E. Integrated Environmental Assessment Summary Sheets

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:	
Water Reuse Treatment at Caister EFR (AW) and transfer from Caister to Ormesby Raw Water Tank	Water Reuse Treatment (16.4 Ml/d max) within existing site footprint at Caister Effluent Reuse Plant (Anglian Water) and transfer from Caister to Ormesby Raw Water Tank (transfer length approx. 7.2 km).	
Option Code:	03b0478B	
SEA Summary		
Residual SEA Objectives with Major Positive Effects (+++)		
SEA Objective	**Comment**	**Mitigation**
N/A	N/A	N/A
Residual SEA Objectives with Major Negative Effects (---)		
SEA Objective	**Comment**	**Mitigation**
To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (- -)	The pipeline passes adjacent to and through Decidious Woodland Priority Habitat. There is potential for permanent loss of these Priority Habitats. No direct effects on other Priority Habitats but there may be disturbance effects during the construction phase and potential effects on protected species. Trinity Broads (SSSI) Groundwater Dependent Terrestrial Ecosystem (GWDTE) is within 500m of the option. Treated effluent to be stored in Ormesby Raw Water Tank, however there is potential for changes in water levels, flows and chemistry in waterbodies connected to the reuse plant intake- and discharge points during operation of the option. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -33.95% (lower impact score if under 20%). Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.	Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid woodland habitat, in particular Ancient Woodland and BAP Priority Habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual construction effects are lessened.
To introduce climate mitigation where required and improve the climate resilience of assets and natural systems. (- -)	Effects on water levels will depend where the effluent is being diverted from and whether this would affect water levels in that waterbody. Reusing water instead of increasing abstraction may increase climate resilience through relieving or preventing additional pressure on the water system.	N/A

SEA Tally Residual		
SEA Scoring (Residual)	**Cumulative Tally (Construction)**	**Cumulative Tally (Operation)**
+++	0.00	0.00
++	0.00	0.00
+	1.00	3.00
0	28.00	33.00
-	12.00	5.00
--	1.00	1.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified three Natura 2000 sites with Likely Significant Effects: The Broads SAC (UK0013577) (approx. 0.2km), Broadland SPA (UK9009253) (approx. 0.6km), and Broadland Ramsar (UK11010) (approx. 0.6km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£289.28
Natural Capital Assessment: Comments:	The option will likely cause the permanent and temporary loss of stocks during construction. Permanent loss of stocks include that of flood plain. Best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat will be applied where possible, meaning the majority of Natural Capital stocks post construction will have no to little change.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary loss of most natural capital stocks and permanent loss of active floodplain stocks during construction. However, most habitat that is expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. The permanent loss of active floodplain stocks will lead to loss of natural hazard management services. There is no change anticipated to water flow regulation however any potential impacts will be covered in the WFD.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-40.53
BNG Outcome (% Change):	-21.71%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	There are 2 waterbodies to be scoped-in for Level 2 assessment
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Very limited risk as the source water is likely to be entirely free of INNS

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	9,640
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£49.15
Option GIS:	

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Linford WTW	Borehole Abstraction (7 Ml/d DO). New conventional water treatment works built on Linford WTW's existing site. Intake from existing, decommissioned borehole, outfall to existing treated water network. NCA and BNG scoped out due to proposed construction within existing site, therefore no expected loss of natural capital stocks or biodiversity net gain/loss.
Option Code:	ESW-ABS-002

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A		

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To reduce or manage flood risk, taking climate change into account. (--)	The option is entirely within Flood Zone 2. New above ground infrastructure may have an impact on flood risk. Potential for flooding to impact construction of the asset, or to damage asset once built. The operation of this option may impact flood risk due to changes abstraction and outfall into the existing water network potentially increasing flows.	Measures to reduce the impact on flooding during the construction phase. Flood risk during construction may still occur so short term flood risk effects may remain. Above ground infrastructure to be designed to be flood resilient. Floodplain compensation may be required. The design should consider future potential increased flood risks to ensure operation can continue.
To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans. (--)	Two waterbodies were considered during the WFD Phase 1 assessment: Thames Middle and Essex Gravels (GW). No effects are anticipated during the construction phase. The assessment determined that the option would have a low level of effect on Thames Middle during operational phase due to maintenance and use of coastal intakes/ outfalls and a medium level impact during operation to Essex Gravels (GW) due to increased abstraction rates. Level 2 WFD assessment identified possible deterioration risks to quantitative dependent surface water body status and chemical GWDTE and saline intrusion and general chemical test elements. These are largely due to the new abstraction from the existing boreholes on the WTW site, which have been out of use for some time. This assessment concludes a precautionary compliance risk, pending further investigation. No risk to achieving water body objectives was identified.	Best practice construction methods and pollution prevention measures to be implemented. With mitigation, no effects are predicted as a result of construction. Currently no assumed mitigation for operational effects. Further WFD assessment required for both waterbodies.

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	1.00

0	29.00	34.00
-	12.00	5.00
--	0.00	2.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified two Natura 2000 sites with Likely Significant Effects: Thames Estuary & Marshes SPA (UK9012021) (~2.4km), and Thames Estuary & Marshes Ramsar (UK11069) (~2.4km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	Scoped out.
Natural Capital Assessment: Comments:	Scoped out.
Ecosystem Service Assessment Comments:	Scoped out.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	Scoped out.
BNG Outcome (% Change):	Scoped out.
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	One waterbody requires further assessment: Essex Gravels.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Source water to be extracted from decommissioned borehole and transferred to new Linford WTW within same site.

Carbon Calculations	
Capital Carbon (tCO2e)	988.03
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	Scoped out.

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:	
New Linford WTW (10Ml/d Option)	Reinstatement of abandoned artesian well, and WTW capacity to 10Ml/d. Requires drilling of up to two new boreholes, a raw water transfer to a new water treatment works, connection to network and wastewater discharge connection. For WRMP design and costing purposes, it has been assumed that no network upgrade should be required.	
Option Code:	ESW-ABS-003C	
SEA Summary		
SEA Objectives with Major/Moderate Positive Effects (+++)		
SEA Objective	**Comment**	**Mitigation**
N/A	N/A	N/A
SEA Objectives with Major/Moderate Negative Effects (---)		
SEA Objective	**Comment**	**Mitigation**
To protect designated sites and their qualifying features	The option is within 500m of Linford Wood Local Nature Reserve, as well as the Thames Estuary and Marshes Marine Protection Area, Ramsar, SSSI, SPA, and Important Bird Area. Within 2km of the option there are two additional SSSI's: Hangman's Wood & Deneholes, and South Thames Estuary and Marshes SSSI. There is potential for indirect effects to habitats and wildlife within these designated sites through disturbance during the construction phase. The option also passes through and runs adjacent to areas of Priority Habitat (Deciduous woodland, Traditional Orchard, Reedbeds, Coastal saltmarsh, and Mudflats). The option is entirely located in a SSSI Impact Risk Zone, resulting in potential indirect effects to surrounding SSSI through disturbance during the construction phase. All construction effects for this option are considered temporary, however mitigation will still need to be put in place where appropriate to reduce/minimise these effects. During operation, indirect effects may arise through localised and periodic maintenance works, any works during operation will have to consider designated sites and their qualifying features	Best practice methods to be implemented to minimise disturbance effects. Ecology surveys might be required at future design stages to determine effects and mitigation required.

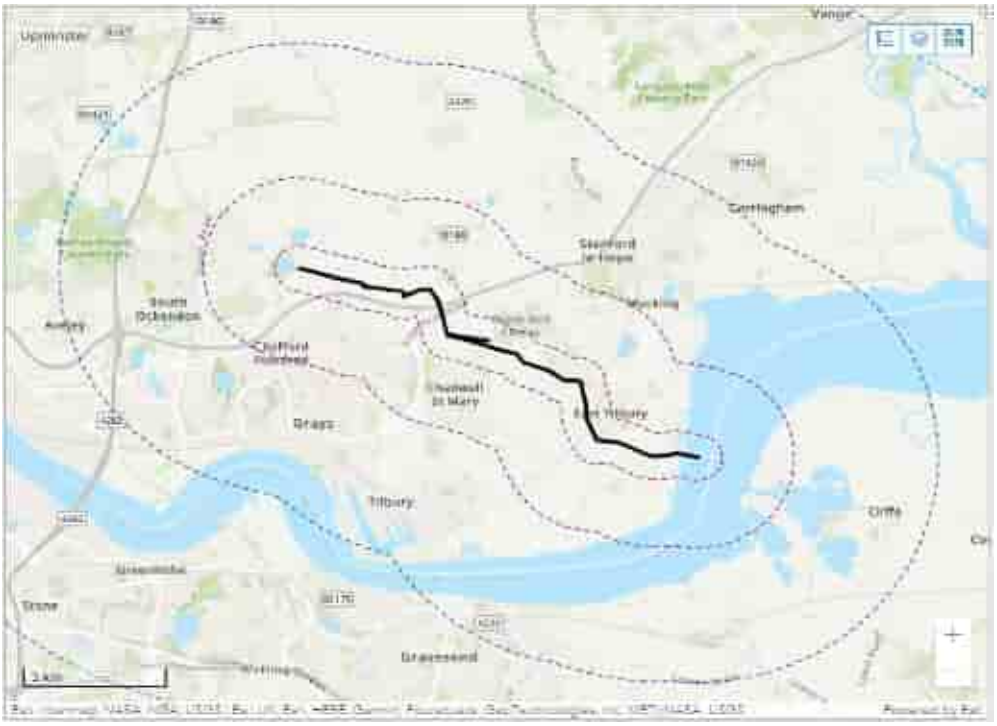
	features. The HRA ToLS identified two Natura 2000 sites that could be affected; Thames Estuary & Marshes SPA (UK9012021) (approx. 2.4km) and Thames Estuary & Marshes Ramsar (UK9012021) (approx. 2.4km). LSE identified for both sites due to non-physical disturbance and biological disturbance during construction and physical damage, non-toxic contamination and biological disturbance during operation.	
To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	Four waterbodies were considered during the WFD Phase 1 assessment: Essex Gravels, Thames Middle, Mardyke, and South Essex Lower London Tertiaries. The assessment determined the option would have a high level of effect during operation on Essex Gravels and South Essex Lower London Tertiaries due to new or increased groundwater abstraction. Low or new effects are considered on all four watercourses during the operational phase.	Best practice construction methods and pollution prevention measures to be implemented. However, some residual effects may still remain.

SEA Tally Residual		
SEA Scoring (Residual)	**Cumulative Tally (Construction)**	**Cumulative Tally (Operation)**
+++	0.00	0.00
++	0.00	0.00
+	0.00	2.00
0	27.00	36.00
-	14.00	2.00
--	1.00	2.00
---	0.00	0.00
(?)		

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified two Natura 2000 sites with Likely Significant Effects: Thames Estuary & Marshes SPA (UK9012021) (0km), and Thames Estuary & Marshes Ramsar (UK11069) (0km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£384.49
Natural Capital Assessment: Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation. Some arable land will likely be permanently lost during construction of the option.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management, loss of food production, loss of air pollutant removal and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-5.26
BNG Outcome (% Change):	-10.92%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	Two waterbodies require further assessment: GB40503G000400 Essex Gravels, and GB40602G401000 South Essex Lower London Tertiaries.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Very limited risk as the source water is likely to be entirely free of INNS. It is assumed that groundwater is free of INNS, and that accessing it will not increase the risk of INNS transfer.

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	1,858
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£37.39

Option GIS:



ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Abberton ASR using existing Layer WTW	ASR scheme located on neighbouring land to Layer de la Haye WTW. New borehole reaching Abberton chalk aquifer. Two variations: A & B. Only A has been sent for environmental screening as it has a larger footprint. Option A - new treatment works and borehole: •Raw water transfer from Abberton Reservoir, via existing main to new ASR site and associated WTW •Raw water treated on site at new WTW •Potable water injected into borehole •Raw water abstracted from borehole •Raw borehole water treated on site at new WTW •Potable water transfer from new WTW to existing service reservoir at Layer de la Haye WTW
Option Code:	ESW-ASR-004B

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A		

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To protect designated sites and their qualifying features. (--)	The option is within 1km of Abberton Reservoir Ramsar and SSSI. No direct impacts likely but there may be disturbance effects during the construction phase. The option is within 2km from Roman River SSSI and the Blackwater Estuary SSSI which may be affected by abstractions. The option is within 2km of the Lexden Park LNR. The entire option is located within an SSSI Impact Risk Zones. The HRA ToLS identified likely significant effects on seven Natura 2000 sites, Abberton Reservoir SPA, Abberton Reservoir Ramsar, Essex Estuaries SAC, Colne Estuary (Mid-Essex Coast Phase 2) SPA, Colne Estuary (Mid-Essex Coast Phase 2) Ramsar, Blackwater Estuary (Mid-Essex Coast Phase 4) SPA and Blackwater Estuary (Mid-Essex Coast Phase 4) Ramsar.	Best practice methods to be implemented to minimise disturbance effects. Ecology surveys will be required at future design stages to determine effects and mitigation required. Groundwater levels should be monitored during operation. HRA AA required to determine the likely significant effects for the Abberton Reservoir SPA and Ramsar.
To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)	The option does not intersect any priority habitats and there are no areas of ancient woodland within 500m of the option. The option is within 2km of Roman River Groundwater Dependent Terrestrial Ecosystems (GWDTE) and from Blackwater Estuary GWDTE which have the potential to be impacted due to abstractions and changes in water levels. There are no chalk rivers within 2km of the option. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -64.63%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.	Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid woodland habitat, in particular Ancient Woodland and Priority Habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. Ecology surveys will be required at future design stages to determine effects and mitigation required.

To introduce climate mitigation where required and improve the climate resilience of assets and natural systems. (--)	Water levels in aquifers may change, reducing resilience of the local environment to climate change.	Ensure sustainable use of water to reduce vulnerability of the local environment.

SEA Tally Residual		
SEA Scoring (Residual)	**Cumulative Tally (Construction)**	**Cumulative Tally (Operation)**
+++	0.00	0.00
++	0.00	0.00
+	1.00	1.00
0	27.00	30.00
-	12.00	9.00
--	2.00	2.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified two Natura 2000 sites with Likely Significant Effects: Abberton Reservoir SPA (UK9009141) (approx. 0.6km) Abberton Reservoir Ramsar Site (UK11001) (approx. 0.6km)
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£741.84
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of pastoral stocks and the permanent loss of arable stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction. Permanent loss of arable stocks are expected as a result of the option.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. There is no change anticipated to water flow regulation. The permanent loss of arable stocks will likely effect agricultural ecosystem service e.g. food production.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-2.17
BNG Outcome (% Change):	-65%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Transfer of raw water from Abberton Reservoir to new ASR site mostly via existing pipelines but creates a new pathway between previously unconnected sites. Abstraction of ground water to new WTW and service reservoir via a closed system therefore limited opportunity for now INNS introductions.

Carbon Calculations	
Capital Carbon (tCO2e)	870.38
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£41.84

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Canvey Island Desalination Terrestrial	Seawater Desalination Plant (190Ml/d DO). Abstraction from the Thames Estuary with discharge to Hanningfield Service Reservoir. Service reservoir located off site. Transfer length between plant and reservoir approximately 20.7km. Tunnelling (micro-tunnelling/horizontal directional drilling) likely to be required as route passes under three railway lines, multiple major roads (A130, A13, A127, A129, A132), one minor road (B1464), eight river crossings (including the River Crouch) and five drainage channel crossings. First part of the route passes through Canvey Wick Nature Reserve however has been routed to avoid as much of this area as possible.
Option Code:	ESW-DES-001

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
To increase water efficiency and increase resilience of water supplies and natural systems to droughts. (++)	During the operational phase, the desalination plant would have positive effects on water supply resilience due to not relying on freshwater sources. The option will also improve the resilience of water supplies as it proposes to supply a base supply even during drought conditions.	N/A

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers (--)	The pipeline passes through areas of the following priority habitats; coastal and floodplain grazing marsh; mudflats; coastal saltmarsh and deciduous woodland. Potential permanent loss of these priority habitats. The option passes within 500m of ancient woodland. No direct effects on ancient woodland but there may be disturbance effects during the construction phase and potential effects on protected species. The Hanningfield Reservoir Groundwater Dependent Terrestrial Ecosystems (GWDTE) is within 500m of the option. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -53.47%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.	Consider minor rerouting to avoid most high value habitats. Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid priority habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual operational effects are lessened.

To minimise/reduce embodied and operational carbon emissions (--)	Effects during construction of the option due to resource use and emissions, and effects during the operational phase due to energy intensive process.	Investigate use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon. Carbon footprint study could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy will be available. Although carbon emissions could be reduced through mitigation, negative effects in the short and medium term will likely remain.

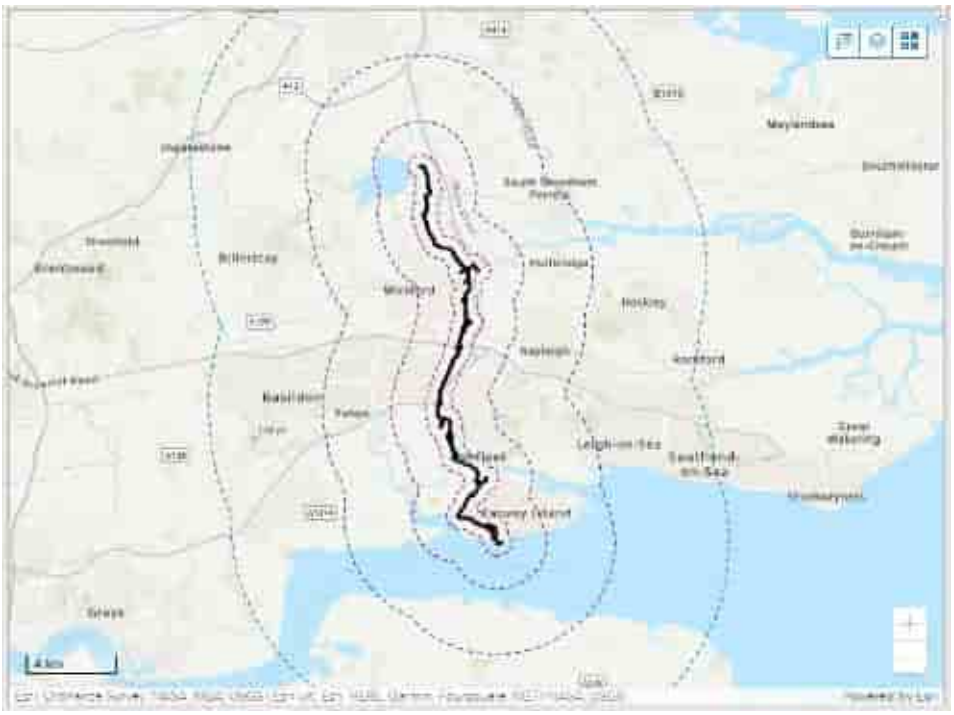
SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	1.00
+	1.00	2.00
0	26.00	31.00
-	15.00	7.00
--	1.00	1.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified 12 Natura 2000 sites with Likely Significant Effects: Benfleet and Southend Marshes Ramsar (approx. 0.5km), Thames Estuary and Marshes Ramsar (approx. 1.5km), Foulness (Mid-Essex Coast Phase 5) Ramsar (approx. 14km), Crouch & Roach Estuaries (Mid-Essex Coast Phase 3)Ramsar (approx. 1.3km), Medway Estuary & Marshes Ramsar (approx. 8km), Benfleet and Southend Marshes SPA (approx. 0.5km), Thames Estuary and Marshes SPA (approx. 1.5km), Outer Thames Estuary SPA (approx. 7.5km), Foulness (Mid-Essex Coast Phase 5) SPA (approx. 15km), Crouch & Roach Estuaries (Mid-Essex Coast Phase 3) SPA (approx. 1.3km), Medway Estuary & Marshes SPA (approx. 8km), Essex Estuaries SAC (approx. 1.3km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£42,652.13
Natural Capital Assessment: Comments:	The option will likely cause the permanent and temporary loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. Some loss of the floodplain is expected as a result of the option construction.
Ecosystem Service Assessment Comments:	The option is likely to generate the loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management, a reduction in food production services, a reduction in recreational and amenity services, and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is some change anticipated in water flow regulation.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-113.97
BNG Outcome (% Change):	-52.56%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	Two waterbodies require further assessment; Essex Gravels and Thames Lower.
INNS Summary	
INNS Risk Score	3 = Low
Comments	Transfer of water from Thames estuary to Herongate Service Reservoir. Changes in flow in the River Thames due to abstraction may make habitat more suitable for some INNS species. Treatment to potable standard would occur prior to reservoir storage so there is considered to be no traversable connection for INNS between the Thames estuary and storage reservoir.

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	4,992.90
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£636.21

Option GIS:



ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Tilbury Bracksih Desalination Terrestrial	Brackish desalination plant at Tilbury (25MLD) with a transfer to Herongate SR. The intake / outfall will be via a pier type structure
Option Code:	ESW-DES-002

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
To increase water efficiency and increase resilience of water supplies and natural systems to droughts (++)	During the operational phase, the desalination plant would have positive effects on water supply resilience due a reduction in the reliance on freshwater sources. The option will also improve the resilience of water supplies as it proposes to supply a base supply even during drought conditions.	N/A

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity. (--)	The option crosses grade 2 and 3 agricultural land with disturbance to these soils during construction. During operation, dependent on the depth of the pipeline and agricultural operations, it would be possible to continue using the land for agricultural purposes, therefore there is unlikely to be any loss of land quality from the transfer pipeline. The location of the pumping station is currently unknown. However, it is likely that this land, if agricultural, will not be reinstated as it is a permanent structure, therefore this land would be permanently lost. The option is directly within authorisied landfill sites -Tilbury Ash disposal site and within 500m of other authorisied landfill sites. Major negative rating because this option has the potential to disturb contaminated material during construction.	Footprint to be amended to avoid direct impacts to landfill sites. Consider implication of building on ash landfill – health and safety/ environmental issues. Reduce damage to agricultural land through design to reduce the option footprint and the construction working area to reduce the amount of land permanently taken or temporarily disturbed. Ground will be reinstated therefore long term residual effects on agricultural soils as a result of pipeline construction are unlikely. There will be permanent loss as a result of the desalination plant. Best practice techniques to prevent disturbance of contaminated material during construction.
To avoid spreading and, where required, manage invasive and non-native species (INNS). (--)	Modearte risk of INNS. Pipeline crosses two waterbodies which could result in introduction of INNS if pipeline is damaged and raw water enters waterbodies. The route crosses several WFD Management catchments and several small rivers and drainage trenches. As the River Thames is known to have several high impact INNS species present, there could be a risk of INNS transmission if the water is not treated at the source.	N/A

To reduce or manage flood risk, taking climate change into account. (--)	The transfer pipeline will pass through different flood zones with works in Flood Zones 2 and 3 potentially having an impact on construction; however, its operation is unlikely to be affected by flooding as it is underground. The desalination plant is to be constructed in Flood Zone 3 for tidal flooding, therefore the desalination plant will be at risk of flooding. This section of the coastline is protected by a sea flood defence. Potentially, in the future the existing defences may not provide the same level of flood protection from increased storm events and sea level rise associated with climate change, and the desalination plant may therefore be at increased flood risk, which may affect its operation and therefore the resilience of water supplies.	Measures to reduce the impact on flooding during the construction phase. Flood risk during construction may still occur so short term flood risk effects may remain. FRA to be undertaken and above ground infrastructure to be designed to be flood resilient. Floodplain compensation may be required. The design should consider the future potential increased flood risks for the desalination plant, to ensure operation can continue.

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	1.00
+	1.00	1.00
0	27.00	36.00
-	11.00	4.00
--	3.00	0.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified five Natura 2000 sites with Likely Significant Effects: Thames Estuary and Marshes Ramsar (UK11069) (approx. 2.1km),Outer Thames Estuary SPA (UK9020309) (approx. 20km), Outer Thames Estuary SPA (approx. 20km), Outer Thames Estuary SPA (UK9020309) (approx. 20km), Benfleet and Southend Marshes Ramsar (UK11006) (approx. 15.5km), and Benfleet and Southend Marshes (SPA)(UK9009171) (approx. 15.5km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£152.99
Natural Capital Assessment: Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. Permanent loss of floodplain is expected as a result of the option construction.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, most habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-14.58
BNG Outcome (% Change):	-12.27%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	Five waterbodies require further assessments: Thames Middle, Mardyke, South Essex Thurrock Chalk, South Essex Lower London Tertiaries, Essex Gravels.
INNS Summary	
INNS Risk Score	3 = Low
Comments	Transfer of water from Thames estuary to Herongate Service Reservoir. Changes in flow in the River Thames due to abstraction may make habitat more suitable for some INNS species. Treatment to potable standard would occur prior to reservoir storage so there is considered to be no traversable connection for INNS between the Thames estuary and storage reservoir.

WRE Metrics	
Capital Carbon (tCO2e)	97,973.60
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£146.21

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Sizewell Desalination using Beachwell	Seawater Desalination Plant. Service reservoir located off site. Two transfers required: Transfer 1 from beach infiltration galleries to desalination plant, length: 2.2km. Transfer 2 from desalination plant to Saxmundham, length: approx. 10.1km. Tunnelling/trenchless techniques likely to be required.
Option Code:	ESW-DES-003

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
To increase water efficiency and increase resilience of water supplies and natural systems to droughts. (++)	During the operational phase, the desalination plant would have positive effects on water supply resilience due to not relying on freshwater sources. The option will also improve the resilience of water supplies as it proposes to supply a base supply even during drought conditions.	N/A

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To protect designated sites and their qualifying features. (--)	The option intersects the Leiston - Aldeburgh SSSI, the Outer Thames Estuary Marine Protected Area (MPA) and the Haven, Aldeburgh LNR so there is the potential for direct impacts. Construction of the pipeline from the desalination plant is likely to affect the features of the SSSI and MPA. The option is within 500m of Sizewell Marshes SSSI, the Suffolk Sandlings and the Alde-Ore Estuary RSPB sites. No direct effects likely but there may be disturbance effects during the construction phase. The HRA ToLS identified 11 Natura 2000 sites that could be affected, Southern North Sea SAC, Outer Thames Estuary SPA, Sandlings SPA, Alde-Ore & Butley Estuaries SAC, Alde-Ore Estuary SPA and Ramsar, Orfordness-Shingle Street SAC, Minsmere to Walberswick Heaths & Marshes SAC, Minsmere-Walberswick SPA and Ramsar and Dew's Pond SAC. Likely significant effects concluded for all sites except Dew's Pond SAC.	Route re-alignment recommended if possible to avoid direct impacts with the SSSI and MPA or trenchless techniques to be used. Best practice methods to be implemented to minimise disturbance effects to the SSSIs. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual operational effects are lessened although this wouldn't negate the need for a potential appropriate assessment. HRA AA required to assess effects on the 10 designated sites including saline discharge.

To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)	Potential permanent loss of these priority habitats; coastal vegetated shingle, lowland dry acid grassland, deciduous woodland, traditional orchard. The option passes within 500m of ancient woodland. No direct effects on ancient woodland but there may be disturbance effects during the construction phase and potential effects on protected species. The Leiston-Aldeburgh Groundwater Dependent Terrestrial Ecosystems is intersected by the option with direct effects likely, Sizewell Marshes GWDTE is within 500m of the option, no direct affects likely. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -49.17%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.	Consider minor rerouting to avoid most high value habitats. Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid priority habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual operational effects are lessened.
To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.(--)	Five waterbodies were considered during the WFD Phase 1 assessment: Suffolk, Hundred River, Leiston Beck, Fromus and Waveney and East Suffolk Chalk & Crag (GW). The assessment determined that the option would have a high level of effect on Suffolk and Waveney and East Suffolk Chalk & Crag during operational phase due to new or increased groundwater abstraction and new discharge of highly saline water to a coastal or traditional waterbody and a low level of effect on the other three waterbodies. There is a low level effect on all waterbodies during construction.	Best practice construction methods and pollution prevention measures to be implemented. However, some residual effects may still remain.
To minimise/reduce embodied and operational carbon emissions (--)	Effects during construction of the option due to resource use and emissions, and effects during the operational phase due to energy intensive process.	Investigate use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon. Carbon footprint study could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy will be available. Although carbon emissions could be reduced through mitigation, negative effects in the short and medium term will likely remain.
To avoid spreading and, where required, manage invasive and non-native species (INNS). (--)	As source water is untreated, there is a risk of INNS transfer from source and potential for pipe bursts to cause water to be released to the environment (creating pathway for the transfer of INNS). Several designated sites found within 1km of transfer and along the section of raw water transfer. Transfer from the desalination plant to Saxmundham Tower involves treated water in a closed system therefore the risk of INNS introduction is negligible.	During construction best practice will be implemented to prevent the spread of INNS.

To conserve, protect and enhance landscape and townscape character and visual amenity. (--)	Option intersects the Suffolk Coasts and Heath AONB (0.04%) and passes through the South Norfolk and High Suffolk Claylands (0.01%) and the Suffolk Coast and Heaths (0.03%) NCAs (with % proportion of NCA affected). Negative effects during construction likely as excavation will be required for the transfer pipeline. Construction will also result in permanent loss of woodland, with impacts on landscape character. The construction and operation of the desalination plant may affect the NCA character, as during operation it would be a large-scale industrial building on the outskirts of Leiston in an area which is currently green fields.	Re-routing of the pipeline to minimise damage and disruption to woodland, or utilise directional drilling or other trenchless techniques to reduce construction effects. Best practice measures to be implemented to minimise effects during construction including although temporary effects during construction may remain. Land reinstated upon completion.

SEA Tally Residual		
SEA Scoring (Residual)	**Cumulative Tally (Construction)**	**Cumulative Tally (Operation)**
+++	0.00	0.00
++	0.00	1.00
+	1.00	2.00
0	26.00	31.00
-	12.00	3.00
--	3.00	5.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified Natura 2000 sites with Likely Significant Effects: Southern North Sea SAC (UK0030395) (approx. 0.0km), Outer Thames Estuary SPA (UK9020309) (approx. 0.0km), Sandlings SPA (UK9020286) (approx. 0.2km), Alde-Ore & Butley Estuaries SAC (UK0030076) (approx. 0.6km),Alde-Ore Estuary SPA (UK9009112) (approx. 0.6km), Alde-Ore Estuary Ramsar (UK11002) (approx. 0.6km), Orfordness-Shingle Street SAC (UK0014780) (approx. 1.8km), Minsmere to Walberswick Heaths & Marshes SAC (UK0012809) (approx. 1.8km), Minsmere-Walberswick SPA (UK9009101) (approx. 1.8km), Minsmere-Walberswick Ramsar (UK11044) (approx. 1.8km)
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£1551.50
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of most stocks and permanent loss of arable stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, most habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation. Permanent loss of arable stocks will likely affect agricultural ecosystem services.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit	-55.72
BNG Outcome (% Change):	-49.17%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	Two waterbodies require further assessment; Suffolk and Waveney and East Suffolk & Crag.
INNS Summary	
INNS Risk Score	4 = Moderate
Comments	Transfer of raw water from Sizewell Beach to desalinisation plant via pipeline approximately 2.km in length. Transfer of treated water from desalinisation plant to Saxmundham Tower. Source water could contain a mixture of groundwater and seawater and therefore could contain INNS.

Carbon Calculations	
Capital Carbon (tCO2e)	27,615.25
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£148.67

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
California (Caister) Desalination using Beachwell	Seawater desalination plant. Service reservoir located off site. Two transfers required: Transfer 1 from beach infiltration galleries to desalination plant, length: 1.8km. Transfer 2 from desalination plant to Barsham WTW, length: approx. 37km. Tunnelling/trenchless techniques likely to be required.
Option Code:	ESW-DES-004

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
To increase water efficiency and increase resilience of water supplies and natural systems to droughts. (++)	During the operational phase, the desalination plant would have positive effects on water supply resilience due to not relying on freshwater sources. The option will also improve the resilience of water supplies as it proposes to supply a base supply even during drought conditions.	N/A

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To protect designated sites and their qualifying features. (--)	The option intersects the Outer Thames Marine Protected Area (MPA) and the Greater Wash MPA, as well as the Great Yarmouth North Denes SSSI (100% favourable) and the Great Yarmouth North Denes RSPB Important Bird Area and there is potential for direct impacts. Geldeston Meadows SSSI (97% unfavourable - no change, 3% unfavourable - declining) is within 500m of the option. No direct effects likely but there may be disturbance effects during the construction phase. The entire option is within a SSSI Impact risk zone. The HRA ToLS identified nine Natura 2000 sites that could be affected, Broadland SPA, Broadland Ramsar, The Broads SAC, Southern North Sea SAC, Greater Wash SPA, Outer Thames Estuary SPA, Great Yarmouth North Denes SPA, Breydon Water Ramsar and Breydon Water SPA. Likely significant effects concluded for all nine sites due to construction and operational effects from hydrological links. Desalination options require discharge of saline solution and well abstraction works. This may lead to adverse effects to designated sites during operation.	Route re-alignment recommended if possible to avoid direct impacts with the SSSI, MPA and the RSPB Important Bird Area or trenchless techniques to be used. Best practice methods to be implemented to minimise disturbance effects to the SSSIs. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual operational effects are lessened although this wouldn't negate the need for a potential appropriate assessment. HRA AA required to assess effects on designated sites including saline discharge.

To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)	The pipeline passes through areas of the following priority habitats; Deciduous woodland, Lowland heath, Maritime cliff and slope, Coastal and floodplain grazing marshland, Coastal sand dunes, Good quality semi-improved grassland, Lowland fens, Purple moor grass and rush pastures. Potential permanent loss of these priority habitats. The option passes within 500m of ancient woodland. No direct effects on ancient woodland but there may be disturbance during construction. Geldeston Meadows Groundwater Dependent Terrestrial Ecosystems is within 500m of the option, no direct affects likely. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -39.43%. Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.	Consider minor rerouting to avoid most high value habitats. Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid priority habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual operational effects are lessened.
To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.(--)	Six waterbodies were considered during the WFD Phase 1 assessment: Norfolk East, Bure & Waveney & Yare & Lothing, Much Fleet, Yare (Wensum to tidal), Waveney (Ellingham Mill - Burgh St. Peter) and Waveney and East Suffolk Chalk & Crag. High level of effects during operation on the Bure & Waveney & Yare & Lothing waterbody due to a new discharge of highly saline water and on Waveney and East Suffolk Chalk & Crag waterbody due to new or increased surface water abstraction. Moderate effects during construction on Norfolk East waterbody due to construction of below ground structures with associated dewatering, within 500m of a sensitive groundwater feature.	Best practice construction methods and pollution prevention measures to be implemented. However, some residual effects may still remain.
To minimise/reduce embodied and operational carbon emissions (--)	Effects during construction of the option due to resource use and emissions, and effects during the operational phase due to energy intensive process.	Investigate use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon. Carbon footprint study could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy will be available. Although carbon emissions could be reduced through mitigation, negative effects in the short and medium term will likely remain.

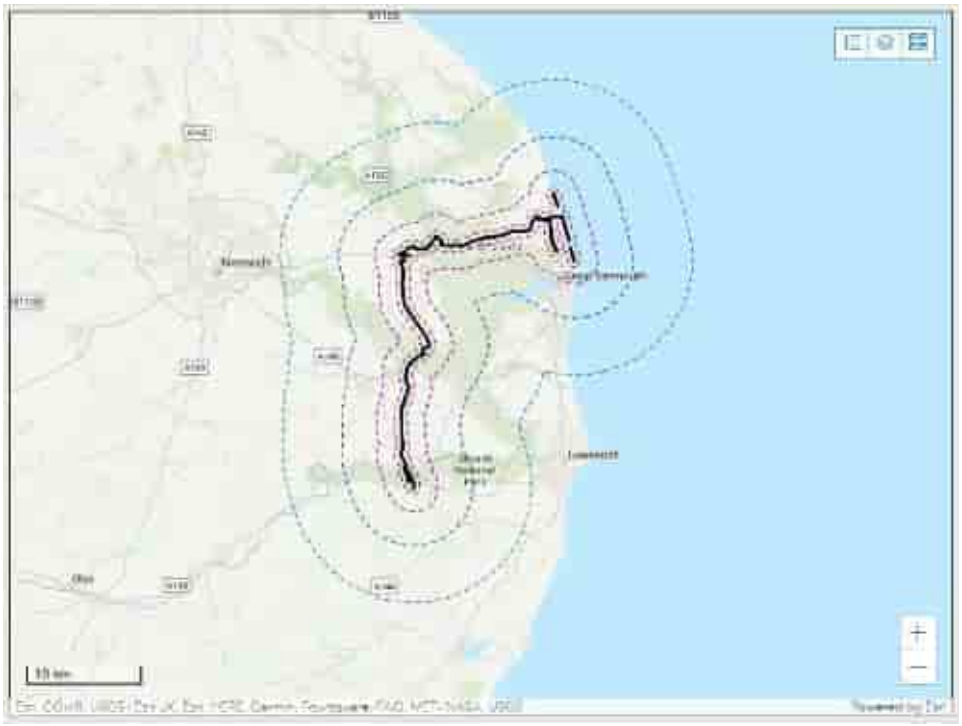
To avoid spreading and, where required, manage invasive and non-native species (INNS). (--)	As source water is untreated, there is a moderate risk of INNS transfer from source and potential for pipe bursts to cause water to be released to the environment (creating pathway for the transfer of INNS). Several designated sites found within 1km of transfer. Transfer crosses two WFD operational catchments. No connections to other waterbodies or washout points are present within the transfer. Transfer from the desalination plant to Barsham WTW involves treated water in a closed system therefore the risk of INNS introduction is negligible.	During construction best practice will be implemented to prevent the spread of INNS.

SEA Tally Residual		
SEA Scoring (Residual)	**Cumulative Tally (Construction)**	**Cumulative Tally (Operation)**
+++	0.00	0.00
++	0.00	1.00
+	1.00	2.00
0	26.00	30.00
-	14.00	5.00
--	1.00	4.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified nine Natura 2000 sites with Likely Significant Effects: Broadland SPA (UK9009253) (approx. 0.05km), Broadland Ramsar (UK11010) (approx. 0.05km), The Broads SAC (UK0013577) (approx. 0.05km), Southern North Sea SAC (UK0030395) (approx. 0.0km), Greater Wash SPA (UK9020329) (approx. 0.0km), Outer Thames Estuary SPA (UK9020309) (approx. 0.0km), Breydon Water Ramsar (UK11008) (approx. 1.8km), Breydon Water SPA (UK9009181) (approx. 1.8km), Great Yarmouth North Denes SPA (UK9009271) (approx. 0km)
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£2,541.09
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of most stocks and permanent loss of arable, pastoral, active floodplain and coastal and floodplain grazing marsh stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, most habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation. Permanent loss of arable and pastoral stocks will likely affect agricultural ecosystem services.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-110.53
BNG Outcome (% Change):	-39.43%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	Three waterbodies require further assessment: Norfolk East; Bure & Waveney & Yare & Lothing; Waveney and East Suffolk Chalk & Crag.
INNS Summary	
INNS Risk Score	4 = Moderate
Comments	Transfer of raw water from California Beach Well to desalinisation plant via pipeline approximately 1.8km in length. Transfer of treated water from desalinisation plant to Barsham WTW. As source water is untreated, there is a slightly greater risk of INNS transfer from source.

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	2,405.32
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£216.91

Option GIS:



ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Canvey Island Desalination - Barge Mounted Solution	Abstraction from the Thames Estuary, discharge to Hanningfield Service Reservoir. Transfer length between plant and reservoir approximately 20.7 km.
Option Code:	ESW-DES-006

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
To increase water efficiency and increase resilience of water supplies and natural systems to droughts. (++)	During the operational phase, the desalination plant would have positive effects on water supply resilience due to a reduction in reliance on freshwater sources. The option will also improve the resilience of water supplies as it proposes to supply a base supply even during drought conditions.	N/A

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To protect designated sites and their qualifying features. (--)	Canvey wick SSSI Holehaven Creek SSSI and Hanningfield Reservoir SSSI are within 500m of the option and may be indirectly affected. The option is entirely located within SSSI Impact Risk Zones. There is one MCZ within 500m, Blackwater, Crouch, Roach and Colne Estuaries. There are no MPAs within 500m of the option. The HRA ToLS identified 12 Natura 2000 sites that all have LSEs: Ramsars: Benfleet and Southend Marshes Ramsar and SPA, Thames Estuary and Marshes Ramsar (approx. 1km), Foulness (Mid-Essex Coast Phase 5) Ramsar and SPA, Crouch & Roach Estuaries (Mid-Essex Coast Phase 3)Ramsar and SPA, Medway Estuary & Marshes Ramsar and SPA and Essex Estuaries SAC (approx. 2km).	Consider refining pipeline alignment or use trenchless techniques to avoid Ramsar, SSSI, SAC, MCZ and SPA. Best practice methods to be implemented to minimise disturbance effects to the Ramsar, SAC, MCZ, SPA and SSSI. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual operational effects are lessened although this wouldn't negate the need for a potential appropriate assessment.

To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)	The pipeline passes through areas of the following BAP priority habitats with potential permanent loss of these BAP priority habitats. The option passes within 500m of ancient woodland. No direct effects on ancient woodland but there may be disturbance effects during the construction phase. There are four Groundwater Dependent Terrestrial Ecosystems within 2km of the option potential for indirect impacts. There are no chalk rivers within 2km. The southern section of the pipeline is directly within an Important Bird Area (RSPB). Potential for disturbance during construction and potential for permanent loss of habitat. There are also likely to be operational impacts on habitats from saline discharge. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -51.40%.	Consider minor rerouting to avoid most high value habitats. Best practice methods are to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid woodland habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual operational effects are lessened.
To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity. (--)	The option crosses grade 3 and 4 agricultural land with disturbance during construction. During operation it would be possible to continue using the land for agricultural purposes, therefore there is unlikely to be any loss of land quality. The location of the desalination plant is within grade 4 agricultural land, and will not be reinstated. The option is directly within Benfleet Creek Historic Landfill. This option has the potential to disturb contaminated material during construction.	Reduce damage to agricultural land to reduce the option footprint and the construction working area to reduce the amount of land permanently taken or temporarily disturbed. Ground will be reinstated so long term residual effects on agricultural soils are unlikely. There will be permanent loss as a result of the desalination plant. Footprint to be amended to avoid direct impacts on historic landfill sites. Best practice techniques to prevent disturbance of contaminated material during construction.
To avoid spreading and, where required, manage invasive and non-native species (INNS). (--)	High risk of INNS being abstracted at source and transferred through the pipeline but a low risk of INNS being introduced into reservoir due to water treatment prior to storage. The pipeline crosses five drainage channel crossings and Canvey Wick Nature Reserve which could result in introduction of INNS if the pipeline is damaged and raw water enters waterbodies. Additionally, the pipeline would cross several Management Catchments. As the River Thames is known to have several high impact INNS species present, there could be a risk of INNS transmission if the water is not treated at the source.	N/A

To reduce or manage flood risk, taking climate change into account. (--)	The transfer pipeline will pass through different flood zones with works in Flood Zones 2 and 3 potentially having an impact on construction; however, its operation is unlikely to be affected by flooding as it is underground. The desalination plant is to be constructed in Flood Zone 2 & 3 for tidal flooding, therefore the desalination plant will be at risk of flooding. This section of the coastline is protected by a sea flood defence. Potentially, in the future, the existing defences may not provide the same level of flood protection from increased storm events and sea level rise associated with climate change, and the desalination plant may therefore be at increased flood risk, which may affect its operation and therefore the resilience of water supplies.	Measures to reduce the impact on flooding during the construction phase. Flood risk during construction may still occur so short term flood risk effects may remain. FRA to be undertaken and above ground infrastructure to be designed to be flood resilient. Floodplain compensation may be required. The design should consider the future potential increased flood risks for the desalination plant, to ensure operation can continue.

SEA Tally Residual		
SEA Scoring (Residual)	**Cumulative Tally (Construction)**	**Cumulative Tally (Operation)**
+++	0.00	0.00
++	0.00	1.00
+	1.00	1.00
0	27.00	35.00
-	9.00	1.00
--	5.00	4.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified 12 Natura 2000 sites with Likely Significant Effects: Benfleet and Southend Marshes Ramsar (approx. 1km), Thames Estuary and Marshes Ramsar (approx. 1km), Foulness (Mid-Essex Coast Phase 5) Ramsar (approx. 14km), Crouch & Roach Estuaries (Mid-Essex Coast Phase 3)Ramsar (approx. 2km), Medway Estuary & Marshes Ramsar (approx. 18km, Benfleet and Southend Marshes SPA (approx. 1km), Thames Estuary and Marshes SPA (approx. 1km), Outer Thames Estuary SPA (approx. 7km), Foulness (Mid-Essex Coast Phase 5) SPA (approx. 14km), Crouch & Roach Estuaries (Mid-Essex Coast Phase 3) SPA (approx. 2km), Medway Estuary & Marshes SPA (approx. 18km), Essex Estuaries SAC (approx. 2km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£603.31
Natural Capital Assessment: Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. Permanent loss of the floodplain is expected as a result of the option construction. Permanent loss of arable stocks is expected as a result of the option.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-113.39
BNG Outcome (% Change):	-51.40%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	Two waterbodies require further assessment: Thames Lower and Essex Gravels.
INNS Summary	
INNS Risk Score	3 = Low
Comments	Transfer of water from Thames estuary to Hanningfield Service Reservoir. Changes in flow in the River Thames due to abstraction may make habitat more suitable for some INNS species. Treatment to potable standard would occur prior to reservoir storage so there is considered to be no traversable connection for INNS between the Thames estuary and storage reservoir.

WRE Metrics	
Capital Carbon (tCO2e)	86,146.50
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£595.79

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Tilbury Brackish Desalination - Barge Mounted Solution	Brackish Desalination Barge (tanks sized for 250 Ml/d DO). Abstraction from the Thames Estuary, discharge to Herongate Service Reservoir. Transfer length between plant and reservoir approximately 18.5 km.
Option Code:	ESW-DES-007

SEA Summary

Residual SEA Objectives with Significant Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
To increase water efficiency and increase resilience of water supplies and natural systems to droughts. (++)	During the operational phase, the desalination plant would have positive effects on water supply resilience due to a reduction in reliance on freshwater sources. The option will also improve the resilience of water supplies as it proposes to supply a base supply even during drought conditions.	N/A

Residual SEA Objectives with Significant Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To protect designated sites and their qualifying features. (--)	The option intersects the Thames Estuary and Marshes RSPB site and has the potential for direct impacts. Construction of the desalination plant is likely to affect the features of the RSPB. The option is within 500m of Langdon Ridge SSSI (19.5% favourable, 80.5% unfavourable - recovering). The HRA ToLS identified 19 Natura 2000 sites that could be affected Thames Estuary & Marshes Ramsar and SPA, Outer Thames Estuary SPA, Benfleet and Southend Marshes Ramsar and SPA, Foulness (Mid-Essex coast phase 5) Ramsar and SPA, Crouch & Roach Estuaries (Mid-Essex coast phase 3) Ramsar and SPA , Dengie (Mis-Essex coast phase 1) Ramsar and SPA, Essex Estuaries SAC, Margate and Long Sands SAC, Medway Estuary & Marshes Ramsar and SPA, The Swale Ramsar and SPA and Blackwater Estuary (Mid-Essex coast phase 4) Ramsar and SPA.	Route re-alignment recommended if possible to avoid direct impacts with the RSPB site or trenchless techniques to be used. Best practice methods to be implemented to minimise disturbance effects to the SSSIs. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual operational effects are lessened.

To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)	The pipeline passes through areas of the following BAP priority habitats including; coastal and floodplain grazing marsh; mudflats; coastal saltmarsh and deciduous woodland. Potential permanent loss of these BAP priority habitats. The option passes through woodland and within 500m of ancient woodland. Likely no direct effects on ancient woodland, but there may be disturbance effects during the construction phase and potential effects on protected species. There are also likely to be operational impacts on habitats from saline discharge. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -73.85%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.	Consider minor rerouting to avoid most high value habitats. Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid woodland habitat, in particular Ancient Woodland and BAP Priority Habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual operational effects are lessened.
To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity. (--)	The option crosses grade 2 and 3 agricultural land with disturbance during construction. During operation it would be possible to continue using the land for agricultural purposes. The location of the desalination plant is on non-agricultural land and will be permanently lost. The desalination plant is located on the Tilbury Ash disposal site authorised landfill site and the Tilbury B Power Station Fort Road historic landfill site.. Major negative rating because this option has the potential to disturb contaminated material during construction.	Reduce damage to agricultural land through design to reduce the option footprint and the construction working area to reduce the amount of land permanently taken or temporarily disturbed. Ground will be reinstated therefore long term residual effects on agricultural soils as a result of pipeline construction are unlikely. Best practice techniques to prevent disturbance of contaminated material during construction.
To avoid spreading and, where required, manage invasive and non-native species (INNS). (--)	Moderate risk of the transfer of INNS during construction and operation as the pipeline crosses several management catchments and two waterbodies, which could result in introduction of INNS if pipeline is damaged and raw water enters waterbodies. As the River Thames is known to have several high impact INNS species present, there could be a risk of INNS transmission if the water is not treated at the source.	N/A
To reduce or manage flood risk, taking climate change into account. (--)	The transfer pipeline will pass through Flood Zones 2 and 3 which may have an impact on construction; however, the operation of the pipeline is unlikely to be affected by flooding as it is underground. The desalination plant is to be constructed in Flood Zone 3 for tidal flooding, therefore the desalination plant will be at risk of flooding. Flood defences are in place along the coastline.	Measures to reduce the impact on flooding during the construction phase. Flood risk during construction may still occur so short term flood risk effects may remain. FRA to be undertaken and above ground infrastructure to be designed to be flood resilient. Floodplain compensation may be required. The design should consider the future potential increased flood risks for the desalination plant, to ensure operation can continue.
SEA Tally Residual		
SEA Scoring (Residual)	**Cumulative Tally (Construction)**	**Cumulative Tally (Operation)**

+++	0.00	0.00
++	0.00	1.00
+	1.00	2.00
0	27.00	33.00
-	10.00	1.00
--	4.00	5.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified five Natura 2000 sites with Likely Significant Effects: Thames Estuary & Marshes SPA (UK9012021) (approx. 2.1km), Thames Estuary and Marshes Ramsar (UK11069) (approx. 2.1km), Outer Thames Estuary SPA (UK9020309) (approx. 20km), Benfleet and Southend Marshes Ramsar (UK11006) (approx. 15.5km), Benfleet and Southend Marshes SPA (UK9009171) (approx. 15.5km)
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£2243.89
Natural Capital Assessment: Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. Permanent loss of the floodplain is expected as a result of the option construction. Permanent loss of arable and pasture stocks expected as a result of the option.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation. Permanent loss of the provision of food production due to the construction of above ground infrastructure.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-26.88
BNG Outcome (% Change):	-23.08%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	Five waterbodies require further assessment: Thames Middle, Mardyke, South Essex Thurrock Chalk, South Essex Lower London Tertiaries and Essex Gravels.
INNS Summary	
INNS Risk Score	3 = Low
Comments	Transfer of water from Thames estuary to Herongate Service Reservoir via a 18km pipeline. Pathway and receptor are closed systems therefore no risk of changing flows. Changes in flow in the River Thames due to abstraction may make habitat more suitable for some INNS species. treatment to potable standard would occur prior to reservoir storage so there is considered to be no traversable connection for INNS between the Thames estuary and storage reservoir. Appropriate mitigation at source or pipeline would reduce risk of INNS transmission

WRE Metrics	
Capital Carbon (tCO2e)	77,312.70
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£637.10

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Corton Desalination using Beachwell	Seawater Desalination Plant. Service reservoir located off site. Two transfers required. Transfer 1: from beach infiltration galleries to desalination plant, length: 722m. Transfer 2: from desalination plant to Barsham WTW, length: approx. 24.7km. Tunnelling (micro/horizontal directional) likely to be required.
Option Code:	ESW-DES-008

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
To increase water efficiency and increase resilience of water supplies and natural systems to droughts. (++)	During the operational phase, the desalination plant would have positive effects on water supply resilience due to not relying on freshwater sources. The option will also improve the resilience of water supplies as it proposes to supply a base supply even during drought conditions.	N/A

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To protect designated sites and their qualifying features. (--)	The option intersects the Corton Cliffs Geological SSSI, the Outer Thames Estuary Marine Protected Area (MPA), the Breydon Water RSPB Important Bird area and the Gunton Warren and Corton Woods LNR, the option has the potential for direct impacts. Construction of the pipeline from the desalination plant is likely to affect the features of the SSSI and MPA. Stanley and Alder Carrs, Aldeby SSSI and Geldeston Meadows SSSI are within 500m of the option. The option is within 500m of the Broadland RSPB Important Bird area. No direct effects likely but there may be disturbance effects during the construction phase. The majority of the option is within a SSSI Impact risk zone. The HRA ToLS concluded LSEs for five Natura 2000 sites that could be affected: Broadland SPA, Broadland Ramsar, The Broads SAC, Southern North Sea SAC, Outer Thames Estuary SPA.	Route re-alignment recommended if possible to avoid direct impacts with the SSSI, MPA and the RSPB Important Bird Area or trenchless techniques to be used. Best practice methods to be implemented to minimise disturbance effects to the SSSIs. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual operational effects are lessened although this wouldn't negate the need for a potential appropriate assessment. HRA AA will be required to assess effects on the five designated sites including saline discharge.

To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)	The pipeline passes through areas of the following priority habitats; Deciduous woodland, Lowland heath, Maritime cliff and slope, Coastal and floodplain grazing marshland, lowland fens, good quality semi-improved grassland and no main habitat but additional habitats present. Potential permanent loss of these priority habitats. The option passes within 500m of ancient woodland. No direct effects on ancient woodland but there may be disturbance effects during the construction phase and potential effects on protected species. Geldeston Meadows and Stanley & Alder Carrs, Aldeby GWDTE are within 500m of the option, no direct affects likely. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -40.2%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.	Consider minor rerouting to avoid most high value habitats. Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid priority habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual operational effects are lessened.
To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.(--)	Four waterbodies were considered during the WFD Phase 1 assessment: Norfolk East, Bure & Waveney & Yare & Lothing, Waveney (Ellingham Mill - Burgh St. Peter) and Waveney and East Suffolk Chalk & Crag (GW). High level effects during operation for Bure & Waveney & Yare & Lothing due to new discharge of highly saline water and for Waveney and East Suffolk Chalk & Crag (GW) due to new or increased surface water abstraction. Moderate construction effects on Norfolk East waterbody due to construction of below ground structures with associated dewatering, within 500m of a sensitive feature.	Best practice construction methods and pollution prevention measures to be implemented. However, some residual effects may still remain.
To minimise/reduce embodied and operational carbon emissions(--)	Effects during construction of the option due to resource use and emissions, and effects during the operational phase due to energy intensive process.	Investigate use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon. Carbon footprint study could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy will be available. Although carbon emissions could be reduced through mitigation, negative effects in the short and medium term will likely remain.
To avoid spreading and, where required, manage invasive and non-native species (INNS). (--)	As source water is untreated, there is a moderate risk of INNS transfer from source and potential for pipe bursts to cause water to be released to the environment (creating pathway for the transfer of INNS). Several designated sites found within 1km of transfer. Transfer crosses two WFD managements catchments. No connections to other waterbodies or washout points are present within the transfer. Transfer from the desalination plant to Barsham WTW involves treated water in a closed system therefore the risk of INNS introduction is negligible.	During construction best practice will be implemented to prevent the spread of INNS.

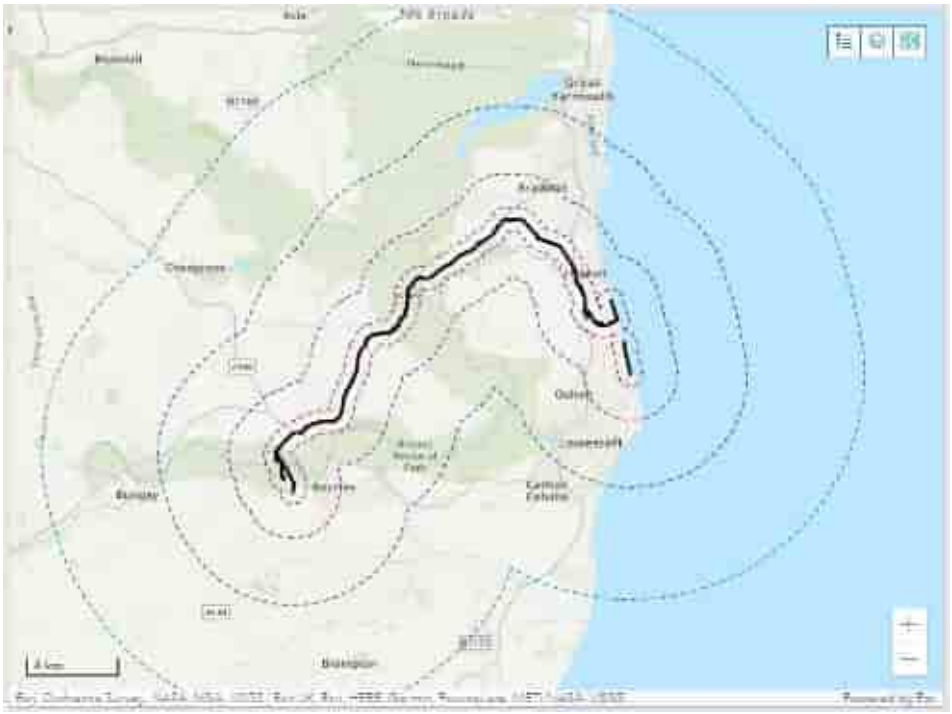
SEA Tally Residual		
SEA Scoring (Residual)	**Cumulative Tally (Construction)**	**Cumulative Tally (Operation)**
+++	0.00	0.00
++	0.00	1.00

+	1.00	2.00
0	26.00	32.00
-	12.00	3.00
--	3.00	4.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified five Natura 2000 sites with Likely Significant Effects: Broadland SPA (UK9009253) (approx. 0.05km), Broadland Ramsar (UK11010) (approx. 0.05km), The Broads SAC (UK0013577) (approx. 0.05km), Southern North Sea SAC (UK0030395) (approx. 0.0km), Outer Thames Estuary SPA (UK9020309) (approx. 0.0km)
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£2,367.11
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of most stocks and the permanent loss of arable, pastoral and coastal an floodplain grazing marsh stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, most habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation. Permanent loss of arable and pastoral stock swill likely impact agricultural ecosystem services e.g. food production.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-79.90
BNG Outcome (% Change):	-40.20%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	Three waterbodies require further assessment: Norfolk East; Bure & Waveney & Yare & Lothing; Waveney and East Suffolk Chalk and Crag.
INNS Summary	
INNS Risk Score	4 = Moderate
Comments	Transfer of raw water from Corton Beach Wells to desalinisation plant via pipeline approximately 722 m in length. Transfer of treated water from desalinisation plant to Barsham WTW. Source water could contain a mixture of groundwater and seawater and therefore could contain INNS. As source water is untreated, there is a slightly greater risk of INNS transfer from source.

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	2,433.77
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£1,276.37

Option GIS:



ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Demand Management Strategy High (Aspirational)	This option includes compulsory Metering by 2035 and 50% leakage reduction by 2050. It also includes a high impact impact "enhanced" water efficiency plan comprising 12 household water efficiency options within 5 categories (Water Use Audit and Inspection, Advice and Information on Leakage Detection and Fixing Techniques, Water Efficiency Enabling Activities, Promotion of Water Saving Devices, and Targeted Water Conservation Information (advice on appliance water usage). The DMO-High package targets a NHH water efficiency reduction of 9% by 2037/8. The water efficiency activity is predicted to contribute to an annual PCC reduction of 1.27 l/hd/d and would cost approx. £1.62M per year. The most substantial expenses are related to water use audits and inspections. For the whole Essex & Suffolk supply area, the combined High Impact Demand Management Option's package (ESW-DMO-High) is not predicted to yield any annual water savings until 2034/35, with anticipated savings of 938.05 Ml for the year 2034/35 (2.57 Ml/d average), rising to 30,623.50 Ml for the year 2074/75 (83.90 Ml/d average). A deficit of -52,811.85 Ml is predicted for the year 2024/25 (-144.69 Ml/d average) between the option's anticipated savings and baseline DYAA Dry year DI.
Option Code:	ESW_DMO_High

SEA Summary

SEA Objectives with Major/Moderate Positive Effects (+++)

SEA Objective	Comment	Mitigation
To protect designated sites and their qualifying features.	Specific locations unknown, however potential for moderate negative effects during construction on biodiversity and habitats in close proximity for activities required to resolve leakage issues. Moderate positive effects upon operation due to improved water efficiency and leakage works resulting in lower water demand therefore less extraction of water from natural environments for human consumption, potentially benefiting designated sites and their qualifying features.	Ensure best practicable means to prevent loss of habitat during leakage works. Use of access shafts (or similar) for leakage works would be used to avoid ecologically sensitive locations. Residual minor construction impact due to mains replacement may remain.
To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers.	Specific locations unknown however metering and leakage works will be specific to distribution pipes/underground pipework and households - which are areas already impacted. Potential for indirect benefits on chalk streams due to keeping water within the natural environment, hence a moderate positive effect during the operational phase.	Best practice mitigation methods i.e., creating a narrow corridor during construction in vulnerable habitats for undertaking leakage works to minimise exposure and protect tree roots. Re-instating any disturbed habitats during mains replacement to a better condition. Potential for improvement in ecology of nearby vulnerable habitats e.g. chalk rivers.

To meet WFD objectives relating to biodiversity.	Potential minor negative impact during construction in regard to mains replacement with potential to contaminate nearby vulnerable habitats. Moderate positive effects during operation as option types will lead to better water usage efficiency - leaving more water in the environment.	Best practice construction methods - creating a narrow corridor during construction in vulnerable habitats for undertaking leakage works to minimise exposure and protect tree roots. Residual minor construction impact due to mains replacement may remain.
To enhance or maintain surface water quality, flows and quantity.	Specific locations unknown. Minor negative effects during construction (leakage works) due to potential for contamination of water resources. Whilst the option is not predicted to yield any annual water savings until 2034/35, with a short-term annual deficit between anticipated savings and baseline DYAA Dry year DI predicted up to this point, moderate positive effects are expected during operation due to long-term improved water efficiency and leakage works (50% by 2050), resulting in 2.57 Ml/d average savings for the year 2034/35, rising to 83.9 Ml/d average savings in the year 2074/75. Consequently, there will be less abstraction for human consumption, and thus more water being kept within the environment. Nevertheless, there is potential for initial short-term negative effects on surface water quality, flows and quantitiy during operation until the option starts to yield annual water savings.	Best practice methods during construction to reduce contamination of surface waters i.e., creating an access channel and a clear work area boundary. Residual minor construction impact due to mains replacement may remain.
To enhance or maintain groundwater quality and resources.	Specific locations unknown. Minor negative effects during construction (leakage works) on water resources. Moderate positive effects upon operation due to improved water efficiency and leakage works resulting in less abstraction for human consumption and more water being kept within the environment. There is, however, potential for initial short-term negative effects on groundwater quality and resources during operation until the option starts to yield annual water savings.	Best practice methods during construction to reduce contamination of groundwater i.e., creating an access channel and a clear work area boundary. Residual minor construction impact due to mains replacement may remain.
To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	Water efficiency advise, metering and leakage works allocated in new areas will result in major positive effects in the operational phase due to less abstraction for human consumption and more water being kept within the environment..	N/A

To increase water efficiency and increase resilience of water supplies and natural systems to droughts.	Water efficiency advise, metering and leakage works allocated in new areas will result in major positive effects in the operational phase due to less abstraction for human consumption and more water being kept within the environment. Whilst the option is not predicted to yield any annual water savings until 2034/35, with a short-term annual deficit between anticipated savings and baseline DYAA Dry year DI predicted up to this point, moderate positive effects are expected during operation due to long-term improved water efficiency and leakage works (50% by 2050), resulting in 2.57 Ml/d average savings for the year 2034/35, rising to 83.9 Ml/d average savings in the year 2074/75. Nevertheless, there is potential for initial short-term negative effects to the reslience of water supplies and natural systems to droughts until the option starts to yield predicted annual water savings.	N/A
To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	Moderate positive effects during operation phase due to water efficiency improvements and leakage works resulting in long-term improved resilience of asset efficiency to water scarcity, and therefore less water extracted from the environment for human consumption. Nevertheless, there is potential for initial short-term negative effects to the climate reslience of assets and natural systems until the option starts to yield predicted annual water savings. The option is not predicted to yield any annual water savings until 2034/35, with a short-term annual deficit between anticipated savings and baseline DYAA Dry year DI predicted up to this point. However, moderate positive effects are expected during operation due to long-term improved water efficiency and leakage works (50% by 2050), resulting in 2.57 Ml/d average savings for the year 2034/35, rising to 83.9 Ml/d average savings in the year 2074/75.	N/A

To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	Specific location unknown, however potential for moderate negative effects during construction (leakage works) on health and wellbeing of community due to disruption. Metering may cause disruption however effects considered negilible. Moderate positive operational effects identified due to increased water efficiency awareness and long-term water availability through DMO savings. However, there is potential for initial short-term negative effects to the health and wellbeing of the local community during operation until the option starts to yield predicted annual water savings.	Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction (leakage works). However, minor and temporary effects are likely to still occur.
To secure resilient water supplies for the health and wellbeing of the community.	A major long-term positive effect in the operational stage as DMOs make the overall water management network more resilient due to less supply options needed in the future as an impact of reduced water demand. Whilst there is potential for initial short-term negative effects to the resilience of water supplies for the health and wellbeing of the community until the option starts to yield predicted annual water savings as the option is not predicted to yield any annual water savings until 2034/35, with a short-term annual deficit between anticipated savings and baseline DYAA Dry year DI predicted up to this point, moderate positive effects are expected during operation due to long-term improved water efficiency and leakage works (50% by 2050), resulting in 2.57 Ml/d average savings for the year 2034/35, rising to 83.9 Ml/d average savings in the year 2074/75.	N/A
To increase access and connect customers to the natural environment, provide education or information resources for the public.	Water efficiency advise, especially focused on gardening, campaigns for vulnerable people and app improvement will result in major positive impacts during operation. Smart metering will allow for behavioural changes in water usage by customers due to access to usage data.	N/A

SEA Objectives with Major/Moderate Negative Effects (---)		
SEA Objective	**Comment**	**Mitigation**
N/A	N/A	N/A

SEA Tally Residual		
SEA Scoring (Residual)	**Cumulative Tally (Construction)**	**Cumulative Tally (Operation)**
+++	0.00	4.00
++	0.00	7.00
+	0.00	2.00
0	30.00	29.00
-	12.00	0.00
--	0.00	0.00
---	0.00	0.00
(?)		

HRA Summary	
HRA Screening Outcome:	This assessment was scoped out for this option due to limited information on geographical and temporal scope of the works required.
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	This assessment was scoped out for this option due to limited information on geographical and temporal scope of the works required.
Natural Capital Assessment: Comments:	N/A
Ecosystem Service Assessment Comments:	N/A
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	This assessment was scoped out for this option due to limited information on geographical and temporal scope of the works required.
BNG Outcome (% Change):	N/A
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	This assessment was scoped out for this option due to limited information on geographical and temporal scope of the works required.
INNS Summary	
INNS Risk Score	This assessment was scoped out for this option due to limited information on geographical and temporal scope of the works required.
Comments	N/A

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	This assessment was scoped out for this option due to limited information on geographical and temporal scope of the works
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	N/A

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Demand Management Option Low (High Demand)	This option includes low metering, AMI Smart metering (3 AMP - 15 year roll-out from 2025) and 30% leakage reduction by 2050. It also includes a Low impact water efficiency plan comprising 6 household water efficiency options within 3 categories (Water Use Audit and Inspection, Advice and Information on Leakage Detection and Fixing Techniques, and Targeted Water Conservation Information (advice on appliance water usage). The Low impact water efficiency plan is predicted to contribute to an annual PCC reduction of 0.49 l/hd/d and would cost approx. £0.58M per year. The most substantial expenses are related to visits and retrofitting/repair. For the whole Essex & Suffolk supply area, the combined Low Impact Demand Management Option's package (ESW-DMO-Low) is predicted to yield annual water savings of 1,485.55 Ml for the year 2024/25 (4.07 Ml/d average), and 16,359.30 Ml for the year 2074/75 (44.82 Ml/d average).
Option Code:	ESW-DMO-Low

SEA Summary

SEA Objectives with Major/Moderate Positive Effects (+++)

SEA Objective	Comment	Mitigation
N/A	N/A	N/A

SEA Objectives with Major/Moderate Negative Effects (---)

SEA Objective	Comment	Mitigation
N/A	N/A	N/A

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	0.00	8.00
0	34.00	34.00
-	8.00	0.00
--	0.00	0.00
---	0.00	0.00
(?)		

HRA Summary	
HRA Screening Outcome:	This assessment was scoped out for this option due to limited information on geographical and temporal scope of the works required.
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	This assessment was scoped out for this option due to limited information on geographical and temporal scope of the works required.
Natural Capital Assessment: Comments:	N/A
Ecosystem Service Assessment Comments:	N/A
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	This assessment was scoped out for this option due to limited information on geographical and temporal scope of the works required.
BNG Outcome (% Change):	N/A
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	This assessment was scoped out for this option due to limited information on geographical and temporal scope of the works required.
INNS Summary	
INNS Risk Score	This assessment was scoped out for this option due to limited information on geographical and temporal scope of the works required.
Comments	N/A

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	This assessment was scoped out for this option due to limited information on geographical and temporal scope of the works required.
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	N/A

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Demand Management Strategy Medium (Preferred)	This option includes compulsory Metering by 2035 and 40% leakage reduction by 2050. It also includes a Medium impact "enhanced" water efficiency plan comprising 12 household water efficiency options within 5 categories (Water Use Audit and Inspection, Advice and Information on Leakage Detection and Fixing Techniques, Water Efficiency Enabling Activities, Promotion of Water Saving Devices, and Targeted Water Conservation Information (advice on appliance water usage). The DMO-Preferred package targets a NHH water efficiency reduction of 9% by 2037/8. The water efficiency ativity is predicted to contribute to an annual PCC reduction of 1.27 l/hd/d and would cost approx. £1.62M per year. The most substantial expenses are related to water use audit and inspection. For the whole Essex & Suffolk supply area, the combined Medium Demand Management Option's package (ESW-DMO-Med) is predicted to yield annual water savings of 1,485.55 Ml for the year 2024/25 (4.07 Ml/d average), and 16,359.30 Ml for the year 2074/75 (44.82 Ml/d average).
Option Code:	ESW_DMO_Med

SEA Summary

SEA Objectives with Major/Moderate Positive Effects (+++)

SEA Objective	Comment	Mitigation
To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	Moderate positive effects during operation phase due to water efficient improvements and leakage works resulting in resilience of asset efficiency to water scarcity, and therefore less water extracted from the environment for human consumption.	N/A
To secure resilient water supplies for the health and wellbeing of the community.	A moderate positive effect in the operational stage as DMOs make the overall water management network more resilient due to less supply options needed in the future as an impact of reduced water demand.	N/A
To increase access and connect customers to the natural environment, provide education or information resources for the public.	Water efficiency advise, especially focused on customer behavioural trends e.g. gardening etc will result in moderate positive impacts during operation. Smart metering will allow for behavioural changes in water usage by customers due to access to usage data.	N/A

SEA Objectives with Major/Moderate Negative Effects (---)

SEA Objective	Comment	Mitigation
N/A	N/A	N/A

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	3.00
+	0.00	10.00
0	30.00	29.00
-	12.00	0.00
--	0.00	0.00
---	0.00	0.00
(?)		

HRA Summary	
HRA Screening Outcome:	This assessment was scoped out for this option due to limited information on geographical and temporal scope of the works required.
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	This assessment was scoped out for this option due to limited information on geographical and temporal scope of the works required.
Natural Capital Assessment: Comments:	N/A
Ecosystem Service Assessment Comments:	N/A
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	This assessment was scoped out for this option due to limited information on geographical and temporal scope of the works required.
BNG Outcome (% Change):	N/A
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	This assessment was scoped out for this option due to limited information on geographical and temporal scope of the works required.
INNS Summary	
INNS Risk Score	This assessment was scoped out for this option due to limited information on geographical and temporal scope of the works required.
Comments	N/A

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	This assessment was scoped out for this option due to limited information on geographical and temporal scope of the works required.
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	N/A

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Southend-on-Sea Water Reuse	Effluent re-use plant being fed from Anglian Water's WRC with a transfer to Hanningfield reservoir (40.5 Ml/d DO). Intake from Southend-on-Sea WRC (Anglian Water owned asset), discharge to Hanningfield Service Reservoir. Two transfers required: Southend-on-Sea WRC to new effluent reuse plant (Transfer 1, approximately 991m, 20.5 Ml/d DO), new effluent reuse plant to Hanningfield reservoir (Transfer 2, approximately 23.1km with 20 Ml/d DO). Tunnelling (micro-tunnelling/horizontal directional drilling) required as route passes under one railway line, multiple major roads (A130, A132), two large river/estuary crossing (River Roach and River Crouch), three smaller river crossings, and one drainage channel crossing.
Option Code:	ESW-EFR-001

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A	N/A	N/A

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To protect designated sites and their qualifying features. (--)	The Crouch & Roach Estuaries Ramsar, SAC, SPA, and SSSI and The Outer Thames Estuary SPA are directly impacted by the option. Hanningfield Reservoir SSSI has no direct effects but there may be disturbance during the construction phase. The option overlaps the Blackwater, Crouch, Roach and Colne Estuaries MCZ and the Crouch & Roach Estuaries MPA and the Outer Thames Estuary MPA. The HRA ToLS identified potential LSE for Crouch & Roach Estuaries (Mid-Essex coast phase 3) Ramsar and SPA, Essex Estuaries SAC, Foulness (Mid-Essex coast phase 5) Ramsar and SPA, Outer Thames Estuary SPA, Benfleet and Southend Marshes Ramsar and SPA. No LSE concluded for the other four sites.	Consider refining pipeline alignment or use trenchless techniques to avoid Ramsar, SSSI, SAC and SPA. Best practice methods to be implemented to minimise adverse effects, however some impacts likely to remain. HRA AA required to assess uncertain effects on Crouch & Roach Estuaries Ramsar and SPA, Essex Estuaries SAC, Foulness Ramsar and SPA, Outer Thames Estuary SPA and Dengie Ramsar and SPA. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual effects are lessened . However, some residual effects are likely to remain.

To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)	The pipeline passes adjacent to and through BAP Priority Habitat. Potential permanent loss of BAP Priority Habitats. No direct effects on other Priority Habitats but there may be disturbance effects during the construction. Construction may cause habitat fragmentation. There are no chalk rivers within 2km of the option. The pipeline crosses the Crouch and Roach Estuaries Groundwater Dependent Terrestrial Ecosystems and is within 500m of the Hanningfield Reservoir GWDTE. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -29.39%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost and therefore is considered a constraint.	Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid woodland habitat, in particular Ancient Woodland and BAP Priority Habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual construction effects are lessened.
To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity. (--)	The option crosses grades 1, 2, 3 and 4 agricultural land with disturbance to these soils during construction. During operation, dependent on the depth of the pipeline and agricultural operations, it would be possible to continue using the land for agricultural purposes, therefore there is unlikely to be any loss of land quality from the transfer pipeline. The location of the pumping station is currently unknown. The current location of the new effluent reuse plant is located within Grade 1 agricultural land. It is likely that the land for the pumping station and effluent reuse plant, if agricultural, will not be reinstated as it is a permanent structure, therefore this land would be permanently lost. The option crosses a historic landfill site and is within 500m of other historic landfill sites with potential to disturb contaminated material during construction. No further effects are anticipated during the operational phase.	Reduce damage to agricultural land through design to reduce the option footprint and the construction working area to reduce the amount of land permanently taken or temporarily disturbed. Ground will be reinstated therefore long term residual effects on agricultural soils as a result of pipeline construction are unlikely. There will be permanent loss as a result of the pumping station and new effluent reuse plant. Permanent loss should be on non-BMV land where possible and only on BMV land where there are no other alternatives. Reinstatement or reprovision required post-construction. Pipeline realignment or trenchless techniques to avoid historic landfill. Best practice techniques to prevent disturbance of contaminated material during construction.
To introduce climate mitigation where required and improve the climate resilience of assets and natural systems. (--)	Effects on water levels will depend where the effluent is being diverted from and whether this would affect water levels in that waterbody. Effluent will be discharged into the Hanningfield Reservoir providing additional flows.	N/A

SEA Tally Residual

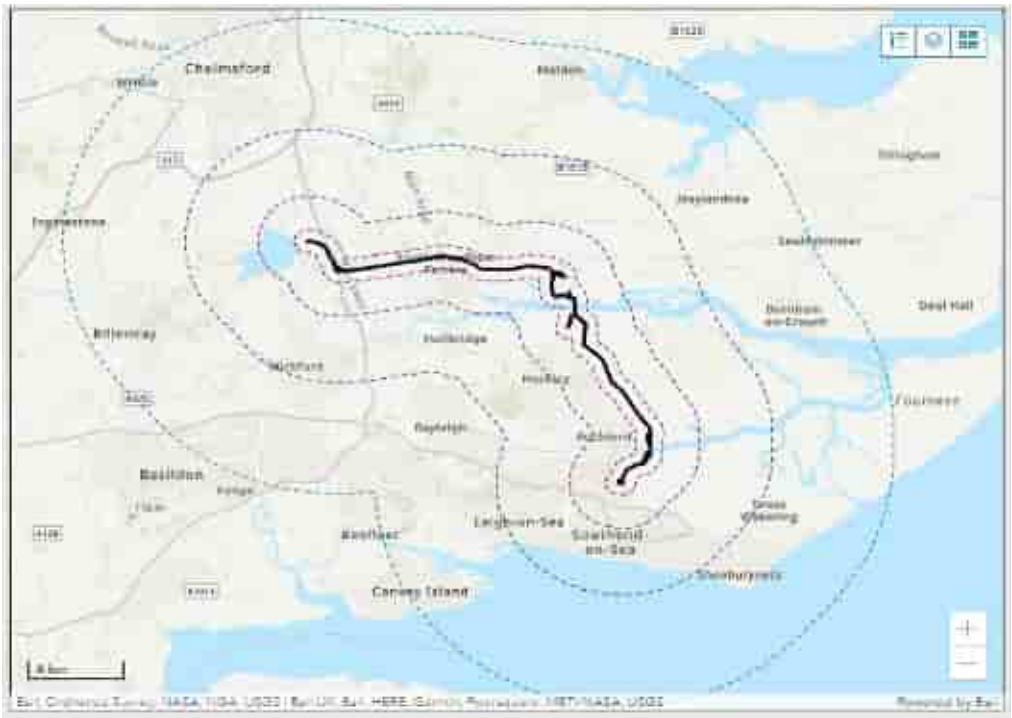
SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	1.00
0	27.00	37.00
-	11.00	3.00
--	3.00	1.00

---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified eight Natural 2000 sites with Likely Significant Effects: Crouch & Roach Estuaries (Mid-Essex Coast Phase 3)Ramsar (UK UK11058) (approx. 0km), Crouch & Roach Estuaries (Mid-Essex Coast Phase 3) SPA (UK9009244) (approx. 0km), Essex Estuaries SAC (UK0013690) (approx. 0km), Foulness (Mid-Essex Coast Phase 5) Ramsar (UK11026) (approx. 7km), Foulness (Mid-Essex Coast Phase 5) SPA (UK9009246) (approx. 7km), Outer Thames Estuary SPA (UK9020309) (approx. 0km), Benfleet and Southend Marshes Ramsar (UK11006) (approx. 3km), Benfleet and Southend Marshes (SPA)(UK9009171) (approx. 3km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£11,271.62
Natural Capital Assessment: Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation. Permanent loss of arable stocks expected as a result of the option.
Ecosystem Service Assessment Comments:	The option is likely to generate the loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation. Permanent loss of arable stocks due to option construction hence loss of associated ecosystem services expected.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-48.75
BNG Outcome (% Change):	-29.39%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	Three waterbodies require further assessment; Lower Thames, Grouch, and Essex Gravels.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Water recycling centres and service reservoirs are both closed systems. Water is transferred via pipeline. Negligible risk of INNS being introduced at source, pathway or receptor.

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	2,886.20
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£272.26

Option GIS:



ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Lowestoft Water Reuse to Lound Lakes	Effluent Reuse Plant (11.1 Ml/d DO). Intake from Lowestoft/Corton WRC, discharge to Lound Lakes. Two transfers required: Lowestoft/Corton WRC to new effluent reuse plant (Transfer 1, length approximately 200 m), new effluent reuse plant to Lound Lakes (Transfer 2, length approximately 4.8 km).

Option Code:	ESW-EFR-002

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A		

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)	The pipeline passes adjacent to and through Priority Habitat. There is potential for permanent loss of these Priority Habitats. No direct effects on other Priority Habitats but there may be disturbance effects during the construction. There are no chalk rivers within 2km or Groundwater Dependent Terrestrial Ecosystems within 5km of the option. Discharge of treated effluent into Lound Lakes Nature Reserve may cause adverse operational effects on these habitats and their hydrological links. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -33.95%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.	Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid woodland habitat, in particular Ancient Woodland and BAP Priority Habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual construction effects are lessened.
To introduce climate mitigation where required and improve the climate resilience of assets and natural systems. (--)	Effects on water levels will depend where the effluent is being diverted from and whether this would affect water levels in that waterbody. Effluent will be discharged into Lound Lakes providing additional flows. Reusing water instead of increasing abstraction may increase climate resilience through relieving or preventing additional pressure on the water system.	N/A

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	3.00
0	28.00	32.00
-	12.00	6.00
--	1.00	1.00

---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified seven Natura 2000 sites with Likely Significant Effects: Southern North Sea SAC (UK0030395) (approx. 0.55km), Outer Thames Estuary SPA (UK9020309) (approx. 0.55km), Breydon Water Ramsar (UK11008) (approx. 4.5km), Breydon Water SPA (UK9009181) (approx. 4.5km), The Broads SAC (UK0013577) (approx. 4.5km), Broadland SPA (UK9009253) (approx. 6km), Broadland Ramsar (UK11010) (approx. 6km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£1327.59
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of stocks and permanent loss of arable stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, most habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. There is no change anticipated to water flow regulation. Permanent loss of arable stocks due to option construction hence loss of associated ecosystem services e.g. food production and carbon storage expected.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-15.97
BNG Outcome (% Change):	-33.95%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment.
INNS Summary	
INNS Risk Score	3 = Low
Comments	Transfer from existing Lowestoft/Corton WRC to Lound Lakes via new pipeline. As water is treated at the source and source and pathway are a closed system, there is negligible risk of INNS being introduced at source, pathway or receptor.

WRE Metrics	
Capital Carbon (tCO2e)	26,345.55
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£222.07

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:	
Lowestoft Water Reuse to Ellingham Mill	Effluent re-use plant (15Ml/d DO). Intake from Lowestoft/Corton WRC (Anglian Water owned asset), discharge to point near Ellingham Mill. Three transfers required: Lowestoft/Corton WRC to new effluent reuse plant (Transfer 1, length approximately 200m), new effluent reuse plant to Ellingham Mill on the River Waveney (Transfer 2, length approximately 26.3km), and a transfer of treated water from Barsham to Holton (Transfer 3, length approximately 12.5km).	
Option Code:	ESW-EFR-002A	
SEA Summary		
Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)		
SEA Objective	**Comment**	**Mitigation**
N/A	N/A	N/A
Residual SEA Objectives with Major/Moderate Negative Effects (---/--)		
SEA Objective	**Comment**	**Mitigation**
To protect designated sites and their qualifying features. (--)	The option overlaps one site: Titsal Wood, Shadingfield (0.08%) SSSI (100.00% unfavourable - declining), with potential for direct impacts. In addition, the following sites are wihin 2km with potential indirect impacts during the construction phase: Broadland Ramsar; The Broads SAC; Southern Noth Sea SAC; Broadland SPA; Outer Thames Estuary SPA; Stanley and Alder Carrs, Alderby SSSI (100.00% unfavourable recovering); Geldeston Meadows SSSI (97.18% unfavourable - no change; 2.82% unfavourable declining). Both those SSSI are GWDTE and within 500m of the option. The HRA ToLS identified eight Natura 2000 sites that could be affected: Broadland SPA (UK9009253) (approx. 0.4km); Broadland Ramsar (~ 0.4km); The Broads SAC (~ 0.4km); Southern North Sea SAC (~ 0.55km); Outer Thames Estuary SPA (~0.55km); Breydon Water Ramsar (~3.5km); Breydon Water SPA (~3.5km); Great Yarmouth North Denes SPA (~7.5km). Potential likely significant effects concluded for Broadland SPA and Ramsar; The Broads SAC; and Outer Thames Estuary SPA . No LSE for Great Yarmouth North Denes SPA. Following HRA AA, it is considered that with aderence to the proposed mitigation, the proposed works associated with this option are not expected to have adverse effects on the overall integrity of the following sites and their qualifying features: Southern North Sea SAC, and Breydon Water Ramsar and SPA. For the remaining sites, averse effects cannot be ruled out.	Best practice methods to be implemented to minimise disturbance effects. For the following Designated Sites it is anticipated that with adherence to proposed mitigation, adverse impacts on the Designated Sites will be alleviated during the construction and operation phases of this option: Southern North Sea SAC, and Breydon Water Ramsar and SPA. For the remaining sites, low and localised effects may still be possible during both the construction and operation phases. These effects cannot be ruled out due to uncertainty, thus further studies to better understand how the qualifying species use the linked habitats are required and to determine more targeted mitigation measures. This option will need to be included in the in-combination assessment. These Designated Sites are: Broadland SPA, Broadland Ramsar, The Broads SAC, and Outer Thames Estuary SPA. However, it is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual construction effects are lessened.
To introduce climate mitigation where required and improve the climate resilience of assets and natural systems. (--)	Effects on water levels will depend where the effluent is being diverted from and whether this would affect water levels in that waterbody. Effluent will be discharged into River Waveney providing additional flows. Reusing water instead of increasing abstraction may increase climate resilience through relieving or preventing additional pressure on the water system.	N/A

To conserve/Protect and enhance the historic environment including the significance of designated and non-designated cultural heritage (including archaeology and built heritage), including any contribution made to that significance by setting.(--)	The option is within three conservation areas and overlaps three Grade II listed structures. Potential for direct impact, therefore major negative construction impact rating (without mitigation / route realignment). It is also within proximity of a number of other listed buildings. Construction may affect the setting of these heritage assets, however this is likely to be temporary as the pipeline will be buried. There is potential for the excavation of the pipeline to impact buried archaeology if present. The new effluent reuse plant will be located where the pipeline crosses road A47, ~200m NW of Lowestoft/Corton WRC.	Pipeline realignment may be required to avoid direct overlap with listed buildings. Construction impact lessened assuming final design will avoid direct impact on heritage assets. Best practice measures to be implemented to minimise setting effects for other historic heritage during construction. Further work likely to be required to determine significance of effect, depending on the presence or absence of buried archaeology. Residual effects may remain due to potential loss of archaeological remains.

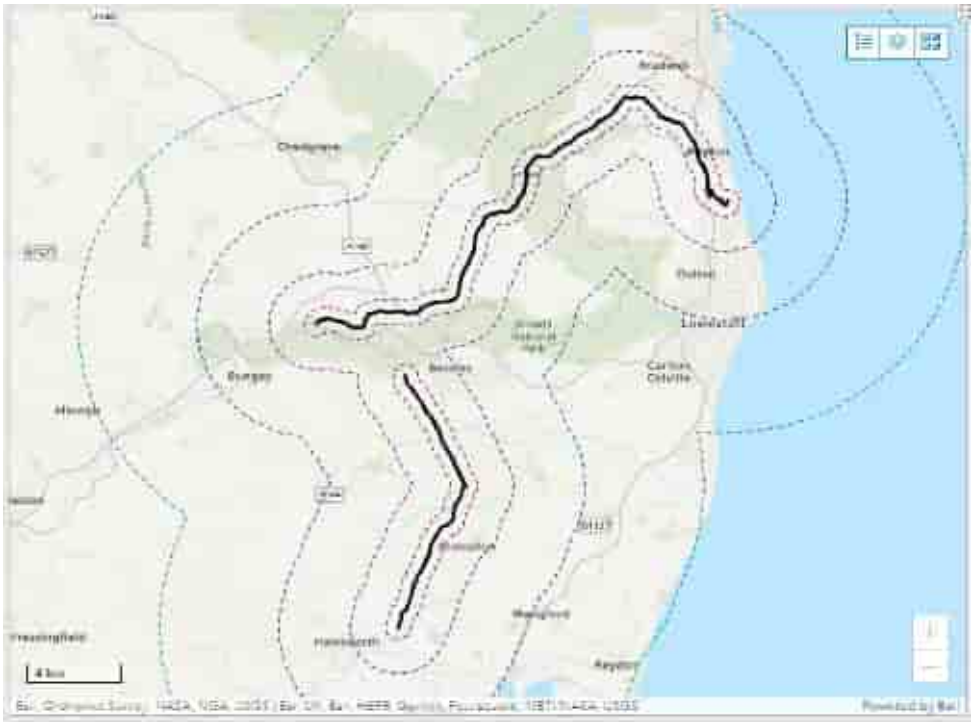
SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	2.00
0	28.00	35.00
-	11.00	4.00
--	2.00	1.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified seven Natural 2000 sites with Likely Significant Effects: Broadland SPA (UK9009253) (approx. 0.4km), Broadland Ramsar (UK11010) (approx. 0.4km), The Broads SAC (UK0013577) (approx. 0.4km), Southern North Sea SAC (UK0030395) (approx. 0.55km), Outer Thames Estuary SPA (UK9020309) (approx. 0.55km), Breydon Water Ramsar (UK11008) (approx. 3.5km), Breydon Water SPA (UK9009181) (approx. 3.5km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£3,016.16
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of most natural capital stocks and the permanent loss of arable and ancient woodland stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary loss of most natural capital stocks and permanent loss of arable and ancient woodland stocks during construction. However, most habitat that is expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. The permanent loss of arable stocks will lead to loss of food production services. Permanent loss of ancient woodland stock will result in the reduction in water purification, loss of carbon sequestration and loss of natural hazard management services. There is no change anticipated to water flow regulation however any potential impacts will be covered in the WFD.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-30.45
BNG Outcome (% Change):	-19.43%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Transfer from existing Lowestoft/Corton WRC to Ellingham Mill via new pipeline. As water is treated at the source and source and pathway are a closed system, there is negligible risk of INNS being introduced at source pathway or receptor. Transfer of treated water Barsham to Holton through 12km pipe- no INNS risk due to treater water transferred through closed system

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	2,716.67
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£1,439.59

Option GIS:



ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:	
Lowestoft Water Reuse to Ellingham Mill	Effluent re-use plant (15Ml/d DO). Intake from Lowestoft/Corton WRC (Anglian Water owned asset), discharge to point near Ellingham Mill. Three transfers required: Lowestoft/Corton WRC to new effluent reuse plant (Transfer 1, length approximately 200m), new effluent reuse plant to Ellingham Mill on the River Waveney (Transfer 2, length approximately 26.3km), and a transfer of treated water from Barsham to Holton (Transfer 3, length approximately 12.5km).	
Option Code:	ESW-EFR-002B	
SEA Summary		
Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)		
SEA Objective	**Comment**	**Mitigation**
N/A	N/A	N/A
Residual SEA Objectives with Major/Moderate Negative Effects (---/--)		
SEA Objective	**Comment**	**Mitigation**
To protect designated sites and their qualifying features. (--)	The option overlaps one site: Titsal Wood, Shadingfield (0.08%) SSSI (100.00% unfavourable - declining), with potential for direct impacts. In addition, the following sites are wihin 2km with potential indirect impacts during the construction phase: Broadland Ramsar; The Broads SAC; Southern Noth Sea SAC; Broadland SPA; Outer Thames Estuary SPA; Stanley and Alder Carrs, Alderby SSSI (100.00% unfavourable recovering); Geldeston Meadows SSSI (97.18% unfavourable - no change; 2.82% unfavourable declining). Both those SSSI are GWDTE and within 500m of the option. The HRA ToLS identified eight Natura 2000 sites that could be affected: Broadland SPA (UK9009253) (approx. 0.4km); Broadland Ramsar (~ 0.4km); The Broads SAC (~ 0.4km); Southern North Sea SAC (~ 0.55km); Outer Thames Estuary SPA (~0.55km); Breydon Water Ramsar (~3.5km); Breydon Water SPA (~3.5km); Great Yarmouth North Denes SPA (~7.5km). Potential likely significant effects concluded for Broadland SPA and Ramsar; The Broads SAC; and Outer Thames Estuary SPA . No LSE for Great Yarmouth North Denes SPA. Following HRA AA, it is considered that with aderence to the proposed mitigation, the proposed works associated with this option are not expected to have adverse effects on the overall integrity of the following sites and their qualifying features: Southern North Sea SAC, and Breydon Water Ramsar and SPA. For the remaining sites, averse effects cannot be ruled out.	Best practice methods to be implemented to minimise disturbance effects. For the following Designated Sites it is anticipated that with adherence to proposed mitigation, adverse impacts on the Designated Sites will be alleviated during the construction and operation phases of this option: Southern North Sea SAC, and Breydon Water Ramsar and SPA. For the remaining sites, low and localised effects may still be possible during both the construction and operation phases. These effects cannot be ruled out due to uncertainty, thus further studies to better understand how the qualifying species use the linked habitats are required and to determine more targeted mitigation measures. This option will need to be included in the in-combination assessment. These Designated Sites are: Broadland SPA, Broadland Ramsar, The Broads SAC, and Outer Thames Estuary SPA. However, it is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual construction effects are lessened.
To introduce climate mitigation where required and improve the climate resilience of assets and natural systems. (--)	Effects on water levels will depend where the effluent is being diverted from and whether this would affect water levels in that waterbody. Effluent will be discharged into River Waveney providing additional flows. Reusing water instead of increasing abstraction may increase climate resilience through relieving or preventing additional pressure on the water system.	N/A

To conserve/Protect and enhance the historic environment including the significance of designated and non-designated cultural heritage (including archaeology and built heritage), including any contribution made to that significance by setting.(--)	The option is within three conservation areas and overlaps three Grade II listed structures. Potential for direct impact, therefore major negative construction impact rating (without mitigation / route realignment). It is also within proximity of a number of other listed buildings. Construction may affect the setting of these heritage assets, however this is likely to be temporary as the pipeline will be buried. There is potential for the excavation of the pipeline to impact buried archaeology if present. The new effluent reuse plant will be located where the pipeline crosses road A47, ~200m NW of Lowestoft/Corton WRC.	Pipeline realignment may be required to avoid direct overlap with listed buildings. Construction impact lessened assuming final design will avoid direct impact on heritage assets. Best practice measures to be implemented to minimise setting effects for other historic heritage during construction. Further work likely to be required to determine significance of effect, depending on the presence or absence of buried archaeology. Residual effects may remain due to potential loss of archaeological remains.

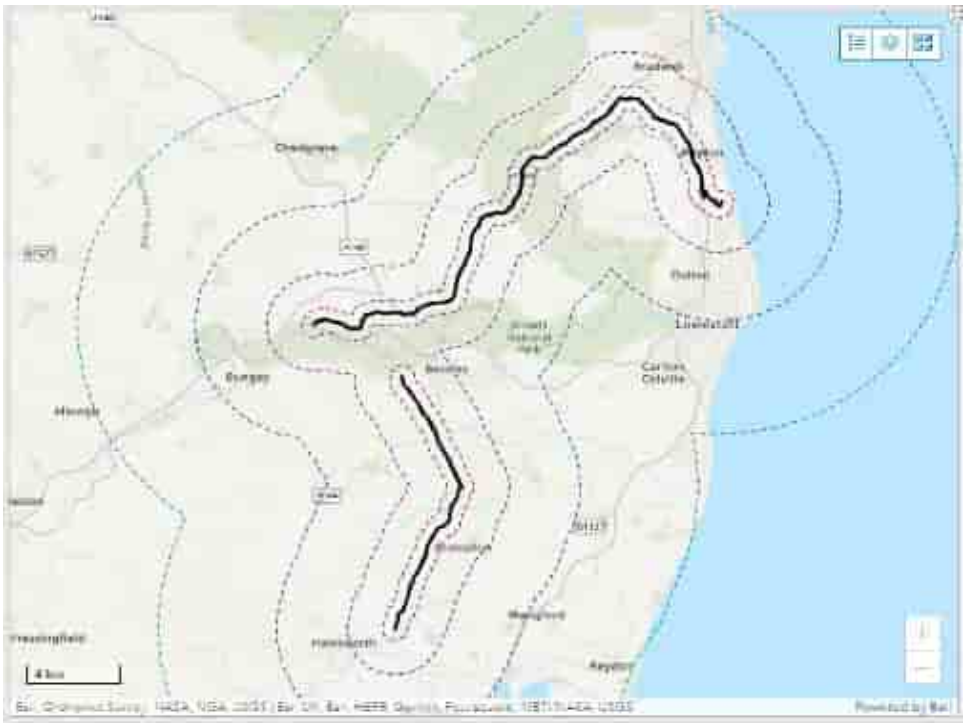
SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	2.00
0	28.00	35.00
-	11.00	4.00
--	2.00	1.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified seven Natural 2000 sites with Likely Significant Effects: Broadland SPA (UK9009253) (approx. 0.4km), Broadland Ramsar (UK11010) (approx. 0.4km), The Broads SAC (UK0013577) (approx. 0.4km), Southern North Sea SAC (UK0030395) (approx. 0.55km), Outer Thames Estuary SPA (UK9020309) (approx. 0.55km), Breydon Water Ramsar (UK11008) (approx. 3.5km), Breydon Water SPA (UK9009181) (approx. 3.5km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£3,016.16
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of most natural capital stocks and the permanent loss of arable and ancient woodland stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary loss of most natural capital stocks and permanent loss of arable and ancient woodland stocks during construction. However, most habitat that is expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. The permanent loss of arable stocks will lead to loss of food production services. Permanent loss of ancient woodland stock will result in the reduction in water purification, loss of carbon sequestration and loss of natural hazard management services. There is no change anticipated to water flow regulation however any potential impacts will be covered in the WFD.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-30.45
BNG Outcome (% Change):	-19.43%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Transfer from existing Lowestoft/Corton WRC to Ellingham Mill via new pipeline. As water is treated at the source and source and pathway are a closed system, there is negligible risk of INNS being introduced at source pathway or receptor. Transfer of treated water Barsham to Holton through 12km pipe- no INNS risk due to treater water transferred through closed system.

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	2,716.67
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£1,439.59

Option GIS:



ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Colchester Water Reuse	Effluent re-use plan being fed from Anglian Water WRC with transfer to Abberton (this is likely to be much better value than the current effluent re-use option to Ardleigh).
Option Code:	ESW-EFR-003

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
To increase water efficiency and increase resilience of water supplies and natural systems to droughts. (++)	During the operational phase, the desalination plant would have positive effects on water supply resilience due to not relying on freshwater sources. The option will also improve the resilience of water supplies as it proposes to supply a base supply even during drought conditions.	N/A

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To protect designated sites and their qualifying features. (--)	The option intersects the Leiston - Aldeburgh SSSI, the Outer Thames Estuary Marine Protected Area (MPA) and the Haven, Aldeburgh LNR so there is the potential for direct impacts. Construction of the pipeline from the desalination plant is likely to affect the features of the SSSI and MPA. The option is within 500m of the Suffolk Sandlings and the Alde-Ore Estuary RSPB sites. No direct effects likely but there may be disturbance during construction. LSE concluded for 10 Natura 2000 sites, Southern North Sea SAC, Outer Thames Estuary SPA, Sandlings SPA, Alde-Ore & Butley Estuaries SAC, Alde-Ore Estuary SPA, Aldre-Ore Estuary Ramsar, Orfordness-Shingle Street SAC, Minsmere to Walberswick Heaths & Marshes SAC, Minsmere-Walberswick SPA, Minsmere-Walberswick Ramsar due to construction and operational effects.	Route re-alignment recommended if possible to avoid direct impacts with the SSSI and MPA or trenchless techniques to be used. Best practice methods to be implemented to minimise disturbance effects to the SSSIs. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual operational effects are lessened although this wouldn't negate the need for a potential appropriate assessment. HRA AA required to assess effects on the 10 designated sites including saline discharge.

To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)	The pipeline passes through areas of the following priority habitats; coastal vegetated shingle, lowland dry acid grassland, deciduous woodland, traditional orchard. Potential permanent loss of these priority habitats. The option passes within 500m of ancient woodland. No direct effects on ancient woodland but there may be disturbance effects during the construction phase and potential effects on protected species. The Leiston-Aldeburgh Groundwater Dependent Terrestrial Ecosystems is intersected by the option with direct effects likely, Sizewell Marshes GWDTE is within 500m of the option. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -49.17%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.	Consider minor rerouting to avoid most high value habitats. Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid priority habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual operational effects are lessened.
To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.(--)	Five waterbodies were considered during the WFD Phase 1 assessment: Suffolk, Hundred River, Leiston Beck, Fromus and Waveney and East Suffolk Chalk & Crag (GW). The assessment determined that the option would have a high level of effect on Suffolk and Waveney and East Suffolk Chalk & Crag during operational phase due to new or increased groundwater abstraction and new discharge of highly saline water to a coastal or traditional waterbody and a low level of effect on the other three waterbodies. There is a low level effect on all waterbodies during construction.	Best practice construction methods and pollution prevention measures to be implemented. However, some residual effects may still remain.
To minimise/reduce embodied and operational carbon emissions (--)	Effects during construction of the option due to resource use and emissions, and effects during the operational phase due to energy intensive process.	Investigate use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon. Carbon footprint study could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy will be available. Although carbon emissions could be reduced through mitigation, negative effects in the short and medium term will likely remain.

To avoid spreading and, where required, manage invasive and non-native species (INNS). (--)	As source water is untreated, there is a risk of INNS transfer from source and potential for pipe bursts to cause water to be released to the environment (creating pathway for the transfer of INNS). Several designated sites found within 1km of transfer and along the section of raw water transfer. Transfer from the desalination plant to Saxmundham Tower involves treated water in a closed system therefore the risk of INNS introduction is negligible.	During construction best practice will be implemented to prevent the spread of INNS.
To conserve, protect and enhance landscape and townscape character and visual amenity. (--)	Option intersects the Suffolk Coasts and Heath AONB (0.04%) and passes through the South Norfolk and High Suffolk Claylands (0.01%) and the Suffolk Coast and Heaths (0.03%) NCAs (with % proportion of NCA affected). Negative effects during construction likely as excavation will be required for the transfer pipeline. Construction will also result in permanent loss of woodland, with impacts on landscape character. The construction and operation of the desalination plant may affect the NCA character, as during operation it would be a large-scale industrial building on the outskirts of Leiston in an area which is currently green fields.	Re-routing of the pipeline to minimise damage and disruption to woodland, or utilise directional drilling or other trenchless techniques to reduce construction effects. Best practice measures to be implemented to minimise effects during construction including although temporary effects during construction may remain. Land reinstated upon completion.

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	1.00
+	1.00	2.00
0	26.00	31.00
-	12.00	3.00
--	3.00	5.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified eight Natura 2000 sites with Likely Significant Effects: Abberton Reservoir Ramsar (UK11001) (approx. 0km), Abberton Reservoir SPA (UK9009141) (0km), Colne Estuary (Mid-Essex Coast Phase 2) Ramsar (UK11015) (2.5km), Colne Estuary (Mid-Essex Coast Phase 2)SPA (UK9009243) (2.5km), Essex Estuaries SAC (UK0013690) (approx. 2.5km), Blackwater Estuary (Mid-Essex Coast Phase 4)Ramsar (UK11007) (approx. 2.8km), Blackwater Estuary (Mid-Essex Coast Phase 4) SPA (UK9009245) (approx. 2.8km), Outer Thames Estuary SPA (UK9020309) (approx. 16km)
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£7548.26
Natural Capital Assessment: Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. Permanent loss of the floodplain is expected as a result of the option construction. Permanent loss of arable and pasture stocks expected as a result of the option.
Ecosystem Service Assessment Comments:	The option is likely to generate the loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation. Permanent loss of pastoral stocks due to option construction hence loss of associated ecosystem services expected.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-59.88
BNG Outcome (% Change):	-88.03%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	Two waterbodies require further assessment; Colne and Essex Gravels.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Water recycling centre is a closed system. Treated water is transferred via pipeline. Negligible risk of INNS being introduced at source and pathway. Receptor is isolated reservoir so there is no risk of changes to flow

WRE Metrics	
Capital Carbon (tCO2e)	11,523.86
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£1,340.33

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Tilbury Water Reuse	Effluent Reuse Plant (28.9 Ml/d DO (maximum)). Intake from Tilbury WRC (Anglian Water owned asset), discharge to Hanningfield Service Reservoir. Two transfers required: Tilbury WRC to new water reuse plant (Transfer 1, length approximately 300-600 m), new water reuse plant to Hanningfield reservoir (Transfer 2, length approximately 32 km).

Option Code:	ESW-EFR-004

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A		

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To protect designated sites and their qualifying features. (--)	Hanningfield Reservoir SSSI (100% favourable) is potentially directly impacted by the option. Langdon Ridge SSSI (19.5% favourable, 80.5% unfavourable - recovering) within 500m of the option. No direct effects but there may be disturbance effects during the construction . The option is within 500m of an important bird area Thames estuary and marshes located at the southern extent. The option is entirely located within SSSI Impact Risk Zones. There are no MCZ/MPAs within 500m of the option. The HRA ToLS concluded LSE for Thames Estuary & Marshes SPA due to operational effects on water quality from effluent discharge.	Refining pipeline alignment or use trenchless techniques to avoid SSSI. Best practice methods to be implemented to minimise disturbance effects. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual effects are lessened. However, some residual effects are likely to remain and this wouldn't negate the need for a potential appropriate assessment.
To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity. (--)	The option crosses grade 2 and 3 agricultural land with disturbance to these soils during construction. During operation, dependent on the depth of the pipeline and agricultural operations, it would be possible to continue using the land for agricultural purposes, therefore there is unlikely to be any loss of land quality from the transfer pipeline. The location of the pumping station is currently unknown. However, it is likely that this land, if agricultural, will not be reinstated as it is a permanent structure, therefore this land would be permanently lost. The option is within 500m of historic landfill sites and authorised landfill sites with potential to disturb contaminated material during construction.	Reduce damage to agricultural land through design to reduce the option footprint and the construction working area to reduce the amount of land permanently taken or temporarily disturbed. Ground will be reinstated therefore long term residual effects on agricultural soils as a result of pipeline construction are unlikely. There will be permanent loss as a result of the pumping station although this is a relatively small area so neutral effects identified. Best practice techniques to prevent disturbance of contaminated material during construction.

To conserve/Protect and enhance the historic environment including the significance of designated and non-designated cultural heritage (including archaeology and built heritage), including any contribution made to that significance by setting.(--)	The option passes through West Tilbury Conservation Area and within 500m of two further conservation areas, it also passes within 500m of four scheduled monuments and is within proximity of a number of listed buildings. The option intersects Chelmsford council - for which conservation area data has not been made available. Construction may affect the setting of these historic assets, however this is likely to be temporary as the pipeline will be buried. There is potential for the excavation of the pipeline to impact buried archaeology if present. The new effluent reuse plant will be located near the existing Tilbury STW with exact location to be determined.	Preferred mitigation for conservation area is to re-route the pipeline; however, if this is not possible then careful construction and reinstatement to its original condition with no detrimental effect on the character, appearance, or design of the RPG or conservation area should be implemented. Best practice measures to be implemented to minimise setting effects for other heritage assets during construction. Further work likely to be required to determine significance of effect, depending on the presence or absence of buried archaeology. Residual effects may remain due to potential loss of archaeological remains.
To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing. (--)	The pipeline crosses two Noise Action Planning Important Areas, and is within 500m of three others. The option crosses Commons and is within 500m of open access areas, primary schools, religious buildings and grounds, golf courses, playing fields, one country park/garden, an airport and a docks. There is no direct land take from these areas. There is likely to be temporary disturbance to users of these sites and the local community during construction. This option may contribute to the local economy through employment opportunities during the construction phase. During operation, it is unlikely to contribute to the local economy. IMD deciles along the pipeline route vary from four to nine.	Route alignment to be amended or trenchless techniques to be used to avoid direct impacts on property and community assets. Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction and land will be reinstated. However, temporary effects are likely to still occur during construction.
To introduce climate mitigation where required and improve the climate resilience of assets and natural systems. (--)	Effects on water levels will depend where the effluent is being diverted from and whether this would affect water levels in that waterbody. Effluent will be discharged into the Hanningfield Reservoir providing additional flows.	N/A

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	2.00
0	28.00	37.00
-	11.00	2.00
--	2.00	1.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified one Natura 2000 site with Likely Significant Effects: Thames Estuary & Marshes SPA (UK9012021) (approx. 2.2km)
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£257.42
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. Permanent loss of the coastal floodplain grazing marsh stocks, floodplain, rivers and ponds stocks is expected as a result of the option construction.
Ecosystem Service Assessment Comments:	The option is likely to generate the loss of natural capital stocks during construction. However, some habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification due to the permanent loss of stocks. There is a permanent change anticipated to water flow regulation. Permanent loss of Coastal Flood Grazing Marsh stocks will permanently reduce the provision of water purification services.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-33.23
BNG Outcome (% Change):	-17.87%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Transfer from water recycling centre to service reservoir (via a new reuse plant). Water would be treated at source and transferred via a new pipeline therefore there is no risk of INNS being introduced at source, pathway or receptor.

WRE Metrics	
Capital Carbon (tCO2e)	55,724.21
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£249.41

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Langford Recycling Plant	New balance tank (180 Ml) to incorporate additional flows and maintain consistently high outputs at Langford Recycling Plant (LRP). Existing intake from Chelmsford WRC and a new intake from Basildon WRC (both Anglian Water owned assets). Existing discharge from LRP to River Chelmer. Two new transfers required: Basildon WRC to LRP inlet works (Transfer 1, length approx. 29 km), LRP inlet works to new balance tank (Transfer 2, length approx. 30 m).
Option Code:	ESW-EFR-010

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A		

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To protect designated sites and their qualifying features. (--)	12 designated sites are within 2km with potential indirect impacts during the construction phase. No direct effects but there may be disturbance effects during the construction phase. The option is entirely located within SSSI Impact Risk Zones. There is one MCZ within 500m. The HRA ToLS identified likely significant effects to five of the aforementioned sites (Crouch and Roach Estuaries (Mid-Essex Coast Phase 3) Ramsar and SPA) and Essex Estuaries SAC, Blackwater Estuary (Mid-Essex Coast Phase 4) Ramsar, Blackwater Estuary (Mid-Essex Coast Phase 4) SPA.	Best practice methods to be implemented to minimise disturbance effects. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual effects are lessened. However, some residual effects are likely to remain and this wouldn't negate the need for a potential appropriate assessment HRA AA required to assess effects on Crouch and Roach Estuaries (Mid-Essex Coast Phase 3) Ramsar and SPA, Blackwater Estuary (Mid-Essex Coast Phase 4) Ramsar and SPA.

To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)	The pipeline passes adjacent to and through Priority Habitat. Potential permanent loss of Priority Habitats. No direct effects on other Priority Habitats but there may be disturbance effects during the construction phase and potential effects on protected species. No direct overlap with Ancient Woodland but there are eight ancient woodlands within 500m with potential for indirect impact. Blanningfield Reservoir (SSSI) Groundwater Dependent Terrestrial Ecosystems (GWDTE) and Crouch and Roach Estuaries (SSSI) GWDTE are within 2km of the option. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -32.33%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.	Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid woodland habitat, in particular Ancient Woodland and BAP Priority Habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual effects are lessened. However, some residual effects are likely to remain.
To introduce climate mitigation where required and improve the climate resilience of assets and natural systems. (--)	Effects on water levels will depend where the effluent is being diverted from and whether this would affect water levels in that waterbody. Effluent will be discharged into River Chelmer providing additional flows. Reusing water instead of increasing abstraction may increase climate resilience through relieving or preventing additional pressure on the water system.	N/A

SEA Tally Residual		
SEA Scoring (Residual)	**Cumulative Tally (Construction)**	**Cumulative Tally (Operation)**
+++	0.00	0.00
++	0.00	0.00
+	1.00	3.00
0	28.00	35.00
-	11.00	3.00
--	2.00	1.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified five Natura 2000 sites with Likely Significant Effects: Crouch & Roach Estuaries (Mid-Essex Coast Phase 3) Ramsar (UK11058) (approx. 0.7km), Crouch & Roach Estuaries (Mid-Essex Coast Phase 3) SPA (UK9009244) (approx. 0.7km), Essex Estuaries SAC (UK0013690) (approx. 0.7km), Blackwater Estuary (Mid-Essex Coast Phase 4) Ramsar (UK11007) (approx. 1.8km), Blackwater Estuary (Mid-Essex Coast Phase 4) SPA (UK9009245) (approx. 1.8km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£1992,32
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. Permanent loss of the coastal floodplain grazing marsh stocks, arable and pastoral stocks, woodland priority stocks and floodplain is expected as a result of the option construction.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, most habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. There is no change anticipated to water flow regulation. Permanent loss of arable stocks and pastoral stocks due to option construction hence loss of associated ecosystem services e.g. carbon storage and food production expected. Permanent loss of coastal floodplain grazing marsh stocks will permanently impact water purification services.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-69.78
BNG Outcome (% Change):	-32.33%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	One waterbody requires further assessment: Crouch.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Transfer from existing Chelmsford WRC and Basildon WRC to River Chelmer via Langford Recycling Plant. Water to be transferred via a new pipeline. As water is treated at the source and source and pathway are a closed system, there is negligible risk of INNS being introduced at source, pathway or receptor.

WRE Metrics	
Capital Carbon (tCO2e)	97,249.19
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£668.88

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Barsham Nitrate Treatment	Nitrate Treatment (4 Ml/d capacity). Nitrate treatment extension on Barsham WTW's existing site. NCA and BNG scoped out due to proposed construction within existing site, therefore no expected loss of natural capital stocks or biodiversity net gain/loss.
Option Code:	ESW-NIT-001

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A		

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
N/A		

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	2.00
0	31.00	39.00
-	10.00	1.00
--	0.00	0.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified no Natura 2000 sites with Likely Significant Effects.
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	Scoped out
Natural Capital Assessment: Comments:	Scoped out
Ecosystem Service Assessment Comments:	Scoped out
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	Scoped out
BNG Outcome (% Change):	Scoped out
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment.
INNS Summary	
INNS Risk Score	None
Comments	Transfer within Barsham WTW's existing site. Transferred water is treated/potable therefore there is no risk of INNS introduction or transfer.

Carbon Calculations	
Capital Carbon (tCO2e)	165.64
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	Scoped out

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Langford Nitrate Treatment	Nitrate Treatment (19.2 Ml/d capacity). Nitrate treatment extension on Langford WTW's existing site. NCA and BNG scoped out due to proposed construction within existing site, therefore no expected loss of natural capital stocks or biodiversity net gain/loss.
Option Code:	ESW-NIT-002

SEA Summary

SEA Objectives with Major/Moderate Positive Effects (+++)

SEA Objective	Comment	Mitigation
N/A		

SEA Objectives with Major/Moderate Negative Effects (---)

SEA Objective	Comment	Mitigation
N/A		

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	2.00
0	26.00	35.00
-	11.00	1.00
--	0.00	0.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified no Natura 2000 sites with Likely Significant Effects.
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	Scoped out.
Natural Capital Assessment: Comments:	Scoped out.
Ecosystem Service Assessment Comments:	Scoped out.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	Scoped out.
BNG Outcome (% Change):	Scoped out.
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment.
INNS Summary	
INNS Risk Score	None
Comments	Transfer within Langford WTW's existing site. Transferred water is treated/potable therefore there is no risk of INNS introduction or transfer.

Carbon Calculations	
Capital Carbon (tCO2e)	248.76
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	Scoped out.

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Langham Nitrate Treatment	Nitrate Treatment (20 Ml/d capacity). Nitrate treatment extension on Langham WTW's existing site. NCA and BNG scoped out due to proposed construction within existing site, therefore no expected loss of natural capital stocks or biodiversity net gain/loss.
Option Code:	ESW-NIT-003

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A		

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
N/A		

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	2.00
0	32.00	39.00
-	9.00	1.00
--	0.00	0.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified no Natura 2000 sites with Likely Significant Effects.
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	Scoped out.
Natural Capital Assessment: Comments:	Scoped out.
Ecosystem Service Assessment Comments:	Scoped out.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	Scoped out.
BNG Outcome (% Change):	Scoped out.
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment.
INNS Summary	
INNS Risk Score	None
Comments	Transfer within Langham WTW's existing site. Transferred water is treated/potable therefore there is no risk of INNS introduction or transfer.

Carbon Calculations	
Capital Carbon (tCO2e)	250.23
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	Scoped out.

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Barsham Nitrate Removal + Pipeline	Electrodialysis Reversal (EDR) or Ion-Exchange (IEX) nitrate treatment at Barsham WTW so that final water meets nitrate PCV. Option contains a discharge stream transfer to Beccles STW (AWS). The pipeline is approx, 5.4km long with a Nominal Diameter of 150mm. The majority of the pipeline it to be laid in road, with approx, 1.1km laid in fields. Barsham River WTW source water has high nitrate oncentrations at certain times of the year, particularly during the winter months, which can if too high stop water production. This option would allow the WTW to continue to operate thorughout the year. This option will provide nitrate treatment via electrodialysis reversal (EDR) for a proportion of the 28 Ml/d river works WTW capacity, when blended with borehole water.
Option Code:	ESW-NIT-004

SEA Summary

SEA Objectives with Major/Moderate Positive Effects (+++)

SEA Objective	Comment	Mitigation
N/A	N/A	N/A

SEA Objectives with Major/Moderate Negative Effects (---)

SEA Objective	Comment	Mitigation
To minimise/reduce embodied and operational carbon emissions.	Given the scale of the option, a large quantity of materials will be required to construct the pipeline and other proposed infrastructure, and construction activities will also generate emissions through significant machinery movements associated with required earthworks, HGV movements from transporting materials, as well as other plant emissions resulting from construction. During operation, energy will be required to provide nitrate treatment through electrodialysis within the existing Barsham WTW, and energy will be needed to pump waste water through the pipeline. Any maintenance and/or replacement works will also produce operational carbon emissions.	Investigate use of renewables during construction and operation for energy supply, and use of materials with lower embodied carbon. Carbon assessment could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy will be more available. Although carbon emissions could be reduced through mitigation, negative effects in the short and medium term will likely remain.
Minimise resource use and waste production.	New infrastructure will be required for the option. Construction will use a significant amount of materials and also generate waste. In addition, resources will be needed for periodic maintenance works and also in operation to treat and pump water from the facility.	Seek opportunities to implement sustainable design measures (design to reduce footprint, selection of materials) and reuse excavated material to reduce the impact, however it is likely that negative effects will remain.

SEA Tally Residual

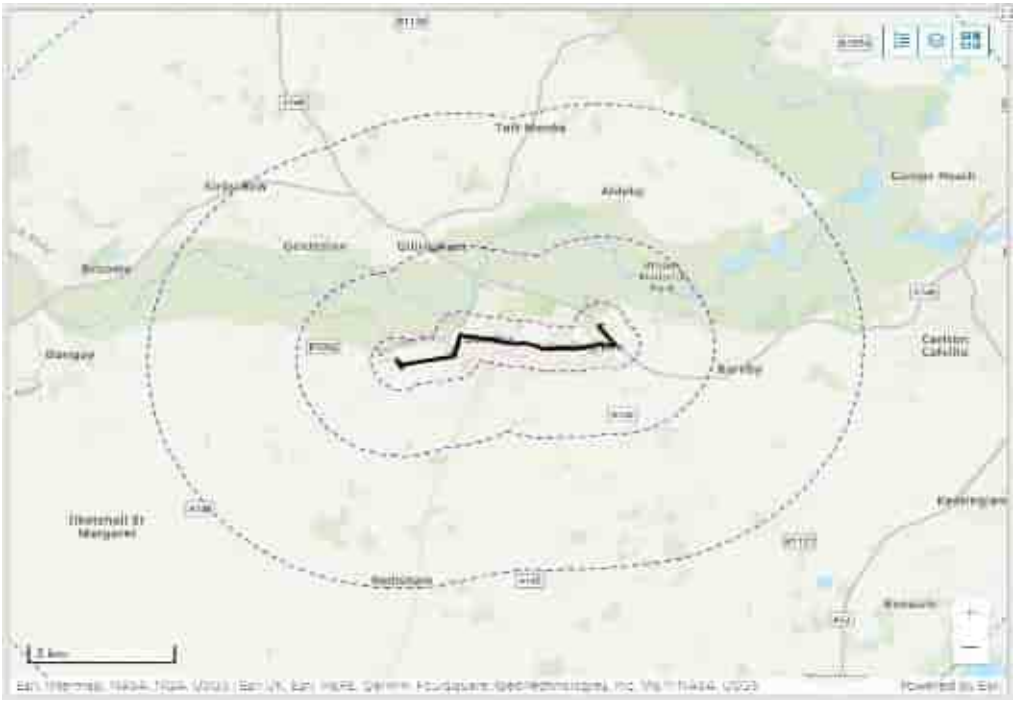
SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00

++	0.00	0.00
+	1.00	2.00
0	27.00	37.00
-	12.00	3.00
--	2.00	0.00
---	0.00	0.00
(?)		

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified three Natura 2000 sites with Likely Significant Effects: Broadland SPA (UK9009253) (approx. 2km), Broadland Ramsar (UK110100) (approx. 2km), and The Broads SAC (UK0013577) (approx. 2km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£588.84
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation.
Ecosystem Service Assessment Comments:	The option is likely to generate the loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of air pollutant removal, loss of natural hazard management and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-9.17
BNG Outcome (% Change):	-51.57%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment
INNS Summary	
INNS Risk Score	None
Comments	During construction, best practice will be implemented to prevent the spread of INNS. No risk of transfer/movement of invasive or non-native species with this option type as the transfer is of wastewater/brine, which is assumed to be free of INNS. Additionally, transfer of wastewater/brine is within a closed system (i.e., between WTW's) rather than to a watercourse.

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	3,692
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£477.36

Option GIS:



ESW WRMP Integrated Environmental Assessment Information Pack

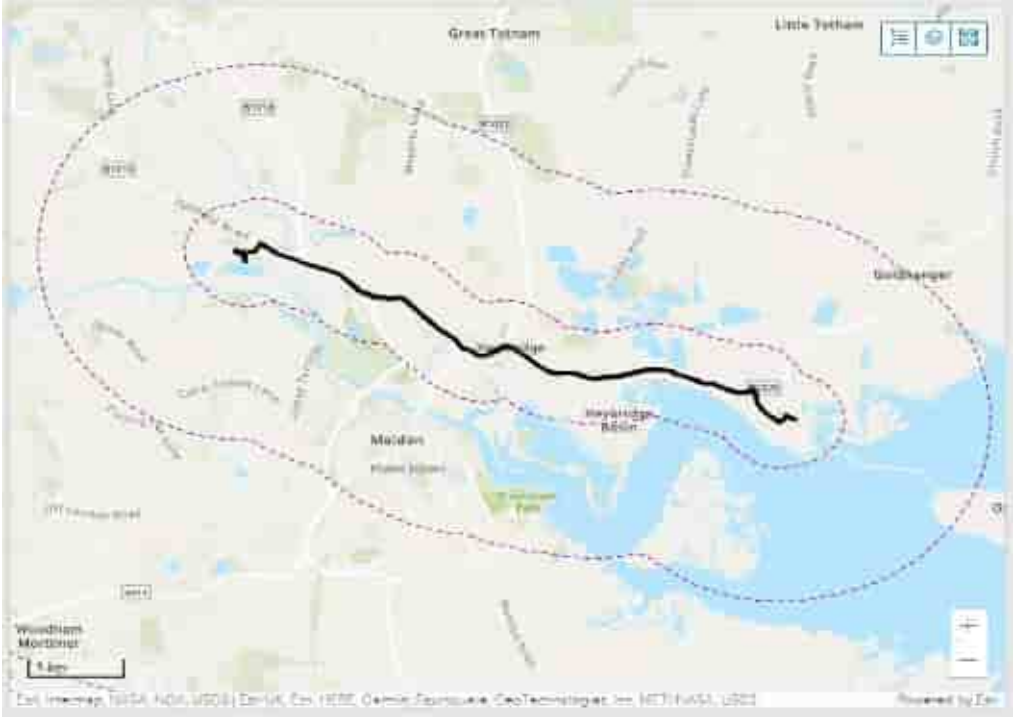
Option Name:	Option Description:	
Langford Nitrate Removal + Pipeline	Electrodialysis Reversal (EDR) or Ion-Exchange (IEX) nitrate treatment Electrodialysis Reversal nitrate treatment at Langford WTW so that final water meets nitrate PCV. Option contains a discharge stream transfer to Maldon STW (AWS). The pipeline is approx, 6.7km long with a Nominal Diameter of 200mm. The pipe is to be laid in road for the entirety of the route.	
Option Code:	ESW-NIT-005	
SEA Summary		
SEA Objectives with Major/Moderate Positive Effects (+++)		
SEA Objective	**Comment**	**Mitigation**
N/A	N/A	N/A
SEA Objectives with Major/Moderate Negative Effects (---)		
SEA Objective	**Comment**	**Mitigation**
To minimise/reduce embodied and operational carbon emissions.	Given the scale of the option, a large quantity of materials will be required to construct the pipeline, and construction activities will also generate emissions through significant machinery movements associated with required earthworks, HGV movements transporting materials, as well as other plant emissions from construction of the pipeline itself. During operation, energy will be required to provide nitrate treatment through electrodialysis within the existing Langford WTW, energy will be needed to pump water through the pipeline and to operate the waste stream pump station. Any maintenance and/or replacement works will also produce operational carbon emissions.	Investigate use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon. Carbon assessment could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy will be more available. Although carbon emissions could be reduced through mitigation, negative effects in the short and medium term will likely remain.
Minimise resource use and waste production.	New infrastructure will be required for the option. Construction will use a significant amount of materials and also generate waste. In addition, resources will be needed for periodic maintenance works, and during operation to treat and pump water from the facility, and power the waste stream pump station.	Seek opportunities to implement sustainable design measures (design to reduce footprint, selection of materials) and reuse excavated material to reduce the impact, however it is likely that negative effects will remain.
SEA Tally Residual		
SEA Scoring (Residual)	**Cumulative Tally (Construction)**	**Cumulative Tally (Operation)**
+++	0.00	0.00

++	0.00	0.00
+	1.00	3.00
0	28.00	36.00
-	11.00	3.00
--	2.00	0.00
---	0.00	0.00
(?)		

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified three Natura 2000 sites with Likely Significant Effects: Blackwater Estuary Ramsar (UK11007) (approx. 0.08km), Essex Estuaries SAC (UK0013690) (approx. 0.08km), and Blackwater Estuary SPA (UK9009245) (approx. 0.08km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£737.96
Natural Capital Assessment: Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation. The option will likely cause some permanent loss of arable land during construction.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management, reduction in air quality, and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-4.58
BNG Outcome (% Change):	-49.21%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	Two waterbodies require further assessment: GB105037033530 Chelmer (d/s confluence with Can), and GB40503G000400 Essex Gravels.
INNS Summary	
INNS Risk Score	None
Comments	During construction, best practice will be implemented to prevent the spread of INNS. No risk of transfer/movement of invasive or non-native species with this option types as the transfer is of wastewater/brine, which is assumed to be free of INNS. Additionally, transfer of wastewater/brine is within a closed system (i.e., between WTW's) rather than to a watercourse.

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	1,241
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£248.79

Option GIS:



ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Langham Nitrate Removal + Pipeline	Electrodialysis Reversal (EDR) or Ion-Exchange (IEX) nitrate treatment Electrodialysis Reversal nitrate treatment at Langham WTW so that final water meets nitrate PCV. Option contains a discharge stream transfer to Colchester STW (AWS). The pipeline is approx, 14.523km long with a Nominal Diameter of 200mm and is laid in road for the entirety of the route.
Option Code:	ESW-NIT-006

SEA Summary

SEA Objectives with Major/Moderate Positive Effects (+++)

SEA Objective	Comment	Mitigation
N/A	N/A	N/A

SEA Objectives with Major/Moderate Negative Effects (---)

SEA Objective	Comment	Mitigation
To minimise/reduce embodied and operational carbon emissions.	Given the scale of the option, a large quantity of materials will be required to construct the pipeline, and construction activities will also generate emissions through significant machinery movements associated with required earthworks, HGV movements transporting materials, as well as other plant emissions from construction of the pipeline itself. During operation, energy will be required to provide nitrate treatment through electrodialysis within the existing Langford WTW, and energy will be needed to pump water through the pipeline. Any maintenance and/or replacement works will also produce operational carbon emissions.	Investigate use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon. Carbon assessment could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy will be more available. Although carbon emissions could be reduced through mitigation, negative effects in the short and medium term will likely remain.
Minimise resource use and waste production.	New infrastructure will be required for the option. Construction will use a significant amount of materials and also generate waste. In addition, resources will be needed for periodic maintenance works and also in operation to treat and pump water from the facility.	Seek opportunities to implement sustainable design measures (design to reduce footprint, selection of materials) and reuse excavated material to reduce the impact, however it is likely that negative effects will remain.

SEA Tally Residual

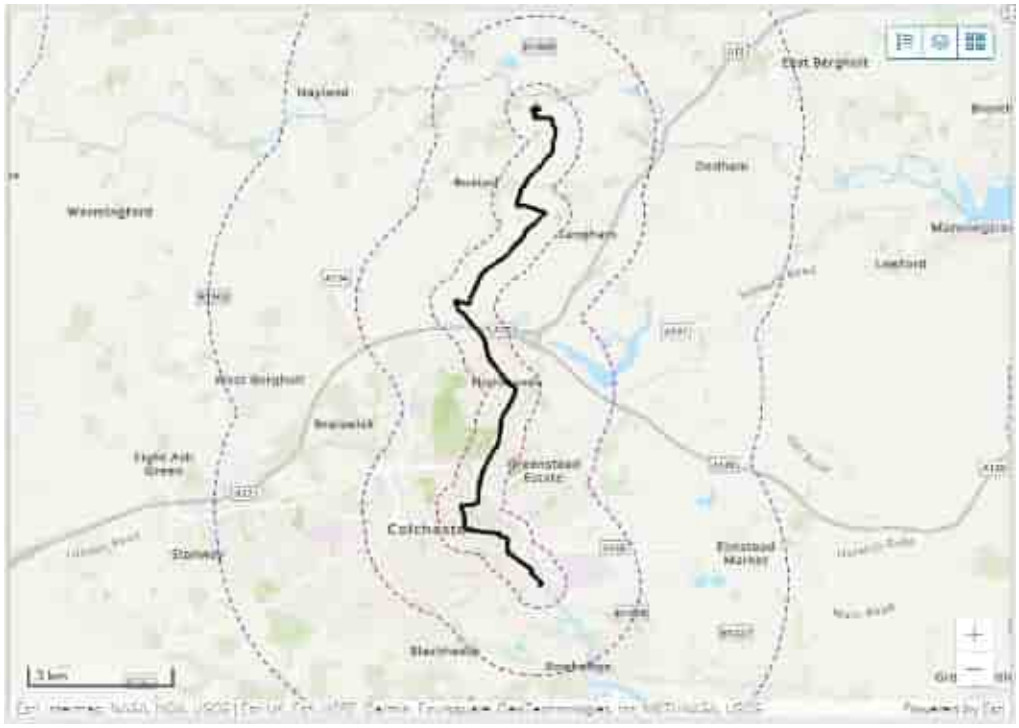
SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	3.00
0	27.00	34.00
-	12.00	5.00
--	2.00	0.00

---	0.00	0.00
(?)		

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified three Natura 2000 sites with Likely Significant Effects: Colne Estuary (Mid-Essex Coast Phase 2) Ramsar (UK11015) (approx. 3.5km), Colne Estuary (Mid-Essex Coast Phase 2) SPA (UK9009243) (approx. 3.5km), and Essex Estuaries SAC (UK013690) (approx. 3.5km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£950.89
Natural Capital Assessment: Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation. Some permanent loss of pastures is likely expected during the construction of the option.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of food production, loss of air pollutant removal, loss of natural hazard management and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-6.36
BNG Outcome (% Change):	-18.32%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment
INNS Summary	
INNS Risk Score	None
Comments	During construction, best practice will be implemented to prevent the spread of INNS. No risk of transfer/movement of invasive or non-native species with this option type as the transfer is of wastewater/brine, which is assumed to be free of INNS. Additionally, transfer of wastewater/brine is within a closed system (i.e., between WTW's) rather than to a watercourse.

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	8,731
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£440.58

Option GIS:



ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Langford WTW upgrade + Abberton RWPS Pump Replacement	The option has two distinct elements: Replacement, and enhanced pumping capacity of two existing pumps, motors, and controls at Abberton Reservoir Raw Water Pumping Station; and upgrades to treatment infrastructure at Langford WTW to accommodate the introduction of soruce water for Abberton raw water reservoir.
Option Code:	ESW-PMP-001A

SEA Summary

SEA Objectives with Major/Moderate Positive Effects (+++)

SEA Objective	Comment	Mitigation
To increase water efficiency and increase resilience of water supplies and natural systems to droughts.	The Abberton RWPS element of the option involves the replacement of two existing pumps, as well as motors and some controls, providing additional pumping capacity, in which the Abberton Raw Water Transfer will pump water to Langford WTW for treatment. The pumping station currently has a restricted capacity to 220 Ml/d (at reservoir bottom water level). During a 1 in 500 year drought the current pumps would be insufficient to maximise abstraction from Abberton during a dry year. The additional pumping capacity is based upon 265-220 Ml/d. Therefore, it is anticipated that the option will provide moderate positive effects during operation, as it will help to increase resilience of water supplies and natural systems to droughts. Langford WTW abstracts raw water from the River Waveney. Raw water is stored in bankside storage prior to treatment. Under certain conditions however, Langford WTW struggles to achieve its peak deployable output. As a result, the proposed option is to upgrade the sites treatment infrastructure and to introduce raw water from Abberton Reservoir so that the WTW can operate at its maximum output capacity. Therefore, this element of the option will also help to increase resilience of water supplies and natural systems to droughts during operation.	N/A

SEA Objectives with Major/Moderate Negative Effects (---)

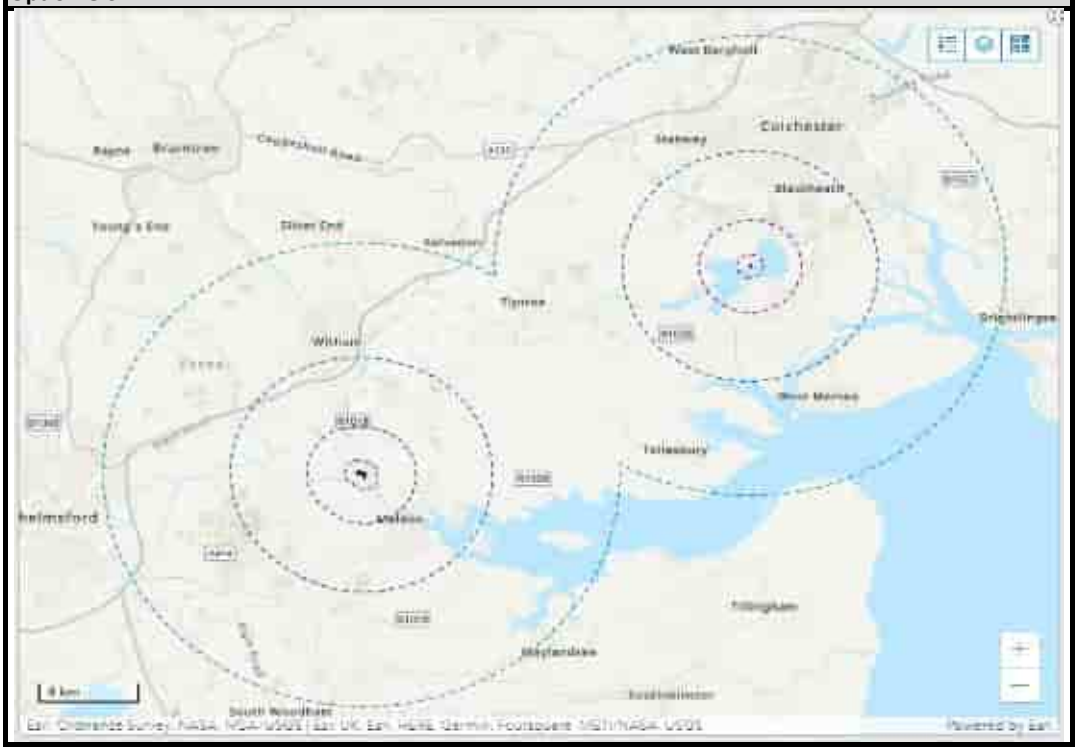
SEA Objective	Comment	Mitigation
N/A	N/A	N/A

SEA Tally Residual		
SEA Scoring (Residual)	**Cumulative Tally (Construction)**	**Cumulative Tally (Operation)**
+++	0.00	0.00
++	0.00	1.00
+	0.00	4.00
0	32.00	33.00
-	10.00	4.00
--	0.00	0.00
---	0.00	0.00
(?)		

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified seven Natura 2000 sites with Likely Significant Effects: Abberton Reservoir SPA (UK9009141) (0km), Abberton Reservoir Ramsar (UK11001) (0km), Essex Estuaries SAC (UK0013690) (approx. 2.2km), Blackwater Estuary (Mid-Essex Coast Phase 4) SPA (UK9009245) (approx. 2.2km), Blackwater Estuary (Mid-Essex Coast Phase 4) Ramsar (UK11007) (approx. 2.2km), Colne Estuary (Midd-Essex Coats Phase 2) Ramsar (UK11015) (approx. 3km), and Colne Estuary (Mid-Essex Coast Phase 2) SPA (UK9009243) (approx. 3km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£457.30
Natural Capital Assessment: Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation. Some permanent loss of arable land is likely expected during construction of the option.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management, loss of food production, loss of air pollutant removal and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-0.64
BNG Outcome (% Change):	-26.44%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment
INNS Summary	
INNS Risk Score	None
Comments	During construction, best practice will be implemented to prevent the spread of INNS. No risk of transfer/movement of invasive or non-native species with this option type as the transfer is of wastewater/brine, which is assumed to be free of INNS. Additionally, transfer of wastewater/brine is within a closed system (i.e., between WTWs) rather than to a watercourse.

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	11,150. This assessment only includes carbon costs for the Abberton RWPS upgrade, as the Langford clarifer component of this option was not part of Mott MacDonald Scope.
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£113.03

Option GIS:



ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
North Suffolk Winter Storage Reservoir	New winter storage reservoir to be built. Intake comes from the River Waveney/River Hundred when there's no spare capacity at Barsham WTW. When supplies are short at Barsham WTW, water is taken from the reservoir and transferred to the WTW. Transfer length approximately 2.8 km.
Option Code:	ESW-RES-002

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (+++)	The pipeline passes adjacent to and through small parcels of Priority Habitat (mainly deciduous woodland and Coastal and floodplain grazing marsh). Potential permanent loss of Priority Habitat. No direct effects on other Priority Habitats but there may be disturbance effects during the construction phase and potential effects on protected species. There is one GWDTE within 2km of the option, and three others in direct hydrological connection with the proposed abstraction point. No chalk rivers within 2km. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. However, there will be a significant gain due to the creation of new open water habitat. The percentage change is +67.01%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.	Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid woodland habitat, in particular Ancient Woodland and BAP Priority Habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. Ecology surveys will be required at future design stages to determine effects and mitigation required. A new reservoir has significant opportunities for benefits for ecology.
To increase access and connect customers to the natural environment, provide education or information resources for the public. (++)	Construction of the reservoir will have no benefits in the short term. However, once completed, the reservoir has the potential to have a positive effect in the medium to long term during operation.	Best practice mitigation to minimise disturbance to users during construction, however some impacts likely to remain. There could be potential to enhance the cycleways as part of the works (e.g. during re-instatement). Enhance operational benefits by incorporating education and information resources within the reservoir design e.g. trails, information boards etc.

Maintain and enhance tourism and recreation (++)	The option is within 500m of a national park, religious buildings and religious grounds, common lands and parks/gardens, and crosses over- and within proximity of watercourses and habitat areas/woodland that could be used for recreation. Therefore there may be some temporary effects on recreation, angling and other water based activities during the construction phase. The proposed pipeline route will cross National Cycle Network routes. There may be temporary disturbance on users of these, as well as other walking and cycling routes, and other public rights of way during the construction phase. The creation of a reservoir may provide an informal recreational opportunity.	Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction. Direct land take of recreational sites to be avoided where possible and land to be reinstated. However, temporary effects are likely to still occur during construction. Enhance operational benefits by incorporating recreational activities such as fishing, sailing, and canoeing into reservoir design.
Residual SEA Objectives with Major/Moderate Negative Effects (---/--)		
SEA Objective	**Comment**	**Mitigation**
To protect designated sites and their qualifying features. (--)	The option footprint does not directly overlap any designated sites. Sotterley Park SSSI is within 500m of the option, and a further two SSSI are within 2km of the option. No direct land-take but there may be disturbance effects during the construction phase. There are a number of water dependent SSSI Groundwater Dependent Terrestrial Ecosystems (GWDTE) along the River Waveney which may be affected by increases in abstraction to supply the reservoir. These SSSIs are therefore likely to be sensitive to any changes in water levels and are likely to be affected by the operation of the option rather than by the construction. The option is entirely located within SSSI Impact Risk Zones. There are no MCZ/MPAs within 500m of the option. The HRA ToLS concluded potential LSE for Broadland SPA and Ramsar; The Broads, Southern North Sea, and Benacre to Easton Bavents Lagoons SAC; Benacre to Easton Bavents, and Outer Thames Estuary SPA.	Best practice methods to be implemented to minimise disturbance effects. Ecology surveys will be required at future design stages to determine effects and mitigation required. Ensure abstraction from the rivers are taken at appropriate times to mitigate against effects on water dependant designated sites. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual operational effects are lessened although this wouldn't negate the need for a potential appropriate assessment.
To meet WFD objectives relating to biodiversity. (--)	Four WFD waterbodies identified. The WFD Phase 1 assessment results show there would be high risks for ecology during operation due to new/increased surface water abstraction (for two waterbodies), and otherwise low impacts from both operation and construction activities.	Best practice construction methods and pollution prevention measures to be implemented. This includes the use of directional drilling or other trenchless technique where the pipeline crosses watercourses. In the short term there is potential for effects. With mitigation, no effects are predicted as a result of construction. For operational impact, further WFD L2 assessment required for Waveney (Ellingham Mill - Burgh St. Peter) and Lothingland Hundred to determine best mitigation approach. Operational residual impacts lessened assuming implementation of adequate mitigation.

To enhance or maintain surface water quality, flows and quantity. (--)	The transfer pipeline crosses watercourses therefore potential for impacts on water quality during the construction phase. Potential operational impacts on water flow in River Waveney due to abstraction for the service reservoir. Potential transfer of INNS during operational phase with impacts on water quality.	Best practice construction methods and pollution prevention measures to be implemented. This includes the use of directional drilling or other trenchless technique where the pipeline crosses watercourses. With mitigation, residual construction effects are considered negligible. Operational impacts on river flow from abstraction and potential transfer of INNS will remain.
To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity. (---)	The transfer pipelines cross grade 2, 3 and 4 agricultural land with disturbance to these soils during construction. During operation, dependent on the depth of the pipeline and agricultural operations, it would be possible to continue using the land for agricultural purposes, therefore there is unlikely to be any loss of land quality from the transfer pipeline. The new reservoir is likely to be located within Grade 3 agricultural land. The construction of the new reservoir is likely to reduce the area of agricultural land (by 903,000 m2), leading to the permanent loss of land. The locations of new pumping stations are currently unknown. However, it is likely that this land, if agricultural, will not be reinstated as they are permanent structures, therefore this land would be permanently lost. The transfer pipelines are within 500m of three historic landfill sites with potential to disturb contaminated material during construction.	Reduce damage to agricultural land through design to reduce the option footprint and the construction working area to reduce the amount of land permanently taken or temporarily disturbed. Ground will be reinstated therefore long term residual effects on agricultural soils as a result of pipeline construction are unlikely. There will be permanent loss as a result of the new reservoir and pumping stations therefore residual effects identified. Best practice techniques to prevent disturbance of contaminated material during construction.
To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans. (--)	Four WFD waterbodies identified. The WFD Phase 1 assessment results show there would be high risks to two waterbodies (Waveney (Ellingham Mill - Burgh St. Peter) and Lothingland Hundred) during operation due to new/increased surface water abstraction, and otherwise low or neutral impacts from both operation and construction activities.	Best practice construction methods and pollution prevention measures to be implemented. If this option were to be selected, further assessment under the WFD would be required for those waterbodies detrimentally affected. If this assessment showed that this option would cause deterioration to, or preventing future improvement of, the ecological status of the waterbodies, evidence would be required to show that there are no reasonable alternative options that would avoid these effects. If there are no alternative options, consideration would need to be given to the presence of reasons of overriding public interest, and mitigation measures would need to be secured. Operational residual impacts lessened assuming implementation of mitigation.

To conserve, protect and enhance landscape and townscape character and visual amenity. (--)	The option is located in the Suffolk Coast and Heaths; South Norfolk and High Suffolk Claylands; The Broads NCAs. Negative effects during construction likely as excavation will be required for the transfer pipelines. The creation of a reservoir and its embankment is likely to disturb the views and landscape character of the area and therefore change the character of the NCA during construction and operation. The pumping stations are relatively small-scale structures and are therefore unlikely to change the landscape character of the area or affect visual amenity during operation.	Best practice measures to be implemented to minimise effects during construction including although temporary effects during construction may remain. Land affected by transfer pipelines will be reinstated upon completion so with mitigation, no residual effects are likely to remain during operation. Incorporate measures to reduce landscape and visual impact of the reservoir and embankment e.g. planting of trees as screening and reducing the height of any embankment. However, although design features will likely improve the aesthetics, the landscape will remain changed.

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	1.00
++	0.00	2.00
+	1.00	3.00
0	26.00	26.00
-	12.00	7.00
--	2.00	3.00
---	1.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified seven Natura 2000 sites with Likely Significant Effects: Broadland SPA (UK9009253) (approx. 2.1km), Broadland Ramsar (UK110100 (approx. 2.1km), The Broads SAC (UK0013577) (approx. 2.1km), Benacre to Easton Bavents Lagoons SAC (UK0013104) (approx. 2.5km), Benacre to Easton Bavents SPA (UK9009291) (approx. 2.5km), Southern North Sea SAC (UK0030395) (approx. 3.8km), Outer Thames Estuary SPA (approx. 3.8km)
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£38,880.17
Natural Capital Assessment: Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that some Natural Capital stocks post construction will have no to little change. Permanent reservoir stocks will be gained. Permanent loss of coastal and floodplain grazing marsh, pasture, arable land, other semi-natural grassland, floodplain, and ponds and linear features is expected as a result of the option construction.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, habitat that is temporarily lost is expected to be reinstated/compensated to pre-construction conditions following best practice technique and will likely have no permanent impact to the provision of ecosystem services. Priority/coniferous woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management, a reduction in food production, and a reduction in water purification. Impacts to water flow regulation are subject to a WFD Level 2 assessment.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	200.27
BNG Outcome (% Change):	66.40%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	Two waterbodies require further assessment: Waveney (Ellingham Mill - Burgh St. Peter) and Lothingland Hundred.
INNS Summary	
INNS Risk Score	6 = High
Comments	Transfer of raw water from River Waveney/River Hundred to Barsham WTW via new North Suffolk Winter Storage Reservoir for long term storage. Abstraction from River Waveney and River Hundred may cause changes to flow level which may make habitat more suitable for some INNS species. Raw water is to be stored in new Reservoir therefore INNS could be introduced to the new waterbody. INNS transported to new waterbody could be spread further by equipment or animals entering the water.

Carbon Calculations	
Capital Carbon (tCO2e)	34,965.31
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£3,779.26

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
North Suffolk winter storage reservoir + Barsham River Works	New winter storage reservoir to be built. Intake comes from the River Waveney when there's no spare capacity at Barsham WTW. When supplies are short at Barsham WTW, water is taken from the reservoir and transferre to the WTW. Two transfer pipelines are required: RIver Waveney to reservoir (2.32km), reservoir to Barsham WTW (3.5km). There are three potential flow rates for both transfer pipelines: 16.2 Ml/d, 18.5 Ml/d, 19.9 Ml/d. Option also includes additional treatment capacity provided by an 16Ml/d extension at the existing Barsham WTW. The additional treatment capacity can easily be located within the existing site boundary. The client proposed that the additional treatment trains be accomodated and located next to, and as an extenson of, to the existing processes.
Option Code:	ESW-RES-002C1

SEA Summary

SEA Objectives with Major/Moderate Positive Effects (+++)

SEA Objective	Comment	Mitigation
To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers.	The option passes through and/or runs adjacent to some small sections of BAP Priority Habitat (Deciduous Woodland, and Coastal and Floodplain Grazing Marsh). Additionally, there are a few small sections of habitats designated as having no main habitat but where additional habitats present within 500m of the option. The option will result in the direct land-take and potential permanent loss of Coastal and Floodplain Grazing Marsh Priority Habitat at its northern end. This will have a direct negative effect on any present biodiversity and priority species. There will also be potential indirect effects to surrounding parcels of Priority Habitat and biodiversity through construction associated disturbances. There is one GWDTE within 2km of the option, as well as numerous parcels of woodland. Operational effects are likely for the GWDTE. The option is expected to cause the a gain of BNG units predominately due to habitat	Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid woodland habitat, in particular Ancient Woodland and BAP Priority Habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. Ecology surveys will be required at future design stages to determine effects and mitigation required.

	creation associated with the new reservoir. The percentage change is +89.52%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost. The Natural Capital Assessment concluded the option would result in -£50,538.57.	
To increase water efficiency and increase resilience of water supplies and natural systems to droughts.	This option will support the building of a new winter storage reservoir. This reservoir will take water from River Waveney when there's no spare capacity at Barsham WTW. When supplies are short at Barsham WTW, water will then be transferred from the reservoir to the WTW. To facilitate this, two new transfer pipelines will be built with three potential flows rates (16.2 Ml/d, 18.5 Ml/d, 19.9 Ml/d). The option also includes additional treatment capacity provided by an 16 Ml/d extension at the existing Barsham WTW. During normal operation, this option could combat the effect of extreme temperatures and drought on water resilience by providing an additional reservoir to supply drinking water, where water has been taken from the River Waveney prior to drought conditions. Positive effects are identified. The reservoir may be vulnerable to longer drought situations where lower flows in the intake rivers mean the reservoir cannot be filled/topped up. The reservoir would be exposed to evaporation due to heat (especially extreme temperatures)/wind exposure and lose water that could not be replaced. Therefore negative effects are also identified. The option is unlikely to affect the local environment's resilience to hazards such as flood risk, temperatures extremes, storms, and gales, but may assist in managing resilience of surrounding flora and fauna to drought.	N/A
SEA Objectives with Major/Moderate Negative Effects (---)		
SEA Objective	**Comment**	**Mitigation**

To protect designated sites and their qualifying features.	There are no designated sites within 500m of the option footprint. Within 2km, there is the Broadland Ramsar, and SPA, and The Broads SAC. Geldeston Meadows SSSI is also located within 2km of the option. This designated site is a water dependent SSSI Groundwater Dependent Terrestrial Ecosystems (GWDTE) along the River Waveney which may be affected by increases in abstraction to supply the reservoir. Therefore, this SSSI is likely to be sensitive to any changes in water levels and so is likely to be affected by the operation of the option. The option is entirely located within SSSI Impact Risk Zones. There are no MCZ/MPAs within 500m of the option. The HRA ToLS identified seven Natura 2000 sites that could be affected; Broadland SPA (UK9009253) (approx. 1.1km), Broadland Ramsar (UK11010) (approx. 1.1km), The Broads SAC (UK0013577) (approx. 1.1km), Breydon Water Ramsar (UK11008) (approx. 12.5km), Breydon Water SPA (UK9009181) (approx. 12.5km), Outer Thames Estuary SPA (UK9020309) (approx. 12.7km), Southern North Sea SAC (UK0030395) (approx. 12.7km). LSE identified for all seven sites during construction due to potential for non-physical disturbance, biological disturbance, toxic contamination, and non-toxic contamination, and during operation due to potential for physical damage, non-toxic contamination, water table availability and biological disturbance.	Best practice methods to be implemented to minimise disturbance effects. Trenchless techniques to be used where appropriate. Ecology surveys required at future design stages to determine effects and mitigation required.
To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	Three waterbodies were considered during the WFD Phase 1 assessment: Waveney (Ellingham Mill - Burgh St. Peter), Waveney (Starston Brook - Ellingham Mill) and Broadland Rivers Chalk & Crag. The assessment determined that the option would have a low level of effects during construction for all three waterbodies, due to the option crossing two main rivers and intake from River Waveney. High level of effects are considered likely during operation for all three waterbodies, due to the creation of a new winter storage reservoir. High impacts are also anticipated specifically for Waveney (Ellingham Mill - Burgh St. Peter) due to new or increased surface water extraction. For other WFD objectives, low level effects are anticipated during operation, due to the option crossing two main rivers and maintenance of new intake from River Waveney.	Best practice construction methods and pollution prevention measures to be implemented. However, some residual effects may still remain.
SEA Tally Residual		

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	1.00
++	0.00	1.00
+	0.00	5.00
0	25.00	27.00
-	15.00	7.00
--	1.00	0.00
---	1.00	1.00
(?)		

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified five Natura 2000 sites with Likely Significant Effects: Broadland SPA (UK9009253) (approx. 1.1km), Broadland Ramsar (UK11010) (approx. 1.1km), The Broads SAC (UK0013577) (approx. 1.1km), Breydon Water Ramsar (UK11008) (approx. 12.5km / 35km downstream), and Breydon Water SPA (UK9009181) (approx. 12.5km / 35km downstream).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£55,665.83
Natural Capital Assessment: Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation. New stocks include the addition of a reservoir.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management, loss of food production and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is a positive change anticipated to water flow regulation due to the addition of the reservoir.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	205.89
BNG Outcome (% Change):	89.52%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	Two waterbodies require further assessment: GB105035045903 Waveney (Ellingham Mill - Burgh St. Peter), and GB105034045902 Waveney (Starston Brook - Elingham Mill)
INNS Summary	
INNS Risk Score	6 = High
Comments	Physical transfer of untreated water (between two locations assumed currently unconnected). Additional risks from pipeline washout, pipeline bursts, washwater discharge, overflows and sludge disposal.

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	4,943.30
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£3,887.18

Option GIS:

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Barsham WTW to Blyth Transfer Main	8 Ml/d transfer from Barsham WTW to Saxmundham Tower. Consists of multiple sections: A - Barsham WTW to Shadingfield Tower (length 5.6 km); B - Shadingfield Tower to Holton WTW (length 7.4 km); C - Holton WTW to Saxmundham Tower (length 19.2 km); D - connects new pipelines to Walpole WTW (length 1.4 km).
Option Code:	ESW-TRA-001

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A	N/A	N/A

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
N/A	N/A	N/A

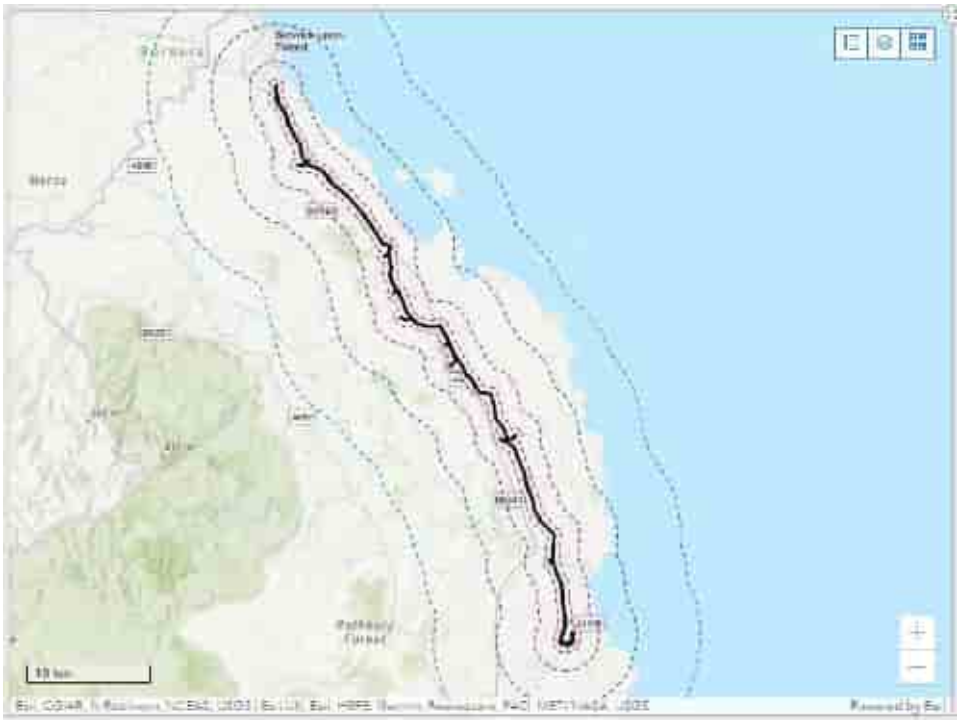
SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	1.00
0	28.00	39.00
-	13.00	2.00
--	0.00	0.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified 12 Natura 2000 sites with Likely Significant Effects: Dew's Ponds SAC (UK0030133) (approx. 0.49km), The Broads SAC (UK0013577) (approx. 2.1km), Broadland Ramsar (UK110100 (approx. 2.1km), Broadland SPA (UK9009243) (approx. 2.1km), Minsmere-Walberswick SPA (UK9009101) (approx. 3.5km), Minsmere to Walberswick Heaths & Marshes SAC (UK0012809) (approx. 3.5km), Minsmere to Walberswick Ramsar (UK11044) (approx. 4km), Alde-Ore & Butley Estuaries SAC (UK0030076) (approx. 5.5km), Alde-Ore Estuary Ramsar (UK11002) (approx. 5.5km), Alde-Ore SPA (UK9009112) (approx. 5.5km), Outer Thames Estuary SPA (UK9020309) (approx. 8km), Southern North Sea SAC (UK0030395) (approx. 8km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£758.02
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that some Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation. Permanent loss of woodland priority stocks expected as a result of the option construction.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the permanent loss of stocks which will result in the permanent release of CO2 due to habitat clearance, permanent loss of natural hazard management, and a permanent reduction in water purification services. There is no change anticipated to water flow regulation.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-23.69
BNG Outcome (% Change):	-14.13%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Transfer of treated water from Barsham WTW to Walpole WTW via Saxmundham Tower . Water is transferred via a new pipeline and forms a closed system therefore there is negligible risk of INNS transmission and introduction at source pathway and receptor.

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	693.35
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£703.69

Option GIS:



ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
New Main from AW SPA Main near Little Whelnetham to Eye Airfield	Effluent re-use plant being fed from Colchester WRC with a transfer to Abberton Reservoir. Intake from Colchester WRC, discharge to Abberton Reservoir. Two transfers required: Colchester WRC to new effluent reuse plant (Transfer 1, approximately 200m) and new effluent reuse plant to Abberton Reservoir (Transfer 2, approximately 5.4km).
Option Code:	EWS-TRA-003

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A		

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)	The pipeline passes adjacent to and through small parcels of Ancient Woodland and BAP Priority Habitat (mainly deciduous woodland). Potential permanent loss of Ancient Woodland and deciduous woodland BAP Priority Habitat. No direct effects on other Priority Habitats but there may be disturbance effects during the construction phase and potential effects on protected species. There are two Groundwater Dependent Territorial Ecosystems (GWDTE) within 500m, Major Farm, Braiseworth (SSSI), and The Gardens, Great Ashfield (SSSI). The chalk river Sapiston is within 2km of the option. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -90.29%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.	Consider minor rerouting to avoid most high value habitats. Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid woodland habitat, in particular Ancient Woodland and BAP Priority Habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual construction effects are lessened.

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0	0
++	0	0
+	1	2
0	30	39
-	10	1
--	1	0
---	0	0
(?)	0	0

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified no Natura 2000 sites with Likely Significant Effects.
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£29,715.29
Natural Capital Assessment: Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation. Permanent loss of arable land and ancient woodland is expected as a result of the option.
Ecosystem Service Assessment Comments:	The option is likely to generate the loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management, a reduction in food production, and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation. Permanent loss of arable stocks and ancient woodland due to option construction hence loss of associated ecosystem services expected.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-128.16
BNG Outcome (% Change):	-90.29%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	There are two waterbodies to be scoped-in for further assessment.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Service reservoirs are both closed systems. Water is transferred via pipeline. Negligable risk of INNS being introduced at source, pathway or receptor.

WRE Metrics	
Capital Carbon (tCO2e)	67,314.62
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£2,794.43

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Essex to Hartismere Transfer	9.75 Ml/d transfer of treated water from Little Whelnetham Service Reservoir to New Eye Airfield Service Rerservoir. Transfer length approximately 31.5 km.
Option Code:	ESW-TRA-004

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A		

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)	The pipeline passes through areas of the following BAP priority habitats; coastal and floodplain grazing marsh; deciduous woodland and good quality-semi improved grassland. Potential permanent loss of these BAP priority habitats. The option passes within 500m of ancient woodland. No direct effects on ancient woodland but there may be disturbance effects during the construction phase and potential effects on protected species. There is one Groundwater Dependent Terrestrial Ecosystems, Major Farm Braiseworth within 500m of the option. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -91.47%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.	Consider minor rerouting to avoid most high value habitats. Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid woodland habitat, in particular Ancient Woodland and BAP Priority Habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual construction effects are lessened.
To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans. (--)	The WFD Phase 1 assessment determined that the option would have a medium level of effect on one or more waterbodies during the operation phase and medium effects on one or more waterbodies during construction, these waterbodies will require further assessment.	Best practice construction methods and pollution prevention measures to be implemented, with these in place no residual effects during operation are expected. Three waterbodies identified will need to undergo WFD stage 2 assessment to determine the construction effects.

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	2.00
0	29.00	39.00
-	10.00	1.00
--	2.00	0.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified two Natura 2000 sites with Likely Significant Effects: Stour and Orwell Estuaries SPA (UK9009121) (approx. 5.1km), Stour and Orwell Estuaries Ramsar (UK11067) (approx.5.1km)
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£44,449.13
Natural Capital Assessment: Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation. Permanent loss of arable stocks is expected as a result of the option.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management, and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation. Permanent loss of arable stocks due to option construction hence loss of associated ecosystem services expected.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	232.32
BNG Outcome (% Change):	-91.62%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	Three waterbodies require further assessment: GB105036040942: Stour (Lamarsh - R. Brett); GB105036040930:Brett; GB105035046280:Gipping (d/s Stowmarket)
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	WTW and service reservoirs are both closed systems. Water is transferred via pipeline. Negligible risk of INNS being introduced at source, pathway or receptor.

WRE Metrics	
Capital Carbon (tCO2e)	74,746.67
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£4,503.10

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Anglian Water Treated Water Import (from east of Norwich area))	Intake from Mousehold WTW, Norwich (Anglian owned asset), discharge to Barsham WTW. Transfer length approximately 28.6 km and 44Ml/d capacity. Route realigned so that it takes off from an Anglian Water transfer outside of Norwich ring road (A47). This has reduced the length of the transfer and reduced the number of critical crossings. Tunnelling (micro-tunnelling/horizontal directional drilling) required as route crosses three major roads (A47, A146, A143), one minor road (B1062), and a large river crossing when just leaving Norwich (River Yare). The route crosses three other rivers (The Beck, River Chet, River Waveney (twice)) and one drainage channel.
Option Code:	ESW-TRA-007

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A		

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)	The pipeline passes through areas of the following BAP priority habitats. Potential permanent loss of these BAP priority habitats. The option passes within 500m of ancient woodland. No direct effects on ancient woodland but there may be disturbance effects during the construction phase and potential effects on protected species. There are two Groundwater Dependent Terrestrial Ecosystems (GWDTE) within 2km of the option, Yare Broads and Marshes and Geldston Meadows. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -73.85%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.	Consider minor rerouting to avoid most high value habitats. Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid woodland habitat, in particular Ancient Woodland and BAP Priority Habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual construction effects are lessened.

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	2.00
0	29.00	38.00
-	11.00	2.00
--	1.00	0.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified three Natura 2000 sites with Likely Significant Effects: The Broads SAC (UK0013577) (approx. 0.1km), Broadland SPA (UK9009253) (approx. 0.1km), Broadland Ramsar (UK11010) (approx. 0.1km)
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£21,185.83
Natural Capital Assessment: Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation. Permanent loss of arable stocks Is expected as a result of the option.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation. Permanent loss of arable stocks due to option construction hence loss of associated ecosystem services expected.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-124.59
BNG Outcome (% Change):	-74.26%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	Four waterbodies require further assessment: Yare; Chet; Waverney; Broadland Rivers Chalk and Crag.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Source- desalinisation pipelines. Chamber/take-off at the source. Pipeline and WTW closed systems. Water being transferred would be treated to potable standard (free of INNS).

WRE Metrics	
Capital Carbon (tCO2e)	54,047.90
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£2,163.95

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Sizewell to Saxmundham	Transfer (8 Ml/d) from AW Sizewell desalination plant to Saxmundham Tower Transfer is approximately 10.1 km long.
Option Code:	ESW-TRA-008

SEA Summary

Residual SEA Objectives with Significant Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A		

Residual SEA Objectives with Significant Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)	The pipeline passes through areas of the following priority habitats; deciduous woodland and traditional orchard. Potential permanent loss of these priority habitats. The option passes within 500m of ancient woodland. No direct effects on ancient woodland but there may be disturbance effects during the construction phase and potential effects on protected species. There are two Groundwater Dependent Terrestrial Ecosystems (GWDTE) within 2km of the option. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -28.66%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.	Consider minor rerouting to avoid most high value habitats. Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid priority habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual construction effects are lessened.

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	2.00
0	30.00	39.00
-	10.00	1.00
--	1.00	0.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified eight Natura 2000 sites with Likely Significant Effects: Sandlings SPA (UK9020286) (approx. 0.9km), Alde-Ore & Butley Estuaries SAC (UK0030076) (approx. 5km), Alde-Ore Estuary SPA (UK9009112) (approx. 5km), Alde-Ore Estuary Ramsar (UK11002) (approx. 5km), Minsmere to Walberswick Heaths & Marshes SAC (UK0012809) (approx. 2.6km), Minsmere - Walberswick SPA (UK9009101) (approx. 2.6km), Minsmere - Walberswick Ramsar (UK11044) (approx. 2.6km), Outer Thames Estuary SPA (UK9020309) (approx. 2.1km)
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£3006.48
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. Traditional orchard expected to be permanently lost as a result of the construction of the option. No loss of the floodplain is expected as a result of the option construction due to standard mitigation.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However most habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management, and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation. Permanent loss of arable stocks due to option construction hence loss of associated ecosystem services expected.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-15.50
BNG Outcome (% Change):	-28.66%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	One waterbody requires further assessment: Waveney and East Suffolk Chalk and Crag
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Water transferred from desalinisation plant to water tower, the source pathway and receptor form a closed system. Water being transferred would be treated to potable standard (free of INNS).

WRE Metrics	
Capital Carbon (tCO2e)	16,757.47
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£303.66

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Wherstead to Saxmundham using AW SPA transfer as water source	Transfer from Wherstead to new service reservoir near Saxmundham WT. Transfer is approximately 46.1 km long, with 10 ml/d max capacity.
Option Code:	ESW-TRA-010

SEA Summary

Residual SEA Objectives with Significant Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A		

Residual SEA Objectives with Significant Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)	The pipeline passes adjacent to and through parcels of Ancient Woodland and BAP Priority Habitat (coastal and floodplain grazing marsh, deciduous woodland and good quality semi-improved grassland). Potential permanent loss of deciduous woodland and other BAP Priority Habitat. No direct effects on Ancient Woodlands but there may be disturbance effects during the construction phase. There are three GWDTE within 2km of the option. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -23.17%. Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.	Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid woodland habitat, in particular Ancient Woodland and BAP Priority Habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual construction effects are lessened.

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	2.00
0	30.00	39.00
-	10.00	1.00
--	1.00	0.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified seven Natura 2000 sites with Likely Significant Effects: Stour and Orwell Estuaries Ramsar (UK11067) (approx. 1.9km), Stour and Orwell Estuaries SPA (UK9009121) (approx. 1.9km), Alde-Ore & Butley Estuaries SAC (UK0030076) (approx. 2.3km), Alde-Ore Estuary Ramsar (UK11002) (approx. 2.3km), Alde-Ore Estuary SPA (UK9009112) (approx. 2.3km), Deben Estuary Ramsar (UK11017) (approx. 4.9km), Deben Estuary SPA (UK9009261) (approx. 4.9km)
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£3288.58
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. Permanent loss of the coastal floodplain grazing marsh stocks, arable and pastoral stocks and floodplain is expected as a result of the option construction.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, some habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique. Broadleaved/mixed/yew/priority/coniferous woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. There is no change anticipated to water flow regulation. Permanent loss of arable stocks and pastoral stocks due to option construction hence loss of associated ecosystem services e.g. carbon storage and food production expected. Permanent loss of coastal floodplain grazing marsh will permanently impact water purification services.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-41.48
BNG Outcome (% Change):	-18.56%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Transfer of treated water from existing pipelines to new service reservoir. Water is to be transferred through a closed system and as source water is treated there is negligible risk of INNS being introduced at source, transfer or receptor.

WRE Metrics	
Capital Carbon (tCO2e)	96,703.65
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£872.13

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Saxmundham to Eye Airfield (Blyth to Hartismere)	Transfer from Saxmundham WT to Eye Airfield. Transfer is approximately 30.2 km long, with 9.5 Ml/d max capacity.
Option Code:	ESW-TRA-011

SEA Summary		
Residual SEA Objectives with Significant Positive Effects (+++/++)		
SEA Objective	**Comment**	**Mitigation**
N/A		
Residual SEA Objectives with Significant Negative Effects (---/--)		
SEA Objective	**Comment**	**Mitigation**
N/A		

SEA Tally Residual		
SEA Scoring (Residual)	**Cumulative Tally (Construction)**	**Cumulative Tally (Operation)**
+++	0.00	0.00
++	0.00	0.00
+	1.00	2.00
0	29.00	39.00
-	12.00	1.00
--	0.00	0.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified five Natura 2000 sites with Likely Significant Effects: Alde-Ore & Butley Estuaries SAC (UK0030076) (approx. 6km), Alde-Ore Estuary Ramsar (UK11002) (approx. 6km), Alde-Ore Estuary SPA (UK9009112) (approx. 6km), Outer Thames Estuary SPA (UK9020309) (approx. 9.9km), Southern North Sea SAC (UK0030395) (approx. 9.9km)
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£1737.95
Natural Capital Assessment: Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. Some permanent loss of the floodplain is expected as a result of the option construction. Permanent loss of the ancient woodland stock and arable land stocks is expected as a result of the option construction.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, some habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique. Broadleaved/mixed/yew/priority/coniferous woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the permanent release of CO2 due to habitat clearance, loss of natural hazard management and a permanent reduction in water purification due to the permanent loss of ancient woodland and arable stocks. There is no change anticipated to water flow regulation. Permanent loss of arable stocks due to option construction hence loss of associated ecosystem services expected.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-10.09
BNG Outcome (% Change):	-7.75%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessments.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Transfer of treated/potable water from Saxmundham water tower to a new service reservoir Eye Airfield. Water is transferred via 30.2km of pipeline and is a closed system therefore the risk of INNS transmission is negligible .

WRE Metrics	
Capital Carbon (tCO2e)	46,717.05
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£732.15

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:	
Eye Airfield to Saxmudham (Hartismere to blyth)	Transfer from Eye Airfield to Saxmundham WT. Transfer is approximately 30.2 km long, with 8 Ml/d max capacity. Alignment is the same as for ESW-TRA-011, but with opposite water transfer direction.	
Option Code:	ESW-TRA-012	
SEA Summary		
Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)		
SEA Objective	**Comment**	**Mitigation**
N/A		
Residual SEA Objectives with Major/Moderate Negative Effects (---/--)		
SEA Objective	**Comment**	**Mitigation**
N/A		
SEA Tally Residual		
SEA Scoring (Residual)	**Cumulative Tally (Construction)**	**Cumulative Tally (Operation)**
+++	0.00	0.00
++	0.00	0.00
+	1.00	2.00
0	29.00	39.00
-	12.00	1.00
--	0.00	0.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified five Natura 2000 sites with Likely Significant Effects: Alde-Ore & Butley Estuaries SAC (UK0030076) (approx. 6km), Alde-Ore Estuary Ramsar (UK11002) (approx. 6km), Alde-Ore Estuary SPA (UK9009112) (approx. 6km), Outer Thames Estuary SPA (UK9020309) (approx. 9.9km), Southern North Sea SAC (UK0030395) (approx. 9.9km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£1709.33
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. Permanent loss of the arable stocks, ancient woodland stocks and floodplain stocks is expected as a result of the option construction.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, most habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the permanent release of CO2 due to habitat clearance, permanent loss of natural hazard management and a permanent reduction in water purification due to the permanent loss of stocks. There is no change anticipated to water flow regulation. Permanent loss of arable stocks due to option construction hence loss of associated ecosystem services e.g. carbon storage and food production expected.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-11.30
BNG Outcome (% Change):	-7.95%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Transfer of treated water from ESW service reservoir connected into the pipeline networks to Saxmundham WT. Water is to be transferred through a closed system and as source water is treated there is negligible risk of INNS being introduced at source transfer and receptor.

WRE Metrics	
Capital Carbon (tCO2e)	44,986.18
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£705.42

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Saxmundham to Barsham (Blyth to Northern Central)	26.5 Ml/d transfer from Saxmundham WT to Barsham WTW. Transfer length approximately 28.3 km long.
Option Code:	ESW-TRA-013

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A		

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To protect designated sites and their qualifying features. (--)	Dew's Ponds SSSI (100% favourable) and SAC is within 500m of the option. No direct effects but there may be disturbance effects during the construction phase. Other designated sites within 2km which may be indirectly affected include ancient woodlands and areas of priority habitat. The option is entirely located within SSSI Impact Risk Zones. There are no MCZ/MPAs within 500m of the option. The HRA ToLS identified 15 Natura 2000 sites that could be affected. Likely significant effects were identified for Dew's Ponds SAC and Broadland SPA. No LSE concluded for the remaining 13 sites.	Best practice methods to be implemented to minimise disturbance effects. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual construction effects are lessened although this wouldn´t negate the need for a potential appropriate assessment.

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	1.00
0	29.00	40.00
-	11.00	1.00
--	1.00	0.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified two Natura 2000 sites with Likely Significant Effects: Dew's Ponds SAC (UK0030133) (approx. 0.1km), Broadland SPA (UK9009243) (approx. 2.1km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£83.53
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, some habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts will result in the loss of stocks which will include the permanent release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. There is no change anticipated to water flow regulation.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-12.64
BNG Outcome (% Change):	-9.59%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Transfer of treated water from Saxmundham Tower to Barsham. Water is transferred via a new pipeline and forms a closed system therefore there is negligible risk of INNS transmission and introduction at source pathway and receptor.

WRE Metrics	
Capital Carbon (tCO2e)	51,795.88
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£79.72

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:	
Eye Airfield to Barsham (Hartismere to Northern Central)	Transfer from Eye Airfield to Barsham WTW. Transfer is approximately 33 km long, with 26.5 Ml/d max capacity.	
Option Code:	ESW-TRA-014	
SEA Summary		
Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)		
SEA Objective	**Comment**	**Mitigation**
N/A		
Residual SEA Objectives with Major/Moderate Negative Effects (---/--)		
SEA Objective	**Comment**	**Mitigation**
To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)	The pipeline passes adjacent to and through small parcels of Ancient Woodland and BAP Priority Habitat (coastal and floodplain grazing, deciduous woodland and good quality semi-improved grassland). Potential permanent loss of Ancient Woodland and other BAP Priority Habitat. There may also be disturbance effects during the construction phase and potential effects on protected species. There are no Groundwater Dependent Terrestrial Ecosystems (GWDTE) or chalk rivers within 2km of the option. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -22.09%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.	Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid woodland habitat, in particular Ancient Woodland and BAP Priority Habitats. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual construction effects are lessened.
To conserve/Protect and enhance the historic environment including the significance of designated and non-designated cultural heritage (including archaeology and built heritage), including any contribution made to that significance by setting. (--)	The option passes through one Conservation Area (Hoxne), and is within 500m of two others (Thorpe Abbots and Brockdish). The option is also within proximity of a number of listed buildings and four Scheduled Monuments. Construction may affect the setting of these historic assets, however this is likely to be temporary as the pipeline will be buried. There is potential for the excavation of the pipeline to impact buried archaeology if present. There will be minimal new above ground infrastructure, which is unlikely to have effects on the setting of heritage assets during operation.	Preferred mitigation for a conservation area is to re-route the pipeline; however, if this is not possible then careful construction and reinstatement to its original condition with no detrimental effect on the character, appearance, or design of the conservation area should be implemented. Best practice measures to be implemented to minimise setting effects for other heritage assets during construction. Further work likely to be required to determine significance of effect, depending on the presence or absence of buried archaeology. Residual effects may remain due to potential loss of archaeological remains.
SEA Tally Residual		
SEA Scoring (Residual)	**Cumulative Tally (Construction)**	**Cumulative Tally (Operation)**

+++	0.00	0.00
++	0.00	0.00
+	1.00	2.00
0	29.00	39.00
-	10.00	1.00
--	2.00	0.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified five Natura 2000 sites with Likely Significant Effects: Broadland SPA (UK9009253) (approx. 2.1km), Broadland Ramsar (UK11010) (approx. 2.1km), The Broads SAC (UK0013577) (approx. 2.1km), Waveney & Little Ouse Valley Fens SAC (UK0012882) (approx. 9.5km), Redgrave & South Lopham Fens Ramsar (UK11056) (approx. 9.5km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£2299.73
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that some Natural Capital stocks post construction will have no to little change. Permanent loss of the coastal floodplain grazing marsh stocks, arable and pastoral stocks and floodplain stocks is expected as a result of the option construction.
Ecosystem Service Assessment Comments:	The option is likely to generate the loss of natural capital stocks during construction. However, some habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the permanent loss of some stocks which will result in the permanent release of CO2 due to habitat clearance, permanent loss of natural hazard management and a permanent reduction in water purification. There is no change anticipated to water flow regulation.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-33.20
BNG Outcome (% Change):	-18.37%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Transfer of treated water from a new service reservoir in Eye to Barsham WTW via a new pipeline. Water is transferred through a closed system therefore there is negligible risk of INNS transmission and introduction at source, pathway and receptor.

WRE Metrics	
Capital Carbon (kgCO2e)	57,775.91
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£294.68

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Barsham to Eye Airfield (Northern Central to Hartismere)	Transfer from Barsham WTW to Eye Airfield. Transfer is approximately 33 km long, with 26.5 Ml/d max capacity.
Option Code:	ESW-TRA-015

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A		

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
N/A		

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	1.00
0	29.00	40.00
-	12.00	1.00
--	0.00	0.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified one Natura 2000 site with Likely Significant Effects: Broadland SPA (UK9009253) (approx. 2.1km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-2296.20
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that some Natural Capital stocks post construction will have no to little change. Permanent loss of the coastal and floodplain grazing marsh stocks, arable and pastoral stocks and floodplain stocks is expected as a result of the option construction.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the permanent loss of stocks which will result in the permanent release of CO2 due to habitat clearance, permanent loss of natural hazard management, permanent reduction in water purification and a permanent loss in food production services. There is no change anticipated to water flow regulation.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-39.21
BNG Outcome (% Change):	-21.67%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Transfer of treated water from Barsham WTW to new service reservoir in Eye Airfield. Transfer is via a new pipeline an forms a closed system, therefore, there is negligible risk of INNS being introduced and transferred at source, pathway and receptor.

WRE Metrics	
Capital Carbon (tCO2e)	54,190.81
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£291.15

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Norwich to Eye	Transfer from Norwich (west) to Eye Airfield. Transfer is approximately 49 km long, with 26.5 Ml/d max capacity.
Option Code:	ESW-TRA-016

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A		

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To conserve/Protect and enhance the historic environment including the significance of designated and non-designated cultural heritage (including archaeology and built heritage), including any contribution made to that significance by setting. (--)	The option passes through a Grade II* Registered Park and Garden (Intwood Hall) and a Conservation Area (Hoxne), and a Scheduled Monument (Venta Icenoru). The options is also within proximity of a number of listed buildings. The option also passes within 500m of 5 other Conservation Areas and 6 Scheduled Monuments. Construction may affect the setting of these historic assets, however, this is likely to be temporary as the pipeline will be buried. There is potential for the excavation of the pipeline to impact buried archaeology if present. There will be minimal new above ground infrastructure, which is unlikely to have effects on the setting of heritage assets during operation.	Preferred mitigation for the Registered Park and Garden and conservation area and Scheduled Monuments is to re-route the pipeline; however, if this is not possible then careful construction and reinstatement to its original condition with no detrimental effect on the character, appearance, or design of the these areas should be implemented. Best practice measures to be implemented to minimise setting effects for other heritage assets during construction. Further work likely to be required to determine significance of effect, depending on the presence or absence of buried archaeology. Residual effects may remain due to potential loss of archaeological remains.

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	2.00
0	28.00	39.00
-	12.00	1.00
--	1.00	0.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified two Natura 2000 sites with Likely Significant Effects: Waveney & Little Ouse Valley Fens SAC (UK0012882) (approx. 9.5km), Redgrave & South Lopham Fens Ramsar (UK11056) (approx. 9.5km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-3305.61
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that some Natural Capital stocks post construction will have no to little change. Permanent loss of the coastal floodplain grazing marsh stocks, arable and pastoral stocks, semi-natural grassland stocks and floodplain stocks are expected as a result of the option construction.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, some habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the permanent release of CO2 due to habitat clearance, permanent loss of natural hazard management and a permanent reduction in water purification due to the permanent loss of some stocks. There is no change anticipated to water flow regulation. Permanent loss of arable stocks and pastoral stocks due to option construction hence loss of associated ecosystem services e.g. carbon storage and food production expected. Permanent loss of coastal floodplain grazing marsh stocks will result in loss of water purification services.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-37.44
BNG Outcome (% Change):	-16.83%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Transfer of water from an existing service reservoir to a new service reservoir via a new pipeline. Route forms a closed system therefore there is negligible risk of INNS transfer and introduction.

WRE Metrics	
Capital Carbon (tCO2e)	80,554.12
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£987.26

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Saxmundham to Coldfair Green / Sizewell	Transfer from Saxmundham Tower to AW Sizewell desalination plant. Transfer is approximately 10.1 km long, with 2.5 Ml/d max capacity.

Option Code:	ESW-TRA-017

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A		

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
N/A		

SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	2.00
0	29.00	39.00
-	12.00	1.00
--	0.00	0.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified three Natura 2000 sites with Likely Significant Effects: Minsmere-Walberswick Ramsar (UK11044) (approx. 2.7km), Minsmere-Walberswick SPA (UK9009101) (approx. 2.7km), Alde-Ore Estuary SPA (UK9009112) (approx. 4.9km)
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£496.61
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that some Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation. Permanent loss of arable stocks and traditional orchard stocks are expected as a result of the option construction.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the loss of stocks which will result in the release of CO2 due to habitat clearance, loss of natural hazard management, permanent reduction in water purification, and a permanent loss in food production services. There is no change anticipated to water flow regulation.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-4.72
BNG Outcome (% Change):	-11.17%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	one waterbody requires further assessment: Waveney and East Suffolk Chalk and Crag.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Transfer of treated water from Saxmundham Tower to Sizewell desalination plant. Water is transferred via a new pipeline and forms a closed system therefore there is negligible risk of INNS transmission and introduction at source pathway and receptor.

WRE Metrics	
Capital Carbon (tCO2e)	15,186.95
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£93.59

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:	
Transfer from Bungway Well to Broome WTW	Transfer from Bungay Wells to Broome WTW. Transfer is approximately 3.6 km long, with 1 Ml/d max capacity.	
Option Code:	ESW-TRA-018	
SEA Summary		
Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)		
SEA Objective	**Comment**	**Mitigation**
N/A	N/A	N/A
Residual SEA Objectives with Major/Moderate Negative Effects (---/--)		
SEA Objective	**Comment**	**Mitigation**
To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)	The pipeline passes adjacent to and through BAP Priority Habitat (Coastal and floodplain grazing marsh, good quality semi improved grassland, and Deciduous woodland). Potential permanent loss of BAP Priority Habitat. There are also likely to be indirect impacts on Priority Habitats such as disturbance effects during the construction phase and potential effects on protected species. There are no Groundwater Dependent Terrestrial Ecosystems (GWDTE) or chalk rivers within 2km of the option. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -61.73%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.	Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid BAP Priority Habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual construction effects are lessened although this wouldn't negate the need for a potential appropriate assessment..
To conserve, protect and enhance landscape and townscape character and visual amenity. (--)	Option overlaps one NCA(s) (with % proportion of NCA affected):The Broads (0.01%). Negative effects during construction likely as excavation will be required for the transfer pipeline. Construction will also result in permanent loss of woodland, with impacts on landscape character. The option overlaps almost completely with a national park, The Broads, and there are likely to be landscape and visual effects during the construction phase. There will be minimal new above ground infrastructure. The pumping station is a relatively small-scale structure and is therefore unlikely to change the landscape character of the area or affect visual amenity during operation.	Re-routing of the pipeline to minimise damage and disruption to woodland, and national park, or utilise directional drilling or other trenchless techniques to reduce construction effects. Best practice measures to be implemented to minimise effects during construction including although temporary effects during construction may remain. Land reinstated upon completion so with mitigation, no residual effects are likely to remain during operation.

SEA Tally Residual		
SEA Scoring (Residual)	**Cumulative Tally (Construction)**	**Cumulative Tally (Operation)**
+++	0.00	0.00
++	0.00	0.00

+	1.00	2.00
0	30.00	38.00
-	9.00	2.00
--	2.00	0.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified three Natura 2000 sites with Likely Significant Effects: Broadland SPA (UK9009253) (approx. 3.7km), Broadland Ramsar (UK11010) (approx. 3.7km), The Broads SAC (UK0013577) (approx. 3.7km)
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£118.17
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary loss of natural capital stocks during construction. However all habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-22.39
BNG Outcome (% Change):	-61.73%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	Two sites require further assessment: Waveney (Starston Brook - Ellingham Mill) and Broadlands Rivers Chalk and Crag.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Transfer of raw water from a number of wells in Bungay to Broome WTW. Option involves the transfer of raw water via a new 3.6km pipeline.

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	1,138.26
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£90.97

Option GIS:

ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Transfer from Holton WTW to Eye Airfield	8.5 Ml/d transfer from Holton WTW to Eye Airfield. Transfer length approximately 30.6 km.
Option Code:	ESW-TRA-019

SEA Summary

Residual SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A	N/A	N/A

Residual SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
To conserve/Protect and enhance the historic environment including the significance of designated and non-designated cultural heritage (including archaeology and built heritage), including any contribution made to that significance by setting. (--)	The option intersects with one grade II listed structure and Halesworth Conservation Area. Furthermore, it is within 500 metres of a number of listed buildings. Construction may affect the setting of these historic assets, however this is likely to be temporary as the pipeline will be buried. There is potential for the excavation of the pipeline to impact buried archaeology if present. There will be minimal new above ground infrastructure, which may have minimal effects on the settings of heritage assets during operation.	Preferred mitigation for the listed building and conservation area is to re-route the pipeline; however, if this is not possible then careful construction and reinstatement to its original condition with no detrimental effect on the character, appearance, or design of the listed building or conservation area should be implemented. Best practice measures to be implemented to minimise setting effects for other heritage assets during construction. Further work likely to be required to determine significance of effect, depending on the presence or absence of buried archaeology. Residual effects may remain due to potential loss of archaeological remains.

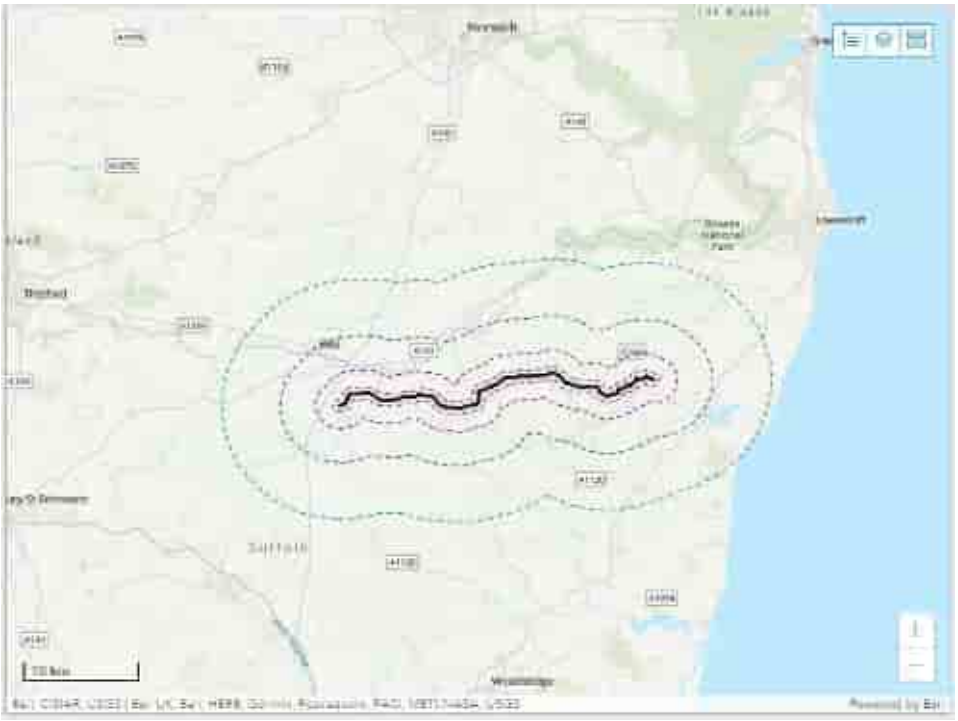
SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	1.00
0	30.00	39.00
-	10.00	2.00
--	1.00	0.00
---	0.00	0.00
(?)	0.00	0.00

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified four Natura 2000 sites with Likely Significant Effects: Minsmere-Walberswick SPA (UK9009101) (approx. 5km), Minsmere to Walberswick Ramsar (UK11044) (approx. 5km), Outer Thames Estuary SPA (UK9020309) (approx. 9.9km), Southern North Sea SAC (UK0030395) (approx. 9.9km)
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£360.92
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-14.91
BNG Outcome (% Change):	-10.42%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment.
INNS Summary	
INNS Risk Score	1 = Very Low
Comments	Transfer of treated water from Holton WTW to the new service reservoir in Eye. Water is transferred via a new pipeline and forms a closed system therefore there is negligible risk of INNS transmission and introduction at source pathway and receptor.

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	899.27
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£328.64

Option GIS:



ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:
Broome to Barsham Transfer	The transfer of raw water from Broome WTW (635605 E, 291565 N) to Barsham WTW (640651 E, 289465 N) - connecting to a new service reservoir. The transfer pipeline is approximately 6.04km long and has an outside diamater of 225mm.
Option Code:	ESW-TRA-023

SEA Summary

SEA Objectives with Major/Moderate Positive Effects (+++/++)

SEA Objective	Comment	Mitigation
N/A	N/A	N/A

SEA Objectives with Major/Moderate Negative Effects (---/--)

SEA Objective	Comment	Mitigation
Minimise resource use and waste production (--).	The option involves the implementation of new infrastructure, and therefore will require the consumption of materials, as well as generate waste and excavated material. Given the scale of the pipeline proposed, resource use and waste production is likely to be high. In addition, the pipeline will also require energy to pump water during operation, and any future maintenance or replacement works will require additional resources.	Seek opportunities to implement sustainable design measures (design to reduce footprint, selection of materials) and reuse excavated material to reduce the impact, however it is likely that negative effects will remain.

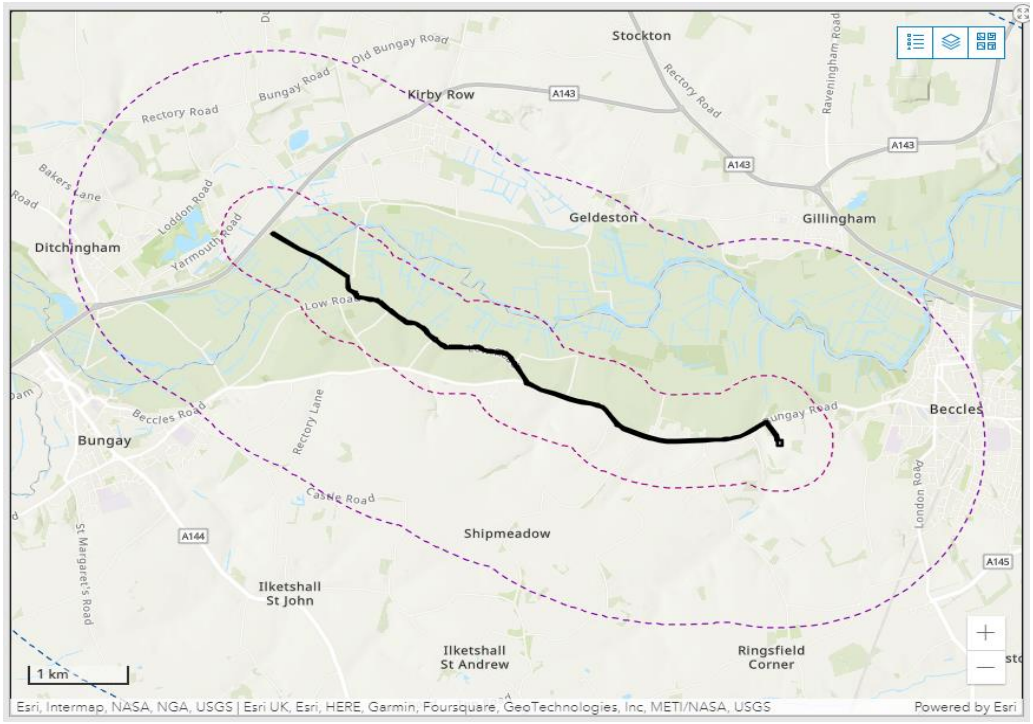
SEA Tally Residual

SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	0.00	3.00
0	29.00	37.00
-	12.00	2.00
--	1.00	0.00
---	0.00	0.00
(?)		

HRA Summary	
HRA Screening Outcome:	The HRA TolS identified three Natura 2000 sites with Likely Significant Effects: Broadland SPA (UK9009253) (approx. 1.5km), Broadland Ramsar (UK110100) (approx. 1.5km), and The Broads SAC (UK0013577) (approx. 1.5km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£473.09
Natural Capital Assessment: Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation. Permanent loss of some arable land is expected during construction of the option.
Ecosystem Service Assessment Comments:	The option is likely to generate the loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecoystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a deay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management, loss of air quality, loss of food production and a reduction in water purification. However, it is not expected to affect the future value as stocks are expected to be reinstated. There is no change anticipated to water flow regulation.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-23.03
BNG Outcome (% Change):	-42.41%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies requiring further assessment
INNS Summary	
INNS Risk Score	3 = Low
Comments	Physical transfer of untreated water (between two locations assumed currently unconnected). Assumes any transferred INNS would be treated/removed at receptor water treatment facility. Additional risks from pipeline washout, pipeline bursts, washwater discharge, overflows and sludge disposal. Transfer of raw water is within a closed system (i.e., between WTWs) rather than to a watercourse.

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£473.09

Option GIS:



ESW WRMP Integrated Environmental Assessment Information Pack

Option Name:	Option Description:	
Langford UV (Crypto)	Additional ultraviolet treatment contactors to treat for cryptosporidium for the full WTW flow capacity of 57Ml/d. These are to be located on the outlet from the Granular Activated Contactors, prior to the clean water storage tanks. The option assumes the need for inline pumping, on site power supply and transformer, additional standby power generation and fuel storage.	
Option Code:	ESW-UVC-001	
SEA Summary		
SEA Objectives with Major/Moderate Positive Effects (+++)		
SEA Objective	**Comment**	**Mitigation**
N/A	N/A	N/A
SEA Objectives with Major/Moderate Negative Effects (---)		
SEA Objective	**Comment**	**Mitigation**
N/A	N/A	N/A
SEA Tally Residual		
SEA Scoring (Residual)	**Cumulative Tally (Construction)**	**Cumulative Tally (Operation)**
+++	0.00	0.00
++	0.00	0.00
+	0.00	4.00
0	33.00	35.00
-	9.00	3.00
--	0.00	0.00
---	0.00	0.00
(?)		

HRA Summary	
HRA Screening Outcome:	The HRA ToLS identified three sites Natura 2000 sites with Likely Significant Effects: Essex Estuaries SAC (UK0013690) (approx. 2.5km), Blackwater Estuary Ramsar (UK11007) (approx. 2.5km), and Blackwater Estuary SPA (UK9009245) (approx. 2.5km).
Natural Capital Assessment Summary	
Natural Capital Assessment Outcome:	-£334.73
Natural Capital Assessment: Comments:	The option will likely cause the permanent loss of stocks during construction.
Ecosystem Service Assessment Comments:	The option is likely to generate the permanent loss of natural capital stocks during construction. Permanent impacts include the loss of food production, carbon storage and air pollutant removal.
Biodiversity Net Gain Assessment Summary	
BNG Outcome (Unit Change):	-0.10
BNG Outcome (% Change):	-100.00%
Water Framework Directive Screening Assessment Summary	
WFD Screening Outcome: (No. Scoped-In / Out)	No waterbodies require further assessment
INNS Summary	
INNS Risk Score	None
Comments	No INNS risk associated with this option as it relates to water treatment and does not involve the movement of raw water.

Carbon Calculations	
Capital Carbon Intensity (£M/tCO2e)	106,058
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£2.00

Option GIS: