

**ESW WRMP Integrated Environmental Assessment  
Information Pack**



<b>Option Name:</b>		<b>Option Description:</b>	
Warkworth WTW to Berwick Upon Tweed Transfer		Transfer from Warkworth WTW to Spring Hill Service Reservoir. Transfer length approximately 56.7km. Tunnelling (micro-tunnelling/horizontal directional drilling) highly likely to be required as the route crosses one railway, three major roads, six minor roads, 15 names rivers and numerous drainage channels.	
<b>Option Code:</b>		BOT-TRA-001	
<b>SEA Summary</b>			
<b>SEA Objectives with Major/Moderate Positive Effects (+++)</b>			
<b>SEA Objective</b>	<b>Comment</b>	<b>Mitigation</b>	
N/A			
<b>SEA Objectives with Major/Moderate Negative Effects (---)</b>			
<b>SEA Objective</b>	<b>Comment</b>	<b>Mitigation</b>	
To protect designated sites and their qualifying features. (---)	Lindisfarne Ramsar and Northumbria Coast Ramsar and SPA's, Berwickshire & Northumberland Coast, North Northumberland Dunes, and Tweed Estuary SACs are located within 2km. There are no direct effects but may be disturbance effects during the construction phase. Northumberland Marine SPA and MPA are within 500m of the option, no direct effects but there may be disturbance effects during the construction phase. River Coquet and Coquet Valley Woodlands SSSI transects the option with potential to directly impact the SSSI with disturbance effects during the construction phase. The option is entirely located within SSSI Impact Risk Zones. There are no MCZ within 500m of the option. The HRA ToLS identified 14 Natura 2000 sites that could be affected. Potential LSE concluded for Northumberland Marine SPA. LSE also concluded for Lindisfarne Ramsar and SPA, Northumberland Coast SPA, Berwickshire & North Northumberland Coast SAC, and North Northumberland Dunes SAC.	Refining pipeline alignment or use trenchless techniques to avoid SSSI. Best practice methods to be implemented to minimise disturbance effects. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual construction effects are lessened although this would not negate the need for a potential appropriate assessment.	

<p>To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)</p>	<p>The pipeline passes adjacent to and through small parcels of Ancient Woodland and BAP Priority Habitat (mainly deciduous woodland). Potential permanent loss of Ancient Woodland and deciduous woodland BAP Priority Habitat. No direct effects on other Priority Habitats but there may be disturbance effects during the construction phase and potential effects on protected species.</p> <p>The pipeline crosses one Groundwater Dependent Terrestrial Ecosystems (GWDTE), River Coquet &amp; Coquet Valley Woodlands (SSSI). There are no chalk rivers within 2km of the option.</p> <p>The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -16.52%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.</p>	<p>Consider minor rerouting to avoid most high value habitats. Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid woodland habitat, in particular Ancient Woodland and BAP Priority Habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual construction effects are lessened.</p>
<p>To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity. (--)</p>	<p>The option crosses grade 3 agricultural land with disturbance to these soils during construction. During operation, dependent on the depth of the pipeline and agricultural operations, it would be possible to continue using the land for agricultural purposes, therefore there is unlikely to be any loss of land quality from the transfer pipeline.</p> <p>The location of the pumping station is currently unknown. However, it is likely that this land, if agricultural, will not be reinstated as it is a permanent structure, therefore this land would be permanently lost.</p>	<p>Reduce damage to agricultural land through design to reduce the option footprint and the construction working area to reduce the amount of land permanently taken or temporarily disturbed.</p> <p>Ground will be reinstated therefore long term residual effects on agricultural soils as a result of pipeline construction are unlikely. There will be permanent loss as a result of the pumping station although this is a relatively small area so neutral effects identified.</p> <p>Best practice techniques to prevent disturbance of contaminated material during construction.</p>
<p>To conserve, protect and enhance landscape and townscape character and visual amenity. (--)</p>	<p>This option overlaps three NCAs North Northumberland Coastal Plain (0.29%), Northumberland Sandstone Hills (0.02%) and South East Northumberland Coastal Plain (0.01%) (with % proportion of NCA affected). Additionally, Northumberland Coast AONB is within 500m of the transfer pipeline. Negative effects during construction likely as excavation will be required for the transfer pipeline. Construction will also result in permanent loss of woodland, including Ancient Woodland, with impacts on landscape character.</p> <p>There will be minimal new above ground infrastructure. The pumping station is a relatively small-scale structure and is therefore unlikely to change the landscape character of the area or affect visual amenity during operation.</p>	<p>Re-routing of the pipeline to minimise damage and disruption to woodland, including Ancient Woodland, or utilise directional drilling or other trenchless techniques to reduce construction effects. Best practice measures to be implemented to minimise effects during construction including although temporary effects during construction may remain. Land reinstated upon completion so with mitigation, no residual effects are likely to remain during operation.</p>

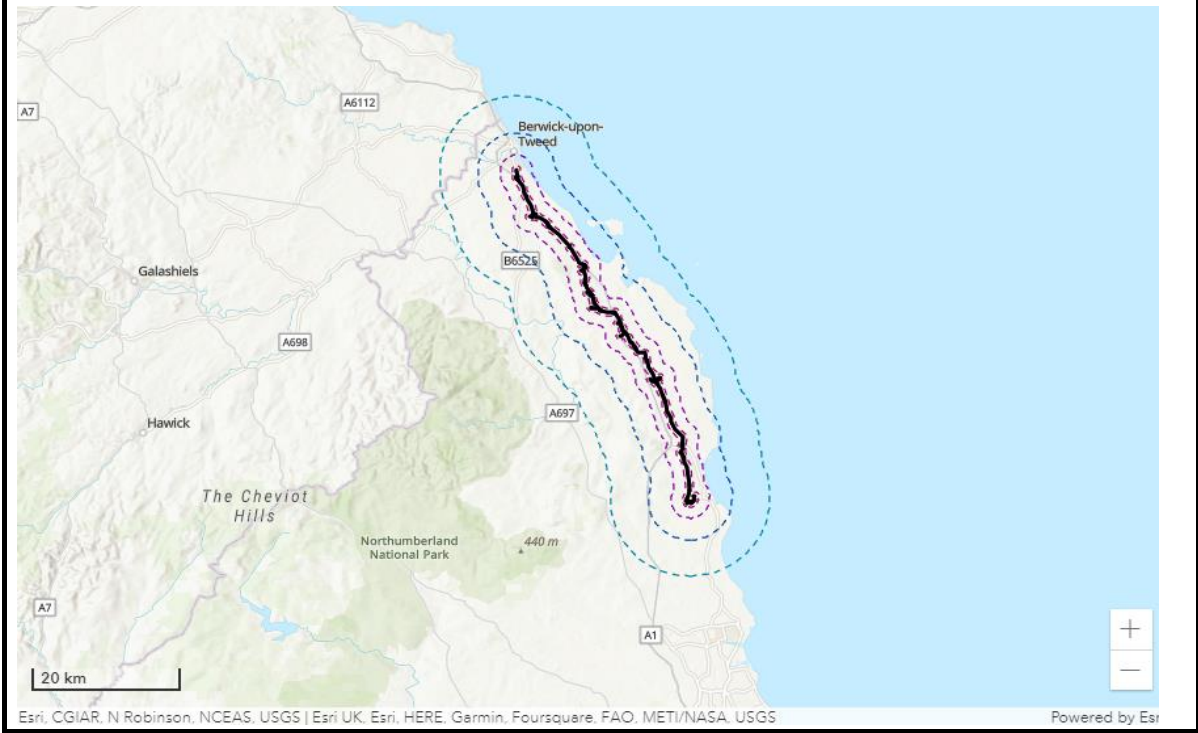
<p>To conserve/Protect and enhance the historic environment including the significance of designated and non-designated cultural heritage (including archaeology and built heritage), including any contribution made to that significance by setting. (--)</p>	<p>The option is within 500m of one registered park or Garden (Alnwick Castle), one Heritage Coast (North Northumberland) seven scheduled monuments and is within proximity of a number of listed buildings.</p> <p>There is one scheduled monument (Springhill Roman Camp) located directly in the northern part of the transfer pipeline that is classed as Heritage at Risk. Construction may affect the setting of these historic assets, however this is likely to be temporary as the pipeline will be buried.</p> <p>There is potential for the excavation of the pipeline to impact buried archaeology if present.</p> <p>There will be minimal new above ground infrastructure, which is unlikely to have effects on the setting of heritage assets during operation.</p>	<p>Re-routing of the pipeline to minimise damage and disruption to scheduled monuments. Best practice measures to be implemented to minimise setting effects for other heritage assets during construction.</p> <p>Further work likely to be required to determine significance of effect, depending on the presence or absence of buried archaeology. Residual effects may remain due to potential loss of archaeological remains.</p>
<p>Avoid negative effects on built assets and infrastructure. (--)</p>	<p>The option crosses major roads, railway and national cycle network routes. Likely to be temporary impacts during construction due to disruption for users. It is assumed that trenchless techniques will be used for pipelines which cross major roads.</p> <p>During the construction phase, there is likely to be some disruption to the local traffic network from the increase in the volume of traffic due to deliveries of construction material for the pipeline.</p> <p>During the operational phase, there is unlikely to be any disturbance to the transport network.</p>	<p>Best practice measures including a Traffic Management Plan to be implemented to minimise disturbance during construction. However, temporary effects are likely to still occur.</p>

SEA Tally Residual		
SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	2.00
0	30.00	39.00
-	11.00	1.00
--	0.00	0.00
---	0.00	0.00
(?)	0.00	0.00

<b>HRA Summary</b>	
<i>HRA Screening Outcome:</i>	Six sites have potential for LSEs, and eight sites have no LSE. No sites require further assessment.
<b>Natural Capital Assessment Summary</b>	
<i>Natural Capital Assessment Outcome:</i>	-£4611.92
Natural Capital Assessment: Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. Permanent loss of ancient woodland is expected as a result of the option construction. Some loss of the floodplain is expected as a result of the option construction.
Ecosystem Service Assessment Comments:	The option is likely to generate the loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. There is no change anticipated to water flow regulation. Permanent loss of arable stocks, pastoral stocks and ancient woodland due to option construction hence loss of associated ecosystem services expected.
<b>Biodiversity Net Gain Assessment Summary</b>	
<i>BNG Outcome (Unit Change):</i>	-43.38
<i>BNG Outcome (% Change):</i>	-13.11%
<b>Water Framework Directive Screening Assessment Summary</b>	
<i>WFD Screening Outcome: (No. Scoped-In / Out)</i>	Three waterbodies require further assessment: Coquet from Forest Burn to Tidal Limit; Northumberland Carboniferous Limestone and Coal Measures.
<b>INNS Summary</b>	
<i>INNS Risk Score</i>	1 = Very Low
Comments	WTW and service reservoirs are both closed systems. Water is transferred via pipeline. Negligible risk of INNS being introduced at source, pathway or receptor.

Carbon Calculations	
Capital Carbon(tCO2e)	21,364.27
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£1,334.36

**Option GIS:**



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<b>Option Name:</b>		<b>Option Description:</b>	
Warkworth Network to Berwick Upon Tweed Transfer		Cross connection between the Warkworth and Berwick Upon Tweed networks to transfer water from Warkworth WRZ to Berwick UPOn Tweed WRZ. Includes reinforcement of existing networks, and length approximately 13.7km. Tunnelling (micro-tunnelling/horizontal directional drilling) potentially required as the route crosses one minor road, four rivers, and four drainage channels.	
<b>Option Code:</b>		BOT-TRA-002	
<b>SEA Summary</b>			
<b>SEA Objectives with Major/Moderate Positive Effects (+++)</b>			
<b>SEA Objective</b>	<b>Comment</b>	<b>Mitigation</b>	
N/A			
<b>SEA Objectives with Major/Moderate Negative Effects (---)</b>			
<b>SEA Objective</b>	<b>Comment</b>	<b>Mitigation</b>	
To protect designated sites and their qualifying features. (---/--)	<p>Tweed Catchment Rivers - England: Till Catchment SSSI is directly affected by the option and direct impacts are likely. Bewick and Beanley Moors SSSI and River Coquet and Coquet Valley Woodlands SSSI are within 500m of the option. No direct effects but there may be disturbance effects during the construction phase. The option is entirely located within SSSI Impact Risk Zones. There are no MCZ/MPAs within 500m of the option.</p> <p>The HRA ToLS identified 12 Natura 2000 sites that could be affected: River Tweed SAC; Northumberland Marine SPA; North Northumberland Dunes SAC; Northumbrian Coast Ramsar; Ford Moss SAC; Tweed Estuary SAC; Lindisfarne Ramsar; Northumberland Coast SPA; Berwickshire &amp; North Northumberland Coast SAC; Lindisfarne SPA; Holburn Lake and Moss SPA and Ramsar. Potential LSE concluded for River Tweed SAC and Northumberland Marine SPA due to proximity of construction works to protected sites for aquatic species (River Tweed SAC) and seabirds (Northumberland Marine SPA) which could be disturbed by construction impacts from such as noise/light nuisance and pollution events. Effects during operation to the River Tweed SAC include physical loss of habitat, water table changes and contamination. No operational effects are anticipated for Northumberland Marine SPA. No LSE concluded for the other ten sites.</p>	<p>Refining pipeline alignment or use trenchless techniques to avoid SSSI. Best practice methods to be implemented to minimise disturbance effects. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual operational effects are lessened although this would not negate the need for a potential appropriate assessment.</p>	

<p>To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (---)</p>	<p>The pipeline passes through small parcels of Ancient Woodland (Barley Mill Bank) and BAP Priority Habitat (mainly deciduous woodland). Potential permanent loss of Ancient Woodland and deciduous woodland BAP Priority Habitat. No direct effects on other Priority Habitats but there may be disturbance effects during the construction phase and potential effects on protected species.</p> <p>There is one Groundwater Dependent Terrestrial ecosystem (GWDTE) within 500m of the option; River Coquet &amp; Coquet Valley Woodland. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -29.87%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.</p>	<p>Consider minor rerouting to avoid most high value habitats. Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques to avoid woodland habitat, in particular Ancient Woodland and BAP Priority Habitat. Habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered to replace damaged or lost habitat. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual construction effects are lessened.</p>
<p>To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity. (--)</p>	<p>The option crosses grade 2, 3, 4 and 5 agricultural land with disturbance to these soils during construction. During operation, dependent on the depth of the pipeline and agricultural operations, it would be possible to continue using the land for agricultural purposes, therefore there is unlikely to be any loss of land quality from the transfer pipeline.</p> <p>The location of the pumping station is currently unknown. However, it is likely that this land, if agricultural, will not be reinstated as it is a permanent structure, therefore this land would be permanently lost.</p>	<p>Reduce damage to agricultural land through design to reduce the option footprint and the construction working area to reduce the amount of land permanently taken or temporarily disturbed.</p> <p>Ground will be reinstated therefore long term residual effects on agricultural soils as a result of pipeline construction are unlikely.</p> <p>There will be permanent loss as a result of the pumping station although this is a relatively small area so neutral effects identified.</p> <p>Best practice techniques to prevent disturbance of contaminated material during construction.</p>
<p>To conserve, protect and enhance landscape and townscape character and visual amenity. (--)</p>	<p>This option overlaps three NCAs North Northumberland Coastal Plain (0.01%), and Northumberland Sandstone Hills (0.01%) and Cheviot Fringe (0.14%) (with % proportion of NCA affected). Negative effects during construction likely as excavation will be required for the transfer pipeline. Construction will also result in permanent loss of woodland, including Ancient Woodland, with impacts on landscape character.</p> <p>There will be minimal new above ground infrastructure. The pumping station is a relatively small-scale structure and is therefore unlikely to change the landscape character of the area or affect visual amenity during operation.</p>	<p>Re-routing of the pipeline to minimise damage and disruption to woodland, including Ancient Woodland, or utilise directional drilling or other trenchless techniques to reduce construction effects. Best practice measures to be implemented to minimise effects during construction including although temporary effects during construction may remain. Land reinstated upon completion so with mitigation, no residual effects are likely to remain during operation.</p>

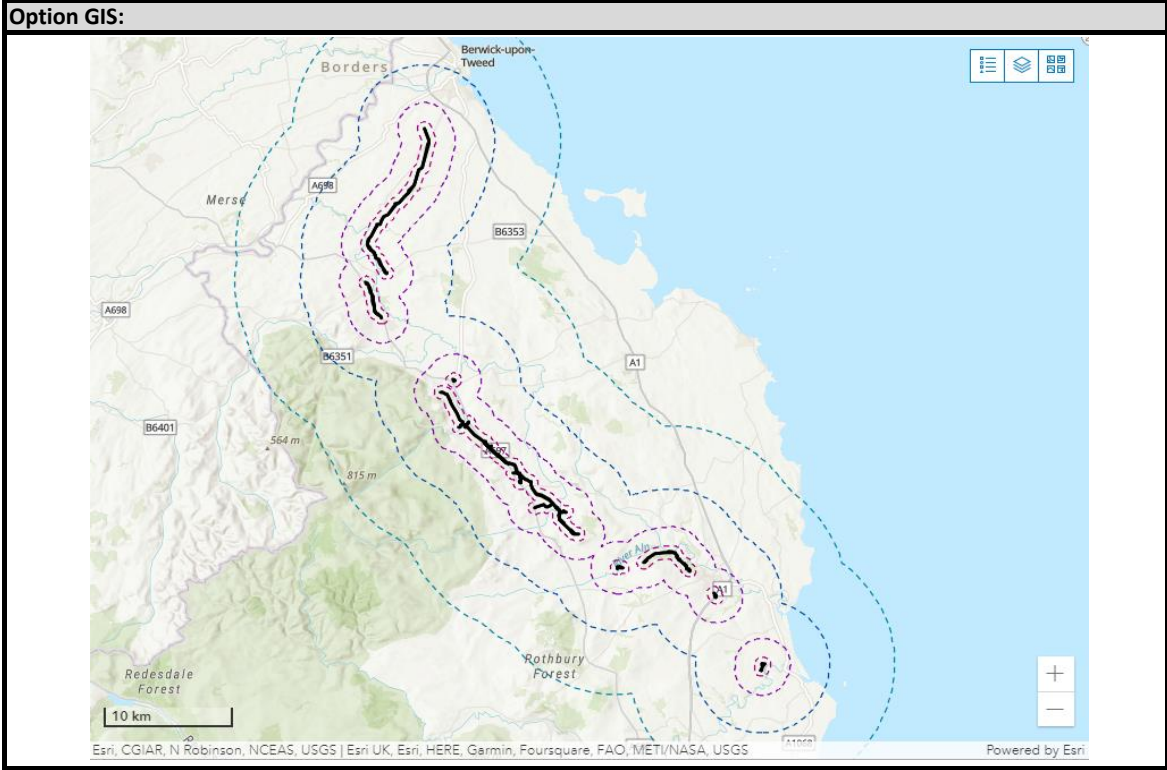
<p>To conserve/Protect and enhance the historic environment including the significance of designated and non-designated cultural heritage (including archaeology and built heritage), including any contribution made to that significance by setting. (--)</p>	<p>The option intersects the Alnwick Castle Registered Park or Garden and one Scheduled monument. The option is within 500m of Wooler Conservation Area, nine scheduled monuments and is within proximity of a number of listed buildings. Construction may affect the setting of these historic assets, however this is likely to be temporary as the pipeline will be buried. There is potential for the excavation of the pipeline to impact buried archaeology if present. There will be minimal new above ground infrastructure, which is unlikely to have effects on the setting of heritage assets during operation.</p>	<p>Best practice measures to be implemented to minimise setting effects for other heritage assets during construction. Further work likely to be required to determine significance of effect, depending on the presence or absence of buried archaeology. Residual effects may remain due to potential loss of archaeological remains.</p>
<p>Avoid negative effects on built assets and infrastructure. (--)</p>	<p>The option crosses a railway, major roads and a National Cycle Network route. Likely to be temporary impacts during construction due to disruption for users. It is assumed that trenchless techniques will be used for pipelines which cross railway lines and major roads. During the construction phase, there is likely to be some disruption to the local traffic network from the increase in the volume of traffic due to deliveries of construction material for the pipeline. During the operational phase, there is unlikely to be any disturbance to the transport network.</p>	<p>Best practice measures including a Traffic Management Plan to be implemented to minimise disturbance during construction. However, temporary effects are likely to still occur.</p>

SEA Tally Residual		
SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	2.00
0	30.00	36.00
-	10.00	4.00
--	1.00	0.00
---	0.00	0.00
(?)	0.00	0.00



<b>HRA Summary</b>	
<i>HRA Screening Outcome:</i>	Ten sites have no LSE, and two sites have potential for LSE: The River Tweed SAC and Northumberland Marine SPA. For the former, during operation a further WFD investigation is suggested (to quantify changes in surface / groundwater). For the latter, during operation network modelling to determine the impact magnitude of this option surface/groundwater levels on the River Coquet will be carried in the next phase.
<b>Natural Capital Assessment Summary</b>	
<i>Natural Capital Assessment Outcome:</i>	-£7,586.64
Natural Capital Assessment: Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. Permanent loss of ancient woodland expected as a result of the option construction. Some loss of the floodplain is expected as a result of the option construction.
Ecosystem Service Assessment Comments:	The option is likely to generate the loss of natural capital stocks during construction. However most habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. There is no change anticipated to water flow regulation. Permanent loss of arable and pastoral stocks and woodland stocks due to option construction hence loss of associated ecosystem services expected.
<b>Biodiversity Net Gain Assessment Summary</b>	
<i>BNG Outcome (Unit Change):</i>	-44.40
<i>BNG Outcome (% Change):</i>	-19.11%
<b>Water Framework Directive Screening Assessment Summary</b>	
<i>WFD Screening Outcome: (No. Scoped-In / Out)</i>	Seven waterbodies require further assessment: Coquet from Forest Burn to Tidal Limit; Aln from Edlingham Burn to Tidal Limit; Till from Linhope Burn to Roddam Burn; Roddam Burn; Lilburn Burn; Wooler Water from Harthope Burn to Till; North Low from source to Berrington Burn.
<b>INNS Summary</b>	
<i>INNS Risk Score</i>	1 = Very Low
Comments	Service reservoirs are both closed systems. Chemical dosing applied at source for hardness and alkalinity but will not affect INNS risk. Water is transferred via pipeline. Negligible risk of INNS being introduced at source, pathway or receptor.

Carbon Calculations	
Capital Carbon (tCO2e)	10,535.97
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£6,490.88



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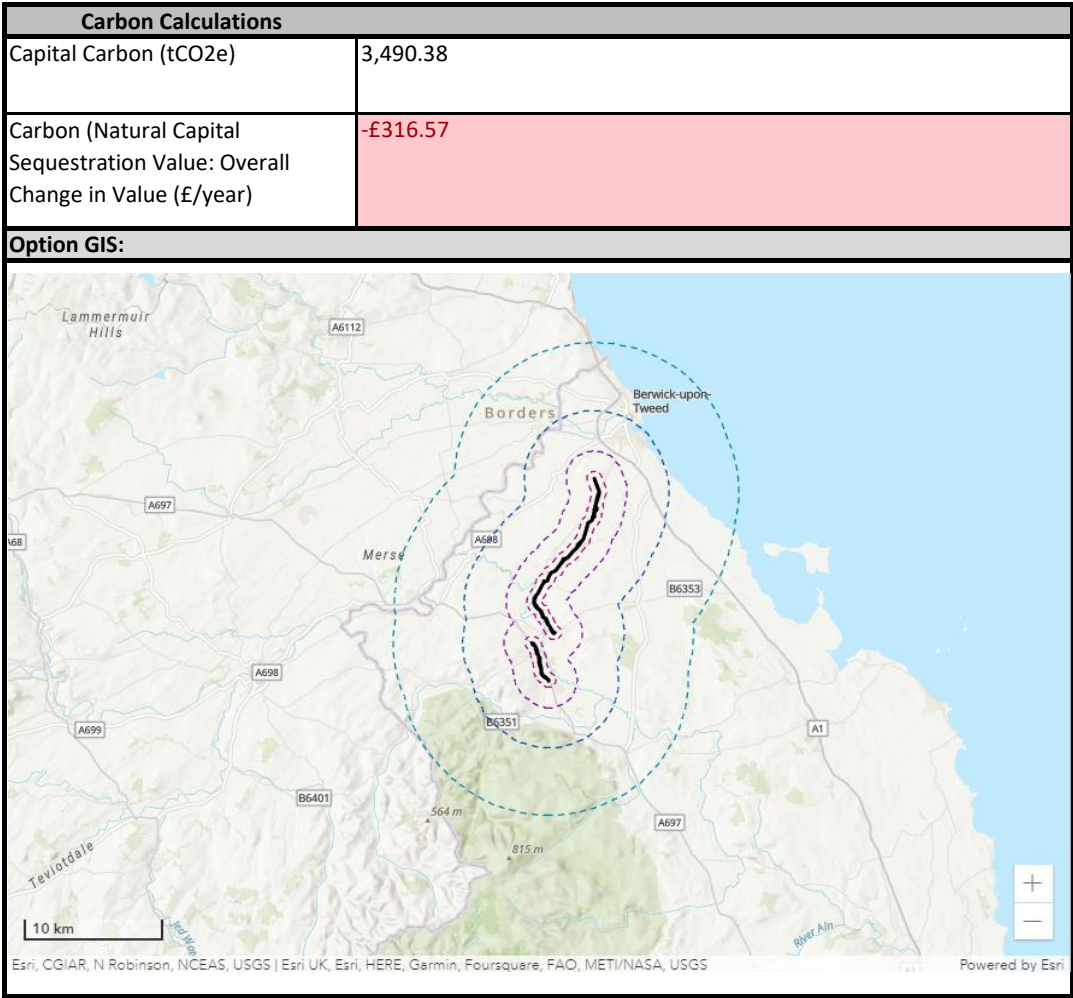
<b>Option Name:</b>		<b>Option Description:</b>	
Watchlaw to Murton Transfer		Transfer from Wooler to Murton WTW, making use of existing pipes from Wooler to Milfield. Pipe replacement required from Milfield to A697/B648670 junction and pipe reinforcement required between A697/B648670 junction and River Till crossing and Ford PS. New pipeline from Ford to Murton WTW. Transfer length approximately 9.66km. Tunnelling (micro-tunnelling/horizontal directional drilling) potentially required as the route crosses one minor road, two names rivers, and one drainage channel.	
<b>Option Code:</b>		BOT-TRA-004	
<b>SEA Summary</b>			
<b>SEA Objectives with Major/Moderate Positive Effects (+++)</b>			
<b>SEA Objective</b>	<b>Comment</b>	<b>Mitigation</b>	
N/A			
<b>SEA Objectives with Major/Moderate Negative Effects (---)</b>			
<b>SEA Objective</b>	<b>Comment</b>	<b>Mitigation</b>	
To protect designated sites and their qualifying features. (-)	<p>Tweed Catchment Rivers - England: Till Catchment SSSI is directly affected by the option and direct impacts are likely. The option is entirely located within SSSI Impact Risk Zones. There are no MCZ/MPAs within 500m of the option.</p> <p>The HRA ToLS identified ten Natura 2000 sites that could be affected, River Tweed SAC Ford Moss SAC (UK0030151), Tweed Estuary SAC (UK0030292), Lindisfarne Ramsar (UK11036), Northumberland Coast SPA (UK9006131), Northumbrian Coast Ramsar (UK11049), Berwickshire &amp; North Northumberland Coast SAC (UK0017072), North Northumberland Dunes SAC (UK0017097), Northumberland Marine SPA (UK9020325) and Lindisfarne SPA UK9006011. Likely significant effects determined for River Tweed SAC on account of potential physical damage and contamination during the construction phase. No effects during operation were identified for this site. No LSE concluded for the remaining nine sites.</p>	<p>Refining pipeline alignment or use trenchless techniques to avoid SSSI. Best practice methods to be implemented to minimise disturbance effects. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented and therefore residual construction effects are lessened although this would not negate the need for a potential appropriate assessment.</p>	

<p>To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (--)</p>	<p>The pipeline passes through small parcels of Ancient Woodland (Barley Mill Bank) and BAP Priority Habitat (mainly deciduous woodland). Potential permanent loss of Ancient Woodland and deciduous woodland BAP Priority Habitat. No direct effects on other Priority Habitats but there may be disturbance effects during the construction phase and potential effects on protected species. There are no Groundwater Dependent Terrestrial Ecosystem (GWDTE) within 500m of the option. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -9.77%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.</p>	<p>The pipeline passes through small parcels of Ancient Woodland (Barley Mill Bank) and BAP Priority Habitat (mainly deciduous woodland). Potential permanent loss of Ancient Woodland and deciduous woodland BAP Priority Habitat. No direct effects on other Priority Habitats but there may be disturbance effects during the construction phase and potential effects on protected species. There are no Groundwater Dependent Terrestrial Ecosystem (GWDTE) within 500m of the option. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -9.77%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.</p>
<p>To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity. (--)</p>	<p>The option crosses grade 2, 3 and 4 agricultural land with disturbance to these soils during construction. During operation, dependent on the depth of the pipeline and agricultural operations, it would be possible to continue using the land for agricultural purposes, therefore there is unlikely to be any loss of land quality from the transfer pipeline. The location of the pumping station is currently unknown. However, it is likely that this land, if agricultural, will not be reinstated as it is a permanent structure, therefore this land would be permanently lost. The option is within 500m of one historic landfill site (Flodden Tiledheds) with potential to disturb contaminated material during construction.</p>	<p>Reduce damage to agricultural land through design to reduce the option footprint and the construction working area to reduce the amount of land permanently taken or temporarily disturbed. Ground will be reinstated therefore long term residual effects on agricultural soils as a result of pipeline construction are unlikely. There will be permanent loss as a result of the pumping station although this is a relatively small area so neutral effects identified. Best practice techniques to prevent disturbance of contaminated material during construction.</p>
<p>To conserve, protect and enhance landscape and townscape character and visual amenity. (--)</p>	<p>This option overlaps two NCAs North Northumberland Coastal Plain (0.01%) and Cheviot Fringe (0.6%) (with % proportion of NCA affected). Negative effects during construction likely as excavation will be required for the transfer pipeline. Construction will also result in permanent loss of woodland, including Ancient Woodland, with impacts on landscape character. There will be minimal new above ground infrastructure. The pumping station is a relatively small-scale structure and is therefore unlikely to change the landscape character of the area or affect visual amenity during operation.</p>	<p>Re-routing of the pipeline to minimise damage and disruption to woodland, including Ancient Woodland, or utilise directional drilling or other trenchless techniques to reduce construction effects. Best practice measures to be implemented to minimise effects during construction including although temporary effects during construction may remain. Land reinstated upon completion so with mitigation, no residual effects are likely to remain during operation.</p>

<p>To conserve/Protect and enhance the historic environment including the significance of designated and non-designated cultural heritage (including archaeology and built heritage), including any contribution made to that significance by setting. (--)</p>	<p>The option intersects one scheduled monument (site E of Milfield village) and is within 500m of a further four scheduled monuments. The option is within 500m of a number of listed buildings. Construction may affect the setting of these historic assets, however this is likely to be temporary as the pipeline will be buried. There is potential for the excavation of the pipeline to impact buried archaeology if present. There will be minimal new above ground infrastructure, which is unlikely to have effects on the setting of heritage assets during operation.</p>	<p>Re-route the pipeline where it intersects the scheduled monument. Best practice measures to be implemented to minimise setting effects for other heritage assets during construction. Further work likely to be required to determine significance of effect, depending on the presence or absence of buried archaeology. Residual effects may remain due to potential loss of archaeological remains.</p>
<p>Avoid negative effects on built assets and infrastructure. (--)</p>	<p>The option crosses a railway, major roads and a National Cycle Network route. Likely to be temporary impacts during construction due to disruption for users. It is assumed that trenchless techniques will be used for pipelines which cross railway lines and major roads. During the construction phase, there is likely to be some disruption to the local traffic network from the increase in the volume of traffic due to deliveries of construction material for the pipeline. During the operational phase, there is unlikely to be any disturbance to the transport network.</p>	<p>Best practice measures including a Traffic Management Plan to be implemented to minimise disturbance during construction. However, temporary effects are likely to still occur.</p>

SEA Tally Residual		
SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	2.00
0	30.00	39.00
-	11.00	1.00
--	0.00	0.00
---	0.00	0.00
(?)	0.00	0.00

<b>HRA Summary</b>	
<i>HRA Screening Outcome:</i>	One site has potential for LSE and nine sites have no LSE. No sites require further assessment.
<b>Natural Capital Assessment Summary</b>	
<i>Natural Capital Assessment Outcome:</i>	-£736.40
Natural Capital Assessment Comments:	The option will likely cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. No loss of the floodplain is expected as a result of the option construction due to standard mitigation.
Ecosystem Service Assessment Comments:	The option is likely to generate the loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management, a reduction in food production services, and a reduction in water purification. There is no change anticipated to water flow regulation. Permanent loss of arable stocks and ancient woodland expected to result in a permanent reduction in the associated ecosystem services.
<b>Biodiversity Net Gain Assessment Summary</b>	
<i>BNG Outcome (Unit Change):</i>	-7.20
<i>BNG Outcome (% Change):</i>	-9.49%
<b>Water Framework Directive Screening Assessment Summary</b>	
<i>WFD Screening Outcome: (No. Scoped-In / Out)</i>	One water body requires further assessment: North Low from Source to Berrington Burn.
<b>INNS Summary</b>	
<i>INNS Risk Score</i>	1 = Very Low
Comments	Transfer of water from one WTW to another via existing pipeline. Water transferred through closed system therefore negligible risk of INNS being introduced at source, transfer or receptor.



<b>Option Name:</b>		<b>Option Description:</b>	
New Borehole at Duddo		Abstraction from a new borehole in Duddo, transfer in a new pipeline to Felkington Mains, transfer using existing pipelines to discharge to Murton WTW. New transfer pipeline length approximately 2.1km. Tunnelling (micro-tunnelling/horizontal directional drilling) unlikely to be required as route follows the road B6354.	
<b>Option Code:</b>		BOT-ABS-002	
<b>SEA Summary</b>			
<b>SEA Objectives with Major/Moderate Positive Effects (+++)</b>			
<b>SEA Objective</b>	<b>Comment</b>	<b>Mitigation</b>	
N/A			
<b>SEA Objectives with Major/Moderate Negative Effects (---)</b>			
<b>SEA Objective</b>	<b>Comment</b>	<b>Mitigation</b>	
To protect designated sites and their qualifying features. (---)	<p>The option is entirely located within SSSI Impact Risk Zones, however it is over 2km away from any SSSI. There are no LNR, NNR, MCZ/MPAs in proximity of the option. No other designated sites within 2km.</p> <p>The HRA ToLS identified nine Natura 2000 sites that could be affected: River Tweed SAC; Tweed Estuary SAC; Lindisfarne Ramsar; Northumberland Coast SPA; Berwickshire &amp; North Northumberland Coast SAC; North Northumberland Dunes SAC; Northumberland Marine SPA; Lindisfarne SPA; and Ford Moss SAC. Potential LSE concluded for River Tweed SAC and Tweed Estuary SAC. Most construction effects excluded for both sites due to sufficient distance from option, however minor and temporary indirect impacts may arise. Operational effects anticipated for both sites due to potential changes in the water table during operation which could affect their qualifying features.</p>	<p>Best practice methods to be implemented to minimise disturbance effects during construction, therefore any residual impacts are negligible.</p> <p>Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that implementation of these will reduce residual operational effects although this wouldn't negate the need for a potential appropriate assessment.</p>	



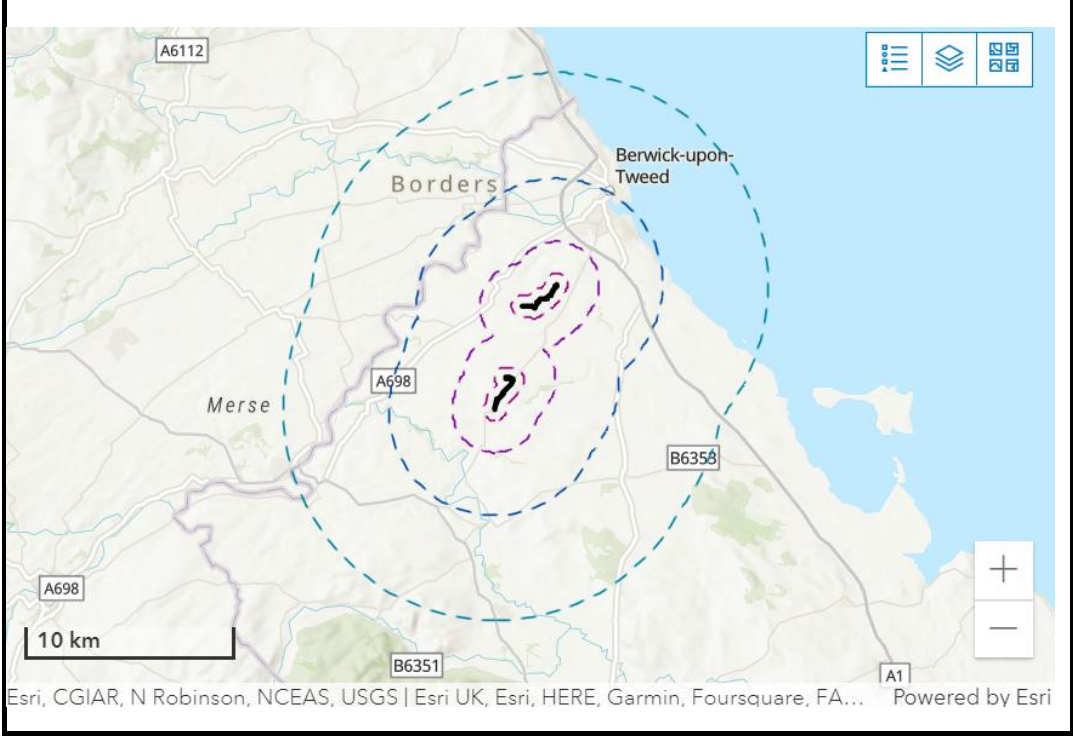
<p>To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers. (---)</p>	<p>The pipeline passes adjacent to and through small parcels of Priority Habitats (Traditional orchard; Lowland fens). Potential permanent loss of these Priority Habitats. Nearest ancient woodland over 500m away, therefore no impacts anticipated. No direct effects on other Priority Habitats but there may be disturbance effects during the construction phase and potential effects on protected species. Operational impacts on two designated sites anticipated due to potential changes in the water table during operation which could affect their qualifying features as habitats for sensitive species. There are no Groundwater Dependent Terrestrial Ecosystem (GWDTE) or chalk rivers within 2km of the option. The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -7.84%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.</p>	<p>Consider minor rerouting to avoid most high value habitats. Best practice methods are assumed to be implemented to minimise disturbance effects and habitat loss including refining pipeline alignment or using trenchless techniques. Lost habitat to be reinstated on completion, or if unavoidable compensatory habitat to be considered. It is assumed that mitigation recommended by further ecology surveys will be implemented, however some impacts may remain. While many construction effects can be mitigated residual operational effects may remain.</p>
<p>To meet WFD objectives relating to biodiversity. (--)</p>	<p>The WFD Phase 1 assessment results show there would be low risk for ecology during construction and medium risks for ecology during operation. Operational risks due to increased abstraction from source under the same conditions.</p>	<p>Best practice construction methods and pollution prevention measures to be implemented. In the short term there is potential for effects. With mitigation, residual construction effects are deemed negligible. For operational impacts, it is assumed that mitigation recommended by further ecology surveys will be implemented.</p>
<p>To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans. (--)</p>	<p>Six waterbodies were considered during the WFD Phase 1 assessment: Till from Glen to River Tweed; Newbiggin Dean Catch (tributary of Tweed); North Low from Source to Berrington Burn; Horncliffe Mill Burn; Till Fell Sandstone (GW); and Northumberland Carboniferous Limestone and Coal Measures (GW). Phase 1 determined that the option would have a medium level of effect on Till from Glen to River Tweed, and Till Fell Sandstone (GW) during operational phase due to increased abstraction rates. Max impact on the other four waterbodies determined as low for both construction- and operational impacts.</p>	<p>Best practice construction methods and pollution prevention measures to be implemented. With mitigation, no effects are predicted as a result of construction. Currently no assumed mitigation for operational effects. Further WFD assessment required for waterbodies Glen to River Tweed, and Till Fell Sandstone (GW).</p>
<p><b>SEA Tally Residual</b></p>		
<p><b>SEA Scoring (Residual)</b></p>	<p><b>Cumulative Tally (Construction)</b></p>	<p><b>Cumulative Tally (Operation)</b></p>
<p>+++</p>	<p>0.00</p>	<p>0.00</p>
<p>++</p>	<p>0.00</p>	<p>0.00</p>
<p>+</p>	<p>1.00</p>	<p>1.00</p>

0	31.00	33.00
-	10.00	4.00
--	0.00	4.00
---	0.00	0.00
(?)	0.00	0.00

<b>HRA Summary</b>	
<i>HRA Screening Outcome:</i>	Two sites have potential for LSEs and seven sites have no LSEs. No sites require further assessment.
<b>Natural Capital Assessment Summary</b>	
<i>Natural Capital Assessment Outcome:</i>	-£355.14
Natural Capital Assessment: Comments:	The option is likely to cause the temporary and permanent loss of stocks during construction. However, best practice mitigation (such as directional drilling) and reinstatement/compensation of habitat means that most Natural Capital stocks post construction will have no to little change. Permanent loss of traditional orchard and arable stocks expected to be a lost as a result of the option construction. No loss of the floodplain is expected as a result of the option construction due to standard mitigation.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary and permanent loss of natural capital stocks during construction. However, habitat expected to be reinstated/compensated to pre-construction conditions following best practice technique will likely have no permanent impact to the provision of ecosystem services. Broadleaved/mixed/yew/priority/coniferous/urban woodland have a significant maturity time with a delay of 30 years. Therefore, this delay is considered within potential future provision of this stock through the ecosystem services assessment. This can be accounted to the tree mortality rate presumed after woodland areas are replanted. Construction impacts include the release of CO2 due to habitat clearance, loss of natural hazard management and a reduction in water purification. Permanent loss of arable stocks due to option construction hence loss of associated ecosystem services expected.
<b>Biodiversity Net Gain Assessment Summary</b>	
<i>BNG Outcome (Unit Change):</i>	-1.79
<i>BNG Outcome (% Change):</i>	-7.84%
<b>Water Framework Directive Screening Assessment Summary</b>	
<i>WFD Screening Outcome: (No. Scoped-In / Out)</i>	Two waterbodies require further assessment: Till from Glen to River Tweed; Till Fell Sandstone.
<b>INNS Summary</b>	
<i>INNS Risk Score</i>	1 = Very Low
Comments	During construction best practice will be implemented to prevent the spread of INNS. Very limited risk as the source water is likely to be entirely free of INNS. It is assumed that groundwater is free of INNS, and that abstracting and transferring groundwater via a pipeline will not cause a risk of INNS transfer.

Carbon Calculations	
Capital Carbon (tCO2e)	1,066
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	-£51.03

**Option GIS:**



<b>Option Name:</b>			<b>Option Description:</b>		
Fosberry Borehold Abstraction			Recommission/refurbishment of a disconnected borehole. Transfer to Wooler WTW. No network reinforcement required. 2 M/d WTW expansion at Wooler WTW to accommodate additional flow. This may require BOT-TRA-004 to BOT-TRA-005 to move the water to the Berwick area.		
<b>Option Code:</b>			BOT-ABS-007		
<b>SEA Summary</b>					
<b>SEA Objectives with Major/Moderate Positive Effects (+++)</b>					
<b>SEA Objective</b>		<b>Comment</b>		<b>Mitigation</b>	
N/A					
<b>SEA Objectives with Major/Moderate Negative Effects (---)</b>					
<b>SEA Objective</b>		<b>Comment</b>		<b>Mitigation</b>	
To protect designated sites and their qualifying features. (--/--)		<p>Tweed Catchment Rivers - England: Till Catchment SSSI are within 500m of the option. No direct effects but there may be disturbance effects during the construction phase.</p> <p>Other designated sites within 500 m: River Tweed SAC.</p> <p>The option is entirely located within SSSI Impact Risk Zones.</p> <p>There are no MCZ/MPAs within 500m of the option.</p> <p>The HRA ToLS identified five Natura 2000 sites that could be affected: River Tweed SAC; Holburn Lake and Moss SPA and Ramsar; Ford Moss SAC; and Tweed Estuary SAC. Potential LSE concluded for River Tweed SAC due to proximity of site to option footprint, therefore construction disturbance effects likely to impact the site's qualifying designation to support sensitive aquatic species. No operational impacts anticipated, and no LSE concluded for the other four sites. There could be changes to water table from abstraction changes.</p>		<p>Best practice methods to be implemented to minimise disturbance effects.</p> <p>Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented, and therefore residual construction effects are lessened although this wouldn't negate the need for a potential appropriate assessment for both construction and operational effects.</p>	
To reduce or manage flood risk, taking climate change into account. (--)		<p>Moderate The new pipe connection is within Flood Zones 2 and 3, therefore there may be temporary flood risk during construction. Once constructed and buried, the pipeline is unlikely to impact flood risk.</p> <p>Operational impacts from abstraction unlikely.</p>		<p>Measures to reduce the impact on flooding during the construction phase. Flood risk during construction may still occur so short term flood risk effects may remain.</p>	

To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans. (--)	Two waterbodies were considered during the WFD Phase 1 assessment: Till from Roddam Burn to Glen; and Till Fell Sandstone (GW). Phase 1 determined that the option would have a medium level of effect on both waterbodies during operational phase due to increased abstraction rates. Minor temporary construction impacts for both options.	Best practice construction methods and pollution prevention measures to be implemented. With mitigation, residual impacts are considered negligible. Currently no assumed mitigation for operational effects. Further WFD assessment required for Till from Roddam Burn to Glen; and Till Fell Sandstone (GW) waterbodies.
--	--	--

SEA Tally Residual		
SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	0.00
++	0.00	0.00
+	1.00	1.00
0	29.00	35.00
-	11.00	5.00
--	1.00	1.00
---	0.00	0.00
(?)	0.00	0.00

<b>HRA Summary</b>	
<i>HRA Screening Outcome:</i>	One site has potential for LSEs and four sites have no LSEs. No sites require further assessment.
<b>Natural Capital Assessment Summary</b>	
<i>Natural Capital Assessment Outcome:</i>	-£0.06
Natural Capital Assessment: Comments:	The option will likely cause the temporary loss of stocks during construction.
Ecosystem Service Assessment Comments:	The option is likely to generate the temporary loss of natural capital stocks during construction. However, habitat is expected to be reinstated/compensated to pre-construction conditions following best practice technique, and there will likely be no permanent impact to the provision of ecosystem services.
<b>Biodiversity Net Gain Assessment Summary</b>	
<i>BNG Outcome (Unit Change):</i>	-0.03
<i>BNG Outcome (% Change):</i>	-3.50%
<b>Water Framework Directive Screening Assessment Summary</b>	
<i>WFD Screening Outcome: (No. Scoped-In / Out)</i>	Two waterbodies require further assessment: Till from Roddam Burn to Glen; Till Fell Sandstone
<b>INNS Summary</b>	
<i>INNS Risk Score</i>	1 = Very Low
Comments	Source water to be extracted from recomissioned borehole and transferred via existng pipeline to new Wooler WTW. No open water is present in this option, therefore there is a negligible risk of INNS being introduced to the receptor, pathway or source.

Carbon Calculations	
Capital Carbon (tCO2e)	510
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year))	£0.00
Option GIS:	
<small>Esri, Ordnance Survey, NASA, NGA, USGS   Esri UK, Esri, HFRF, Garmin, Foursquare, ... Powered by Esri</small>	



**ESW WRMP Integrated Environmental Assessment  
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Option Name:	Option Description:	
Demand Management Strategy High (Aspirational)	<p>This option includes compulsory Metering by 2035 and 50% leakage reduction by 2050. It also includes a high impact water efficiency plan comprising 12 household water efficiency options within 5 categories (Water Use Audit and Inspection, Advice and Information on Leakage Detection and Fixing Techniques, Water Efficiency Enabling Activities, Promotion of Water Saving Devices, and Targeted Water Conservation Information (advice on appliance water usage). The DMO-High package targets a non-household (NHH) water efficiency reduction of 9% by 2037/8.</p> <p>For the whole Northumbrian Water supply area (Berwick WRZ and Kielder WRZ), the combined High Impact Demand Management Option's package (ESW-DMO-High) is predicted to yield annual water savings of 2,124.3 MI for the year 2024/25 (5.82 MI/d average), and 63,919.1 MI for the year 2074/75 (183.34 MI/d average). The majority of these savings (~99%) are within Kielder WRZ.</p>	
Option Code:	NW-DMO-High	
SEA Summary		
SEA Objectives with Major/Moderate Positive Effects (+++)		
SEA Objective	Comment	Mitigation
To increase water efficiency and increase resilience of water supplies and natural systems to droughts. (+++)	Water efficiency advice and metering (NHH 9% target reduction by 2037/8) and leakage works (50% reduction by 2050) allocated in new areas will improve water efficiency (183.34 MI/d average savings for the year 2074/75), resulting in major positive effects in the operational phase due to less abstraction for human consumption and more water being kept within the environment.	N/A
To secure water supplies for the health and wellbeing of the community. (+++)	A major positive effect in the operational stage as DMOs make the overall water management network more resilient due to less supply options needed in the future as an impact of reduced water demand.	N/A
To increase access and connect customers to the natural environment, provide education or information resources for the public. (+++)	Water efficiency advice, especially focused on gardening, campaigns for vulnerable people and app improvement will result in major positive impacts during operation. Smart metering will allow for behavioural changes in water usage by customers due to the analysis of the usage data.	N/A

<p>To enhance or maintain surface water quality, flows and quantity. (++)</p>	<p>Specific locations for the associated works are unknown. Minor negative effects during construction (leakage works) due to potential for contamination of water resources. Moderate positive effects upon operation due to improved water efficiency (NHH 9% target reduction by 2037/8) and leakage works (50% reduction by 2050), producing 5.82 MI/d average savings for the year 2024/25, and 183.34 MI/d average savings in the year 2074/75. This will result in less abstraction for human consumption and more water being kept within the environment. Metering and leakage works will also be specific to distribution pipes/underground pipework and households.</p>	<p>Best practice methods during construction to reduce contamination of surface waters i.e., creating an access channel and a clear work area boundary. Residual minor construction impact due to mains replacement may remain.</p>
<p>To enhance or maintain groundwater quality and resources. (++)</p>	<p>Specific locations for the associated works are unknown. Minor negative effects during construction (leakage works) on water resources. Moderate positive effects upon operation due to improved water efficiency (NHH 9% target reduction by 2037/8) and leakage works (50% reduction by 2050), producing 5.82 MI/d average savings for the year 2024/25, and 183.34 MI/d average savings in the year 2074/75. This will result in less abstraction for human consumption and more water being kept within the environment.</p>	<p>Best practice methods during construction to reduce contamination of groundwater i.e., creating an access channel and a clear work area boundary. Residual minor construction impact due to mains replacement may remain.</p>
<p>To introduce climate mitigation where required and improve the climate resilience of assets and natural systems. (++)</p>	<p>Moderate positive effects are anticipated during operation phase due to water efficient improvements and leakage works resulting in resilience of asset efficiency to water scarcity, and therefore less water extracted from the environment for human consumption.</p>	<p>N/A</p>

<p>To conserve, protect and enhance landscape and townscape character and visual amenity (++)</p>	<p>Specific locations for the associated works are unknown, however there is potential for negative effects during construction (leakage works) on landscape. It is anticipated that these effects can be mitigated and will likely be short-term in nature, therefore minor negative effects during the construction phase have been identified. Moderate positive effects are anticipated during operation due to improved water efficiency and leakage works resulting in less water abstracted for human consumption and more water being kept within the environment, which could conserve or improve landscape character.</p>	<p>Best practice measures will likely be implemented to minimise effects during construction (leakage works), however minor and temporary impacts may remain.</p>
<p>To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing. (++)</p>	<p>Specific location for the associated works are unknown, however potential for negative effects during construction (leakage works) are anticipated on health and wellbeing of community due to disruption. Metering may cause disruption however effects considered negligible. However, it is anticipated that any effects will be short-term in nature and can be mitigated, therefore a minor negative effect during the construction phase has been identified. Moderate positive operational effects have been identified due to increased water efficiency awareness and water availability through DMO savings.</p>	<p>Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction (leakage works). However, minor and temporary effects are likely to still occur.</p>

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

SEA Objective	Comment	Mitigation
<p>To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity (--)</p>	<p>There is the potential for negative effects during the construction phase as there is potential to disturb contaminated material and/or high quality agricultural soils during construction phase (leakage works) due to digging for mains replacement. However, it is anticipated this can be mitigated, therefore a minor negative effect has been identified. Land reinstated upon completion of leakage works.</p>	<p>Land reinstated upon completion of leakage works. Best practice construction measures to be implemented. Construction impact from risk of disturbing contaminated soils remains.</p>

<p>To reduce and minimise air emissions during construction and operation (--)</p>	<p>Specific location for the associated works are unknown, however construction works (leakage works - mains replacement) likely to have negative effects, however these are likely to be minimal and short-term in nature, therefore a minor negative effect has been identified. Effects are also anticipated from water efficiency measures due to use of combustion engine vehicles to complete audits, metering installation, and maintenance, however these are anticipated to be minimal.</p>	<p>Best practice mitigation measures implemented during construction. Consider shift of employee fleet to electric vehicles to lessen impact from maintenance, audit, and installation visits.</p>
<p>To minimise/reduce embodied and operational carbon emissions (--)</p>	<p>The option is estimated to have minor negative effects during the construction phase as carbon will be generated from materials used to manufacture infrastructure associated with metering (embodied carbon) and construction (leakage works) activities. There are also travel-related emissions associated with water efficiency activities (e.g. audits) and installation of metering devices. Minor positive effects are anticipated during operation due to repairing rather than replacing existing infrastructure.</p>	<p>Best practice mitigation measures implemented during construction. Consider shift of employee fleet to electric vehicles to lessen impact from maintenance, audit, and installation visits. Residual carbon emissions to remain.</p>
<p>To conserve, protect and enhance landscape and townscape character and visual amenity (--)</p>	<p>Specific locations for the associated works are unknown, however there is potential for negative effects during construction (leakage works) on landscape. It is anticipated that these effects can be mitigated and will likely be short-term in nature, therefore minor negative effects during the construction phase have been identified. Moderate positive effects are anticipated during operation due to improved water efficiency and leakage works resulting in less water abstracted for human consumption and more water being kept within the environment, which could conserve or improve landscape character.</p>	<p>Best practice measures will likely be implemented to minimise effects during construction (leakage works), however minor and temporary impacts may remain.</p>

<p>To conserve/Protect and enhance the historic environment including the significance of designated and non-designated cultural heritage (including archaeology and built heritage), including any contribution made to that significance by setting (--)</p>	<p>Specific location for the associated works are unknown, however potential for negative effects during construction (leakage works) on historic environment are anticipated, particularly if the works are needed in close proximity to sensitive receptors. However, these effects are anticipated to be minimal and short-term in nature and therefore minor negative effects during the construction phase have been identified.</p>	<p>Best practice measures will likely be implemented to minimise effects during construction (leakage works), however minor and temporary impacts may remain.</p>
<p>To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing (--)</p>	<p>Specific location for the associated works are unknown, however potential for negative effects during construction (leakage works) are anticipated on health and wellbeing of community due to disruption. Metering may cause disruption however effects considered negligible. However, it is anticipated that any effects will be short-term in nature and can be mitigated, therefore a minor negative effect during the construction phase has been identified. Moderate positive operational effects have been identified due to increased water efficiency awareness and water availability through DMO savings.</p>	<p>Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction (leakage works). However, minor and temporary effects are likely to still occur.</p>
<p>Minimise resource use and waste production (--)</p>	<p>Negative effects are anticipated during construction as metering and leakage works (pressure management and mains replacement) involve use of materials and may generate waste. However, these are anticipated to be minimal and short-term in nature can be mitigated, therefore minor negative effects are anticipated.</p>	<p>Ensure best practice methods to reduce waste through accurate planning for metering and leakage work areas.</p>

To avoid negative effects on built assets and infrastructure (including green infrastructure) (--)	Specific location for the associated works are unknown, however potential for negative effects during construction (leakage works) and introduction of main pipes on built assets and infrastructure if roads need to be closed or roadworks put in place. However, mitigation can be applied and therefore a minor negative effect has been identified during the construction phase. Effects during the operational phase are considered to be negligible.	Best practice measures including a Traffic Management Plan to be implemented to minimise disturbance during construction (leakage works). However, minor and temporary effects are likely to still occur.
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SEA Tally Residual		
SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	3.00
++	0.00	5.00
+	0.00	5.00
0	29.00	29.00
-	13.00	0.00
--	0.00	0.00
---	0.00	0.00
(?)		

<b>HRA Summary</b>	
<i>HRA Screening Outcome:</i>	
<b>Natural Capital Assessment Summary</b>	
<i>Natural Capital Assessment Outcome:</i>	
Natural Capital Assessment: Comments:	
Ecosystem Service Assessment Comments:	
<b>Biodiversity Net Gain Assessment Summary</b>	
<i>BNG Outcome (Unit Change):</i>	
<i>BNG Outcome (% Change):</i>	
<b>Water Framework Directive Screening Assessment Summary</b>	
<i>WFD Screening Outcome: (No. Scoped-In / Out)</i>	
<b>INNS Summary</b>	
<i>INNS Risk Score</i>	
Comments	

<b>Carbon Calculations</b>	
Capital Carbon Intensity (£M/tCO <sub>2</sub> e)	
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	
<b>Option GIS:</b>	



**ESW WRMP Integrated Environmental Assessment  
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Option Name:	Option Description:
Demand Management Strategy Medium (Preferred)	<p>This option includes Option 2 Metering Smart by 2035 and 55% leakage reduction by 2050. It also includes a Medium impact water efficiency plan comprising 12 household water efficiency options within 5 categories (Water Use Audit and Inspection, Advice and Information on Leakage Detection and Fixing Techniques, Water Efficiency Enabling Activities, Promotion of Water Saving Devices, and Targeted Water Conservation Information (advice on appliance water usage). In addition, it also includes a programme of non-household water efficiency activity comprising 13 water efficiency options within 6 categories (Information Provision, Infrastructure and Leak Investigation, Water Efficiency Solutions for Domestic-Type Use, Water Efficiency Solutions for Mixed-Type Use, Water Efficiency Consultancy for Industry, and Golf Course Water Efficiency). The DMO-Preferred package targets a NHH water efficiency reduction of 9% by 2037/8.</p> <p>For the whole Northumbrian Water supply area (Berwick WRZ and Kielder WRZ), the combined Medium Demand Management Option's package (NW-DMO-Med) is predicted to yield no annual water savings for the baseline year (2024/25), and 52,246.1 MI for the year 2074/75 (143.14 MI/d average). The majority of these savings (~99%) are made in Kielder WRZ.</p>
Option Code:	NW-DMO-Med

**SEA Summary**

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

SEA Objective	Comment	Mitigation
To increase water efficiency and increase resilience of water supplies and natural systems to droughts. (+++)	Water efficiency advice and metering (NHH 9% target reduction by 2037/8) and leakage works (55% reduction by 2050) allocated in new areas will improve water efficiency (143.14 MI/d average savings for the year 2074/75), resulting in major positive effects in the operational phase due to less abstraction for human consumption and more water being kept within the environment.	N/A
To enhance or maintain surface water quality, flows and quantity (++)	Specific locations for the proposed works are unknown. Minor negative effects during construction (leakage works) due to potential for contamination of water resources. Moderate positive effects during operation due to improved water efficiency (NHH 9% target reduction by 2037/8) and leakage works (55% reduction by 2050), providing 143.14 MI/d average savings for the year 2074/75. This will result in less abstraction for human consumption and more water being kept within the environment. Metering and leakage works will also be specific to distribution pipes/underground pipework and households.	Best practice methods during construction to reduce contamination of surface waters i.e., creating an access channel and a clear work area boundary.

To enhance or maintain groundwater quality and resources (++)	Specific locations for the proposed works are unknown. Minor negative effects during construction (leakage works) on water resources. Moderate positive effects upon operation due to improved water efficiency (NHH 9% target reduction by 2037/8) and leakage works (55% reduction by 2050), providing 143.14 MI/d average savings for the year 2074/75. This will result in less abstraction for human consumption and more water being kept within the environment.	Best practice methods during construction to reduce contamination of groundwater i.e., creating an access channel and a clear work area boundary.
To introduce climate mitigation where required and improve the climate resilience of assets and natural systems (++)	Neutral effects are identified for the construction phase. Moderate positive effects during operation phase due to water efficient improvements and leakage works resulting in resilience of asset efficiency to water scarcity, and therefore less water extracted from the environment for human consumption.	N/A
To secure resilient water supplies for the health and wellbeing of the community. (++)	Neutral effects are anticipated during the construction phase. A moderate positive effect in the operational stage as DMOs are anticipated to make the overall water management network more resilient due to less supply options needed in the future as an impact of reduced water demand.	N/A
To increase access and connect customers to the natural environment, provide education or information resources for the public. (++)	Neutral effects are anticipated during the construction phase. Water efficiency advice, especially that which focuses on customer behavioural trends e.g. gardening etc. will result in moderate positive impacts during operation. Smart metering will allow for behavioural changes in water usage by customers due to the analysis of the usage data.	N/A
<b>SEA Objectives with Major/Moderate Negative Effects (---)</b>		
<b>SEA Objective</b>	<b>Comment</b>	<b>Mitigation</b>

<p>To reduce and minimise air emissions during construction and operation (--)</p>	<p>Specific location for the associated works are unknown, however leakage works will require construction activities which have to potential to result in moderate negative impact during construction phase, in particular if they are needed in close proximity to an AQMA or other sensitive receptors. However, due to uncertainty and the short-term nature of the works, in addition to the application of mitigation, a minor effect is anticipated for the construction phase. Moderate negative impacts from water efficiency measures due to use of combustion engine vehicles to complete audits, metering installation, and maintenance.</p>	<p>Best practice mitigation measures implemented during construction to minimise air pollution. Consider shift of employee fleet to electric vehicles to lessen impact from maintenance, audit, and installation visits.</p>
<p>To minimise/reduce embodied and operational carbon emissions (--)</p>	<p>The option is estimated to have potential negative effects during the construction phase and minor positive effects during the operations phase. Carbon will be generated from materials used to manufacture infrastructure associated with metering (embodied carbon) and construction (leakage works) activities. With mitigation, these effects are anticipated to be minor for the construction phase. There are also travel-related emissions associated with water efficiency activities (e.g. audits) and installation of metering devices. Minor positive effects upon operation due to repairing rather than replacing existing infrastructure.</p>	<p>Best practice mitigation measures implemented during construction. Consider shift of employee fleet to electric vehicles to lessen impact from maintenance, audit, and installation visits. Residual carbon emissions to remain.</p>

<p>To conserve, protect and enhance landscape and townscape character and visual amenity (--)</p>	<p>Specific locations for the associated works are unknown, however potential for potential negative effects during construction (leakage works) on landscape. It is anticipated that mitigation will result in minor negative effects during the construction phase. Minor positive effects upon operation due to improved water efficiency and leakage works resulting in less water abstracted for human consumption and more water being kept within the environment, which could conserve or improve landscape character.</p>	<p>Best practice measures will likely be implemented to minimise effects during construction (leakage works), however minor and temporary impacts may remain.</p>
<p>To conserve/Protect and enhance the historic environment including the significance of designated and non-designated cultural heritage (including archaeology and built heritage), including any contribution made to that significance by setting (--)</p>	<p>Specific location for the associated works are unknown, however potential for moderate negative effects during construction (leakage works) on historic environment, particularly if the works are needed in close proximity to sensitive receptors. Neutral effects are identified for the operational phase.</p>	<p>Best practice measures will likely be implemented to minimise effects during construction (leakage works), however minor and temporary impacts may remain.</p>
<p>To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing (--)</p>	<p>Specific location for the associated works are unknown, however potential for moderate negative effects during construction (leakage works) on health and wellbeing of community due to disruption. Metering may cause disruption however effects considered negligible. Minor positive operational effects identified due to increased water efficiency awareness and water availability through DMO savings.</p>	<p>Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction (leakage works). However, minor and temporary effects are likely to still occur.</p>
<p>Minimise resource use and waste production (--)</p>	<p>Potential negative impact during construction as metering and leakage works (pressure management) involve use of materials and may generate waste. Due to the minimal and short-term nature of the works, and the potential to mitigate effects, minor negative effects have been identified for the construction phase. Neutral effects are anticipated during the operational phase.</p>	<p>Ensure best practice methods to reduce waste through accurate planning for metering and leakage work areas.</p>

<p>To avoid negative effects on built assets and infrastructure (including green infrastructure) (--)</p>	<p>Specific location for the associated works are unknown, however potential for potential negative effects during construction (leakage works) and introduction of main pipes on built assets and infrastructure if roads need to be closed or roadworks put in place. Due to the minimal and short-term nature of the works, and the potential to mitigate effects, minor negative effects have been identified for the construction phase. Neutral effects are anticipated during the operational phase.</p>	<p>Best practice measures including a Traffic Management Plan to be implemented to minimise disturbance during construction (leakage works). However, minor and temporary effects are likely to still occur.</p>
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SEA Tally Residual		
SEA Scoring (Residual)	Cumulative Tally (Construction)	Cumulative Tally (Operation)
+++	0.00	1.00
++	0.00	5.00
+	0.00	7.00
0	30.00	29.00
-	12.00	0.00
--	0.00	0.00
---	0.00	0.00
(?)		

<b>HRA Summary</b>	
<i>HRA Screening Outcome:</i>	
<b>Natural Capital Assessment Summary</b>	
<i>Natural Capital Assessment Outcome:</i>	
Natural Capital Assessment: Comments:	
Ecosystem Service Assessment Comments:	
<b>Biodiversity Net Gain Assessment Summary</b>	
<i>BNG Outcome (Unit Change):</i>	
<i>BNG Outcome (% Change):</i>	
<b>Water Framework Directive Screening Assessment Summary</b>	
<i>WFD Screening Outcome: (No. Scoped-In / Out)</i>	
<b>INNS Summary</b>	
<i>INNS Risk Score</i>	
Comments	

<b>Carbon Calculations</b>	
Capital Carbon Intensity (£M/tCO <sub>2</sub> e)	
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	
<b>Option GIS:</b>	

**ESW WRMP Integrated Environmental Assessment  
Information Pack**



Option Name:	Option Description:
Demand Management Strategy Medium (Preferred)	<p>This option includes Option 2 Metering Smart by 2035 and 55% leakage reduction by 2050. It also includes a Medium impact water efficiency plan comprising 12 household water efficiency options within 5 categories (Water Use Audit and Inspection, Advice and Information on Leakage Detection and Fixing Techniques, Water Efficiency Enabling Activities, Promotion of Water Saving Devices, and Targeted Water Conservation Information (advice on appliance water usage). In addition, it also includes a programme of non-household water efficiency activity comprising 13 water efficiency options within 6 categories (Information Provision, Infrastructure and Leak Investigation, Water Efficiency Solutions for Domestic-Type Use, Water Efficiency Solutions for Mixed-Type Use, Water Efficiency Consultancy for Industry, and Golf Course Water Efficiency). The DMO-Preferred package targets a NHH water efficiency reduction of 9% by 2037/8.</p> <p>For the whole Northumbrian Water supply area (Berwick WRZ and Kielder WRZ), the combined Medium Demand Management Option's package (NW-DMO-Med) is predicted to yield no annual water savings for the baseline year (2024/25), and 52,246.1 MI for the year 2074/75 (143.14 MI/d average). The majority of these savings (~99%) are made in Kielder WRZ.</p>
Option Code:	NW-DMO-Med

**SEA Summary**

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

SEA Objective	Comment	Mitigation
To increase water efficiency and increase resilience of water supplies and natural systems to droughts. (+++)	Water efficiency advice and metering (NHH 9% target reduction by 2037/8) and leakage works (55% reduction by 2050) allocated in new areas will improve water efficiency (143.14 MI/d average savings for the year 2074/75), resulting in major positive effects in the operational phase due to less abstraction for human consumption and more water being kept within the environment.	N/A
To enhance or maintain surface water quality, flows and quantity (++)	Specific locations for the proposed works are unknown. Minor negative effects during construction (leakage works) due to potential for contamination of water resources. Moderate positive effects during operation due to improved water efficiency (NHH 9% target reduction by 2037/8) and leakage works (55% reduction by 2050), providing 143.14 MI/d average savings for the year 2074/75. This will result in less abstraction for human consumption and more water being kept within the environment. Metering and leakage works will also be specific to distribution pipes/underground pipework and households.	Best practice methods during construction to reduce contamination of surface waters i.e., creating an access channel and a clear work area boundary.



To enhance or maintain groundwater quality and resources (++)	Specific locations for the proposed works are unknown. Minor negative effects during construction (leakage works) on water resources. Moderate positive effects upon operation due to improved water efficiency (NHH 9% target reduction by 2037/8) and leakage works (55% reduction by 2050), providing 143.14 MI/d average savings for the year 2074/75. This will result in less abstraction for human consumption and more water being kept within the environment.	Best practice methods during construction to reduce contamination of groundwater i.e., creating an access channel and a clear work area boundary.
To introduce climate mitigation where required and improve the climate resilience of assets and natural systems (++)	Neutral effects are indentified for the construction phase. Moderate positive effects during operation phase due to water efficient improvements and leakage works resulting in resilience of asset efficiency to water scarcity, and therefore less water extracted from the environment for human consumption.	N/A
To secure resilient water supplies for the health and wellbeing of the community. (++)	Neutral effects are anticipated during the construction phase. A moderate positive effect in the operational stage as DMOs are anticipated to make the overall water management network more resilient due to less supply options needed in the future as an impact of reduced water demand.	N/A
To increase access and connect customers to the natural environment, provide education or information resources for the public. (++)	Neutral effects are anticipated during the construction phase. Water efficiency advice, especially that which focuses on customer behavioural trends e.g. gardening etc. will result in moderate positive impacts during operation. Smart metering will allow for behavioural changes in water usage by customers due to the analysis of the usage data.	N/A
<b>SEA Objectives with Major/Moderate Negative Effects (---)</b>		
<b>SEA Objective</b>	<b>Comment</b>	<b>Mitigation</b>

<p>To reduce and minimise air emissions during construction and operation (--)</p>	<p>Specific location for the associated works are unknown, however leakage works will require construction activities which have to potential to result in moderate negative impact during construction phase, in particular if they are needed in close proximity to an AQMA or other sensitive receptors. However, due to uncertainty and the short-term nature of the works, in addition to the application of mitigation, a minor effect is anticipated for the construction phase. Moderate negative impacts from water efficiency measures due to use of combustion engine vehicles to complete audits, metering installation, and maintenance.</p>	<p>Best practice mitigation measures implemented during construction to minimise air pollution. Consider shift of employee fleet to electric vehicles to lessen impact from maintenance, audit, and installation visits.</p>
<p>To minimise/reduce embodied and operational carbon emissions (--)</p>	<p>The option is estimated to have potential negative effects during the construction phase and minor positive effects during the operations phase. Carbon will be generated from materials used to manufacture infrastructure associated with metering (embodied carbon) and construction (leakage works) activities. With mitigation, these effects are anticipated to be minor for the construction phase. There are also travel-related emissions associated with water efficiency activities (e.g. audits) and installation of metering devices. Minor positive effects upon operation due to repairing rather than replacing existing infrastructure.</p>	<p>Best practice mitigation measures implemented during construction. Consider shift of employee fleet to electric vehicles to lessen impact from maintenance, audit, and installation visits. Residual carbon emissions to remain.</p>

<p>To conserve, protect and enhance landscape and townscape character and visual amenity (--)</p>	<p>Specific locations for the associated works are unknown, however potential for potential negative effects during construction (leakage works) on landscape. It is anticipated that mitigation will result in minor negative effects during the construction phase. Minor positive effects upon operation due to improved water efficiency and leakage works resulting in less water abstracted for human consumption and more water being kept within the environment, which could conserve or improve landscape character.</p>	<p>Best practice measures will likely be implemented to minimise effects during construction (leakage works), however minor and temporary impacts may remain.</p>
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<p>Minimise resource use and waste production (--)</p>	<p>Potential negative impact during construction as metering and leakage works (pressure management) involve use of materials and may generate waste. Due to the minimal and short-term nature of the works, and the potential to mitigate effects, minor negative effects have been identified for the construction phase. Neutral effects are anticipated during the operational phase.</p>	<p>Ensure best practice methods to reduce waste through accurate planning for metering and leakage work areas.</p>

<p>To avoid negative effects on built assets and infrastructure (including green infrastructure) (--)</p>	<p>Specific location for the associated works are unknown, however potential for potential negative effects during construction (leakage works) and introduction of main pipes on built assets and infrastructure if roads need to be closed or roadworks put in place. Due to the minimal and short-term nature of the works, and the potential to mitigate effects, minor negative effects have been identified for the construction phase. Neutral effects are anticipated during the operational phase.</p>	<p>Best practice measures including a Traffic Management Plan to be implemented to minimise disturbance during construction (leakage works). However, minor and temporary effects are likely to still occur.</p>
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0	30.00	29.00
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--	0.00	0.00
---	0.00	0.00
(?)		

<b>HRA Summary</b>	
<i>HRA Screening Outcome:</i>	
<b>Natural Capital Assessment Summary</b>	
<i>Natural Capital Assessment Outcome:</i>	
Natural Capital Assessment: Comments:	
Ecosystem Service Assessment Comments:	
<b>Biodiversity Net Gain Assessment Summary</b>	
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<b>Carbon Calculations</b>	
Capital Carbon Intensity (£M/tCO <sub>2</sub> e)	
Carbon (Natural Capital Sequestration Value: Overall Change in Value (£/year)	
<b>Option GIS:</b>	