



Northumbrian Water - Water Resources Management Plan 2024

Environmental Report - Appendix K

October 2024

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Assessment Cover Information	
Option ID	NW_DMO_High
Option Name	Demand Management Strategy High (Aspirational)
Water company	Northumbrian Water
Option Description	<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>
WRZ	Northumbrian Water (Berwick WRZ and Kielder WRZ)

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Comment	Mitigation	Residual Construction Effects		Residual Operational Effects	
		+	-	+	-			+	-	+	-
Biodiversity, flora and fauna	To protect designated sites and their qualifying features.	0	-	+	0	Specific locations for the associated works are unknown, however potential for minor negative effects during construction where activities required to resolve leakage issues could run in close proximity to biodiversity and habitats. Minor positive effects upon operation due to improved water efficiency 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 for the year 2074/75. This will result in lower water demand therefore less extraction of water from natural environments for human consumption, potentially providing indirect benefits to designated sites and their qualifying features.	Ensure best practicable means to prevent loss of habitat during leakage works. Use of access shafts (or similar) for leakage works would be used to avoid ecologically sensitive locations. Residual minor construction impact due to mains replacement may remain.	0	-	+	0
	To provide opportunities for habitat creation or restoration and deliver a net benefit / BNG.	0	0	+	0	Specific locations for the associated works are unknown however metering and leakage works will be specific to existing distribution pipes/underground pipework and households, therefore a neutral effect during the construction phase is anticipated. Potential for indirect benefits on chalk streams due to keeping water within the natural environment, hence a minor positive effect during the operational phase.	Best practice mitigation methods i.e., creating a narrow corridor during construction in vulnerable habitats for undertaking leakage works to minimise exposure and protect tree roots. Re-instating any disturbed habitats during mains replacement to a better condition. Potential for improvement in ecology of nearby vulnerable habitats e.g. chalk rivers.	0	0	+	0
	To avoid spreading and, where required, manage invasive and non-native species (INNS).	0	0	0	0	Specific locations for the associated works are unknown however metering and leakage works will be specific to distribution pipes/underground pipework and households therefore a neutral effect has been identified.	Best practice mitigation methods i.e. wash work boots on site after conducting leakage works to prevent any spread of INNS.	0	0	0	0
	To meet WFD objectives relating to biodiversity.	0	-	+	0	Potential minor negative impact during construction in regard to mains replacement with potential to contaminate nearby vulnerable habitats. Minor positive effects during operation as option types will lead to better water usage efficiency - leaving more water in the environment.	Best practice construction methods - creating a narrow corridor during construction in vulnerable habitats for undertaking leakage works to minimise exposure and protect tree roots. Residual minor construction impact due to mains replacement may remain.	0	-	+	0

Soil	To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	0	--	0	0	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.	Land reinstated upon completion of leakage works. Best practice construction measures to be implemented. Construction impact from risk of disturbing contaminated soils remains.	0	-	0	0
Water	To reduce or manage flood risk, taking climate change into account.	0	0	0	0	Specific location for the associated works are unknown, however this option is not anticipated to increase flood risk.	Measures to reduce the impact on flooding during the construction phase (leakage works) should still be implemented.	0	0	0	0
	To enhance or maintain surface water quality, flows and quantity.	0	-	++	0	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.	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.	0	-	++	0
	To enhance or maintain groundwater quality and resources.	0	-	++	0	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.	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.	0	-	++	0
	To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	0	-	+	0	Construction activities associated with leakage works which take place in close proximity to WFD waterbodies have the potential to result in minor negative effects, however specific locations are currently unknown. During the operational phase, water efficiency advice, metering and leakage works which take place in close proximity in new areas will result in moderate positive effects in the operational phase due to less abstraction for human consumption and more water being kept within the environment, therefore a minor positive effect has been identified.	N/A	0	-	+	0
	To increase water efficiency and increase resilience of water supplies and natural systems to droughts.	0	0	+++	0	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	0	0	+++	0
Air	To reduce and minimise air emissions during construction and operation.	0	--	0	0	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.	Best practice mitigation measures implemented during construction. Consider shift of employee fleet to electric vehicles to lessen impact from maintenance, audit, and installation visits.	0	-	0	0
Climatic Factors	To minimise/reduce embodied and operational carbon emissions	0	--	+	0	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.	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.	0	-	+	0
	To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	0	0	++	0	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.	N/A	0	0	++	0

Landscape	To conserve, protect and enhance landscape and townscape character and visual amenity.	0	--	++	0	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.	Best practice measures will likely be implemented to minimise effects during construction (leakage works), however minor and temporary impacts may remain.	0	-	++	0
Historic Environment	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.	0	--	0	0	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.	Best practice measures will likely be implemented to minimise effects during construction (leakage works), however minor and temporary impacts may remain.	0	-	0	0
Population and Human Health	To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	0	--	++	0	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.	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.	0	-	++	0
	To secure resilient water supplies for the health and wellbeing of the community.	0	0	+++	0	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	0	0	+++	0
	To increase access and connect customers to the natural environment, provide education or information resources for the public.	0	0	+++	0	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	0	0	+++	0

	Maintain and enhance tourism and recreation.	0	0	0	0	Specific locations for the associated works are unknown. Effects during construction (leakage works) on tourism and recreation are negligible due to use of access shafts (or similar) and implementation of appropriate diversions.	Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction (leakage works).	0	0	0	0
Material Assets	Minimise resource use and waste production.	0	--	0	0	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, and can be mitigated, therefore minor negative effects are anticipated.	Ensure best practice methods to reduce waste through accurate planning for metering and leakage work areas.	0	-	0	0
	To avoid negative effects on built assets and infrastructure (including green infrastructure).	0	--	0	0	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.	0	-	0	0

Assessment Cover Information	
Option ID	NW-DMO-Low
Option Name	Demand Management Option Low (High Demand)
Water company	Northumbrian Water
Option Description	<p>This option includes low metering, AMI Smart metering (3 AMP - 15 year roll-out from 2020) and 30% leakage reduction by 2050. It also includes a Low impact water efficiency plan comprising 6 household water efficiency options within 3 categories (Water Use Audit and Inspection, Advice and Information on Leakage Detection and Fixing Techniques, and Targeted Water Conservation Information (advice on appliance water usage). The DMO-Low 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 Low Impact Demand Management Option's package (NW-DMO-Low) is predicted to yield no annual water savings for the baseline year (2024/25), with the scenario forecast showing that demand will exceed the ability of demand management measures to supply enough water during this period, producing a water deficit of 113.15 MI for the year (0.31 MI/d average). However, from 2025/26 small water savings are predicted, growing to 30,324.2 MI for the year 2074/75 (83.08 MI/d average). The majority of these savings (~99%) are made in Kielder WRZ.</p>
WRZ	Northumbrian Water (Berwick WRZ and Kielder WRZ)

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Comment	Mitigation	Residual Construction Effects		Residual Operational Effects	
		+	-	+	-			+	-	+	-
Biodiversity, flora and fauna	To protect designated sites and their qualifying features.	0	-	+	0	Specific locations for the associated works are unknown, however there is potential for minor negative effects during construction where activities required to resolve leakage issues could run in close proximity to biodiversity and habitats. Minor positive effects upon operation due to improved water efficiency and leakage works (30% reduction by 2050), producing 83.08 MI for the year 2074/75. This will result in lower water demand, therefore less extraction from natural environments for human consumption, potentially benefiting designated sites and their qualifying features.	Best practice mitigation measures during the construction phase to be employed to prevent loss of habitat during leakage works. Use of access shafts (or similar) to avoid ecologically sensitive locations.	0	-	+	0
	To provide opportunities for habitat creation or restoration and deliver a net benefit / BNG.	0	-	0	0	Specific locations for the associated works are unknown, however metering and leakage works will be specific to distribution pipes/underground pipework and households - which are areas with limited existing biodiversity. However, there is potential for limited vegetation removal as part of the leakage works. No new habitat change is expected from the limited mains replacement, hence a neutral effect with mitigation implemented. Potential indirect benefits for chalk streams due to keeping water within the natural environment, however, for the low DMO strategy, this impact is considered negligible.	Best practice mitigation methods i.e., creating a narrow corridor during construction in vulnerable habitats for undertaking leakage works to minimise exposure and protect tree roots. Re-instating any disturbed habitats during mains replacement to a better condition.	0	0	0	0
	To avoid spreading and, where required, manage invasive and non-native species (INNS).	0	0	0	0	Specific locations for the associated works are unknown, however metering and leakage works will be specific to distribution pipes/underground pipework and households therefore a negligible effect is anticipated.	Best practice mitigation methods i.e. wash work boots on site after conducting leakage works to prevent any spread of INNS.	0	0	0	0
	To meet WFD objectives relating to biodiversity.	0	0	0	0	Neutral effects during construction and operation as metering and leakage works will be specific to distribution pipes/underground pipework and households.	Best practice construction methods - creating a narrow corridor during construction in vulnerable habitats for undertaking leakage works to minimise exposure and protect tree roots.	0	0	0	0

Soil	To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	0	-	0	0	Minor negative impact during construction as there is potential to disturb contaminated material and top soils during construction (leakage works) due to digging for mains replacement. Neutral effects during the operation phase are anticipated as works are fixing leakages and there will be no permanent land change.	Land reinstated upon completion of leakage works. Best practice construction measures to be implemented. Construction impact from risk of disturbing contaminated soils remains.	0	-	0	0
Water	To reduce or manage flood risk, taking climate change into account.	0	0	0	0	Specific location for the associated works are unknown, however this option is not anticipated to increase flood risk.	Measures to reduce the impact on flooding during the construction phase (leakage works) should still be implemented.	0	0	0	0
	To enhance or maintain surface water quality, flows and quantity.	0	-	++	0	Specific locations for the associated works are unknown. Negative effects during construction (leakage works) on water resources are negligible due to use of access shafts (or similar). Metering and leakage works will also be specific to distribution pipes/underground pipework and households, thus avoiding surface water bodies. Following mitigation implementation, neutral effects are anticipated during the construction phase. Modelling predicts that demand will exceed the ability of demand management measures to supply enough water during the baseline year (2024/25), producing a water deficit of 113.15 MI for the year (0.31 MI/d average), thus potentially having a short-term minor negative effect on surface water quality, flows and quantity during operation. However, from 2025/26, small water savings are predicted, growing to 83.08 MI/d for the year 2074/75, and thus long-term moderate positive effects during operation are expected due to improved water efficiency (NHH 9% target reduction by 2037/8) and leakage works (30% reduction by 2050). This will result in lower water demand, and therefore less extraction from natural environments for human consumption.	Best practice methods during construction to reduce contamination of surface waters i.e., creating an access channel and a clear work area boundary.	0	0	++	0
	To enhance or maintain groundwater quality and resources.	0	-	++	0	Specific locations for the associated works are unknown. Potential negative effects during construction (leakage works) on water resources are considered to be neutral due to use of access shafts (or similar) and the application of mitigation measures. Moderate positive effects upon operation due to improved water efficiency (NHH 9% target reduction by 2037/8) and leakage works (30% reduction by 2050), providing 83.08 MI/d average savings in 2074/75. This will result in lower water demand, and therefore less extraction allowing more water to be 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.	0	0	++	0
	To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	0	0	+	0	Construction activities associated with leakage works which take place in close proximity to WFD waterbodies have the potential to result in negative effects. However these effects are anticipated to be minimal and short-term in nature therefore neutral effects are anticipated. During the operational phase, water efficiency advice, metering and leakage works may result in minor positive effects in the operational phase due to less abstraction for human consumption and more water being kept within the environment.	N/A	0	0	+	0
	To increase water efficiency and increase resilience of water supplies and natural systems to droughts.	0	0	++	0	No construction phase impacts are anticipated during the construction phase as the works will be minor and short-term in nature. Improved water efficiency measures, metering and leakage works allocated in new areas will result in moderate positive effects in the operational phase.	N/A	0	0	++	0

Air	To reduce and minimise air emissions during construction and operation.	0	-	0	0	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. Minor negative impacts from water efficiency measures due to use of combustion engine vehicles to complete audits, metering installation, and maintenance.	Best practice mitigation measures implemented during construction. Consider shift of employee fleet to electric vehicles to lessen impact from maintenance, audit and installation visits.	0	-	0	0
Climatic Factors	To minimise/reduce embodied and operational carbon emissions	0	-	+	0	The option is anticipated to have minor negative effects during the construction phase and minor positive effects during the operational phase. Carbon will be generated from materials used to manufacture infrastructure associated with metering (embodied carbon), 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 upon operation due to repairing rather than replacing existing infrastructure.	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.	0	-	+	0
	To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	0	0	+	0	Minor 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	0	0	+	0
Landscape	To conserve, protect and enhance landscape and townscape character and visual amenity.	0	-	0	0	Specific locations for the associated works are unknown, however potential for minor negative effects during construction (leakage works) on landscape. Neutral effects are anticipated during operation.	Best practice measures will likely be implemented to minimise effects during construction (leakage works), however minor and temporary impacts may remain.	0	-	0	0
Historic Environment	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.	0	-	0	0	Specific location for the associated works are unknown, however potential for minor negative effects during construction (leakage works) on historic environment. Neutral effects are identified during the operational phase.	Best practice measures will likely be implemented to minimise effects during construction (leakage works), however minor and temporary impacts may remain.	0	-	0	0

	To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	0	-	+	0	Specific location for the associated works are unknown, however potential for minor negative effects during construction (leakage works) on health and wellbeing of community due to disruption. Metering may also cause disruption however effects considered negligible. Minor positive operational effects have been identified due to increased water efficiency awareness and water availability through DMO savings.	Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction (leakage works). However, minor and temporary effects are likely to still occur.	0	-	+	0
Population and Human Health	To secure resilient water supplies for the health and wellbeing of the community.	0	0	+	0	A minor positive effect in the operational phase 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. However, modelling predicts that demand will exceed the ability of demand management measures to supply enough water during the baseline year (2024/25), producing a water deficit of 113.15 Ml for the year (0.31 Ml/d average). This is included here as a short-term risk to water supply in the area. After this period, water savings are predicted to increase, growing to 83.08 Ml for the year 2074/75, and thus improved water efficiency (NHH 9% target reduction by 2037/8) and leakage works (30% reduction by 2050) will help to secure more resilient water supplies for the health and wellbeing of the community.	N/A	0	0	+	0
	To increase access and connect customers to the natural environment, provide education or information resources for the public.	0	0	++	0	A neutral effect has been identified during the construction phase. Improved water efficiency advice relating to customer behavioural trends will result in minor positive impacts during operation. Smart metering will allow for behavioural changes in water usage by customers due to the analysis of the usage data. A moderate positive effect during the operational phase is anticipated.	N/A	0	0	++	0
	Maintain and enhance tourism and recreation.	0	0	0	0	Specific locations for the associated works are unknown. Effects during construction (leakage works) on tourism and recreation are negligible due to use of access shafts (or similar) and implementation of appropriate diversions. Neutral effects are anticipated during the operational phase.	Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction (leakage works).	0	0	0	0
	Minimise resource use and waste production.	0	-	0	0	Minor negative impact during construction as metering and leakage works (pressure management) involve use of materials and may generate waste. Neutral effects are anticipated during the operational phase.	Ensure best practice methods to reduce waste through accurate planning for metering and leakage work areas.	0	-	0	0
Material Assets	To avoid negative effects on built assets and infrastructure (including green infrastructure).	0	-	0	0	Specific location for the associated works are unknown, however potential for minor negative effects during construction (leakage works) on built assets and infrastructure if roads need to be closed or roadworks put in place. Neutral effects are anticipated during the operational phase.	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.	0	-	0	0

Assessment Cover Information	
WRE Option ID	NW-DMO-Med
Option Name	Demand Management Strategy Medium (Preferred)
Water company	Northumbrian Water
Option Description	<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 (NHH) 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>
WRZ	Northumbrian Water (Berwick WRZ and Kielder WRZ)

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Comment	Mitigation	Residual Construction Effects		Residual Operational Effects	
		+	-	+	-			+	-	+	-
Biodiversity, flora and fauna	To protect designated sites and their qualifying features.	0	-	+	0	Specific locations for the associated works are unknown, however there is potential for minor negative effects during construction where activities required to resolve leakage issues could run in close proximity to biodiversity receptors and protected habitats. A minor positive effect is anticipated 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 lower water demand therefore less extraction of water from natural environments for human consumption, potentially benefiting designated sites and their qualifying features. It is anticipated that works will be to existing infrastructure and no new land-take will be required to resolve leaks. Planning permission is not anticipated to be required for proposed works.	Ensure best practicable means to prevent loss of habitat during leakage works. Use of access shafts (or similar) for leakage works would be used to avoid ecologically sensitive locations.	0	-	+	0
	To provide opportunities for habitat creation or restoration and deliver a net benefit / BNG.	0	0	+	0	Specific locations for the associated works are unknown, however metering and leakage works will be specific to distribution pipes/underground pipework and households - which are areas already use to water supply purposes and are not anticipated to be potential biodiversity receptors. There are potential for indirect benefits on chalk streams due to keeping water within the natural environment, and therefore a minor positive effect during the operational phase has been identified.	Best practice mitigation methods i.e., creating a narrow corridor during construction in vulnerable habitats for undertaking leakage works to minimise exposure and protect tree roots and re-instating any disturbed habitats during mains replacement to a better condition. Potential for improvement in ecology of nearby vulnerable habitats e.g. chalk rivers.	0	0	+	0
	To avoid spreading and, where required, manage invasive and non-native species (INNS).	0	0	0	0	Specific locations for the proposed works are unknown however metering and leakage works will be specific to distribution pipes/underground pipework and households hence negligible effect.	Best practice mitigation methods i.e. wash work boots on site after conducting leakage works to prevent any spread of INNS.	0	0	0	0
	To meet WFD objectives relating to biodiversity.	0	-	+	0	Potential minor negative impact during construction phase of leakage works and metering with potential to contaminate nearby vulnerable habitats. Minor positive effects during operation as option types will lead to better water usage efficiency - leaving more water in the environment.	Best practice construction methods - creating a narrow corridor during construction in vulnerable habitats for undertaking leakage works to minimise exposure and protect tree roots.	0	-	+	0

Soil	To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	0	-	0	0	Minor negative effect during construction as there is potential to disturb contaminated material and top soils during construction (leakage works) due to digging for mains replacement. Neutral effect identified during operation.	Land reinstated upon completion of leakage works. Best practice construction measures to be implemented. Construction impact from risk of disturbing contaminated soils remains.	0	-	0	0
Water	To reduce or manage flood risk, taking climate change into account.	0	0	0	0	Specific location for the proposed works are unknown, however this option is not anticipated to increase flood risk during the construction and operational phases.	Measures to reduce the impact on flooding during the construction phase (leakage works) should still be implemented.	0	0	0	0
	To enhance or maintain surface water quality, flows and quantity.	0	-	++	0	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.	0	-	++	0
	To enhance or maintain groundwater quality and resources.	0	-	++	0	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.	0	-	++	0
	To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	0	0	+	0	Construction activities associated with leakage works which take place in close proximity to WFD waterbodies have the potential to result in negative effects, however due to uncertainty, and the minimal and short-term nature of the works, a neutral effect is anticipated. During the operational phase, water efficiency advice, metering and leakage works could result in moderate positive effects in the operational phase due to less abstraction for human consumption and more water being kept within the environment.	N/A	0	0	+	0
	To increase water efficiency and increase resilience of water supplies and natural systems to droughts.	0	0	+++	0	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	0	0	+++	0
Air	To reduce and minimise air emissions during construction and operation.	0	--	0	0	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.	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.	0	-	0	0

Climatic Factors	To minimise/reduce embodied and operational carbon emissions	0	--	+	0	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.	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.	0	-	+	0
	To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	0	0	++	0	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	0	0	++	0
Landscape	To conserve, protect and enhance landscape and townscape character and visual amenity.	0	--	+	0	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.	Best practice measures will likely be implemented to minimise effects during construction (leakage works), however minor and temporary impacts may remain.	0	-	+	0
Historic Environment	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.	0	--	0	0	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.	Best practice measures will likely be implemented to minimise effects during construction (leakage works), however minor and temporary impacts may remain.	0	-	0	0
Population and Human Health	To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	0	--	+	0	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.	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.	0	-	+	0
	To secure resilient water supplies for the health and wellbeing of the community.	0	0	++	0	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	0	0	++	0

	To increase access and connect customers to the natural environment, provide education or information resources for the public.	0	0	++	0	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	0	0	++	0
	Maintain and enhance tourism and recreation.	0	0	0	0	Specific locations for the associated works are unknown. Effects during construction (leakage works) on tourism and recreation are negligible due to use of access shafts (or similar) and implementation of appropriate diversions. As a result, neutral effects are anticipated during the construction phase.	Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction (leakage works).	0	0	0	0
Material Assets	Minimise resource use and waste production.	0	--	0	0	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.	Ensure best practice methods to reduce waste through accurate planning for metering and leakage work areas.	0	-	0	0
	To avoid negative effects on built assets and infrastructure (including green infrastructure).	0	--	0	0	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.	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.	0	-	0	0

Assessment Cover Information	
WRE Option ID	BOT-ABS-002
Option Name	New Borehole at Duddo
Water company	Northumbria
Option Description	Abstraction from new borehole in Duddo. Current licence is 15 (MI/d) but sustainable level is close to 8 (MI/d). Impact on surface water and flow index (hornmill dean burn). Transfer to Murton WTW with pipeline replacement between Thornton and Murton. No additional treatment capacity is required at Murton due to headroom at Murton.
WRZ	Berwick-upon-Tweed

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Comment	Mitigation	Residual Construction Effects		Residual Operational Effects	
		+	-	+	-			+	-	+	-
Biodiversity, flora and fauna	To protect designated sites and their qualifying features.	0	-	0	---	<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 (~2.3 km); Tweed Estuary SAC (~3.5 km); Lindisfarne Ramsar (~4.8 km); Northumberland Coast SPA (~4.8 km); Berwickshire & North Northumberland Coast SAC (~4.8 km); North Northumberland Dunes SAC (~ 4.8 km); Northumberland Marine SPA (~4.8 km); Lindisfarne SPA (~5.1 km); and Ford Moss SAC (~ 5.3 km). 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>	Best practice methods to be implemented to minimise disturbance effects during construction, therefore any residual impacts are negligible. 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.	0	0	0	--
	To provide opportunities for habitat creation or restoration and deliver a net benefit / BNG.	0	-	0	---	<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.</p> <p>There are no Groundwater Dependent Terrestrial Ecosystem (GWDTE) or 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 -7.84%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.</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.	0	-	0	--

	To avoid spreading and, where required, manage invasive and non-native species (INNS).	0	0	0	0	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.	N/A	0	0	0	0
	To meet WFD objectives relating to biodiversity.	0	-	0	--	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.	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.	0	0	0	--
Soil	To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	0	-	0	0	The option crosses mostly grade 3 and some grade 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. Furthermore, a majority of the pipeline is aligned along existing roads, therefore the actual degree of land-loss may be less severe. No landfill sites within 500m of the option, therefore potential disturbance of contaminated soils is unlikely.	Ground will be reinstated, therefore long term residual effects on agricultural soils as a result of pipeline construction are unlikely.	0	0	0	0
	To reduce or manage flood risk, taking climate change into account.	0	0	0	0	The option is entirely within Flood Zone 1. Construction and operation not thought to increase flood risk.	N/A	0	0	0	0
	To enhance or maintain surface water quality, flows and quantity.	0	-	0	--	The northernmost transfer section crosses a small watercourses, therefore there are potential impacts on water quality during the construction phase. During operation, increased abstraction may reduce water flow and water quality, e.g. through increased salinity in downstream estuary (less fresh water input). Part of the option is within a Nitrate Vulnerable Zone.	Best practice construction methods and pollution prevention measures to be implemented. This includes the use of directional drilling or other trenchless techniques where the pipeline crosses watercourses. With mitigation, no effects are predicted as a result of construction.	0	0	0	-
Water	To enhance or maintain groundwater quality and resources.	0	-	0	0	The option intersects source protection zones 1 and 3 with potential for impacts on water quality during the construction phase.	Best practice construction methods and pollution prevention measures to be implemented. With mitigation, no effects are predicted as a result of construction.	0	0	0	0

	To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	0	-	0	--	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.	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).	0	0	0	--
	To increase water efficiency and increase resilience of water supplies and natural systems to droughts.	0	0	0	-	The option may increase groundwater abstraction once operational, thus depleting water resources within the environment. Therefore, an increased vulnerability of the natural environment to drought might be anticipated.	N/A	0	0	0	-
Air	To reduce and minimise air emissions during construction and operation.	0	-	0	0	The option is not within an AQMA nor are there any within 2km. Construction likely to have a temporary impact on air quality.	Best practice mitigation measures to be implemented during construction, however short term air quality effects may remain.	0	-	0	0
Climatic Factors	To minimise/reduce embodied and operational carbon emissions	0	-	0	-	Carbon will generated from materials used to construct the new infrastructure (embodied carbon), construction activities and from operation.	Investigate use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon. Carbon footprint study could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy will be available. Although carbon emissions could be reduced through mitigation, negative effects in the short and medium term will likely remain.	0	-	0	-
	To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	0	0	0	-	The option will increase groundwater abstraction once operational, depleting water resources within the environment. Therefore, an increase in climate change vulnerability might be anticipated.	N/A	0	0	0	-
Landscape	To conserve, protect and enhance landscape and townscape character and visual amenity.	0	-	0	0	This option overlaps two NCAs: Cheviot Fringe (0.02%); North Northumberland Coastal Plain (0.01%) (with % proportion of NCA affected). Negative effects during construction likely as excavation will be required for the transfer pipeline. The new borehole is within an existing abstraction site, therefore visual impact on landscape considered minimal. No operational effects on landscape anticipated.	Best practice measures to be implemented to minimise effects during construction, although temporary effects during construction may remain.	0	-	0	0

Historic Environment	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.	0	-	0	0	<p>The option intersects "MILEPOST 3/4 MILE NORTH EAST OF DUDDO" Grade II listed structure. Construction may affect the setting of these historic assets, however this is likely to be temporary.</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>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>	0	-	0	0
Population and Human Health	To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	+	-	0	0	<p>The option is within 500m of religious grounds and one religious building. There is no direct land take from these areas, but likely to be temporary disturbance to users of these sites and the local community during construction.</p> <p>This option may contribute to the local economy through employment opportunities during the construction phase. During operation, it is unlikely to contribute to the local economy.</p> <p>IMD deciles along the option footprint vary from three to nine.</p>	<p>Best practice mitigation measures e.g. noise management to be implemented to minimise disturbance during construction. However, temporary effects are likely to still occur during construction.</p>	+	-	0	0
	To secure resilient water supplies for the health and wellbeing of customers.	0	0	+	0	<p>There are no shellfish waters or bathing waters within 500m of the option location.</p> <p>All potable water transfers have been treated and are isolated from contamination, therefore it is highly unlikely that this option would affect disease transmission during operation. Increased groundwater abstraction will improve water supply for human consumption.</p>	N/A	0	0	+	0
	To increase access and connect customers to the natural environment, provide education or information resources for the public.	0	-	0	0	<p>The option does not cross any National Trails or National Cycle Network routes. No disruptions to users of these anticipated, however construction along existing roads is likely to cause some disruption to users of these.</p>	<p>Best practice mitigation measures e.g. noise and traffic management to be implemented to minimise effects during construction, however some temporary impacts will remain.</p>	0	-	0	0
	Maintain and enhance tourism and recreation	0	-	0	0	<p>The pipeline route does not cross any open spaces, LNRs or NNRs. It crosses a couple minor watercourses and habitat areas that could be used for recreation, and is within 500m of a religious ground. Therefore there may be some minor temporary effects on recreation during the construction phase. No operational effects anticipated.</p>	<p>Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction. Direct land take of recreational sites to be avoided where possible and land to be reinstated. However, temporary effects are likely to still occur during construction.</p>	0	-	0	0
	Minimise resource use and waste production	0	-	0	0	<p>New infrastructure required for option which will use materials and generate waste and excavated material. Operation of option not anticipated to generate waste.</p>	<p>Seek opportunity to implement sustainable design measures (design to reduce footprint, selection of materials) and reuse excavated material to reduce the impact, however it is likely that negative effects will remain.</p>	0	-	0	0

<p>Material Assets</p>	<p>Avoid negative effects on built assets and infrastructure</p>	<p>0</p>	<p>-</p>	<p>0</p>	<p>0</p>	<p>The option does not cross any roads, railways or cycle routes, however the southern transfer element runs along road B6354 from Duddo to Felkington. Likely to be temporary impacts during construction due to disruption for users.</p> <p>There is also 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>	<p>0</p>	<p>-</p>	<p>0</p>	<p>0</p>
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Assessment Cover Information	
Option ID	Supplying Teeside Industrial Water
Option Name	Supplying Teeside Industrial Water
Water company	Northumbrian Water
Option Description	This option involves bringing the existing but currently non operational Low Worsall RWPS on the Tees back into use, installing Eel Regs compliant eel screens at Low Worsall RPWS and increasing abstraction licences at Low Worsall RWPS back up to 2016 levels and at Blackwell RWPS back up to historic (pre-2016) levels.
WRZ	Northumbrian Water

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Comment	Mitigation	Residual Construction Effects		Residual Operational Effects	
		+	-	+	-			+	-	+	-
Biodiversity, flora and fauna	To protect designated sites and their qualifying features.	0	-	0	---	<p>Any changes to existing abstraction regime have the potential for adverse effects on water quality or habitat quality and availability even if they are within existing licence parameters.</p> <p>The HRA ToLS identified two Natura 2000 sites that could be affected Teesmouth and Cleveland Coast SPA (UK9006061) (multiple site units; closest approximately 18.78km), Teesmouth and Cleveland Coast Ramsar Site (UK11068) (multiple site units; closest approximately 26.38km) Likely significant effects concluded for both sites during construction and operation.</p> <p>The Level 2 AA determined that both sites are considered sufficiently distant that it is considered unlikely that any activities associated with construction phase will result in likely significant effects on the habitat site or its qualifying features. During operation there is the potential for adverse effects on both sites due to the increase in water abstraction, however, it is considered that with adherence to the proposed mitigation, the proposed works associated with the option are not expected to have adverse effects on the overall Habitats Sites integrity and/or its qualifying features.</p>	<p>Appropriate mitigation measures (if required) during operation will be informed by completion of further studies including hydrological modelling of the abstraction on the River Tees, in order to prevent adverse effects on site integrity. This will include the identification of appropriate environmental flows as appropriate.</p> <p>Ensure identified flow requirements downstream of abstraction location are compliant with potential appropriate compensation flow to be considered if necessary.</p> <p>The operational limits of the transfer will be constrained by the updated Northumbria River Basin Management Plan (RBMP) — the principal safeguard related to river basin management. RBMPs set the legally binding, locally specific, environmental objectives that underpin water regulation (such as permitting) and planning activities.</p>	0	0	0	-
	To deliver BNG, protect biodiversity, priority species and vulnerable habitats such as chalk rivers.	0	0	0	0	The option is not expected to cause the loss of BNG units due to habitat clearance associated with construction. There maybe impacts arising from changes to existing abstractions.	N/A	0	0	0	0
	To avoid spreading and, where required, manage invasive and non-native species (INNS).	0	0	0	---	Physical transfer of untreated water between two locations. It is assumed that the Low Worsall Pumping Station is currently unconnected to the reservoirs Kirkleatham and I.C.I. Blackwell Pumping Station is connected to Gately Moor Reservoir and Long Newton Reservoir and this will be an increase in abstraction. Additional risks from pipeline washout, pipeline bursts, washwater discharge, overflows and sludge disposal. Assumed all water transfer will occur within a closed pipeline, transferred water will be untreated, the source and destination are currently unconnected, and water transfer will only occur under drought conditions. The Level 1 INNS assessment resulted in a risk magnitude of 5 = High.	Biosecurity measures will be in place to ensure the management of invasive non-native species on construction sites and during controlled activities. Further INNS assessment work will be required at project level. Treatment will likely be required by the end user to reduce INNS risk.	0	0	0	--

	To meet WFD objectives relating to biodiversity.	0	-	0	--	<p>New or increased abstraction may increase pressures on water quality due to reduction in dilution which may result in non-toxic contamination and biological disturbance due to the impact of dissolved inorganic nitrogen and macroalgae.</p> <p>The WFD Phase 1 assessment determined two river water bodies and one transitional water body were identified as requiring further assessment: GB103025072190 - Tees from River Greta to River Skerne, GB103025072595 - Tees from Skerne to Tidal Limit and GB510302509900: TEES.</p> <p>The Level 2 WFD assessment for the Tees from River Greta to River Skerne water body, Tees from Skerne to Tidal Limit, and TEES transitional water body identified potential adverse impacts (impact score 2) to biological quality elements (invertebrates and macrophytes and phytobenthic), hydro morphological supporting elements (hydrological regime and mitigation measures assessment) and physicochemical quality elements (ammonia, dissolved oxygen, pH and phosphate). This is due to the proposed increase in licence of the surface water abstraction (Blackwell), the proposed reinstatement of the surface water abstraction at Lower Worsall.</p>	<p>Ensuring identified flow requirements downstream of abstraction location are still met under scheme. If not appropriate compensation flow is required, perhaps through increased contribution from the Tyne Tees tunnel. Best practice construction methods and pollution prevention measures to be implemented. With mitigation, no effects are predicted as a result of construction.</p>	0	0	0	-
Soil	To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	0	0	0	0	The option does not require any major new infrastructure and is not anticipate to have an effect on soils.	N/A	0	0	0	0
Water	To reduce or manage flood risk, taking climate change into account.	0	-	0	0	The new infrastructure consists of the installation of eel passes. The option involves increasing abstraction licences at Low Worsall RWPS back up to previous levels. There is not likely to be a notable effect on flood risk.	<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. FRA to be undertaken and above ground infrastructure to be designed to be flood resilient. Floodplain compensation may be required.</p>	0	0	0	0
	To enhance or maintain surface water quality, flows and quantity.	0	-	0	--	<p>The Level 2 WFD assessment for the Tees from River Greta to River Skerne water body identified potential adverse impacts due to the proposed increase in licence of the surface water abstraction (Blackwell).</p> <p>The Level 2 WFD assessment for the Tees from Skerne to Tidal Limit identified potential adverse impacts due to the proposed reinstatement of the surface water abstraction at Lower Worsall and the increase in licence at the Blackwell abstraction in the upstream water body.</p> <p>Further assessment is required to ensure identified flow requirements downstream of abstraction location are still met under scheme.</p>	<p>Mitigation is proposed in the form of ensuring identified flow requirements downstream of abstraction location (127MI/d /s of Blackwell) are still met under scheme and if not, appropriate compensation flow is required, perhaps through increased contribution from the Tyne Tees tunnel. Best practice construction methods and pollution prevention measures to be implemented.</p>	0	0	0	-
	To enhance or maintain groundwater quality and resources.	0	-	0	0	Unlikely to have an effect as abstracting from surface water.	Best practice construction methods and pollution prevention measures to be implemented. With mitigation, no effects are predicted as a result of construction.	0	0	0	0

	To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	0	-	0	--	The WFD Phase 1 assessment determined two river water bodies and one transitional water body were identified as requiring further assessment: GB103025072190 - Tees from River Greta to River Skerne, GB103025072595 - Tees from Skerne to Tidal Limit and GB510302509900: TEES. The Level 2 WFD assessment for the Tees from River Greta to River Skerne water body, Tees from Skerne to Tidal Limit, and TEES transitional water body identified potential adverse impacts (impact score 2) to biological quality elements (invertebrates and macrophytes and phytobenthic), hydro morphological supporting elements (hydrological regime and mitigation measures assessment) and physicochemical quality elements (ammonia, dissolved oxygen, pH and phosphate). This is due to the proposed increase in licence of the surface water abstraction (Blackwell), the proposed reinstatement of the surface water abstraction at Lower Worsall.	Ensuring identified flow requirements downstream of abstraction location are still met under scheme. If not appropriate compensation flow is required, perhaps through increased contribution from the Tyne Tees tunnel. Best practice construction methods and pollution prevention measures to be implemented. With mitigation, no effects are predicted as a result of construction.	0	0	0	-
	To increase water efficiency and increase resilience of water supplies and natural systems to droughts.	0	0	0	-	The option involves increasing abstraction which may reduce the natural system's resilience to drought. This should be considered within the abstraction license	N/A	0	0	0	-
Air	To reduce and minimise air emissions during construction and operation.	0	-	0	0	The option is not within an AQMA nor are there any within 2km. Construction is likely to have a very minor temporary impact on air quality.	Best practice mitigation measures to be implemented during construction, however short term air quality effects may remain.	0	-	0	0
Climatic Factors	To minimise/reduce embodied and operational carbon emissions	0	-	0	-	Effects during construction of the option due to resource use and emissions, and effects during the operational phase as the option requires a pumping station.	Investigate use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon. Carbon footprint study could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy will be available. Although carbon emissions could be reduced through mitigation, negative effects in the short and medium term will likely remain.	0	-	0	-
	To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	0	0	0	0	Water levels not predicted to be significantly affected therefore unlikely to affect resilience of the local environment to climate change.	N/A	0	0	0	0
Landscape	To conserve, protect and enhance landscape and townscape character and visual amenity.	0	-	0	0	The option is within Tees Lowlands NCA. Minor negative effects likely during construction. There will be minimal new above ground infrastructure. The eel screen may have minor impacts to the visual amenity of the area.	Best practice measures to be implemented to minimise effects during construction. Land reinstated upon completion so with mitigation, no residual effects are likely to remain during operation.	0	-	0	0
Historic Environment	To conserve/protect and enhance historic environment and heritage assets, and their setting, including archaeologically important sites.	0	-	0	0	There will be minimal new above ground infrastructure associated with the eel screen, which may have temporary effects on the setting of heritage assets during construction. No effects anticipated during operation.	Best practice measures to be implemented to minimise setting effects for other heritage assets during construction.	0	-	0	0
Population and Human Health	To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	0	-	0	0	There is potential for some minor temporary disturbance to local residence during construction of the eel screen from noise and traffic.	Best practice mitigation measures e.g. noise management to be implemented to minimise disturbance during construction. However, temporary effects are likely to still occur during construction.	0	0	0	0
	To secure resilient water supplies for the health and wellbeing of customers.	0	0	+	0	There are no shellfish waters or bathing waters within 500m of the option location. The option will help to increase resilience of public water supply.	N/A	0	0	+	0
	To increase access and connect customers to the natural environment, provide education or information resources for the public.	0	-	0	0	There may be temporary disturbance on recreation water users, as well and other public rights of way during the construction phase. Effects during operation are not anticipated.	Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction.	0	0	0	0

	Maintain and enhance tourism and recreation	0	-	0	0	There may be some temporary effects on recreation, angling and other water based activities during the construction phase. During construction people may not be able to use the watercourse for recreational purposes. No effects during operation.	Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction. Direct land take of recreational sites to be avoided where possible and land to be reinstated. However, temporary effects are likely to still occur during construction.	0	-	0	0
Material Assets	Minimise resource use and waste production	0	-	0	0	New infrastructure is required which will require resources and generate waste. Minimal operation effects are anticipated.	Seek opportunity to implement sustainable design measures (design to reduce footprint, selection of materials) and reuse excavated material to reduce the impact, however it is likely that negative effects will remain.	0	-	0	0
	Avoid negative effects on built assets and infrastructure	0	0	0	0	There are no major roads, railways, national cycle routes, national trails in proximity to the option. No effects to built assets and infrastructure anticipated.	Best practice measures including a Traffic Management Plan to be implemented to minimise disturbance during construction. However, temporary effects are likely to still occur.	0	0	0	0

Assessment Cover Information	
WRE Option ID	BOT-ABS-007
Option Name	Fosberry Borehole Abstraction
Water company	Northumbria
Option Description	Recommission/refurbishment of disconnected borehole. Transfer to Wooler WTW. No network reinforcement required. 2 MI/d WTW expansion at Wooler WTW to accommodate additional flow.
WRZ	Berwick-upon-Tweed

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Comment	Mitigation	Residual Construction Effects		Residual Operational Effects	
		+	-	+	-			+	-	+	-
Biodiversity, flora and fauna	To protect designated sites and their qualifying features.	0	---	0	--	<p>Tweed Catchment Rivers - England: Till Catchment SSSI (18% unfavourable - recovering, 75% Unfavourable- No change, 7% Unfavourable-Declining) 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. 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 five Natura 2000 sites that could be affected: River Tweed SAC (~0.2 km); Holburn Lake and Moss SPA and Ramsar (~8 km); Ford Moss SAC (~9 km); and Tweed Estuary SAC (~20km). 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>	Best practice methods to be implemented to minimise disturbance effects. Ecology surveys will be required at future design stages to determine effects and mitigation required. It is assumed that mitigation recommended by further ecology surveys will be implemented, and therefore residual construction effects are lessened although this wouldn't negate the need for a potential appropriate assessment for both construction and operational effects.	0	--	0	-
	To provide opportunities for habitat creation or restoration and deliver a net benefit / BNG.	0	-	0	0	<p>The pipeline passes within 500m of the following Priority Habitats: Traditional Orchards; Good Quality Semi Improved Grassland; and Deciduous Woodland. No direct effects on Priority Habitats or woodlands but there may be disturbance effects during the construction phase and potential effects on protected species.</p> <p>The option is expected to cause the loss of BNG units due to habitat clearance associated with construction. The percentage change is -3.5%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.</p>	Best practice methods are assumed to be implemented to minimise disturbance effects.	0	-	0	0
	To avoid spreading and, where required, manage invasive and non-native species (INNS).	0	0	0	0	<p>Source water to be extracted from recommissioned borehole and transferred via existing 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. Very limited risk as the source water is likely to be entirely free of INNS. It is assumed that abstracting and transferring groundwater via a pipeline will not cause a risk of INNS transfer. Use of existing infrastructure further reduces INNS transmission during construction phase.</p>	N/A	0	0	0	0

	To meet WFD objectives relating to biodiversity.	0	0	0	-	The WFD Phase 1 assessment results show there would be no risk for ecology during construction. There is potential for minor risks to a watercourse during operation if water is drained from pipes for maintenance.	Best practice construction methods and pollution prevention measures to be implemented. This includes the use of directional drilling or other trenchless techniques where the pipeline crosses watercourses. In the short term there is potential for effects. With mitigation, no effects are predicted as a result of construction. There are potential operational impacts in the short term.	0	0	0	-
Soil	To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	0	-	0	0	Works will involve recommissioning/refurbishment of disconnected boreholes and using existing infrastructure. There will be a new pipe connection of approx. 320m only with no need for network reinforcement elsewhere. The new pipeline connection 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.	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.	0	0	0	0
Water	To reduce or manage flood risk, taking climate change into account.	0	--	0	0	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. Operational impacts from abstraction unlikely.	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.	0	-	0	0
	To enhance or maintain surface water quality, flows and quantity.	0	-	0	0	The transfer pipeline is within 500m of watercourses therefore has low potential for impacts on water quality during the construction phase. No effects are anticipated during operation.	Best practice construction methods and pollution prevention measures to be implemented. With mitigation, residual impacts are considered negligible.	0	0	0	0
	To enhance or maintain groundwater quality and resources.	0	-	0	0	The option is located within Zone 1 groundwater SPZs with potential for impacts on water quality during the construction phase.	Best practice construction methods and pollution prevention measures to be implemented. With mitigation, residual impacts are considered negligible.	0	0	0	0
	To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	0	-	0	--	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.	0	0	0	--
	To increase water efficiency and increase resilience of water supplies and natural systems to droughts.	0	0	0	-	The option may increase groundwater abstraction once operational, thus depleting water resources within the environment. Therefore, an increased vulnerability of the natural environment to drought might be anticipated.	N/A	0	0	0	-
Air	To reduce and minimise air emissions during construction and operation.	0	-	0	0	The option is not within an AQMA nor are there any within 2km. Construction likely to have a temporary impact on air quality.	Best practice mitigation measures to be implemented during construction, however short term air quality effects may remain.	0	-	0	0

Climatic Factors	To minimise/reduce embodied and operational carbon emissions	0	-	0	-	Carbon will generated from materials used to construct the new infrastructure (embodied carbon), construction activities and from operation.	Investigate use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon. Carbon footprint study could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy will be available. Although carbon emissions could be reduced through mitigation, negative effects in the short and medium term will likely remain.	0	-	0	-
	To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	0	0	0	-	The option will increase groundwater abstraction once operational, depleting water resources within the environment. Therefore, an increase in climate change vulnerability might be anticipated.	N/A	0	0	0	-
Landscape	To conserve, protect and enhance landscape and townscape character and visual amenity.	0	-	0	0	Option overlaps two NCA(s) Northumberland Sandstone Hills (0.01%), Cheviot Fringe (0.01%) (with % proportion of NCA affected). Some negative effects during construction likely as excavation will be required for the new section of transfer pipeline, but reduced impact where using existing infrastructure. Construction adjacent to woodland could result in disturbance during construction. There will be minimal new above ground infrastructure and is therefore unlikely to change the landscape character of the area or affect visual amenity during operation.	Re-routing of the pipeline to minimise damage and disruption to woodland, 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.	0	-	0	0
Historic Environment	To conserve/protect and enhance historic environment and heritage assets, and their setting, including archaeologically important sites.	0	-	0	0	The option passes within 500m of Wooler Conservation Area, 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.	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.	0	-	0	0
Population and Human Health	To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	+	-	0	0	The pipeline is within 500m a playing fields and a bowling green. There is no direct land take from these areas. There is likely to be temporary disturbance to users of these sites and the local community during construction. This option may contribute to the local economy through employment opportunities during the construction phase. During operation, it is unlikely to contribute to the local economy. IMD deciles along the pipeline route vary from four to seven.	Best practice mitigation measures e.g. noise management to be implemented to minimise disturbance during construction. However, temporary effects are likely to still occur during construction.	+	-	0	0
	To secure resilient water supplies for the health and wellbeing of customers.	0	0	+	0	There are no shellfish waters or bathing waters within 500m of the option location. All potable water transfers have been treated and are isolated from contamination, therefore it is highly unlikely that this option would affect disease transmission during operation. Increased groundwater abstraction will improve water supply for human consumption.	N/A	0	0	+	0
	To increase access and connect customers to the natural environment, provide education or information resources for the public.	0	-	0	0	The proposed pipeline route does not cross any National Trail or National Cycle Network routes. There may be temporary disturbance on users of other public rights of way during the construction phase. No operational impacts anticipated.	Best practice mitigation measures e.g. noise and traffic management to be implemented to minimise effects during construction, however some temporary impacts will remain.	0	-	0	0

	Maintain and enhance tourism and recreation	0	-	0	0	The pipeline route is within 500m of a playing field and bowling green and habitat areas/woodland that could be used for recreation. Therefore there may be some temporary effects on recreation during the construction phase. No operational impacts anticipated.	Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction. However, temporary effects are likely to still occur during construction.	0	-	0	0
Material Assets	Minimise resource use and waste production	0	-	0	0	New infrastructure required for option which will use materials and generate waste and excavated material. Operation of option not anticipated to generate waste.	Seek opportunity to implement sustainable design measures (design to reduce footprint, selection of materials) and reuse excavated material to reduce the impact, however it is likely that negative effects will remain.	0	-	0	0
	Avoid negative effects on built assets and infrastructure	0	-	0	0	The option is within 500m of a major road. Potential for temporary disruption for users during construction, including increased pressure on the local traffic network from the increase in the volume of traffic due to deliveries of construction material. No operational impacts anticipated.	Best practice measures including a Traffic Management Plan to be implemented to minimise disturbance during construction. However, temporary effects are likely to still occur.	0	-	0	0

Assessment Cover Information	
WRE Option ID	BOT-TRA-001
Option Name	Warkworth WTW to Berwick Upon Tweed Transfer
Water company	Northumbrian Water
Option Description	This option proposes to transfer water from Warkworth WTW to Springhill Service Reservoir in Berwick upon Tweed (using mostly existing infrastructure), but a new pipeline is proposed with a total transfer length of approximately 56.7 km.
WRZ	Northumbrian Water

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Comment	Mitigation	Residual Construction Effects		Residual Operational Effects	
		+	-	+	-			+	-	+	-
	To protect designated sites and their qualifying features.	0	---	0	0	<p>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 there 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.</p> <p>River Coquet and Coquet Valley Woodlands SSSI (11.70% favorable, 88.30% Unfavourable-Recovering) transects the option with potential to directly impact the SSSI with disturbance effects during the construction phase.</p> <p>The option is entirely located within SSSI Impact Risk Zones.</p> <p>There are no MCZ within 500m of the option.</p> <p>The HRA ToLS identified 14 Natura 2000 sites that could be affected: Northumberland Marine SPA (~0.2 km); Lindisfarne Ramsar (~1.2 km); Northumberland Coast SPA (~1.2 km); Berwickshire & North Northumberland Coast SAC (~1.2 km); North Northumberland Dunes SAC (~1.2 km); Tweed Estuary SAC (~1.5 km); Lindisfarne SPA (~1.8 km); Northumbrian Coast Ramsar (~2.3 km); Newman Fen SAC (~2.4 km); River Tweed SAC (~2.4 km); Holburn Lake and Moss SPA (~2.9 km); Holburn Lake and Moss Ramsar (~2.9 km); Ford Moss SAC (~7.4 km); Farn islands SPA (~9.8 km). Potential LSE concluded for Northumberland Marine SPA due to hydrological links and the site's qualifying bird species, which could be disturbed by construction impacts from such as noise/light nuisance and pollution events resulting in physical and non-physical disturbances, toxic and non-toxic contamination and biological disturbances. LSE also concluded for Lindisfarne Ramsar and SPA, Northumberland Coast SPA, Berwickshire & North Northumberland Coast SAC, and North Northumberland Dunes SAC for the same reasons, this time resulting in toxic and non-toxic contamination and biological disturbances following construction phases. No effects from operation. No LSE for the remaining sites.</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.	0	-	0	0

Biodiversity, flora and fauna	To provide opportunities for habitat creation or restoration and deliver a net benefit / BNG.	0	--	0	0	<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 & 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>	0	-	0	0
	To avoid spreading and, where required, manage invasive and non-native species (INNS).	0	0	0	0	Physical transfer of treated water via pipeline between two locations assumed currently unconnected. INNS will be removed at source and the transfer is isolated from the wider environment therefore negligible risk of INNS transfer.	N/A	0	0	0	0
	To meet WFD objectives relating to biodiversity.	0	-	0	0	The WFD Phase 1 assessment results show there would be low risks for ecology during construction but no effects during operation.	Best practice construction methods and pollution prevention measures to be implemented. This includes the use of directional drilling or other trenchless techniques where the pipeline crosses watercourses. In the short term there is potential for effects. With mitigation, no effects are predicted as a result of construction.	0	0	0	0
Soil	To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	0	--	0	0	<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. 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. 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>	0	0	0	0
	To reduce or manage flood risk, taking climate change into account.	0	-	0	0	The majority of the option is within Flood Zone 1, however the option does pass through Flood Zones 2 and 3 and flood defences, and may have an impact on construction. Impacts on operation unlikely given the pipeline is buried. The pipeline is unlikely to increase the risk of flooding.	<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. FRA to be undertaken and above ground infrastructure to be designed to be flood resilient. Floodplain compensation may be required.</p>	0	-	0	0

Water	To enhance or maintain surface water quality, flows and quantity.	0	-	0	0	The transfer pipeline crosses watercourses therefore has potential for impacts on water quality during the construction phase. No effects are anticipated during operation.	Best practice construction methods and pollution prevention measures to be implemented. This includes the use of directional drilling or other trenchless techniques where the pipeline crosses watercourses. With mitigation, no effects are predicted as a result of construction.	0	0	0	0
	To enhance or maintain groundwater quality and resources.	0	-	0	0	The option is located within 500m of one groundwater SPZs with potential for impacts on water quality during the construction phase.	Best practice construction methods and pollution prevention measures to be implemented. With mitigation, no effects are predicted as a result of construction.	0	0	0	0
	To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	0	-	0	-	The WFD Phase 1 assessment determined that the option would have a medium level of effect on one or more waterbodies during the construction phase via and effects during operation. Risks are via discharges (construction only) and below ground (construction and operational) from below ground structures.	Assessment to be undertaken to determine risks for constructional phase, with operational phase requiring drainage and discharges into local watercourse to maintain flow. Best practice construction methods and pollution prevention measures to be implemented. With further assessment and mitigation, no effects are predicted as a result of construction or operational phase.	0	0	0	0
	To increase water efficiency and increase resilience of water supplies and natural systems to droughts.	0	0	+	0	The option will transfer water from an area of surplus to one of deficit and does not require further abstraction therefore supports resilience of water supplies during potential future drought scenarios.	N/A	0	0	+	0
Air	To reduce and minimise air emissions during construction and operation.	0	-	0	0	The option is not within an AQMA nor are there any within 2km. Construction likely to have a temporary impact on air quality.	Best practice mitigation measures to be implemented during construction, however short term air quality effects may remain.	0	-	0	0
Climatic Factors	To minimise/reduce embodied and operational carbon emissions	0	-	0	-	Effects during construction of the option due to resource use and emissions, and effects during the operational phase as the option requires a pumping station.	Investigate use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon. Carbon footprint study could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy will be available. Although carbon emissions could be reduced through mitigation, negative effects in the short and medium term will likely remain.	0	-	0	-
	To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	0	0	0	0	Water levels not predicted to be significantly affected therefore unlikely to affect resilience of the local environment to climate change.	N/A	0	0	0	0

Landscape	To conserve, protect and enhance landscape and townscape character and visual amenity.	0	--	0	0	<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>	0	-	0	0
Historic Environment	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.	0	--	0	0	<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. 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>	0	-	0	0
Population and Human Health	To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	+	-	0	0	<p>The pipeline is within 500m of seven greenspaces, two churches/places of worship, one public park, two primary school, one secondary schools and one services area. There is no direct land take from these areas. There is likely to be temporary disturbance to users of these sites and the local community during construction.</p> <p>This option may contribute to the local economy through employment opportunities during the construction phase. During operation, it is unlikely to contribute to the local economy.</p> <p>IMD deciles along the pipeline route vary from three to ten.</p>	<p>Best practice mitigation measures e.g. noise management to be implemented to minimise disturbance during construction. However, temporary effects are likely to still occur during construction.</p>	+	-	0	0
	To secure resilient water supplies for the health and wellbeing of customers.	0	0	0	0	<p>There are no shellfish waters or bathing waters within 500m of the option location. The movement of water from one point to another increases the risks of disease transmission. All potable water transfers have been treated and are isolated from contamination, therefore it is highly unlikely that this option would affect disease transmission during operation.</p>	N/A	0	0	0	0
	To increase access and connect customers to the natural environment, provide education or information resources for the public.	0	-	0	0	<p>The proposed pipeline route will cross one National Cycle Network routes. There may be temporary disturbance on users of these, as well as other walking and cycling routes, and other public rights of way during the construction phase.</p>	<p>Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction. Temporary diversions of cycle route required to mitigate disruption during works. There could be potential to enhance the cycleways as part of the works (e.g. during re-instatement).</p>	0	0	+	0

	Maintain and enhance tourism and recreation	0	-	0	0	The pipeline route crosses open spaces, watercourses and habitat areas/woodland that could be used for recreation and is within 500m of playing fields, religious grounds, public parks and gardens. Therefore there may be some temporary effects on recreation, angling and other water based activities during the construction phase.	Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction. Direct land take of recreational sites to be avoided where possible and land to be reinstated. However, temporary effects are likely to still occur during construction.	0	-	0	0
Material Assets	Minimise resource use and waste production	0	-	0	0	New infrastructure required for option which will use materials and generate waste and excavated material.	Seek opportunity to implement sustainable design measures (design to reduce footprint, selection of materials) and reuse excavated material to reduce the impact, however it is likely that negative effects will remain.	0	-	0	0
	Avoid negative effects on built assets and infrastructure	0	--	0	0	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. 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.	Best practice measures including a Traffic Management Plan to be implemented to minimise disturbance during construction. However, temporary effects are likely to still occur.	0	-	0	0

Assessment Cover Information	
WRE Option ID	BOT-TRA-002
Option Name	Warkworth Network to Berwick upon Tweed Transfer
Water company	Northumbrian Water
Option Description	Transfer from Hedgeley Service Reservoir to New Scots Quarry Service Reservoir, with a chemical dosing kiosk located at Hedgeley SR. Transfer length approximately 13.7 km.
WRZ	Northumbrian Water

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Comment	Mitigation	Residual Construction Effects		Residual Operational Effects	
		+	-	+	-			+	-	+	-
	To protect designated sites and their qualifying features.	0	---	0	--	<p>Tweed Catchment Rivers - England: Till Catchment SSSI (18% unfavourable - recovering, 75% unfavourable - no change, 7% unfavourable - declining) is directly affected by the option and direct impacts are likely. Bewick and Beanley Moors SSSI (2% favourable, 88% unfavourable - recovering, 10% unfavourable - no change) and River Coquet and Coquet Valley Woodlands SSSI (12% favourable, 88% unfavourable - recovering) are within 500m of the option. No direct effects but there may be disturbance effects during the construction phase.</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 12 Natura 2000 sites that could be affected: River Tweed SAC (~0 km); Northumberland Marine SPA (~0.6 km); North Northumberland Dunes SAC (~2.2 km); Northumbrian Coast Ramsar (~2.2 km); Ford Moss SAC (~2.1 km); Tweed Estuary SAC (~3 km); Lindisfarne Ramsar (~4.8 km); Northumberland Coast SPA (~4.8 km); Berwickshire & North Northumberland Coast SAC (~4.8 km); Lindisfarne SPA (~5.1 km); Holburn Lake and Moss SPA and Ramsar (~9.7 km). 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.</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 operational effects are lessened although this would not negate the need for a potential appropriate assessment.</p>	0	-	0	-

Biodiversity, flora and fauna	To provide opportunities for habitat creation or restoration and deliver a net benefit / BNG.	0	---	0	0	<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 & 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>	0	--	0	0
	To avoid spreading and, where required, manage invasive and non-native species (INNS).	0	0	0	0	<p>Risk of INNS very low. Physical transfer of treated water between two locations assumed currently unconnected. Water will be treated to potable standard (assumed free of INNS) and transferred within a closed system, therefore there is considered to be a negligible INNS risk.</p>	N/A	0	0	0	0
	To meet WFD objectives relating to biodiversity.	0	-	0	-	<p>The WFD Phase 1 assessment results show there would be medium risks for ecology during construction and operation due to required drainage and proximity of works to groundwater sensitive site.</p>	<p>Best practice construction methods and pollution prevention measures to be implemented. This includes the use of directional drilling or other trenchless techniques where the pipeline crosses watercourses. In the short term there is potential for effects. Mitigation to protect watercourses and GWDTE include treatment of dewatering discharge before releasing into local watercourses to maintain flow. With mitigation, no effects are predicted as a result of construction, however some impacts may remain for operation.</p>	0	0	0	-
Soil	To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	0	--	0	0	<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. 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>	0	0	0	0

Water	To reduce or manage flood risk, taking climate change into account.	0	-	0	0	The majority of the option is within Flood Zone 1, however the option does pass through Flood Zones 2 and 3 and flood defences, and may have an impact on construction. Impacts on operation unlikely given the pipeline is buried. The pipeline is unlikely to increase the risk of flooding.	Measures to reduce the impact on flooding during the construction phase. Flood risk during construction may still occur so short term flood risk effects may remain. FRA to be undertaken and above ground infrastructure to be designed to be flood resilient. Floodplain compensation may be required.	0	-	0	0
	To enhance or maintain surface water quality, flows and quantity.	0	-	0	0	The transfer pipeline crosses watercourses therefore potential for impacts on water quality during the construction phase. No effects are anticipated during operation.	Best practice construction methods and pollution prevention measures to be implemented. This includes the use of directional drilling or other trenchless techniques where the pipeline crosses watercourses. With mitigation, no effects are predicted as a result of construction.	0	0	0	0
	To enhance or maintain groundwater quality and resources.	0	-	0	0	The option intersects source protection zones 1 and 3 with potential for impacts on water quality during the construction phase.	Best practice construction methods and pollution prevention measures to be implemented. With mitigation, no effects are predicted as a result of construction.	0	0	0	0
	To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	0	-	0	-	The WFD Phase 1 assessment determined that the option would have a medium level of effect on one or more waterbodies during the construction and operational phases.	Best practice construction methods and pollution prevention measures to be implemented. With mitigation, no effects are predicted as a result of construction, however some impacts may remain for operation.	0	0	0	-
	To increase water efficiency and increase resilience of water supplies and natural systems to droughts.	0	0	+	0	The option will transfer water from an area of surplus to one of deficit and does not require further abstraction therefore supports resilience of water supplies during potential future drought scenarios.	N/A	0	0	+	0
Air	To reduce and minimise air emissions during construction and operation.	0	-	0	0	The option is not within an AQMA nor are there any within 2km. Construction likely to have a temporary impact on air quality.	Best practice mitigation measures to be implemented during construction, however short term air quality effects may remain.	0	-	0	0
Climatic Factors	To minimise/reduce embodied and operational carbon emissions	0	-	0	-	Effects during construction of the option due to resource use and emissions, and effects during the operational phase as the option requires a pumping station.	Investigate use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon. Carbon footprint study could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy will be available. Although carbon emissions could be reduced through mitigation, negative effects in the short and medium term will likely remain.	0	-	0	-

	To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	0	0	0	0	Water levels not predicted to be significantly affected therefore unlikely to affect resilience of the local environment to climate change.	N/A	0	0	0	0
Landscape	To conserve, protect and enhance landscape and townscape character and visual amenity.	0	--	0	0	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. There will be minimal new above ground infrastructure. The pumping station is a relatively small-scale structure and is therefore unlikely to change the landscape character of the area or affect visual amenity during operation.	Re-routing of the pipeline to minimise damage and disruption to woodland, 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.	0	-	0	0
Historic Environment	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.	0	--	0	0	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.	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.	0	-	0	0
Population and Human Health	To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	+	-	0	0	The pipeline is within 500m of playing fields, sports and leisure facilities, an airfield, one secondary school, religious grounds, allotments, public parks and gardens. There is no direct land take from these areas. There is likely to be temporary disturbance to users of these sites and the local community during construction. This option may contribute to the local economy through employment opportunities during the construction phase. During operation, it is unlikely to contribute to the local economy. IMD deciles along the pipeline route vary from 3 to 9.	Best practice mitigation measures e.g. noise management to be implemented to minimise disturbance during construction. However, temporary effects are likely to still occur during construction.	+	-	0	0
	To secure resilient water supplies for the health and wellbeing of customers.	0	0	0	0	There are no shellfish waters or bathing waters within 500m of the option location. The movement of water from one point to another increases the risks of disease transmission. All potable water transfers have been treated and are isolated from contamination, therefore it is highly unlikely that this option would affect disease transmission during operation.	N/A	0	0	0	0

	To increase access and connect customers to the natural environment, provide education or information resources for the public.	0	-	0	0	The proposed pipeline route will cross one National Cycle Network routes. There may be temporary disturbance on users of these, as well as other walking and cycling routes, and other public rights of way during the construction phase.	Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction. There could be potential to enhance the cycleways as part of the works (e.g. during re-instatement).	0	0	+	0
	Maintain and enhance tourism and recreation	0	-	0	0	The pipeline route crosses open spaces, watercourses and habitat areas/woodland that could be used for recreation and is within 500m of playing fields, religious grounds, public parks and gardens and allotments. Therefore there may be some temporary effects on recreation, angling and other water based activities during the construction phase.	Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction. Direct land take of recreational sites to be avoided where possible and land to be reinstated. However, temporary effects are likely to still occur during construction.	0	-	0	0
Material Assets	Minimise resource use and waste production	0	-	0	0	New infrastructure required for option which will use materials and generate waste and excavated material.	Seek opportunity to implement sustainable design measures (design to reduce footprint, selection of materials) and reuse excavated material to reduce the impact, however it is likely that negative effects will remain.	0	-	0	0
	Avoid negative effects on built assets and infrastructure	0	--	0	0	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.	Best practice measures including a Traffic Management Plan to be implemented to minimise disturbance during construction. However, temporary effects are likely to still occur.	0	-	0	0

Assessment Cover Information	
WRE Option ID	BOT-TRA-004
Option Name	Watchlaw to Murton transfer
Water company	Northumbria
Option Description	Upgrade / reinforcement of Wooler > Ford > Haggerston > Springhill to allow transfer for additional water from Wooler to Berwick upon Tweed.
WRZ	Berwick-upon-Tweed

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Comment	Mitigation	Residual Construction Effects		Residual Operational Effects	
		+	-	+	-			+	-	+	-
Biodiversity, flora and fauna	To protect designated sites and their qualifying features.	0	--	0	0	<p>Tweed Catchment Rivers - England: Till Catchment SSSI (18% unfavourable - recovering, 75% unfavourable - no change, 7% unfavourable - declining) is directly affected by the option and direct impacts are likely.</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 ten Natura 2000 sites that could be affected, River Tweed SAC (approx. 0.05km) Ford Moss SAC (UK0030151) (approx. 2.1 km), Tweed Estuary SAC (UK0030292) (approx. 3.5 km), Lindisfarne Ramsar (UK11036) (approx. 4.8 km) Northumberland Coast SPA (UK9006131) (approx. 4.8 km), Northumbrian Coast Ramsar (UK11049) (approx. 4.8 km), Berwickshire & North Northumberland Coast SAC (UK0017072) (approx. 4.8 km), North Northumberland Dunes SAC (UK0017097) (approx. 4.8 km), Northumberland Marine SPA (UK9020325) (approx. 4.8 km) and Lindisfarne SPA UK9006011 (approx. 5.1 km). 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>	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.	0	-	0	0
	To provide opportunities for habitat creation or restoration and deliver a net benefit / BNG.	0	--	0	0	<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 are no Groundwater Dependent Terrestrial Ecosystem (GWDTE) within 500m 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 -9.77%. Note: Ancient Woodland has been excluded from calculations as this habitat is classed as irreplaceable once lost.</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.	0	-	0	0

	To avoid spreading and, where required, manage invasive and non-native species (INNS).	0	0	0	0	Risk of INNS very low. Transfer of treated water between two WTWs via an existing pipeline. Negligible INNS risk as treated water will be free from INNS and the transfer is isolated from the wider environment.	N/A	0	0	0	0
	To meet WFD objectives relating to biodiversity.	0	-	0	0	The WFD Phase 1 assessment results show there would be low risks for ecology during construction only, due to trenching and laying of pipe lines involving watercourse crossings.	Best practice construction methods and pollution prevention measures to be implemented. This includes the use of directional drilling or other trenchless techniques where the pipeline crosses watercourses, bedding material for pipelines will be constructed such that they do not form preferential pathways for groundwater flow, appropriate measures will be in place to protect ecology and watercourse will be returned back to its natural state. With mitigation, no effects are predicted as a result of construction.	0	0	0	0
Soil	To protect and enhance the functionality and quality of soils, including the protection of high-grade agricultural land, and geodiversity.	0	--	0	0	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.	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.	0	0	0	0
	To reduce or manage flood risk, taking climate change into account.	0	-	0	0	The majority of the option is within Flood Zone 1, however the option does pass through Flood Zones 2 and 3 and flood defences, and may have an impact on construction. Impacts on operation unlikely given the pipeline is buried. The pipeline is unlikely to increase the risk of flooding.	Measures to reduce the impact on flooding during the construction phase. Flood risk during construction may still occur so short term flood risk effects may remain. FRA to be undertaken and above ground infrastructure to be designed to be flood resilient. Floodplain compensation may be required.	0	-	0	0
	To enhance or maintain surface water quality, flows and quantity.	0	-	0	0	The transfer pipeline crosses watercourses therefore potential for impacts on water quality during the construction phase. No effects are anticipated during operation.	Best practice construction methods and pollution prevention measures to be implemented. This includes the use of directional drilling or other trenchless techniques where the pipeline crosses watercourses. With mitigation, no effects are predicted as a result of construction.	0	0	0	0
Water	To enhance or maintain groundwater quality and resources.	0	-	0	0	The option intersects source protection zones 3 with potential for impacts on water quality during the construction phase.	Best practice construction methods and pollution prevention measures to be implemented. With mitigation, no effects are predicted as a result of construction.	0	0	0	0

	To meet WFD objectives and support the achievement of environmental objectives set out in River Basin Management Plans.	0	-	0	-	The WFD Phase 1 assessment determined that the option would have a medium level of effect on one or more waterbodies during the construction and operational phases on sensitive below ground features.	Best practice construction methods and pollution prevention measures to be implemented. With further assessment and mitigation, no effects are predicted as a result of construction or operational phase.	0	0	0	0
	To increase water efficiency and increase resilience of water supplies and natural systems to droughts.	0	0	+	0	The option will transfer water from an area of surplus to one of deficit and does not require further abstraction therefore supports resilience of water supplies during potential future drought scenarios.	N/A	0	0	+	0
Air	To reduce and minimise air emissions during construction and operation.	0	-	0	0	The option is not within an AQMA nor are there any within 2km. Construction likely to have a temporary impact on air quality.	Best practice mitigation measures to be implemented during construction, however short term air quality effects may remain.	0	-	0	0
Climatic Factors	To minimise/reduce embodied and operational carbon emissions	0	-	0	-	Effects during construction of the option due to resource use and emissions, and effects during the operational phase as the option requires a pumping station.	Investigate use of renewables during construction and operation for energy supply and use of materials with lower embodied carbon. Carbon footprint study could help identify areas for carbon savings or alternative materials. As the electricity grid is decarbonised, greener energy will be available. Although carbon emissions could be reduced through mitigation, negative effects in the short and medium term will likely remain.	0	-	0	-
	To introduce climate mitigation where required and improve the climate resilience of assets and natural systems.	0	0	0	0	Water levels not predicted to be significantly affected therefore unlikely to affect resilience of the local environment to climate change.	N/A	0	0	0	0
Landscape	To conserve, protect and enhance landscape and townscape character and visual amenity.	0	--	0	0	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.	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.	0	-	0	0

Historic Environment	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.	0	--	0	0	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.	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.	0	-	0	0
Population and Human Health	To maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing.	+	-	0	0	The pipeline is within 500m of playing fields, an airfield and religious grounds/buildings. There is no direct land take from these areas. There is likely to be temporary disturbance to users of these sites and the local community during construction. This option may contribute to the local economy through employment opportunities during the construction phase. During operation, it is unlikely to contribute to the local economy. IMD deciles along the pipeline route vary from 3,4 & 9.	Best practice mitigation measures e.g. noise management to be implemented to minimise disturbance during construction. However, temporary effects are likely to still occur during construction.	+	-	0	0
	To secure resilient water supplies for the health and wellbeing of customers.	0	0	0	0	There are no shellfish waters or bathing waters within 500m of the option location. The movement of water from one point to another increases the risks of disease transmission. All potable water transfers have been treated and are isolated from contamination, therefore it is highly unlikely that this option would affect disease transmission during operation.	N/A	0	0	0	0
	To increase access and connect customers to the natural environment, provide education or information resources for the public.	0	-	0	0	The proposed pipeline route will cross one National Cycle Network routes. There may be temporary disturbance on users of these, as well as other walking and cycling routes, and other public rights of way during the construction phase.	Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction. There could be potential to enhance the cycleways as part of the works (e.g. during re-instatement).	0	0	+	0
	Maintain and enhance tourism and recreation	0	-	0	0	The pipeline route crosses open spaces, watercourses and habitat areas/woodland that could be used for recreation and is within 500m of playing fields and religious grounds. Therefore there may be some temporary effects on recreation, angling and other water based activities during the construction phase.	Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction. Direct land take of recreational sites to be avoided where possible and land to be reinstated. However, temporary effects are likely to still occur during construction.	0	-	0	0
	Minimise resource use and waste production	0	-	0	0	New infrastructure required for option which will use materials and generate waste and excavated material.	Seek opportunity to implement sustainable design measures (design to reduce footprint, selection of materials) and reuse excavated material to reduce the impact, however it is likely that negative effects will remain.	0	-	0	0

<p>Material Assets</p>	<p>Avoid negative effects on built assets and infrastructure</p>	<p>0</p>	<p>--</p>	<p>0</p>	<p>0</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>	<p>0</p>	<p>-</p>	<p>0</p>	<p>0</p>
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