



Anglian Water 2015 Water Resource Management Plan

Strategic Environmental Assessment
Environmental Report Volume I: Main Report

December 2013
Anglian Water

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Abbreviations

AA	Appropriate Assessment
AESI	Adverse Effects on Site Integrity
AMP	Asset Management Plan
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Networks
CAMS	Catchment Abstraction Management Strategy
CCS	Considerate Constructors Scheme
CFMP	Catchment Flood Management Plan
CO₂	Carbon Dioxide
cSAC	Candidate Special Area of Conservation
pSPA	Proposed Special Protection Area
DCLG	Department for Communities and Local Government
DMA	District Metered Area
DMP	Drought Management Plan
EC	European Commission
GEP	Good Ecological Potential
GES	Good Ecological Status
HRA	Habitat Regulations Assessment
IMD	Index of Multiple Deprivation
LA	Local Authority
LNR	Local Nature Reserve
LoS	Levels of Service
LSE	Likely Significant Effects
LSOA	Lower Super Output Area
NNR	National Nature Reserve
NO₂	Nitrogen Dioxide
ODPM	Office of the Deputy Prime Minister
PPP	Policies, Plans, Programmes
RBD	River Basin District
RIGS	Regionally Important Geological Site
RSS	Regional Spatial Strategy
RZ	Resource Zone
SAC	Special Area of Conservation
SCI	Sites of Community Importance
SDS	Strategic Direction Statement

SEA	Strategic Environmental Assessment
SM	Scheduled Monument
SO₂	Sulphur Dioxide
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
STW	Sewage Treatment Works
tCO₂e	Tonnes Carbon Dioxide Equivalent
ToLS	Test of Likely Significance
UDP	Unitary Development Plan
UK	United Kingdom
UKWIR	United Kingdom Water Industry Research
WFD	Water Framework Directive
WR	Water Resource
WRMP	Water Resource Management Plan
WRP	Water Resource Planning
WTW	Water Treatment Works

Glossary

Baseline	A description of the present and future state of an area, in the absence of any development, taking into account changes resulting from natural events and from other human activities
Consultation Body	An authority which because of its environmental responsibilities is likely to be concerned by the effects of implementing plans and programmes and must be consulted under the SEA Directive. The Consultation Bodies designated in the SEA Regulations are Natural England, English Heritage and the Environment Agency
Climate Change Adaptation	Involves adjustments to natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities
Climate Change Mitigation	Involves taking action to reduce the impact of human activity on the climate system, primarily through reducing greenhouse gas emissions
Green Infrastructure	Green Infrastructure is a strategically planned and delivered network of high quality green spaces and other environmental features. It should be designed and managed as a multifunctional resource capable of delivering a wide range of environmental and quality of life benefits for local communities. Green Infrastructure includes parks, open spaces, playing fields, woodlands, allotments and private gardens
Habitats Directive	European Directive 2001/42/EC 'on the conservation of natural habitats and of wild fauna and flora'. Transposed into UK law via the Conservation of Habitats and Species Regulations 2012 (as amended)
Habitats Regulations Assessment	Any plan or programme which could affect a European site (Special Area of Conservation (SAC), Special Protection Area (SPA), Ramsar site) will be subject to the Habitats Directive, and will require a Habitats Regulations Assessment. This involves assessing whether the plan is likely to have any significant effect on the SAC, SPA, or Ramsar site. If so, a full Appropriate Assessment will have to be undertaken to assess in detail the likely effects
Indicator	A measure of variables over time, often used to measure achievement of objectives
Mitigation Measures	Refers to measures to avoid, reduce or offset significant adverse effects
Objective	A statement of what is intended, specifying the desired direction of change in trends
Ramsar	Ramsar sites are wetlands of international importance, designated under the Ramsar Convention (an international agreement signed in Ramsar, Iran, in 1971, which provides for the conservation and good use of wetlands)
Scoping	The process of deciding the scope and level of detail of an SEA, including the sustainability effects and options which need to be considered, the assessment methods to be used, and the structure and contents of the SEA Environmental Report
SEA Directive	European Directive 2001/42/EC 'on the assessment of the effects of

Strategic Environmental Assessment

certain plans and programmes on the environment'. Transposed into UK law via The Environmental Assessment of Plans and Programmes Regulations 2004

SEA Framework

Generic term used internationally to describe environmental assessment as applied to policies, plans and programmes. In this report, 'SEA' is used to refer to the type of environmental assessment required under the SEA Directive

SEA Objectives

This is the objectives and criteria developed for the plan/programme/project

These are specific objectives that have been developed for this project. They are also part of the SEA Framework, against which the plan objectives and schemes have been tested for the purposes of this SEA

Non-Technical Summary

Introduction

Anglian Water is required to prepare and publish a Water Resource Management Plan (WRMP). The purpose of a WRMP is to set out a 25 year strategy for managing water supply and demand.

To complete the 2015 WRMP, Anglian Water commissioned work to assess the environmental implications of each feasible option for maintaining the supply-demand balance. This work was completed in three parts:

- A Strategic Environmental Assessment (SEA);
- A Habitats Regulations Assessment (HRA); and
- A Water Framework Directive (WFD) assessment.

Anglian Water commissioned Mott MacDonald to complete the SEA and HRA. Atkins was commissioned to complete the WFD assessments.

Although the process for producing a WRMP is interlinked with the processes for producing the SEA and HRA, only the results of the SEA are reported in this document. The HRA is reported separately. The WFD assessments have fed into both the SEA and HRA and, via these, into the WRMP. A summary of all of this environmental work is given in the 2015 WRMP.

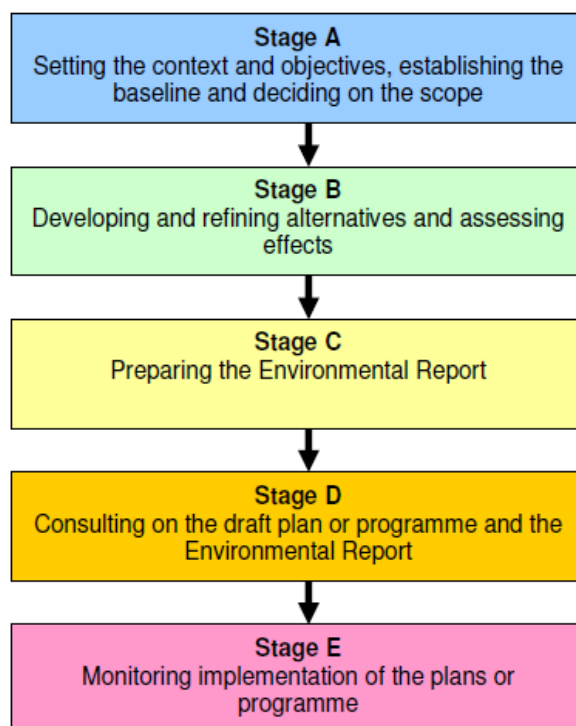
SEA Process

Under the European Directive 2001/42/EC, on the assessment of the effects of certain plans and programmes on the environment (also known as the 'Strategic Environmental Assessment (SEA) Directive'), and the resulting Environmental Assessment of Plans and Programmes Regulations 2004, a SEA is required to ensure that the environmental effects of the WRMP are considered. This Environmental Report follows on from the first stage of the SEA process (Stage A Scoping). During the scoping stage a Scoping Report was issued to the statutory consultees for consultation. The results of the scoping exercise and consultee comments have been taken on board and included within this report. The draft Environmental Report was subject to a 12 week public consultation period from June to August 2013, alongside the draft WRMP and draft HRA Report. The consultation comments received have been reviewed and addressed in this final Environmental Report, the final WRMP, and the final HRA Report.

The Anglian Water WRMP SEA has been carried out in accordance with the UKWIR Guidance 'Strategic Environmental Assessment and Habitats Regulations Assessment – Guidance for Water Resources Management Plans and Drought Plans' (ref.

12/WR/02/7); and the Office of Deputy Prime Minister (ODPM) (now the Department for Communities and Local Government (DCLG)) Guidance 'A Practical Guide to the Strategic Environmental Assessment Directive' (September 2005). The Figure below shows the different stages in the SEA process.

SEA Process Stages



Water Resources Management Plan

All water companies are required to prepare a Water Resource Management Plan (WRMP) to comply with statutory requirements in the Water Resources Management Plan Regulations 2007 issued by the Secretary of State in exercise of the powers conferred by the Water Act 2003. The purpose of the WRMP is to set out how a water company intends to balance supply and demand over a period of 25 years.

For the purposes of water resource management the Anglian Water region and WRMP are structured around Resource Zones (RZs).

The Anglian Water strategic water resource management objectives may be summarised as follows:

- **Reliable supplies:** providing the level of service that customers expect and making sure that the Anglian Water supply system is resilient to the effects of climate change,

population and property growth and other challenges such as deteriorating raw water quality and the periodic effects of drought;

- **Sustainable upstream resource base:** no damage to the environment from the things that Anglian Water do; and
- **An affordable investment programme:** good value for money for customers - not just by keeping bills as low as possible, but by protecting vulnerable customers as well.

As part of the WRMP development process Anglian Water has undertaken modelling to identify areas with a surplus or deficit of water supply. For areas with deficits, Anglian Water has developed a range of options for maintaining the supply demand balance. These fall into two broad categories:

- Demand Management options – options that will reduce the demand for water including metering, water efficiency, and leakage reduction; and
- Supply options – options that will provide a water supply to customers including transfers, maximising existing resources, trading, tankering, and new resources.

Scoping Results

The SEA Scoping Report was issued for formal consultation in October 2012 to the three statutory consultees (Environment Agency, Natural England and English Heritage). Comments received were taken into consideration in the preparation of the Environmental Report.

The scoping process identified the relevant plans and programmes at International, National, Regional and Local level and their implications for the SEA and WRMP schemes. Scoping also set the environmental, social and economic baseline context for the Anglian Water region area, and identified key environmental and sustainability challenges and opportunities. The baseline data was further updated in the Environmental Report to include site specific baseline data for scheme options.

Mott MacDonald and Anglian Water produced a SEA Framework consisting of SEA objectives, assessment criteria and indicators for the WRMP SEA. The SEA Framework was based on the SEA Directive topics, baseline and key issues for the region. The SEA objectives are:

Anglian Water WRMP SEA Objectives

- | |
|---|
| 1. Protect and enhance where possible the ecological and chemical status of watercourses and water bodies in accordance with the WFD objectives |
| 2. Maintain and improve sustainable water resources and encourage the sustainable use of water |

Anglian Water WRMP SEA Objectives	
3. Minimise the risk and reduce the impact of flooding	
4. Ensure security of water supplies for customers whilst ensuring operations/schemes do not negatively affect local communities	
5. Deliver WRMP schemes together with the local community and work with the local supply chain	
6. Protect and enhance biodiversity and geo-diversity across the region	
7. Protect and enhance landscape quality and character across the region	
8. Protect and enhance the historic environment, heritage assets and their setting	
9. Educate, manage, plan and adapt for the effects of climate change	
10. Minimise greenhouse gas emissions and energy use from water resource management operations	
11. Ensure that a sustainable approach is adopted for new water resource infrastructure and that existing infrastructure is utilised/expanded where possible	
12. Protect best quality soil and agricultural land	

Assessment Methodology

The WRMP and the scheme options were assessed against the SEA framework by determining the level of environmental performance of the draft WRMP and scheme options against each of the SEA Framework objectives. It should be noted that the assessment was a high level evaluation.

Prediction and evaluation of effects was undertaken based on the following criteria:

- Interaction;
- Magnitude;
- Importance; and
- Significance.

Interaction

+	Potential positive interaction
0	Neutral or no interaction
-	Potential negative interaction
D	Dependent upon implementation

Magnitude

Magnitude	Description
Negligible	No measurable effect on the baseline. Effects would be one or more of the following: possible community/local, short-term, temporary or indirect
Minor	Slight measurable change in the baseline. Effects would be one or more of the following: likely community/local, short term, temporary, direct or indirect
Moderate	Measurable change in the baseline. Effects would be one or more of the following: definite, local borough, medium term, semi-permanent or temporary, direct or indirect or reversible
Major	Substantial measurable change in the baseline. Effects would be one or more of the following: definite, borough/regional/national/European, long term, permanent, direct or irreversible

Importance

Importance	Description
High	International, national, regional statutory recognition/designation, highly sensitive to change, vulnerable, has major effect on human health, quality or life and/or local environment
Medium	Local recognition/designations, sensitive to change, has moderate effects on human health, quality of life and/or local environment
Low	No statutory recognition/designations, not sensitive to change, not vulnerable, minor influence on human health, quality of life and/or local environment

Significance

Importance	Magnitude			
	Negligible	Minor	Moderate	Major
Low	Not Significant	Not Significant	Not Significant	Significant
Medium	Not Significant	Not Significant	Significant	Highly Significant
High	Not Significant	Significant	Highly Significant	Highly Significant

	Highly Significant Positive
	Significant Positive
	Not Significant Positive
	No Effect
	Not Significant Negative
	Significant Negative
	Highly Significant Negative
	Effect Unknown / Effect depends on conclusions of other studies

Assessment Results

Scheme Options Assessment

Each of the WRMP demand management options and supply options were assessed against the SEA Framework using the assessment methodology presented above.

None of the demand management options have been assessed as having significant negative effects. Metering and water efficiency will have the least environmental effects and will have positive effects in terms of encouraging customers to use less water by providing practical solutions and advice for water efficiency. This will help change customer habits, reducing demand and ensuring water security. Leakage reduction will have benefits through reducing the volume of water lost in the network due to leakages. This will also help reduce demand and ensure water security. Leakage options will have temporary negative effects associated with excavations to repair or replace pipes to reduce future leakages. All of the demand management options were identified as suitable to be taken forward into the WRMP.

For areas with deficits Anglian Water has developed a range of potential supply options to stand alongside the demand management options described above to reduce the deficits. The list of schemes that were assessed is provided below:

- West Suffolk RZ:
 - WS1 Newmarket RZ transfer;
 - WS2 East Suffolk RZ transfer;
 - WS3 Bury St. Edmunds water reuse;
 - WS4 Thetford water reuse;
 - WS5 River Lark Flow Augmentation; and
 - WS6 South Essex RZ transfer.
- Ely RZ:
 - E1 Fenland RZ transfer; and
 - E2 Newmarket RZ transfer.

- Newmarket RZ:
 - NWM1 Ely RZ transfer; and
 - NWM2 West Suffolk RZ transfer.
- Cheveley RZ:
 - CVY1 Newmarket RZ transfer; and
 - CVY2 West Suffolk RZ transfer.
- Central Essex RZ:
 - CE1 South Essex RZ transfer; and
 - CE2 West Suffolk RZ transfer.
- Norwich & the Broads RZ:
 - NB1 / NB12 Bacton desalination;
 - NB2 / NB11 Norwich water reuse;
 - NB3 Cantley desalination;
 - NB4 Lowestoft water reuse;
 - NB5 Norwich storage;
 - NB6 Norwich intake with pre-treatment;
 - NB7 Norwich intake with lining existing bankside storage;
 - NB8 Norwich intake with new bankside storage; and
 - NB10 Norwich intake to existing bankside storage.
- Fenland RZ:
 - F1 Kings Lynn and Wisbech water reuse;
 - F2 Kings Lynn desalination;
 - F4 Ruthamford North RZ Transfer (12 MI/d); and
 - F5 Ruthamford North RZ Transfer (25 MI/d).
- Hunstanton RZ:
 - H1 Fenland RZ transfer;
 - H2 Heacham water reuse;
 - H3 Wash desalination; and
 - H4 Hunstanton RZ groundwater development.
- South Essex RZ:
 - SE1 Colchester water reuse;
 - SE2 / SE8 East Suffolk RZ transfer;
 - SE4 Amendment to Ardleigh agreement;
 - SE6 South Essex RZ groundwater development; and
 - SE7 Ardleigh reservoir extension.
- East Suffolk RZ:
 - ES3 Ipswich water reuse;
 - ES4 Felixstowe desalination;
 - ES6 East Suffolk RZ groundwater development; and
 - ES10 South Essex RZ transfer.
- Ruthamford North:
 - RHFA2 Peterborough water reuse;
 - RHFA3 Rutland dam raising;
 - RHFA4 Reduce export to STW;
 - RHFA5 Pitsford dam raising;
 - RHFA6 Canal transfer; and
 - RHFA15 Saltersford reduction.

- Ruthamford South:
 - RHFA1 Ruthamford North RZ Transfer 1;
 - RHFA7 Grafham dam raising;
 - RHFA8 New Ruthamford South reservoir;
 - RHFA9 Grafham intake refurbishment;
 - RHFA10 Re-commission Pulloxhill WTW;
 - RHFA11 Re-commission Ruthamford South RZ reservoir;
 - RHFA13 Ruthamford North RZ Transfer 2;
 - RHFA14 Huntingdon water reuse;
 - RHFP1 Ruthamford North RZ Transfer 3;
 - RHFP2 Ruthamford North RZ Transfer 4;
 - RHFP3 Ruthamford North RZ Transfer 5;
 - RHFP4 Clapham WTW; and
 - RHFP5 Ruthamford North RZ transfer.
- Cambridgeshire and West Suffolk RZ (old RZ*):
 - CWS1 Thetford PZ transfer;
 - CWS3 Sudbury PZ transfer;
 - CWS6 Haverhill water reuse; and
 - CWS11 Fenland RZ transfer.

**Note: The Cambridgeshire and West Suffolk RZ has been split into West Suffolk RZ, Sudbury RZ, Newmarket RZ, Ely RZ, and Cheveley RZ. However, schemes developed under the Cambridgeshire and West Suffolk RZ which have not been subsequently taken forward are included in the SEA for completeness and retain their CWS scheme reference.*

The SEA has identified the environmental effects of each scheme and identified which schemes could be taken forward into the WRMP Preferred Plan. Mitigation and further studies to reduce environmental effects of schemes have also been developed and presented.

Scheme Options Cumulative Assessment

The cumulative assessment has identified schemes that are likely to have potential construction and/or operational effects, or are mutually exclusive within RZs. Potential cumulative construction effects have been identified where schemes are located in the same area because simultaneous construction may lead to increased nuisance for communities from noise, dust, visual intrusion, diversions and road closures, effects on ecology, and land and water quality. Potential cumulative operational effects have been identified where schemes are abstracting or discharging into the same water body because this may lead to increased effects on water quality and ecology. However, it should be noted that the potential for cumulative effects is considered small because in reality only a few of the schemes from each RZ will be taken forward, and these are likely to be during different AMP periods, so cumulative effects are considered to be low risk.

Norwich and the Broads RZ and Hunstanton RZ have the most potential cumulative construction effects because all the schemes within these RZ are concentrated in a relatively small area compared to the other RZ where schemes are more spread out in different areas.

Development of the WRMP Preferred Plan

Details of the full 25 year plan set out in the WRMP are presented in the table below. These schemes make up the preferred plan in the 2015 WRMP. Feasible supply schemes not selected may be considered in the future if the size of deficits increases due to sustainability reductions or climate change.

The schemes in the preferred plan were chosen based on a number of factors including:

- Economic modelling;
- Feasibility;
- Capacity to meet deficit;
- Environmental effects (from the HRA, SEA, and WFD assessment); and
- Capacity to meet long-term supply demand objectives.

Resource Zone	Scheme	AMP
West Suffolk	East Suffolk RZ transfer (WS2)	7
	River Lark Flow Augmentation (WS5)	8
	Water Efficiency	6
	Leakage control	6
Norwich and the Broads	Norwich intake to existing bankside storage (NB10)	7
	Norwich water reuse (NB11)	9
	Water Efficiency	6
	Leakage control	6
Hunstanton	Fenland RZ transfer (H1)	7
	Enhanced metering	6
	Water efficiency	6
	Leakage control	6
Fenland	Ruthamford North RZ transfer (12 MI/d) (F4)	7
	Enhanced metering	6
	Water efficiency	6
	Leakage control	6
East Suffolk and Essex	South Essex RZ Transfer (ES10)	9
	Leakage control	6
	Water efficiency	6
	Ipswich water reuse (ES3)	10
South Essex	Extension of Ardleigh agreement (SE4)	9
	Leakage	6

Resource Zone	Scheme	AMP
Newmarket	Water efficiency	6
	West Suffolk RZ transfer (NWM2)	8
	Leakage	6
Central Essex	Water efficiency	6
	South Essex RZ transfer (CE1)	8
	Leakage	6
Ely	Water efficiency	6
	Newmarket RZ transfer (E2)	7
	Leakage	6
	Water efficiency	6
Cheveley	Enhanced metering	6
	Newmarket RZ transfer (CVY1)	8
	Leakage	6
Ruthamford North	Water efficiency	6
	Saltersford reduction (RHFA15)	10
	Leakage	6
	Water efficiency	6
Ruthamford South	Enhanced metering	6
	Ruthamford North RZ Transfer 1 (RHFA1)	8
	Re-commission Ruthamford South RZ reservoir (RHFA11)	10
	Leakage	6
	Enhanced metering	6
	Water efficiency	6

Assessment of the WRMP Preferred Plan

The WRMP was assessed against the SEA Framework using the assessment methodology presented above. The assessment was undertaken in two stages: the first assessed the WRMP preferred schemes before mitigation; and the second assessed the preferred schemes assuming mitigation measures had been implemented. The following table shows the results of the assessment assuming that the mitigation measures suggested have been implemented.

Resource Zone	Scheme	SEA Objectives											
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land
West Suffolk	East Suffolk RZ transfer (WS2)												
	River Lark Flow Augmentation (WS5)												
	Water Efficiency												
	Leakage control												
Norwich and the Broads	Norwich intake to existing bankside storage (NB10)												
	Water Efficiency												
	Leakage control												
	Norwich water reuse (NB11)												
Hunstanton	Fenland RZ transfer (H1)												
	Enhanced metering												
	Water efficiency												
	Leakage control												
Fenland	Ruthamford North RZ transfer (12 Ml/d) (F4)												
	Leakage control												
	Enhanced metering												
	Water efficiency												
East Suffolk and Essex	South Essex RZ Transfer (ES10)												
	Water efficiency												
	Leakage control												
	Ipswich water reuse (ES3)												
South Essex	Extension of Ardleigh agreement (SE4)												
	Water efficiency												
	Leakage												
Newmarket	West Suffolk RZ transfer (NWM2)												
	Water efficiency												
	Leakage												
Central Essex	South Essex RZ transfer (CE1)												
	Water efficiency												
	Leakage												
Ely	Newmarket RZ transfer (E2)												
	Enhanced metering												
	Water efficiency												
	Leakage control												
Cheveley	Newmarket RZ transfer (CVY1)												
	Water efficiency												
	Leakage												

Resource Zone	Scheme	SEA Objectives											
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land
North Ruthamford	Saltersford reduction (RHFA15)												
	Enhanced metering												
	Water efficiency												
	Leakage control												
Ruthamford South	Ruthamford North RZ Transfer 1 (RHFA1)												
	Re-commission Ruthamford South RZ reservoir (RHFA11)												
	Leakage												

Cumulative Assessment of the WRMP Preferred Plan

The preferred plan is unlikely to have any negative construction or operational cumulative effects. This is mainly because schemes are located in different areas throughout the region so are unlikely to affect the same receptors; do not abstract or discharge from the same water bodies; or is not in the same AMP period. There may be cumulative positive benefits from implemented of demand management options through the resource zones.

Habitats Regulations Assessment

A HRA Task 1 'Test of Likely Significance' (ToLS) (screening) was undertaken for the WRMP scheme options to determine whether there was potential for likely significant effects (LSE) on European sites. Where the HRA Task 1 ToLS demonstrated potential for schemes to have LSE and these schemes were chosen as preferred schemes for the WRMP, a HRA Task 2 Appropriate Assessment (AA) was undertaken. There were only two preferred schemes with potential for LSE. These two schemes were:

- NB2 / NB11 Norwich water reuse; and
- RHFA1 Ruthamford North RZ Transfer 1.

Scheme NB2 / NB11

The results of the Task 2 AA for scheme NB2 / NB11 concluded that no physical loss of habitat extent or current vegetation structure and/or composition within the designated sites is predicted. The water quality treatments incorporated into the design of the proposed scheme are considered to be sufficient to avoid adverse effects on the designated sites due to water quality change. A flow volume diagram was developed by

Anglian Water which predicted that flows downstream of Whitlingham STW will not be altered. Therefore, no direct or indirect effects to the designated sites are predicted as a result of the implementation of the NB2 / NB11 Norwich Water Reuse scheme.

No adverse effects on the qualifying features of the Broads SAC and Broadland SPA and Ramsar site are expected through the implementation of this scheme.

Scheme RHFA1

The results of the Task 2 AA for scheme RHFA1 concluded that the footprint of the scheme is at least 500m outside the boundary of the Nene Valley Gravel Pits SPA/Ramsar site; therefore, habitat extent, vegetation structure and/or composition within the designated sites will not be affected.

Habitat fragmentation can be avoided through the timing of construction works outside of the winter period so as not to disturb or displace Golden Plover, a qualifying species of the SPA.

Restrictions on construction timing and implementation of measures to protect water quality are considered sufficient to avoid adverse effects on the integrity of the European sites with respect to water pollution. Therefore, no direct effects to the designated sites are predicted as a result of the implementation of the RHFA1 scheme, and any indirect disturbance to its qualifying features can be avoided through mitigation.

No adverse effects on the qualifying features of the Nene Valley Gravel Pits SPA/Ramsar site are expected through the implementation of this scheme.

Water Framework Directive Assessment

A WFD assessment screening exercise was undertaken by the Environment Agency to determine the level of risk from the proposed schemes to WFD status and objectives of water bodies. Schemes screened as requiring a WFD assessment were subject to a WFD assessment to ensure that they would not cause deterioration or lead to failure of objectives. The WFD assessments were undertaken by Atkins. The conclusions of the assessments have been used to inform the SEA.

Conclusions of the SEA

The SEA undertaken for the WRMP has helped to identify proposed schemes that have the potential for significant negative effects. Mitigation measures (such as pipeline re-routing to avoid designated sites) have been identified to reduce the effects. Schemes

that have the potential for unacceptable significant negative effects (which could not be mitigated) were rejected at the option selection process stage and not taken forward into the WRMP preferred plan.

The SEA has also assessed the potential cumulative effects of the scheme options to ensure that schemes with significant cumulative effects are not taken forward together. In addition the SEA assessed the effects of implementing the preferred plan (including cumulative effects).

The table below summarises the results of the SEA, HRA, and WFD assessments for the preferred plan schemes. The assessments demonstrated that with implementation of mitigation measures the WRMP preferred plan will not have significant negative effects.

Resource Zone	Scheme	SEA	HRA	WFD
West Suffolk	East Suffolk RZ transfer (WS2)	No significant negative effects predicted following mitigation	No LSE determined at Screening	No risks identified
	River Lark Flow Augmentation (WS5)	No significant negative effects predicted	No LSE determined at Screening	No risk of deterioration
	Water Efficiency	No significant negative effects predicted	Not required	Not required
	Leakage control	No significant negative effects predicted	Not required	Not required
Norwich and the Broads	Norwich intake to existing bankside storage (NB10)	No significant negative effects predicted following mitigation	No LSE determined at Screening	No risk of deterioration
	Norwich water reuse (NB11)	Potential CO ₂ effects. No other significant negative effects predicted following mitigation	AA concluded no AESI	Low risk of deterioration
	Water Efficiency	No significant negative effects predicted	Not required	Not required
	Leakage control	No significant negative effects predicted	Not required	Not required
Hunstanton	Fenland RZ transfer (H1)	No significant negative effects predicted	No LSE determined at Screening	Overall, low risk of deterioration
	Enhanced metering	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required
	Leakage control	No significant negative effects predicted	Not required	Not required
Fenland	Ruthamford North RZ transfer (12 Ml/d) (F4)	No significant negative effects predicted following mitigation	No LSE determined at Screening	Low risk of deterioration
	Enhanced metering	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative	Not required	Not required

Resource Zone	Scheme	SEA	HRA	WFD
		effects predicted		
	Leakage control	No significant negative effects predicted	Not required	Not required
East Suffolk and Essex	South Essex RZ Transfer (ES10)	No significant negative effects predicted following mitigation	No LSE determined at Screening	Low risk of deterioration (Colne sources)
	Leakage control	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required
	Ipswich water reuse (ES3)	Potential CO ₂ effects. No other significant negative effects predicted following mitigation	No LSE determined at Screening following mitigation	No risk of deterioration
South Essex	Extension of Ardleigh agreement (SE4)	No significant negative effects predicted	No LSE determined at Screening	Low risk of deterioration
	Leakage	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required
Newmarket	West Suffolk RZ transfer (NWM2)	No significant negative effects predicted following mitigation	No LSE determined at Screening	Low risk of deterioration
	Leakage	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required
Central Essex	South Essex RZ transfer (CE1)	No significant negative effects predicted following mitigation	No LSE determined at Screening	Low risk of deterioration (Ardleigh or Colne sources)
	Leakage	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required
Ely	Newmarket RZ transfer (E2)	No significant negative effects predicted following mitigation	No LSE determined at Screening	Low risk of deterioration
	Leakage	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required
	Enhanced metering	No significant negative effects predicted	Not required	Not required
Cheveley	Newmarket RZ transfer (CVY1)	No significant negative effects predicted following mitigation	No LSE determined at Screening	Low risk of deterioration
	Leakage	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required

Resource Zone	Scheme	SEA	HRA	WFD
Ruthamford North	Salterford reduction (RHFA15)	No significant negative effects predicted	No LSE determined at Screening	No risks identified
	Leakage	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required
	Enhanced metering	No significant negative effects predicted	Not required	Not required
Ruthamford South	Ruthamford North RZ Transfer 1 (RHFA1)	Potential CO ₂ effects. No other significant negative effects predicted following mitigation	AA concluded no AESI with mitigation	No risk of deterioration (existing mitigation measures for Rutland Water)
	Re-commission Ruthamford South RZ reservoir (RHFA11)	No significant negative effects predicted	No LSE determined at Screening	Potential risk to Foxcote Reservoir. Mitigation identified to be implemented
	Leakage	No significant negative effects predicted	Not required	Not required
	Enhanced metering	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required

1. Introduction

1.1 Introduction

Anglian Water is required to prepare and publish a Water Resource Management Plan (WRMP). The purpose of a WRMP is to set out a 25 year strategy for managing water supply and demand.

To complete the 2015 WRMP, Anglian Water commissioned work to assess the environmental implications of each feasible option for maintaining the supply-demand balance. This work was completed in three parts:

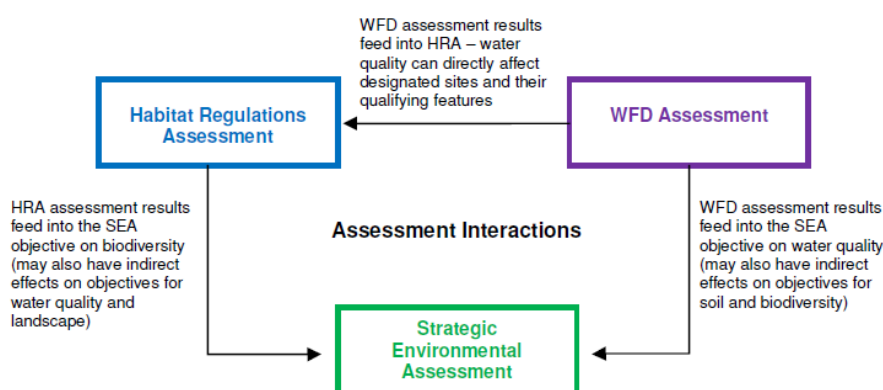
- A Strategic Environmental Assessment (SEA);
- A Habitats Regulations Assessment (HRA); and
- A Water Framework Directive (WFD) assessment.

Anglian Water commissioned Mott MacDonald to complete the SEA and HRA. Atkins was commissioned to complete the WFD assessments.

Although the process for producing a WRMP is interlinked with the processes for producing the SEA and HRA, only the results of the SEA are reported in this document. The HRA is reported separately. The WFD assessments have fed into both the SEA and HRA and, via these, into the WRMP. A summary of all of this environmental work is given in the draft 2015 WRMP.

Figure 1.1 shows the interactions between the different assessments.

Figure 1.1: Assessment Interactions



Under the European Directive 2001/42/EC, on the assessment of the effects of certain plans and programmes on the environment (also known as the 'Strategic Environmental Assessment (SEA) Directive'), and the resulting Environmental Assessment of Plans and Programmes Regulations 2004, a SEA is required to ensure that the environmental effects of the WRMP are considered. This Environmental Report follows on from the first stage of the SEA process (Stage A Scoping). During the scoping stage a Scoping Report was issued to the statutory consultees for consultation. The results of the scoping exercise and consultee comments have been taken on board and included within this report. The draft Environmental Report was subject to a 12 week public consultation period from June to August 2013,

alongside the draft WRMP and draft HRA Report. The consultation comments received have been reviewed and addressed in this final Environmental Report, the final WRMP, and the final HRA Report.

1.2 Purpose of the Assessment Stage and Environmental Report

The purpose of the assessment stage and Environmental Report was to review the scheme options and the preferred plan (WRMP) and identify any potential effects (positive and negative). This was achieved through undertaking the following:

- Review of the Anglian Water WRMP SEA Scoping Report;
- Review of the proposed scheme options and update of baseline information and plans and programmes review;
- Identify and evaluate predicted effects of the WRMP scheme options through appraisal against the SEA Framework;
- Identify and evaluate predicted effects of the WRMP looking at cumulative effects of schemes in Water Resource Zones through appraisal against the SEA Framework;
- Identify mitigation measures;
- Develop monitoring proposals to be implemented by Anglian Water during the WRMP period;
- Prepare an Environmental Report for public consultation; and
- Address consultation comments and finalise Environmental Report for submission.

1.3 Compliance with SEA Directive

This Environmental Report has been prepared in accordance with the requirements of the SEA Directive. Table 1.1 indicates where the specific requirements in SEA Directive relating to the Environmental Report (SEA Directive Annex I) can be found within this report.

Table 1.1: SEA Directive Requirements Signposting Table

SEA Directive Environmental Report Requirements	Section of Environmental Report where Requirements is found
a) An outline of the contents, main objectives of the plan or programme and relationship with other relevant plans and programmes	Chapter 3, Chapter 4, Appendix A
b) The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme	Chapter 4, Appendix B, Appendix D
c) The environmental characteristics of areas likely to be significantly affected	Chapter 4, Appendix B, Appendix D
d) Any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC and 92/43/EEC	Chapter 4
e) The environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation	Chapter 4, Appendix A
f) The likely significant effects on the environment, including on issues such as biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors	Chapter 5, Chapter 6, Appendix D
g) The measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme	Chapter 5, Chapter 6

SEA Directive Environmental Report Requirements	Section of Environmental Report where Requirements is found
h) An outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information	Chapter 2, Chapter 5, Chapter 6
i) A description of the measures envisaged concerning monitoring in accordance with Article 10	Chapter 9
j) A non-technical summary of the information provided under the above headings	Non-Technical Summary Section

1.4 Links with Wider Studies

1.4.1 Introduction to the Habitats Regulations Assessment

Under the European Directive 2001/42/EC on the conservation of natural habitats and of wild fauna and flora (also known as the 'Habitats Directive') and the resulting Conservation of Habitats and Species Regulations 2012 (as amended), a HRA was required to ensure that effects of the WRMP on sites of European nature conservation importance were considered.

European designated sites include:

- Special Protection Areas (SPAs);
- Special Areas of Conservation (SACs);
- candidate SACs (cSAC);
- proposed SPAs (pSPA); and
- Sites of Community Importance (SCIs) which have been adopted by the EC, but not yet formally designated by the government of a Member State.

In the UK, Ramsar sites are also required to undergo an assessment when a plan is considered likely to have a significant effect upon them. Within the Anglian region there are 38 SACs, and 27 SPAs and Ramsar wetlands of International importance, and therefore a HRA was required. A HRA Task 1 'Test of Likely Significance' (ToLS) (screening) was undertaken for the WRMP scheme options to determine whether there was potential for likely significant effects (LSE) on European sites. Where the HRA Task 1 ToLS demonstrated potential for schemes to have LSE and these schemes were chosen as preferred schemes for the WRMP, a HRA Task 2 Appropriate Assessment (AA) was undertaken.

A HRA Report (December 2013) was produced and should be read in conjunction with the WRMP and Environmental Report. A summary of the results is provided in Section 7 of this Environmental Report.

1.4.2 Relationship between the SEA and HRA

The SEA and HRA processes were undertaken in parallel to enable the two processes to feed into each other. The HRA results have fed directly into the SEA appraisal of the scheme options under SEA Objective 6 'Protect and enhance biodiversity and geo-diversity across the region'. SEA Objective 6 covers effects on European designated sites as well as wider biodiversity issues such as effects on Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs), and Local Nature Reserves (LNRs).

The HRA results were used in the SEA to determine the effects of scheme options on European designated sites as part of the assessment under SEA Objective 6. The HRA results also had an indirect

bearing on other SEA objectives such as SEA Objective 1 on water quality and SEA objective 7 on landscape (see Figure 1.1).

1.4.3 Introduction to the Water Framework Directive Assessment

The Water Framework Directive (WFD) aims to provide a better water environment in Europe for surface waters, including rivers, estuaries and coastal waters and also groundwater.

The WFD requires that good status is achieved in all water bodies by 2015.

For surface waters, good status is made up of good environmental status (or potential in artificial or heavily modified water bodies) and good chemical status. Ecological status consists of biological, hydro-morphological and physio-chemical elements.

For groundwater, good status consists of quantitative and qualitative status. Improvement measures have been planned for water bodies in order that they meet good status. The Directive also requires that there is no deterioration in water body status. WFD objectives are shown in Table 1.2.

Table 1.2: WFD Environmental Objectives

Objectives (from Article 4 of WFD)	Reference and Description
4.1(a)(i)	Member States shall implement the necessary measures to prevent deterioration of the status of all bodies of surface water
4.1(a)(ii)	Member States shall protect, enhance and restore all bodies of surface water, subject to the application of subparagraph (iii) for artificial and heavily modified bodies of water, with the aim of achieving good surface water status by 2015
4.1(a)(iii)	Member States shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status by 2015
4.1(a)(iv)	Progressively reduce pollution from priority substances and cease or phasing out emissions, discharges and losses of priority hazardous substances
Ground Water 4.1(b)(i)	Prevent Deterioration in Status and prevent or limit input of pollutants to groundwater

Source: Water Framework Directive

1.4.4 Relationship between the SEA and WFD

A Water Framework Directive Assessment screening exercise was undertaken by the Environment Agency to determine the level of risk from the proposed schemes to WFD status and objectives of water bodies. Schemes screened as requiring a WFD assessment were subject to a WFD assessment to ensure that they would not cause deterioration or lead to failure of objectives.

The WFD assessments were undertaken by Atkins. The results of the WFD screening and assessments have fed into the SEA by informing the assessment of the schemes under SEA Objective 1 on water quality. The results also had indirect effects upon other objectives including biodiversity, and have also fed into the HRA process (see Figure 1.1). A summary of the results is provided in Section 8 of this Environmental Report.

1.4.5 Relationship of the WRMP to the SEA, HRA and WFD assessments

The SEA, HRA and WFD assessments have all had an important role in influencing the schemes that were taken forward into the final WRMP Preferred Plan. Figure 1.2 and Figure 1.3 show the interactions between the WRMP development process and the SEA, HRA and WFD assessment processes.

Figure 1.2: Interactions between the WRMP and the SEA and HRA

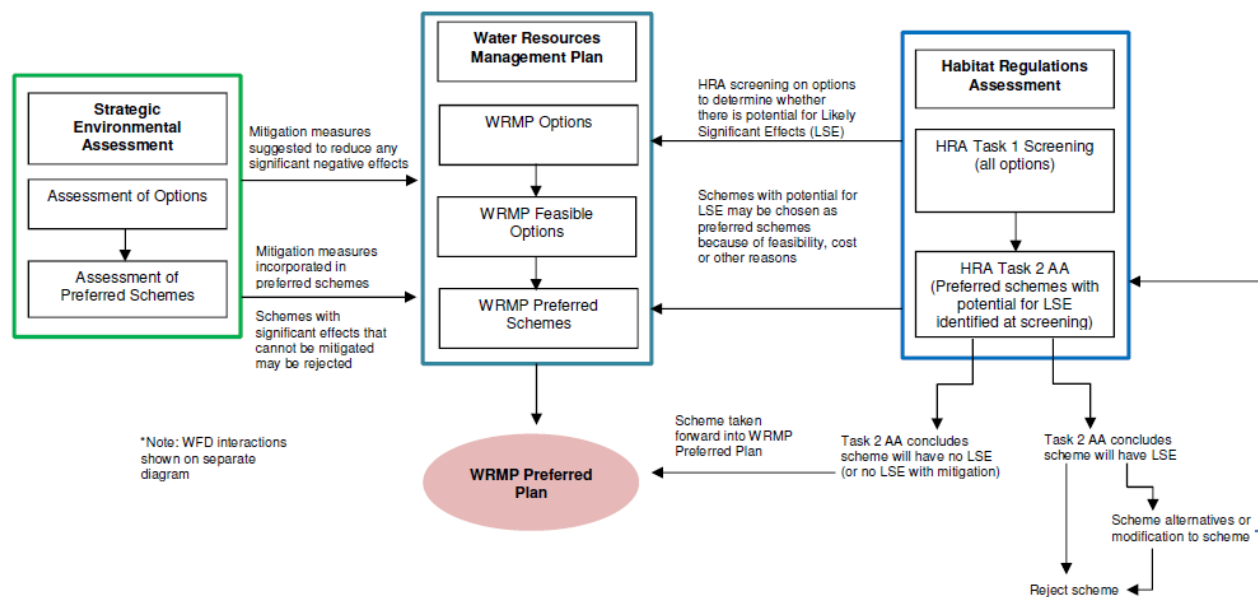
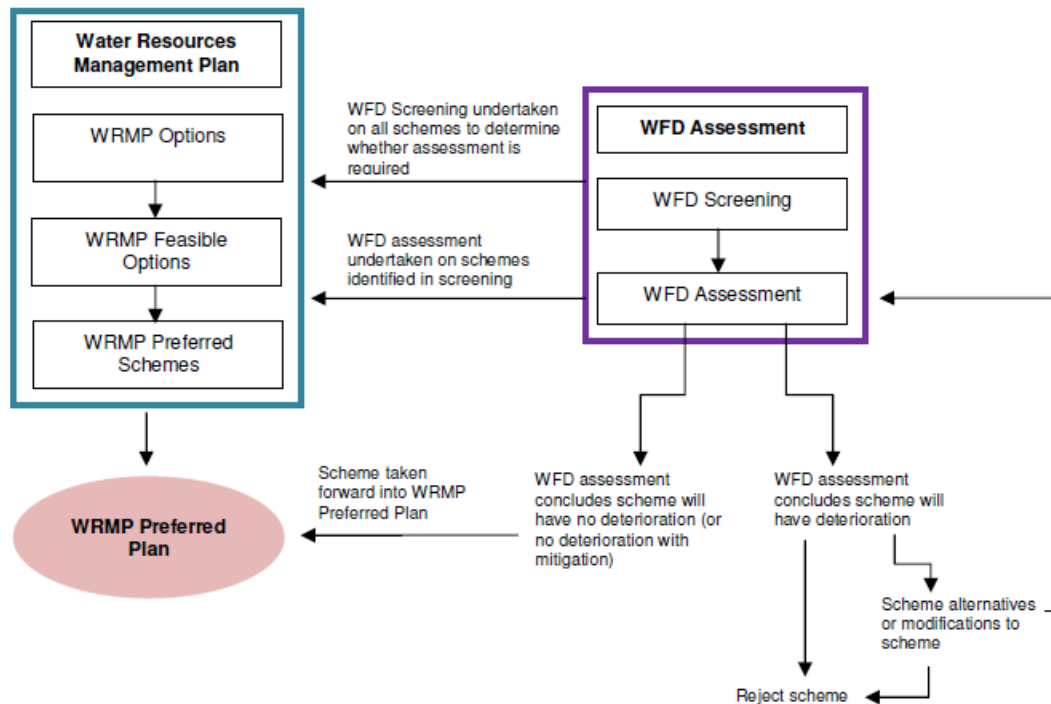


Figure 1.3: Interactions between the WRMP and the WFD assessment



1.5 Limitations of the SEA

During the production of this Environmental Report, Mott MacDonald has used published data and information provided by Anglian Water and from third party organisations.

The baseline data used as part of this assessment was based on the best available information until February 2013. Anglian Water has continued to model and develop options during the production of this Environmental Report and subsequently it is possible that the baseline may have changed from the baseline used for this assessment. As such the baseline data gathered has been used to provide the context of the current conditions in the Anglian region and for site specific scheme options. The assessment that has been undertaken is a high level assessment and does not negate the requirements for detailed project specific environmental assessments for schemes in the WRMP.

2. SEA Process and Methodology

2.1 SEA Legislative Requirements and Purpose

A SEA is required for the Anglian Water WRMP under the European Union Directive 2001/42/EC, more commonly known as the SEA Directive. The Directive was transposed into United Kingdom (UK) law via the Environmental Assessment of Plans and Programmes Regulations 2004, which requires an assessment of the effects of certain plans and programmes on the environment.

Article 3 of the SEA Directive defines the scope of when SEA is required for plans and programmes. Article 3 (2b) states that SEA is required for plans and programmes which are prepared for water management, set the framework for development consents, and/or are likely to have a significant environmental effect.

Some of the key objectives of the SEA process are to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans with a view to promoting sustainable development. The SEA also works to inform the decision-making process through the identification and assessment of the significant and cumulative effects a plan or programme may have on the environment. This is conducted at a strategic level and enables consultation on the potential effects of a plan with a wide range of stakeholders.

2.2 SEA Process and Stages

2.2.1 SEA Process Overview

The Anglian Water WRMP SEA has been carried out in accordance with the UKWIR Guidance 'Strategic Environmental Assessment and Habitats Regulations Assessment – Guidance for Water Resources Management Plans and Drought Plans' (ref. 12/WR/02/7); the Office of Deputy Prime Minister (ODPM) (now the Department for Communities and Local Government (DCLG)) Guidance 'A Practical Guide to the Strategic Environmental Assessment Directive' (September 2005); and will meet the requirements of the SEA Directive (and resulting SEA Regulations). Figure 2.1 shows the different stages in the SEA process, and Table 2.1 breaks the stages down into the individual tasks involved.

The previous Anglian Water WRMP was published in 2010 (see Chapter 3 for further details) and a SEA was undertaken for the Plan by Grontmij. Mott MacDonald has built on the SEA work done for the previous WRMP within this Environmental Report.

Figure 2.1: SEA Process Stages

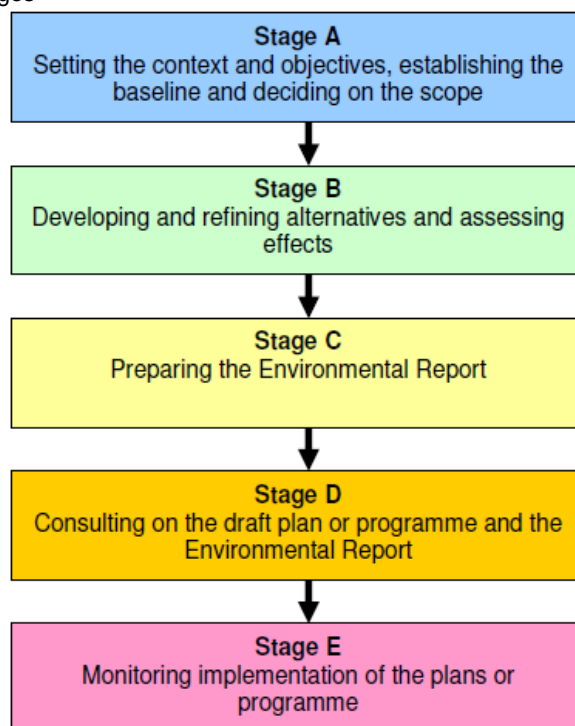


Table 2.1: Description of SEA Stages and Tasks

SEA Stage	SEA Task	Task Purpose
Stage A Setting the context and objectives, establishing the baseline and deciding on the scope	A1: Identifying other relevant plans, programmes, and environmental protection objectives	To establish how the plan or programme is affected by outside factors, to suggest ideas for how any constraints can be addressed, and to help to identify SEA objectives
	A2: Collecting baseline information	To provide an evidence base for environmental problems, prediction of effects, and monitoring; to help in the development of SEA objectives
	A3: Identifying environmental problems	To help focus the SEA and streamline the subsequent stages, including baseline information analysis, setting of the SEA objectives, prediction of effects and monitoring
	A4: Developing SEA objectives	To provide a means by which the environmental performance of the plan or programme and alternatives can be assessed
	A5: Consulting on the scope of SEA	To ensure that the SEA covers the likely significant environmental effects of the plan or programme
Stage B Developing and refining alternatives and assessing effects	B1: Testing the plan or programme objectives against the SEA objectives	To identify potential synergies or inconsistencies between the objectives of the plan or programme and the SEA objectives and help in developing alternatives
	B2: Developing strategic alternatives	To develop and refine strategic alternatives
	B3: Predicting the effects of the draft plan or programme, including alternatives	To predict the significant environmental effects of the plan or programme and alternatives
	B4: Evaluating the effects of the draft plan or programme, including alternatives	To evaluate the predicted effects of the plan or programme and its alternatives and assist in the refinement of the plan or programme

SEA Stage	SEA Task	Task Purpose
	B5: Considering ways of mitigating adverse effects	To ensure that adverse effects are identified and potential mitigation measures are considered
	B6: Proposing measures to monitor the environmental effects of plan or programme implementation	To detail the means by which the environmental performance for the plan or programme can be assessed
Stage C Preparing the Environmental Report	C1: Preparing the Environmental Report	To present the predicted environmental effects of the plan or programme, including alternatives, in a form suitable for public consultation and use by decision-makers
Stage D Consulting on the draft plan or programme and the Environmental Report	D1: Consulting on the draft plan or programme and Environmental Report	To give the public and the Consultation Bodies an opportunity to express their opinions on the findings of the Environmental Report and to use it as a reference point in commenting on the plan or programme. To gather more information through the opinions and concerns of the public
	D2: Assessing significant changes	To ensure that the environmental implications of any significant changes to the draft plan or programme at this stage are assessed and taken into account
	D3: Decision making and providing information	To provide information on how the Environmental Report and consultees' opinions were taken into account in deciding the final form of the plan or programme to be adopted
Stage E Monitoring implementation of the plans or programme	E1: Developing aims and methods for monitoring	To track the environmental effects of the plan or programme to show whether they are as predicted; to help identify adverse effects
	E2: Responding to adverse effects	To prepare for appropriate responses where adverse effects are identified

Source: Adapted from 'A Practical Guide to the Strategic Environmental Assessment Directive' (ODPM, September 2005)

2.2.2 Assessment Methodology

The WRMP and the scheme options were assessed against the SEA framework by determining the level of environmental performance of the WRMP and scheme options against each of the SEA Framework objectives. It should be noted that the assessment was a high level evaluation.

Prediction and evaluation of effects was undertaken based on the following criteria:

- Interaction;
- Magnitude;
- Importance; and
- Significance.

Interaction

Prediction of effects was undertaken using the interaction key as outlined below. Where an interaction was identified, commentary was provided to describe the nature of the interaction and how it would affect the SEA objective.

+	Potential positive interaction
0	Neutral or no interaction
-	Potential negative interaction
D	Dependent upon implementation

Magnitude

Having identified the effects of the WRMP and scheme options, an assessment of the significance of these effects was then conducted. For each potential interaction identified (as above), an evaluation of predicted impact magnitude was undertaken using the following criteria:

Magnitude	Description
Negligible	No measurable effect on the baseline. Effects would be one or more of the following: possible community/local, short-term, temporary or indirect
Minor	Slight measurable change in the baseline. Effects would be one or more of the following: likely community/local, short term, temporary, direct or indirect
Moderate	Measurable change in the baseline. Effects would be one or more of the following: definite, local borough, medium term, semi-permanent or temporary, direct or indirect or reversible
Major	Substantial measurable change in the baseline. Effects would be one or more of the following: definite, borough/regional/national/European, long term, permanent, direct or irreversible

Importance

For each potential interaction identified an evaluation of the sustainability value of the indicators affected was undertaken. The valuation was based on:

- The statutory importance;
- Sensitivity to change;
- Vulnerability;
- Degree of influence on health;
- Quality of life; and
- Quality of the local environment.

Information from the baseline study was used to inform the evaluation. Importance was measured using the following criteria:

Importance	Description
High	International, national, regional statutory recognition/designation, highly sensitive to change, vulnerable, has major effect on human health, quality of life and/or local environment
Medium	Local recognition/designations, sensitive to change, has moderate effects on human health, quality of life and/or local environment
Low	No statutory recognition/designations, not sensitive to change, not vulnerable, minor influence on human health, quality of life and/or local environment

Significance

For each potential interaction the significance was determined using the following criteria:

Importance	Magnitude			
	Negligible	Minor	Moderate	Major
Low	Not Significant	Not Significant	Not Significant	Significant
Medium	Not Significant	Not Significant	Significant	Highly Significant
High	Not Significant	Significant	Highly Significant	Highly Significant

	Highly Significant Positive
	Significant Positive
	Not Significant Positive
	No Effect
	Not Significant Negative
	Significant Negative
	Highly Significant Negative
	Effect Unknown

Carbon Assessment

The assessment of embodied and operational carbon under SEA objective 10 was assessed using the scale provided below. There is no national or industry set benchmarking scale therefore the scale below has been developed based on the relative carbon amounts (measured in tCO₂e) of the scheme options.

0	No Effect
1 – 10,000	Not Significant Negative
10,001 – 30,000	Significant Negative
30,000+	Highly Significant Negative
Unknown	Unknown

2.2.3 Assessment Assumptions

Due to the high level nature of the assessment the following assumptions were made:

- The information provided by Anglian Water on scheme maps including environmental and heritage features maps was correct (most of this information was cross-checked with the MAGIC website);
- The assessment was made on the scheme details provided by Anglian Water (latest revision November 2013);
- The assessment is a high level assessment of potential effects based on the baseline collected and does not go into the detail of an EIA; and
- The assessment is mainly qualitative and has been undertaken by environmental specialists with input from stakeholders.

3. Description and Context of the Water Resources Management Plan

3.1 WRMP Context

All water companies are required to prepare a Water Resources Management Plan (WRMP) to comply with statutory requirements in the Water Resources Management Plan Regulations 2007 issued by the Secretary of State in exercise of the powers conferred by the Water Act 2003. The purpose of the WRMP is to set out how a water company intends to balance supply and demand over a period of 25 years.

Anglian Water published their previous WRMP in February 2010. It set out the strategy for maintaining a secure water supply-demand balance through a combination of water resource management measures including demand management, transfers and water resource development.

WRMPs are prepared every 5 years and reviewed annually as part of the WRMP Annual Review that involves the production of a stand-alone report and table that are submitted to Defra as part of the WRMP statutory review process. The new WRMP has been prepared by Anglian Water and published in 2015. The 2015 WRMP is the subject of the SEA.

3.2 WRMP Region

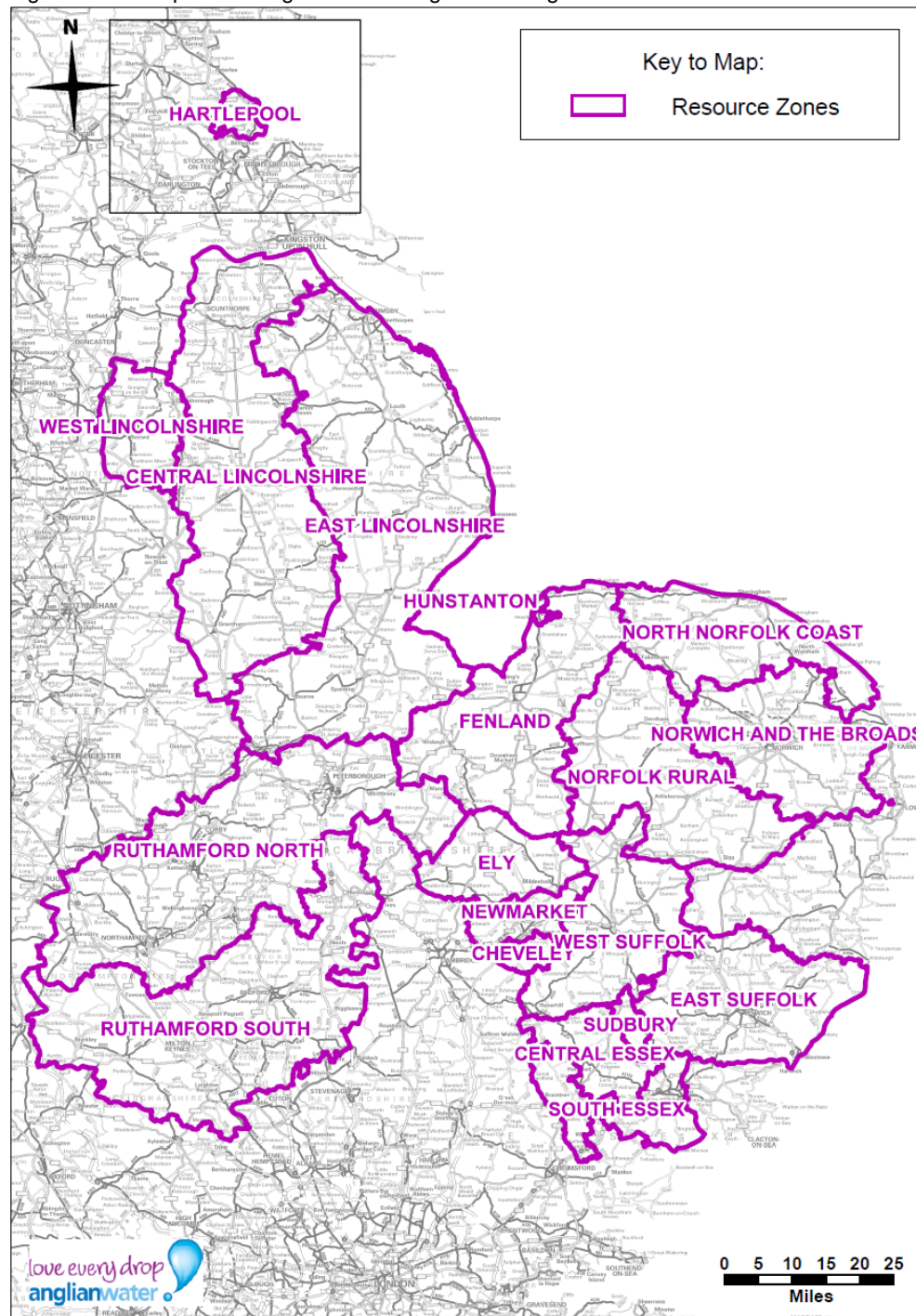
Anglian Water is the largest water and wastewater company in England and Wales by geographic area. It stretches from the Humber north of Grimsby, to the Thames estuary and then from Buckinghamshire to Lowestoft on the east coast (see Figure 3.1). It also covers the Hartlepool area. It is also one of the driest regions in the country, with just 600 millimeters of rain each year, on average a third less than the rest of England.

For the purposes of water resource management the Anglian Water region and WRMP are structured around Resource Zones (RZs). The RZs have recently been reviewed and there have been changes to boundaries and names from those defined in the previous WRMP. Each RZ is based on the characteristics of the local water supply system and represents the largest area in which water resources can be shared. In each RZ, customers therefore experience the same risk of supply failure from a resource shortfall. The current RZs are:

- Hartlepool;
- West Lincolnshire;
- Central Lincolnshire;
- East Lincolnshire;
- Hunstanton;
- Fenland;
- North Norfolk Coast;
- Norwich and The Broads;
- Norfolk Rural;
- Ely;
- Newmarket;
- Cheveley;
- West Suffolk;
- East Suffolk;
- Sudbury;
- Central Essex;

- South Essex;
- Ruthamford North; and
- Ruthamford South.

Figure 3.1: Map of the Anglian Water Region showing Water Resource Zones



Source: Anglian Water (2013)

3.3 WRMP Objectives

3.3.1 General

The 2009 Anglian Water Strategic Direction Statement (SDS) identifies growth, climate change and growing environmental pressure as the key drivers for future water resource management strategy in the Anglian region. In response, the Anglian Water 2010 WRMP and 2009 business plan promoted a twin-track investment programme based on managing leakage, increasing meter penetration and water efficiency activity, transferring resources from areas of surplus to areas of need and using the remaining available resources.

Since 2010, the Government White Paper: Water for Life has been published. This recognised the strategic challenge of growth, climate change and growing environmental need, and that investment will be required to ensure that customers continue to receive the service they expect. The key elements of the White Paper have been transposed into the current Water Resource Planning (WRP) guideline and from this, the Governments priorities for the 2015 WRMP and PR14 business plan may be summarised as:

- Provide secure, sustainable and affordable supplies for customers;
- Take a long-term perspective, ensuring that supply systems are made resilient to the effect of future uncertainties, such as climate change;
- Take better account of the value of water and the environmental and social costs of its abstraction and use;
- Consider all options for balancing supply and demand, including:
 - Water trading, and
 - Cross boundary and third party solutions,
- Reduce the demand for water by managing leakage and introducing water efficiency measures to customers that help reduce the volume of water they use; and
- Ensure that customer views are taken into account on levels of service (LoS) and cost.

The Anglian Water strategic water resource management objectives are consistent with the priorities expressed in Water for Life and the WRP guideline and may be summarised as follows:

- Reliable supplies: providing the level of service that customers expect and making sure that the Anglian Water supply system is resilient to the effects of climate change, population and property growth and other challenges such as deteriorating raw water quality and the periodic effects of drought;
- Sustainable upstream resource base: no damage to the environment from the things that Anglian Water do; and
- An affordable investment programme: good value for money for customers - not just by keeping bills as low as possible, but by protecting vulnerable customers as well.

To achieve these outcomes, it will be necessary for Anglian Water to:

- Ensure that water is used more efficiently: includes initiatives to change customer attitudes and water using behaviour, reduce leakage, increase water reuse and trade surplus water;
- Use water from sustainable sources: includes reforming abstraction activity and replacing sources linked to unsustainable levels of abstraction;
- Create a flexible and adaptive supply-system: includes increasing connectivity and building multi-stakeholder adaptive management capacity;
- Increase resilience: this also includes increasing connectivity within the water supply network, as well as the increasing the stored volume of raw water; and

- Sustainable design and construction: delivering water resource schemes using low carbon design and lean construction techniques.

From these high-level requirements, the principal elements of the 2015 WRMP and PR14 BP will be derived. In terms of key environmental objectives, a review of the Policies, Plans and Programmes shows that the following have relevance to the Anglian Water supply-demand strategy:

- To protect and enhance the natural environment;
- To reduce consumption of natural resources, including water and energy;
- To maintain and improve the quality of our river and coastal waters;
- To improve health and wellbeing; and
- To adapt to and mitigate the effects of climate change.

3.3.2 WRMP Scheme Delivery

In 2008 Anglian Water developed a low carbon design strategy which was implemented across all capital delivery routes. This encompassed the measurement, management and reduction of embodied and operational emissions in all new and refurbished assets.

This low carbon strategy supports two goals in the PR09 business plan: to halve the embodied carbon emissions of assets built in 2015 from a 2010 baseline; and reduce operational carbon emissions by 10% in real terms by 2015 from a 2010 baseline. Robust governance means scheme design carbon emissions are measured and challenged on three separate occasions prior to construction starting on site.

With low carbon design now embedded within the organisation and the benefits fully understood, this focus will continue beyond 2015. Design and delivery of schemes contained within the WRMP will be in accordance with the principles of the low carbon design strategy.

3.4 Schemes

The list of scheme options that were assessed is provided below:

- West Suffolk RZ:
 - WS1 Newmarket RZ transfer;
 - WS2 East Suffolk RZ transfer;
 - WS3 Bury St. Edmunds water reuse;
 - WS4 Thetford water reuse;
 - WS5 River Lark Flow Augmentation; and
 - WS6 South Essex RZ transfer.
- Ely RZ:
 - E1 Fenland RZ transfer; and
 - E2 Newmarket RZ transfer.
- Newmarket RZ:
 - NWM1 Ely RZ transfer; and
 - NWM2 West Suffolk RZ transfer.
- Cheveley RZ:
 - CVY1 Newmarket RZ transfer; and
 - CVY2 West Suffolk RZ transfer.
- Central Essex RZ:

- CE1 South Essex RZ transfer; and
- CE2 West Suffolk RZ transfer.
- Norwich & the Broads RZ:
 - NB1 / NB12 Bacton desalination;
 - NB2 / NB11 Norwich water reuse;
 - NB3 Cantley desalination;
 - NB4 Lowestoft water reuse;
 - NB5 Norwich storage;
 - NB6 Norwich intake with pre-treatment;
 - NB7 Norwich intake with lining existing bankside storage;
 - NB8 Norwich intake with new bankside storage; and
 - NB10 Norwich intake to existing bankside storage.
- Fenland RZ:
 - F1 Kings Lynn and Wisbech water reuse;
 - F2 Kings Lynn desalination;
 - F4 Ruthamford North RZ Transfer (12 Ml/d); and
 - F5 Ruthamford North RZ Transfer (25 Ml/d).
- Hunstanton RZ:
 - H1 Fenland RZ transfer;
 - H2 Heacham water reuse;
 - H3 Wash desalination; and
 - H4 Hunstanton RZ groundwater development.
- South Essex RZ:
 - SE1 Colchester water reuse;
 - SE2 / SE8 East Suffolk RZ transfer;
 - SE4 Amendment to Ardleigh agreement;
 - SE6 South Essex RZ groundwater development; and
 - SE7 Ardleigh reservoir extension.
- East Suffolk RZ:
 - ES3 Ipswich water reuse;
 - ES4 Felixstowe desalination;
 - ES6 East Suffolk RZ groundwater development; and
 - ES10 South Essex RZ transfer.
- Ruthamford North:
 - RHFA2 Peterborough water reuse;
 - RHFA3 Rutland dam raising;
 - RHFA4 Reduce export to STW;
 - RHFA5 Pitsford dam raising;
 - RHFA6 Canal transfer; and
 - RHFA15 Saltersford reduction.
- Ruthamford South:
 - RHFA1 Ruthamford North RZ Transfer 1;
 - RHFA7 Grafham dam raising;
 - RHFA8 New Ruthamford South reservoir;
 - RHFA9 Grafham intake refurbishment;
 - RHFA10 Re-commission Pulloxhill WTW;
 - RHFA11 Re-commission Ruthamford South RZ reservoir;

- RHFA13 Ruthamford North RZ Transfer 2;
 - RHFA14 Huntingdon water reuse;
 - RHFP1 Ruthamford North RZ Transfer 3;
 - RHFP2 Ruthamford North RZ Transfer 4;
 - RHFP3 Ruthamford North RZ Transfer 5;
 - RHFP4 Clapham WTW; and
 - RHFP5 Ruthamford North RZ transfer.
- Cambridgeshire and West Suffolk RZ (old RZ*):
- CWS1 Thetford PZ transfer;
 - CWS3 Sudbury PZ transfer;
 - CWS6 Haverhill water reuse; and
 - CWS11 Fenland RZ transfer.

**Note: The Cambridgeshire and West Suffolk RZ has been split into West Suffolk RZ, Sudbury RZ, Newmarket RZ, Ely RZ, and Cheveley RZ. However, schemes developed under the Cambridgeshire and West Suffolk RZ which have not been subsequently taken forward are included in the SEA for completeness and retain their CWS scheme reference.*

4. Stage A - Scoping Summary

4.1 Plans and Programmes Review

The WRMP must comply with all current relevant policies, plans, programmes (PPPs) and environmental protection legislation at international, national and local levels.

The SEA Directive requires “an outline of the plan or programme’s relationship with other relevant plans and programmes”; Annex 1(a) and

“the environmental protection objectives, established at international, Community or Member State level, which are relevant to the plans or programme and the way those objectives and any environmental considerations have been taken into account during its preparation.” Annex 1(e)

The WRMP must support and where possible strengthen the objectives of other local plans and strategies within the Anglian region. A review of these documents is required in order to identify any potential inconsistencies or constraints between these documents and the WRMP. Any inconsistencies and constraints identified can then be addressed. Figure 4.1 below lists the current and relevant PPPs, which were considered during the Scoping stage and additional plans and programmes added as a result of the scoping consultation. Table 4.1 lists the Local Authorities that the scheme options are within. For each Local Authority the Core Strategy, Local Plan or Unitary Development Plan (UDP) (as appropriate), Water Cycle Study and other relevant plans have been reviewed. Appendix A presents the PPP review and a description on how these objectives or requirements were integrated into the WRMP and taken on board in the SEA.

Figure 4.1: Relevant Policies, Plans, Programmes and Environmental Protection Legislation

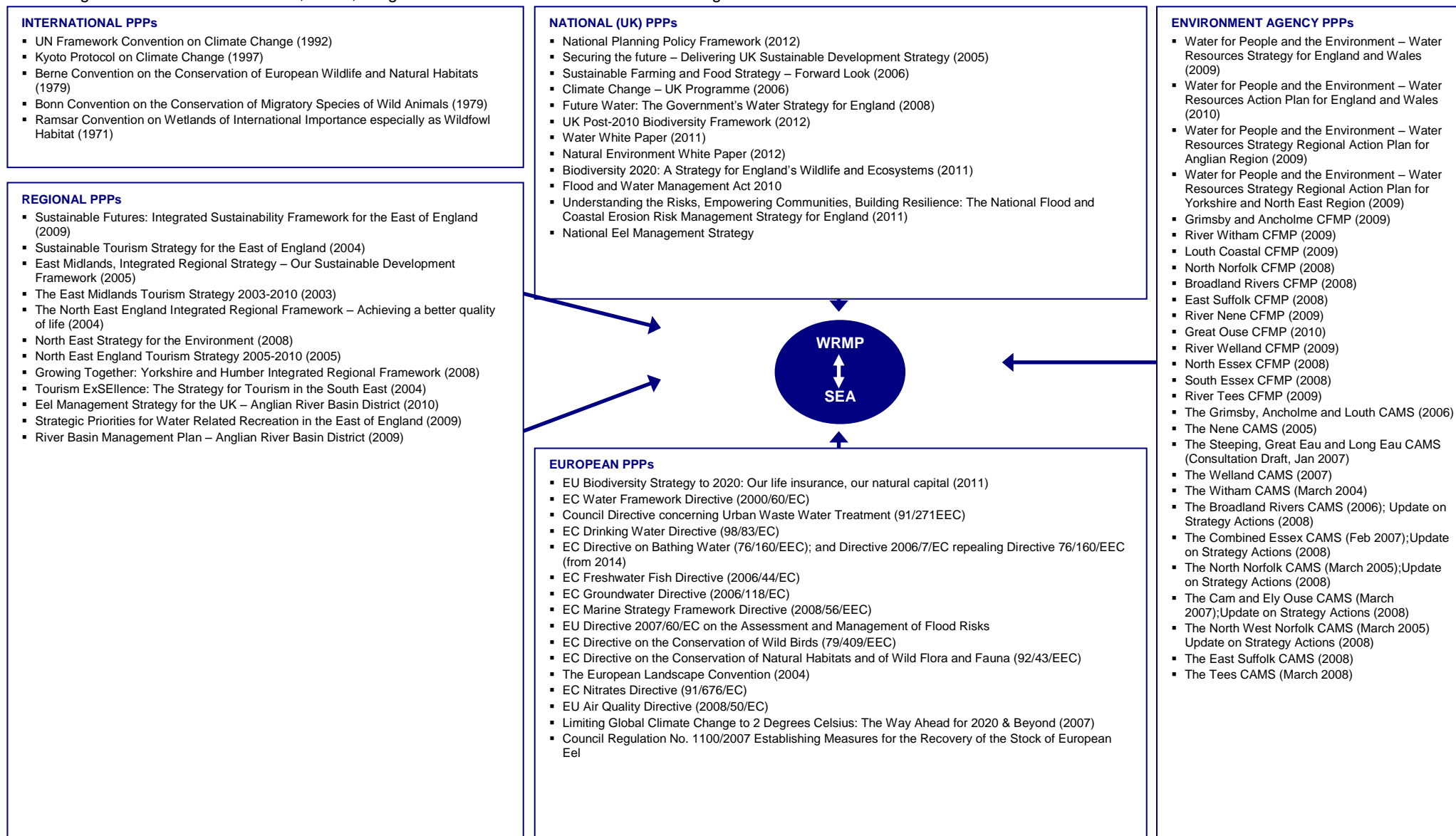


Table 4.1: Local Plans and Programmes

Local Plans and Programmes
<ul style="list-style-type: none"> • Area of Outstanding Natural Beauty (AONB) Management Plans – Norfolk Coast Management Plan, Suffolk Coast and Heaths Management Plan, Dedham Vale AONB and Stour Valley Management Plan • Norwich City • Norfolk County • Broadland • South Norfolk • Breckland • Great Yarmouth • Kings Lynn and West Norfolk • Rutland • Ipswich • Suffolk Coastal • Mid Suffolk • Suffolk County • Babergh • St. Edmundsbury • Fenland • Peterborough • Colchester • Essex County • Northampton • Broads Authority

4.2 Baseline Information

Current baseline information for the environment and socio-economics was collected and examined for the Anglian region during the scoping exercise. The baseline information collected during the scoping stage of the process forms an evidence base against which environmental effects (either positive or negative) resulting from the WRMP can be predicted and assessed.

The SEA Directive requires:

- 'The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme.' Annex I(b);
- 'The environmental characteristics of areas likely to be significantly affected' Annex I(c); and
- 'Any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Council Directive 79/409/EEC on the conservation of wild birds and the Habitats Directive.' Annex 1(d).

The baseline information collected is presented under the topics outlined in Annex 1(f) of the 'SEA Directive' and is contained within Appendix B. The topics which were reviewed during the scoping exercise are listed below:

- Biodiversity, Flora and Fauna;
- Water;

- Soil;
- Air;
- Climatic Factors;
- Population and Human Health; and
- Landscape and Cultural Heritage.

Following scoping the WRMP scheme options were determined and a further baseline information exercise was undertaken to gather site/scheme specific baseline. This information is presented in Appendix D.

4.2.1 Future Baseline

The SEA Directive requires that ‘the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the Plan or Programme’ is identified. Prediction of future trends is difficult because they depend on a wide range of global, national and regional factors and decision-making. However, from an initial review of baseline it is likely that the following trends will continue:

Biodiversity, Flora and Fauna – habitats and species are likely to continue to be protected through European and UK legislation. The European Habitats and Birds Directive, which is implemented in the UK through the “Habitats Regulations”, provides a high level of protection to a network of water-dependent special areas of conservation. Thus, protecting the quantity and quality of water in these important water dependent habitats will continue to attract the focus of policymakers¹.

Water – water quality is likely to continue to be maintained and improved through legislation such as the Water Framework Directive (WFD). The region is a water-stressed area and localised over-abstraction from ground and surface waters, coupled with high water use, puts added pressure on some of the region’s water resources and water dependent environments. Furthermore, the water quality standards of the WFD combined with population increase and planned growth, could involve more wastewater treatment using energy intensive processes. This could increase the water industry’s CO₂ emissions contributing to further change in climate.

Soil – climate change may cause a rise in temperatures and a reduction in summer rainfall, which could increase the likelihood of drought conditions, putting pressure on soils. In addition, there will be an increasing demand for water in agriculture, and climate change is likely to result in increasing summer demand for irrigation water of up to 25%, in the Anglian region.

Air – air quality will continue to be protected through national and European legislation and targets. However, future development and growth will continue to affect air quality through transport and industry.

Climatic Factors – climate change may result in reduced summer rainfall and low river flows. These climate conditions, combined with localised over abstraction, could further concentrate pollutants in water and impact water quality.

¹ Anglian Water - A right to water? Meeting the challenge of sustainable water allocation. 2011

Population and Human Health – more frequent droughts or floods may limit the regions access to water. In addition, more challenging environmental standards have led, and may continue to lead, to an increase in the water set aside for the environment. This will decrease the quantity available for consumptive use. The region has a fast growing population which is largely attributed to high levels of migration. Population in the Anglian region is projected to grow by 17% by 2028. Life expectancy is also higher than the national average and numbers of elderly residents are likely to increase. These increases in population will increase demand for water and put pressure on water resources.

Landscape and Cultural Heritage – cultural heritage assets are likely to continue to be preserved through legislation and the planning process. Landscapes are constantly evolving and changing. Future development may put pressure on green belt.

4.3 Key Issues and Opportunities

A key stage in the scoping process is to decide what topics are relevant for the Anglian Water WRMP SEA and what topics (if any) should be scoped out. Table 4.2 presents which topics were scoped in or out. It also presents the key issues and opportunities relevant to each topic. Topics were scoped in based on the baseline situation and the WRMP potentially impacting them. This was assessed by reviewing baseline conditions and current environmental issues for the Anglian Water region and assessing the likelihood of a potential impact.

Table 4.2: Key Issues and Opportunities

SEA Topic	Scoped In	Scoped Out	Evidence and Issues	Implications and Opportunities
Air Quality		✓	In general air quality in the region is good. However, there are some declared AQMAs. Air pollution is from road transport, agriculture and industry	The WRMP is unlikely to affect air quality as most water resource schemes will either emit no or minimal emissions from their operations. Odour is unlikely to be an issue as this is associated with sewage treatment works, which are not covered in the WRMP. There may be temporary construction effects from proposed WRMP schemes. However, it is assumed that these would be mitigated through best site practice and a Construction Environmental Management Plan
Water - quality	✓		Only 18% of surface waters meet the Water Framework Directive 'good' status or better for water quality Diffuse pollution, point source pollution and physical modification are the most common reasons for the region's surface waters not to meet 'good' status	The WRMP is an important mechanism for helping to maintain and improve chemical and ecological water quality. The WRMP should avoid measures which may negatively impact water quality, and identify opportunities to reduce known pressures on water quality and ecology, for example by alleviation of low flows
Water - resources			The region is a water-stressed region and has the lowest average rainfall in the UK Over 30% of water resource management units have been assessed as having 'no water available' for additional abstraction at times of low flow 60% of the region's water supplies are currently sourced from surface	The WRMP should avoid measures that increase over-abstraction and, where cost effective and possible, should aim to reduce abstraction from over abstracted and over licensed water resource units The WRMP should plan for periods of peak demand, e.g. during summer months

SEA Topic	Scoped In	Scoped Out	Evidence and Issues	Implications and Opportunities
			water and groundwater resources that are over-abstracted or over-licensed In 2009-10, people in region used an average of 147 litres of water/day, compared to the national average of 146 litres/person/day	
Water - flooding			Large areas of the region are at or below sea level and 20% of the region is within the flood zone 30% of the most productive agricultural land is also within the flood zone Over 400,000 properties are at risk of flooding from either rivers or the sea. This is approximately 11% of the total properties in the region Water and wastewater treatment works and pumping stations are particularly at risk, since they tend to be located near rivers	WRMP schemes should be located away from high flood risk areas and where appropriate, should include flood protection in their design WRMP schemes may help reduce flood risk through measures that involve flood storage
Climatic Factors	✓		The region is predicted to have hotter, drier summers and wetter, warmer winters. This may lead to summer droughts; a reduction in natural river flows during late summer and early autumn; more properties at risk of river or coastal flooding; important habitats declining due to changes in condition Sea level is projected to rise as a result of climate change The Anglian region contributes approx. 14% of England's total CO ₂ emissions 10% of electricity used in the East of England comes from renewable sources	As much of the region is flat and low-lying, there are few hills providing gravity to assist the transport of water. Therefore transporting water involves the use of large amounts of energy Climate change may lead to future periods of drought conditions and scarcity of water. When developing strategies and schemes for the WRMP future impacts of climate change should be taken into account Anglian Water has corporate goals to 'Reduce our operational carbon emissions by 10% in real terms by 2015 from 2010 baseline' and 'Effective management of the impact of growth and climate change in our region' and 'Halve our embodied carbon in new assets we build by 2015 from a 2010 baseline'. The WRMP and the schemes proposed should help deliver these goals through design and efficiency
Soil	✓		Over 70% of the land in the Anglian region was farmed in 2009, the majority for crops and horticulture Over 90% of land in the region is classified as Nitrate Vulnerable Zones Over 40% of the Country's most productive agricultural land (grade 1 and 2) is in the Anglian region	The WRMP has the potential to impact on agricultural land through the schemes proposed. Schemes could negatively affect agricultural land through actual loss of land for schemes, or through reduction in water available for irrigation. When choosing schemes this should be taken into account. There are also opportunities to benefit agricultural land from new schemes to increase raw water storage and supply
Biodiversity, Fauna, and Flora	✓		The Anglian region is rich in flora and fauna. It contains several SPA, SAC, SSSI, NNR, LNR and RIGS. These are also important for tourism More SSSIs in Anglian are in favourable condition Between 2009 and 2010 1.3km of SSSI river were restored	Works carried out as a result of the WRMP e.g. schemes involving construction have the potential to cause loss of habitat or damage designated and non-designated sites. Therefore, the locations for such schemes should be carefully considered Schemes implemented as part of the WRMP also have the potential to cause

SEA Topic	Scoped In	Scoped Out	Evidence and Issues	Implications and Opportunities
			<p>The region supports large proportions of England's wetland and coastal habitats including reedbeds (45%), grazing marshes (20%) and inter-tidal mudflats (40%)</p> <p>60% of the Anglian rivers fail the 2015 target of 'Good' status for fish under the Water Framework Directive</p>	<p>pollution to surface and groundwaters which may have effects on wildlife</p> <p>Wetland and marsh habitat rely on water, the WRMP should ensure that it does not affect these areas through over abstraction and should look for opportunities to reduce abstraction pressure where cost effective and possible</p> <p>There is an opportunity within the WRMP to implement schemes which also benefit the natural environment e.g. habitat creation or enhancement</p> <p>WRMP should consider the impact of measures on geomorphology, particularly river bank and channel processes, and should maximise opportunities to reduce pressures on natural processes that affect biodiversity and habitats</p>
Landscape	✓		<p>There are several important landscape areas in the region (e.g. Fens of Cambridgeshire and the Norfolk Broads) including designated landscapes (AONB and National Parks), and landscape character areas</p> <p>Large parts of the region are typically flat and low-lying and approximately a quarter of the land is below sea level</p>	<p>Works carried out as a result of the WRMP e.g. schemes involving construction have the potential to affect visual amenity and character of a landscape area. However, the WRMP also has an opportunity to implement schemes that may enhance landscape</p>
Cultural Heritage	✓		<p>The region has a rich heritage and contains many listed buildings, conservation areas, historic parks and gardens and heritage coast. These areas are also important for tourism</p>	<p>Works carried out as a result of the WRMP e.g. schemes involving construction have the potential to damage the fabric of a heritage assets or affect its setting. When considering WRMP schemes location and effects on heritage assets should be considered and adverse effects minimised. Opportunities to enhance the historic environment should also be considered</p>
Population and Socio-Economics	✓		<p>In 2009, 6.2 million people were living in Anglian region and this is projected to increase</p> <p>400,000 properties are located in the floodplain</p> <p>930,000 properties are at risk of flooding from rivers, the sea and surface water flooding already in our region</p> <p>Future growth will put further pressure on already stretched environmental resources and infrastructure</p>	<p>Projected population growth in the region will have implications for the WRMP and increase demand and pressure on water resources. The WRMP needs to balance meeting this increased demand with encouraging sustainable use of water resources</p> <p>The WRMP should aim to ensure security of water supply while encouraging water efficiency by customers</p> <p>Delivery of the WRMP may also present opportunities to work with local supply chain, and implement training programmes that enhance the skills of the workforce</p>
Human Health	✓		<p>0.8 % of Anglian Lower Super Output Areas (LSOAs) (30 out of 3955) are classed as 'most deprived', equivalent to approximately 45,000 people or 0.7% of the population</p> <p>However, the majority of local LSOAs are within the five lowest bands of deprivation, and South</p>	<p>WRMP schemes involving construction may cause temporary dust and noise nuisance</p> <p>Water bodies e.g. rivers, reservoirs etc. are used both for water-based recreation and nature trails. The WRMP should aim to reduce any negative effects and maximise opportunities to enhance or create recreational opportunities</p>

SEA Topic	Scoped In	Scoped Out	Evidence and Issues	Implications and Opportunities
			Northamptonshire and South Cambridgeshire are the least deprived	Development and delivery of the WRMP may also present opportunities to work and engage with local communities
Material Assets, Material Use and Waste	✓		Anglian Water operates 1,257 water and wastewater treatment works. Anglian Water has 112,833 km of water and wastewater pipes supplying and transporting water across an area of 27,500 square km	The WRMP should consider the resource demands of water resource measures. WRMP schemes involving construction of water resource infrastructure may generate waste material during construction and operation. The WRMP should seek to minimise waste generated and reuse and recycle material where possible. Anglian Water has a corporate goal to 'Get it right first time, every time. Zero waste'. WRMP schemes should aim to reduce waste associated with construction and operation.

4.4 SEA Framework

A key stage in the SEA process is the development of the SEA Framework which includes SEA objectives, assessment criteria and indicators (see Table 4.3). The SEA objectives and assessment criteria will be used in SEA Stage B (the assessment stage) to appraise the WRMP schemes and preferred plan to determine their potential environmental effects. The SEA objectives have been based on the SEA Directive topics, baseline information, and key issues for the Anglian Water region. The indicators will be used as the basis for proposals to monitor the implementation of the WRMP. The specific monitoring proposals and indicators chosen will depend on the results of the assessment. Monitoring should be focused where the potential for negative effects is identified (see Section 9 for Monitoring proposals).

Table 4.3: SEA Framework

Topic	Anglian Water WRMP SEA Objectives	Assessment Criteria	Indicators
Water	1. Protect and enhance where possible the ecological and chemical status of watercourses and water bodies in accordance with the WFD objectives	<ul style="list-style-type: none"> Will it affect the ecological status/potential of water bodies? Will it affect the chemical status/potential of water bodies? Will it affect overall water quality of water bodies? 	<ul style="list-style-type: none"> Ecological status of water bodies Chemical status of water bodies Number of pollution incidents during construction of WRMP schemes Km of river affected by habitat loss/gain
	2. Maintain and improve sustainable water resources and encourage the sustainable use of water	<ul style="list-style-type: none"> Will it reduce water lost through leakages? Will it reduce over abstraction? Will it reduce customer water consumption? 	<ul style="list-style-type: none"> Change in leakage (Ml/d and litres/property/day) Change in number of areas over abstracted and over licensed Change in per capita consumption per customer Change in % of households fitted with water meters
	3. Minimise the risk and reduce the impact of flooding	<ul style="list-style-type: none"> Will it contribute to managing flood risk e.g. involve flood storage? Will it involve loss or construction on the floodplain? 	<ul style="list-style-type: none"> Number of WRMP schemes involving flood reduction measures such as flood storage Area of floodplain lost Population and number of properties at risk from flooding
Population, Human Health	4. Ensure security of water supplies for customers whilst ensuring operations/schemes do not negatively affect local communities	<ul style="list-style-type: none"> Will it help secure water supplies for customers? Will it cause nuisance for local communities? Will it create community assets e.g. reservoir nature trail? 	<ul style="list-style-type: none"> Number of areas and population with water deficits Number of complaints Number and area of community assets created
Socio-Economics	5. Deliver WRMP schemes together with the local community and work with the local supply chain	<ul style="list-style-type: none"> Will the public be kept informed and consulted upon on WRMP proposals? Will local suppliers be used? 	<ul style="list-style-type: none"> Number of public/community events (leaflets, workshops, exhibitions, adverts etc.) % of suppliers used of schemes who are local (within 50 mile radius)
Biodiversity	6. Protect and enhance biodiversity and geo-diversity across the region	<ul style="list-style-type: none"> Will it encourage habitat creation? Will it involve loss or damage to statutory to non-statutory habitats? Will it affect aquatic biodiversity? Will it affect habitats that rely on water e.g. wetlands? 	<ul style="list-style-type: none"> Number of WRMP schemes that will lead to habitat creation, and amount of habitat created (hectares) Area (hectares) and number of statutory and non-statutory ecological sites that will be lost to WRMP schemes Area of both blue and green infrastructure created
Landscape	7. Protect and enhance landscape quality and character across the region	<ul style="list-style-type: none"> Will it negatively affect landscape quality and character? 	<ul style="list-style-type: none"> Number of WRMP schemes located within designated landscape areas

Topic	Anglian Water WRMP SEA Objectives	Assessment Criteria	Indicators
		<ul style="list-style-type: none"> Will it enhance landscape quality and character? 	<ul style="list-style-type: none"> Area (hectares) of landscape affected Number of WRMP schemes including additional landscaping
Cultural Heritage	8. Protect and enhance the historic environment, heritage assets and their setting	<ul style="list-style-type: none"> Will it affect the fabric of an historic asset? Will it affect the setting of a historic asset? Will it enhance the historic environment? 	<ul style="list-style-type: none"> Number of historic assets damaged by a WRMP scheme Number of WRMP schemes built within 500m of a historic asset Number of historic assets enhanced by schemes
Climate Factors	9. Educate, manage, plan and adapt for the effects of climate change	<ul style="list-style-type: none"> Will it assist in educating people about the impacts of climate change on water resources? Will it help the region to adapt to climate change effects on water resources? 	<ul style="list-style-type: none"> Number of educational campaigns implemented Number of WRMP schemes and proportion of new deployable output designed to take future climate change effects into account
	10. Minimise greenhouse gas emissions and energy use from water resource management operations	<ul style="list-style-type: none"> Will it increase generation of greenhouse gases? Will it increase energy use? Will new assets built as a result of the WRMP be designed to have half the embodied carbon (from 2010 baseline)? Will schemes be designed to contribute to reducing operational carbon emissions by 10% in real terms by 2015 from 2010 baseline? Will it generate emissions from transport? 	<ul style="list-style-type: none"> Tonnes greenhouse gas emission generated from new schemes and change in emission per MI/d Energy use from new operations and change in energy use per MI/d Number and distance of journeys
Material Assets, Material Use and Waste	11. Ensure that a sustainable approach is adopted for new water resource infrastructure and that existing infrastructure is utilised/expanded where possible	<ul style="list-style-type: none"> Will the scheme use sustainable materials? Will it utilise/expand existing infrastructure rather than building new infrastructure? Is the scheme designed to be low maintenance? Will the scheme generate waste/is it a zero waste scheme? Will waste generated by the scheme be halved to landfill? 	<ul style="list-style-type: none"> % of A-Rated, recycled, reused material used in infrastructure schemes Number of schemes that utilise existing infrastructure Maintenance regime periods Waste generated from new WRMP schemes (tonnes) Waste by % disposal method
Soil	12. Protect best quality soil and agricultural land	<ul style="list-style-type: none"> Will it help maintain water supplies for irrigation? Will it cause loss or damage to soils and agricultural land? 	<ul style="list-style-type: none"> % of new water supplies available for farming Area of agricultural land (by grade) lost due to the need for water resource schemes/infrastructure

4.5 Compatibility of SEA Objectives

When developing objectives based on environmental, social and economic issues, it is likely that not all of these objectives will relate or be compatible. For example, objectives covering economic issues may sometimes conflict with environmental objectives, and vice versa. A compatibility assessment of the SEA objectives is presented in Figure 4.2, and demonstrates any potential conflicts and uncertainties between objectives.

The following key has been used to illustrate the SEA objectives compatibility:

+	Objectives are compatible
-	Objectives are potentially incompatible
0	Objectives are not related
/	Uncertainty over relationship

Table 4.4: SEA Objectives

Ref	Anglian Water WRMP SEA Objectives
1	Protect and enhance where possible the ecological and chemical status of watercourses and water bodies in accordance with the WFD objectives
2	Maintain and improve sustainable water resources and encourage the sustainable use of water
3	Minimise the risk and reduce the impact of flooding
4	Ensure security of water supplies for customers whilst ensuring operations/schemes do not negatively affect local communities
5	Deliver WRMP schemes together with the local community and work with the local supply chain
6	Protect and enhance biodiversity and geo-diversity across the region
7	Protect and enhance landscape quality and character across the region
8	Protect and enhance the historic environment, heritage assets and their setting
9	Educate, manage, plan and adapt for the effects of climate change
10	Minimise greenhouse gas emissions and energy use from water resource management operations
11	Ensure that a sustainable approach is adopted for new water resource infrastructure and that existing infrastructure is utilised/expanded where possible
12	Protect best quality soil and agricultural land

Figure 4.2: SEA Objectives Compatibility Matrix

SEA Objectives	1. Meet WFD objectives											
	2. Sustainable water resources & use	+										
	3. Reduce flooding impacts	+	+									
	4. Water security	+	+	+								
	5. Working with the community	+	+	+	+							
	6. Protect & enhance biodiversity	+	+	+	/	+						
	7. Protect & enhance landscape	+	+	+	/	+	+					
	8. Protect & enhance historic assets	0	0	+	/	+	0	+				
	9. Climate change	+	+	+	+	+	+	+	+			
	10. Minimise GHG emissions & energy use	+	+	+	/	+	+	+	+	+		
	11. Sustainable approach to water infrastructure	+	+	+	+	+	/	+	/	+	/	+
	12. Protect soil & agricultural land	+	+	+	+	+	+	+	0	+	+	+
	1. Meet WFD objectives	2. Sustainable water resources & use	3. Reduce flooding impacts	4. Water security	5. Working with the community	6. Protect & enhance biodiversity	7. Protect & enhance landscape	8. Protect & enhance historic assets	9. Climate change	10. Minimise GHG emissions & energy use	11. Sustainable approach to water infrastructure	12. Protect soil & agricultural land
SEA Objectives												

Instances of uncertainty between SEA objectives are explained below:

Objective 4 with Objectives 6, 7, 8 and 10: ensuring security of water supplies for customers may mean building new infrastructure which could affect biodiversity, landscape and cultural heritage depending on the location and nature of the development and the mitigation measures implemented. New infrastructure may also require more energy contributing to greenhouse gas emissions. However, environmental assessment, the planning process and appropriate mitigation should minimise effects. Schemes could also enhance biodiversity, landscape and cultural heritage through landscaping and habitat creation. Use of renewable energy and energy efficiency can be built into new schemes to reduce their energy consumption and associated greenhouse gas emissions.

Objective 11 with Objectives 6, 7, 8 and 10: new water resource infrastructure could affect biodiversity, landscape and cultural heritage depending on the location and nature of the development and the mitigation measures implemented. New infrastructure may also require more energy contributing to greenhouse gas emissions. However, if a sustainable approach is adopted that considers social, economic and environmental effects of proposed schemes, and appropriate siting and mitigation is taken on board then effects should be minimised. Schemes also have the potential to enhance biodiversity, landscape and cultural heritage through landscaping and habitat creation. Use of renewable energy and energy efficiency

can be built into new schemes to reduce their energy consumption and associated greenhouse gas emissions.

4.6 Compatibility of WRMP Objectives and SEA Objectives

It is important that the objectives developed for the Anglian Water WRMP are compatible with the SEA objectives. Table 4.5 shows the compatibility of the objectives. Both the Anglian Water WRMP objectives and sub-objectives were tested.

Table 4.5: Compatibility of WRMP and SEA Objectives

Table No. 1: Comparing of WFD and SEA Objectives									
SEA Objectives	1. Meet WFD objectives	+	+	0	+	+	+	0	+
	2. Sustainable water resources & use	+	+	+	+	+	+	+	+
	3. Reduce flooding impacts	+	+	0	+	+	0	+	+
	4. Water security	+	0	+	+	+	+	+	+
	5. Working with the community	+	+	+	+	+	+	+	+
	6. Protect & enhance biodiversity	0	+	0	+	+	0	0	+
	7. Protect & enhance landscape	0	+	0	+	+	0	0	+
	8. Protect & enhance historic assets	0	+	0	+	+	0	0	+
	9. Climate change	+	+	0	+	+	+	+	+
	10. Minimise GHG emissions & energy use	+	+	0	+	+	+	0	+
	11. Sustainable approach to water infrastructure	+	+	+	+	+	+	+	+
	12. Protect soil & agricultural land	+	+	0	+	+	0	0	+
	Reliable supplies	Sustainable upstream resource base	An affordable investment programme	Ensure that water is used more efficiently	Use water from sustainable sources	Create a flexible and adaptive supply-system	Increase resilience	Sustainable design and construction	
	Anglian Water WRMP Objectives			Anglian Water WRMP Sub-Objectives					
	Anglian Water WRMP Objectives								

Table 4.5 demonstrates that the WRMP objectives and sub-objectives and the SEA objectives are compatible and no conflicts have been identified. WRMP objectives and sub-objectives will support the SEA objectives in terms of delivering water security for communities, protecting the natural environment, encouraging efficient use of water, and responding and adapting to the effects of climate change.

5. Description and Assessment of WRMP Options

5.1 Introduction

As part of the WRMP development process Anglian Water has undertaken modelling to identify areas with a surplus or deficit of water supply. For areas with deficits, Anglian water has developed a range of options for maintaining the supply demand balance. These fall into two broad categories:

- Demand Management options – options that will reduce the demand for water including metering, water efficiency, and leakage reduction; and
- Supply options – options that will provide a water supply to customers including transfers, maximising existing resources, trading, tankering, and new resources.

The WRMP will be a mix of these two broad categories. Although demand management options are likely to have the least environmental effects, if implemented on their own they will not meet the deficits forecast in the region. Therefore, supply options are also needed.

HRA and WFD assessments were not undertaken for the demand management options because they are not required due to the nature of demand management schemes.

5.2 Demand Management Options Description

The demand management options proposed in the 2015 WRMP build on demand management initiatives which are being delivered as part of Anglian Water's current WRMP which include:

- Installation of 300,000 meters - These are being installed either through Anglian Water's enhanced or optant metering programmes. Anglian Water estimate that customers who switch to measured supplies may reduce their water consumption by up to 60 l/property/day; and
- The completion of 87,500 water audits, with free fitting of water saving devices. Anglian Water estimate that customers who opt for this service typically reduce their consumption by approximately 40 l/property/day.

Demand Management Option 1: Household and Commercial Water Metering

This involves installing water meters in properties so that customers have measured water supplies. Customers who are billed on the basis of measured supplies generally use less water than unmeasured customers. The WRMP has a target to achieve full coverage of the number of metered households during the forecast period, without implementing compulsory metering. This target will meet Government policy objectives by increasing the numbers of metered households to 96% of Anglian Water customers.

Demand Management Option 2: Water Efficiency Campaigns

Anglian Water has a water efficiency campaign '*Drop 20 litres*'. This campaign aims to encourage households to drop their water consumption by 20 litres. Anglian Water has a number of initiatives under this campaign to help households achieve this target. These include: water efficiency home visits; water saving tips for the home and garden on their website and leaflets; and free water saving products and kits available. Anglian Water also has a broader campaign '*Love Every Drop*'. The goal of this campaign is to increase customer awareness about the value of water in the region. The WRMP will meet Government policy objectives by reducing average household consumption by a minimum of 12%.

Demand Management Option 3: Leakage Reduction

The water supply network within the Anglian Water region is divided into various water management areas. These areas are metered at various points and known as District Metered Areas (DMAs). Meters have been installed at various locations throughout the water distribution supply networks for the purposes of monitoring demand. These meters are logged continuously and the data is sent to Anglian Water for analysis. .

An increase in demand within a DMA may be a result of legitimate use or it may be as a result of a burst or background leakage in the water distribution network. If legitimate water use is ruled out then leakage teams will locate the burst or damaged water main and repair it. The WRMP will meet Government policy objectives by delivering a level of leakage which is at least 11% below the Anglian Water current sustainable economic level of leakage.

5.3 Demand Management Options Assessment

Each of the WRMP demand management options described in Section 5.2 was assessed against the SEA Framework using the assessment methodology presented in Section 2.2.2. The assessment results are presented in Table 5.1.

Key

	Highly Significant Positive
	Significant Positive
	Not Significant Positive
	No Effect
	Not Significant Negative
	Significant Negative
	Highly Significant Negative
	Effect Unknown / Effect depends of conclusions of other studies

Table 5.1: Demand Management Options Assessment

SEA Objectives	Demand Management Options														
	DM Option 1: Metering					DM Option 2: Water Efficiency					DM Option 3: Leakage Reduction				
	Int	Mag	Imp	Sig	Comments	Int	Mag	Imp	Sig	Comments	Int	Mag	Imp	Sig	Comments
1. Water Quality	+	Min	Low	NS	Potential indirect benefits from water savings meaning less water needs to be abstracted, so less effects on water flows and less need for capital works	+	Min	Low	NS	Potential indirect benefits from water savings meaning less water needs to be abstracted, so less effects on water flows and less need for capital works	+	Min	Low	NS	Potential indirect effects from water savings if leakages are detected early. Will help reduce potential pollution effects of burst pipes which can lead to flooding and effects on water quality. However, in order to repair/upgrade pipes excavation and works will take place which could cause pollution
2. Water Resources	+	Mod	Med	S	Metering may encourage less customer water use	+	Mod	Med	S	Will help reduce customer water consumption and encourage water efficiency	+	Mod	Med	S	Will help to reduce water lost through leakages
3. Flood Risk	0	N/A	N/A	N/A	Unlikely to affect flood risk	0	N/A	N/A	N/A	Unlikely to affect flood risk	+	Min	Med	NS	Will help reduce localised flooding associated with burst pipes
4. Water Security	+	Min	Low	NS	Will help ensure water security through reducing demand and encouraging water efficiency. Minimal disruption to residents through fitting of meters in properties.	+	Min	Low	NS	Will help ensure water security through reducing demand and encouraging water efficiency. Minimal disruption to residents through fitting of water saving devices	-	Min	Low	NS	Will help ensure water security through reducing the amount of water lost through the system. However, it will involve digging up pipes causing temporary nuisance and disruption to residents
5. Community	+	Mod	Med	S	Direct involvement of community through fitting of water metres in properties and advice on	+	Maj	Med	HS	Includes campaigns focused on customers to improve their water efficiency. Provides free water saving	+	Min	Med	NS	Anglian Water encourages its customers to report leakages

SEA Objectives	Demand Management Options																			
	DM Option 1: Metering					DM Option 2: Water Efficiency					DM Option 3: Leakage Reduction									
	Int	Mag	Imp	Sig	Comments	Int	Mag	Imp	Sig	Comments	Int	Mag	Imp	Sig	Comments					
					reducing water consumption					audits and devices to customers										
6. Biodiversity	+	Min	Low	NS	Potential indirect benefits from water savings meaning less water needs to be abstracted, so less effects on water flows and less need for capital works which may affect habitats and species	+	Min	Low	NS	Potential indirect benefits from water savings meaning less water needs to be abstracted, so less effects on water flows and less need for capital works which may affect habitats and species	-	Min	Med	NS	Will help reduce potential pollution effects of burst pipes on ecology. However, in order to repair/upgrade pipes excavation and works will take place which could cause pollution and loss of sensitive habitats or species depending on location					
7. Landscape	0	N/A	N/A	N/A	Unlikely to affect landscape character	0	N/A	N/A	N/A	Unlikely to affect landscape character	-	Min	Low	NS	Digging up pipes could cause temporary visual impacts affecting landscape character					
8. Historic Assets	0	N/A	N/A	N/A	Unlikely to affect historic assets	0	N/A	N/A	N/A	Unlikely to affect historic assets	0	N/A	N/A	N/A	Unlikely to affect historic assets unless pipe leak is next to a listed structure or scheduled monuments. Minimal potential for discovery of archaeological remains as ground will have been previously disturbed to lay the pipeline					
9. Climate Change Adaptation	+	Min	Low	NS	Metering may encourage people to use less water helping to reduce water demand	+	Min	Low	NS	Water efficiency will provide water savings reducing water demand	+	Min	Low	NS	Reducing leakage volumes will help reduce water demand					
10. Climate Change Mitigation	-	Min	Low	NS	The manufacturing and materials used to produce the meters will involve some embodied	-	Min	Low	NS	The manufacturing and materials used to produce the water saving devices will involve some	-	Min	Low	NS	The manufacturing and materials used to produce the pipes will involve some embodied carbon and					

SEA Objectives	Demand Management Options															
	DM Option 1: Metering					DM Option 2: Water Efficiency					DM Option 3: Leakage Reduction					
	Int	Mag	Imp	Sig	Comments	Int	Mag	Imp	Sig	Comments	Int	Mag	Imp	Sig	Comments	
					carbon and carbon emissions. Staff travelling to homes to fit meters will also produce GHG from vehicle emissions					embodied carbon and carbon emissions.					carbon emissions. Staff travelling to leakage sites and machinery for digging up pipes will generate some GHGs.	
11. Sustainable Design	+	Mod	Med	S	Will involve resources for manufacturing meters but meters are sustainable through helping to reduce water consumption. May help reduce need for supply schemes	+	Mod	Med	S	Will involve resources for manufacturing water saving devices but these are sustainable through helping to reduce water consumption and encourage water efficiency. May help reduce need for supply schemes	+	Min	Low	NS	Repairs and new pipes will involve resource use. But this will help reduce water lost in the long run	
12. Soil and Land	0	N/A	N/A	N/A	Unlikely to affect soil or land	0	N/A	N/A	N/A	Unlikely to affect soil or land	-	Min	Low	NS	Will help reduce potential soil pollution effects of burst pipes. However, in order to repair/upgrade pipes excavation and works will take place causing temporary disturbance of soil and land	

* Int = Interaction
Mag = Magnitude
Imp = Importance
Sig = Significance

5.4 Summary of Demand Management Options Assessment

None of the demand management options have been assessed as having significant negative effects. Metering and water efficiency will have the least environmental effects and will have positive effects in terms of encouraging customers to use less water by providing practical solutions and advice for water efficiency. This will help change customer habits, reducing demand and ensuring water security. Leakage reduction will have benefits through reducing the volume of water lost in the network due to leakages. This will also help reduce demand and ensure water security. Leakage options will have temporary negative effects associated with excavations to repair or replace pipes to reduce future leakages. All of the demand management options were considered suitable to be taken forward into the WRMP.

5.5 Supply Scheme Options

For areas with deficits Anglian Water developed a range of potential supply options to stand alongside the demand management options described above to reduce the deficits. The identified deficit areas and scheme options are presented in Tables 5.2 to 5.14. It should be noted that the tables contain potential schemes but only a few will be taken forward into the preferred plan for the WRMP. Determination of schemes to be taken forward will depend on feasibility, economic modelling, capacity to meet the deficit, environmental effects (from the SEA, HRA and WFD assessment), and capacity to meet long-term supply demand objectives.

Table 5.2: West Suffolk RZ

RZ: West Suffolk			
Scheme Ref	Scheme Name	Average Capacity (MI/d)	Scheme Description
WS1	Newmarket RZ transfer	8.5	New pipeline to transfer surplus to Haverhill/Bury PZ
WS2	East Suffolk RZ transfer	15.0	Transfer from either Ipswich PZ or Semer PZ to Bury PZ.
WS3	Bury St Edmunds water reuse	5.0	Fornham STW effluent reuse
WS4	Thetford water reuse	2.9	Thetford STW effluent reuse
WS5	River Lark flow augmentation	4.5	Water will be diverted from the existing discharge point upstream to off-set the impact of abstractions along the stretch of river that runs through Bury St Edmunds
WS6	South Essex RZ transfer	15.0	Transfer from either Ipswich PZ or Horkesley Reservoir to Bury PZ.

Table 5.3: Ely RZ

RZ: Ely			
Scheme Ref	Scheme Name	Average Capacity (MI/d)	Scheme Description
E1	Fenland RZ transfer	15.0	Stoke Ferry WTW to Isleham WTW
E2	Newmarket RZ transfer	5.0	Warren Hill reservoir to Isleham WTW

Table 5.4: Newmarket RZ

RZ: Newmarket			
Scheme Ref	Scheme Name	Average Capacity (MI/d)	Scheme Description
NWM1	Ely RZ transfer	9.0	Isleham reservoir to Warren Hill reservoir
NWM2	West Suffolk RZ transfer	6.0	Rushbrooke to Warren Hill

Table 5.5: Cheveley RZ

RZ: Cheveley			
Scheme Ref	Scheme Name	Average Capacity (MI/d)	Scheme Description
CVY1	Newmarket RZ transfer	1.0	Transfer from Warren Hill WR to Woodditon WT
CVY2	West Suffolk RZ transfer	1.0	Transfer from Woodditon WR to Hundon WR

Table 5.6: Central Essex RZ

RZ: Central Essex			
Scheme Ref	Scheme Name	Average Capacity (MI/d)	Scheme Description
CE1	South Essex RZ transfer	1.5	Coggeshall reservoir to Lt Maplestead
CE2	West Suffolk RZ transfer	1.5	Rushbrooke to Steeple Bumpstead

Table 5.7: Norwich and The Broads RZ

RZ: Norwich and The Broads			
Scheme Ref	Scheme Name	Average Capacity (MI/d)	Scheme Description
NB1 / NB12	Bacton desalination	46.0	NB1 - North Sea desalination plant
	Bacton desalination	11.0	NB12 - Bacton desalination scheme sized for nominal 10 MI/d
NB2 / NB11	Norwich water reuse (SR)	25.0	NB2 - STW effluent reuse
	Norwich water reuse (growth scheme)	11.0	NB11 - Norwich water reuse scheme sized for nominal 10 MI/d and including a 10 MI/d extension of Norwich WTW
NB3	Cantley desalination	43.0	New brackish water plant
NB4	Lowestoft water reuse	10.0	STW effluent reuse
NB5	Norwich storage	46.0	100 days storage reservoir and pipelines to and from Norwich WTW
NB6	Norwich intake with pre-treatment	43.0	Full pre-treatment plant with no bankside storage
NB7	Norwich intake with lining existing bankside storage	43.0	Includes lining Norwich pits
NB8	Norwich intake with new bankside storage	43.0	Includes new 10 days bankside storage
NB10	Norwich intake to existing bankside storage	46.0	Uses the upstream intake and conveys raw water to Norwich pits via a new pipeline. Then raw water will return via the existing infrastructure to Norwich WTW.

Table 5.8: Fenland RZ

RZ: Fenland			
Scheme Ref	Scheme Name	Average Capacity (MI/d)	Scheme Description
F1	Kings Lynn and Wisbech water reuse	12.0	Effluent from Kings Lynn STW and Wisbech STW to Stoke Ferry WTW
F2	Kings Lynn desalination	12.0	Desalination plant in Kings Lynn
F4	Ruthamford North RZ Transfer (12 MI/d)	12.0	Transfer from March PZ to WisbechPRZ
F5	Ruthamford North RZ Transfer (25 MI/d)	25.0	Transfer from MarchPRZ to Wisbech PZ

Table 5.9: Hunstanton RZ

RZ: Hunstanton			
Scheme Ref	Scheme Name	Average Capacity (MI/d)	Scheme Description
H1	Fenland RZ transfer	1.5	Transfer from Kings Lynn PZ or Snettisham PZ to Hunstanton RZ
H2	Heacham water reuse	1.0	Effluent reuse from STW

RZ: Hunstanton			
H3	Wash desalination	1.0	Desalination plant on the Wash
H4	Hunstanton RZ groundwater development	1.0	Existing Anglian Water groundwater sources which have been decommissioned

Table 5.10: South Essex RZ

RZ: South Essex			
Scheme Ref	Scheme Name	Average Capacity (MI/d)	Scheme Description
SE1	Colchester water reuse	16.0	Effluent reuse at STW
SE2 / SE8	East Suffolk RZ transfer	12.0	Transfer from Alton to Horkesley WR
SE4	Amendment to Ardleigh agreement	2.7	Amend the Ardleigh agreement and increase Anglian Water proportion. No capex only opex
SE6	South Essex RZ groundwater development	1.0	Anglian Water disused groundwater source
SE7	Ardleigh reservoir extension	2.0	Extension of Ardleigh Reservoir, involving conversion of a gravel pit into an extension of the reservoir. To treat the additional water (4 MI/d) the existing Ardleigh WTW will be extended.

Table 5.11: East Suffolk RZ

RZ: East Suffolk			
Scheme Ref	Scheme Name	Average Capacity (MI/d)	Scheme Description
ES3	Ipswich water reuse	11.0	Cliff Quay effluent reuse scheme sized for East Suffolk RZ and South Essex RZ deficits
ES4	Felixstowe desalination	11.0	Desalination plant sized for East Suffolk RZ and South Essex RZ deficits
ES6	East Suffolk RZ groundwater development	0.8	Anglian Water disused groundwater source
ES10	South Essex RZ transfer	6.0	Transfer from Colchester PZ to Ipswich PZ

Table 5.12: Ruthamford North RZ

RZ: Ruthamford North			
Scheme Ref	Scheme Name	Average Capacity (MI/d)	Scheme Description
RHFA2	Peterborough water reuse	20.0	Effluent reuse
RHFA3	Rutland dam raising	16.0	Dam raising
RHFA4	Trade with STW	18.0	Reduce trade with STW
RHFA5	Pitsford dam raising	11.0	Dam raising and transfer to WR
RHFA6	Canal transfer	13.0	Canal transfer to Pitsford and transfer into WR
RHFA15	Saltersford reduction	8.0	Reduce raw water export to Central Lincolnshire RZ

Table 5.13: Ruthamford South RZ

RZ: Ruthamford South			
Scheme Ref	Scheme Name	Average Capacity (MI/d)	Scheme Description
RHFA1	Ruthamford North RZ Transfer 1	24.0	Deployment of Wing surplus at Ecton Booster Uprate Hannington to Salcey WR
RHFA7	Grafham dam raising	40.0	Dam raising
RHFA8	New Ruthamford South reservoir	26.0	New reservoir
RHFA9	Grafham intake refurbishment	10.0	Refurbish pumps to increase capacity
RHFA10	Re-commission Pulloxhill WTW	3.5	Pulloxhill WTW Infrastructure from WTW to Amphill WR
RHFA11	Re-commission Ruthamford South RZ reservoir	9.0	Foxcote WTW Infrastructure from WTW to Deanshanger WR

RZ: Ruthamford South			
RHFA13	Ruthamford North RZ Transfer 2	39.0	Transfer North RHF RZ to South RHF RZ Uprate Hannington to Salcey WR Uprate Salcey WR intake Uprate Old Stratford WB
RHFA14	Huntingdon water reuse	5.4	Reuse of Huntingdon STW discharge reuse. Transfer from Huntingdon STW to Grafham Water Reservoir
RHFP1	Ruthamford North RZ Transfer 3	41.0	Deployment of Wing surplus at Ecton Booster Uprate Hannington to Salcey WR Uprate Salcey WR intake Uprate Old Stratford WB
RHFP2	Ruthamford North RZ Transfer 4	41.0	Deployment of Wing and Grafham surplus at Ecton Booster Uprate Hannington to Salcey WR Uprate Salcey WR intake Uprate Old Stratford WB Uprate Grafham to Ampthill WR
RHFP3	Ruthamford North RZ transfer 5	41.0	Deployment of Ling and Grafham surplus Uprate Wilby Valve Uprate Grafham to Ampthill WR
RHFP4	Clapham WTW	0	Deployment of Grafham surplus and Clapham WTW Uprate Clapham WTW Uprate Grafham to Ampthill WR Uprate Ampthill to Milton Keynes
RHFP5	Ruthamford North RZ transfer	0	Uprate Grafham to Ampthill WR Uprate Ampthill to Milton Keynes

Table 5.14: Cambridgeshire and West Suffolk RZ (old RZ)

RZ: Cambridgeshire and West Suffolk (old RZ*)			
Scheme Ref	Scheme Name	Average Capacity (MI/d)	Scheme Description
CWS1	Thetford PZ transfer	1.7	New pipeline to transfer surplus to Bury PZ
CWS3	Sudbury PZ transfer	0.7	New pipeline to transfer surplus to Haverhill/Bury PZ
CWS6	Haverhill water reuse	2.3	Haverhill STW effluent reuse
CWS11	Fenland RZ transfer	8.0	Transfer form Wisbech PZ to Haverhill PZ or Bury PZ

**Note: The Cambridgeshire and West Suffolk RZ has been split into West Suffolk RZ, Sudbury RZ, Newmarket RZ, Ely RZ, and Cheveley RZ. However, schemes developed under the Cambridgeshire and West Suffolk RZ which have not been subsequently taken forward are included in the SEA for completeness and retain their CWS scheme reference.*

5.6 Supply Scheme Options Assessment

Each of the supply scheme options listed in Tables 5.2 to 5.14 was assessed against the SEA Framework using the assessment methodology presented in Section 2.2.2. A summary of the assessment results is provided in Table 5.15, and the detailed assessment tables for each scheme option are presented in Appendix D. It should be noted that the scheme options were assessed based on the scheme description and mapping provided by Anglian Water (April 2013, updated November 2013) and does not include the implementation of mitigation measures.

Key

	Highly Significant Positive
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	Significant Positive
	Not Significant Positive
	No Effect
	Not Significant Negative
	Significant Negative
	Highly Significant Negative
	Effect Unknown / Effect depends on conclusions of other studies

Table 5.15: Summary of Supply Scheme Options Assessment (before mitigation)

Resource Zone	Scheme	SEA Objectives												Key Issues (before mitigation)	Mitigation
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land		
West Suffolk	WS1 Newmarket RZ transfer													Proposed pipeline route runs through an area of ancient woodland.	Pipeline could be re-routed to avoid the area of ancient woodland.
	WS2 East Suffolk RZ transfer													Gt. Welnetham WR is within an area of ancient woodland so a small part of the pipeline is within this area. Proposed pipeline route runs through the corner of an area of ancient woodland.	Cannot avoid ancient woodland by WR area due to location of WR. Pipeline could be re-routed to avoid the other area of ancient woodland.
	WS3 Bury St Edmunds water reuse													Proposed pipeline route would run through a SSSI and LNR, and through 2 historic landfill sites	Pipeline could be re-routed to avoid the SSSI, LNR and historic landfill sites
	WS4 Thetford water reuse													Proposed pipeline route would run through SAC, SPA, SSSI and LNR, and a historic landfill site	Could re-route pipeline to avoid part of the SPA, SAC and SSSI but unlikely to be able to avoid it completely due to location of Barnham Cross WW. Re-route to avoid historic landfill site. HRA screening concluded potential for LSE on the Breckland SPA and Breckland SAC. HRA AA required if scheme taken forward
	WS5 River Lark flow augmentation													No negative significant effects predicted	None required
	WS6 South Essex RZ transfer													Gt. Welnetham WR is within an area of ancient woodland so a small part of the pipeline is within this area. Proposed pipeline route runs through a LNR	Cannot avoid ancient woodland area due to location of WR. Pipeline could be re-routed to avoid LNR
Ely	E1 Fenland RZ transfer													Pipeline route runs through 2 SSSIs and a SPA.	Investigate feasibility of re-routing pipeline away from designated sites. Best practice construction methods to reduce effects. HRA screening concluded potential for LSE on the Fenland SAC. HRA AA required if scheme taken forward
	E2 Newmarket RZ transfer													Pipeline route runs through 2 SSSIs, and within 200m of a NNR and a SAC.	Investigate feasibility of re-routing pipeline away from designated sites. Best practice construction methods to reduce effects.
Newmarket	NWM1 Ely RZ transfer													Pipeline route runs through 2 SSSIs, and within 200m of a NNR and a SAC.	Investigate feasibility of re-routing pipeline away from designated sites. Best practice construction methods to reduce effects.
	NWM2 West Suffolk RZ													Proposed pipeline route runs through an area of ancient woodland.	Pipeline could be re-routed to avoid the area of ancient woodland.

Resource Zone	Scheme	SEA Objectives												Key Issues (before mitigation)	Mitigation
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land		
Cheveley RZ	transfer													No negative significant effects predicted	None required
	CVY1 Newmarket RZ transfer													No negative significant effects predicted	None required
	CVY2 West Suffolk RZ transfer													No negative significant effects predicted	None required
Central Essex	CE1 South Essex RZ transfer													Pipeline runs through or near (within 300m) of 4 areas of ancient woodland.	Investigate feasibility of re-routing pipeline away from areas of ancient woodland
	CE2 West Suffolk RZ transfer													Pipeline runs through or near (within 300m) of 6 areas of ancient woodland. Pipeline route through Registered Parks and Gardens, and within 300m of high concentration of listed buildings	Investigate feasibility of re-routing pipeline away from areas of ancient woodland and historic sites
Norwich & The Broads	NB1 / NB12 Bacton desalination													Proposed pipeline route would run next to the boundary of an SAC, SPA, Ramsar, through a SSSI/LNR site. On boundary of area of ancient woodland and National Park. 2 Scheduled Monuments 40 and 80m away. Adjacent to historic landfill site. New desalination plant in areas of fields will affect landscape and landtake from high quality agricultural land	Pipeline could be re-routed further away from SAC, SPA, Ramsar, ancient woodland, and National park (route follows road next to woodland and national park so as long as it doesn't encroach on these areas then it may not need re-routing for these 2 areas). Very difficult to re-route pipeline away from SSSI/LNR and historic landfill site because of the location of Norwich WTW. Compensation for loss of high quality agricultural land may be required. With good site practices effects on SM could be minimised. HRA screening concluded potential for LSE on Hainsborough, Hammond and Winterton SAC, and Paston Great Barn SAC. HRA AA required if scheme taken forward
	NB2 / NB11 Norwich water reuse													Proposed pipeline route would be 150m and 160m from 2 SSSIs, and adjacent to 2 LNRs. Through a Scheduled Monument, 50m from a SM, 100m from 4 SMs, 150m from 3 SMs. Through Registered Park and Garden and close to 2 others. Through centre of Norwich, many receptors	Could re-route to avoid Registered Park and Garden and SM, but very hard to re-route over 500m from historic assets. HRA screening concluded potential for LSE on the Broads SAC, and Broadland SPA and Ramsar. HRA AA required if scheme taken forward
	NB3 Cantley desalination													Brine discharge into Breydon Water potential for water quality issues. Proposed pipeline route would run through Broadland SPA, SAC, Ramsar, 2 SSSI's, and a LNR.	Potential significant effects of brine discharge. Difficult to re-route pipeline away from designated sites but could potentially be done with big diversions. HRA screening concluded potential for LSE on the Broads

Resource Zone	Scheme	SEA Objectives												Key Issues (before mitigation)	Mitigation
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land		
														Discharge point on boundary of SPA, Ramsar, SSSI and LNR. The existing Cantley works and a section of the proposed pipeline leading to the plant is within a NNR	SAC, Broadland SPA and Ramsar, and Breydon Water SPA and Ramsar. HRA AA required if scheme taken forward
	NB4 Lowestoft water reuse													Proposed pipeline route crosses several waterways associated with The Broads, and crosses the River Wensum SSSI which has the potential to cause water quality issues and ecological issues. Through area of ancient woodland	Very hard to avoid waterways associated with The Broads and the River Wensum SSSI. Potential to avoid the area of ancient woodland if discharge point moved slightly. HRA screening concluded potential for LSE on the Broadland SPA and Ramsar. HRA AA required if scheme taken forward
	NB5 Norwich storage													The proposed scheme would pass through an area of Ancient Woodland and two Local Nature Reserves. This option would not change the overall flows downstream of the intake as it is designed to compensate for the cessation of abstraction at Norwich Pits. The proposed intake and discharge from the new storage would be downstream of the SAC. Significant effects on the Wensum SAC, Broads SAC, and Broadland SPA/Ramsar are not reasonably foreseeable	Re-route to avoid ancient woodland and LNRs
	NB6 Norwich intake with pre-treatment													Proposed scheme would pass within 100m to Sweet Briar Meadows SSSI and LNR. This option would not change the overall flows downstream of the intake as it is designed to compensate for the cessation of abstraction at Norwich Pits. The proposed intake and discharge from the new storage would be downstream of the SAC. Significant effects on the Wensum SAC, Broads SAC, and Broadland SPA/Ramsar are not reasonably foreseeable. However, in the event of an outage at Norwich WTW it is possible that Norwich Pits might need to be used for a short period of time (up to two days). A study has been carried out to identify the possible impacts on qualifying features and it was concluded that no significant impacts are expected due to a reduction in water levels	Good practice construction methods should reduce effects on the SSSI and LNR.
	NB7 Norwich													The proposed scheme will pass through the	Re-routing of pipeline required to avoid SSSI and LNR

Resource Zone	Scheme	SEA Objectives												Key Issues (before mitigation)	Mitigation
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land		
	intake with lining existing bankside storage													Sweet Briar Road Meadows SSSI and the Wensum Valley LNR. This option would not change the overall flows downstream of the intake as it is designed to compensate for the cessation of abstraction at Norwich Pits. The proposed intake and discharge from the new storage would be downstream of the SAC. Significant effects on the Wensum SAC, Broads SAC, and Broadland SPA/Ramsar are not reasonably foreseeable. However, in the event of an outage at Norwich WTW it is possible that Norwich Pits might need to be used for a short period of time (up to two days). A study has been carried out to identify the possible impacts on qualifying features and it was concluded that no significant impacts are expected due to a reduction in water levels	
	NB8 Norwich intake with new bankside storage													Proposed scheme would pass through an LNR. The proposal would also pass within 500m of another two LNRs and within 200m of a SSSI. This option would not change the overall flows downstream of the intake as it is designed to compensate for the cessation of abstraction at Norwich Pits. The proposed intake and discharge from the new storage would be downstream of the SAC. Significant effects on the Wensum SAC, Broads SAC, and Broadland SPA/Ramsar are not reasonably foreseeable. However, in the event of an outage at Norwich WTW it is possible that Norwich Pits might need to be used for a short period of time (up to two days). A study has been carried out to identify the possible impacts on qualifying features and it was concluded that no significant impacts are expected due to a reduction in water levels	Re-route pipeline to avoid LNR
	NB10 Norwich intake to													The proposed scheme will pass through the Sweet Briar Road Meadows SSSI and the Wensum Valley LNR. This option would not	Re-routing of pipeline required to avoid SSSI and LNR

Resource Zone	Scheme	SEA Objectives												Key Issues (before mitigation)	Mitigation
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land		
	existing bankside storage													change the overall flows downstream of the intake as it is designed to compensate for the cessation of abstraction at Norwich Pits. The proposed intake and discharge from the new storage would be downstream of the SAC. Significant effects on the Wensum SAC, Broads SAC, and Broadland SPA/Ramsar are not reasonably foreseeable. However, in the event of an outage at Norwich WTW it is possible that Norwich Pits might need to be used for a short period of time (up to two days). A study has been carried out to identify the possible impacts on qualifying features and it was concluded that no significant impacts are expected due to a reduction in water levels	
Fenland	F1 Kings Lynn and Wisbech water reuse													Potential to reduce flows in the River Nene and The Great Ouse River. This could affect the sediment transport quantities into The Wash and affect qualifying habitats that are dependent on this. Indirectly species dependent on these habitats could also be affected due to changes in food availability. WFD concluded further assessment of effects required.	Further investigation in water flow issues through WFD and HRA. HRA screening concluded potential for LSE on the Wash and North Norfolk Coast SAC and the Wash SPA and Ramsar. HRA AA required if scheme taken forward
	F2 Kings Lynn desalination													The proposed Pipeline runs through a SSSI. Potential water quality issues with brine discharging into River Great Ouse. Potential reduced flows in the Great Ouse river and into The Wash which could affect habitats that support qualifying species in designated sites. WFD concluded potential for high risk of deterioration in Great Ouse.	Hard to re-route pipeline to avoid SSSI without a large diversion. HRA screening concluded potential for LSE on the Wash and North Norfolk Coast SAC and the Wash SPA and Ramsar. HRA AA and further WFD assessment required if scheme taken forward
	F4 Ruthamford North RZ transfer (12 Ml/d)													Proposed pipeline route also goes through a LNR	Re-route pipeline to avoid LNR
	F5 Ruthamford North RZ													Proposed pipeline route also goes through a LNR	Re-route pipeline to avoid LNR

Resource Zone	Scheme	SEA Objectives												Key Issues (before mitigation)	Mitigation
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land		
	transfer (25 MI/d)														
Hunstanton	H1 Fenland RZ transfer													WFD assessment concluded medium risk of deterioration to River Heacham and North West Norfolk Sands	Option needs to be balanced against previous and proposed NEP investigations to determine the optimal balance between sources (e.g. the total capacity should not be abstracted from only one source).
	H2 Heacham water reuse													Storage of treated effluent in aquifer could result in less storage for rainwater increasing flood risk. Proposed pipeline route would run close/through SSSI, and 500m from The Wash SPA, Ramsar, SSSI	Pipeline could be re-routed to avoid SSSI. Cannot change distance to The Wash designated sites due to the location of Heacham STW. HRA screening concluded potential for LSE on the Wash and North Norfolk Coast SAC and the Wash SPA and Ramsar. HRA AA required if scheme taken forward
	H3 Wash desalination													Proposed scheme would pass close approximately 200m from The Wash SSSI. It would also come within 80m of the Catlane Wood area of Ancient Woodland. Water intakes and discharges are likely to be located within this SSSI as well as The Wash SPA and Ramsar. WFD assessment concluded medium risk of deterioration.	Cannot change distance to The Wash designated sites because of the location of Hunstanton works. Could re-route pipeline further away from the area of ancient woodland. HRA screening concluded potential for LSE on the Wash and North Norfolk Coast SAC and the Wash SPA and Ramsar. HRA AA required if scheme taken forward. Water quality risk to be mitigated through scheme design if taken forward.
	H4 Hunstanton RZ groundwater development													WFD assessment concluded medium risk of deterioration.	Further hydro-ecological investigations are required to look at the sensitivity of the upper reaches to the implementation of this option
South Essex	SE1 Colchester water reuse													Proposed scheme runs adjacent to Salary Brook LNR, and through an area of ancient woodland	Re-route pipeline to avoid LNR and ancient woodland. HRA screening concluded potential for LSE on the Colne Estuary SPA and Ramsar. HRA AA required if scheme taken forward
	SE2 / SE8 East Suffolk RZ transfer													Runs through or adjacent to 5 areas of ancient woodland	Re-route pipeline to avoid areas of ancient woodland
	SE4 Amendment to Ardleigh agreement													No negative significant effects predicted	None required
	SE6 South Essex RZ groundwater development													No negative significant effects predicted	None required

Resource Zone	Scheme	SEA Objectives												Key Issues (before mitigation)	Mitigation
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land		
	SE7 Ardleigh reservoir extension													There is hydrological connectivity between the scheme and the designated site; potential changes in water flows from the reservoir during construction has the potential to effect supporting processes on which qualifying natural habitats and species rely.	HRA screening concluded potential for LSE on the Colne Estuary SPA and Ramsar. HRA AA required if scheme taken forward
East Suffolk	ES3 Ipswich water reuse													Proposed scheme would pass through the Stour and Orwell Estuaries SPA and Ramsar site, and the Holbrook Park area of Ancient Woodland. The scheme would also run adjacent to the Cutlers Wood area of Ancient Woodland. The scheme would also run adjacent to the Spring Wood and Millennium Wood, Belstead LNR and the Spring Wood area of Ancient Woodland	Re-route pipeline to avoid SPA, ancient woodland areas and LNR. HRA screening concluded potential for LSE on the Stour and Orwell Estuaries SPA and Ramsar. However, effects are due to the location of the pipeline through the designated site. Pipeline can be re-routed a sufficient distance to avoid effects
	ES4 Felixstowe desalination													New desalination plant is 100m from a Scheduled Monument (SM) and is likely to have effects on the setting	Consultation with English Heritage. Scale and materials used could help minimise effects on the setting of the SM
	ES6 East Suffolk RZ groundwater development													No negative significant effects predicted	None required
	ES10 South Essex RZ transfer													Runs through or adjacent to 5 areas of ancient woodland	Re-route pipeline to avoid areas of ancient woodland
Ruthamford North	RHFA2 Peterborough water reuse													Pipeline route runs through or near to 8 SSSIs and 2 SPA. Pipeline route runs through historic areas. Pipeline route runs through or near 9 Scheduled Monuments. Runs through an authorised landfill site	Investigate feasibility of re-routing pipeline. HRA screening concluded potential for LSE on the Nene Washes SAC, SPA and Ramsar. HRA AA required if scheme taken forward
	RHFA3 Rutland dam raising													Bamhill moated site SM is located on the scheme site. Construction of dam within designated site likely to result in disturbance of qualifying features. Increase in reservoir water height likely to result in loss of habitat. WFD assessment concluded potential for high risk of deterioration.	Further investigation into effects of Scheduled Monument on the site of the reservoir. HRA screening concluded potential for LSE on the Rutland Water SPA and Ramsar. HRA AA required if scheme taken forward. Further WFD investigation will be required to demonstrate that the increase in water levels at Rutland Water will not affect the biological elements or water quality in the waterbody.

Resource Zone	Scheme	SEA Objectives												Key Issues (before mitigation)	Mitigation
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land		
	RHFA4 Trade with STW													No negative significant effects predicted	None required
	RHFA5 Pitsford dam raising													WFD assessment concluded potential for high risk of deterioration.	Further WFD investigation will be required to demonstrate that the increase in water levels at Pitsford Water will not affect the biological elements or water quality in the waterbody.
	RHFA6 Canal transfer													Pipeline runs through a SSSI and 3 LNR, and runs adjacent to a second SSSI, and another LNR. Pipeline route runs adjacent to 3 SM and within 1km of 22 further Scheduled Monuments	Investigate feasibility of re-routing pipeline to avoid designated site and SM
	RHFA15 Saltersford reduction													No negative significant effects predicted	None required
Ruthamford South	RHFA1 Ruthamford North RZ transfer 1													Pipeline route crosses the River Nene and passes close to designated sites (adjacent to a SSSI)	HRA screening concluded potential for LSE on the Upper Nene Valley Gravel Pits SPA and Ramsar. HRA AA required if scheme taken forward
	RHFA7 Grafham dam raising													Significant negative effects associated with CO ₂ output. WFD assessment concluded potential for high risk of deterioration.	Further investigation will be required to demonstrate that the increase in water levels at Grafham Water will not affect the biological elements or water quality in the waterbody.
	RHFA8 New Ruthamford south reservoir													Runs through a SSSI and is adjacent to a LNR. Scheme introduced a new abstraction source effluent increasing the pressure on clean water abstraction sources	Investigate feasibility of re-routing the pipeline to avoid the SSSI
	RHFA9 Grafham intake refurbishment													No negative significant effects predicted	None required
	RHFA10 Re-commission Pulloxhill WTW													Pulloxhill WTW approx. 100 m from a SSSI. Pipeline route goes through a LNR, and is approx. 250m from a SSSI. Ampthill WR and pipeline route approx. 500m from two Scheduled Monuments.	Pipeline could be re-routed to avoid the LNR and to be further away from the SSSI. Good site practices should reduce effects on heritage and ecological sites.
	RHFA11 Re-commission Ruthamford South RZ reservoir													No negative significant effects predicted	None required.

Resource Zone	Scheme	SEA Objectives												Key Issues (before mitigation)	Mitigation
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land		
	RHFA13 Ruthamford North RZ transfer 2													Pipeline route runs through or near to three SSSIs. Pipeline route runs through the centre of Milton Keynes where there is a high concentration of listed buildings and Scheduled Ancient Monuments. The route goes through a SM site	Investigate feasibility of re-routing the pipeline to avoid SM, and further investigate effects on SSSIs
	RHFA14 Huntingdon water reuse													Runs through and is adjacent to SSSI. Construction of the pipeline crossing likely to result in a change in river water quality which at a time of flood could affect the extent and distribution of qualifying natural habitats of designated site	Investigate feasibility of re-routing the pipeline to avoid the SSSI. HRA screening concluded potential for LSE on the Portholme SAC. HRA AA required if scheme taken forward
	RHFP1 Ruthamford North RZ transfer 3													Pipeline route runs through or near to three SSSIs. Pipeline route runs through Milton Keynes where there is a high concentration of listed buildings and Scheduled Ancient Monuments and runs through a SM. Pipeline in close proximity to habitat likely to support qualifying features of designated site. Pipeline crosses River Nene between designated sites and has potential to cause effects	Investigate feasibility of re-routing the pipeline to avoid SM, and further investigate effects on SSSIs. HRA screening concluded potential for LSE on the Upper Nene Valley Gravel Pits SPA and Ramsar. HRA AA required if scheme taken forward
	RHFP2 Ruthamford North RZ transfer 4													Pipeline route runs through or near to three SSSIs and through areas of ancient woodland. Pipeline route runs through Milton Keynes where there is a high concentration of listed buildings and Scheduled Ancient Monuments and runs through a SM	Investigate feasibility of re-routing the pipeline to avoid SM, and further investigate effects on SSSIs
	RHFP3 Ruthamford North RZ transfer 5													Pipeline route runs through or near to seven SSSIs and through two areas of ancient woodland	Investigate feasibility of re-routing the pipeline to avoid areas of ancient woodland and SSSIs
	RHFP4 Clapham WTW													Pipeline route runs through or near to three SSSIs and goes through an area of ancient woodland. Pipeline route runs close to 9 Scheduled Monuments and through a Registered Park and Garden	Investigate feasibility of re-routing the pipeline to avoid areas of ancient woodland and SSSIs

Resource Zone	Scheme	SEA Objectives												Key Issues (before mitigation)	Mitigation
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land		
	RHFP5 Ruthamford North RZ transfer													Pipeline route runs through or near to SSSIs and through an area of ancient woodland. Pipeline route runs close to 9 Scheduled Monuments and through a Registered Park and Garden	Investigate feasibility of re-routing the pipeline to avoid areas of ancient woodland and SSSIs, and Registered Park and Garden. HRA screening concluded potential for LSE on the Portholme SAC. HRA AA required if scheme taken forward
Cambridgeshire and West Suffolk RZ	CWS1 Thetford PZ transfer													Proposed pipeline route would run through Breckland SAC, SPA, SSSI and LNR, and an area of ancient woodland.	Pipeline could be re-routed round area of ancient woodland. However, it would be more difficult to re-route the pipeline away from the SPA, SSSI but it may be possible. HRA screening concluded potential for LSE on the Breckland SPA and Breckland SAC. HRA AA required if scheme taken forward
	CWS3 Sudbury PZ transfer													Proposed pipeline route runs through an area of ancient woodland and runs along the boundary of a Registered Park and Garden.	Very hard to avoid ancient woodland due to location of Gt. Welnetnam WR. Very hard to avoid Registered Park and Garden due to location of Long Melford WR in the designated site.
	CWS6 Haverhill water reuse													Proposed pipeline route would run through a LNR	Re-route the pipeline to avoid the LNR.
	CWS11 Fenland RZ transfer													Proposed scheme would pass through two SSSIs, a large area of SPA and Ramsar site, it would pass adjacent to an LNR.	Possible to re-route pipeline around some of the SSSI, SPA and Ramsar site but not all of it due to location of Branham Cross WTW. HRA screening concluded potential for LSE on the Breckland SPA and Breckland SAC. HRA AA required if scheme taken forward

5.7 Summary of Supply Scheme Options Assessment

Table 5.16 provides recommendations and mitigation for taking scheme options forward into the WRMP.

Table 5.16: Scheme Options Summary and Recommendations

Scheme Ref	Scheme Name	SEA Recommendations and Justification	
West Suffolk RZ			
WS1	Newmarket RZ transfer	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Pipeline could be re-routed to avoid the area of ancient woodland.
WS2	East Suffolk RZ transfer	Scheme could be taken forward into WRMP subject to re-routing of pipeline and further investigation into effects on area of ancient woodland	Cannot avoid ancient woodland by WR area due to location of WR. Pipeline could be re-routed to avoid the other area of ancient woodland. Employ construction techniques that do not involve loss of trees from the area of ancient woodland. Best practice construction methods to reduce effects.
WS3	Bury St. Edmunds water reuse	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Pipeline could be re-routed at avoid the SSSI, LNR and historic landfill sites
WS4	Thetford water reuse	Further investigation required into feasibility of re-routing pipeline and conclusions of AA. If the SPA cannot be avoided it is recommended that the scheme is rejected	Could potentially avoid SM but would require a few diversions through Thetford. Could re-route pipeline to avoid part of the SPA but unlikely to be able to avoid it completely due to location of Barnham Cross WTW. Re-route to avoid historic landfill site. HRA screening concluded potential for LSE on the Breckland SPA and Breckland SAC. HRA AA required if scheme taken forward
WS5	River Lark flow augmentation	Scheme could be taken forward into WRMP	No significant negative effects predicted
WS6	South Essex RZ transfer	Scheme could be taken forward into WRMP subject to re-routing of pipeline and further investigation into effects on area of ancient woodland	Cannot avoid ancient woodland area due to location of WR. Pipeline could be re-routed to avoid LNR. Employ construction techniques that do not involve loss of trees from the area of ancient woodland. Best practice construction methods to reduce effects.
Ely RZ			
E1	Fenland RZ transfer	Scheme could be taken forward into WRMP subject to further investigation into re-routing of pipeline and conclusions of AA	Investigate feasibility of re-routing pipeline away from designated sites. Best practice construction methods to reduce effects. HRA screening concluded potential for LSE on the Fenland SAC. HRA AA required if scheme taken forward
E2	Newmarket RZ transfer	Scheme could be taken forward into WRMP subject to further investigation into re-routing of pipeline	Investigate feasibility of re-routing pipeline away from designated sites. Best practice construction methods to reduce effects.
Newmarket RZ			
NWM1	Ely RZ transfer	Scheme could be taken forward into WRMP subject to further investigation into re-routing of pipeline	Investigate feasibility of re-routing pipeline away from designated sites. Best practice construction methods to reduce effects.
NWM2	West Suffolk RZ transfer	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Pipeline could be re-routed to avoid the area of ancient woodland.
Cheveley RZ			
CVY1	Newmarket RZ transfer	Scheme could be taken forward into WRMP	No significant negative effects predicted
CVY2	West Suffolk RZ transfer	Scheme could be taken forward into WRMP	No significant negative effects predicted
Central Essex RZ			
CE1	South Essex RZ transfer	Scheme could be taken forward into WRMP subject to re-routing of pipeline and further investigation into	Investigate feasibility of re-routing pipeline away from areas of ancient woodland or employ construction techniques that do not involve loss of trees from the area of ancient woodland

Scheme Ref	Scheme Name	SEA Recommendations and Justification	
		effects on area of ancient woodland	
CE2	West Suffolk RZ transfer	Scheme could be taken forward into WRMP subject to re-routing of pipeline and further investigation into effects on area of ancient woodland	Investigate feasibility of re-routing pipeline away from areas of ancient woodland or employ construction techniques that do not involve loss of trees from the area of ancient woodland
Norwich and The Broads RZ			
NB1 / NB12	Bacton desalination	Further investigation required into feasibility of re-routing pipeline and conclusions of AA. If the SSSI/LNR cannot be avoided it is recommended that scheme is rejected	Pipeline could be re-routed further away from SAC, SPA, Ramsar, ancient woodland, and National park (route follows road next to woodland and national park so as long as it doesn't encroach on these areas then it may not need re-routing for these 2 areas). Very difficult to re-route pipeline away from SSSI/LNR and historic landfill site because of the location of Norwich WTW. Compensation for loss of high quality agricultural land may be required. With good site practices effects on SM could be minimised. HRA screening concluded potential for LSE on Hainsborough, Hammond and Winterton SAC, and Paston Great Barn SAC. HRA AA required if scheme taken forward
NB2 / NB11	Norwich water reuse	Scheme could be taken forward into the WRMP subject to re-routing pipeline and conclusions of AA	Could re-route to avoid Registered Park and Garden and SM. HRA screening concluded potential for LSE on the Broads SAC, and Broadland SPA and Ramsar. HRA AA required if scheme taken forward
NB3	Cantley desalination	It is recommended that scheme be rejected at this stage due to the potential significant effects of brine discharge and effects on designated sites	Potential significant issues with brine discharge. Difficult to re-route pipeline away from designated sites but could potentially be done with big diversions. HRA screening concluded potential for LSE on the Broads SAC, Broadland SPA and Ramsar, and Breydon Water SPA and Ramsar. HRA AA required if scheme taken forward
NB4	Lowestoft water reuse	Further investigation required into feasibility of re-routing pipeline and conclusions of AA	Very hard to avoid waterways associated with The Broads and the River Wensum SSSI. Potential to avoid the area of ancient woodland if discharge point moved slightly. HRA screening concluded potential for LSE on the Broadland SPA and Ramsar. HRA AA required if scheme taken forward
NB5	Norwich storage	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Re-route to avoid ancient woodland and LNRs
NB6	Norwich intake with pre-treatment	Scheme could be taken forward into the WRMP	Good practice construction methods should reduce effects on the SSSI and LNR.
NB7	Norwich intake with lining existing bankside storage	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Re-routing of pipeline required to avoid SSSI and LNR
NB8	Norwich intake with new bankside storage	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Re-route pipeline to avoid LNR
NB10	Norwich intake to existing bankside storage	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Re-routing of pipeline required to avoid SSSI and LNR
Fenland RZ			
F1	Kings Lynn and Wisbech water reuse	Scheme could be taken forward into WRMP subject to conclusions of AA and further WFD assessment	Further investigation in water flow issues through WFD and HRA. HRA screening concluded potential for LSE on the Wash and North Norfolk Coast SAC and the Wash SPA and Ramsar. HRA AA required if scheme taken forward
F2	Kings Lynn desalination	Further investigation required into feasibility of re-routing pipeline and conclusions of AA	Hard to re-route pipeline to avoid SSSI without a large diversion. Further investigation in water flow issues through WFD and HRA. HRA screening concluded potential for LSE on the Wash and North Norfolk Coast SAC and the Wash SPA and Ramsar. HRA AA and further WFD assessment required if

Scheme Ref	Scheme Name	SEA Recommendations and Justification	
			scheme taken forward
F4	Ruthamford North RZ Transfer (12 MI/d)	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Pipeline could be re-routed to avoid the LNR
F5	Ruthamford North RZ Transfer (25 MI/d)	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Pipeline could be re-routed to avoid the LNR
Hunstanton RZ			
H1	Fenland RZ transfer	Scheme could be taken forward into WRMP subject to implementation of mitigation stated	Option needs to be balanced against previous and proposed NEP investigations to determine the optimal balance between sources (e.g. the total capacity should not be abstracted from only one source).
H2	Heacham water reuse	Scheme could be taken forward into WRMP subject to re-routing of pipeline and conclusions of AA	Pipeline could be re-routed to avoid SSSI. Cannot change distance to The Wash designated sites due to the location of Heacham STW. HRA screening concluded potential for LSE on the Wash and North Norfolk Coast SAC and the Wash SPA and Ramsar. HRA AA required if scheme taken forward
H3	Wash desalination	Scheme could be taken forward into WRMP subject to conclusions of AA and WFD mitigation	Cannot change distance to The Wash designated sites because of the location of Hunstanton works. Could re-route pipeline further away from the area of ancient woodland. HRA screening concluded potential for LSE on the Wash and North Norfolk Coast SAC and the Wash SPA and Ramsar. HRA AA required if scheme taken forward. Water quality risk to mitigated through scheme design if taken forward.
H4	Hunstanton RZ groundwater development	Scheme could be taken forward into WRMP subject to further hydro-ecological studies	Further hydro-ecological investigations are required to look at the sensitivity of the upper reaches to the implementation of this option
South Essex RZ			
SE1	Colchester water reuse	Scheme could be taken forward into WRMP subject to re-routing of pipeline and conclusions of AA	Re-route pipeline to avoid LNR and ancient woodland. Investigate water quality issues further to ensure no negative effects. HRA screening concluded potential for LSE on the Colne Estuary SPA and Ramsar. HRA AA required if scheme taken forward
SE2 / SE8	East Suffolk RZ transfer	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Re-route pipeline to avoid areas of ancient woodland
SE4	Amendment to Ardleigh agreement	Scheme could be taken forward into WRMP	No significant negative effects predicted
SE6	South Essex RZ groundwater development	Scheme could be taken forward into WRMP	No significant negative effects predicted
SE7	Ardleigh reservoir extension	Scheme could be taken forward into WRMP subject to conclusions of AA	HRA screening concluded potential for LSE on the Colne Estuary SPA and Ramsar. HRA AA required if scheme taken forward
East Suffolk RZ			
ES3	Ipswich water reuse	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Re-route pipeline to avoid SPA, ancient woodland areas and LNR. HRA screening concluded potential for LSE on the Stour and Orwell Estuaries SPA and Ramsar. However, effects are due to the location of the pipeline through the designated site. Pipeline can be re-routed a sufficient distance to avoid effects
ES4	Felixstowe desalination	Scheme could be taken forward into WRMP subject to consultation with English Heritage	Consultation with English Heritage. Scale and materials used could help minimise effects on the setting of the SM
ES6	East Suffolk RZ groundwater development	Scheme could be taken forward into WRMP	No significant negative effects predicted
ES10	South Essex RZ transfer	Scheme could be taken forward into WRMP subject to	Re-route pipeline to avoid areas of ancient woodland

Scheme Ref	Scheme Name	SEA Recommendations and Justification	
		re-routing of pipeline	
Ruthamford North RZ			
RHFA2	Peterborough water reuse	Scheme could be taken forward into WRMP subject to re-routing of pipeline and conclusions of AA	Re-route pipeline to avoid SSSIs and SPAs. HRA screening concluded potential for LSE on the Nene Washes SAC, SPA and Ramsar. HRA AA required if scheme taken forward
RHFA3	Rutland dam raising	Scheme could be taken forward into WRMP subject to further investigation of effects on SM and conclusions of AA and further WFD investigation	Further investigation into effects of Scheduled Monument on the site of the reservoir. HRA screening concluded potential for LSE on the Rutland Water SPA and Ramsar. HRA AA required if scheme taken forward. Further WFD investigation will be required to demonstrate that the increase in water levels at Rutland Water will not affect the biological elements or water quality in the waterbody.
RHFA4	Trade with STW	Scheme could be taken forward into WRMP	No significant negative effects predicted
RHFA5	Pitsford dam raising	Scheme could be taken forward into WRMP subject to further WFD investigation	Further WFD investigation will be required to demonstrate that the increase in water levels at Pitsford Water will not affect the biological elements or water quality in the waterbody
RHFA6	Canal transfer	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Re-route pipeline to avoid SSSIs and LNRs
RHFA15	Saltersford reduction	Scheme could be taken forward into WRMP	No significant negative effects predicted
Ruthamford South RZ			
RHFA1	Ruthamford North RZ Transfer 1	Scheme could be taken forward into WRMP subject to re-routing of pipeline and conclusions of AA	Re-route pipeline to avoid the area of ancient woodland. HRA screening concluded potential for LSE on the Upper Nene Valley Gravel Pits SPA and Ramsar. HRA AA required if scheme taken forward
RHFA7	Grafham dam raising	Scheme could be taken forward into WRMP subject to further WFD investigation	Further investigation will be required to demonstrate that the increase in water levels at Grafham Water will not affect the biological elements or water quality in the waterbody.
RHFA8	New Ruthamford South reservoir	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Re-route pipeline to avoid the SSSI adjacent LNR.
RHFA9	Grafham intake refurbishment	Scheme could be taken forward into WRMP	No significant negative effects predicted
RHFA10	Re-commission Pulloxhill WTW	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Pipeline could be re-routed to avoid the LNR and to be further away from the SSSI. Good site practices should reduce effects on heritage and ecological sites.
RHFA11	Re-commission Ruthamford South RZ reservoir	Scheme could be taken forward into WRMP	No significant negative effects predicted
RHFA13	Ruthamford North RZ Transfer 2	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Re-route pipeline to avoid SM and SSSIs
RHFA14	Huntingdon water reuse	Scheme could be taken forward into WRMP subject to re-routing of pipeline and conclusions of AA	Re-route pipeline to avoid the SSSI. HRA screening concluded potential for LSE on the Portholme SAC. HRA AA required if scheme taken forward
RHFP1	Ruthamford North RZ Transfer 3	Scheme could be taken forward into WRMP subject to re-routing of pipeline and conclusions of AA	Re-route pipeline to avoid SM, SSSIs and ancient woodland areas. HRA screening concluded potential for LSE on the Upper Nene Valley Gravel Pits SPA and Ramsar. HRA AA required if scheme taken forward
RHFP2	Ruthamford North RZ Transfer 4	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Re-route pipeline to avoid SM, SSSIs and ancient woodland areas
RHFP3	Ruthamford North RZ Transfer 5	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Re-route pipeline to avoid areas of ancient woodland and SSSIs

Scheme Ref	Scheme Name	SEA Recommendations and Justification	
RHFP4	Bedford WTW	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Re-route pipeline to avoid areas of ancient woodland, SSSIs, and Registered Park and Garden
RHFP5	Ruthamford North RZ transfer	Scheme could be taken forward into WRMP subject to re-routing of pipeline and conclusions of AA	Re-route pipeline to avoid areas of ancient woodland and SSSIs, and Registered Park and Garden. HRA screening concluded potential for LSE on the Portholme SAC. HRA AA required if scheme taken forward
Cambridgeshire and West Suffolk RZ			
CWS1	Thetford PZ transfer	Further investigation required into feasibility of re-routing pipeline and conclusions of AA. If after further investigation, the designated sites cannot be avoided it is recommended that the scheme is rejected	Pipeline could be re-routed round area of ancient woodland. However, it would be more difficult to re-route the pipeline away from the SPA, SSSI but it may be possible. HRA screening concluded potential for LSE on the Breckland SPA and Breckland SAC. HRA AA required if scheme taken forward
CWS3	Sudbury PZ transfer	If after further investigation, the ancient woodland and Registered Park and Garden cannot be avoided it is recommended that the scheme is rejected	Very hard to avoid ancient woodland due to location of Gt. Welnetham WR. Very hard to avoid Registered Park and Garden due to location of Long Melford WR in the designated site.
CWS6	Haverhill water reuse	Scheme could be taken forward into WRMP subject to re-routing of pipeline	Re-route the pipeline to avoid the LNR.
CWS11	Fenland RZ transfer	Further investigation required into feasibility of re-routing pipeline and conclusions of AA. If after further investigation, the designated sites cannot be avoided it is recommended that the scheme is rejected	Possible to re-route pipeline around some of the SSSI, SPA and Ramsar site but not all of it due to location of Branham Cross WTW. HRA screening concluded potential for LSE on the Breckland SPA and Breckland SAC. HRA AA required if scheme taken forward

5.8 Cumulative Effects of Options

The SEA can be used to identify any potential interactions between the proposed schemes that may be deployed within a particular water resource zone. Certain schemes may be mutually exclusive, for example, because they draw on the same resources or use the same site or other schemes may have potential construction or operational effects if constructed and operated simultaneously.

UKWIR SEA guidance suggests using a matrix approach to considering scheme interactions. This approach has been used below to identify potential interactions between scheme options (including both supply and demand options). It should be noted that a limitation of this approach is that it enables a view of paired interactions only.

The potential for cumulative effects is considered to be small because in reality only a few of the schemes from each RZ will be taken forward, and these are likely to be during different AMP periods, so cumulative effects are considered to be low risk.

Key

	Mutually exclusive schemes, i.e. use the same site or the same resource
	Potential cumulative construction impacts if constructed simultaneously
	Potential cumulative impacts in operation
	No cumulative impacts

West Suffolk RZ

Supply Scheme Options	WS1									
	WS2									
	WS3									
	WS4									
	WS6									
	WS5									
Demand Mgt Options	DM1									
	DM2									
	DM3									
		WS1	WS2	WS3	WS4	WS6	WS5	DM1	DM2	DM3
West Suffolk RZ Options		Supply Scheme Options					Demand Mgt Options			

There is potential for schemes WS5 and WS3 to have cumulative negative construction effects if constructed simultaneously because they both have pipelines routes running around the Bury St Edmunds area. However, the potential for negative effects is considered to be minor.

Ely RZ

Supply Scheme Options	E1					
	E2					
Demand Mgt Options	DM1					
	DM2					
	DM3					
Ely RZ Options		E1	E2	DM1	DM2	DM3
		Supply Scheme Options		Demand Mgt Options		

It is unlikely that there would be construction or operational cumulative effects because the schemes are spread out within the RZ.

Newmarket RZ

Supply Scheme Options	NWM1					
	NWM2					
Demand Mgt Options	DM1					
	DM2					
	DM3					
Newmarket RZ Options		NWM1	NWM2	DM1	DM2	DM3
		Supply Scheme Options		Demand Mgt Options		

It is unlikely that there would be construction or operational cumulative effects because the schemes are spread out within the RZ.

Cheveley RZ

Supply Scheme Options	CVY1					
	CVY2					
Demand Mgt Options	DM1					
	DM2					
	DM3					
Cheveley RZ Options		CVY1	CVY2	DM1	DM2	DM3
		Supply Scheme Options		Demand Mgt Options		

It is unlikely that there would be construction or operational cumulative effects because the schemes are spread out within the RZ.

Central Essex RZ

Supply Scheme Options	CE1					
	CE2					
Demand Mgt Options	DM1					
	DM2					
	DM3					
Central Essex RZ Options		CE1	CE2	DM1	DM2	DM3
		Supply Scheme Options		Demand Mgt Options		

It is unlikely that there would be construction or operational cumulative effects because the schemes are spread out within the RZ.

Norwich and The Broads RZ

Supply Scheme Options	NB1 / NB12												
	NB2 / NB11												
	NB3												
	NB4												
	NB5												
	NB6												
	NB7												
	NB8												
	NB10												
	NB10												
Demand Mgt Options	DM1												
	DM2												
	DM3												
Norwich and The Broads RZ Options		NB1	NB2	NB3	NB4	NB5	NB6	NB7	NB8	NB10	DM1	DM2	DM3
		Supply Scheme Options									Demand Mgt Options		

There is potential for the supply scheme options to have negative construction effects if schemes are constructed simultaneously because they are all concentrated in a relatively small area. Schemes NB4 and NB2 together have the potential for cumulative effects during operation, as well as construction, because both of the schemes discharge into the River Wensum. However, the potential for negative effects is considered to be minor.

Fenland RZ

Supply Scheme Options	F1							
	F2							
	F4							
	F5							
Demand Mgt Options	DM1							
	DM2							
	DM3							
Fenland RZ Options		F1	F2	F4	F5	DM1	DM2	DM3
		Supply Scheme Options				Demand Mgt Options		

There is potential for schemes F2 and F1 to have cumulative negative construction effects if constructed simultaneously because they both have pipelines routes running on the west side of Kings Lynn. However, potential effects are considered minor.

Hunstanton RZ

Supply Scheme Options	H1							
	H2							
	H3							
	H4							
Demand Mgt Options	DM1							
	DM2							
	DM3							
Hunstanton RZ Options		H1	H2	H3	H4	DM1	DM2	DM3
		Supply Scheme Options				Demand Mgt Options		

There is potential for the supply scheme options to have negative construction effects if schemes are constructed simultaneously because they are all concentrated in a relatively small area. However, potential effects are considered to be minor.

South Essex RZ

Supply Scheme Options	SE1							
	SE2 / SE8							
	SE4							
	SE6							
	SE7							
Demand Mgt Options	DM1							
	DM2							
	DM3							
South Essex RZ Options		SE1	SE2	SE4	SE6	SE7	DM1	DM2
		Supply Scheme Options					Demand Mgt Options	

It is unlikely that there would be construction or operational cumulative effects because the schemes are not geographically close to each other, and do not share the same abstraction or discharge sources.

East Suffolk RZ

Supply Scheme Options	ES3							
	ES4							
	ES6							
	ES10							
Demand Mgt Options	DM1							
	DM2							
	DM3							
East Suffolk RZ Options		ES3	ES4	ES6	ES10	DM1	DM2	DM3
		Supply Scheme Options				Demand Mgt Options		

There is potential for schemes ES3 and ES10 to have cumulative negative construction effects if constructed simultaneously because they both have pipelines routes running around the south-west side of Ipswich. However, potential effects are considered minor.

Ruthamford North RZ

Supply Scheme Options	RHFA2							
	RHFA3							
	RHFA4							
	RHFA5							
	RHFA6							
	RHFA15							
Demand Mgt Options	DM1							
	DM2							
	DM3							
Ruthamford North RZ Options		RHFA2	RHFA3	RHFA4	RHFA5	RHFA6	RHFA15	DM1
			Supply Scheme Options				Demand Mgt Options	

Schemes RHFA2 and RHFA3 together have the potential for cumulative effects during operation because both of the schemes propose to use the Rutland Water resource. However, the potential for negative effects is considered to be minor. There is potential for schemes RHFA5 and RHFA6 to have cumulative negative construction effects if constructed simultaneously because they both have pipelines routes running around Northampton. However, potential effects are considered minor.

Ruthamford South RZ		RHFA1	RHFA7	RHFA8	RHFA9	RHFA10	RHFA11	RHFA13	RHFA14	RHFP1	RHFP2	RHFP3	RHFP4	DM1	DM2	DM3
Supply Scheme Options	RHFA1	Green	Grey													
	RHFA7	Green	Green	Grey												
	RHFA8	Green	Green	Green	Grey											
	RHFA9	Green	Green	Green	Green	Grey										
	RHFA10	Green	Green	Green	Green	Green	Grey									
	RHFA11	Green	Green	Green	Green	Green	Green	Grey								
	RHFA13	Green	Green	Green	Green	Green	Green	Green	Grey							
	RHFA14	Green	Green	Green	Green	Green	Green	Green	Green	Grey						
	RHFP1	Green	Green	Green	Green	Green	Green	Green	Green	Green	Grey					
	RHFP2	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Grey				
Demand Mgt Options	DM1	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Grey	
	DM2	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Grey
	DM3	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Ruthamford South RZ Options		RHFA1	RHFA7	RHFA8	RHFA9	RHFA10	RHFA11	RHFA13	RHFA14	RHFP1	RHFP2	RHFP3	RHFP4	DM1	DM2	DM3
		Supply Scheme Options												Demand Mgt Options		

Cambridgeshire and West Suffolk RZ (old RZ)

		Cambridgeshire and West Suffolk RZ (Old RZ)							
Supply Scheme Options	CWS1								
	CWS3								
	CWS6								
	CWS11								
Demand Mgt Options	DM1								
	DM2								
	DM3								
Cambridgeshire and West Suffolk RZ Options		CWS1	CWS3	CWS6	CWS11	DM1	DM2	DM3	
		Supply Scheme Options				Demand Mgt Options			

There is potential for schemes CWS1 and CWS11 to have cumulative negative construction effects if constructed simultaneously because they both have pipelines routes running around Thetford and Bury St Edmunds areas. However, potential effects are considered minor.

5.9 Cumulative Assessment Summary

The cumulative assessment has identified schemes that are likely to have potential construction and/or operational effects, or are mutually exclusive within RZs. Potential cumulative construction effects have been identified where schemes are located in the same area because simultaneous construction may lead to increased nuisance for communities from noise, dust, visual intrusion, diversions and road closures, effects on ecology, and land and water quality. Potential cumulative operational effects have been identified where scheme are abstracting or discharging into the same water body because this may lead to increased effects on water quality and ecology.

Norwich and the Broads RZ and Hunstanton RZ have the most potential cumulative construction effects because all the schemes within these RZ are concentrated in a relatively small area compared to the other RZ where schemes are more spread out in different areas.

5.10 Water Resources East Anglia Project Schemes

Anglian Water is working with the Environment Agency, neighbouring water companies, and organisations from different sectors, piloting an innovative approach to water resources planning – the Water Resources East Anglia (WREA) project. Using an emerging scenario-based approach to water resources management planning, robust decision making enables stakeholders to make well-informed trade-offs between different economic, social and environmental objectives.

The WREA project aims to develop a common understanding of long-term supply–demand risk in the Anglian region. The project is considering the full range of options, including storage reservoirs, water reuse and desalination, aquifer storage and recovery, and further significant reductions in demand. The aim is to develop plans that perform robustly over a wide variety of plausible scenarios, and are better aligned to the outcomes that customers and other stakeholders want.

The schemes considered as part of the WREA project will be subjected to environmental assessments as part of the WREA process.

Two of the proposed WREA schemes were included in the SEA undertaken by Grontmij (April 2008) on the previous WRMP. The assessment undertaken as part of the SEA for these two schemes concluded that:

- South Lincolnshire Reservoir - implications of abstracting water from the River Witham or River Trent are not expected to be significant due to the existing high winter flows of these rivers. However, increased abstractions could potentially affect ecological status of the two rivers as a result of a reduction in dilution of pollutants and changes to morphology. Adverse effects are identified for biodiversity due to the location of designated sites within the proposed footprint of the reservoir. The development and subsequent alteration of the land usage could have an impact on water dependent designated sites. In terms of cultural heritage, the scheme could potentially disturb known settlement sites from prehistoric and Roman periods; and
- New South Lincolnshire Reservoir to Peterborough - The majority of assessed effects are expected to be of no significance, owing to the fact that none of the GIS constraints were identified within the search area of the scheme, or within the working width of the pipeline. In terms of biodiversity, minor adverse effects could arise from the pipeline passing in close proximity to reedbed BAP habitat. Minor adverse effects on land use are also identified from the use of agricultural land during construction. In respect to water, floodplain land will be disrupted during construction as the pipeline is routed below ground; however, the underground pipeline is not expected to significantly impact on floodplain storage capacity. In terms of cultural heritage, the pipeline could pass through or close to a large number of archaeological sites from the prehistoric to medieval periods, predominantly on the southern section of the pipeline route.

6. Development and Assessment of the WRMP

6.1 Evolution of Scheme Options

The initial list of scheme options was further refined and amended based on a number of criteria including capacity to meet demand, and feasibility in terms of cost and environmental implications. The schemes listed in Table 6.1 were deemed to be either not feasible or not required, and were therefore not considered further in developing the preferred plan.

Table 6.1: Discounted Scheme Options

Scheme Ref	Scheme Name	Reason for discounting scheme
Norwich and The Broads RZ		
NB2	Norwich water reuse	Scheme NB2 is a sustainability reduction scheme which provided an alternative to the current raw water source from the Wensum. However this option did not provide adequate resource to fully satisfy the sustainability reduction so was discounted. A smaller Norwich water reuse option has been developed (NB11) which includes additional water treatment capacity and therefore provides additional DO.
NB3	Cantley desalination	Rejected due to potential significant environmental effects of brine discharge and effects on designated sites
NB4	Lowestoft water reuse	Discounted as this option did not provide adequate resource to fully satisfy the sustainability reduction and the potential environmental effects on designated sites
NB6	Norwich intake with pre-treatment	Since the publication of the draft WRMP Anglian Water has been working with the Environment Agency and Natural England to resolve concerns about the preferred option for delivering the Wensum sustainability reduction (NB10). As part of this work all the Norwich and the Boards RZ options have been revisited to ensure that a common approach is taken for all options. The preferred option (NB10) requires the intake to Norwich WTW to be taken from either Norwich Pits or Norwich WTW depending on the operational mode (i.e. river flow conditions and/or water quality). Under all these operational modes the water is treated using the existing water treatment process at Norwich WTW. Therefore as the risks (water quality, low flow etc.) can be managed and are considered acceptable for NB10 then the option to add additional upfront treatment process (NB6) is not required and therefore discounted.
NB7	Norwich intake with lining existing bankside storage	As stated above all Norwich and the Boards RZ options have been revisited. The preferred option (NB10) requires continued operation of Norwich Pits without lining of the pits. The risks associated with not lining the pits are deemed acceptable therefore this option is not required and has been discounted.
NB8	Norwich intake with new bankside storage	This option to provide new bankside storage (NB8) was developed as an alternative to utilising the existing storage at Norwich Pits if the risks associated with continued operation of the pits were deemed unacceptable. As described above the preferred option utilises the existing storage at Norwich Pits and the risks associated with this are considered manageable therefore this option has been discounted.
Ruthamford South RZ		
RHFA9	Grafham intake refurbishment	This option was not presented in the draft WRMP. It was discounted before the publication of the draft as it was assumed that the work required to restore the intake will be carried out as asset maintenance. Therefore the baseline DO was calculated assuming the intake had been refurbished and the option discounted.
RHFP1	Ruthamford North RZ Transfer 3	The original option set for Ruthamford was developed using an early version of the supply demand balance which showed a peak deficit greater than the average deficit. Therefore a set of peak specific options were developed (denoted RHFP1, P2 etc.). However the final supply demand balance used for the draft WRMP and the revised draft WRMP shows a smaller peak deficit than at average. Therefore the option set developed for average are adequate to satisfy the peak deficits and the peak specific options have been discounted.
RHFP2	Ruthamford North RZ Transfer 4	See above.
RHFP3	Ruthamford North RZ Transfer 5	See above.
RHFP4	Bedford WTW	See above.

Scheme Ref	Scheme Name	Reason for discounting scheme
RHFP5	Ruthamford North RZ transfer	See above.
Cambridgeshire and West Suffolk RZ		
CWS1	Thetford PZ transfer	Following further review of RZ integrity Cambridgeshire and West Suffolk RZ has been split into a number of new RZs for the revised draft WRMP. This option is no longer applicable to the new configuration of RZs.
CWS3	Sudbury PZ transfer	As above, this option is no longer applicable to the new configuration of RZs.
CWS6	Haverhill water reuse	As above, this option is no longer applicable to the new configuration of RZs.
CWS11	Fenland RZ transfer	As above, this option is no longer applicable to the new configuration of RZs.

6.2 Development of the WRMP

Details of the full 25 year plan set out in the WRMP are presented in Table 6.2. The scheme reference numbers are in brackets. These schemes make up the preferred plan in the 2015 WRMP. Feasible supply schemes (described in section 5) not selected may be considered in the future if the size of deficits increases due to sustainability reductions or climate change.

The schemes in the preferred plan were chosen based on a number of factors including:

- Economic modelling;
- Feasibility;
- Capacity to meet deficit;
- Environmental effects (from the HRA, SEA and WFD assessment); and
- Capacity to meet long-term supply demand objectives.

Table 6.2: 2015 WRMP Preferred Plan

Resource Zone	Scheme	AMP
West Suffolk	East Suffolk RZ transfer (WS2)	7
	River Lark Flow Augmentation (WS5)	8
	Water Efficiency	6
	Leakage control	6
Norwich and the Broads	Norwich intake to existing bankside storage (NB10)	7
	Norwich water reuse (NB11)	9
	Water Efficiency	6
	Leakage control	6
Hunstanton	Fenland RZ transfer (H1)	7
	Enhanced metering	6
	Water efficiency	6
	Leakage control	6
Fenland	North Ruthamford RZ transfer (12 Ml/d) (F4)	7
	Enhanced metering	6
	Water efficiency	6
	Leakage control	6
East Suffolk and Essex	South Essex RZ Transfer (ES10)	9
	Leakage control	6
	Water efficiency	6
	Ipswich water reuse (ES3)	10
South Essex	Extension of Ardleigh agreement (SE4)	9

Resource Zone	Scheme	AMP
Newmarket	Leakage	6
	Water efficiency	6
	West Suffolk RZ transfer (NWM2)	8
	Leakage	6
Central Essex	Water efficiency	6
	South Essex RZ transfer (CE1)	8
	Leakage	6
Ely	Water efficiency	6
	Newmarket RZ transfer (E2)	7
	Leakage	6
	Water efficiency	6
Cheveley	Enhanced metering	6
	Newmarket RZ transfer (CVY1)	8
	Leakage	6
Ruthamford North	Water efficiency	6
	Saltersford reduction (RHFA15)	10
	Leakage	6
	Water efficiency	6
Ruthamford South	Enhanced metering	6
	Ruthamford North RZ Transfer 1 (RHFA1)	8
	Re-commission Ruthamford South RZ reservoir (RHFA11)	10
	Leakage	6
	Enhanced metering	6
	Water efficiency	6

6.3 Assessment of the WRMP

The WRMP was assessed against the SEA Framework using the assessment methodology presented in Section 2.2.2. The assessment was undertaken in two stages: the first assessed the WRMP preferred schemes before mitigation; and the second assessed the preferred schemes assuming mitigation measures had been implemented.

Key

	Highly Significant Positive
	Significant Positive
	Not Significant Positive
	No Effect
	Not Significant Negative
	Significant Negative
	Highly Significant Negative
	Effect Unknown / Effect depends on results of other studies

6.3.1 Assessment of the WRMP before Mitigation

The WRMP preferred schemes were assessed according to the current proposals (as of November 2013). Where appropriate mitigation measures have been suggested. The results of the assessment are presented in Table 6.3.

Table 6.3: Preferred Plan Assessment without Mitigation

Resource Zone	Scheme	SEA Objectives												Comments	Mitigation
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land		
West Suffolk	East Suffolk RZ transfer (WS2)													Gt. Welnetham WR is within an area of ancient woodland so a small part of the pipeline is within this area. Proposed pipeline route runs through the corner of an area of ancient woodland. HRA screening concluded no LSE	Cannot avoid ancient woodland by WR area due to location of WR. Pipeline could be re-routed to avoid the other area of ancient woodland. Employ construction techniques that do not involve loss of trees from the area of ancient woodland. Use of best practice construction methods
	River Lark flow augmentation (WS5)													No negative significant effects predicted. HRA screening concluded no LSE and WFD assessment concluded no risk of deterioration	None required
	Water Efficiency													No negative significant effects predicted	Increased promotion and advertisement of water efficiency campaigns and water saving devices
	Leakage control													No negative significant effects predicted. Leakage options will have temporary negative effects associated with digging up pipeline to repair or replace pipes to reduce future leakages	Adherence to good site practice to reduce nuisance to the community (noise, dust, road closures) and potential ecology and pollution effects
Norwich and the Broads	Norwich intake to existing bankside storage (NB10)													The proposed scheme will pass through the Sweet Briar Road Meadows SSSI and the Wensum Valley LNR. HRA screening concluded no LSE and WFD assessment concluded no risk of deterioration	Re-routing of pipeline required to avoid SSSI and LNR. Use of best practice construction methods
	Water Efficiency													No negative significant effects predicted	Increased promotion and advertisement of water efficiency campaigns and water saving devices
	Leakage control													No negative significant effects predicted. Leakage options will have temporary negative effects associated with digging up pipeline to repair or replace pipes to reduce future leakages	Adherence to good site practice to reduce nuisance to the community (noise, dust, road closures) and potential ecology and pollution effects
	Norwich													Proposed pipeline route would be 150m and 160m	Re-route to avoid Registered Park and

Resource Zone	Scheme	SEA Objectives												Comments	Mitigation
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land		
	water reuse (NB11)													from 2 SSSIs, and adjacent to 2 LNRs. Through a Scheduled Monument (SM), 50m from a SM, 100m from 4 SMs, 150m from 3 SMs. Through Registered Park and Garden. The HRA screening concluded there was potential for likely significant effects. A Task 2 AA was, therefore, undertaken which concluded no adverse effects on site integrity (see section 7). WFD assessment concluded low risk of deterioration	Garden and SM. Use of best construction practices to reduce effects on nearby designated sites.
Hunstanton	Fenland RZ transfer (H1)													The pipeline route is close to listed buildings. WFD assessment concluded medium risk of deterioration to River Heacham and North West Norfolk Sands. HRA screening concluded no LSE.	Consultation with English Heritage and good site practices should minimise effects on historic assets. Option needs to be balanced against previous and proposed NEP investigations to determine the optimal balance between sources (e.g. the total capacity should not be abstracted from only one source). Use of best practice construction methods
	Enhanced Metering													No negative significant effects predicted	Increased coverage and promotion of metering schemes and benefits to households
	Water efficiency													No negative significant effects predicted	Increased promotion and advertisement of water efficiency campaigns and water saving devices
	Leakage control													No negative significant effects predicted. Leakage options will have temporary negative effects associated with digging up pipeline to repair or replace pipes to reduce future leakages	Adherence to good site practice to reduce nuisance to the community (noise, dust, road closures) and potential ecology and pollution effects
Fenland	Ruthamford North RZ transfer (12 Ml/d) (F4)													Proposed pipeline route goes through a LNR. HRA screening concluded no LSE and WFD assessment concluded low risk of deterioration	Pipeline could be re-routed to avoid the LNR. Use of best practice construction methods
	Enhanced metering													No negative significant effects predicted	Increased coverage and promotion of metering schemes and benefits to

Resource Zone	Scheme	SEA Objectives												Comments	Mitigation
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land		
															households
	Water efficiency													No negative significant effects predicted	Increased promotion and advertisement of water efficiency campaigns and water saving devices
	Leakage control													No negative significant effects predicted. Leakage options will have temporary negative effects associated with digging up pipeline to repair or replace pipes to reduce future leakages	Adherence to good site practice to reduce nuisance to the community (noise, dust, road closures) and potential ecology and pollution effects
East Suffolk and Essex	South Essex RZ Transfer (ES10)													Runs through or adjacent to 5 areas of ancient woodland. HRA screening concluded no LSE	Re-route pipeline to avoid areas of ancient woodland. Use of best practice construction methods
	Water efficiency													No negative significant effects predicted	Increased promotion and advertisement of water efficiency campaigns and water saving devices
	Leakage control													No negative significant effects predicted. Leakage options will have temporary negative effects associated with digging up pipeline to repair or replace pipes to reduce future leakages	Adherence to good site practice to reduce nuisance to the community (noise, dust, road closures) and potential ecology and pollution effects
	Ipswich water reuse (ES3)													Proposed scheme would pass through the Stour and Orwell Estuaries SPA and Ramsar site, and the Holbrook Park area of Ancient Woodland. The scheme would also run adjacent to the Cutlers Wood area of Ancient Woodland. The scheme would also run adjacent to the Spring Wood and Millennium Wood, Belstead LNR and the Spring Wood area of Ancient Woodland. HRA screening concluded no LSE (providing mitigation was implemented) and WFD assessment concluded no risk of deterioration	Re-route pipeline to avoid SPA, ancient woodland areas and LNR. Use of best practice construction methods
South Essex	Extension of Ardleigh agreement (SE4)													No negative significant effects predicted. HRA screening concluded no LSE and WFD assessment concluded low risk of deterioration	None required
	Water													No negative significant effects predicted	Increased promotion and advertisement of water efficiency

Resource Zone	Scheme	SEA Objectives												Comments	Mitigation
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land		
Newmarket	efficiency														campaigns and water saving devices
	Leakage													No negative significant effects predicted. Leakage options will have temporary negative effects associated with digging up pipeline to repair or replace pipes to reduce future leakages	Adherence to good site practice to reduce nuisance to the community (noise, dust, road closures) and potential ecology and pollution effects
	West Suffolk RZ transfer (NWM2)													Proposed pipeline route runs through an area of ancient woodland. HRA screening concluded no LSE	Pipeline could be re-routed to avoid the area of ancient woodland. Use of best practice construction methods
	Water efficiency													No negative significant effects predicted	Increased promotion and advertisement of water efficiency campaigns and water saving devices
	Leakage													No negative significant effects predicted. Leakage options will have temporary negative effects associated with digging up pipeline to repair or replace pipes to reduce future leakages	Adherence to good site practice to reduce nuisance to the community (noise, dust, road closures) and potential ecology and pollution effects
Central Essex	South Essex RZ transfer (CE1)													Pipeline runs through or near (within 300m) of 4 areas of ancient woodland. HRA screening concluded no LSE	Re-routing pipeline away from areas of ancient woodland. Use of best practice construction methods
	Water efficiency													No negative significant effects predicted	Increased promotion and advertisement of water efficiency campaigns and water saving devices
	Leakage													No negative significant effects predicted. Leakage options will have temporary negative effects associated with digging up pipeline to repair or replace pipes to reduce future leakages	Adherence to good site practice to reduce nuisance to the community (noise, dust, road closures) and potential ecology and pollution effects
Ely	Newmarket RZ transfer (E2)													Pipeline route runs through 2 SSSIs, and within 200m of a NNR and a SAC. HRA screening concluded no LSE	Re-routing pipeline away from SSSI sites or use of best practices during construction to reduce effects
	Enhanced Metering													No negative significant effects predicted	Increased coverage and promotion of metering schemes and benefits to households
	Water efficiency													No negative significant effects predicted	Increased promotion and advertisement of water efficiency campaigns and water saving devices

Resource Zone	Scheme	SEA Objectives												Comments	Mitigation
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land		
	Leakage													No negative significant effects predicted. Leakage options will have temporary negative effects associated with digging up pipeline to repair or replace pipes to reduce future leakages	Adherence to good site practice to reduce nuisance to the community (noise, dust, road closures) and potential ecology and pollution effects
Cheveley	Newmarket RZ transfer (CVY1)													No negative significant effects predicted. HRA screening concluded no LSE	None required
	Water efficiency													No negative significant effects predicted	Increased promotion and advertisement of water efficiency campaigns and water saving devices
	Leakage													No negative significant effects predicted. Leakage options will have temporary negative effects associated with digging up pipeline to repair or replace pipes to reduce future leakages	Adherence to good site practice to reduce nuisance to the community (noise, dust, road closures) and potential ecology and pollution effects
North Ruthamford	Saltersford reduction (RHFA15)													No negative significant effects predicted. HRA screening concluded no LSE	None required
	Enhanced Metering													No negative significant effects predicted	Increased coverage and promotion of metering schemes and benefits to households
	Water efficiency													No negative significant effects predicted	Increased promotion and advertisement of water efficiency campaigns and water saving devices
	Leakage													No negative significant effects predicted. Leakage options will have temporary negative effects associated with digging up pipeline to repair or replace pipes to reduce future leakages	Adherence to good site practice to reduce nuisance to the community (noise, dust, road closures) and potential ecology and pollution effects
Ruthamford South	Ruthamford North RZ Transfer 1 (RHFA1)													Pipeline route is adjacent to a SSSI, and passes through an area of ancient woodland. Potential to affect the Upper Nene Valley Gravel pits SPA and Ramsar supporting qualifying features through the pipeline crossing the River Nene between sections of the designated site. The HRA screening concluded there was potential for likely significant effects. A Task 2 AA was, therefore, undertaken	Re-route pipeline to avoid the area of ancient woodland Task 2 AA concluded no AESI providing the following mitigation is implemented: timing of construction works outside of the winter period so as not to disturb or displace Golden

Resource Zone	Scheme	SEA Objectives												Comments	Mitigation
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land		
														which concluded no adverse effects on site integrity providing mitigation was implemented (see section 7)	Plover, a qualifying species of the SPA. Restrictions on construction timing and implementation of measures to protect water quality (see section 7)
	Re-commission Ruthamford South RZ reservoir (RHFA11)													No negative significant effects predicted. HRA screening concluded no LSE	None required. Use of best practice construction methods
	Leakage													No negative significant effects predicted. Leakage options will have temporary negative effects associated with digging up pipeline to repair or replace pipes to reduce future leakages	Adherence to good site practice to reduce nuisance to the community (noise, dust, road closures) and potential ecology and pollution effects

6.3.2 Mitigation Measures

Table 6.4 presents the high level mitigation that has been identified from the assessment (Table 6.3). The suggested mitigation will be applied to the preferred plan schemes to ensure that their environmental effects are minimised. Opportunities for enhancement measures have also been considered. Mitigation and enhancement measures cover design, construction and operation/maintenance phases.

Table 6.4: Mitigation and Enhancement Measures

Scheme	Mitigation / Enhancement Measures
East Suffolk RZ transfer (WS2)	<ul style="list-style-type: none"> Cannot avoid ancient woodland by WR area due to location of WR. Pipeline could be re-routed to avoid the other area of ancient woodland. Employ construction techniques that do not involve loss of trees from the area of ancient woodland Use of best practice construction methods
River Lark flow augmentation (WS5)	<ul style="list-style-type: none"> None identified
Norwich intake to existing bankside storage (NB10)	<ul style="list-style-type: none"> Use of good site practices during construction and maintenance Re-routing of pipeline to avoid SSSI and LNR
Norwich water reuse (NB11)	<ul style="list-style-type: none"> Pipeline to be re-routed to avoid Registered Park and Garden and SM Use of good site practices during construction and maintenance
Fenland RZ transfer (H1)	<ul style="list-style-type: none"> Consultation with English Heritage in relation to close proximity of 3 Grade II listed buildings to the proposed pipeline route Use of good site practices during construction and maintenance Balanced against previous and proposed NEP investigations to determine the optimal balance between sources (e.g. the total capacity should not be abstracted from only one source)
Ruthamford North RZ transfer (12 Ml/d) (F4)	<ul style="list-style-type: none"> Pipeline to be re-routed to avoid the LNR Use of good site practices during construction and maintenance
South Essex RZ transfer (ES10)	<ul style="list-style-type: none"> Pipeline to be re-routed to avoid areas of ancient woodland Use of good site practices during construction and maintenance
Ipswich water reuse (ES3)	<ul style="list-style-type: none"> Pipeline to be re-routed to avoid SPA, ancient woodland areas and LNR Use of good site practices during construction and maintenance
Extension to Ardleigh agreement (SE4)	<ul style="list-style-type: none"> None identified
West Suffolk RZ transfer (NWM2)	<ul style="list-style-type: none"> Pipeline could be re-routed to avoid the area of ancient woodland Use of best practice construction methods
South Essex RZ transfer (CE1)	<ul style="list-style-type: none"> Re-routing pipeline away from areas of ancient woodland Use of best practice construction methods
Newmarket RZ transfer (E2)	<ul style="list-style-type: none"> Re-routing pipeline away from SSSI sites or use of best practices during construction to reduce effects
Newmarket RZ transfer (CVY1)	<ul style="list-style-type: none"> None identified
Salterford reduction (RHFA15)	<ul style="list-style-type: none"> None identified
Ruthamford North RZ Transfer 1 (RHFA1)	<ul style="list-style-type: none"> Pipeline to be re-routed to avoid ancient woodland Use of good site practices during construction and maintenance Timing of construction works outside of the winter period so as not to disturb or displace Golden Plover, a qualifying species of the SPA. Restrictions on construction timing and implementation of measures to protect water quality
Re-commission Ruthamford South RZ reservoir (RHFA11)	<ul style="list-style-type: none"> None identified
Leakage Control	<ul style="list-style-type: none"> Adherence to good site practice to reduce nuisance to the community (noise, dust, road closures) and potential ecology and pollution effects

Scheme	Mitigation / Enhancement Measures
Enhanced Metering	<ul style="list-style-type: none"> Increased coverage and promotion of metering schemes and benefits to households
Water Efficiency	<ul style="list-style-type: none"> Increased promotion and advertisement of water efficiency campaigns and water saving devices

Table 6.4 above refers to good site practices; these will help to reduce potential negative effects associated with construction of water supply schemes. Construction mitigation measures could include (but are not limited to):

- Site Management:
 - Sign up to the Considerate Constructors Scheme (CCS);
 - Environmental site inductions for site staff and visitors;
 - Toolbox talks and posters for site staff on environmental issues;
 - Signs and fencing to protect and warn workforce of any sensitive areas; and
 - Secure site with fencing, locked gates and warning signage to prevent vandalism.
- Minimise dust and odour generation and spread of mud:
 - Dust suppression measures; and
 - Covered stockpiles.
- Prevention of water pollution:
 - Incident response plan;
 - Spill kits; and
 - Obtain necessary permit from Environment Agency if works are over or near water.
- Noise and vibration:
 - Screening;
 - Limit working hours and days;
 - Keep residents/neighbours informed of works; and
 - If works are likely to cause nuisance to neighbours may need to apply to Local Authority for permit under Control of Pollution Act 1974 – liaise with Local Authority Environmental Health Officer.
- Waste and materials:
 - Store waste securely; and
 - Reuse and recycle materials where possible on site.
- Air pollution:
 - minimise site vehicle journeys; and
 - turn plant off when not in use.
- Ecology:
 - If work are near hedges or trees consider doing works outside of the bird breeding season; and
 - Consult ecologist/Natural England/Local Authority Environmental Protection Officer if necessary.
- Built Heritage and Archaeology:
 - Watching brief;
 - Record finds; and
 - Consult archaeologist/English Heritage/Local Authority Heritage Officer if necessary.

6.3.3 Assessment of the WRMP Following Application of Mitigation Measures

The WRMP preferred schemes were assessed on the assumption that the mitigation measures suggested in Table 6.4 will be implemented. The results of the assessment are presented in Table 6.5.

Table 6.5: Preferred Plan Assessment after Mitigation has been applied

Resource Zone	Scheme	SEA Objectives												Comments
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land	
West Suffolk	East Suffolk RZ transfer (WS2)													No significant negative effects predicted
	River Lark Flow Augmentation (WS5)													No significant negative effects predicted
	Water Efficiency													No significant negative effects predicted
	Leakage control													No significant negative effects predicted
Norwich and the Broads	Norwich intake to existing bankside storage (NB10)													No significant negative effects predicted
	Water Efficiency													No significant negative effects predicted
	Leakage control													No significant negative effects predicted
	Norwich water reuse (NB11)													Significant negative effects associated with CO ₂ output. No other significant negative effects predicted. Task 2 AA concluded no AESI
Hunstanton	Fenland RZ transfer (H1)													No significant negative effects predicted
	Enhanced metering													No significant negative effects predicted
	Water efficiency													No significant negative effects predicted
	Leakage control													No significant negative effects predicted
Fenland	Ruthamford North RZ transfer (12 Ml/d) (F4)													No significant negative effects predicted
	Leakage control													No significant negative effects predicted.
	Enhanced metering													No significant negative effects predicted.
	Water efficiency													No significant negative effects predicted
East Suffolk and Essex	South Essex RZ Transfer (ES10)													No significant negative effects predicted
	Water efficiency													No significant negative effects predicted
	Leakage control													No significant negative effects predicted

Resource Zone	Scheme	SEA Objectives												Comments
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land	
	Ipswich water reuse (ES3)													Significant negative effects associated with CO ₂ output
South Essex	Extension of Ardeleigh agreement (SE4)													No significant negative effects predicted
	Water efficiency													No significant negative effects predicted
	Leakage													No significant negative effects predicted
Newmarket	West Suffolk RZ transfer (NWM2)													No significant negative effects predicted
	Water efficiency													No significant negative effects predicted
	Leakage													No significant negative effects predicted
Central Essex	South Essex RZ transfer (CE1)													No significant negative effects predicted
	Water efficiency													No significant negative effects predicted
	Leakage													No significant negative effects predicted
Ely	Newmarket RZ transfer (E2)													No significant negative effects predicted
	Enhanced metering													No significant negative effects predicted
	Water efficiency													No significant negative effects predicted
	Leakage control													No significant negative effects predicted
Cheveley	Newmarket RZ transfer (CVY1)													No significant negative effects predicted
	Water efficiency													No significant negative effects predicted
	Leakage													No significant negative effects predicted
North Ruthamford	Saltersford reduction (RHFA15)													No significant negative effects predicted
	Enhanced metering													No significant negative effects predicted
	Water efficiency													No significant negative effects predicted
	Leakage control													No significant negative effects predicted
Ruthamford South	Ruthamford North RZ Transfer 1 (RHFA1)													Significant negative effects associated with CO ₂ output. No other significant negative effects predicted. Task 2 AA concluded no AESI following mitigation

Resource Zone	Scheme	SEA Objectives												Comments
		1. Water Quality	2. Water Resources	3. Flood Risk	4. Water Security	5. Community	6. Biodiversity	7. Landscape	8. Historic Assets	9. Climate Change Adaptation	10. Climate Change Mitigation	11. Sustainable Design	12. Soil and Land	
	Re-commission Ruthamford South RZ reservoir (RHFA11)													No significant negative effects predicted
	Leakage													No significant negative effects predicted

6.4 Cumulative Assessment of the Preferred Plan

The preferred plan is unlikely to have any negative construction or operational cumulative effects. This is mainly because schemes are located in different areas throughout the region so are unlikely to affect the same receptors; do not abstract or discharge from the same water bodies; or is not in the same AMP period. There may be cumulative positive benefits from implemented of demand management options through the resource zones.

Schemes NB11 and NB10 have the potential to cause negative cumulative construction effects if constructed simultaneously. However, under the preferred plan they will be implemented in different AMP periods. NB11 is programmed under AMP9 and NB10 is programmed under AMP7.

Schemes ES3 and ES10 also have the potential to cause negative cumulative construction effects if constructed simultaneously. However, under the preferred plan they will be implemented in different AMP periods. ES3 is programmed under AMP10 and ES10 is programmed under AMP9.

7. Habitats Regulations Assessment

7.1 HRA Task 1 Test of Likely Significance (Screening)

As discussed in Section 1.4 a HRA Task 1 'Test of Likely Significance' (ToLS) (screening) was undertaken for the WRMP scheme options to determine whether there was potential for likely significant effects (LSE) on European sites.

Table 7.1 provides a summary of the results of the HRA ToLS. It demonstrates which of the scheme options may have likely significant effects and on which designated sites.

The schemes in grey are those that were discounted during the WRMP process due to capacity, feasibility, economic or environmental reasons (see section 6.1). The schemes in blue are the WRMP preferred schemes. The remaining schemes are those that are included in the WRMP as feasible schemes but have not currently been taken forward as preferred schemes.

Feasible schemes identified as having likely significant effects may need to be taken forward to a Task 2 Appropriate Assessment (AA) if Anglian Water decides to take the scheme forward. Preferred schemes identified as having likely significant effects have been subjected to a Task 2 AA and a summary of the results are presented in Section 7.2. For full details refer to the HRA Report (Mott MacDonald, December 2013).

Table 7.1: HRA ToLS Summary Results

Scheme		European sites with likely significant effect
West Suffolk RZ		
WS1	Newmarket PZ transfer	None
WS2	East Suffolk RZ Transfer	None
WS3	Bury St Edmunds water reuse	None
WS4	Thetford water reuse	• Breckland SPA/SAC
WS5	River Lark Flow Augmentation	None
WS6	South Essex RZ Transfer	None
Ely RZ		
E1	Fenland RZ transfer	• Fenland SAC
E2	Newmarket RZ transfer	None
Newmarket RZ		
NWM1	Ely RZ transfer	None
NWM2	West Suffolk RZ transfer	None
Cheveley RZ		
CVY1	Newmarket RZ transfer	None
CVY2	West Suffolk RZ transfer	None
Central Essex RZ		
CE1	South Essex RZ transfer	None
CE2	West Suffolk RZ transfer	None
Norwich and The Broads RZ		
NB1 / NB12	Bacton desalination	• Paston Great Barn SAC

Scheme		European sites with likely significant effect
		<ul style="list-style-type: none"> Haisborough, Hammond and Winterton SAC
NB2 / NB11	Norwich water reuse	<ul style="list-style-type: none"> The Broads SAC Broadland SPA/Ramsar
NB3	Cantley desalination (this scheme has been rejected)	<ul style="list-style-type: none"> Breydon Water SPA/Ramsar The Broads SAC Broadland SPA/Ramsar
NB4	Lowestoft water reuse	<ul style="list-style-type: none"> Broadland SPA/Ramsar The Broads SAC
NB5	Norwich storage	None
NB6	Norwich intake with pre-treatment	None
NB7	Norwich intake with lining existing bankside storage	None
NB8	Norwich intake with new bankside storage	None
NB10	Norwich intake to existing bankside storage	None
Fenland RZ		
F1	Kings Lynn and Wisbech water reuse	<ul style="list-style-type: none"> The Wash SPA/Ramsar The Wash & North Norfolk Coast SAC
F2	Kings Lynn desalination	<ul style="list-style-type: none"> The Wash SPA/Ramsar The Wash & North Norfolk Coast SAC
F4	Ruthamford North RZ Transfer (12 MI/d)	None
F5	Ruthamford North RZ Transfer (25 MI/d)	None
Hunstanton RZ		
H1	Fenland RZ transfer	None
H2	Heacham water reuse	<ul style="list-style-type: none"> The Wash SPA/Ramsar The Wash & North Norfolk Coast SAC
H3	Wash desalination	<ul style="list-style-type: none"> The Wash SPA/Ramsar The Wash & North Norfolk Coast SAC
H4	Hunstanton RZ groundwater development	None
South Essex RZ		
SE1	Colchester water reuse	<ul style="list-style-type: none"> Colne Estuary (Mid-Essex Coast Phase 2) SPA/Ramsar
SE2 / SE8	East Suffolk RZ transfer	None
SE4	Amendment to Ardleigh agreement	None
SE6	South Essex RZ groundwater development	None
SE7	Ardleigh reservoir extension	<ul style="list-style-type: none"> Colne Estuary (Mid-Essex Coast Phase 2) SPA/Ramsar
East Suffolk RZ		
ES3	Ipswich water reuse	None
ES4	Felixstowe desalination	None
ES6	East Suffolk RZ groundwater development	None
ES10	South Essex RZ transfer	None
Ruthamford North RZ		

Scheme		European sites with likely significant effect
RHFA2	Peterborough water reuse	• Nene Washes SAC/SPA/Ramsar
RHFA3	Rutland dam raising	• Rutland Water SPA/Ramsar
RHFA4	Reduce export to STW	None
RHFA5	Pitsford dam raising	None
RHFA6	Canal transfer	None
RHFA15	Salterford reduction	None
Ruthamford South RZ		
RHFA1	Ruthamford North RZ Transfer 1	• Upper Nene Valley Gravel Pits SPA/Ramsar
RHFA7	Grafham dam raising	None
RHFA8	New Ruthamford South reservoir	None
RHFA9	Grafham intake refurbishment	None
RHFA10	Re-commission Pulloxhill WTW	None
RHFA11	Re-commission Ruthamford South RZ reservoir	None
RHFA13	Ruthamford North RZ Transfer 2	None
RHFA14	Huntingdon water reuse	• Portholme SAC
RHFP1	Ruthamford North RZ Transfer 3	• Upper Nene Valley Gravel Pits SPA/Ramsar
RHFP2	Ruthamford North RZ Transfer 4	None
RHFP3	Ruthamford North RZ Transfer 5	None
RHFP4	Bedford WTW	None
RHFP5	Ruthamford North RZ transfer	• Portholme SAC
Cambridgeshire and West Suffolk RZ		
CWS1	Thetford PZ transfer	• Breckland SAC/SPA
CWS3	Sudbury PZ transfer	None
CWS6	Haverhill water reuse	None
CWS11	Fenland RZ transfer	• Breckland SAC/SPA

7.2 HRA Task 2 Appropriate Assessment

Where the HRA Task 1 ToLS demonstrated potential for schemes to have LSE and these schemes were chosen as preferred schemes for the WRMP, a HRA Task 2 AA was undertaken. There were only two preferred schemes with potential for LSE. These two schemes were:

- NB2/NB11 Norwich water reuse; and
- RHFA1 RHF North Transfer 1.

Scheme NB2/NB11

The results of the Task 2 AA for scheme NB2/NB11 concluded that no physical loss of habitat extent or current vegetation structure and/or composition within the designated sites is predicted. The water quality treatments incorporated into the design of the proposed scheme are considered to be sufficient to avoid adverse effects on the designated sites due to water quality change. A flow volume diagram was developed by Anglian Water which predicted that flows downstream of Whitlingham STW will not be altered.

Therefore, no direct or indirect effects to the designated sites are predicted as a result of the implementation of the NB2/NB11 Norwich Water Reuse scheme.

No adverse effects on the qualifying features of the Broads SAC and Broadland SPA and Ramsar site are expected through the implementation of this scheme.

Scheme RHFA1

The results of the Task 2 AA for scheme RHFA1 concluded that the footprint of the scheme is at least 500m outside the boundary of the Nene Valley Gravel Pits SPA/Ramsar site; therefore, habitat extent, vegetation structure and/or composition within the designated sites will not be affected.

Habitat fragmentation can be avoided through the timing of construction works outside of the winter period so as not to disturb or displace Golden Plover, a qualifying species of the SPA.

Restrictions on construction timing and implementation of measures to protect water quality are considered sufficient to avoid adverse effects on the integrity of the European sites with respect to water pollution. Therefore, no direct effects to the designated sites are predicted as a result of the implementation of the RHFA1 scheme, and any indirect disturbance to its qualifying features can be avoided through mitigation.

No adverse effects on the qualifying features of the Nene Valley Gravel Pits SPA/Ramsar site are expected through the implementation of this scheme.

8. Water Framework Directive Assessment

8.1 WFD Assessment Summary

As discussed in Section 1.4 a WFD Assessment screening exercise was undertaken by the Environment Agency to determine the level of risk from the proposed schemes to WFD status and objectives of water bodies. Schemes screened as requiring a WFD assessment (and that were feasible schemes in the WRMP) were subject to a WFD assessment to ensure that they would not cause deterioration or lead to failure of objectives. The WFD assessments were undertaken by Atkins. A summary of the Atkins results is provided in Table 8.1 (for full details refer to the Atkins Water Framework Directive No Deterioration Screening Assessment – Technical Note, November 2013).

Key

	Likely beneficial impacts
	No risk of deterioration
	Low risk of deterioration
	Medium risk of deterioration
	High risk of deterioration
	Effect Unknown / Effect depends on conclusions of other studies

Table 8.1: WFD Assessment Screening Summary Table

Scheme Ref	Scheme Name	Waterbody	WFD Assessment Summary
West Suffolk and Sudbury RZ			
WS3	Bury St. Edmunds water reuse	Cam and Ely Ouse Chalk	The increase in groundwater levels in the underlying aquifer may have some effect on flows in these waterbodies. No other effects are predicted and on this basis it can be reasonably concluded that this option would not lead to a WFD status deterioration for these waterbodies. Further assessment, potentially including additional groundwater modelling and water quality simulation (e.g. SAGIS) will confirm this conclusion. It is assumed that this will be undertaken as part of the discharge consenting process.
		River Lark	
		River Lark US Mill St Bridge	
WS4	Thetford water reuse	Little Ouse	There is a low risk of deterioration associated with changes in water quality downstream of the current discharge and associated with the quality of effluent to be injected. These risks will need to be resolved in order to obtain consent to discharge to ground.
		Cam and Ely Ouse Chalk	
WS5	River Lark Flow Augmentation	River Lark	The increase to flow through Bury St Edmunds is likely to lead to an increase in amenity value and has the potential to improve the Hydrology status according to the WFD. On this basis it can be reasonably concluded that this option would not lead to a deterioration in the status of these waterbodies. Further assessment of water quality risks (e.g. SAGIS) will provide greater certainty in this conclusion. It is assumed that this will be undertaken as part of the discharge consent process.
		River Lark US Mill St Bridge	
Norwich and The Broads RZ			
NB1 / NB12	Bacton desalination	Norfolk East	The moderate exposure and meso-tidal conditions mean that it can be reasonably concluded that this option would not lead to a deterioration in the waterbody. Further assessment is required to increase certainty in this conclusion, particularly for the larger option.
NB2 / NB11	Norwich water reuse	River Yare (Tidal)	Low risk. The effluent will be treated to a higher standard than the prevailing water quality in the river before the discharge from the Whitlingham STW is returned to Norwich WTW intake. Further investigation required to understand the potential impacts on the

Scheme Ref	Scheme Name	Waterbody	WFD Assessment Summary
			scheme and demonstrate that there will be no effect on WFD status.
NB10	Norwich intake to existing bankside storage	Tud	It is assumed that there will be no change in flows downstream of the revised intake. This option has been the focus of detailed discussions with the EA. No further assessment is considered necessary.
		Wensum DS	
		Wensum US	
Fenland RZ			
F1	Kings Lynn and Wisbech water reuse	Nene	Due to the absence of flow data and the potential impact to The Wash SPA, further assessment is required to provide certainty in this conclusion. Assessment to quantify the impact on flow and potentially water quality simulation (e.g. SAGIS) is recommended. It is assumed that water quality will be considered as part of the discharge consent process. However further assessment considering the impact on flow is recommended prior to this option being progressed.
		Great Ouse	
		River Wissey and Cut-off Channel	
F2	Kings Lynn desalination	Great Ouse	It cannot be concluded that this option will not lead to the deterioration of the Great Ouse waterbody. The desalinisation process involves the discharge of brine back to the waterbody. The location within a relatively small tidal estuary means that this presents risks to water quality which cannot be discounted without significant further investigation. The effects of any abstraction would also have to be assessed, both in terms of the reduction in flow in volumetric terms and the associated changes in tidal functioning and morphological processes.
F4	Ruthamford North RZ Transfer (12 MI/d)	Nene	The proposed increase to abstraction has the potential to lead to a deterioration of the Nene and Welland. However, the presence of an MRF constraint on the licence mean that this risk is low, but further investigation is required. The operation of this scheme is unlikely to adversely affect Rutland Water.
		Welland	
		Rutland Water	
Hunstanton RZ			
H1	Fenland RZ transfer	North West Norfolk Chalk	None
		Babingley River	Even if the entire 1.3MI/d were sourced at the expense of flows any one of these waterbodies, there would only be a low risk of deterioration.
		Gaywood River	
		Heacham River	The location of Heacham STW relative waterbody outflow means that the regional groundwater models predict a surplus. Site specific information from the Environment Agency suggests that the upper reaches may be at risk of deterioration as a consequence of the proposed option.
		North West Norfolk Sandringham	
H2	Heacham water reuse	Heacham River	The increase in groundwater levels in the underlying aquifer may have some effect on flows in the surface waterbody. No other effects are predicted and on this basis it can reasonably concluded that this option would not lead to a deterioration in the waterbody. Water quality impacts require further investigation to confirm that the proposals will not lead to the deterioration of the waterbody.
		North West Norfolk Chalk	
H3	Wash desalination	Wash Outer	Medium risk to be mitigated through scheme design if the option is taken forward.
H4	Hunstanton RZ groundwater development	Heacham River	The location of Heacham STW relative waterbody outflow means that the regional groundwater models predict a surplus. Site specific information from the Environment Agency suggests that the upper reaches may be at risk of deterioration as a consequence of the proposed option. Further hydro-ecological investigations are required to look at the sensitivity of the upper reaches to the implementation of this option
		North West Norfolk Sandringham	
South Essex RZ			
SE1	Colchester water reuse	Colne	The increased discharge to the Colne has the potential to improve the Hydrology and Chemical status according to the WFD. On this basis it can be reasonably concluded that this option would not lead to a deterioration in the waterbody. By contrast, the equivalent decrease in discharge in the Blackwater and Colne has the potential
		Blackwater and Colne	

Scheme Ref	Scheme Name	Waterbody	WFD Assessment Summary
			to impact upon water quality. Further water quality assessment is assumed to be undertaken as part of the discharge consent process. Calculations suggest that the proposed diversion would result in a residual flow which is compliant with the EFI, on this basis it can reasonably concluded that this option would not lead to a deterioration in the waterbody.
SE4	Amendment to Ardleigh agreement	Salary Brook	Based on the method developed by the Environment Agency, there is a low risk of the proposal resulting in the deterioration of the Colne waterbody. No other risks were identified. More specific hydro-ecological investigations may be required to inform the increase in abstraction. Reasons for the apparent biological resilience to abstraction (i.e. Macro-invertebrates at 'good' when flows at Band 2 non-compliant) for the Colne should be explored prior to implementation.
		Colne	
		Ardleigh Reservoir	
SE6	South Essex RZ groundwater development	Stour DS Lamarsh	The hydrological analysis indicates a low risk of deterioration. Given the Band 3 non-compliance of the waterbody, further hydro-ecological investigation is recommended to confirm the findings of this work before abstraction is recommenced.
		Essex Gravels	
SE7	Ardleigh reservoir extension	Salary Brook	Based on the method developed by the Environment Agency, there is a low risk of the proposal resulting in the deterioration of Colne. Risks identified due to the physical disturbance to the Ardleigh Reservoir. No risks identified for Salary Brook. More specific hydro-ecological investigations may be required to inform the increase in abstraction. Reasons for the apparent biological resilience to abstraction (i.e. Macro-invertebrates at 'good' when flows at Band 2 non-compliant) should be explored prior to implementation.
		Colne	
		Ardleigh Reservoir	
East Suffolk RZ			
ES3	Ipswich water reuse	River Gipping	It is assumed that there will be no reduction of freshwater flow to the estuary. Further assessment needed to confirm that there will be no deterioration.
		Orwell (Tidal)	
		Orwell	
ES4	Felixstowe desalination	Essex	The moderate exposure and meso-tidal conditions mean that it can be reasonably concluded that this option would not lead to a deterioration in the waterbody. Further assessment is required to increase certainty in this conclusion.
ES6	East Suffolk RZ groundwater development	Waveney and East Suffolk Chalk and Crag	A low risk of deterioration is predicted.
		River Gipping	
Ruthamford North RZ			
RHFA3	Rutland dam raising	Nene	The proposed increase to abstraction has the potential to lead to a deterioration of the Nene and Welland waterbodies. However, the presence of an MRF constraint on the licence means that this risk is low, but further investigation is required.
		Welland	
		North Gwash	The scale of impacts from the implementation of this option on these waterbodies are unlikely to be significant relative to the existing level of disturbance caused by the reservoir.
		South Gwash	
		Rutland Water	Possible deterioration/non-compliance due to raised water levels affecting quality elements that support aquatic species, particularly 'structure of the lake shore'. Further investigation into the possible impacts raised water levels are likely to have on the biological elements are required. A review of the water quality impacts will be required.
RHFA5	Pitsford dam raising	Scaldwell Stream	The scale of impacts from the implementation of this option on the waterbodies are unlikely to be significant relative to the existing level of disturbance caused by the reservoir.
		Walgrove Stream	
		Pitsford Arm of the Brampton Branch	
		Nene	The proposed increase to abstraction has the potential to lead to a deterioration of the waterbody, on this basis further investigation to

Scheme Ref	Scheme Name	Waterbody	WFD Assessment Summary
			assess the impact on hydrology is recommended. However, the presence of an MRF constraint on the licence means that this risk of impact on WFD classification is low.
		Pitsford Water	Possible deterioration/non-compliance due to raised water levels affecting quality elements that support aquatic species, particularly 'structure of the lake shore'. Further investigation into the possible impacts raised water levels are likely to have on the biological elements are required. A review of the water quality impacts will be required.
Ruthamford South RZ			
RHFA7	Grafham dam raising	Ouse	The proposed increase to abstraction has the potential to lead to a deterioration of the waterbody. However, the presence of an MRF constraint on the licence and proposed reduction in licence quantities from 2016 mean that this risk is low. Further investigation will be required to demonstrate that an increase to abstraction will not affect water quality in the waterbody. This should include a consideration of the effectiveness of the existing MRF and could be informed by the investigation conducted in support of Anglian Water's drought plan.
		Diddington Brook	The scale of impacts from the implementation of this option on the waterbody are unlikely to be significant relative to the existing level of disturbance caused by the reservoir.
		Grafham Water	Possible deterioration/non-compliance due to raised water levels affecting quality elements that support aquatic species, particularly 'structure of the lake shore'. Further investigation into the possible impacts raised water levels are likely to have on the biological elements are required. A review of the water quality impacts will be required.
RHFA8	New Ruthamford South reservoir	Ouse	The proposed increase to abstraction has the potential to lead to a deterioration of the waterbody. However, the presence of an MRF constraint on the licence and proposed reduction in licence quantities from 2016 mean that this risk is low. Further investigation will be required to demonstrate that an increase to abstraction will not affect water quality in the waterbody. This should include a consideration of the effectiveness of the existing MRF and could be informed by the investigation conducted in support of Anglian Water's drought plan.
RHFA14	Huntingdon water reuse	Grafham Water	The diversion of effluent from Huntingdon STW has the potential to affect water quality in these waterbodies, and therefore have an indirect impact on the biological elements. However relevant consent will be dependent on demonstration that the diversion will not affect WFD status. On this basis it can be reasonably concluded that this option is unlikely to lead to a deterioration in the waterbody. Further assessment including mass balance calculations will provide certainty in this conclusion.
		Diddington Brook	
		Ouse	

(Source: Atkins (November 2013) Water Framework Directive No Deterioration Screening Assessment – Technical Note

9. Monitoring

9.1 Monitoring Proposals

Monitoring the negative effects of implementing the WRMP is an essential on-going element of the SEA process. Monitoring helps ensure that the identified SEA objectives are being achieved, allows early identification of unforeseen adverse effects and thus appropriate remedial action can be taken. Monitoring will be an important requirement to measure performance and ensure the WRMP is being successfully implemented. The DCLG guidance states that it is inappropriate to monitor everything and monitoring proposals should be focused on the following areas:

- Indicate a likely breach of international, national or local legislation, recognised guidelines or standards;
- May give rise to irreversible damage, with a view to identifying trends before such damage occurs; and
- Were subject to uncertainty in the SEA and where monitoring would enable prevention or mitigation measures to be taken.

Table 9.1 presents the SEA monitoring proposal for the WRMP. The indicators have been adapted to those developed as part of the SEA Framework in Table 4.3.

Table 9.1: SEA Monitoring Proposals

Topic	Anglian Water WRMP SEA Objectives	Indicators	Timescale
Water	1. Protect and enhance where possible the ecological and chemical status of watercourses and water bodies in accordance with the WFD objectives	<ul style="list-style-type: none"> • Ecological status of water bodies where scheme abstract and discharge • Chemical status of water bodies where scheme abstract and discharge • Number and severity of pollution incidents during construction of WRMP schemes 	<ul style="list-style-type: none"> • Annually • Annually • Collected during scheme construction periods and reported at the end of each AMP period
	2. Maintain and improve sustainable water resources and encourage the sustainable use of water	<ul style="list-style-type: none"> • Change in leakage (Ml/d and litres/property/day) • Change in number of areas over abstracted and over licensed • Change in per capita consumption per customer • Change in % of households fitted with water meters 	<ul style="list-style-type: none"> • Annually • Each AMP period • Annually • Annually
Biodiversity	6. Protect and enhance biodiversity and geo-diversity across the region	<ul style="list-style-type: none"> • Number of WRMP schemes that will lead to habitat creation, and amount of habitat created (hectares) • Area (hectares) and number of statutory and non-statutory ecological sites that will be lost to WRMP schemes • Area (hectares) of both blue and green infrastructure created 	<ul style="list-style-type: none"> • Each AMP period • Each AMP period • Each AMP period
Cultural Heritage	8. Protect and enhance the historic environment, heritage assets and their setting	<ul style="list-style-type: none"> • Number of historic assets damaged by a WRMP scheme • Number of WRMP schemes built within 500m of a historic asset • Number of historic assets enhanced by schemes 	<ul style="list-style-type: none"> • Each AMP period • Each AMP period • Each AMP period
Climate Factors	9. Educate, manage, plan and adapt for the effects of climate change	<ul style="list-style-type: none"> • Number of educational campaigns implemented • Number of WRMP schemes and proportion of new deployable output designed to take future climate change effects into account 	<ul style="list-style-type: none"> • Each AMP period • Each AMP period

9.2 Links to Other Tiers of Plans, Programmes and the Project Level

The WRMP and its options have been assessed at a high strategic level. The preferred plan schemes and any additional schemes taken forward to implementation will be subject to the formal planning process and may require an Environmental Impact Assessment under the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (as amended). Requirements for EIA will be determined on a scheme by scheme basis. As part of this process more detailed scheme specific mitigation measures will be developed.

The WRMP supports several local, regional and national plans and programmes. It will have a direct link to water resources and water supply plans and policies. The WRMP will also have direct links to other Anglian Water plans such as the Drought Management Plan and other water company's plans. These links are further explained below. The WRMP will also have indirect links to plans relating to health and well-being, housing, and the environment.

The WRMP will interact with and support the Anglian Water Draft Drought Management Plan (DMP) 2012. The DMP looks at demand side management actions and supply side management actions for ensuring water supply during drought conditions. Demand side management actions in the DMP include:

- Publicity campaign to use water wisely;
- Encourage meter optants;
- Leakage reduction;
- Temporary water use ban;
- Drought Order ban to restrict non-essential use; and
- Rota cuts/use of standpipes.

The Demand Management options in the WRMP will directly support these drought plan measures, particularly using water wisely, metering and leakage reduction.

Supply side management actions are the measures employed to increase supply during a drought, over and above the activities Anglian Water ordinarily undertake. Supply side management actions described in the DMP are categorised into the following categories:

- Reservoirs;
- Direct river intakes; and
- Drought-vulnerable groundwater sources.

Links are possible with other water company's plans and strategies where water trading and transfers cross water company boundaries. Although 2 of the options (Trade with STW (RHFA4) and Canal Transfer (RHFA 6)) are cross boundary, these options were not chosen as part of the preferred plan.

10. Consultation

10.1 Scoping Consultation

The SEA Scoping Report was subject to a five week consultation period during which the three statutory consultees (Environment Agency, Natural England, and English Heritage) had the opportunity to comment on the scope, content and level of detail of the Scoping Report and SEA. Feedback was received from the statutory consultees and is provided in Appendix C along with how the feedback has been considered in the SEA process.

10.2 Environmental Report, HRA Report and WRMP Consultation

The draft Environmental Report, draft HRA Report and draft WRMP were issued for a twelve week public consultation period between June and August 2013. The documents were made available to the statutory consultees and were published on the Anglian Water website. Responses were received from several consultees. In particular, the following consultees provided comments on the SEA and HRA:

- Natural England;
- Environment Agency;
- Ofwat; and
- The Broads Authority.

The responses received have been reviewed and addressed in the final documents.

A number of meetings were held with the consultees to discuss the WRMP and particular schemes within it. In relation to the SEA and HRA meetings were held with Natural England in August 2013 and October 2013 to discuss potential issues and outcomes of the HRA.

11. Conclusions of the SEA

11.1 Conclusions and Difference the SEA Process has made to the WRMP

The SEA undertaken for the WRMP has helped to identify proposed schemes that have the potential for significant negative effects. Mitigation measures (such as pipeline re-routing to avoid designated sites) have been identified to reduce the effects. Schemes that have the potential for unacceptable significant negative effects (which could not be mitigated) were rejected at the option selection process stage and not taken forward into the WRMP preferred plan.

The SEA has also assessed the potential cumulative effects of the scheme options to ensure that schemes with significant cumulative effects are not taken forward together. In addition the SEA assessed the effects of implementing the preferred plan (including cumulative effects).

The table below summarises the results of the SEA, HRA, and WFD assessments for the Preferred Plan schemes. The assessments demonstrated that with implementation of mitigation measures the WRMP preferred plan will not have significant negative effects.

Table 11.1: Preferred Plan Schemes - Summary of Conclusions of Environmental Assessments (SEA, HRA, WFD)

Resource Zone	Scheme	SEA	HRA	WFD
West Suffolk	East Suffolk RZ transfer (WS2)	No significant negative effects predicted following mitigation	No LSE determined at Screening	No risks identified
	River Lark Flow Augmentation (WS5)	No significant negative effects predicted	No LSE determined at Screening	No risk of deterioration
	Water Efficiency	No significant negative effects predicted	Not required	Not required
	Leakage control	No significant negative effects predicted	Not required	Not required
Norwich and the Broads	Norwich intake to existing bankside storage (NB10)	No significant negative effects predicted following mitigation	No LSE determined at Screening	No risk of deterioration
	Norwich water reuse (NB11)	Potential CO ₂ effects. No other significant negative effects predicted following mitigation	AA concluded no AESI	Low risk of deterioration
	Water Efficiency	No significant negative effects predicted	Not required	Not required
	Leakage control	No significant negative effects predicted	Not required	Not required
Hunstanton	Fenland RZ transfer (H1)	No significant negative effects predicted	No LSE determined at Screening	Overall, low risk of deterioration
	Enhanced metering	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required
	Leakage control	No significant negative effects predicted	Not required	Not required
Fenland	Ruthamford North RZ	No significant negative	No LSE determined	Low risk of

Resource Zone	Scheme	SEA	HRA	WFD
	transfer (12 Ml/d) (F4)	effects predicted following mitigation	at Screening	deterioration
	Enhanced metering	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required
	Leakage control	No significant negative effects predicted	Not required	Not required
East Suffolk and Essex	South Essex RZ Transfer (ES10)	No significant negative effects predicted following mitigation	No LSE determined at Screening	Low risk of deterioration (Colne sources)
	Leakage control	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required
	Ipswich water reuse (ES3)	Potential CO ₂ effects. No other significant negative effects predicted following mitigation	No LSE determined at Screening following mitigation	No risk of deterioration
South Essex	Extension of Ardleigh agreement (SE4)	No significant negative effects predicted	No LSE determined at Screening	Low risk of deterioration
	Leakage	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required
Newmarket	West Suffolk RZ transfer (NWM2)	No significant negative effects predicted following mitigation	No LSE determined at Screening	Low risk of deterioration
	Leakage	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required
Central Essex	South Essex RZ transfer (CE1)	No significant negative effects predicted following mitigation	No LSE determined at Screening	Low risk of deterioration (Ardleigh or Colne sources)
	Leakage	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required
Ely	Newmarket RZ transfer (E2)	No significant negative effects predicted following mitigation	No LSE determined at Screening	Low risk of deterioration
	Leakage	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required
	Enhanced metering	No significant negative effects predicted	Not required	Not required
Cheveley	Newmarket RZ transfer (CVY1)	No significant negative effects predicted following mitigation	No LSE determined at Screening	Low risk of deterioration
	Leakage	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required

Resource Zone	Scheme	SEA	HRA	WFD
Ruthamford North	Saltersford reduction (RHFA15)	No significant negative effects predicted	No LSE determined at Screening	No risks identified
	Leakage	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required
	Enhanced metering	No significant negative effects predicted	Not required	Not required
Ruthamford South	Ruthamford North RZ Transfer 1 (RHFA1)	Potential CO ₂ effects. No other significant negative effects predicted following mitigation	AA concluded no AESI with mitigation	No risk of deterioration (existing mitigation measures for Rutland Water)
	Re-commission Ruthamford South RZ reservoir (RHFA11)	No significant negative effects predicted	No LSE determined at Screening	Potential risk to Foxcote Reservoir. Mitigation identified to be implemented
	Leakage	No significant negative effects predicted	Not required	Not required
	Enhanced metering	No significant negative effects predicted	Not required	Not required
	Water efficiency	No significant negative effects predicted	Not required	Not required

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