

Option Assessment Information	
Option ID	CW24-01A
Option Name	Combined Ouse Gravel Sources - Fenstanton to St Ives
Water company	Cambridge Water
Option Description	<p>This option is to recommission the unused groundwater abstraction source (Fenstanton, Ouse gravels). Fenstanton BH site (E/N: 531441, 269947) was decommissioned in 1999, it is assumed all operational plant has been removed, therefore new infrastructure is required comprising of:</p> <p>2 new 0.6dia, 25m deep borehole shafts, inclusive of two 2.5kW pumps (5kW)</p> <p>New borehole control building (20m2)</p> <p>A new 1.2km raw water pumped pipeline will be laid between Fenstanton BHs and St Ives WTW for transfer of raw water.</p> <p>1.2km of linear land compensation for the pipeline proposed.</p> <p>0-50kW Power supply</p> <p>The St Ives BH and WTW have been progressed separately since WRMP19 and are undergoing recommissioning as part of AMP7. This option assumes that the St Ives WTW will be operational and sized to receive the Fenstanton BH flows proposed for dWRMP24. It is also assumed no upgrades are required to deploy the additional water from St Ives.</p>
Yield	0.55 MI/d
WRZ	Cambridge

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
Option 01A	Construction (negative)	-/?	-	-	-	0	-	-	-/?	0	0	0	-	-	0	-	0	0
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0
	Operation (negative)	-/?	0	0	0	-	-	0	0	0	0	0	0	0	0	0	0	0
	Operation (positive)	0	+	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0

Construction
<p>Objective 1: Minor negative uncertain effect - Portholme SAC is located 6.5km, along the River Great Ouse, upstream of Option 01A therefore no LSE are anticipated from construction works upon the qualifying features of the SAC (H6510 Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis). Ouse Washes SAC/SPA/Ramsar is located along the Old Bedford River and the New Bedford River, which are artificial, partial diversion of the waters of the River Great Ouse. The designated sites are located 8.85km downstream of option 01A. Due to the distance between the option and the designated sites, construction works are not anticipated to have an impact on the qualifying features through noise, visual disturbance or air pollution. However, construction works which include a new pipeline in proximity to the River Great Ouse (180m) may result in surface and groundwater pollution incident, sedimentation which may affect qualifying feature of the Ouse Washes SAC (spined loach) and the waterbird assemblage associated with the SPA and Ramsar sites. LSE could not be ruled out and further assessment was required. The HRA Stage 2 Appropriate Assessment undertaken for Ouse Washes SAC/SPA/Ramsar concluded that with appropriate mitigation there will be no adverse effects on conservation objectives or site integrity during construction, however without further option details there is still some uncertainty.</p> <p>There are 8 further SSSI within 10km of the option, the closest site is Hemingford Grey Meadow 1.5km away. There are two LNRs within 10km of the option with the closest being Mare Fen located 4.8km away. There are no NNRs within 10km. There are no ancient woodland areas within 5km of the option, the closest ancient woodland area is located 6.1km away. Pipeline construction activities and construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.</p>
<p>Objective 2: Minor negative effect - Pipeline construction will cause a temporary, minor, negative impact.</p>
<p>Objective 3: Minor negative effect - Although construction activities are required which could result in increased distribution of terrestrial and aquatic INNS, the risk is considered as minor assuming best practice biosecurity measures will be adopted during construction.</p>
<p>Objective 4: Minor negative effect - The entire option is within Grade 3 agricultural land. There are 4 permitted landfill sites within 10km, with the closest being 4.6km away. There are 15 historic landfill sites within 5km of the option, the closest site is 420m away.</p>
<p>Objective 5: Neutral effect - The River Ouse (Roxton to Earith) is located 160m from the option. West Brook is within 1km of the option. There are no groundwater bodies within 5km of the option. No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.</p>
<p>Objective 6: Minor negative effect - Construction activities near watercourses may have a minor effect on water quality which result in short-term or intermittent effects on receptors. The component would not lead to a change in WFD classification.</p>
<p>Objective 7: Minor negative effect - The option is almost entirely within Flood Zone 3, with the remainder in Flood Zone 2. Construction of the option could potentially cause or exacerbate flooding in the catchment.</p>
<p>Objective 8: Minor negative uncertain effect - Hemingford to Fenstanton (A15) AQMA has it's closest point approximately 900m from the option. Impacts on these AQMAs resulting from construction are considered unlikely. There will be an increase in vehicle movement associated with construction activities and will likely cause short-term deterioration in local air quality. The number of vehicle movements is unknown, thus the extent of impact is uncertain.</p>
<p>Objective 9: Neutral effect - Construction would involve the use of materials with embodied carbon as well as carbon emissions related to construction traffic. The associated embodied carbon for this option is 27 tCO2e which will have a neutral overall effect on greenhouse gas emissions.</p>
<p>Objective 10: Neutral effect - It is not anticipated that the construction of this option would have any effect on climate resilience.</p>
<p>Objective 11: Minor positive effect - The option has a capital spend of ~£1.2M which will have a minor positive effect on employment.</p>

Objective 12: Minor negative effect - Construction works are not expected to have a significant impact on opportunities/facilities for recreation or tourism. There are 6 greenspace areas within 1km of the option, with the closest being play space 110m from the option. The options pipeline crosses two national cycle routes (24 and 51). There are no national trials within 10km of the option. There are 6 CRoWs within 5km, with the closest being 2.4km away (Holywell Front). Hinchingsbrooke Country Park is located 8.1km away.
Objective 13: Minor negative effect - Construction of the option is not expected to have a significant impact on health during the construction period due to the semi-rural location of the option. Construction works may have a minor negative effect (e.g. noise disturbance, vibration, dust deposition and air quality impacts) on residential receptors in surrounding St Ives.
Objective 14: Neutral effect - The construction phase of this option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - Although the option looks at recommissioning an existing groundwater abstraction source, the option assumes that all operational structures have been removed and will therefore require the use of new materials to build new infrastructure. New infrastructure includes borehole shafts, a borehole control room and pipelines. The option is expected to have a minor negative effect on waste and resources as despite a number of elements requiring new resources, the volumes of material are likely to be relatively small and the option has a capital spend of ~£1.2M.
Objective 16: Neutral effect - There are no World Heritage Sites within 10km of the option. There are two parks and gardens within 10km of the option; Childerley Hall is 8.9km away and Abbots Ripton Hall is 9.5km away. There are 2 scheduled monuments within 1km of the option (St Ives Bridge is 620m away and 'the priory barn' is 700m away), there are a further 28 scheduled monuments within 10km of the option. There are a vast number of listed buildings within St Ives, with two within 100m (Limes Park 45m away and Brandon House 90m away). It is not anticipated construction would have any significant effect on these heritage assets, due to the distance between these sites and proposed works.
Objective 17: Neutral effect - There are no AONBs or National Parks within 10km of the option. The Cambridge greenbelt is 9.5km from the option .The option requires the construction of a pipeline and a borehole control room, construction works are likely to be visually intrusive to the semi-rural landscape in the very short term.

Operation
Objective 1: Minor negative uncertain effect - Option 01A is based on the available abstraction licence at Fenstanton BH despite the boreholes not being in used since 1999. Water abstraction will be required during operation in proximity to the River Great Ouse which is hydrologically connected to the Ouse Washes SAC/SPA/Ramsar (downstream of option 01A) and Portholme SAC (upstream of option 01A). As a result, abstraction of ground water may have an impact on the water level within the River Great Ouse. The HRA Stage 2 Appropriate Assessment undertaken for Ouse Washes SAC/SPA/Ramsar concluded that with appropriate mitigation there will be no adverse effects on conservation objectives or site integrity during operation, however further hydrological modelling should be undertaken to fully assess the impacts of water abstraction for a project-level HRA hence there remains some uncertainty. The operation of this option could result in minor effects on non-designated aquatic habitats or species. Flows in the River Ouse may be reduced however only by a small amount. As a result, there could be up to minor degradation of non-designated aquatic habitat as a result of any changes to flow, geomorphology or water quality associated with this component. Any operational impacts are unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Minor positive effect - It is assumed that operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Neutral effect - No negative effects are expected as the scheme involves the abstraction and transfer of groundwater water within a closed system.
Objective 4: Neutral effect - It is not anticipated that there would be any operational effects on soil, land use or geodiversity.
Objective 5: Minor negative effect - Operational activities associated with this component may have a minor discernible effect on river flows or groundwater levels. This flow change is insufficient to impact sediment dynamics and will not result in a change to channel morphology.
Objective 6: Minor negative effect - The reduction in flows associated with this component may reduce the rivers buffering capacity against point source pollutants, however, this would not be sufficient to cause WFD deterioration.
Objective 7: Neutral effect - The operation of this option is not expected to cause or exacerbate the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Neutral effect - It is not anticipated that there would be any significant impact on traffic congestion during the operational period such that the option is expected to have a neutral effect on local air quality. The number of vehicle movements required during the operation of the option is currently unknown, although as borehole, pumps, and controls infrastructure are not likely to generate > 5 vehicle movements per day the effect against this objective has been scored as a neutral effect.
Objective 9: Neutral effect - As part of the option a new power supply of up to 50Kw will be provided. Operation of the pumps will require additional energy. Operational carbon emissions over the lifespan of scheme has been estimated at 51 tCO2e which will have a neutral effect overall.
Objective 10: Minor positive effect - Operation of the option will provide 0.55ML/d of water resource, supporting community resilience to climate change wherein drought may otherwise have been a risk.
Objective 11: Neutral effect - Operation of this option will provide an additional 0.55ML/d that will have a neutral effect on supporting economic activity.
Objective 12: Neutral effect - Operation of the option is not expected to have a negative impact on tourism and recreation.
Objective 13: Neutral effect - Operation of this option will provide an additional 0.55ML/d that can support human health and wellbeing (less than 1MLd which triggers Minor positive).
Objective 14: Neutral effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the Cambridge Water supply area by providing an additional 0.55ML/d deployable output (5ML/d triggers minor positive).
Objective 15: Neutral effect - Operation of the option will require additional energy (51 tCO2e over the lifespan of the scheme) and may require the use of additional chemicals to treat raw water, however, given the relatively small yield the overall effect is considered to be neutral.
Objective 16: Neutral effect - Operation of this option is not expected to have any impact on cultural heritage sites.
Objective 17: Neutral effect - The option will require a control room building, however this is not expected to have any significant impact on the landscape as this will be within an existing built up area. Therefore impacts on the landscape are considered neutral.

Option Assessment Information	
Option ID	01B
Option Name	Combined Ouse Gravel sources - Fenstanton to St Ives
Water company	Cambridge Water
Option Description	<p>This option is to recommission the unused groundwater abstraction source (Fenstanton, Ouse gravels). Fenstanton BH site (E/N: 531441, 269947) was decommissioned in 1999, it is assumed all operational plant has been removed, therefore new infrastructure is required comprising of:</p> <p>2 new 0.6dia, 25m deep borehole shafts, inclusive of two 18.3kW pumps (37kW)</p> <p>New borehole control building (20m2)</p> <p>A new 1.2km raw water pumped pipeline will be laid between Fenstanton BHs and St Ives WTW for transfer of raw water.</p> <p>1.2km of linear land compensation for the pipeline proposed.</p> <p>0-50kW Power supply</p> <p>4MI/d WTW upgrade</p> <p>The St Ives BH and WTW have been progressed separately since WRMP19 and are undergoing recommissioning as part of AMP7. This option assumes that the St Ives WTW will be operational and an upgrade of the works is to be undertaken to allow for the additional 4MI/d.</p>
Yield	4MI/d
WRZ	Cambridge

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
Option 01B	Construction (negative)	-/?	-	-	-	0	-	-	-/?	-	0	0	-	-	0	-	0	0
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0
	Operation (negative)	-/?	0	0	0	-	-	0	0	-	0	0	0	0	0	-	0	0
	Operation (positive)	?	+	0	0	0	0	0	0	0	+	+	0	+	0	0	0	0

Construction
Objective 1: Minor negative uncertain effect - Portholme SAC is located 6.5km, along the River Great Ouse, upstream of Option 01B therefore no LSE are anticipated from construction works upon the qualifying features of the SAC (H6510 Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis). Ouse Washes SAC/SPA/Ramsar is located along the Old Bedford River and the New Bedford River, which are artificial, partial diversion of the waters of the River Great Ouse. The designated sites are located 8.85km downstream of option 01B. Due to the distance between the option and the designated sites, construction works are not anticipated to have an impact on the qualifying features through noise, visual disturbance or air pollution. However, construction works which include a new pipeline in proximity to the River Great Ouse (180m) may result in surface and groundwater pollution incident, sedimentation which may affect qualifying feature of the Ouse Washes SAC (spined loach) and the waterbird assemblage associated with the SPA and Ramsar sites. LSE could not be ruled out and further assessment was required. The HRA Stage 2 Appropriate Assessment undertaken for Ouse Washes SAC/SPA/Ramsar concluded that with appropriate mitigation there will be no adverse effects on conservation objectives or site integrity during construction, however without further option details there is still some uncertainty. There are 8 further SSSI within 10km of the option, the closest site is Hemingford Grey Meadow 1.5km away. There are two LNRs within 10km of the option with the closest being Mare Fen located 4.8km away. There are no NNRs within 10km. There are no ancient woodland areas within 5km of the option, the closest ancient woodland area is located 6.1km away. Pipeline construction activities and construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Minor negative effect - Pipeline construction will cause a temporary, minor, negative impact.
Objective 3: Minor negative effect - Although construction activities are required which could result in increased distribution of terrestrial and aquatic INNS, the risk is considered as minor assuming best practice biosecurity measures will be adopted during construction.
Objective 4: Minor negative effect - The entire option is within Grade 3 agricultural land. There are 4 permitted landfill sites within 10km, with the closest being 4.6km away. There are 14 historic landfill sites within 5km of the option, the closest site is 430m away.
Objective 5: Neutral effect - The River Ouse (Roxton to Earith) is located 110m from the option. West Brook is within 1km of the option. There are no groundwater bodies within 5km of the option. No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.
Objective 6: Minor negative effect - Construction activities near watercourses may have a minor effect on water quality which result in short-term or intermittent effects on receptors. The component would not lead to a change in WFD classification.
Objective 7: Minor negative effect - The option is entirely within Flood Zones 2 and 3. Construction of the option could potentially cause or exacerbate flooding in the catchment.
Objective 8: Minor negative uncertain effect - Hemingford to Fenstanton (A15) AQMA has it's closest point approximately 900m from the option. Impacts on these AQMAs resulting from construction are considered unlikely. There will be an increase in vehicle movement associated with construction activities and will likely cause short-term deterioration in local air quality. The number of vehicle movements is unknown, thus the extent of impact is uncertain.
Objective 9: Minor negative effect - Construction would involve the use of materials with embodied carbon as well as carbon emissions related to construction traffic. The associated embodied carbon for this option is 274 tCO2e which will have a minor negative effect on greenhouse gas emissions.
Objective 10: Neutral effect - It is not anticipated that the construction of this option would have any effect on climate resilience.
Objective 11: Minor positive effect - The option has a capital spend of ~£4M (assuming no renewals) which will a minor positive effect on employment.

Objective 12: Minor negative effect - Construction works are not expected to have a significant impact on opportunities/facilities for recreation or tourism. There are 5 greenspace areas within 1km of the option, with the closest being play space 250m from the option. The options pipeline crosses national cycle route 24. There are no national trials within 10km of the option. There are 6 CRoWs within 5km, with the closest being 2.4km away (Holywell Front). Hinchingsbrooke Country Park is located 8.1km away.
Objective 13: Minor negative effect - Construction of the option is not expected to have a significant impact on health during the construction period due to the semi-rural location of the option. Construction works may have a minor negative effect (e.g. noise disturbance, vibration, dust deposition and air quality impacts) on residential receptors in nearby St Ives and Fenstanton.
Objective 14: Neutral effect - The construction phase of this option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative effect - Although the option looks at recommissioning an existing groundwater abstraction source, the option assumes that all operational structures have been removed and will therefore require the use of new materials to build new infrastructure. New infrastructure includes borehole shafts, a borehole control room and pipelines. The option is expected to have a minor negative effect on waste and resources as despite a number of elements requiring new resources, the volumes of material are likely to be relatively small and the CAPEX value is ~£4M.
Objective 16: Neutral effect - There are no World Heritage Sites within 10km of the option. There are two parks and gardens within 10km of the option; Childerley Hall is 8.7km away and Abbots Ripton Hall is 9.7km away. There are 28 scheduled monuments within 10km of the option, the closest is 'The Priory Barn' approximately 120m away. There are a vast number of listed buildings within St Ives, with the closest being Limes Park 540m away. It is not anticipated construction would have any significant effect on these heritage assets, due to the distance between these sites and proposed works.
Objective 17: Neutral effect - There are no AONBs or National Parks within 10km of the option. The Cambridge greenbelt is 9.4km from the option .The option requires the construction of a pipeline and a borehole control room, construction works may be visually intrusive to the semi-rural landscape in the very short term.

Operation

Objective 1: Minor negative uncertain effect - Option 01B is based on the available abstraction licence at Fenstanton BH despite the boreholes not being in used since 1999. Water abstraction will be required during operation in proximity to the River Great Ouse which is hydrologically connected to the Ouse Washes SAC/SPA/Ramsar (downstream of option 01A) and Porholme SAC (upstream of option 01A). As a result, abstraction of ground water may have an impact on the water level within the River Great Ouse. The HRA Stage 2 Appropriate Assessment undertaken for Ouse Washes SAC/SPA/Ramsar concluded that with appropriate mitigation there will be no adverse effects on conservation objectives or site integrity during operation, however further hydrological modelling should be undertaken to fully assess the impacts of water abstraction for a project-level HRA hence there remains some uncertainty. The operation of this option could result in minor effects on non-designated aquatic habitats or species. Flows in the River Ouse may be reduced however only by a small amount. As a result, there could be up to minor degradation of non-designated aquatic habitat as a result of any changes to flow, geomorphology or water quality associated with this component. Any operational impacts are unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Minor positive effect - It is assumed that operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Neutral effect - No negative effects are expected as the scheme involves the abstraction and transfer of groundwater water within a closed system.
Objective 4: Neutral effect - It is not anticipated that there would be any operational effects on soil, land use or geodiversity.
Objective 5: Minor negative effect - Operational activities associated with this component may have a minor discernible effect on river flows or groundwater levels. This flow change is insufficient to impact sediment dynamics and will not result in a change to channel morphology.
Objective 6: Minor negative effect - The reduction in flows associated with this component may reduce the rivers buffering capacity against point source pollutants, however, this would not be sufficient to cause WFD deterioration.
Objective 7: Neutral effect - The operation of this option is not expected to cause or exacerbate the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Neutral effect - It is not anticipated that there would be any significant impact on traffic congestion during the operational period such that the option is expected to have a neutral effect on local air quality. The number of vehicle movements required during the operation of the option is currently unknown, although as borehole, pumps, and controls infrastructure are not likely to generate > 5 vehicle movements per day the effect against this objective has been scored as a neutral effect.
Objective 9: Minor negative effect - As part of the option a new power supply of up to 50Kw will be provided. Operation of the pumps will require additional energy. Operational carbon emissions over the lifespan of scheme has been estimated at 48 tCO2e in the initial year of implementation (2030) followed by a decline to 2.57 tCO2e/year from 2050 onwards (401 tCO2e in total). This will have an overall minor negative effect.
Objective 10: Minor positive effect - Operation of the option will provide 4Ml/d of water resource, supporting community resilience to climate change wherein drought may otherwise have been a risk.
Objective 11: Minor positive effect - Operation of this option will provide an additional 4Ml/d that can support economic activity.
Objective 12: Neutral effect - Operation of the option is not expected to have a negative impact on tourism and recreation.
Objective 13: Minor positive effect - Operation of this option will provide an additional 4Ml/d that can support human health and wellbeing.
Objective 14: Neutral effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the Cambridge Water supply area by providing an additional 4Ml/d deployable output (5Ml/d triggers minor positive).
Objective 15: Minor negative effect - Operation of the option will require additional energy (401 tCO2e over the option lifespan) and may require the use of additional chemicals to treat raw water.
Objective 16: Neutral effect - Operation of this option is not expected to have any impact on cultural heritage sites.
Objective 17: Neutral effect - The option will require a control room building, however this is not expected to have any significant impact on the landscape as this will be within an existing built up area. Therefore impacts on the landscape are considered neutral.

Option Assessment Information	
Option ID	37Aii
Option Name	Site-scale greywater re-use (Northstowe or similar growth)
Water company	Cambridge Water
Option Description	<p>This option incorporates the requirements for site-scale effluent greywater re-use in a new large scale (10k) housing developments. This assumes that the developer will include for greywater collection direct from each built property that will connect to a centralised system that can connect to this options assets This option is being progressed at strategic level, and the findings/costs applied to other future development sites of similar size. The option is expected to be included in the development at design and planning stage.</p> <p>To progress the option a proposed development site in Cambridge has been identified as an example site at Martials Airfield, Cambridge City Airport (549054, 258662).</p> <p>The option includes the required assets of:</p> <p>500m of 180mm raw water pipeline (used for connectivity)</p> <p>A pre-treatment unit for 0.6Ml/d (before the raw water enters the reservoir)</p> <p>A 13.5ha covered reservoir for 4.83Ml storage capacity.</p> <p>1 control building (20m2) (for the reservoir and pump controls)</p> <p>2 x 0.5kW pumps (1kW) (to export the flows from the reservoir to WTW)</p> <p>A new WTW for 0.6Ml/d (to treat the greywater to potable standards)</p> <p>Land compensation costs for 2ha (included as an incentive for the developers for the land area required for the reservoir, pipeline compensation, buildings and WTW)</p> <p>Power supply (51-250kW)</p>
Yield	0.5Ml/d
WRZ	Cambridge Water

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
Option 37A	Construction (negative)	-	0	-	-/?	0	-	-	-/?	-	0	0	-	--	0	-/?	-/?	0
	Construction (positive)	0	0	0	+	0	0	0	0	0	0	++	0	0	0	0	0	0
	Operation (negative)	0	0	0	0	0	0	0	0	-	0	0	0	0	0	-	0	0
	Operation (positive)	0	0	0	0	0	0	0	0	0	+	+	0	+	0	++	0	0

Construction
Objective 1: Minor negative effect - There are no Ramsar sites, SACs, SPAs or NNRs within 10km of the option. There are 8 SSSIs within 5km of the option, the closest site to the option is Wilbraham Fens located 1.38km away. Barnwell LNR is directly adjacent to the option site, there are a further 9 LNRs within 5km. There are no ancient woodland areas within 5km of the option. There are no European designated sites within 10km of the scheme components, or impact pathways over a greater distance. Pipeline construction activities and construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Neutral effect - It is not anticipated that the construction of this option would have any effect on sustainable natural resources.
Objective 3: Minor negative effect - Although extensive construction activities are required which result in increased distribution of terrestrial and aquatic INNS, the risk is considered as minor assuming best practice biosecurity measures will be adopted during construction.
Objective 4: Minor positive effect - This scheme may have a positive effect due to the development of previously developed land.
Objective 4: Minor negative uncertain effect - The majority of the site is within urban or non-agricultural land. Some of the site to the east is located within Grade 2 and 3 Agricultural land, which is considered best and most versatile land, there is potential for land take of this high grade land. The site is directly adjacent to a historic landfill site therefore there is a potential risk of contamination, there are 9 further historic landfill sites within 5km of the option site. There are 5 permitted waste sites within 10km of the option, with the closest being Eversden Landfill Ltd located 1.37km from the site boundary. The majority of this impacts would be for the housing development and the impact associated with the greywater re-use scheme is anticipated to be minor, with uncertainty until the location of the service reservoir within the scheme is confirmed.
Objective 5: Neutral effect - No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.
Objective 6: Minor negative effect - Construction activities near watercourses may have a minor effect on water quality which result in short-term or intermittent effects on receptors. The component would not lead to a change in WFD classification.
Objective 7: Minor negative effect - The site itself is not within a Flood Zone, however Flood Zones 2 and 3 are within 500m. Construction of the option is unlikely to cause or exacerbate flooding in the catchment.
Objective 8: Minor negative uncertain effect - There are 2 AQMAs within 10km of the option. The Cambridge AQMA is located 1.17km from the option site and the A14 Corridor AQMA is 3.62km away. Impacts on these AQMAs resulting from construction are considered unlikely. There will be an increase in vehicle movement associated with construction activities and will likely cause short-term deterioration in local air quality. The number of vehicle movements is unknown, thus the extent of impact is uncertain.
Objective 9: Minor negative effect - Construction of a new service reservoir would involve the use of materials with embodied carbon as well as carbon emissions related to construction traffic. The estimated embodied carbon for this option is 867 tCO2e which will have a minor negative effect on GHG emissions.
Objective 10: Neutral effect - It is not anticipated that the construction of this option would have any effect on climate resilience.
Objective 11: Moderate positive effect - The total expenditure over the lifespan of this option is ~£20m. This would result in a moderate increase in construction related jobs and support the local economy.

Objective 12: Minor negative effect - Construction works have the potential to have a significant impact on opportunities/facilities for recreation or tourism. There are 2 greenspace areas adjacent to the proposed option site, There are a further 10 greenspace sites within 500m. National cycle route 51 runs adjacent to the site boundary for approximately 550m. There are no National trails within 10km of the option. Coldham's Common CRoW is located 230m for the option site boundary, there are a further 13 CRoWs within 5km. There are no Country Parks within 10km of the option. However, the main disruptor is likely to be the housing development, rather than the greywater harvesting component.
Objective 13: Moderate negative effect - Construction of the option could potentially have a significant impact on health during the construction period, due to the largely urban location. Construction works may have a moderate negative effect (e.g. noise disturbance, vibration, dust deposition and air quality impacts) on surrounding residential receptors in Teversham, Romsey, Barnwell and Cherry Hinton. Due to the scale of the option effects are anticipated to be moderate.
Objective 14: Neutral effect - The construction of the scheme is not anticipated to have an effect on sustainable and efficient use of resilient water resources.
Objective 15: Minor negative uncertain effect - The option involves constructing a number of new assets including a greywater treatment WTW, 13.5 ha service reservoir and 500m pipeline with limited opportunities for recycling. The amount of materials required is currently unknown but is assumed to be minor however the significance of effects against this objective is currently uncertain.
Objective 16: Minor negative uncertain effect - There are no World Heritage Sites within 10km of the option. There are 12 registered Parks and Gardens within 5km of the option, with the closest being 1.57km from the option site. There is a Scheduled Monument 930m from the option (Moated site at Manor Farm), there are a further 17 scheduled monuments within 5km of the option site. There is one listed building that appears to be within the option's proposed development site, there are a further 18 listed buildings within 1km of the option. There is a potential risk of a significant effect on the listed building within the proposed site. However, these impacts are likely to be caused by the housing development rather than the greywater recycling component. The location of the service reservoir is a key source of uncertainty against this objective.
Objective 17: Neutral effect - There are no National Parks or AONBs within 10km of the option. Approximately 20% of the proposed option site is within the Cambridge Greenbelt. Construction of the proposed development will have a moderate negative effect on the local landscape, but the greywater recycling component is unlikely to contribute significantly to this negative impact.

Operation
Objective 1: Neutral effect - There are no European designated sites within 10km of the scheme components, or impact pathways over a greater distance. This option involves the capture of greywater and transport of this water to a service reservoir. There are no pathways for this option to impact any non-designated aquatic habitats or species.
Objective 2: Neutral effect - The operational use of this option is not anticipated to have any effect on biodiversity net gain or net impacts on other natural resources.
Objective 3: Neutral effect - It is not anticipated that either the use of a community level greywater recycling system or use of a new service reservoir will create pathways for INNS.
Objective 4: Neutral effect - It is not anticipated that there would be any operational effects on soil, land use or geodiversity.
Objective 5: Neutral effect - This option involves the capture of greywater and transport of this water to a service reservoir. There are no pathways for this option to impact surface water or groundwater quantity.
Objective 6: Neutral effect - This option involves the capture of greywater and transport of this water to a service reservoir. There are no pathways for this option to impact water quality.
Objective 7: Neutral effect - The operation of this option is not expected to cause or exacerbate the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Neutral effect - It is not anticipated that there would be any significant impact on traffic congestion during the operational period such that the option is expected to have a neutral effect on local air quality.
Objective 9: Minor negative effect - Operation of option will require the use of energy to power the WTW, pumps, control room etc. The estimated total operational carbon over the lifespan (80 years) of this option is 347 tCO2e (24 tCO2e in the first year 2035 and decreasing to 3.76 tCO2e per year from 2050 onwards). This will have a minor negative effect on GHG emissions.
Objective 10: Minor positive effect - Operation of the option will provide 0.5MI/d of water resource, supporting community resilience to climate change wherein drought may otherwise have been a risk.
Objective 11: Minor positive effect - Operation of this option will provide an additional 0.5MI/d that can support economic activity.
Objective 12: Neutral effect - Operation of the option is not expected to have a negative impact on tourism and recreation.
Objective 13: Minor positive effect - Operation of this option will provide an additional 0.5MI/d that can support human health and wellbeing.
Objective 14: Neutral effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the Cambridge Water supply area by providing an additional 0.5MI/d deployable output.
Objective 15: Moderate positive effect - the option incorporates rainwater harvesting into new housing developments which encourages sustainable design.
Objective 15: Minor negative effect - Operation of the option will require energy (347 tCO2e over option lifespan) and will likely require the use of chemicals to treat raw water. Therefore there are likely to be minor negative resource impacts during operation.
Objective 16: Neutral effect - Operation of this option is not expected to have any impact on cultural heritage sites.
Objective 17: Neutral effect - Although there are no landscape designations in the area, the option results in a large scale development which will permanently alter the existing landscape. However, assessment of the option is on the option itself, rather than the housing development which is largely independent of the greywater recycling component.

Option Assessment Information	
Option ID	38B
Option Name	Northstowe rainwater harvest or similar growth large storage
Water company	Cambridge Water
Option Description	<p>This option incorporates the requirements for site-scale rainwater harvesting in new large scale (10k) housing developments. This assumes that the developer will include for rainwater harvesting direct from each built property that will connect to a centralised system that can connect to this options assets. This option is being progressed at strategic level, and the findings/costs applied to other future development sites of similar size. The option is expected to be included in the development at design and planning stage.</p> <p>To progress the option a proposed development site in Cambridge has been identified at Martials Airfield – Cambridge City Airport (549054, 258662).</p> <p>The option includes the required assets of:</p> <p>500m of 180mm raw water pipeline (used for connectivity)</p> <p>A 17ha embankment reservoir for 245.7Ml/yr storage capacity (this allows for a constant supply throughout the year)</p> <p>1 control building (20m2) (for the reservoir and pump controls)</p> <p>2 x 0.8kW pumps (2kW) (to export the flows from the reservoir to WTW)</p> <p>A new WTW for 0.9Ml/d (to treat the rainwater to potable standards)</p> <p>Land compensation costs for 2ha (included as an incentive for the developers for the land area required for the reservoir, pipeline compensation, buildings and WTW)</p> <p>Power supply (51-250kW)</p>
Yield	0.9Ml/d
WRZ	Cambridge

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
Option 38	Construction (negative)	-	0	-	-/?	0	-	0	-/?	-	0	0	0	--	0	-/?	0	-
	Construction (positive)	0	0	0	+	0	0	0	0	0	0	+++	0	0	0	0	0	0
	Operation (negative)	--	--	0	0	--	--	0	0	-	0	0	0	0	0	-	0	-/?
	Operation (positive)	0	0	0	0	0	+	+/?	0	0	+	0	0	+	+	++	0	0

Construction
Objective 1: Minor negative effect - There are 18 SSSI's within 10km of the proposed development site, the nearest SSSI is Wilbraham Fens which is 1.4km away. There are 13 LNRs within 10km of the proposed scheme, 3 of which are within 1km including Barnwell LNR which lies adjacent to the border of the proposed development site. There is one area of ancient woodland within 10km of the scheme, Madingley Wood, located over 7.5km away. There are no NNRs within 10km of the site. There are no European designated sites within 10km of the scheme components, or impact pathways over a greater distance therefore the HRA concluded no LSEs. Pipeline construction activities and construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Neutral effect - It is not anticipated that the construction of this option would have any effect on sustainable natural resources.
Objective 3: Minor negative effect - Although extensive construction activities are required which result in increased distribution of terrestrial and aquatic INNS, the risk is considered as minor assuming best practice biosecurity measures will be adopted during construction.
Objective 4: Minor positive effect - This scheme may have a positive effect due to the development of previously developed land.
Objective 4: Minor negative uncertain effect - The majority of the site is within urban or non-agricultural land. Some of the site to the east is located within Grade 2 and 3 Agricultural land, which is considered best and most versatile land, there is potential for land take of this high grade land. The site is directly adjacent to a historic landfill site therefore there is a potential risk of contamination, there are 9 further historic landfill sites within 5km of the option site. There are 5 permitted waste sites within 10km of the option, with the closest being Eversden Landfill Ltd located 1.37km from the site boundary. The majority of this impacts would be for the housing development and the impact associated with the rainwater harvesting scheme is anticipated to be minor, with uncertainty until the location of the embankment reservoir within the scheme is confirmed.
Objective 5: Neutral effect - No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.
Objective 6: Minor negative effect - Construction activities near watercourses may have a minor effect on water quality which result in short-term or intermittent effects on receptors. The component would not lead to a change in WFD classification.
Objective 7: Neutral effect - This option would involve the construction of above-ground water supply infrastructure, but it is located outside floodplain areas. It is anticipated that the option would neither cause nor exacerbate flooding in the catchment during construction.
Objective 8: Minor negative uncertain effect - The proposed development site is not within an AQMA, however, vehicle movements associated with the construction activities may result in a decrease of the local air quality. This option is currently being assessed at a strategic level and there is no available data on the number of vehicle movements required at this stage, therefore the assessment is uncertain.
Objective 9: Minor negative effect - Construction of a new 17 ha embankment reservoir would involve the use of materials with embodied carbon as well as carbon emissions related to construction traffic. The estimated embodied carbon for this option is 207 tCO2e which will have a minor negative effect on GHG emissions.
Objective 10: Neutral effect - The construction phase of the option would have no effect on resilience to climate change effects.

Objective 11: Major positive effect - The total expenditure over the lifespan of this option is ~£223m. This would result in a significant increase in construction related jobs and support the local economy.
Objective 12: Neutral effect - The proposed development example site is within an existing airfield with no tourism or recreational facilities within the boundary. Therefore, construction of the scheme would not have an effect on tourism or recreation.
Objective 13: Moderate negative effect - Construction of the option could potentially have a significant impact on health during the construction period, due to the largely urban location. Construction works may have a moderate negative effect (e.g. noise disturbance, vibration, dust deposition and air quality impacts) on surrounding residential receptors in Teversham, Romsey, Barnwell and Cherry Hinton. Due to the scale of the option effects are anticipated to be moderate.
Objective 14: Neutral effect - The construction of the scheme is not anticipated to have an effect on sustainable and efficient use of resilient water resources.
Objective 15: Minor negative uncertain effect - The option involves constructing a number of new assets including a rainwater treatment WTW, 17 ha embankment reservoir and 500m pipeline with limited opportunities for recycling. The amount of materials required is currently unknown but is assumed to be minor however the significance of effects against this objective is currently uncertain.
Objective 16: Neutral effect - within 1km of the proposed development site, there is 1 scheduled monument (Moated site at Manor Farm) and 19 listed buildings, 1 of which falls within the boundary of the scheme. Construction of the option will have no effect on cultural heritage assets or archaeology.
Objective 17: Minor negative effect - The option would result in new, above ground infrastructure that has a minor negative effect on the local landscape. A portion of the Cambridge greenbelt is within the proposed development site therefore there is potential for minor temporary effects during construction of the embankment reservoir.

Operation
Objective 1: Moderate negative effect - There are no European designated sites within 10km of the scheme components, or impact pathways over a greater distance. This option would intercept rainwater and divert this to a service reservoir. There are flow pressures in the receiving water courses that would be increased through the interception of this rainwater. As such there is the potential for moderate negative impacts on any non-designated aquatic habitats or species.
Objective 2: Moderate negative effect - Permanent habitat loss will occur from the installation and operational use of the pre-treatment plant, storage reservoir and WTW etc, this is expected to have a moderate impact
Objective 3: Neutral effect - Although the transfer of rainwater itself does not pose a INNS risk, the construction of a new reservoir will establish new habitat and secondary pathways for the distribution of INNS if not covered. The current assessment is based upon the assumption that the reservoir will be covered. Best practice biosecurity measures (such as signs, wash down facilities for recreational users, etc) may reduce secondary transfer risks at the proposed reservoir.
Objective 4: Neutral effect - the option would not result in any effects on soils or land use
Objective 5: Moderate negative effect - This option would intercept rainwater and divert this to a service reservoir. There are flow pressures in the receiving water courses that would be increased through the interception of this rainwater and CAMS (catchment abstraction management plan) indicates that there is no water available for abstraction in the catchment. As such there is the potential for moderate negative impacts on surface water quantity.
Objective 6: Minor positive effect - The capture of rainfall runoff prior to entering the river network could have positive water quality impacts with there being a reduction in diffuse source pollution. Objective 6: Moderate negative effect - The potential moderate reduction in flow may increase any point source water quality pressures in the receiving water course which could potentially lead to deterioration in the physico-chemical water quality status elements in the receiving water body.
Objective 7: Minor positive uncertain effect - This option would involve the construction of above-ground water supply infrastructure, including an embankment reservoir, which could help alleviate flooding in the catchment. The assessment is uncertain for the scheme as the option is being progressed at strategic level, with the findings applied to other future development sites of simiar size. The proposed development site is an example site and specific locations would require developer input and cannot be identified at this stage.
Objective 8: Neutral effect - the option would not result in any effects on air quality during operation.
Objective 9: Minor negative effect - The option would result in a minor increase in operational carbon emissions. The estimated total operational carbon over the lifespan (80 years) of this option is 256 tCO2e (17 tCO2e in the first year 2035 and decreasing to 2.7 tCO2e per year from 2050 onwards). This will have a minor negative effect on GHG emissions.
Objective 10: Minor positive effect - The option would have a minor positive effect on increasing resilience/decreasing the vulnerability to climate change effects through provision of an additional 0.9Ml/d water resource.
Objective 11: Neutral effect - The option would provide an additional design capacity of 0.9Ml/d which would have a neutral effect on the economy.
Objective 12: Neutral effect - The proposed development example site is within an existing airfield with no tourism or recreational facilities within the boundary. Therefore, operation of the scheme would not have an effect on tourism or recreation.
Objective 13: Minor positive effect - This option would lead to a minor increase in design capacity (0.9Ml/d) of drinking water which would be available to the local community.
Objective 14: Minor positive effect - the option is a water efficiency scheme (rainwater harvesting) with a design capacity of 0.9Ml/d. The option would result in an minor improvement in water efficiency and resilience.
Objective 15: Moderate positive effect - the option incorporates rainwater harvesting into new housing developments which encourages sustainable design. Objective 15: Minor negative effect - Operation of the option will require energy (256 tCO2e over option lifespan) and will likely require the use of chemicals to treat raw water. Therefore there are likely to be minor negative resource impacts during operation.
Objective 16: Neutral effect - The option will have no effect on cultural heritage assets or archaeology during operation.
Objective 17: Minor negative uncertain effect - Although there are no landscape designations in the area, the option results in a large scale development which will permanently alter the existing landscape. However, assessment of the option is on the rainwater harvesting, rather than the housing development. The embankment reservoir would be a permanent feature although it is uncertain whether this would enhance or detract from the existing landscape features. This option has been assessed as minor negative with uncertainty until specific design and location details of the embankment reservoir is confirmed.

Option Assessment Information	
Option ID	57
Option Name	New surface water - River CAM abstraction & treatment works
Water company	Cambridge Water
Option Description	<p>This option is to construct a new bankside pumped abstraction point on the River Cam ~2km downstream of Milton WWTW, this is to provide a buffer for the blending of final effluent and river water before abstraction. Due to the unavailability of WWTW discharge data at this stage of option development, it has been assumed that up to the River Cam’s HoF will be available for abstraction (22.2MI/d for 120 days a year, corresponding to a DO of 7MI/d). Once abstracted the water will be stored in a large embankment reservoir. From this reservoir the water will be pumped to a new WTW for treatment and deployed via an additional pumped pipeline into the Cambridge network, proposed at Chery Hinton.</p> <p>The following assets have been proposed for this option.</p> <ol style="list-style-type: none">1. Two 31.6kW river bankside intake pumps (63kW), with the necessary arrangements, inclusive of features such as gravel traps and eel screens etc.2. New embankment open reservoir (2664MI)3. Two 9.9kW reservoir abstraction pumps (20kW)4. Control building for reservoir (20m2 footprint area)5. 50m of 650mm pumped pipeline6. 7MI/d New WTW to treat the abstraction to potable standard7. Control building for WTW (20m2 footprint area)8. Two 50.1kW (100kW) pumps to transfer water to Cambridge network (Cherry Hinton)9. 10km of 400mm pipeline from new WTW to Cherry Hinton10. Three new power supplies, two 0-50kW and one 51-250kW
Yield	7 MI/d
WRZ	Cambridge

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
Option 57	Construction (negative)	--/?	--	-	---	0	-	--	-/?	--	0	0	-	-	0	--/?	---	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	0	0	0
	Operation (negative)	-	0	--	0	-	-	0	0	--	0	0	0	0	0	--/?	0	0
	Operation (positive)	0	+	0	0	0	0	++	0	0	+	++	0	++	++	0	0	0

Construction
<p>Objective 1: Moderate negative uncertain effect - There are 24 SSSI's within 10km of the option, including 3 within 1km, and the nearest is Cherry Hinton SSSI which is 61m away from the proposed pipeline. Construction in this close proximity may cause significant damage to the SSSI but with appropriate mitigation the effects may be reduced to moderate. There are 13 LNRs within 10km, including 2 within 1km of the option where the nearest (Limekiln Close) is within 70m of the proposed pipeline. There are a further 2 areas of ancient woodland and 1 NNR within 10km of the option. Pipeline construction activities and construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.</p> <p>There are 3 European designated sites within 10km of the scheme, Devils Dyke SAC (10km east) and Fenland SAC and Wicken Fen Ramsar site which both share the same boundary (7.9km north-east). Due to the distance and the lack of hydrological connectivity between option 57 and Devils Dyke SAC, no LSE are anticipated from construction works. Fenland SAC and Wicken Fen Ramsar share the same boundary, both designated sites are located along Burwell Lode and Wicken Lode tributaries of Reach Lode which flows into the River Cam, downstream of option 57, approximately 7.9km away. Therefore due to the distance between option 57 and Fenland SAC and Wicken Fen Ramsar, and due to the lack of hydrological connectivity, no LSE are anticipated from option 57 upon the habitat qualifying features (peat fens, H6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae), and H7210 Calcareous fens with Cladium mariscus and species of the Caricion davallianae) nor upon S1166 Great crested newt Triturus cristatus or fen violet Viola persicifolia. Spined loach may be present within the River Cam of which the confluence is located ~700m from Fenland SAC and therefore construction work may impact supporting habitat for spined loach if present within the River Cam through surface pollution incidents, sedimentation or introduction of INNS. LSE could not be ruled out and further assessment was required for spined loach. The HRA Stage 2 Appropriate Assessment concluded no adverse effects on conservation objectives or site integrity during construction provided appropriate mitigation is incorporated. The overall effects are uncertain until mitigation measures can be confirmed.</p>
Objective 2: Moderate negative effect - Construction of two large assets and associated ancillary infrastructure in an area with SSSIs etc close by is likely to cause at least moderate negative impacts on natural resources/ecosystem services.
Objective 3: Minor negative effect - Although extensive construction activities are required which result in increased distribution of terrestrial and aquatic INNS, the risk is considered as minor assuming best practice biosecurity measures will be adopted during construction.
Objective 4: Major negative effect - The option involves the construction of a 10km pipeline, the majority of which is within Grade 2 and Grade 2 agricultural land. This will result in temporarily loss of the best and most versatile agricultural land. A large embankment reservoir, WTW, and control buildings will represent large-scale permanent land-take.
Objective 5: Neutral effect - No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.
Objective 6: Minor negative effect - Construction activities near watercourses may have a minor effect on water quality which result in short-term or intermittent effects on receptors. The component would not lead to a change in WFD classification.

Objective 7: Moderate negative effect - This option would involve the construction of above-ground water supply infrastructure which would be partially located within Flood Zone 3.
Objective 8: Minor negative uncertain effect - The proposed development site is not within an AQMA, however, vehicle movements associated with the construction activities may result in a decrease of the local air quality. There is no available data on the number of vehicle movements required for the scheme at this stage therefore the assessment is uncertain.
Objective 9: Moderate negative effect - Construction of the required infrastructure would use materials with a moderate amount of embodied carbon (2303 tCO2e).
Objective 10: Neutral effect - The construction phase of the option would have no effect on resilience to climate change effects.
Objective 11: Major positive effect - The total expenditure of the option is estimated at ~£230 million which would result in a significant increase in construction jobs.
Objective 12: Minor negative effect - The proposed pipeline route intersects the national cycle network and is within 40m of a playing field, construction would temporarily reduce the availability and quality of existing recreational facilities.
Objective 13: Minor negative effect - the option would have a temporary effect on human health through localised noise and/or air quality impacts related to the construction activities. Best practice measures will be employed to minimise these effects. The pipeline also intersects a national cycle network route and is within 40m of a playing field. The construction would have a minor temporary negative effect on amenity in the area.
Objective 14: Neutral effect - the construction of the scheme will have no effect on sustainable and efficient use of resilient water resources.
Objective 15: Moderate negative uncertain effect - the option requires new infrastructure with limited opportunities to reuse or recycle waste materials. The amount of materials required is unknown but given the scale of the option it is anticipated to be a moderate amount.
Objective 16: Major negative effect - within 1km of the proposed development site, there are 43 listed buildings and 6 scheduled monuments, 1 of which (Horningsea kilns, site of) is within the area proposed for the embankment reservoir. Construction of the option would result in the permanent loss of this heritage asset thereby diminishing its significance. Furthermore, the proposed pipeline intersects Fulbourn Hospital, a conservation area which is listed on Historic England's 'Heritage at Risk' register.
Objective 17: Minor negative effect - The option would result in new, above ground infrastructure that has a minor negative effect on the local landscape. A large proportion of the option is located within the Cambridge greenbelt.

Operation
Objective 1: Minor negative effect - Due to the distance and the lack of hydrological connectivity between option 57 and Devils Dyke SAC, no LSE are anticipated from construction works. Option 57 will require additional abstraction on the River Cam to provide additional raw water to be stored in an embankment reservoir. This stretch of the River Cam is currently supplemented by effluent discharge from Milton WWTW. Option 57 is based on the available abstraction of the River Cam, allowing 22.2Ml/d to be abstracted during 120 days of the year. Fenland SAC and Wicken Fen Ramsar share the same boundary, both designated sites are located along Burwell Lode and Wicken Lode tributaries of Reach Lode which flows into the River Cam, downstream of option 57, approximately 7.9km away. No new licence abstraction is required and abstraction of water will be managed through HoF. No LSE are anticipated from operation of option 57. The operation of this option could result in effects on non-designated aquatic habitats or species. Flows in the River Cam would be reduced however a suitable hands-off flow condition will be required to ensure no significant impacts on biodiversity. As a result, there could be up to minor degradation of non-designated aquatic habitat as a result of any changes to flow, geomorphology or water quality associated with this component. Any operational impacts are unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Moderate positive effect - The option will have an impact to land cover, particularly the large embankment reservoir. This is expected to be a moderate positive impact during operation’
Objective 3: Moderate negative effect - The construction of a new reservoir fed by raw water abstraction from the River Cam will establish new habitat and transfer pathway for INNS. Additionally the reservoir will provide new secondary pathways for the distribution of INNS. The scheme is assessed as "Moderate" risk on account of the proposed reservoir being located on the banks of the River Cam therefore reducing the potential of spread to separate waterbodies or catchments. Best practice biosecurity measures (such as signs, wash down facilities for recreational users, etc) may reduce
Objective 4: Neutral effect - the option would not result in any effects on soils or land use during operation.
Objective 5: Minor negative effect - Operational activities associated with this component may have a minor discernible effect on river flows or groundwater levels, however, hands-off flow conditions would be required to prevent this from being a significant impact. This flow change is insufficient to impact sediment dynamics and will not result in a change to channel morphology.
Objective 6: Minor negative effect - The reduction in flows associated with this component may reduce the rivers buffering capacity against point source pollutants, however, this would not be sufficient to cause WFD deterioration..
Objective 7: Moderate positive effect - This option would involve the construction of an open embankment reservoir which is partially located within flood zone 3 and has the potential to help alleviate or mitigate flood risk in the catchment.
Objective 8: Neutral effect - the option would not result in any effects on air quality during operation.
Objective 9: Moderate negative effect - The option would result in a moderate increase in operational carbon emissions (2669 tCO2e) including 85 tCO2e in the first year of implementation reducing to 38 tCO2e from 2050 onwards.
Objective 10: Minor positive effect - The option would have a minor positive effect on increasing resilience/decreasing the vulnerability to climate change effects through provision of an additional 7Ml/d water resource.
Objective 11: Moderate positive effect - The option would provide an additional design capacity of 7Ml/d.
Objective 12: Neutral effect - The operation of the scheme would not result in any effects on existing recreational facilities and/or tourism.
Objective 13: Moderate positive effect - This option would lead to a moderate increase in design capacity (7Ml/d) of drinking water which would be available to the local community.
Objective 14: Moderate positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the Cambridge Water supply area by providing an additional 7Ml/d deployable output.
Objective 15: Moderate negative uncertain effect - the operation of the option is likely to require additional energy (2669 tCO2e) and may require the use of chemicals, however, the effects in this regard are currently uncertain.
Objective 16: Neutral effect - The option will have no effect on cultural heritage assets or archaeology during operation.
Objective 17: Neutral effect - The option would result in new, above ground infrastructure but it is not within an area designated for landscape.

Option Assessment Information	
Option ID	71
Option Name	Supply side – Effluent re-use
Water company	Cambridge Water
Option Description	<p>This option is to capture the final effluent from Milton WWTW which currently gets discharged into the River Cam. The effluent will be transferred to a new WTW where it will be treated to potable standard and then the water will be deployed to the Cambridge Water network via new pipeline and pumping station. The following assets have been proposed for this option:</p> <ol style="list-style-type: none">1. Two 5.7kW (11kW) final effluent transfer pumps to New WTW2. Control building (20m2 footprint area)3. 800m of 400mm raw water pumped pipeline4. 7 MI/d new WTW to treat final effluent to potable standard5. Control building (50m2) footprint area6. Two 48.5kW (97kW) pumps to transfer water to Cambridge network (Cherry Hinton)7. 8.3km 400mm diameter pumped pipeline from new WTW to Cherry Hinton8. Two new power supplies, one for 0-50kW and one for 51-250kW - Land acquisition assumed to be 10ha for new WTW and 0.5ha for final effluent pump at WWTW.9. Land compensation for pipelines (9.1km)
Yield	7 MI/d
WRZ	Cambridge

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
Option 71	Construction (negative)	-	--	-	--	0	-	0	-/?	--	0	0	-	-	0	---/?	---	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	0	0	0
	Operation (negative)	-	0	0	0	-	-	0	0	-	0	0	0	0	0	-/?	0	0
	Operation (positive)	0	++	0	0	0	+	0	0	0	+	++	0	++	+	0	0	0

Construction
Objective 1: Minor negative effect - There are 22 SSSIs within 10km of the option, including 3 within 1km. The nearest SSSI to the option is Cherry Hinton Pit, ~60m from the proposed pipeline where it joins Cherry Hinton. There are 13 LNRs within 10km including 2 within 1km. The nearest LNR is East Pit, which is less than 60m from the proposed pipeline. There is one area of ancient woodland 8km away. Due to the close proximity of the pipeline to these designations, construction activities may result in minor negative, but temporary, effects on the quality of these sites. There are no European designated sites within 10km of the scheme components, or impact pathways over a greater distance. The ultimate downstream receptor is The Wash and North Norfolk Coast SAC, however none of the qualifying features are migratory fish species, where use of functionally linked habitat within the River Cam could have been an issue. Similarly, The Wash SPA and Ramsar, are considered sufficiently distant such that the River Cam does not provide functionally linked habitat for any of the qualifying features. Pipeline construction activities and construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Moderate negative effect - Based on land acquisition of 10ha for a new WTW construction is expected to cause a permanent moderate negative impact.
Objective 3: Minor negative effect - Although extensive construction activities are required which result in increased distribution of terrestrial and aquatic INNS, the risk is considered as minor assuming best practice biosecurity measures will be adopted during construction.
Objective 4: Moderate negative effect - The option requires the construction of a new WTW, the proposed site for this is within Grade 2 agricultural land. This option would result in a moderate loss of best and most versatile agricultural land. The option involves the construction of a 8.3km pipeline, the majority of which is within Grade 2 and Grade 2 agricultural land. This will result in temporarily loss of the best and most versatile agricultural land. There are also 2 historic landfill sites within 500m of the proposed pipeline, the nearest is 70m to the east of the pipeline and construction activities have the potential to disturb contaminated land.
Objective 5: Neutral effect - No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.
Objective 6: Minor negative effect - Construction activities near watercourses may have a minor effect on water quality which result in short-term or intermittent effects on receptors. The component would not lead to a change in WFD classification.
Objective 7: Neutral effect - This option would involve the construction of above-ground water supply infrastructure but is located outside floodplain areas. It is anticipated that the option would neither cause or exacerbate flooding in the catchment.
Objective 8: Minor negative uncertain effect - The proposed development site is not within an AQMA (the nearest is Cambridge AQMA 3.5km away) , however, vehicle movements associated with the construction activities may result in a decrease of the local air quality. There is no available data on the number of vehicle movements required for the scheme at this stage therefore the assessment is uncertain.
Objective 9: Moderate negative effect - Construction of the required infrastructure would use materials with a moderate amount of embodied carbon (2,610 tonnes CO2e).
Objective 10: Neutral effect - The construction phase of the option would have no effect on resilience to climate change effects.

Objective 11: Major positive effect - The total expenditure of the option is estimated at ~£76 million which would result in a significant increase in construction jobs.
Objective 12: Minor negative effect - The option is 200m away from Milton Country Park and the proposed pipeline route also intersects the national cycle network and is within 40m of a playing field, construction would temporarily reduce the availability and quality of existing recreational facilities.
Objective 13: Minor negative effect - the option would have a temporary effect on human health through localised noise and/or air quality impacts related to the construction activities. Best practice measures will be employed to minimise these effects. The pipeline also intersects a national cycle network route and is within 40m of a playing field. The construction would have a minor temporary negative effect on amenity in the area.
Objective 14: Neutral effect - the construction of the scheme will have no effect on sustainable and efficient use of resilient water resources.
Objective 15: Major negative uncertain effect - the option requires new infrastructure with limited opportunities to reuse or recycle waste materials. The amount of materials required is unknown but given the scale of the option and using cost as a proxy is expected to be a major amount with uncertainty until these details are confirmed.
Objective 16: Major negative effect - within 1km of the proposed development site, there are 51 listed buildings and 2 scheduled monuments, including 1 (Settlement site by Caudle Corner Farm) 20m from the proposed pipeline. Furthermore, the proposed pipeline intersects Fulbourn Hospital, a conservation area which is listed on Historic England's 'Heritage at Risk' register. Construction of the pipeline would result in deterioration of this asset and diminish its significance, resulting in a major adverse effect.
Objective 17: Minor negative effect - The option would result in new, above ground infrastructure that has a minor negative effect on the local landscape. A large proportion of the option is located within the Cambridge greenbelt.

Operation
Objective 1: Minor negative effect - The operation of this option could result in effects on non-designated aquatic habitats or species. Flows in the River Cam would be reduced however a suitable hands-off flow condition will be required to ensure no significant impacts on biodiversity. As a result, there could be up to minor degradation of non-designated aquatic habitat as a result of any changes to flow, geomorphology or water quality associated with this component. Any operational impacts are unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems. There are no European designated sites within 10km of the scheme components, or impact pathways over a greater distance. The ultimate downstream receptor is The Wash and North Norfolk Coast SAC, however none of the qualifying features are migratory fish species, where use of functionally linked habitat within the River Cam could have been an issue. Similarly, The Wash SPA and Ramsar, are considered sufficiently distant such that the River Cam does not provide functionally linked habitat for any of the qualifying features.
Objective 2: Moderate positive effect - It is assumed that operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Neutral effect - No negative effects are expected as the scheme involves the transfer of effluent to reuse treatment and redeployment into supply within a closed system.
Objective 4: Neutral effect - the option would not result in any effects on soils or land use during operation.
Objective 5: Minor negative effect - Operational activities associated with this component may have a minor discernible effect on river flows or groundwater levels, however, hands-off flow conditions would be required to prevent this from being a significant impact. This flow change is insufficient to impact sediment dynamics and will not result in a change to channel morphology.
Objective 6: Minor positive effect - A reduction in wastewater treatment works discharge into the watercourse may lead to water quality improvements downstream of the wastewater treatment works discharge. Objective 6: Minor negative effect - Reduced flow could impact volume related quality parameters.
Objective 7: Neutral effect - This option would involve the construction of above-ground water supply infrastructure but is located outside floodplain areas. It is anticipated that the option would neither cause or exacerbate flooding in the catchment during operation of the option.
Objective 8: Neutral effect - the option would not result in any effects on air quality during operation.
Objective 9: Minor negative effect - The option would result in 721 tCO2e of total operational carbon emissions over the life span of the option (50 tCO2e in the first year reducing to 7.8 tCO2e from 2050 onwards). This results in a moderate negative effect.
Objective 10: Minor positive effect - The option would have a minor positive effect on increasing resilience/decreasing the vulnerability to climate change effects through provision of an additional 7MI/d water resource.
Objective 11: Moderate positive effect - The option would provide an additional design capacity of 7MI/d.
Objective 12: Neutral effect - The operation of the scheme would not result in any effects on existing recreational facilities and/or tourism.
Objective 13: Moderate positive effect - This option would lead to a moderate increase in design capacity (7MI/d) of drinking water which would be available to the local community.
Objective 14: Minor positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the Cambridge Water supply area by providing an additional 7MI/d deployable output.
Objective 15: Minor negative uncertain effect - the operation of the option is likely to require additional energy (721 tCO2e over the lifespan of the option) and may require the use of chemicals, however, the effects in this regard are currently uncertain.
Objective 16: Neutral effect - The option will have no effect on cultural heritage assets or archaeology during operation.
Objective 17: Neutral effect - The option would result in new, above ground infrastructure but it is not within an area designated for landscape.

Option Assessment Information	
Option ID	73A
Option Name	Internal potable water transfer - FENS Reservoir potable transfer
Water company	Cambridge Water
Option Description	<p>The construction of a major new surface water reservoir with WTW in South Fenland is progressing at strategic level, this is to be shared between CAM and AWS. The location of the reservoir is to be chosen from four potential alternatives (A - Chatteris, B - Ely, C - Southery and D - Burnt Fen).</p> <p>The overall concept (sub-option A) is to construct the new raw water reservoir with a new abstraction point at Forty Foot Drain, north of Chatteris (at (541577, 287496) although the locations provided are indicative for this stage of the project), along with a WTW. The treated water from this new WTW will then be transferred via a new pumping station and pumped pipeline to Madingley DSR, with offtake to Bluntisham DSR, inclusive of additional storage at both locations.</p> <p>As option CW24-73A only includes the treated water transfer elements, only the following infrastructure assets have been included in the option:</p> <ul style="list-style-type: none">- High lift 980kW pump for 55MI/d with a 106m lift.- Control building (footprint area of 200m2)- 18km of 900mm between high lift pump and Bluntisham offtake- 18km of 800mm between Bluntisham offtake and Madingley.- 5MI/d storage reservoir to be provided at Bluntisham- 21MI/d storage reservoir to be provided at Madingley- Land compensation for the pipelines- Land purchase for the two storage reservoirs- Power supply (251-1000kW)
Yield	50MI/d
WRZ	Cambridge Water

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
Option 73A	Construction (negative)	-/?	---	-	--	0	-	--	--/?	--	-/?	0	--	-	0	---/?	-	--
	Construction (positive)	0	0	0	0	0	0	0	0	0	?	+++	0	0	0	0	0	0
	Operation (negative)	0	0	-	0	-	-/?	0	0	---	0	0	0	0	0	-	0	-
	Operation (positive)	0	++	0	0	0	0	++	0	0	++	+++	+	+++	++	0	0	0

Construction
<p>Objective 1: Minor negative uncertain effect - Ouse Washes Ramsar, SAC, SPA and SSSI approximately 2.8km away from the scheme. 1 further SAC within 10km. There is one SSSI within 1km of the option (Madingley Wood approx. 780m away). Due to the distance and the lack of hydrological connectivity between option 73A and Eversden and Whimpole Woods SAC, no LSE are anticipated from construction works through air pollution, human disturbance or water pollution. However as barbastelle can travel up to 7km and more for foraging, LSE cannot be ruled out as construction works may results in loss, damage to supporting habitat and habitat fragmentation. Ouse Washes SAC/SPA/Ramsar is located along the Old Bedford River and the New Bedford River, which are artificial, partial diversion of the waters of the River Great Ouse. The construction of the pipeline associated with option 73A will require crossing the River Great Ouse, approximately 6km upstream of the designated site and crossing various ditches connected to the Ouse Washes SPA/SAC/Ramsar. Due to the distance between the option and the designated sites, construction works are not anticipated to have an impact on the qualifying features through noise, visual disturbance or air pollution. However, construction works may result in surface and groundwater pollution incident, sedimentation which may affect qualifying feature of the Ouse Washes SAC (spined loach) and the waterbird assemblage associated with the SPA and Ramar sites. Construction of option 73A may also result in loss or damage of supporting habitat if present within the footprint of the project, in particular the section highly drained to the north. LSE could not be ruled out and further assessment was be required. The HRA Stage 2 Appropriate Assessment undertaken for Ouse Washes SAC/SPA/Ramsar and Eversden and Wimpole Woods SAC concluded that with appropriate mitigation there will be no adverse effects on conservation objectives or site integrity during construction, however without further option details there is still some uncertainty.</p> <p>There are a further 6 SSSIs within 5km. There are no NNRs within 10km of the option. There are 2 LNRs within 5km of the option with the closest being Mare Fen approximately 400m away. There are 2 ancient woodland areas within 1km of the option with the closest being 800m away. The sites are considered at a sufficient distance that construction of the option, with appropriate mitigation, will not result in adverse effects on site quality. Pipeline construction activities and construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.</p>
Objective 2: Major negative effect - The various components of this option are extensive with potential significant negative effects during construction.
Objective 3: Minor negative effect - Although extensive construction activities are required which result in increased distribution of terrestrial and aquatic INNS, the risk is considered as minor assuming best practice biosecurity measures will be adopted during construction.
Objective 4: Moderate negative effect - Approximately 90% of the scheme is within Grade 1-3 agricultural land. The new structures required for the scheme will therefore require land take of best and most versatile land for agriculture. There are 4 historic landfill sites within 1km of the scheme with the closest being approximately 220m away. There are a further 15 historic sites within 5km. The strategic main crosses through a permitted waste site (Park Farm). There are a further 4 permitted waste sites within 5km of the scheme.
Objective 5: Neutral effect - Two main rivers cross the mains route, there are two further water courses within 1km of the option. No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.
Objective 6: Minor negative effect - Construction activities near watercourses may have a minor effect on water quality which result in short-term or intermittent effects on receptors. The component would not lead to a change in WFD classification.
Objective 7: Moderate negative effect - Approximately 50% of the scheme is within Flood Zones 2 and 3. Construction of the option could potentially cause or exacerbate flooding in the catchment.

Objective 8: Moderate negative uncertain effect - The A14 Corridor AQMA is located 1.9km away and the Hemingford to Fenstanton (A14) AQMA is 3.4km away. Impacts on these AQMAs resulting from construction are considered unlikely. There will be an increase in vehicle movement associated with construction activities and will likely cause short-term deterioration in local air quality. The number of vehicle movements and potential traffic routes is unknown, thus the extent of impact is uncertain. However, the scale of the works is likely to be considerable and so assessed to have moderate negative uncertain effect.
Objective 9: Moderate negative effect - Construction would involve the use of materials with embodied carbon as well as carbon emissions related to construction traffic. The estimated embodied carbon for this option is 2,598 tCO2e which will have a moderate negative effect on GHG emissions.
Objective 10: Minor negative effect - The construction of the scheme within Flood Zones 2 and 3 has the potential to increase vulnerability to flooding, however development that is consented must have regard to potential climate change effects and so the assessment assumes flood risk assessment and management protocols will be included within the construction phase.
Objective 11: Major positive effect - The option has a total expenditure of ~£44.9 million which will provide a significant increase in construction jobs.
Objective 12: Moderate negative effect - Construction works may have a moderate impact on opportunities/facilities for recreation or tourism. There are 24 greenspace areas within 1km of the scheme, with the closest being an allotment site 150m away. The option pipeline crosses cycle route 51. There are no national trails within 10km of the scheme. There are two CRoWs within 1km of the scheme, with the closest being approximately 700m away. Coton Country Park is located 2.1km away.
Objective 13: Minor negative effect - Construction of the option is not expected to have a significant impact on health during the construction period, due to the largely rural location. Construction works may have a minor negative effect (e.g. noise disturbance, vibration, dust deposition and air quality impacts) on residential receptors including nearby Swavesey, Neddington, Bluntisham, Somersham and Chatteris.
Objective 14: Neutral effect - The construction phase of this option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Major negative uncertain effect - The option will require the development of new infrastructure including a pumping station and strategic main. In addition, the existing reservoirs at Bluntisham and Madingley will be upgraded to provide additional storage. The option will therefore require the use of new materials. The option is expected to have a major effect on waste and resources. Whilst the quantities of materials required are currently unknown, the scale of the assets described are in-line with assumptions of large-scale development.
Objective 16: Minor negative effect - There are no World Heritage Sites within 10km of the scheme. Madingley Hall (250m away) and Childerley Hall (880m away) gardens are within 1km of the option. There are two Scheduled Monuments within 1km, with the closest being 'Castel Hill' earthworks 370m away. There are 83 listed buildings within 1km of the scheme, with the closest being Hale Windmill approximately 70m away. It is not anticipated construction would have any significant effect on these heritage assets, due to the distance between these sites and proposed works.
Objective 17: Moderate negative effect - There are no AONBs or National Parks within 10km of the scheme. Less than 10% of the scheme is within the Cambridge Greenbelt. Construction of the pipeline will only be visually intrusive during the construction phase only however, construction of the pumping station and upgrades to the reservoirs will continue to be visually intrusive to the semi-rural landscape over the long-term.

Operation
Objective 1: Neutral effect - Option 73A does not include an abstraction of water, or increase in water abstraction - it is just a transfer of the potable water source from the new Fens reservoir. Therefore, no LSE are anticipated from operation of option 73A. This option is a transfer of potable water therefore there is not expected to be any impacts on any non-designated aquatic habitats or species.
Objective 2: Major positive effect - It is assumed that operational biodiversity net gain (particularly within the new reservoir) would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Minor negative effect - The diversion of raw water into a new reservoir introduces pathways for INNS. However, it is assumed that maintenance will be undertaken under best practice mitigation measures in view of the company wide biosecurity plan and waste materials potentially containing INNS propagules such as screen debris or mechanical filtration solids will be handled appropriately. The WTW treatment processes to produce potable water are anticipated to eliminate risks of further INNS pathways into the distribution network.
Objective 4: Neutral effect - It is not anticipated that there would be any operational effects on soil, land use or geodiversity.
Objective 5: Minor negative effect - Abstractions from the Forty Foot Drain to fill the new raw water reservoir could impact on local surface water flows. Abstraction rate information is not available but a proposed DO of 55Mld indicates high rates of abstraction. A minor negative impact is assumed, on the basis that abstraction would be controlled according to local water resources regulatory regimes.
Objective 6: Minor negative uncertain effect - Diversion of abstracted water from the Forty Foot Drain into a raw water reservoir is not anticipated to create significant water quality effects, although reductions in flow volume could reduce dilution impacts and reduce oxygenation in the surface water. These effects are uncertain.
Objective 7: Moderate positive effect - The reservoirs at Bluntisham and Madingley are located within Flood Zone 2 and 3, as they are being upgraded to store more water they have the potential to help alleviate or mitigate flooding in the catchment. The operation of this option is not expected to cause or exacerbate the risk of flooding in the vicinity of the scheme or elsewhere.
Objective 8: Neutral effect - It is not anticipated that there would be any significant impact on traffic congestion during the operational period such that the option is expected to have a neutral effect on local air quality, however, as the number of vehicle movements required during the operation of the option is currently unknown, the effect against this objective has been scored as a minor negative uncertain effect.
Objective 9: Major negative effect - The new strategic main and pumping station will require energy to pump water. Operational carbon emissions over the lifespan of scheme has been estimated at 5446 tCO2e (380tCO2e in the first year of implementation reducing to 59 tCO2e from 2050 onwards). This will have a significant effect on GHG emissions.
Objective 10: Moderate positive effect - Operation of the option will provide 50 MI/d of water resource, supporting community resilience to climate change wherein drought may otherwise have been a risk.
Objective 11: Major positive effect - Operation of this option will provide an additional 50MI/d that can support economic activity.
Objective 12: Minor positive effect - Operation of the option is not expected to have a negative impact on tourism and recreation. A large new raw water reservoir likely to provide new recreational and amenity facilities and features
Objective 13: Major positive effect - Operation of this option will provide an additional 50MI/d that can support human health and wellbeing.
Objective 14: Moderate positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the Cambridge Water supply area by providing an additional 50MI/d deployable output.
Objective 15: Minor negative effect - Operation of the option will require additional energy and will likely require the use of additional chemicals to treat the additional raw water. Therefore there are likely to be minor negative resource impacts during operation.
Objective 16: Neutral effect - Operation of this option is not expected to have any impact on cultural heritage sites.
Objective 17: Minor negative effect - The option will permanently alter the existing landscape where the reservoirs and pumping station are located, having a minor negative effect on the landscape during operation.

Option Assessment Information	
Option ID	75Aiii
Option Name	AWS potable transfer through CAM area 5MI/d (this iteration includes CW paying for some of the AWS main and blending WTW plant)
Water company	Cambridge Water
Option Description	<p>AWS are understood to be considering construction of a new strategic pipeline running from their existing Grafham WTW to a new strategic reservoir at Rede, that is being constructed adjacent to an existing distribution reservoir at Rede. This main is expected to run through the north of Cambridge and will therefore intersect existing CAM supply mains. A cross-connection will be constructed where the new AWS strategic main from Grafham to Rede (west to east) intersects the existing CAM supply mains; this will notionally be located approximately 2km north of Longstanton. The infrastructure required for this option includes:</p> <ul style="list-style-type: none">- 750m of 300mm diameter cross-connection pipework has been included in this option for variable allowance and costing purposes due to the uncertainty of the final AWS strategic main location.- The pipework will be equipped with a flowmeter and pressure reducing valve (PRV)- Land compensation for the pipeline <p>This option is different to option CW24-75Ai and ii as it has considered the requirement of a chemical dosing polishing plant, to reduce the risk of water quality changes and the potential impact on customers, from mixing different two water sources, i.e. surface water (AWS) and groundwater (CAM). A review of water quality of the receiving network, and of the bulk import of potable water has indicated that additional treatment, in the form of breakpoint chlorination, is required on the imported potable water from AWS, prior to mixing with the existing CAM network. The infrastructure required for breakpoint chlorination includes:</p> <ul style="list-style-type: none">-Chlorine contact tank (99.2 m3)-Sodium Hypochlorite dosing rig and storage (5 MI/d) <p>-Chemical Dosing - pH correction (5 MI/d) NOTE: this will need further review at detailed design stage, the assumption of need has been included in the costs to date.</p> <ul style="list-style-type: none">-Land requirement (300 m2)-New power supply (0-50 kW)
Yield	5 MI/d
WRZ	External raw water bulk supply/transfer – Potable transfer from AWS grid main crossing West to East through CW area of supply

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
Option CW24-75A	Construction (negative)	-/?	-	-	-	0	-	-	-/?	-	0	0	0	-	0	-/?	0	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	0	0	0
	Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-/?	0	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	+	++	0	++	+	0	0	0

Construction
Objective 1: Minor negative uncertain effect - The Ouse Washes Ramsar, SAC, SPA and SSSI site is approximately 7km from the option. There are a further 4 SSSIs within 10km of the option including Overhall Grove located 6.4km from the option. There are no NNRs within 10km of the option. There are two LNRs within 10km of the option with Mare Fen 3km away and Worts Meadow 8.7km away. There are some ancient woodland areas located 4.5km from the option. Ouse Washes SAC/SPA/Ramsar is located along the Old Bedford River and the New Bedford River, which are artificial, partial diversion of the waters of the River Great Ouse. The construction of the 750m pipeline associated with option 75A will require crossing Swavesey Drain, a small tributary of the River Great Ouse (approximately 4.8km upstream of the confluence) which joins the river approximately 4.9km upstream of the Ouse Wash SAC/SPA/Ramsar. The location of the blending plant is also in close proximity to two drains (c.70m). A review of sites surveyed for the WeBS and NBN Atlas data suggests that the site for the blending plant is not offsite functionally linked habitat. Few species are recorded within 2km or are in in very low numbers. Due to the distance between the option and the designated sites, construction works are not anticipated to have an impact on the qualifying features through noise, visual disturbance or air pollution. However, construction works may result in surface and groundwater pollution incident, sedimentation which may affect qualifying feature of the Ouse Washes SAC (spined loach) and the waterbird assemblage associated with the SPA and Ramar sites. The HRA Stage 2 Appropriate Assessment undertaken for Ouse Washes SAC/SPA/Ramsar concluded that with appropriate mitigation there will be no adverse effects on conservation objectives or site integrity during construction, however without further option details there is still some uncertainty. Pipeline construction activities and construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Minor negative effect - Construction of the pipeline and blending plant is expected to cause a minor negative impact.
Objective 3: Minor negative effect - Although extensive construction activities are required which result in increased distribution of terrestrial and aquatic INNS, the risk is considered as minor assuming best practice biosecurity measures will be adopted during construction.
Objective 4: Minor negative effect - The option is wholly located within Grade 3 Agricultural land which is some of the best and most versatile land. The option involves permanent land take for the blending plant however the footprint of the site is small (300m2). Construction of the pipeline is temporary and it is assumed any excavated material will be reinstated following installation of the pipeline. This results in an overall minor negative effect on soils and land use. Additionally. there are two historic landfill sites within 5km of the option with the closest being Hill Farm approximately 1.4km away. There are a further 16 historic landfill sites within 10km of the option. There are three permitted waste sites within 10km of the option with the closest site being Milton Landfill 8.7km away. The construction of the option will have no effects on these sites.
Objective 5: Neutral effect - Swavesey Drain is within 1km of the option (approximately 500m away). There are no groundwater bodies within 1km of the option. No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.
Objective 6: Minor negative effect - Construction activities near watercourses may have a minor effect on water quality which result in short-term or intermittent effects on receptors. The component would not lead to a change in WFD classification.
Objective 7: Minor negative effect - Construction of the pipeline would be located within Flood Zones 2 and 3 and the option would involve the construction of above ground water supply infrastructure, a blending plant, largely (>95%) within Flood Zone 2 which could be at risk of flooding during the construction period.

Objective 8: Minor negative uncertain effect - The A14 Corridor AQMA is located 3.6km from the option. The Hemingford to Fenstanton (A14) AQMA and Cambridge AQMA are both within 10km of the option. Impacts on these AQMAs resulting from construction are considered unlikely. There will be an increase in vehicle movement associated with construction activities that may cause short-term deterioration in local air quality and mitigation will be required. The number of vehicle movements is unknown, thus the extent of impact is uncertain but anticipated to be minor.
Objective 9: Minor negative effect - Construction would involve the use of materials with embodied carbon as well as carbon emissions related to construction traffic. The estimated embodied carbon for this option is 303 tCO2e which will have a minor negative effect on GHG emissions.
Objective 10: Neutral effect - It is not anticipated that the construction of this option would have any effect on climate resilience.
Objective 11: Major positive effect - The option has a total expenditure of ~£4.7 million which will provide a significant increase in construction related employment.
Objective 12: Neutral effect - Construction works are not expected to have a significant impact on opportunities/facilities for recreation or tourism. There are 4 greenspace areas within 1km of the option. With the closest being play space approximately 700m from the option. There are no national trails within 10km of the option. National cycle route 51 is located within 1km of the option with it's closest point being approximately 600m away. There is one CRoW located approximately 4.7km from the option. There is one country park 9.3km from the option location. Any effect on tourism and recreation through the reduction in availability and quality of existing facilities and greenspace is anticipated to be very minor (nearest greenspace to excavation is 700m) and very short-term.
Objective 13: Minor negative effect - Construction of the option is not expected to have a significant impact on health during the construction period, due to the largely rural location. Construction works may have a minor negative effect (e.g. noise disturbance, vibration, dust deposition and air quality impacts) on residential receptors in nearby Northstowe and Longstanton.
Objective 14: Neutral effect - The construction phase of this option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative uncertain effect - The option involves constructing a new pipeline and blending plant, thus requiring new materials with no use of existing assets and limited opportunities to reuse or recycle waste. At this stage of option development this is assume to have a minor negative effect on waste and resources as the pipeline is only 700m in length and the blending plant is small in footprint (total land requirement of 300m2). However, as the quantities of materials required are currently unknown, the significance of effects against this objective is currently uncertain.
Objective 16: Neutral effect - There are no World Heritage Sites within 10km of the option. There are 5 registered parks and gardens within 10km, with the closest being Childerley Hall located 6.3km away. There are 6 scheduled monuments within 10km of the option, 'Castle Hill' earthworks is the closest scheduled monument approximately 3.1km from the option. There is one scheduled monument within 1km of the option (Village water pump, Longstanton 750m away). It is not anticipated construction would have any significant effect on these heritage assets, due to the distance between these sites and proposed works however this will be further assessed at the design stage.
Objective 17: Minor negative effect - There are no AONBs or National Parks within 10km of the option. The Cambridge greenbelt is within 5km of the option with it's closest point approximately 4km away. The option requires the construction of a pipeline and a new blending plant, construction works are likely to be visually intrusive to the rural landscape in the short term.

Operation
Objective 1: Neutral effect - Option 75Aiii is a third party potable water transfer which includes a cross-connection from Anglian Water's new strategic pipeline to the Cambridge network with a supply of 5Ml/d. The availability of surplus water has been identified by Anglian Water. The option does not require an abstraction licence, or change to abstraction licence. Therefore, no LSE are anticipated from option 75Aiii. This option is not expected to cause adverse effects on any non-designated aquatic habitats or species.
Objective 2: Minor positive effect - It is assumed that operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Neutral effect - the scheme involves the transfer of treated water within a closed system. It is assumed that maintenance will be undertaken under best practice mitigation measures in view of the company wide biosecurity plan and waste materials potentially containing INNS propagules such as screen debris or mechanical filtration solids will be handled appropriately.
Objective 4: Neutral effect - It is not anticipated that there would be any operational effects on soil, land use or geodiversity.
Objective 5: Neutral effect - This option is a transfer of potable water therefore there is not expected to be any impacts on the quantity of groundwater or surface water.
Objective 6: Neutral effect - This option is a transfer of potable water therefore there is not expected to be any impacts on water quality.
Objective 7: Neutral effect - The operation of this option is not expected to cause or exacerbate the risk of flooding in the vicinity of the scheme or elsewhere. The design of the new above ground infrastrucuture (blending plant) is assumed to have built in flood risk mitigation.
Objective 8: Neutral effect - There may be some vehicle movements during operation of the option for blending plant maintenance purposes, however, these are anticipated to be relatively infrequent and will not impact the local air quality. Air quality impacts will be assessed further at the design stage.
Objective 9: Minor negative effect - As the pipeline will be a high pressure main, it should not be necessary to pump the water to achieve the desired water output. However, a minor amount of energy will be required to treat additional water during operation. Operational carbon emissions are 112 tCO2e for this option.
Objective 10: Minor positive effect - Operation of the option will provide 5 Ml/d of water resource, which will have a minor positive effect on increasing the resilience/decreasing the vulnerability to climate change effects.
Objective 11: Moderate positive effect - Operation of this option will provide an additional 5Ml/d that can support economic activity.
Objective 12: Neutral effect - Operation of the option is not expected to have a negative impact on tourism and recreation.
Objective 13: Moderate positive effect - Operation of this option will provide an additional 5Ml/d that can support human health and wellbeing.
Objective 14: Minor positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the Cambridge Water supply area by providing an additional 5Ml/d deployable output.
Objective 15: Minor negative uncertain effect - The operation of the option will require additional energy to treat water at the blending plant however no pumping is required as it is assumed the hydraulic head developed in the AWS main to reach Rede is sufficient. The option will require the use of chemicals and the waste will need to be discarded appropriately, this will have a minor effect on waste and resources but will require detailed design to be undertaken and therefore the effects are uncertain at this stage.
Objective 16: Neutral effect - Operation of this option is not expected to have any impact on cultural heritage sites.
Objective 17: Minor negative effect - The option is not located in a designated landscape area however will involve a new polishing plant which will be a permanent fixture in the landscape. This is anticipated to have a minor, long-term effect on the local landscape.

Option Assessment Information	
Option ID	75Biii
Option Name	AWS potable transfer through CAM area 10MI/d (this iteration includes CW paying for some of the AWS main)
Water company	Cambridge Water
Option Description	<p>AWS are understood to be considering construction of a new strategic pipeline running from their existing Grafham WTW to a new strategic reservoir at Rede, that is being constructed adjacent to an existing distribution reservoir at Rede. This main is expected to run through the north of Cambridge and will therefore intersect existing CAM supply mains. A cross-connection will be constructed where the new AWS strategic main from Grafham to Rede (west to east) intersects the existing CAM supply mains; this will notionally be located approximately 2km north of Longstanton. The infrastructure required for this option includes:</p> <ul style="list-style-type: none">- 750m of 300mm diameter cross-connection pipework has been included in this option for variable allowance and costing purposes due to the uncertainty of the final AWS strategic main location.- The pipework will be equipped with a flowmeter and pressurereducing valve (PRV)- Land compensation for the pipeline <p>This option is different to option CW24-75Ai and ii as it has considered the requirement of a chemical dosing polishing plant, to reduce the risk of water quality changes and the potential impact on customers, from mixing different two water sources, i.e. surface water (AWS) and groundwater (CAM). A review of water quality of the receiving network, and of the bulk import of potable water has indicated that additional treatment, in the form of breakpoint chlorination, is required on the imported potable water from AWS, prior to mixing with the existing CAM network. The infrastructure required for breakpoint chlorination includes:</p> <ul style="list-style-type: none">-Chlorine contact tank (99.2 m3)-Sodium Hypochlorite dosing rig and storage (10 MI/d) <p>-Chemical Dosing - pH correction (5 MI/d) NOTE: this will need further review at detailed design stage, the assumption of need has been included in the costs to date.</p> <ul style="list-style-type: none">-Land requirement (300 m2)-New power supply (0-50 kW)
Yield	10 MI/d
WRZ	External raw water bulk supply/transfer – Potable transfer from AWS grid main crossing West to East through CW area of supply

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
Option CW24-75B	Construction (negative)	-/?	-	-	-	0	-	-	-/?	-	0	0	0	-	0	-/?	0	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	0	0	0
	Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-/?	0	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	+	++	0	++	+	0	0	0

Construction
Objective 1: Minor negative uncertain effect - The Ouse Washes Ramsar, SAC, SPA and SSSI site is approximately 7km from the option. There are a further 4 SSSIs within 10km of the option including Overhall Grove located 6.4km from the option. There are no NNRs within 10km of the option. There are two LNRs within 10km of the option with Mare Fen 3km away and Worts Meadow 8.7km away. There are some ancient woodland areas located 4.5km from the option. Ouse Washes SAC/SPA/Ramsar is located along the Old Bedford River and the New Bedford River, which are artificial, partial diversion of the waters of the River Great Ouse. The construction of the 750m pipeline associated with option 75A will require crossing Swavesey Drain, a small tributary of the River Great Ouse (approximately 4.8km upstream of the confluence) which joins the river approximately 4.9km upstream of the Ouse Wash SAC/SPA/Ramsar. The location of the blending plant is also in close proximity to two drains (c.70m). A review of sites surveyed for the WeBS and NBN Atlas data suggests that the site for the blending plant is not offsite functionally linked habitat. Few species are recorded within 2km or are in in very low numbers. Due to the distance between the option and the designated sites, construction works are not anticipated to have an impact on the qualifying features through noise, visual disturbance or air pollution. However, construction works may result in surface and groundwater pollution incident, sedimentation which may affect qualifying feature of the Ouse Washes SAC (spined loach) and the waterbird assemblage associated with the SPA and Ramar sites. The HRA Stage 2 Appropriate Assessment undertaken for Ouse Washes SAC/SPA/Ramsar concluded that with appropriate mitigation there will be no adverse effects on conservation objectives or site integrity during construction, however without further option details there is still some uncertainty. Pipeline construction activities and construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for
Objective 2: Minor negative effect - Construction of the pipeline and blending plant is expected to cause a minor negative impact.
Objective 3: Minor negative effect - Although construction activities are required which result in increased distribution of terrestrial and aquatic INNS, the risk is considered as minor assuming best practice biosecurity measures will be adopted during construction.
Objective 4: Minor negative effect - The option is wholly located within Grade 3 Agricultural land which is some of the best and most versatile land. The option involves permanent land take for the blending plant however the footprint of the site is small. Construction of the pipeline is temporary and it is assumed any excavated material will be reinstated following installation of the pipeline. This results in an overall minor negative effect on soils and land use. Additionally, there are two historic landfill sites within 5km of the option with the closest being Hill Farm approximately 1.4km away. There are a further 16 historic landfill sites within 10km of the option. There are three permitted waste sites within 10km of the option with the closest site being Milton Landfill 8.7km away. The construction of the option will have no effects on these sites.
Objective 5: Neutral effect - Swavesey Drain is within 1km of the option (approximately 500m away). There are no groundwater bodies within 1km of the option. No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.
Objective 6: Minor negative effect - Construction activities near watercourses may have a minor effect on water quality which result in short-term or intermittent effects on receptors. The component would not lead to a change in WFD classification.
Objective 7: Minor negative effect - Construction of the pipeline would be located within Flood Zones 2 and 3 and the option would involve the construction of above ground water supply infrastructure, a blending plant, largely (>95%) within Flood Zone 2 which could be at risk of flooding during the construction period.
Objective 8: Minor negative uncertain effect - The A14 Corridor AQMA is located 3.6km from the option. The Hemingford to Fenstanton (A14) AQMA and Cambridge AQMA are both within 10km of the option. Impacts on these AQMAs resulting from construction are considered unlikely. There will be an increase in vehicle movement associated with construction activities that may cause short-term deterioration in local air quality and mitigation will be required. The number of vehicle movements is unknown, thus the extent of impact is uncertain but anticipated to be minor.

Objective 9: Minor negative effect - Construction would involve the use of materials with embodied carbon as well as carbon emissions related to construction traffic. The estimated embodied carbon for this option is 588 tCO2e which will have a minor negative effect on GHG emissions.
Objective 10: Neutral effect - It is not anticipated that the construction of this option would have any effect on climate resilience.
Objective 11: Major positive effect - The option has a total expenditure of ~£8.2 milion which will provide a significant increase in construction related employment.
Objective 12: Neutral effect - Construction works are not expected to have a significant impact on opportunities/facilities for recreation or tourism. There are 4 greenspace areas within 1km of the option. With the closest being play space approximately 700m from the option. There are no national trails within 10km of the option. National cycle route 51 is located within 1km of the option with it's closest point being approximately 600m away. There is one CRoW located approximately 4.7km from the option. There is one country park 9.3km from the option location. Any effect on tourism and recreation through the reduction in availability and quality of existing facilities and greenspace is anticipated to be very minor (nearest greenspace to excavation is 700m) and very short-term.
Objective 13: Minor negative effect - Construction of the option is not expected to have a significant impact on health during the construction period, due to the largely rural location. Construction works may have a minor negative effect (e.g. noise disturbance, vibration, dust deposition and air quality impacts) on residential receptors in nearby Northstowe and Longstanton.
Objective 14: Neutral effect - The construction phase of this option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative uncertain effect - The option involves constructing a new pipeline and blending plant, thus requiring new materials with no use of existing assets and limited opportunities to reuse or recycle waste. At this stage of option development this is assume to have a minor negative effect on waste and resources as the pipeline is only 700m in length and the blending plant is small in footprint (total land requirement of 300m2). However, as the quantities of materials required are currently unknown, the significance of effects against this objective is currently uncertain.
Objective 16: Neutral effect - There are no World Heritage Sites within 10km of the option. There are 5 registered parks and gardens within 10km, with the closest being Childerley Hall located 6.3km away. There are 6 scheduled monuments within 10km of the option, 'Castle Hill' earthworks is the closest scheduled monument approximately 3.1km from the option. There is one scheduled monument within 1km of the option (Village water pump, Longstanton 750m away). It is not anticipated construction would have any significant effect on these heritage assets, due to the distance between these sites and proposed works however this will be further assessed at the design stage.
Objective 17: Minor negative effect - There are no AONBs or National Parks within 10km of the option. The Cambridge greenbelt is within 5km of the option with it's closest point approximately 4km away. The option requires the construction of a pipeline and a new blending plant, construction works are likely to be visually intrusive to the rural landscape in the short term.

Operation
Objective 1: Neutral effect - Option 75B is a third party potable water transfer which includes a cross-connection from Anglian Water's new strategic pipeline to the Cambridge network with a supply of 10MI/d. The availability of surplus water has been identified by Anglian Water. The option does not require an abstraction licence, or change to abstraction licence. Therefore, no LSE are anticipated from option 75B. This option is not expected to cause adverse effects on any non-designated aquatic habitats or species.
Objective 2: Minor positive effect - It is assumed that operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Neutral effect - the scheme involves the transfer of treated water within a closed system. It is assumed that maintenance will be undertaken under best practice mitigation measures in view of the company wide biosecurity plan and waste materials potentially containing INNS propagules such as screen debris or mechanical filtration solids will be handled appropriately.
Objective 4: Neutral effect - It is not anticipated that there would be any operational effects on soil, land use or geodiversity.
Objective 5: Neutral effect - This option is a transfer of potable water therefore there is not expected to be any impacts on the quantity of groundwater or surface water.
Objective 6: Neutral effect - This option is a transfer of potable water therefore there is not expected to be any impacts on water quality.
Objective 7: Neutral effect - The operation of this option is not expected to cause or exacerbate the risk of flooding in the vicinity of the scheme or elsewhere. The design of the new above ground infrastrucuture (blending plant) is assumed to have built in flood risk mitigation.
Objective 8: Neutral effect - There may be some vehicle movements during operation of the option for blending plant maintenance purposes, however, these are anticipated to be relatively infrequent and will not impact the local air quality. Air quality impacts will be assessed further at the design stage.
Objective 9: Minor negative effect - As the pipeline will be a high pressure main, it should not be necessary to pump the water to achieve the desired water output. However, a minor amount of energy will be required to treat additional water during operation. Operational carbon emissions are 112 tCO2e for this option.
Objective 10: Minor positive effect - Operation of the option will provide 10 MI/d of water resource, which will have a minor positive effect on increasing the resilience/decreasing the vulnerability to climate change effects.
Objective 11: Moderate positive effect - Operation of this option will provide an additional 10MI/d that can support economic activity.
Objective 12: Neutral effect - Operation of the option is not expected to have a negative impact on tourism and recreation.
Objective 13: Moderate positive effect - Operation of this option will provide an additional 10MI/d that can support human health and wellbeing.
Objective 14: Minor positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the Cambridge Water supply area by providing an additional 10MI/d deployable output.
Objective 15: Minor negative uncertain effect - The operation of the option will require additional energy to treat water at the blending plant however no pumping is required as it is assumed the hydraulic head developed in the AWS main to reach Rede is sufficient. The option will require the use of chemicals and the waste will need to be discarded appropriately, this will have a minor effect on waste and resources but will require detailed design to be undertaken and therefore the effects are uncertain at this stage.
Objective 16: Neutral effect - Operation of this option is not expected to have any impact on cultural heritage sites.
Objective 17: Minor negative effect - The option is not located in a designated landscape area however will involve a new polishing plant which will be a permanent fixture in the landscape. This is anticipated to have a minor, long-term effect on the local landscape.

Option Assessment Information	
Option ID	75Ci
Option Name	AWS potable transfer through CAM area 15Mld (this iteration includes only the cost of the Cambridge pipeline from the AWS main into the network)
Water company	Cambridge Water
Option Description	<p>AWS are understood to be considering construction of a new strategic pipeline running from their existing Grafham WTW to a new strategic reservoir at Rede, that is being constructed adjacent to an existing distribution reservoir at Rede. This main is expected to run through the north of Cambridge and will therefore intersect existing CAM supply mains. A cross-connection will be constructed where the new AWS strategic main from Grafham to Rede (west to east) intersects the existing CAM supply mains; this will notionally be located approximately 2km north of Longstanton. The infrastructure required for this option includes:</p> <ul style="list-style-type: none">- 750m of 300mm diameter cross-connection pipework has been included in this option for variable allowance and costing purposes due to the uncertainty of the final AWS strategic main location.- The pipework will be equipped with a flowmeter and pressure reducing valve (PRV)- Land compensation for the pipeline <p>This option is different to option CW24-75Ai and ii as it has considered the requirement of a chemical dosing polishing plant, to reduce the risk of water quality changes and the potential impact on customers, from mixing different two water sources, i.e. surface water (AWS) and groundwater (CAM). A review of water quality of the receiving network, and of the bulk import of potable water has indicated that additional treatment, in the form of breakpoint chlorination, is required on the imported potable water from AWS, prior to mixing with the existing CAM network. The infrastructure required for breakpoint chlorination includes:</p> <ul style="list-style-type: none">-Chlorine contact tank (99.2 m3)-Sodium Hypochlorite dosing rig and storage (15 MI/d) <p>-Chemical Dosing - pH correction (5 MI/d) NOTE: this will need further review at detailed design stage, the assumption of need has been included in the costs to date.</p> <ul style="list-style-type: none">-Land requirement (300 m2)-New power supply (0-50 kW)
Yield	15 MI/d
WRZ	External raw water bulk supply/transfer – Potable transfer from AWS grid main crossing West to East through CW area of supply

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
Option CW24-75A	Construction (negative)	-/?	-	-	-	0	-	-	-/?	-	0	0	0	-	0	-/?	0	-
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	+++	0	0	0	0	0	0
	Operation (negative)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-/?	0	-
	Operation (positive)	0	+	0	0	0	0	0	0	0	+	++	0	++	+	0	0	0

Construction
Objective 1: Minor negative uncertain effect - The Ouse Washes Ramsar, SAC, SPA and SSSI site is approximately 7km from the option. There are a further 4 SSSIs within 10km of the option including Overhall Grove located 6.4km from the option. There are no NNRs within 10km of the option. There are two LNRs within 10km of the option with Mare Fen 3km away and Worts Meadow 8.7km away. There are some ancient woodland areas located 4.5km from the option. Ouse Washes SAC/SPA/Ramsar is located along the Old Bedford River and the New Bedford River, which are artificial, partial diversion of the waters of the River Great Ouse. The construction of the 750m pipeline associated with option 75A will require crossing Swavesey Drain, a small tributary of the River Great Ouse (approximately 4.8km upstream of the confluence) which joins the river approximately 4.9km upstream of the Ouse Wash SAC/SPA/Ramsar. The location of the blending plant is also in close proximity to two drains (c.70m). A review of sites surveyed for the WeBS and NBN Atlas data suggests that the site for the blending plant is not offsite functionally linked habitat. Few species are recorded within 2km or are in in very low numbers. Due to the distance between the option and the designated sites, construction works are not anticipated to have an impact on the qualifying features through noise, visual disturbance or air pollution. However, construction works may result in surface and groundwater pollution incident, sedimentation which may affect qualifying feature of the Ouse Washes SAC (spined loach) and the waterbird assemblage associated with the SPA and Ramar sites. The HRA Stage 2 Appropriate Assessment undertaken for Ouse Washes SAC/SPA/Ramsar concluded that with appropriate mitigation there will be no adverse effects on conservation objectives or site integrity during construction, however without further option details there is still some uncertainty. Pipeline construction activities and construction activities near water may result in minor loss or degradation of non-designated aquatic habitat associated with short-term changes in river flows, geomorphology or water quality. There could be a short term change in sediment dynamics associated with any construction activities near water, however, this is unlikely to alter geomorphological forms and processes which underpin physical habitat for aquatic ecosystems.
Objective 2: Minor negative effect - Construction of the pipeline and blending plant is expected to cause a minor negative impact.
Objective 3: Minor negative effect - Although extensive construction activities are required which result in increased distribution of terrestrial and aquatic INNS, the risk is considered as minor assuming best practice biosecurity measures will be adopted during construction.
Objective 4: Minor negative effect - The option is wholly located within Grade 3 Agricultural land which is some of the best and most versatile land. The option involves permanent land take for the blending plant however the footprint of the site is small. Construction of the pipeline is temporary and it is assumed any excavated material will be reinstated following installation of the pipeline. This results in an overall minor negative effect on soils and land use. Additionally. there are two historic landfill sites within 5km of the option with the closest being Hill Farm approximately 1.4km away. There are a further 16 historic landfill sites within 10km of the option. There are three permitted waste sites within 10km of the option with the closest site being Milton Landfill 8.7km away. The construction of the option will have no effects on these sites.
Objective 5: Neutral effect - Swavesey Drain is within 1km of the option (approximately 500m away). There are no groundwater bodies within 1km of the option. No construction activities associated with this component would have a discernible effect on river flows or groundwater levels. There could be a short term change in sediment dynamics associated with the construction activities near water, however, this is expected to be minimal and is unlikely to result in a change in channel morphology.
Objective 6: Minor negative effect - Construction activities near watercourses may have a minor effect on water quality which result in short-term or intermittent effects on receptors. The component would not lead to a change in WFD classification.
Objective 7: Minor negative effect - Construction of the pipeline would be located within Flood Zones 2 and 3 and the option would involve the construction of above ground water supply infrastructure, a blending plant, largely (>95%) within Flood Zone 2 which could be at risk of flooding during the construction period.

Objective 8: Minor negative uncertain effect - The A14 Corridor AQMA is located 3.6km from the option. The Hemingford to Fenstanton (A14) AQMA and Cambridge AQMA are both within 10km of the option. Impacts on these AQMAs resulting from construction are considered unlikely. There will be an increase in vehicle movement associated with construction activities that may cause short-term deterioration in local air quality and mitigation will be required. The number of vehicle movements is unknown, thus the extent of impact is uncertain but anticipated to be minor.
Objective 9: Minor negative effect - Construction would involve the use of materials with embodied carbon as well as carbon emissions related to construction traffic. The estimated embodied carbon for this option is 858 tCO2e which will have a minor negative effect on GHG emissions.
Objective 10: Neutral effect - It is not anticipated that the construction of this option would have any effect on climate resilience.
Objective 11: Major positive effect - The option has a total expenditure of ~£11.6 million which will provide a significant increase in construction related employment.
Objective 12: Neutral effect - Construction works are not expected to have a significant impact on opportunities/facilities for recreation or tourism. There are 4 greenspace areas within 1km of the option. With the closest being play space approximately 700m from the option. There are no national trails within 10km of the option. National cycle route 51 is located within 1km of the option with it's closest point being approximately 600m away. There is one CRoW located approximately 4.7km from the option. There is one country park 9.3km from the option location. Any effect on tourism and recreation through the reduction in availability and quality of existing facilities and greenspace is anticipated to be very minor (nearest greenspace to excavation is 700m) and very short-term.
Objective 13: Minor negative effect - Construction of the option is not expected to have a significant impact on health during the construction period, due to the largely rural location. Construction works may have a minor negative effect (e.g. noise disturbance, vibration, dust deposition and air quality impacts) on residential receptors in nearby Northstowe and Longstanton.
Objective 14: Neutral effect - The construction phase of this option is not anticipated to have any effect on the sustainable and efficient use of resilient water resources.
Objective 15: Minor negative uncertain effect - The option involves constructing a new pipeline and blending plant, thus requiring new materials with no use of existing assets and limited opportunities to reuse or recycle waste. At this stage of option development this is assume to have a minor negative effect on waste and resources as the pipeline is only 700m in length and the blending plant is small in footprint (total land requirement of 300m2). However, as the quantities of materials required are currently unknown, the significance of effects against this objective is currently uncertain.
Objective 16: Neutral effect - There are no World Heritage Sites within 10km of the option. There are 5 registered parks and gardens within 10km, with the closest being Childerley Hall located 6.3km away. There are 6 scheduled monuments within 10km of the option, 'Castle Hill' earthworks is the closest scheduled monument approximately 3.1km from the option. There is one scheduled monument within 1km of the option (Village water pump, Longstanton 750m away). It is not anticipated construction would have any significant effect on these heritage assets, due to the distance between these sites and proposed works however this will be further assessed at the design stage.
Objective 17: Minor negative effect - There are no AONBs or National Parks within 10km of the option. The Cambridge greenbelt is within 5km of the option with it's closest point approximately 4km away. The option requires the construction of a pipeline and a new blending plant, construction works are likely to be visually intrusive to the rural landscape in the short term.

Operation
Objective 1: Neutral effect - Option 75A is a third party potable water transfer which includes a cross-connection from Anglian Water's new strategic pipeline to the Cambridge network with a supply of 5MI/d. The availability of surplus water has been identified by Anglian Water. The option does not require an abstraction licence, or change to abstraction licence. Therefore, no LSE are anticipated from option 75A. This option is not expected to cause adverse effects on any non-designated aquatic habitats or species.
Objective 2: Minor positive effect - It is assumed that operational biodiversity net gain would be greater than the net loss in construction; however, without quantification, its magnitude is uncertain. In consequence, an equivalent positive score to the negative score in construction is provided.
Objective 3: Neutral effect - the scheme involves the transfer of treated water within a closed system. It is assumed that maintenance will be undertaken under best practice mitigation measures in view of the company wide biosecurity plan and waste materials potentially containing INNS propagules such as screen debris or mechanical filtration solids will be handled appropriately.
Objective 4: Neutral effect - It is not anticipated that there would be any operational effects on soil, land use or geodiversity.
Objective 5: Neutral effect - This option is a transfer of potable water therefore there is not expected to be any impacts on the quantity of groundwater or surface water.
Objective 6: Neutral effect - This option is a transfer of potable water therefore there is not expected to be any impacts on water quality.
Objective 7: Neutral effect - The operation of this option is not expected to cause or exacerbate the risk of flooding in the vicinity of the scheme or elsewhere. The design of the new above ground infrastrucuture (blending plant) is assumed to have built in flood risk mitigation.
Objective 8: Neutral effect - There may be some vehicle movements during operation of the option for blending plant maintenance purposes, however, these are anticipated to be relatively infrequent and will not impact the local air quality. Air quality impacts will be assessed further at the design stage.
Objective 9: Minor negative effect - As the pipeline will be a high pressure main, it should not be necessary to pump the water to achieve the desired water output. However, a minor amount of energy will be required to treat additional water during operation. Operational carbon emissions are 112 tCO2e for this option.
Objective 10: Minor positive effect - Operation of the option will provide 15 MI/d of water resource, which will have a minor positive effect on increasing the resilience/decreasing the vulnerability to climate change effects.
Objective 11: Moderate positive effect - Operation of this option will provide an additional 15MI/d that can support economic activity.
Objective 12: Neutral effect - Operation of the option is not expected to have a negative impact on tourism and recreation.
Objective 13: Moderate positive effect - Operation of this option will provide an additional 15MI/d that can support human health and wellbeing.
Objective 14: Minor positive effect - The option is not a leakage reduction or water efficiency option and would have no impact on water efficiency. However, the option would increase the resilience of water resources within the Cambridge Water supply area by providing an additional 15MI/d deployable output.
Objective 15: Minor negative uncertain effect - The operation of the option will require additional energy to treat water at the blending plant however no pumping is required as it is assumed the hydraulic head developed in the AWS main to reach Rede is sufficient. The option will require the use of chemicals and the waste will need to be discarded appropriately, this will have a minor effect on waste and resources but will require detailed design to be undertaken and therefore the effects are uncertain at this stage.
Objective 16: Neutral effect - Operation of this option is not expected to have any impact on cultural heritage sites.
Objective 17: Minor negative effect - The option is not located in a designated landscape area however will involve a new polishing plant which will be a permanent fixture in the landscape. This is anticipated to have a minor, long-term effect on the local landscape.

Option Assessment Information	
Option ID	N/A
Option Name	50% Leakage Reduction by 2050
Water company	Cambridge Water
Option Description	<div>This targets a 50% leakage reduction by 2050 through a series of activities including:<ul style="list-style-type: none">- Proactive trunk mains leakage reduction- Advanced pressure optimisation- Customer supply pipe repair or replacement (without smart networks)- Distribution Mains/Comms pipe replacement- Customer supply pipe repair or replacement (with smart networks)- DMA MOT (with smart networks)- DMA ALC plus (with smart networks)- DMA MOT (without smart networks)- DMA ALC plus (without smart networks)</div>
Yield	35.02 MI/d
WRZ	Cambridge

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
Option: 50% Leakage Reduction by 2050	Construction (negative)	0	0	0	0	0	0	0	0	?	0	0	0	0	0	?	0	0
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	?	0	0	0	0	0	0
	Operation (negative)	?	0	0	0	0	0	0	0	?	0	0	0	0	0	0	0	0
	Operation (positive)	0	0	0	0	++	0	0	0	0	++	+++	0	+++	+++	0	0	0

Construction
Objective 1: Neutral effects - Construction of this option is not anticipated to impact on biodiversity.
Objective 2: Neutral effect - Construction of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - Construction activity is not anticipated to impact INNS.
Objective 4: Neutral effect - Construction of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Neutral effect - Construction of this option is not anticipated to impact on water quantity
Objective 6: Neutral effect - Construction of this option is not anticipated to impact on water quality
Objective 7: Neutral effect - The construction of this option is not anticipated to impact on flood risk.
Objective 8: Neutral negative effect - Vehicle movements will inevitably be associated with the implementation of leakage activities involved in this option which may result in a decrease of the local air quality. There is no available data on the number of vehicle movements required at this stage, however the activities are assumed to be spread both spatially across the supply area and temporally therefore any effects are assumed to be negligible.
Objective 9: Neutral negative uncertain effect - No CAPEX, embodied carbon and material usage data are available at this stage therefore the assessment us uncertain.
Objective 10: Neutral effect - The construction of this option would have no effect on resilience to climate change effects.
Objective 11: Neutral positive uncertain effect - The construction of this option is not anticipated to impact on the local employment opportunities, the local or regional economy, or on recreational activities. No capex data is available for this option therefore the assessment is uncertain.
Objective 12: Neutral effect - The construction of this option is not anticipated to impact on tourism and recreation.
Objective 13: Neutral effect - The construction of this option is not anticipated to impact on human health and well-being.
Objective 14: Neutral effect - The construction of this option is not anticipated to impact on water resource use.
Objective 15: Neutral uncertain effect - the option will require materials for the activities required. There is no available data on the materials required at this stage and whether there are any opportunties for recycling, therefore the assessment is uncertain.

Objective16: Neutral effect - The construction of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The construction of this option is not anticipated to impact on landscape

Operation
Objective 1: Neutral effect uncertain - The operation of this option involves the 'fix' aspect of find and fix. This would include trunk mains and customer supply pipes as discovered. Trunk main repairs may involve some excavation. Impact on biodiversity is unknown until locations and repair methods are identified.
Objective 2: Neutral effect - The operation of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - The operation of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The operation of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Moderate positive effect - The operation of this option would result in a moderate reduction in the demand for water (35.02 MI/d benefit) and does not require abstraction to achieve yield.
Objective 6: Neutral effect - The construction of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The construction of this option is not anticipated to impact on flood risk.
Objective 8: Neutral effect - The operation of this option is not anticipated to have any effects on air quality.
Objective 9: Neutral uncertain effect - No operational carbon data are available for this scheme therefore the assessment is uncertain.
Objective 10: Moderate positive effect - as operation of the option will provide 35.02 MI/d of water resource, supporting community resilience to climate change wherein drought may otherwise have been a risk.
Objective 11: Major positive effect - The option would provide an additional capacity of 35.02 MI/d.
Objective 12: Neutral effect - The proposed development example site is within an existing airfield with no tourism or recreational facilities within the boundary. Therefore, operation of the scheme would not have an effect on tourism or recreation.
Objective 13: Major positive effect - This option would lead to a major increase in deployable output (35.02 MI/d) providing benefits to the local community, human health and recreation.
Objective 14: Major positive effect - This option would result in a major reduction in leakage from the supply network of approx. 35.02 MI/d.
Objective 15: Neutral effect - The operation of this option is not anticipated to impact on waste and resource use.
Objective16: Neutral effect - The construction of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The construction of this option is not anticipated to impact on landscape

Option Assessment Information																		
Option ID	N/A																	
Option Name	Non-household Enhanced Meters (9% reduction in NHH demand)																	
Water company	Cambridge Water																	
Option Description	This option is a DMO with a 9% reduction in non-household demand. Fitting of Enhanced Meter Technology over AMP8 and AMP9 to all NHH.																	
Yield	17.36 MI/d																	
WRZ	Cambridge																	

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
Option Non-household Enhanced Meters (9% reduction in NHH demand)	Construction (negative)	0	0	0	0	0	0	0	?	?	0	0	0	0	0	?	0	0
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	?	0	0	0	0	0	0
	Operation (negative)	0	0	0	0	0	0	0	0	?	0	0	0	0	0	0	0	0
	Operation (positive)	0	0	0	0	++	0	0	0	0	+	++	0	++	+++	0	0	0

Construction
Objective 1: Neutral effects - Construction of this option is not anticipated to impact on biodiversity. This option involves the fitting of enhanced meter technology.
Objective 2: Neutral effect - Construction of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - Construction activity is not anticipated to impact INNS.
Objective 4: Neutral effect - Construction of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Neutral effect - Construction of this option is not anticipated to impact on water quantity
Objective 6: Neutral effect - Construction of this option is not anticipated to impact on water quality
Objective 7: Neutral effect - The construction of this option is not anticipated to impact on flood risk.
Objective 8: Neutral negative uncertain effect - Vehicle movements will inevitably be associated with the installation of meter technology which may result in a decrease of the local air quality. There is no available data on the number of vehicle movements required at this stage, therefore the assessment is uncertain.
Objective 9: Neutral negative uncertain effect - No CAPEX or carbon data are available at this stage therefore the assessment us uncertain.
Objective 10: Neutral effect - The construction of this option would have no effect on resilience to climate change effects.
Objective 11: Neutral positive uncertain effect - The construction of this option is not anticipated to impact on the local employment opportunities, the local or regional economy, or on recreational activities. No capex data is available for this option therefore the assessment is uncertain.
Objective 12: Neutral effect - The construction of this option is not anticipated to impact on tourism and recreation.
Objective 13: Neutral effect - The construction of this option is not anticipated to impact on human health and well-being.
Objective 14: Neutral effect - The construction of this option is not anticipated to impact on water resource use.
Objective 15: Neutral uncertain effect - the option will require materials for the additional meters required. There is no available data on the number of meters or materials required at this stage, therefore the assessment is uncertain.
Objective16: Neutral effect - The construction of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The construction of this option is not anticipated to impact on landscape

Operation
Objective 1: Neutral effect - The operation of this option is not anticipated to impact on biodiversity.
Objective 2: Neutral effect - The operation of this option is not anticipated to impact on sustainable natural resources.

Objective 3: Neutral effect - The operation of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The operation of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Moderate positive effect - The operation of this option would result in a moderate reduction in the demand for water (17.36 MI/d benefit) and does not require abstraction to achieve yield.
Objective 6: Neutral effect - The construction of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The construction of this option is not anticipated to impact on flood risk.
Objective 8: Neutral effect - the option would not result in any effects on air quality during operation.
Objective 9: Neutral uncertain effect - No operational carbon data are available for this scheme therefore the assessment is uncertain.
Objective 10: Minor positive effect - as operation of the option will provide 17.36 M/d of water resource, supporting community resilience to climate change wherein drought may otherwise have been a risk.
Objective 11: Moderate positive effect - The option would provide an additional capacity of 17.36 MI/d.
Objective 12: Neutral effect - The proposed development example site is within an existing airfield with no tourism or recreational facilities within the boundary. Therefore, operation of the scheme would not have an effect on tourism or recreation.
Objective 13: Moderate positive effect - This option would lead to a moderate increase in design capacity (17.36 MI/d) of drinking water which would be available to the local community.
Objective 14: Major positive effect - This option is a water efficiency option with a design capacity of 22.14 MI/d. This option will result in an improvement in water efficiency and resilience.
Objective 15: Neutral effect - the operation of the option is unlikely to require additional energy or the use of chemicals.
Objective16: Neutral effect - The construction of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The construction of this option is not anticipated to impact on landscape

Option Assessment Information																		
Option ID	N/A																	
Option Name	Water Efficiency (110 l/h/d by 2050)																	
Water company	Cambridge Water																	
Option Description	<div>This targets a water efficiency programme involving these measures:</div> <div><div>- Water labelling no minimum standards</div><div>- Household water efficiency programme (partnering approach, home visit)</div><div>- Housing associations - targeted programme</div><div>- Innovative tariffs</div><div>- Water neutrality (without smart metering)</div><div>- Community Water Efficiency Scheme (without smart metering)</div></div>																	
Yield	22.14 MI/d																	
WRZ	Cambridge																	

Option	Stage	1. Biodiversity	2. Sustainable Natural Resources	3. INNS	4. Soils, Geodiversity and Land Use	5. Water Quantity	6. Water Quality	7. Flood Risk	8. Air Quality	9. Greenhouse Gas Emissions	10. Climate Resilience	11. Economy	12. Tourism and Recreation	13. Human Health and Well-being	14. Water Resource Use	15. Waste and Resource Use	16. Cultural Heritage	17. Landscape
Option:Water Efficiency (110 l/h/d by 2050)	Construction (negative)	0	0	0	0	0	0	0	?	-/?	0	0	0	0	0	?	0	0
	Construction (positive)	0	0	0	0	0	0	0	0	0	0	?	0	0	0	0	0	0
	Operation (negative)	?	0	0	0	0	0	0	0	?	0	0	0	0	0	0	0	0
	Operation (positive)	0	0	0	0	++	0	0	0	0	++	++	0	++	+++	0	0	0

Construction
Objective 1: Neutral effects - Construction of this option is not anticipated to impact on biodiversity.
Objective 2: Neutral effect - Construction of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - Construction activity is not anticipated to impact INNS.
Objective 4: Neutral effect - Construction of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Neutral effect - Construction of this option is not anticipated to impact on water quantity
Objective 6: Neutral effect - Construction of this option is not anticipated to impact on water quality
Objective 7: Neutral effect - The construction of this option is not anticipated to impact on flood risk.
Objective 8: Neutral negative uncertain effect - Vehicle movements will inevitably be associated with the implementation of the measures involved in this option which may result in a decrease of the local air quality. There is no available data on the number of vehicle movements required at this stage, therefore the assessment is uncertain.
Objective 9: Minor negative uncertain effect - The construction of the option would include embodied carbon from material production of water meters and water efficiency devices (total carbon not disclosed). In addition, the option would require an unspecified number of vehicle movements to carry out the home/site visits and installations. No carbon or material usage data are available at this stage therefore the assessment us uncertain.
Objective 10: Neutral effect - The construction of this option would have no effect on resilience to climate change effects.
Objective 11: Neutral positive uncertain effect - The construction of this option is not anticipated to impact on the local employment opportunities, the local or regional economy, or on recreational activities. No capex data is available for this option therefore the assessment is uncertain.
Objective 12: Neutral effect - The construction of this option is not anticipated to impact on tourism and recreation.
Objective 13: Neutral effect - The construction of this option is not anticipated to impact on human health and well-being. Some disturbances may occur during installation of devices, however these are anticipated to be minor.
Objective 14: Neutral effect - The construction of this option is not anticipated to impact on water resource use.
Objective 15: Neutral uncertain effect - the option will require materials for the activities required. There is no available data on the materials required at this stage, therefore the assessment is uncertain.
Objective16: Neutral effect - The construction of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The construction of this option is not anticipated to impact on landscape

Operation
Objective 1: Neutral effect - The operation of this option is not anticipated to impact on biodiversity.
Objective 2: Neutral effect - The operation of this option is not anticipated to impact on sustainable natural resources.
Objective 3: Neutral effect - The operation of this option is not anticipated to impact on INNS.
Objective 4: Neutral effect - The operation of this option is not anticipated to impact on soils, geodiversity and land use.
Objective 5: Moderate positive effect - The operation of this option would result in a moderate reduction in the demand for water (22.14 MI/d benefit) and does not require abstraction to achieve yield.
Objective 6: Neutral effect - The construction of this option is not anticipated to impact on water quality.
Objective 7: Neutral effect - The construction of this option is not anticipated to impact on flood risk.
Objective 8: Neutral effect - The operation of this option is not anticipated to have any effects on air quality.
Objective 9: Neutral uncertain effect - No operational carbon data are available for this scheme therefore the assessment is uncertain.
Objective 10: Moderate positive effect - as operation of the option will provide 22.14 MI/d of water resource, supporting community resilience to climate change wherein drought may otherwise have been a risk.
Objective 11: Moderate positive uncertain effect - The option would provide an additional capacity of 22.14 MI/d.
Objective 12: Neutral effect - The proposed development example site is within an existing airfield with no tourism or recreational facilities within the boundary. Therefore, operation of the scheme would not have an effect on tourism or recreation.
Objective 13: Moderate positive effect - This option would lead to a moderate increase in deployable output (22.14 MI/d) providing benefits to the local community, human health and recreation.
Objective 14: Major positive effect - This option is a water efficiency option with a design capacity of 22.14 MI/d. This option will result in an improvement in water efficiency and resilience.
Objective 15: Neutral effect - The operation of this option is not anticipated to impact on waste and resource use.
Objective16: Neutral effect - The construction of this option is not anticipated to impact on cultural heritage.
Objective 17: Neutral effect - The construction of this option is not anticipated to impact on landscape