

The performance of each option against the SEA objectives are reported in Section 3.3 to Section 3.8.

Table 3.1: WRSE SEA output – Effects with no mitigation

	Option	1		2		3		4		5		6	
SEA Topic	SEA Objective	Construc-tion	Operation	Construc-tion	Operation	Construc-tion	Operation	Construc-tion	Operation	Construc-tion	Operation	Construc-tion	Operation
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	---	0	---	0	--	0	--	0	---	0	---	0
Soil	Protect and enhance the functionality, quantity and quality of soils	-	0	-	0	-	0	-	0	-	0	-	0
Water	Increase resilience and reduce flood risk	-	0	-	0	-	0	-	0	-	0	-	0
	Protect and enhance the quality of the water environment and water resources	--	0	--	0	--	0	--	0	--	0	--	0
	Deliver reliable and resilient water supplies	0	+++	0	+++	0	+++	0	+++	0	+++	0	+++
Air	Reduce and minimise air emissions	-	0	-	0	-	0	-	0	-	0	-	
Climatic Factors	Reduce embodied and operational carbon emissions	-	---	-	---	-	---	-	---	-	---	-	---
	Reduce vulnerability to climate change risks and hazards	0	+	0	+	0	+	0	+	0	+	0	+
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	--	-	--	-	--	-	--	-	--	-	--	-

	Option	1		2		3		4		5		6	
SEA Topic	SEA Objective	Construc-tion	Operation	Construc-tion	Operation	Construc-tion	Operation	Construc-tion	Operation	Construc-tion	Operation	Construc-tion	Operation
Historic Environment	Conserve, protect and enhance the historic environment, including archaeology	-	-	-	-	---	-	---	-	-	-	---	-
Population and Human Health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	--	0	--	0	---	0	---	0	--	0	---	0
	Maintain and enhance tourism and recreation	-	0	-	0	-	0	-	0	-	0	-	0
Material Assets	Minimise resource use and waste production	--	0	--	0	--	0	--	0	--	0	--	0
	Avoid negative effects on built assets and infrastructure	--	0	--	0	--	0	--	0	--	0	--	0

Table 3.2: WRSE SEA output – Residual effects (post mitigation)

	Option	1		2		3		4		5		6	
SEA Topic	SEA Objective	Construc-tion	Operation	Construc-tion	Operation	Construc-tion	Operation	Construc-tion	Operation	Construc-tion	Operation	Construc-tion	Operation
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	--	+	--	+	-	+	-	+	--	+	--	+
Soil	Protect and enhance the functionality, quantity and quality of soils	-	0	-	0	-	0	-	0	-	0	-	0
Water	Increase resilience and reduce flood risk	-	0	-	0	-	0	-	0	-	0	-	0
	Protect and enhance the quality of the water environment and water resources	-	0	-	0	-	0	-	0	-	0	-	0
	Deliver reliable and resilient water supplies	0	+++	0	+++	0	+++	0	+++	0	+++	0	+++
Air	Reduce and minimise air emissions	-	0	-	0	-	0	-	0	-	0	-	0
Climatic Factors	Reduce embodied and operational carbon emissions	-	---	-	---	-	---	-	---	-	---	-	---
	Reduce vulnerability to climate change risks and hazards	0	+	0	+	0	+	0	+	0	+	0	+
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	-	0	-	0	-	0	-	0	-	0	-	0

	Option	1		2		3		4		5		6	
SEA Topic	SEA Objective	Construc-tion	Operation	Construc-tion	Operation	Construc-tion	Operation	Construc-tion	Operation	Construc-tion	Operation	Construc-tion	Operation
Historic Environment	Conserve, protect and enhance the historic environment, including archaeology	-	0	-	0	-	0	-	0	-	0	-	0
Population and Human Health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	-	+	-	+	--	+	--	+	-	+	--	+
	Maintain and enhance tourism and recreation	-	0	-	0	-	0	-	0	-	0	-	0
Material Assets	Minimise resource use and waste production	-	0	-	0	-	0	-	0	-	0	-	0
	Avoid negative effects on built assets and infrastructure	-	0	-	0	-	0	-	0	-	0	-	0

3.3 Option 1: Culham to Otterbourne Potable

Potable water transfer from Culham ([redacted], to include treatment at Culham) to the existing Otterbourne WTW. 120Ml/d transfer capacity with the following offtakes: 10-20Ml/d offtake to the existing Kingsclere WSR, 10-20Ml/d offtake to the existing Micheldever WSR, 10-20Ml/d offtake to SEW at the existing Northgate WSR

Biodiversity, flora and fauna

With no mitigation in place, the pipeline was found to result in major negative effects for biodiversity, flora and fauna during construction, which can be improved to a residual moderate negative effect if appropriate mitigation was applied. During operation, with no mitigation in place, the pipeline was found to result in neutral effects for biodiversity, flora and fauna, which can be improved to a residual minor positive effect if appropriate mitigation was applied.

These effects were identified due to the route intersecting with two Special Areas of Conservation (SACs) and four Sites of Special Scientific Interest (SSSIs): Kennet and Lambourn Floodplain SAC and SSSI, River Kennet SSSI, River Lambourn SAC and SSSI and River Test SSSI (the rivers are all classed as chalk streams). There are an additional two SACs and seven SSSIs within 500m, and a further six SSSIs and three LNRs within 2000m There are likely to be disturbance effects during construction. The majority of the sites are also Groundwater Dependent Terrestrial Ecosystems (GWDTE)[1].

In addition, it was reported that there would likely be direct habitat loss of ancient woodlands and a variety of priority habitats; and disturbance for species during construction. Certain habitat types can be reinstated but they may take time to recover.

Operation is unlikely to have negative effects unless maintenance is required within designated sites.

The WRSE Habitats Regulation Assessment (HRA) screening assessment concluded that a HRA Appropriate Assessment will be required for a number of SACs including those mentioned above and others that are further away but potentially hydrologically linked.

Mitigation suggested included investigating the feasibility of directional drilling under the designated river sites; undertaking detailed ecological surveys and assessment; introducing habitat compensation, creation and/or species relocation schemes where required.

Soil

With no mitigation in place, the pipeline was found to result in minor negative effects for soil during construction The rating of effect was unlikely to change if the identified mitigation was applied, and therefore retained a residual minor negative effect post mitigation for construction

These effects were identified due to the pipeline intersecting with three historic landfill sites. Pollution of soils may result during construction, with permanent land take possibly required for construction of pumping stations and other above ground structures

Mitigation suggested included implementation of pollution prevention and control measures to reduce the likelihood of contaminants leaching through soil and entering groundwater

[1] Groundwater Dependent Terrestrial Ecosystems (GWDTE) are wetlands such as springs, flushes and fens which are fed by groundwater rather than rainfall or surface runoff. They are particularly sensitive to hydrological and ecological changes caused by development. Foundations, borrow pits and linear infrastructure such as roads, tracks and trenches can disrupt groundwater flow and impact upon these sensitive habitats

Water

The pipeline was found to result in:

- minor negative effects during construction for resilience and flood risk if no mitigation were in place The rating of effect was unlikely to change if the identified mitigation was applied, and therefore retained a residual minor negative effect post mitigation;
- moderate negative effects during construction for quality of the water environment and water resources if no mitigation were in place, which can be improved to a residual minor negative effect if appropriate mitigation was applied; and
- major positive effects during operation for reliable and resilient water supplies No mitigation is required and therefore the rating of effect remains as major positive for residual effects.

The negative resilience and flood risk effects were identified due to parts of the scheme lying in Flood Zones 2 and 3, and therefore, there is a risk of flooding during construction works Operational effects are unlikely. Measures to reduce the impact of flooding during the construction phase are likely to be implemented, however a potential residual flood risk is likely to remain

The negative effects for quality of the water environment and water resources were identified due to the pipeline intersecting with Source Protection Zone (SPZ) 1 and 2, and with seven Water Framework Directive (WFD) groundwater bodies The scheme also lies within a nitrate vulnerable zone and crosses several rivers. As such, there is potential for water quality effects during construction. The WFD phase 1 screening concluded that further WFD assessment is required for the Thames (Evenlode to Thame)[2] (assuming directional drilling for most rivers)

The positive effects for reliable and resilient water supplies were identified because the scheme will improve water transfer across regions, improving water resource management and resilience of supply

Mitigation suggested included implementing pollution prevention and control measures to reduce the likelihood of contaminants leaching through soil and entering groundwater. In addition, bedding material can be designed so as not to form a preferential pathway for groundwater. Directional drilling should be used where possible.

Air

With no mitigation in place, the pipeline was found to result in minor negative effects for air during construction. The rating of effect was unlikely to change if the identified mitigation was applied, and therefore retained a residual minor negative effect post mitigation for construction

These effects were identified due to the likelihood of generating short-term vehicle emissions and dust from construction activities.

Mitigation suggested included implementing best practice mitigation measures during construction phase, however minor and temporary impacts on air quality are likely to still occur.

Climatic Factors

The pipeline was found to result in:

- minor negative effects for embodied and operational carbon emissions for construction, and major negative effects for operation if no mitigation were in place The rating of effect was unlikely to change if the identified mitigation was applied, and therefore retained a residual

[2] Note that the WRSE SEA outputs in Appendix A incorrectly name the waterbodies requiring WFD Phase 2 screening The correct name has been included in this report Please see Annex B3 WFD for further detail

minor negative effect post mitigation for construction and a major negative effect post mitigation for operation (relative to other WRSE Regional Plan options); and

- minor positive effects during operation for vulnerability to climate change risks and hazards. No mitigation is required and therefore the rating of effect remains as minor positive for residual effects.

The negative effects were identified due to the generation of carbon from materials used to construct the pipeline (embodied carbon), construction activities and from operation (e g energy use by pumping stations).

The positive effects were identified due to the scheme contributing to efficient use of water resources, providing protection against future drought scenarios (and potentially avoiding abstractions in more vulnerable areas).

Mitigation suggested included investigating the use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon A carbon footprint study could help identify areas for carbon savings or alternative materials. In the future, as the electricity grid is decarbonised, greener energy will become available

Landscape

With no mitigation in place, the pipeline was found to result in moderate negative effects for landscape during construction, and minor negative effects during operation, which can be improved to a residual minor negative effect during construction and neutral effect during operation if appropriate mitigation was applied.

These effects were identified due to the route intersecting with the North Wessex Downs Area of Outstanding Natural Beauty (AONB) and four National Character Areas (NCAs); Thames Basin Heaths; Hampshire Downs; Upper Thames Clay Vales; and Berkshire and Marlborough Downs Construction will result in visual effects, however, the majority of the pipeline infrastructure will be below ground and land reinstated above it. The WSR and treatment works at the end of the route/offtake routes are existing and it is assumed that any upgrade works would be within the existing operational site boundaries (full options details have yet to be determined)

Mitigation suggested including best practice measures to reduce visual impact during construction Construction should be conducted in phases so visual disturbance will be temporary at each location The pipeline will be buried once constructed but pumping stations and other above ground structures may require screening for landscape effects. Once further option detail on WSR and treatment works upgrades are determined effects should be reviewed.

Historic Environment

With no mitigation in place, the pipeline was found to result in minor negative effects for historic environment during construction, and minor negative effects during operation. The construction effect was unlikely to change if the identified mitigation was applied, and therefore retained a residual minor negative effect post mitigation for construction The effects during operation can be improved to a residual neutral effect if appropriate mitigation was applied.

These effects were identified due to the numerous listed buildings and several scheduled monuments located within 500m of the route There is also a registered battlefield (Battle of Newbury 1643) and four registered parks and gardens within 500m of the scheme. There are unlikely to be direct effects, although the route is adjacent to several of the identified assets During construction there may be temporary effects on the setting of these assets. There is also potential to uncover archaeology during excavation works for the pipeline. The majority of the pipeline infrastructure is underground and land will be reinstated above, therefore, operational

effects on setting are unlikely It is not clear where pumping stations will be located and whether these will be near historic assets.

Mitigation suggested included implementing best practice measures during construction and siting pumping stations and other permanent above ground infrastructure away from historic assets.

Population and Human Health

The pipeline was found to result in:

- moderate negative effects during construction for health and wellbeing of the local community, including economic and social wellbeing if no mitigation were in place, which can be improved to a residual minor negative effect if appropriate mitigation was applied. During operation a neutral effect was recorded if no mitigation were in place, which can be improved to a residual minor positive effect if appropriate mitigation was applied; and
- minor negative effects for tourism and recreation if no mitigation were in place. The rating of effect was unlikely to change if the identified mitigation was applied, and therefore retained a residual minor negative effect post mitigation for construction

The health and wellbeing effects were identified due to the pipeline intersecting a golf course and the boundary of a primary school. Construction may affect the functioning of the golf course and the use of school playing fields The route is also within 500m of allotments, churches, schools, a playing field and a cemetery. Construction is likely to cause noise and visual disruption for users of these assets. Land will be reinstated following construction.

Mitigation suggested included liaison with the golf course and primary school if route cannot be re-routed around these assets. Best practice construction methods should be implemented to reduce amenity effects for the community Potential opportunities to enhance the local areas should be explored when reinstating land in order to achieve positive effects

The tourism and recreation effects were identified due to the pipeline intersecting the Ridgeway National Trail, a sports facility and three cycle routes, therefore causing temporary disruption during construction It is likely that diversions would be put in place during construction and that land will be reinstated. However, there may be temporary restrictions in access to the sports facility

Mitigation suggested included implementation of best practice construction methods to minimise disruption and appropriate use of diversions and signage. The pipeline route should be diverted around the sports facility

Material Assets

The pipeline was found to result in:

- moderate negative effects during construction for resource use and waste production if no mitigation were in place, which can be improved to a residual minor negative effect if appropriate mitigation was applied; and
- moderate negative effects during construction on built assets and infrastructure if no mitigation were in place, which can be improved to a residual minor negative effect if appropriate mitigation was applied

The effects for resource use and waste production were identified due to pipeline construction requiring materials and resource use. It was noted that excavated material is likely to be reused onsite

Mitigation suggested included the opportunity to implement sustainable design measures, and sourcing of materials locally where possible. However it is likely that minor negative effects will remain.

The effects on built assets and infrastructure were identified due to the pipeline intersecting motorways at three locations (including the M3 and M4), a number of A-roads and one railway line potentially causing disruption during construction. Potential road closures on smaller roads may cause disruption Operational effects are unlikely as the pipeline will be underground

Mitigation suggested included the use of directional drilling where possible to minimise disruption on road and rail infrastructure.

3.4 Option 2: Culham to Otterbourne Raw

Raw water transfer from Culham ([redacted]) to the existing Otterbourne WTW. 120Ml/d transfer capacity with the following offtakes: 10-20Ml/d offtake to the existing Kingsclere WSR, 10 20Ml/d offtake to the existing Micheldever WSR, 10-20Ml/d offtake to SEW at the existing Northgate WSR Treatment within SRN/SEW supply area

Option 2 scored exactly the same as Option 1 on all SEA topics. As such, the information has not been repeated here

An additional note was made for Biodiversity, Flora, Fauna, which was that as this option requires a raw water transfer, there is a potential for Invasive Non Native Species (INNS) transfer The mitigation identified for this was to undertake an INNS assessment

3.5 Option 3: Reading to Otterbourne Raw

Raw water transfer from the existing Reading WTW to the existing Otterbourne WTW. 120Ml/d transfer capacity with the following offtakes: 10 20Ml/d offtake to the existing Kingsclere WTW, 10 20Ml/d offtake to Andover, 10-20Ml/d offtake to SEW at the existing Northgate WSR Treatment within SRN/SEW supply area.

Biodiversity, flora and fauna

With no mitigation in place, the pipeline was found to result in moderate negative effects during construction for biodiversity, flora and fauna, which can be improved to a residual minor negative effect if appropriate mitigation was applied During operation, with no mitigation in place, the pipeline was found to result in neutral effects for biodiversity, flora and fauna, which can be improved to a residual minor positive effect if appropriate mitigation was applied.

These effects were identified due to the route intersecting with the River Test SSSI (a chalk river). There are a number of additional SSSIs and LNRs within 500m and the route is within 500m of the River Itchen SAC and SSSI. There are several other designated sites within 2000m There are likely to be disturbance effects during construction The majority of the sites are also GWDTE.

In addition, it was reported that there would likely be direct habitat loss of ancient woodlands and a variety of priority habitats; and disturbance for species during construction Land will be reinstated above the pipeline but habitats and species disturbed may take time to recover.

Operation is unlikely to have negative effects unless maintenance is required within designated sites

The WRSE HRA screening assessment concluded that a HRA Appropriate Assessment will be required for a number of the designated sites including those mentioned above and others that are further away but potentially hydrologically linked.

This is a raw water transfer and therefore, there is potential for INNS transfer

Mitigation suggested included investigating the feasibility of directional drilling under the designated river sites; undertaking detailed ecological surveys and assessment; introducing habitat compensation, creation and/or species relocation schemes where required and undertaking an INNS assessment.

Soil

With no mitigation in place, the pipeline was found to result in minor negative effects for soil during construction. The rating of effect was unlikely to change if the identified mitigation was applied, and therefore retained a residual minor negative effect post mitigation for construction

These effects were identified due to the pipeline intersecting with two authorised landfill sites and one historic landfill. Pollution of soils may be possible during construction, with permanent land take possibly required for construction of pumping stations and other above ground structures.

Mitigation suggested included implementation of pollution prevention and control measures to reduce the likelihood of contaminants leaching through soil and entering groundwater

Water

The pipeline was found to result in:

- minor negative effects during construction for resilience and flood risk if no mitigation were in place. The rating of effect was unlikely to change if the identified mitigation was applied, and therefore retained a residual minor negative effect post mitigation;
- moderate negative effects during construction for quality of the water environment and water resources if no mitigation were in place, which can be improved to a residual minor negative effect if appropriate mitigation was applied; and
- major positive effects during operation for reliable and resilient water supplies No mitigation is required and therefore the rating of effect remains as major positive for residual effects.

The negative resilience and flood risk effects were identified due to parts of the scheme lying in Flood Zones 2 and 3, and therefore, and therefore, there is a risk of flooding during construction works. Operational effects are unlikely. Measures to reduce the impact of flooding during the construction phase are likely to be implemented, however a potential residual flood risk is likely to remain.

The negative effects for quality of the water environment and water resources were identified due to the pipeline intersecting with Source Protection Zone (SPZ) 1 and 2, and with eight WFD groundwater bodies. The scheme also lies within a nitrate vulnerable zone and crosses several rivers As such, there is potential for water quality effects during construction The WFD phase 1 screening concluded that further WFD assessment is required for the Thames (Wallingford to Caversham)[3] (assuming directional drilling for most rivers).

The positive effects for reliable and resilient water supplies were identified because the scheme will improve water transfer across regions, improving water resource management and resilience of supply.

Mitigation suggested included implementing pollution prevention and control measures to reduce the likelihood of contaminants leaching through soil and entering groundwater. In

[3] Note that the WRSE SEA outputs in Appendix A incorrectly name the waterbodies requiring WFD Phase 2 screening The correct name has been included in this report Please see Annex B3 WFD for further detail

addition, bedding material can be designed so as not to form a preferential pathway for groundwater. Directional drilling should be used where possible.

Air

With no mitigation in place, the pipeline was found to result in minor negative effects for air during construction. The rating of effect was unlikely to change if the identified mitigation was applied, and therefore retained a residual minor negative effect post mitigation for construction

These effects were identified due to the likelihood of generating short-term vehicle emissions and dust from construction activities.

Mitigation suggested included implementing best practice mitigation measures during construction phase, however minor and temporary impacts on air quality are likely to still occur.

Climatic Factors

The pipeline was found to result in:

- minor negative effects for embodied and operational carbon emissions for construction, and major negative effects for operation if no mitigation were in place. The rating of effect was unlikely to change if the identified mitigation was applied, and therefore retained a residual minor negative effect post mitigation for construction and a major negative effect post mitigation for operation (relative to other WRSE Regional Plan options); and
- minor positive effects during operation for vulnerability to climate change risks and hazards. No mitigation is required and therefore the rating of effect remains as minor positive for residual effects

The negative effects were identified due to the generation of carbon from materials used to construct the pipeline (embodied carbon), construction activities and from operation (e.g. energy use by pumping stations)

The positive effects were identified due to the scheme contributing to efficient use of water resources, providing protection against future drought scenarios (and potentially avoiding abstractions in more vulnerable areas)

Mitigation suggested included investigating the use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon. A carbon footprint study could help identify areas for carbon savings or alternative materials In the future, as the electricity grid is decarbonised, greener energy will become available.

Landscape

With no mitigation in place, the pipeline was found to result in moderate negative effects for landscape during construction, and minor negative effects during operation, which can be improved to a residual minor negative effect during construction and neutral effect during operation if appropriate mitigation was applied.

These effects were identified due to the route intersecting with the North Wessex Downs AONB and NCA Construction will result in visual effects, however, the majority of the pipeline infrastructure will be below ground and land reinstated above it. The WSR and treatment works at the end of the route/offtake routes are existing and it is assumed that any upgrade works would be within the existing operational site boundaries (full options details have yet to be determined).

Mitigation suggested including best practice measures to reduce visual impact during construction Construction should be conducted in phases so visual disturbance will be temporary at each location. The pipeline will be buried once constructed but pumping stations and other above ground structures may require screening for landscape effects. Once further

option detail on WSR and treatment works upgrades are determined effects should be reviewed.

Historic Environment

With no mitigation in place, the pipeline was found to result in major negative effects for historic environment during construction, and minor negative effects during operation, which can be improved to a residual minor negative effect during construction and neutral effect during operation if appropriate mitigation was applied

These effects were identified due to the numerous listed buildings and several scheduled monuments located within 500m of the route The route also intersects with two registered parks and gardens and runs along the boundary of a scheduled monument. During construction there may be temporary effects on the setting of these assets and direct impacts on the two registered parks and gardens There is also potential to uncover archaeology during excavation works for the pipeline. The majority of the pipeline infrastructure is underground and land will be reinstated above, therefore, operational effects on setting are unlikely. It is not clear where pumping stations will be located and whether these will be near historic assets

Mitigation suggested included implementing best practice measures during construction and siting pumping stations away from historic assets. The pipeline should be re-routed around the registered parks and gardens

Population and Human Health

The pipeline was found to result in:

- major negative effects during construction for health and wellbeing of the local community, including economic and social wellbeing if no mitigation were in place, which can be improved to a residual moderate negative effect if appropriate mitigation was applied During operation a neutral effect was recorded if no mitigation were in place, which can be improved to a residual minor positive effect if appropriate mitigation was applied; and
- minor negative effects for tourism and recreation if no mitigation were in place The rating of effect was unlikely to change if the identified mitigation was applied, and therefore retained a residual minor negative effect post mitigation for construction.

The health and wellbeing effects were identified due to the pipeline intersecting a golf course and school in Theale, Padworth Common Open access area, a rugby club and school in Tadley, Ashe Public Park, and two cricket clubs in Basingstoke and Andover. The route is also within 500m of additional community facilities Therefore, construction is likely to have a significant impact on the local community. Land will be reinstated following construction.

Mitigation suggested included re routing the pipeline around community assets if possible; or if not, liaison with affected asset owners would be required Best practice construction methods to reduce amenity effects for the community. Potential opportunities to enhance the local areas should be explored when reinstating land in order to achieve positive effects.

The tourism and recreation effects were identified due to the pipeline intersecting two cycle routes and a sports facility, therefore causing temporary disruption during construction. It is likely that diversions would be put in place during construction and that land will be reinstated However, there may be temporary restrictions in access to the sports facility

Mitigation suggested included implementation of best practice construction methods to minimise disruption and appropriate use of diversions and signage The pipeline route should be diverted around the sports facility.

Material Assets

The pipeline was found to result in:

- moderate negative effects during construction for resource use and waste production if no mitigation were in place, which can be improved to a residual minor negative effect if appropriate mitigation was applied; and
- moderate negative effects during construction on built assets and infrastructure if no mitigation were in place, which can be improved to a residual minor negative effect if appropriate mitigation was applied.

The effects for resource use and waste production were identified due to pipeline construction requiring materials and resource use. It was noted that excavated material is likely to be reused onsite.

Mitigation suggested included the opportunity to implement sustainable design measures, and sourcing of materials locally where possible. However it is likely that minor negative effects will remain.

The effects on built assets and infrastructure were identified due to the pipeline intersecting motorways at three locations, several A-roads and three railway lines potentially causing disruption during construction. Potential road closures on smaller roads may cause disruption. Operational effects are unlikely as the pipeline will be underground

Mitigation suggested included the use of directional drilling where possible to minimise disruption on road and rail infrastructure.

3.6 Option 4: Reading to Otterbourne Potable

Potable water transfer from existing Reading WTW (with treatment at Reading) to the existing Otterbourne WTW. 120Ml/d transfer capacity with the following offtakes: 10-20Ml/d offtake to the existing Kingsclere WTW, 10-20Ml/d offtake to Andover, 10 20Ml/d offtake to SEW at the existing Northgate WSR

Option 4 scored exactly the same as Option 3 on all SEA topics. As such, the information has not been repeated here

It was noted however, that as this option requires a potable water transfer, there is no potential for INNS transfer.

3.7 Option 5: Culham to Testwood Raw

Raw water transfer from Culham ([redacted]) to the existing Testwood WTW. 120Ml/d transfer capacity with the following offtakes: 10-20Ml/d offtake to the existing Kingsclere WTW, 10-20Ml/d offtake to Andover, 10 20Ml/d offtake to SEW at the existing Northgate WSR Treatment within SRN/SEW supply area

Option 5 scored exactly the same as Option 1 on all SEA topics. Some additional information was included in the assessments to cover the additional length of pipeline between Otterbourne and Testwood This information is detailed in the appropriate topic below Where the information was the same as Option 1, the information has not been repeated.

Biodiversity, flora and fauna

The effects are as Option 1 with additional intersections with the Solent and Southampton Water Ramsar site, and the Lower Test Valley SSSI. There are also a number of additional SACs, a Special Protection Area (SPA), SSSIs and LNRs within 500m and 2000m

In addition, as this option requires a raw water transfer, there is a potential for INNS transfer.

Mitigation suggested included investigating the feasibility of directional drilling under the designated river sites; undertaking detailed ecological surveys and assessment; introducing habitat compensation, creation and/or species relocation schemes where required and undertaking an INNS assessment

Soil

The effects are as Option 1 with additional intersections with historic landfill sites (total of seven historic landfill sites)

Water

The effects are as Option 1 with an additional intersection of a WFD groundwater body (total of 8 WFD groundwater bodies).

Landscape

The effects are as Option 1 with an additional intersection of an NCA (total of 5 NCAs).

Historic Environment

The effects are as Option 1 with an additional registered park and garden within 500m of the scheme (total of 5 registered parks and gardens).

Material Assets

The effects are as Option 1 with additional intersections of motorways (the M27) and railway lines.

3.8 Option 6: Reading to Testwood Raw

Raw water transfer from existing Reading WTW to the existing Testwood WTW 120Ml/d transfer capacity with the following offtakes: 10-20Ml/d offtake to the existing Kingsclere WTW, 10 20Ml/d offtake to Andover, 10-20Ml/d offtake to SEW at the existing Northgate WSR. Treatment within SRN/SEW supply area

Option 6 scored similarly to Option 3 on most SEA topics. The exception to this was for Biodiversity, flora and fauna, during construction.

Some additional information was included in the assessments to cover the additional length of pipeline between Otterbourne and Testwood. This information is detailed in the appropriate topic below Where the information was the same as Option 3, the information has not been repeated

Biodiversity, flora and fauna

With no mitigation in place, the pipeline was found to result in major negative effects during construction for biodiversity, flora and fauna, which can be improved to a residual moderate negative effect if appropriate mitigation was applied. During operation, with no mitigation in place, the pipeline was found to result in neutral effects for biodiversity, flora and fauna, which can be improved to a residual minor positive effect if appropriate mitigation was applied.

These effects were identified due to the route intersecting with the Solent and Southampton Water Ramsar site, and two SSSIs: Lower Test Valley and River Test (a chalk stream) There are also a number of additional SACs, an SPA, SSSIs and LNRs within 500m and 2000m.

Other effects and mitigation were as Option 3.

Soil

The effects are as Option 3 with additional intersections with historic landfill sites (total of two authorised landfill sites and five historic landfills)

Water

The effects are as Option 3 with an additional intersection of a WFD groundwater body (total of nine WFD groundwater bodies).

Landscape

The effects are as Option 3 with an additional intersection of three NCAs (total of 4 NCAs).

Historic Environment

The effects are as Option 3 with an additional intersection of a registered park and garden (total of three registered parks and gardens)

Population and Human Health

The health and wellbeing effects were identified due to the pipeline intersecting a golf course, two playing fields, Ashe Park, Main Road Methodist church, and the boundary of two schools

Other effects and mitigation were as Option 3.

4 Additional Assessment

4.1 Overview

This section provides additional assessment to supplement the WRSE outputs relating to SEA. The following assessment does not change or update the WRSE scores in Section 3

There are three types of additional assessment presented in this section. These are:

- Local level data: Where the effects of the pipeline options on local designations are assessed
- Habitat improvement data: Where the effects of the pipeline options on river restoration and habitat creation areas are assessed.
- Scheme component data: Where the effects of scheme components associated with the pipeline options are assessed.

In addition this section presents the findings of additional assessment undertaken as part of the Gate 1 submission to RAPID: This includes additional HRA and WFD Assessment

4.2 Local level data

The following locally designated areas have been reviewed for each of the pipeline options:

- Local wildlife sites (or Sites of Importance for Nature Conservation (SINCs)); and
- Conservation areas.

Table 4.1 details the local wildlife sites that intersect or lie within 200m of the Options. It should be noted that this list has been compiled using the websites as listed in Table 5 2 and as such may contain omissions and/or errors.

Table 4.2 details the conservation areas that intersect or lie within 200m of the Options. It should be noted that this list has been compiled using the websites as listed in Table 5 2 and as such may contain omissions and/or errors.

Each of the options intersect or lie within 200m of a number of local wildlife sites as shown in Table 4 1 There are likely to be disturbance effects during construction, however mitigation can be put in place such as directional drilling under the designated sites; undertaking detailed ecological surveys and assessment; introducing habitat compensation, creation and/or species relocation schemes where required

Each of the options intersect or lie within a number of conservation areas as shown in Table 4.2. Effects on the setting of the conservation areas may result, however mitigation can be put in place such as directional drilling under the designated area and siting pumping stations and other permanent above ground infrastructure away from the designated area.

Table 4.1: Local wildlife sites within 200m of the T2ST options

Name	Grid Ref	Local Authority	Affected by options
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Name	Grid Ref	Local Authority	Affected by options
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Table 4.2: Conservation areas within 200m of the T2ST options

Name	Grid Ref	Local Authority	Affected by options
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4.3 Habitat improvement data

The following site specific data has been reviewed for each of the pipeline options:

- Manor House Farm habitat creation area; and
- River Restoration Plans for:
  - River Kennet SSSI and River Lambourn SSSI and SAC;
  - River Itchen SSSI and SAC;
  - River Test SSSI.

Manor House Farm habitat creation area is part of the Regional Habitat Compensation Programme (RHCP) which is a strategic programme run by the Environment Agency and seeks to replace habitats that are lost due to coastal squeeze or tidal inundation effects that arise from the management of coastal defences[4]. The Manor House Farm habitat creation scheme will be creating approx. 69ha of grazing marsh (see map in Appendix C).

Options 5 and 6 require land that is located to the south of the Manor House Farm habitat creation area. Construction may cause negative effects due to disturbance to the habitat creation area, however mitigation can be put in place such as directional drilling under the area; undertaking detailed ecological surveys and assessment; introducing habitat compensation, creation and/or species relocation schemes where required.

The national programme of river restoration planning and implementation on river SSSIs in England is led by the Environment Agency and Natural England. The River Restoration Plans describe the specific approach being taken to restore the named SSSI river.

Options 1, 2 and 5 intersect the River Kennet and Lambourn Floodplain SAC and SSSI. Options 3, 4 and 6 intersect the River Itchen SAC and SSSI. All six options intersect the River Test SSSI. Construction may cause negative effects due to disturbance to the river restoration areas, however mitigation can be put in place such as directional drilling under the area; undertaking detailed ecological surveys and assessment; introducing habitat compensation, creation and/or species relocation schemes where required.

4.4 Scheme component data

The WRSE review was undertaken in January 2021, and updated in March 2021, using data from the T2ST Options Appraisal (ref: Thames to Southern Transfer (T2ST) SRO, Option Appraisal, 3 November 2020, 5201578/9.1/DG/004).

As part of the additional work undertaken in order to produce RAPID Gate 1 Report, it has been identified that the six options require additional components in order for them to transfer water. The components associated with each option are set out in Table 4.3.

These components have been included within this section of the SEA.

Table 4.3: Additional areas of work since WRSE assessment

Option ref	Changes since WRSE assessment

1	• New start point and section of pipeline route at Culham
	• Possible alternative offtake to Upper Enham
	• Slight modification of the pipeline route to Andover WTW
	• Modification of offtake to Otterbourne North (not Otterbourne WTW)
	• Additional areas for works at:
	  ○ Culham WTW
	  [redacted]

[4] Source: Regional Habitat Compensation Programme — Coastal Partners (accessed 27/04/21)

Option ref	Changes since WRSE assessment
	[redacted] ○ Upper Enham Reservoir ○ Andover WTW [redacted] ○ Otterbourne North WTW
2	• New start point and section of pipeline route at Culham • Slight modification of the pipeline route to Kingsclere WTW • Slight modification of the pipeline route to Andover WTW • Modification of offtake to Otterbourne North (not Otterbourne WTW) • Additional areas for works at: ○ Culham WTW [redacted] ○ Kingsclere WTW ○ Andover WTW [redacted] ○ Otterbourne North WTW
3	• Modification of the pipeline route to Kingsclere WTW • Slight modification of the pipeline route to Northgate WSR • Modification of offtake to Otterbourne North (not Otterbourne WTW) • Additional areas for works at: [redacted] ○ Kingsclere WTW ○ Andover WTW [redacted] ○ Otterbourne North WTW
4	• Possible alternative offtake to Upper Enham • Modification of the pipeline route to Kingsclere WTW • Slight modification of the pipeline route to Northgate WSR • Modification of offtake to Otterbourne North (not Otterbourne WTW) • Additional areas for works at: [redacted] ○ Kingsclere WTW ○ Andover WTW [redacted] ○ Otterbourne North WTW
5	• New start point and section of pipeline route at Culham • Slight modification of the pipeline route to Kingsclere WTW • Slight modification of the pipeline route to Andover WTW • Slight modification of the pipeline route to Testwood • Additional areas for works at: ○ Culham WTW [redacted] ○ Andover WTW [redacted] ○ Testwood
6	• Modification of the pipeline route to Kingsclere WTW • Slight modification of the pipeline route to Northgate WSR • Additional areas for works at: [redacted] ○ Kingsclere WTW ○ Andover WTW [redacted] ○ Testwood

For each of the scheme components, a preliminary assessment has been made against the SEA objectives. Only SEA objectives where an effect is likely to result are reported. If no text is included, no SEA effects are considered likely.

4.4.1 Culham WTW

The review of this component against the SEA objectives show additional effects are likely for two SEA topics.

Water

The Culham WTW site lies partially within Flood Zones 2 and 3 and therefore, there is a risk of flooding during construction works. Operational effects are unlikely. Measures to reduce the impact of flooding during the construction phase are likely to be implemented, however a potential residual flood risk is likely to remain.

Landscape

The Culham WTW site lies within the Upper Thames Clay Vales NCA. Construction will result in visual effects. The site may require screening for landscape effects. Further investigation into the potential landscape effects should be undertaken in Gate 2.

4.4.2 [redacted]

[redacted]

4.4.3 [redacted]

[redacted]

[redacted]

4.4.4 Upper Enham Reservoir

The review of this component against the SEA objectives show additional effects are likely for two SEA topics.

Water

The Upper Enham Reservoir site lies within SPZ 2 and a nitrate vulnerable zone. As such, there is potential for water quality effects during construction. Mitigation should be included such as implementing pollution prevention and control measures to reduce the likelihood of contaminants leaching through soil and entering groundwater.

Landscape

The Upper Enham Reservoir site lies within the North Wessex Downs AONB and the Hampshire Downs NCA. Construction will result in visual effects. The site may require screening for landscape effects. Further investigation into the potential landscape effects should be undertaken in Gate 2.

4.4.5 Andover WTW

The review of this component against the SEA objectives show additional effects are likely for three SEA topics.

Landscape

The Andover WTW site lies within the Hampshire Downs NCA. Construction will result in visual effects. The site may require screening for landscape effects. Further investigation into the potential landscape effects should be undertaken in Gate 2.

Historic Environment

The following listed buildings lie within 500m of the Andover WTW site:

- Bridge Next To Fishing Cottage, Grade II listed;
- Church Of All Saints, Grade II* listed;
- Norman Court, Grade II listed; and
- Barns And Stables 50 Metres South Of Norman Court, Grade II listed.

During construction there may be temporary effects on the setting of these assets. Further investigation into the potential Historic Environment effects should be undertaken in Gate 2.

Population and Human Health

The Andover WTW site lies within 500m of community facilities including golf courses and religious grounds. Construction may have an effect on the local community. Land will be reinstated following construction. Best practice construction methods should be employed to reduce amenity effects for the community. Potential opportunities to enhance the local areas should be explored when reinstating land.

4.4.6

4.4.7

-
-

4.4.8 Otterbourne WTW

The review of this component against the SEA objectives show additional effects are likely for five SEA topics.

Biodiversity, flora and fauna

The Otterbourne WTW site is within 500m of the River Itchen SSSI and SAC There are several other designated sites within 2000m. There are likely to be disturbance effects during construction. In addition there may be direct habitat loss of a variety of priority habitats; and disturbance for species during construction. Mitigation should be implemented such as undertaking detailed ecological surveys and assessment; introducing habitat compensation, creation and/or species relocation schemes where required.

Soil

The Otterbourne WTW site lies within 500m of the Otterbourne pumping station historic landfill site. Pollution of soils may result during construction. Mitigation suggested includes implementation of pollution prevention and control measures to reduce the likelihood of contaminants leaching through soil and entering groundwater.

Landscape

The Otterbourne WTW site lies within the Hampshire Downs NCA and approximately 300m west of the South Downs National Park. Construction will result in visual effects. The site may require screening for landscape effects. Further investigation into the potential landscape effects should be undertaken in Gate 2.

Historic Environment

The following listed buildings lie within 500m of the Otterbourne WTW site:

- Myrtle Cottage, Grade II listed;
- Sunningdale, Grade II listed;
- The Old Parsonage, Grade II listed; and
- Bourne House, Grade II listed.

During construction there may be temporary effects on the setting of these assets. Further investigation into the potential Historic Environment effects should be undertaken in Gate 2.

Population and Human Health

The Otterbourne WTW site lies within 500m of community facilities including a playing field. Construction may have an effect on the local community. Land will be reinstated following construction. Best practice construction methods should be employed to reduce amenity effects for the community. Potential opportunities to enhance the local areas should be explored when reinstating land.

4.4.9 [redacted]

[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

[redacted]

4.4.10

[redacted]

[redacted]

4.4.11 Kingsclere WTW

The review of this component against the SEA objectives show additional effects are likely for four SEA topics.

Soil

The Kingsclere WTW site lies within 500m of the Old Chalk Pits historic landfill site. Pollution of soils may result during construction. Mitigation suggested includes implementation of pollution prevention and control measures to reduce the likelihood of contaminants leaching through soil and entering groundwater.

Water

The Kingsclere WTW site lies within SPZ 2 and on the western boundary of a nitrate vulnerable zone. As such, there is potential for water quality effects during construction. Mitigation should be included such as implementing pollution prevention and control measures to reduce the likelihood of contaminants leaching through soil and entering groundwater.

Landscape

The Kingsclere WTW site lies within the North Wessex Downs AONB and the Thames Basin Heaths and Hampshire Downs NCAs. Construction will result in visual effects. The site may require screening for landscape effects. Further investigation into the potential landscape effects should be undertaken in Gate 2.

Population and Human Health

The Kingslere WTW site lies within 500m of community facilities including a golf course and playing fields. Construction may have an effect on the local community. Land will be reinstated following construction. Best practice construction methods should be employed to reduce amenity effects for the community. Potential opportunities to enhance the local areas should be explored when reinstating land.

4.4.12 Testwood

The review of this component against the SEA objectives show additional effects are likely for five SEA topics.

Biodiversity, flora and fauna

The Testwood site is within 500m of the Solent & Southampton Water Ramsar site and SPA, the Lower Test Valley SSSI, and the River Test SSSI There are several other designated sites within 2000m. There are likely to be disturbance effects during construction. In addition there may be direct habitat loss of a variety of priority habitats; and disturbance for species during construction. Mitigation should be implemented such as undertaking detailed ecological surveys and assessment; introducing habitat compensation, creation and/or species relocation schemes where required.

Soil

The Testwood site lies within 500m of the "East of Nutsey Lane" historic landfill site. Pollution of soils may result during construction. Mitigation suggested includes implementation of pollution prevention and control measures to reduce the likelihood of contaminants leaching through soil and entering groundwater.

Water

The Testwood site lies within Flood Zones 2 and 3 and a nitrate vulnerable zone, and therefore, there is a risk of flooding during construction works. Operational effects are unlikely. Measures to reduce the impact of flooding during the construction phase are likely to be implemented, however a potential residual flood risk is likely to remain.

Landscape

The Testwood site lies within the South Hampshire Lowlands NCA. Construction will result in visual effects. The site may require screening for landscape effects. Further investigation into the potential landscape effects should be undertaken in Gate 2.

Historic Environment

Nursling Mill, Grade II listed building lies within 500m of the Testwood site. During construction there may be temporary effects on the setting of this asset. Further investigation into the potential Historic Environment effects should be undertaken in Gate 2.

4.5 Additional assessment as part of the Gate 1 process

As part of the Gate 1 submission to RAPID, additional regulatory assessments have been completed for the T2ST options for HRA and WFD. The regulatory assessments are summarised in Annex B1 the EAR and the full assessments are presented as separate annexes (Annex B2 and B3 respectively).

The Habitats Regulations Assessment reports the findings of the full HRA Stage 2 / Appropriate Assessment (AA). WRSE undertook the initial HRA screening and identified a number of potential 'likely significant effects', and a number of 'uncertain effects' for each of the options. The AA concluded that all six options were identified as having 'no likely significant effects' (alone), after mitigation is implemented. This was dependant on the route for Options 5 and 6 being altered to avoid intersecting the Solent and Southampton Water Ramsar and Special Protection Area (SPA) sites, so as to avoid any likely significant effects on these sites. In addition, the HRA specified that directional drilling would be required for all options to cross the River Lambourn Special Area of Conservation (SAC), and for Options 5 and 6 to cross the River Test, so as to avoid likely significant effects on these sites.

The Water Framework Directive Assessment reports the findings of the WFD. The Level 1 WFD assessment undertaken by WRSE indicated that all options had one waterbody which required further assessment; Thames (Evenlode to Thame) – Option 1, 2 and 5; and Thames (Wallingford to Caversham) – Option 3, 4 and 6. Level 2 WFD assessments were completed for these two waterbodies. The findings indicate that there are potentially precautionary WFD

compliance risks associated with the operation of the new abstractions for all options. The potential hydrological effects could conflict with achieving WFD status objectives. This is particularly the case for Options 3, 4 and 6 where hydrology/river flow is an existing limiting factor. The potential biological effects, particularly on fish, would require further assessment. For all options it has been assumed that another SRO would be used in combination with this option to support the water to the River Thames. This will help to reduce the impact on hydrological regime and therefore on the biological elements.

5 Conclusion and Recommendations

5.1 Conclusion

This section sets out the conclusions based on the WRSE SEA findings and additional assessment that has been undertaken to date for the six options under consideration.

For construction, all of the options would have some negative or neutral residual effects across the SEA objectives during construction. The effects are similar for all options with the exception of Biodiversity and Population and Human Health. Options 1, 2 and 5 intersect with a greater number of designated sites than Options 3 and 4 and therefore are predicted to result in greater residual effects on Biodiversity during construction. Options 3, 4 and 6 intersect with a greater number of community facilities than Options 1, 2 and 5 and therefore are predicted to result in greater residual effects on community receptors during construction.

During operation, all of the options would have neutral or positive residual effects across the SEA objectives, with the exception of Climatic Factors. Positive residual effects could result from habitat enhancement and enhancing the local areas for the community. In addition, positive residual effects were likely to result due to the scheme improving water transfer across regions, thus improving water resource management and resilience of supply; and the scheme contributing to efficient use of water resources, providing protection against future drought scenarios (and potentially avoiding abstractions in more vulnerable areas). However, Climatic Factors retained a residual major negative effect for embodied and operational carbon emissions due to the likely energy use during operation (e.g. pumping stations).

The local level data findings show that each of the options intersect or lie within 200m of a number of local wildlife sites and conservation areas. However mitigation can be put in place in order to reduce the potential effects on these areas.

The habitat improvement data findings show that Options 5 and 6 require land that is located to the south of the Manor House Farm habitat creation area. All options intersect SSSI and SAC river restoration areas, and construction may cause disturbance effects to these river restoration areas.

The scheme component data findings show that all additional components have some additional effects on some of the SEA objectives. The Otterbourne, Reading and Testwood sites show the most additional effects, with effects likely for five SEA topics. The Otterbourne site is required for Options 1, 2, 3 and 4. The Reading site is required for Options 3, 4 and 6, and the Testwood site is required for Options 5 and 6.

The additional regulatory assessments undertaken as part of Gate 1 for HRA and WFD find that Options 5 and 6 should be re-routed to avoid intersecting the Solent and Southampton Water Ramsar and SPA. In addition directional drilling would be required for all options to cross the River Lambourn Special Area of Conservation (SAC), and for Options 5 and 6 to cross the River Test, so as to avoid likely significant effects on these sites. There are potentially precautionary WFD compliance risks associated with the operation of the new abstractions for all options. The potential hydrological effects could conflict with achieving WFD status objectives. This is particularly the case for Options 3, 4 and 6 where hydrology/river flow is an existing limiting factor.

As such, it is likely that of the six options, Options 1 and 2 will result in the fewest effects based on the findings from the SEA.

A summary of the key potential benefits and adverse impacts of the options is included in Table 5.1.

Table 5.1: Summary of the key potential benefits and adverse impacts of the options

Topic	Benefit	Adverse
Biodiversity, flora and fauna	All options have an opportunity to protect and enhance biodiversity during operation	All options intersect with a number of designated sites, priority habitats and ancient woodlands.
Soil	None identified	All options intersect with historic landfills.
Water	All options deliver reliable and resilient water supplies	Parts of all options lie within flood zones 2 and 3, SPZ 1 and 2, and intersect with WFD groundwater bodies
Air	None identified	All options are likely to generate short-term vehicle emissions and dust from construction activities
Climatic Factors	All options reduce vulnerability to climate change risks and hazards	All options will likely result in greater energy use during operation
Landscape	None identified	Parts of all options lie within the North Wessex Downs AONB
Historic Environment	None identified	Options 2, 3 and 6 intersect with two registered parks and gardens and run along the boundary of a scheduled monument. All options lie within 500m of historic assets.
Population and Human Health	No requirement for land from existing residential properties. All options have an opportunity to maintain and enhance the health and wellbeing of the local community	Options 3, 4 and 6 intersect with a number of community facilities
Material Assets	None identified	All options intersect motorways, A-roads and railway lines potentially causing disruption during construction.

5.2 Recommendations

It is recommended that the mitigations suggested in this report are implemented at Gate 2. These include:

- Directional drilling under designated river sites for all Options;
- Re-route pipeline in Options 3, 4 and 6 to avoid the registered parks and gardens (heritage asset); and
- Re-route pipeline in all Options to avoid sports facilities (community and amenity asset).

The SEA should be reviewed at Gate 2 stage to include potential in-combination effects with other SROs, water company capital investments or third-party development plans or projects.

The SEA should be reviewed at Gate 2 stage to support optioneering refinements and the selection of a preferred design for T2ST.

A. WRSE output tables

This data has been redacted

B. Datasets reviewed for the additional assessment

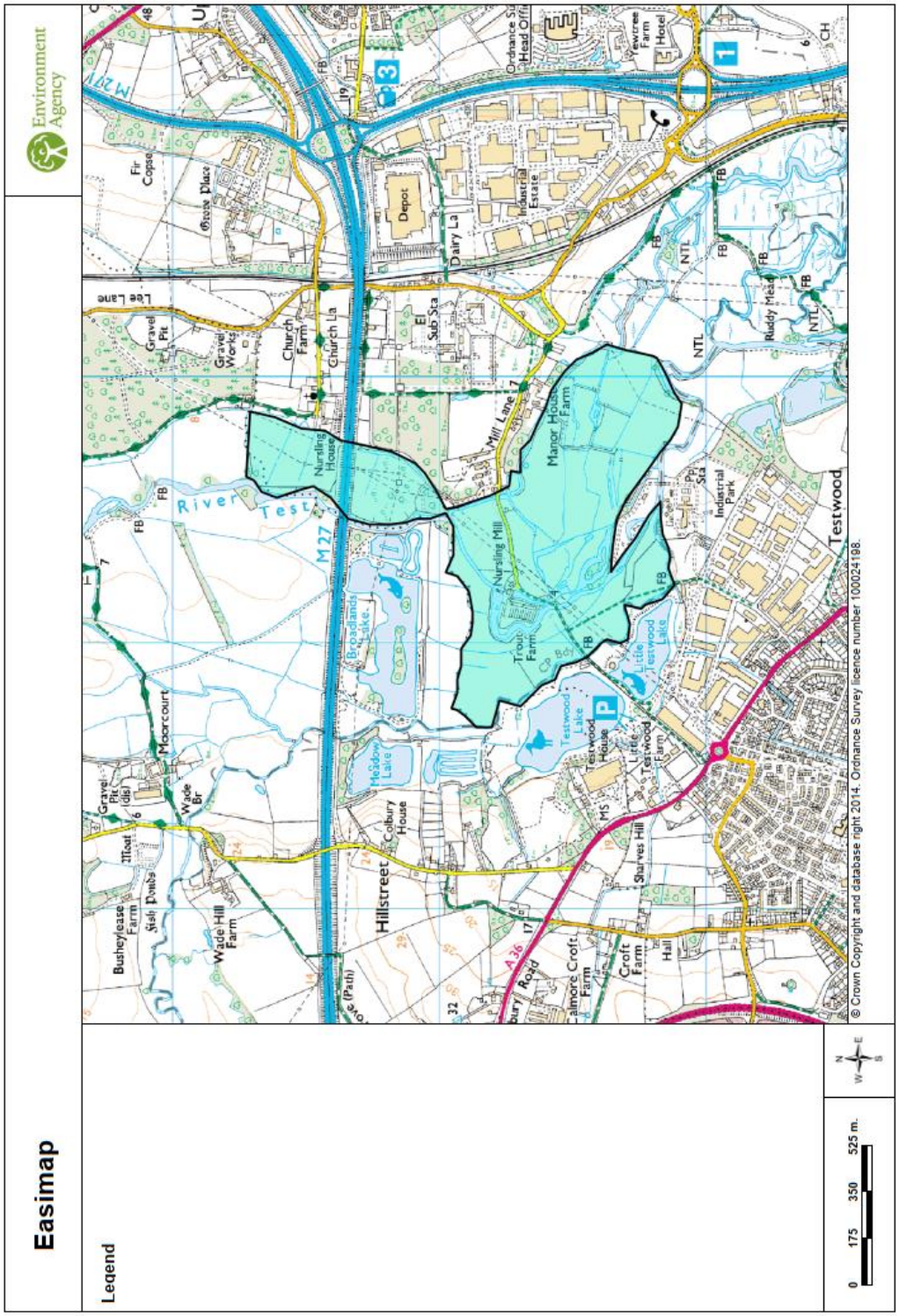
Additional local level or site specific data included in this assessment is listed in Table 5.2.

Table 5.2: Additional local level or site specific data reviewed for SEA effects

Topic theme/SEA directive topic	Additional data reviewed	Source
Biodiversity, Flora, Fauna	Manor House Farm habitat creation area	Environment Agency (See map in Appendix C)
	River Restoration Plans for: • River Kennet SSSI and River Lambourn SSSI and SAC • River Itchen SSSI and SAC • River Test SSSI	Natural England, via the River Restoration Centre (https://www.therrc.co.uk/designated-rivers)
	Local wildlife sites	Vale of the White Horse and South Oxfordshire: http://maps.southoxon.gov.uk/gis/?cat=appl&ref=5
		West Berkshire: https://gis2.westberks.gov.uk/webaps/OnlineMap/
		Basingstoke and Deane: http://www.arcgis.com/apps/Viewer/index.html?appid=7a6aba6613324537ac852932fe1ec518
		New Forest: https://www.newforest.gov.uk/media/707/policies-Map-Waterside/pdf/Policies_Map_Waterside_PDF_v2-1.pdf?m=637298052648670000
		Test Valley: https://tvbc.maps.arcgis.com/apps/MapJournal/index.html?appid=b2d7ce0c3b554a7d9daa2881c025db0c
		Winchester: http://winch.maps.arcgis.com/apps/webappviewer/index.html?id=c2870859802f4cd782993ccf041f070c
Historic Environment	Conservation areas	Vale of the White Horse and South Oxfordshire: http://maps.southoxon.gov.uk/gis/?cat=appl&ref=5
		West Berkshire: https://gis2.westberks.gov.uk/webaps/OnlineMap/
		Basingstoke and Deane: http://www.arcgis.com/apps/Viewer/index.html?appid=7a6aba6613324537ac852932fe1ec518
		Test Valley:

Topic theme/SEA directive topic	Additional data reviewed	Source
		https://tvbc.maps.arcgis.com/apps/MapJournal/index.html?appid=b2d7ce0c3b554a7d9daa2881c025db0c
		New Forest: https://maps.newforest.gov.uk/publicmap/map.aspx?mapname=tpo
		Winchester: http://winch.maps.arcgis.com/apps/webappviewer/index.html?id=c2870859802f4cd782993ccf041f070c

C. Manor House Farm habitat creation area



Source: Environment Agency, 27 January 2021

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