MOTT MACDONALD

Affinity Water Drought Plan

Strategic Environmental Assessment Environmental Report Appendix G - Drought Permit Assessment Matrices

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Affinity Water Drought Plan

Strategic Environmental Assessment Environmental Report Appendix G - Drought Permit Assessment Matrices

June 2022

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Contents

G. Drought Permit Assessment Matrices

Assessment Cover Information	
Option Name	AMER
Water company	Affinity Water
Option Description	AMER pumping station is located in the River Misbourne catchment. Under the terms of the drought permit, Affinity Water would seek to increase abstraction at the site by 8 Ml/d. The proposed uplift is the same both before and after the planned 2024 sustainability reduction at the site. This permit option has not changed from our previous drought plan.

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Comment	Mitigation	Residual Construction Effects		Residual Operational Effects	
		+	-	+	-			+	-	+	-
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	0	0	0	--	Modelling was used to inform the EARs which has been used to inform the SEA. The model has a more complex representation of the Chalk aquifer than previous models, however there are problems with the calibration of flows, in particular low flows, which are generally underestimated by the model. It should be noted that for this reason, the results presented in the EARs and the SEA are generally highly conservative and/or uncertain and would represent the worst-case scenario rather than the expected outcome. The AMER EAR (2022) identified the potential for minor effects on Sarratt Bottom SSSI (100.00% unfavourable - no change) and Frogmore Meadows SSSI (100.00% unfavourable - recovering), both of which are GWDTE and located over 5km from the option on the River Chess. The operation of AMER has the potential to result additional drawdown within these SSSIs and as such could result in a reduction in the quality or extent of the habitat. However, the additional drawdown will occur a few months after the end of the drought permit when wetter weather conditions may have resumed. The option is within a SSSI IRZ. Denham Country Park LNR is located approximately 13km downstream of the option on the River Misbourne and the AMER EAR (2022) identifies potential for minor (uncertain) effects as flows would be reduced during drought permit implementation and during a potentially extended recovery period. The HRA Stage 1 Screening (Ricardo, 2022) identified no designated sites within 2000m of the drought permit location. The Chilterns Beechwoods SAC is approximately 6.6km south-west of potentially effected reaches. As no construction is required as part of the drought permit and the qualifying features of the SAC are not water dependent, no impact pathways have been identified during operation. Therefore, no likely significant effects are anticipated alone as a result of AMER drought permit implementation. There is deciduous woodland priority habitat within 500m as well as ancient woodland, however no direct effects anticipated. Increased abstraction has the potential to result in major (but uncertain) impacts upon chalk river priority habitat. Negligible to moderate (uncertain) effects also identified for other NERC habitats including Wet Woodland; Ponds; Lowland Fen; and River Misbourne Local Key Area. Impacts to species expected from natural drought conditions have the potential to be exacerbated by abstraction. The AMER EAR assessment concluded that in the River Misbourne (Reach 1 and Reach 2), there is potential for major (uncertain) or moderate impacts on brown trout, European eel, European water vole, bullhead, and WFD fish, macroinvertebrate and macrophyte communities. The potential for minor or negligible impacts on some of these species are predicted for the River Chess (Reach 1). The AMER EAR also identified negligible to minor (uncertain) effects on European otter; Common toad; Great crested newt; Common frog; Smooth newt; Palmate newt; Daubenton's bat; Soprano pipistrelle bat; European polecat; Himalayan Balsam; and American Mink. These conclusions are made on a precautionary basis given the uncertainty surrounding the groundwater modelling results which are considered highly conservative. The EAR identified the potential for minor (but uncertain) effects on Himalayan Balsam INNS. The implementation of this drought option may increase the spread of these INNS as a result of increase in favourable habitat condition, for example, through an increase in exposed riparian area/river banks.	Precautionary monitoring and mitigation measures have been proposed for agreement with the EA. Mitigation measures will be feature, location, species and community specific, and will be targeted only to those impacts that arise specifically as a result of drought permit implementation (as opposed to those arising due to environmental drought pressures). An Environmental Monitoring Plan (EMP) has been prepared as part of the EAR which sets out mitigation and monitoring on a precautionary basis prior to implementation of the drought permit to establish the prevailing baseline conditions, as well as the monitoring to be carried out during implementation (particularly to inform and trigger any potential mitigation measures) and post-implementation.	0	0	0	-
Soil	Protect and enhance the functionality, quantity and quality of soils	0	0	0	0	The option is within urban land. No new infrastructure required therefore neutral effect.	N/A	0	0	0	0
Water	Increase resilience and reduce flood risk	0	0	0	-	The option is within Flood Zone 2 and is at high risk of surface water flooding. There is no new infrastructure, however existing asset may be vulnerable to flooding.	Implement measures to reduce flood risk, however likely that residual flood risk will remain therefore minor effects identified.	0	0	0	-
	Protect and enhance the quality of the water environment and water resources	0	0	0	---	Modelling was used to inform the EARs which has been used to inform the SEA. The model has a more complex representation of the Chalk aquifer than previous models, however there are problems with the calibration of flows, in particular low flows, which are generally underestimated by the model. It should be noted that for this reason, the results presented in the EARs and the SEA are generally highly conservative and/or uncertain and would represent the worst-case scenario rather than the expected outcome. Reduced flows are possible as a result of the option. Water quality impacts may occur as a result of low flows, however impacts associated with the option are likely to be less than what would occur with natural drought. Modelling shows drought abstraction will lengthen drying reaches and time frame assuming constant use so should represent a worst case. Peak-use targeted and this should limit additional drying (although potential for prolonged use of up to 6 months). The AMER EAR (2022) assessment concluded, on a precautionary basis due to the model calibration, the following impacts on Hydrogeology/ Hydrology river reaches within the identified study area: Misbourne Reach 1 (River Misbourne above the inflow to the lake in Chalfont Park) – potential major and temporary impacts due to the potential for the additional abstraction to extend the period of drying; Misbourne Reach 2 (River Misbourne below the inflow to the lake in Chalfont Park to the confluence with the River Colne) – major and temporary impacts due to potential reduction in flows and/or potential increased lengths of dry river-bed; and Chess Reach 1 (River Chess from source to confluence with River Colne) – minor and temporary impacts due to potential reduction in flows. The AMER EAR (2022) assessment concluded the following effects on water quality: minor within the River Misbourne Reach 1, minor to major in the River Misbourne Reach 2, and minor to major in the River Chess Reach 1. However, as noted, these impacts are provided as a worst case scenario as a result of the modelling. Option is within SPZ 1, however the option will not result in any effects to the SPZ. The option is not within a NVZ.	Demand management will be enhanced alongside the drought permit to reduce the volume required for abstraction. Mitigation will be focussed on specific ecological impacts associated with flow reductions arising from the implementation of the drought permit. Water quality and river flows/groundwater level monitoring will be taken throughout, including baseline monitoring, during the onset of the drought, during the drought permit implementation, and finally post drought.	0	0	0	--
	Deliver reliable and resilient water supplies	0	0	+	0	Drought permit option will allow for the delivery of water supplies during drought periods. Positive effect identified, however it is not a long-term solution.	N/A	0	0	+	0
Air	Reduce and minimise air emissions	0	0	0	0	The option is over 500m from an AQMA. No new infrastructure required therefore neutral effect.	N/A	0	0	0	0
Climatic Factors	Reduce embodied and operational carbon emissions	0	0	0	-	No carbon data available. There is no new infrastructure associated with the option therefore no construction related emissions are identified. However, carbon may be generated during the operational phase from increased abstraction and processing and a minor negative effect is therefore identified.	Investigate use of renewables during operation for energy supply. As the electricity grid is decarbonised, greener energy will be available.	0	0	0	-
	Reduce vulnerability to climate change risks and hazards	0	0	0	-	The option will reduce resillience of the environment by abstracting water during a drought period. The option is located within an area classed as having priority habitat which is of high vulnerability to climate change.	Monitor river levels and implement appropriate mitigation as required during a drought period.	0	0	0	-
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	0	0	0	0	Option within the Chilterns national landscape character areas and within 200m of Chilterns AONB. No direct impacts but there is potential for negative effects on visual amenity and landscape character resulting from increased abstraction during a period of drought. However, this is considered negligible in the context of being in a drought situation which will cause natural effects on the landscape.	N/A	0	0	0	0
Historic Environment	Conserve, protect and enhance the historic environment, including archaeology	0	0	0	0	The option within 500m numerous listed buildings. The AMER EAR also considers additional heritage features including: Moated site in Chalkdell Wood, 100m north westnorthwest of Frith Hill House Scheduled Monument; The Castle Scheduled Monument; and Castle Tower Scheduled Monument; Missenden Abbey Registered Park and Garden; Shardeloes Registered Parks and Garden; Milton's Cottage Registered Park and Garden; and Denham Place Registered Park and Garden. The EAR identifies that none of these assets are likely to be impacted over the duration of the drought options implementation and therefore are classed as not sensitive. Neutral effects are therefore identified, however it is recognised that there are potential for effects if there are other water / drought sensitive assets, such as preserved organic and palaeoenvironmental remains, or known or unrecorded and deeply buried archaeology, are present. It should also be noted that drought permits will be implemented in severe drought conditions and the additional impact of the drought permits on these assets is not likely to be significant. However, this is unknown at this stage and further assessment may be required at a more detailed stage.	Further baseline collection and assessment will be required at a more detailed stage to explore the hydrological influence around the drought permits in relation to these types of assets. Implement appropriate mitigation if required. Consult with Historic England.	0	0	0	0
Population and Human Health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	0	0	0	0	There is no new infrastructure required for the option therefore there is not likely to be any impacts on the local community.	N/A	0	0	0	0
	Maintain and enhance tourism and recreation	0	0	0	0	Drought permit option could affect recreation, angling and other water based activities. However, the AMER EAR (2022) identifies negligible effects on recreation therefore neutral effects are identified. Residents are aware of low flows and drought will worsen flow naturally.	N/A	0	0	0	0
Material Assets	Minimise resource use and waste production	0	0	0	0	There is no new infrastructure required for the option therefore unlikely to have effect on waste production or resource use.	N/A	0	0	0	0
	Avoid negative effects on built assets and infrastructure	0	0	0	0	There is no new infrastructure require for the option therefore unlikely to have effects on built assets and infrastructure.	N/A	0	0	0	0

Assessment Cover Information	
Option Name	FULL
Water company	Affinity Water
Option Description	FULL is located in the River Mimram catchment, just north of Welwyn. Affinity Water would seek an increase in abstraction from the source to 6 Ml/d and disaggregation with the Digswell source. This would result in a 9 Ml/d increase in abstraction from the Mimram catchment for public water supply. As a potential mitigation option, Affinity Water propose that up to 3 Ml/d could be discharged to the Mimram as river support whilst the permit is in effect, if the full drought permit volume is not required for supply. By monitoring the catchment during droughts, Affinity Water know that this is likely to provide water to reaches that would otherwise be naturally dry.

SEA Topic	SEA Objective	Construction Effects +	Construction Effects -	Operational Effects +	Operational Effects -	Comment	Mitigation	Residual Construction Effects +	Residual Construction Effects -	Residual Operational Effects +	Residual Operational Effects -
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	0	0	0	--	Modelling was used to inform the EARs which has been used to inform the SEA. The model has a more complex representation of the Chalk aquifer than previous models, however there are problems with the calibration of flows, in particular low flows, which are generally underestimated by the model. It should be noted that for this reason, the results presented in the EARs and the SEA are generally highly conservative and/or uncertain and would represent the worst-case scenario rather than the expected outcome. The FULL EAR (2022) identified potential moderate impacts on Tewinbury SSSI (50.98% Unfavourable recovering, 49.02% unfavourable declining) which is a GWDTE and located on the River Mimram approximately 4km downstream. The abstraction of groundwater water (around 8cm drawdown predicted) could result in a reduction in the quality or extent of the habitat within the SSSI given the relatively high groundwater table, particularly for the wetland habitats. The reduction in water may result in the influx of opportunistic terrestrial grass species as the site may undergo succession should recharge rates not be sufficient. However, the impacts to the site will be temporary in nature. Negligible effects are identified for Rye Meads SSSI and Amwell Quarry SSSI in the FULL EAR (2022). The option is within a SSSI IRZ. No direct encroachment on LNRs, however, Danesbury Park LNR and Singlers Marsh LNR are both adjacent to the River Mimram and the option. The FULL EAR identified the potential for negligible effects on Danesbury Park LNR. Moderate (uncertain) effects were identified in the EAR on Singlers Marsh LNR due to the hydrological impacts within Mimram Reach 2 and therefore could result in impacts on habitat and supported species. It should be noted that the site would be dry at the time of permit application, and is known to recover rapidly when abstraction at the drought permit site is ceased. FULL is over 10km from the Lee Valley SPA and Ramsar site, however it was screened into the HRA Stage 1 (Ricardo, 2022) due to potential hydrological connectivity. However, based on groundwater modelling results the implementation of the FULL drought permit will result in a maximum additional drawdown of 0.01cm alone. Therefore, no likely significant effects are anticipated on the qualifying features of the Lee Valley SPA and Ramsar site. Increased abstraction has the potential to have impacts upon chalk river priority habitat where the FULL EAR identified the potential for minor to major (uncertain effects). Negligible to minor (but uncertain) effects identified on Coastal and floodplain grazing marsh, Wet woodland, Ponds, Lowland fens, and Reedbeds. There are areas of priority habitat directly surrounding the abstraction point including deciduous woodland and coastal and floodplain grazing marsh within 400m. Impacts to species expected from natural drought conditions may be exacerbated by abstraction. These effects are considered to be minor compared to natural drought conditions as abstraction targets peak demand periods (although potential for prolonged use up to 6 month which is the drought permit duration). There is not anticipated to be effects on Ancient Woodland. The FULL EAR also concluded that the drought permit implementation has the potential result in minor to major (but uncertain) impacts on brook lamprey, brown trout, bullhead, grayling, WFD fish, macroinvertebrate and macrophyte communities. The EAR also identified negligible to major (but uncertain) effects on Great crested newt, Common toad, Soprano pipistrelle bat, Norfolk hawker dragonfly, Mud pond snail and Fine-lined pea mussel. These conclusions are made on a precautionary basis given the uncertainty surrounding the groundwater modelling results which are considered highly conservative. The EAR identified the potential for minor (but uncertain) effects on Himalayan Balsam INNS. The implementation of this drought option may increase the spread of these INNS as a result of increase in favourable habitat condition, for example, through an increase in exposed riparian area/river banks.	Precautionary monitoring and mitigation measures have been proposed for agreement with the EA. Mitigation measures will be feature, location, species and community specific, and will be targeted only to those impacts that arise specifically as a result of drought permit implementation (as opposed to those arising due to environmental drought pressures). An Environmental Monitoring Plan (EMP) has been prepared as part of the EAR which sets out monitoring on a precautionary basis prior to implementation of the drought permit to establish the prevailing baseline conditions, as well as the monitoring to be carried out during implementation (particularly to inform and trigger any potential mitigation measures) and post-implementation. As a potential mitigation option, Affinity Water propose that up to 3 Ml/d could be discharged to the Mimram as river support whilst the permit is in effect, if the full drought permit volume is not required for supply. By monitoring the catchment during droughts, Affinity Water know that this is likely to provide water to reaches that would otherwise be naturally dry.	0	0	0	-
Soil	Protect and enhance the functionality, quantity and quality of soils	0	0	0	0	The option is within urban land. No new infrastructure required therefore neutral effect.	N/A	0	0	0	0
Water	Increase resilience and reduce flood risk	0	0	0	-	The option is within Flood Zone 2 and is at high risk of surface water flooding. There is no new infrastructure, however existing asset may be vulnerable to flooding.	Implement measures to reduce flood risk, however likely that residual flood risk will remain therefore minor effects identified.	0	0	0	-
	Protect and enhance the quality of the water environment and water resources	0	0	0	---	Modelling was used to inform the EARs which has been used to inform the SEA. The model has a more complex representation of the Chalk aquifer than previous models, however there are problems with the calibration of flows, in particular low flows, which are generally underestimated by the model. It should be noted that for this reason, the results presented in the EARs and the SEA are generally highly conservative and/or uncertain and would represent the worst-case scenario rather than the expected outcome. Reduced flows are possible as a result of the option. Water quality impacts may occur as a result of low flows, however impacts associated with the option are likely to be less than what would occur with natural drought. The FULL EAR (2022) concluded, on a precautionary basis due to the model calibration, the following potential impacts on hydrogeology/hydrology in the river reaches within the identified study area: Mimram Reach 1 (River Mimram from Nine Wells to Kimpton Mill) – up to moderate and temporary impacts (but certain) due to the potential for the additional abstraction to extend the period of drying and potential reduction in flows; Mimram Reach 2 (River Mimram from Kimpton Mill to Tewinbury) – up to major and temporary (but uncertain) impacts due to the potential for the additional abstraction to extend the period of drying and potential reduction in flows; Mimram Reach 3 (River Mimram from Tewinbury to confluence with River Lea) – up to major and temporary (but uncertain) impacts due to the potential reduction in flows; Lea Reach 1 (River Lea from confluence with the Mimram to the New River intake) - minor and temporary (but uncertain) due to the potential reduction in flows; and Lea Reach 2 (River Beane from Stapleford to confluence with the Lea) – up to major and temporary (but uncertain) due to the potential reduction in flow velocity. Subsequent effects on the water regime were considered and identified some hydromorphological and water quality pressures (dissolved oxygen, orthophosphate and ammonia, varying on a reach by reach basis). The FULL EAR (2022) assessment concluded the following potential effects on water quality: moderate and temporary for the Mimram Reach 1; minor to major for the Mimram Reach 2 and 3; negligible for the Lea Reach 1; and minor to major for the Lea Reach 2. However, as noted, these impacts are provided as a worst case scenario as a result of the modelling. Option is within SPZ 1, however the option will not result in any effects to the SPZ. The option is within a NVZ.	Demand management will be enhanced alongside the drought permit to reduce the volume required for abstraction. If the full drought permit is not required for supply, up to 3Ml/d could be discharged into the Mimram as river support while the drought permit is in effect. Mitigation will be focussed on specific ecological impacts associated with flow reductions arising from the implementation of the drought permit. Water quality and river flows/groundwater level monitoring will be taken throughout, including baseline monitoring, during the onset of the drought, during the drought permit implementation, and finally post drought.	0	0	0	--
	Deliver reliable and resilient water supplies	0	0	+	0	Drought permit option will allow for the delivery of water supplies during drought periods, however it is not a long-term resilient solution	N/A	0	0	+	0
Air	Reduce and minimise air emissions	0	0	0	0	The option is over 500m from an AQMA. No new infrastructure required therefore neutral effect.	N/A	0	0	0	0
Climatic Factors	Reduce embodied and operational carbon emissions	0	0	0	-	No carbon data available. There is no new infrastructure associated with the option therefore no construction related emissions are identified. However, carbon may be generated during the operational phase from increased abstraction and processing and a minor negative effect is therefore identified.	Investigate use of renewables during operation for energy supply. As the electricity grid is decarbonised, greener energy will be available.	0	0	0	-
	Reduce vulnerability to climate change risks and hazards	0	0	0	-	The option will reduce resilience of the environment by abstracting water during a drought period. The option is located within an area classed as having priority habitat which is of high vulnerability to climate change.	Monitor river levels and implement appropriate mitigation as required during a drought period.	0	0	0	-
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	0	0	0	0	The option is within the Chilterns national landscape character area. The option is not likely to effect the setting, character or views of the landscape. There is no new infrastructure required for the option therefore there is not likely to be any impacts.	N/A	0	0	0	0
Historic Environment	Conserve, protect and enhance the historic environment, including archaeology	0	0	0	0	The option within 500m of numerous listed buildings. The FULL EAR also considers additional heritage features within the study area of the FULL option including: Temple Dinsley Registered Park and Garden; St Paul's Walden Bury Registered Park and Garden; The Hoo, Kimpton Registered Park and Garden; Dicket Mead Roman villa Scheduled Monument; Lockleys Roman villa Scheduled Monument; Tewin Water Registered Park and Garden; and Pashanger Registered Park and Garden. The EAR identifies that none of these assets are likely to be impacted over the duration of the drought options implementation and therefore are classed as not sensitive. Neutral effects are therefore identified, however it is recognised that there are potential for effects f there are other water / drought sensitive assets, such as preserved organic and palaeoenvironmental remains, or known or unrecorded and deeply buried archaeology, are present. It should also be noted that drought permits will be implemented in severe drought conditions and the additional impact of the drought permits on these assets is not likely to be significant. However, this is unknown at this stage and further assessment may be required at a more detailed stage.	Further baseline collection and assessment will be required at a more detailed stage to explore the hydrological influence around the drought permits in relation to these types of assets. Implement appropriate mitigation if required. Consult with Historic England.	0	0	0	0
Population and Human Health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	0	0	0	0	There is no new infrastructure required for the option therefore there is not likely to be any impacts on the local community.	N/A	0	0	0	0
	Maintain and enhance tourism and recreation	0	0	0	-	Drought permit option could affect recreation, angling and other water based activities. The FULL EAR (2022) identifies the potential for negligible to low impacts on recreation as a result of the option. Residents are aware of low flows and drought will worsen flow naturally. A minor negative effect has been identified.	Continued communication with the local community to increase awareness.	0	0	0	-
Material Assets	Minimise resource use and waste production	0	0	0	0	There is no new infrastructure required for the option therefore unlikely to have effect on waste production or resource use.	N/A	0	0	0	0
	Avoid negative effects on built assets and infrastructure	0	0	0	0	There is no new infrastructure require for the option therefore unlikely to have effects on built assets and infrastructure.	N/A	0	0	0	0
	SEA Metrics	Positive	1					Positive	1		
		Negative	-16					Negative	-9		

Assessment Cover Information	
Option Name	PICC
Water company	Affinity Water
Option Description	PICC abstraction is located in the River Gade catchment. Under the terms of the drought permit, Affinity Water would seek to uplift the permitted abstraction from this source and the Upper Gade catchment by 6.4 Ml/d. This permit option has not changed from our previous drought plan.

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Comment	Mitigation	Residual Construction Effects		Residual Operational Effects	
		+	-	+	-			+	-	+	-
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	0	0	0	--	Modelling was used to inform the EARs which has been used to inform the SEA. The model has a more complex representation of the Chalk aquifer than previous models, however there are problems with the calibration of flows, in particular low flows, which are generally underestimated by the model. It should be noted that for this reason, the results presented in the EARs and the SEA are generally highly conservative and/or uncertain and would represent the worst-case scenario rather than the expected outcome. The PICC EAR (2022) identified the potential for minor effects on Croxley Common Moor SSSI (100% Unfavourable recovering), a GWDTE and LNR which is located approximately 14km downstream of the option where the River Gade meets the River Colne. The additional drawdown (around 1cm) could result in a reduction in the quality or extent of the habitat. The reduction in water may result in the influx of opportunistic terrestrial species as the site may undergo succession should recharge rates not be sufficient. However given the limited drawdown that has been modelled, groundwater impacts are expected to be of minimal severity to the site. The option is within a SSSI IRZ. There is no direct encroachment on LNRs but the Shrubhill Common LNR is 1km and Howe Grove Wood LNR is 2.2km from PICC, however no effects anticipated. The PICC EAR (2022) identifies potential for minor effects on Cassiobury Park LNR (hydrological impacts affecting the wetland habitats), Stocker's Lake LNR (downstream of the impacted reach therefore potential disturbance to the habitat and species supported) and Rickmansworth Aquadrome LNR (within impacted reach and potential disturbance to habitats and supported species). EAR concluded groundwater impacts are not predicted for any of the statutory sites; those that have groundwater close to the surface under normal conditions are not within the zone of significant additional drawdown due to the drought permits. The HRA Stage 1 Screening (Ricardo, 2022) identified the Chiltern Beechwoods SAC (4.6km) as having the potential to be affected but concluded no LSE as a result of the option. Increased abstraction has the potential to have minor to major (but uncertain) impacts upon chalk river priority habitat as per the PICC EAR. The EAR also identified negligible to moderate (but uncertain) effects on Coastal and floodplain grazing marsh, Ponds, Wet woodland and Lowland fens. Impacts to species expected from natural drought conditions have the potential to be exacerbated by abstraction. There are seven ancient woodlands within 1km radius as well as several pockets of deciduous woodland. These are not anticipated to be affected. The EAR assessment concluded that drought permit implementation has the potential to have minor to major (but uncertain) impacts on European Eel, brown trout, bullhead, grayling, spined loach, WFD fish, macroinvertebrate and macrophyte communities. The EAR also identified minor (but uncertain) effects on Soprano pipistrelle bat and the Common toad. These conclusions are made on a precautionary basis given the uncertainty surrounding the groundwater modelling results which are considered highly conservative. The implementation of this drought option has the potential to have minor (but uncertain effects) on Himalayan Balsam INNS. The implementation of this drought option may increase the spread of these INNS as a result of increase in favourable habitat condition, for example, through an increase in exposed riparian area/river banks.	Precautionary monitoring and mitigation measures have been proposed for agreement with the EA. Mitigation measures will be feature, location, species and community specific, and will be targeted only to those impacts that arise specifically as a result of drought permit implementation (as opposed to those arising due to environmental drought pressures). An Environmental Monitoring Plan (EMP) has been prepared as part of the EAR which sets out monitoring on a precautionary basis prior to implementation of the drought permit to establish the prevailing baseline conditions, as well as the monitoring to be carried out during implementation (particularly to inform and trigger any potential mitigation measures) and post-implementation.	0	0	0	-
Soil	Protect and enhance the functionality, quantity and quality of soils	0	0	0	0	The option within agricultural land classed as grade 3 land and is not anticipated to have an effect given there is no new infrastructure required for this option.	N/A	0	0	0	0
Water	Increase resilience and reduce flood risk	0	0	0	0	Drought permit option is located within Flood Zone 1 therefore at low risk of flooding from rivers and the sea. The option also has very low risk of surface water flooding. No new infrastructure required therefore neutral effect.	N/A	0	0	0	0
	Protect and enhance the quality of the water environment and water resources	0	0	0	---	Modelling was used to inform the EARs which has been used to inform the SEA. The model has a more complex representation of the Chalk aquifer than previous models, however there are problems with the calibration of flows, in particular low flows, which are generally underestimated by the model. It should be noted that for this reason, the results presented in the EARs and the SEA are generally highly conservative and/or uncertain and would represent the worst-case scenario rather than the expected outcome. During drought the natural condition will tend to drying of the headwaters moving progressively downstream with a perennial head predicted to be maintained at Water End. Downstream flows will be lower with river perching potentially leading to pooling and dry reaches. Groundwater modelling predicted the abstraction may lower flow further and delay flow returning in the Upper Gade and Bulbourne, thus potentially exacerbating the natural conditions. These effects are conservative as modelling does not consider local confining layers which will limit aquifer interaction with certain river reaches. The EAR groundwater modelling results suggest that the PICC permit may have the potential to cause sections of Gade Reach 2 to dry that would not go dry otherwise, with recovery of flows expected to take up to 12 months following cessation of the permit. The PICC EAR (2022) concluded on a precautionary basis due to the model calibration, the following potential impacts on hydrogeology/hydrology in the river reaches within the identified study area: Moderate and temporary (but uncertain) in River Gade Reach 1; Major and temporary (but uncertain) in River Gade Reach 2; Minor and temporary (but uncertain) in River Gade Reach 3; Moderate and temporary (but uncertain) in River Gade Reach 4; and Moderate and temporary (but uncertain) in River Colne Reach 1. The PICC EAR (2022) assessment concluded the following potential effects on water quality: negligible to minor (River Gade Reach 1); Minor to moderate (River Gade Reach 2); Negligible (River Gade Reach 3); Negligible to minor (River Gade Reach 4 and River Colne Reach 1). However, as noted, these impacts are provided as a worst case scenario as a result of the modelling. Option is within SPZ 1, however the option will not result in any effects to the SPZ. The option is not within a NVZ.	Demand management will be enhanced alongside the drought permit to reduce the volume required for abstraction. Mitigation will be focussed on specific ecological impacts associated with flow reductions arising from the implementation of the drought permit. Water quality and river flows/groundwater level monitoring will be taken throughout, including baseline monitoring, during the onset of the drought, during the drought permit implementation, and finally post drought.	0	0	0	--
	Deliver reliable and resilient water supplies	0	0	+	0	Drought permit option will allow for the delivery of water supplies during drought periods, however it is not a long-term resilient solution.	N/A	0	0	+	0
Air	Reduce and minimise air emissions	0	0	0	0	The option is over 500m from an AQMA. No new infrastructure required therefore neutral effect.	N/A	0	0	0	0
Climatic Factors	Reduce embodied and operational carbon emissions	0	0	0	-	No carbon data available. There is no new infrastructure associated with the option therefore no construction related emissions are identified. However, carbon may be generated during the operational phase from increased abstraction and processing and a minor negative effect is therefore identified.	Investigate use of renewables during operation for energy supply. As the electricity grid is decarbonised, greener energy will be available.	0	0	0	-
	Reduce vulnerability to climate change risks and hazards	0	0	0	-	The option will reduce resilience of the environment by abstracting water during a drought period. The option is located within an area classed as having priority habitat which is of high vulnerability to climate change.	Monitor river levels and implement appropriate mitigation as required during a drought period.	0	0	0	-
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	0	0	0	0	The option is within the Chilterns national landscape character area. The option is not likely to effect the setting, character or views of the landscape. There is no new infrastructure required for the option therefore there is not likely to be any impacts.	N/A	0	0	0	0
Historic Environment	Conserve, protect and enhance the historic environment, including archaeology	0	0	0	0	There are several listed buildings within 500m of option and the option is within 500m of Gadebridge Roman villa Scheduled Monument. The PICC EAR also considers additional heritage features within the study area of the PICC option including: The Charter Tower, Hemel Hempstead Scheduled Monument; Hemel Water Gardens Registered Park and Garden; Dominican Priory (site of) (excluding inhabited parts) Scheduled Monument; Royal Palace (site of Scheduled Monument; Little London moated site and surrounding earthwork enclosures, Kings Langley Scheduled Monument; and Cassiobury Park Registered Parks and Gardens. The EAR identifies that none of these assets are likely to be impacted over the duration of the drought options implementation and therefore are classed as not sensitive. Neutral effects are therefore identified, however it is recognised that there are potential for effects if there are other water / drought sensitive assets, such as preserved organic and palaeoenvironmental remains, or known or unrecorded and deeply buried archaeology, are present. It should also be noted that drought permits will be implemented in severe drought conditions and the additional impact of the drought permits on these assets is not likely to be significant. However, this is unknown at this stage and further assessment may be required at a more detailed stage.	Further baseline collection and assessment will be required at a more detailed stage to explore the hydrological influence around the drought permits in relation to these types of assets. Implement appropriate mitigation if required. Consult with Historic England.	0	0	0	0
Population and Human Health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	0	0	0	0	There is no new infrastructure required for the option therefore there is not likely to be any impacts on the local community.	N/A	0	0	0	0
	Maintain and enhance tourism and recreation	0	0	0	-	Drought permit option could affect recreation, angling and other water based activities. The PICC EAR (2022) identifies the potential for negligible to low impacts on recreation as a result of the option. Residents are aware of low flows and drought will worsen flow naturally. A minor negative effect has been identified.	Continued communication with the local community to increase awareness.	0	0	0	-
Material Assets	Minimise resource use and waste production	0	0	0	0	There is no new infrastructure required for the option therefore unlikely to have effect on waste production or resource use.	N/A	0	0	0	0
	Avoid negative effects on built assets and infrastructure	0	0	0	0	There is no new infrastructure require for the option therefore unlikely to have effects on built assets and infrastructure.	N/A	0	0	0	0

Assessment Cover Information	
Option Name	RUNGS
Water company	Affinity Water
Option Description	Affinity Water greensand source at RUNGS is located within the catchment of the River Lea. The Lower Greensands aquifer is located deep below the Chalk and the two units are not hydraulically connected, with the greensand aquifer being recharged from the area in the Anglian region. As a result, abstraction from this source does not have the potential to impact the River Lea but may exhibit a small, delayed impact in the outcrop area. Under the terms of the permit, we would seek to uplift abstraction by 5.3 Ml/d from current licensed rates.

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Comment	Mitigation	Residual Construction Effects		Residual Operational Effects	
		+	-	+	-			+	-	+	-
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	0	-	0	--	Modelling was used to inform the EARs which has been used to inform the SEA. The model has a more complex representation of the Chalk aquifer than previous models, however there are problems with the calibration of flows, in particular low flows, which are generally underestimated by the model. It should be noted that for this reason, the results presented in the EARs and the SEA are generally highly conservative and/or uncertain and would represent the worst-case scenario rather than the expected outcome. The RUNGS EAR (2022) identified potential for moderate (uncertain) effects on Flitwick Moor SSSI (76.83% favourable, 23.17% unfavourable - recovering) and GWDTE. The additional drawdown could result in a reduction in the quality or extent of the habitat as a result of alteration to the environmental conditions, given the high groundwater table present at this site, particularly within the wetland habitats present at the site. The reduction in water may result in the influx of opportunistic terrestrial grass species as the site may undergo succession should recharge rates not be sufficient. The impacts to the site will be temporary in nature. Moderate (uncertain) effects are also identified for Kings and Bakers Woods and Heaths SSSI (56.80% favourablem, 43.20% unfavouable - recovering). The site is not classified a GWDTE however there is uncertainty around the dependance of wet woodland habitat on groundwater and the simulated water table is at surface at this site. An approximately 3 cm additional drawdown is predicted from drought pumping, about 6 months after the end of the drought permit period. Galley and Warden Hills SSSI and Blow's Down SSSI, which are both GWDTE, are within 5km, however these are not located within the same groundwater body as the option therefore operational effects are not anticipated. Given the distance, construction related effects are not identified. The option is entirely located within SSSI Impact Risk Zone. Cottage Bottom Fields LNR is approximately 2.5km west and Galley and Warden Hills LNR and GWDTE is approximately 4.3km , however no effects anticipated. The HRA Stage 1 (Ricardo, 2022) identified Chilterns Beechwoods SAC is within 9.9km to the west of the site, however no likely significant effects are anticipated during the construction or operational phases. No pathways are identified given the distance between the SAC and RUNGS and the lack of supporting habitat. Qualifying features are also not water dependent. The option is within 500m of an area of Ancient Woodland but no effects are likely. There is Priority Habitat within 500m and therefore potential for minor disturbance effects during the construction phase. However, this option is associated with the Lower Greensand aquifer and is not a chalk source therefore no effects anticipated during operation. The RUNGS EAR (2022) identified the potential for minor (uncertain) effects on Soprano pipistrelle, Great crested newt, Common toad, Common frog. Minor (uncertain) effects were also identified for Wet Woodland, Ponds and Lowland fens. The implementation of this drought option is not anticipated to increase the spread of INNS.	Best practice mitigation to minimise disturbance effects on habitats during the construction phase. Precautionary monitoring and mitigation measures have been proposed for agreement with the EA. Mitigation measures will be feature, location, species and community specific, and will be targeted only to those impacts that arise specifically as a result of drought permit implementation (as opposed to those arising due to environmental drought pressures). An Environmental Monitoring Plan (EMP) has been prepared as part of the EAR which sets out monitoring on a precautionary basis prior to implementation of the drought permit to establish the prevailing baseline conditions, as well as the monitoring to be carried out during implementation (particularly to inform and trigger any potential mitigation measures) and post-implementation.	0	-	0	-
Soil	Protect and enhance the functionality, quantity and quality of soils	0	0	0	0	The option is located in an area classed as urban land. The option is within 200m of a historic landfill site. Given the nature of the construction works (upgrades to the treatment plant), the option is not likely to result in the disturbance of contaminants during the construction.	N/A	0	0	0	0
Water	Increase resilience and reduce flood risk	0	0	0	0	The option within Flood Zone 1 therefore it is at low risk of flooding from rivers and the sea. The option is also located in an area at very low risk of surface water flooding.	N/A	0	0	0	0
	Protect and enhance the quality of the water environment and water resources	0	-	0	0	Modelling was used to inform the EARs which has been used to inform the SEA. The model has a more complex representation of the Chalk aquifer than previous models, however there are problems with the calibration of flows, in particular low flows, which are generally underestimated by the model. It should be noted that for this reason, the results presented in the EARs and the SEA are generally highly conservative and/or uncertain and would represent the worst-case scenario rather than the expected outcome. The option is not within proximity to any surface water receptors, however there is potential for the construction phase to result in contaminated run-off entering the water environment. It is identified that the Lower Greensand aquifer which the option will be abstracting from has high storativity and the option would not be affecting chalk streams. The RUNGS EAR (2022) identified negligible effects on hydrology / hydrogeology within the following waterbodies: Broughton Brook; Flit Tributary; River Ivel; and Henlow Brook. There are also no impacts on water quality within these waterbodies as a result of the option. It is therefore identified that the option will have a neutral operational effect. Option lies within SPZ Zone 1, however no effects on the SPZ are identified as a result of the option. The option is within a NVZ.	Best practice construction measures implemented to mitigate effects therefore residual effects are unlikely.	0	0	0	0
	Deliver reliable and resilient water supplies	0	0	+	0	Drought permit option will allow for the delivery of water supplies during drought periods, however it is not a long-term resilient solution.	N/A	0	0	+	0
Air	Reduce and minimise air emissions	0	-	0	0	The option is not within 500m of an AQMA. Construction phase involves construction of a new pump, operational building, pipeline and monitoring equipment which is likely to have minor and temporary impact on localised air quality.	Best practice mitigation measures likely to be implemented during construction phase, however minor and temporary impacts on air quality are likely to still occur.	0	-	0	0
Climatic Factors	Reduce embodied and operational carbon emissions	0	-	0	-	No carbon data available for this option. There is some minor construction work associated with this option including a new pump, operational building, pipeline and monitoring equipment. Carbon will be 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.	0	-	0	-
	Reduce vulnerability to climate change risks and hazards	0	0	0	0	The option will be abstracting from the Lower Greensand aquifer which has high storativity. As such, it is not anticipated that the option will significantly affect the local environment's resilience to climate change. The option is not mapped as an area with priority habitat which is vulnerable to climate change.	N/A	0	0	0	0
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	0	0	0	0	The option is within the Chilterns national landscape character area and within 2km of an area of Green Belt and Chilterns AONB. However, no impacts on these designations are anticipated. Limited potential for visual impact due to the nature of the works and location within existing treatment works.	N/A	0	0	0	0
Historic Environment	Conserve, protect and enhance the historic environment, including archaeology	0	0	0	0	The option is not within 500m of any historic assets therefore no effects are anticipated. There is limited potential for buried archaeology to be affected as a result of the construction works given it is located within existing treatment works site. Given the option is abstracting from the Lower Greensand aquifer which is identified to have high storavity and there will be negligible effects on the water environment during the operation of the option, there is not likely to be effects on any water / drought sensitive assets.	N/A	0	0	0	0
Population and Human Health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	0	-	0	0	The option is within 500m of a school, church and greenspace sites. There is likely to be minimal and temporary disturbance effects on users of these sites and the local community during construction. No operational impacts are identified.	Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction and land will be reinstated. However, minor and temporary effects are likely to still occur.	0	-	0	0
	Maintain and enhance tourism and recreation	0	-	0	0	The option is within 500m of a playing field and public park. There is potential for there to be minimal and temporary disturbance effects on users of these sites and the local community during construction. No operational impacts are identified. There is not anticipated to be any effects on recreation as a result of the option. Residents are aware of low flows and drought will worsen flow naturally.	Best practice mitigation measures e.g. noise management to be implemented to minimise effects during construction and land will be reinstated. However, minor and temporary effects are likely to still occur.	0	-	0	0
Material Assets	Minimise resource use and waste production	0	-	0	0	The option is anticipated to generate minor levels of waste during works to upgrade the existing treatment works.	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 minor negative effects will remain.	0	-	0	0
	Avoid negative effects on built assets and infrastructure	0	-	0	0	The option is within 500m from a main road (M1) and National Cycleway, however effects are not anticipated due to the distance from the works and scale of works. There may be localised traffic disruption during construction.	Best practice measures including a Traffic Management Plan to be implemented to minimise disturbance during construction. However, minor and temporary effects are likely to still occur.	0	-	0	0

Assessment Over Information	
Option Name	THUN
Water company	Affinity Water
Option Description	The THUN source is located in the River Rib catchment. Under the proposed drought permit, the hands off flow (HoF) constraint which ordinarily constrains abstraction when the flow in the Rib is low, would be suspended. This would make an additional 2.73 Ml/d available for public water supply. Additionally, the THUN drought permit would allow Affinity Water to increase abstraction at the source by 2.18 Ml/d. The result would be 4.91 Ml/d in total of additional water for public water supply.

SEA Topic	SEA Objective	Construction Effects +	Construction Effects -	Operational Effects +	Operational Effects -	Comment	Mitigation	Residual Construction +	Residual Construction -	Residual Operational +	Residual Operational -
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	0	0	0	--	Modelling was used to inform the EARs which has been used to inform the SEA. The model has a more complex representation of the Chalk aquifer than previous models, however there are problems with the calibration of flows, in particular low flows, which are generally underestimated by the model. It should be noted that for this reason, the results presented in the EARs and the SEA are generally highly conservative and/or uncertain and would represent the worst-case scenario rather than the expected outcome. Amwell Quarry SSSI is within 5km, located downstream of THUN (as part of the Lee Valley SPA and Ramsar designated sites). Rye Meads SSSI is also a GWDTE and is part of the Lee Valley designated sites. The EAR (2022) identifies the potential for minor uncertain effects on Amwell Quarry SSSI as 1.2 cm additional drawdown could result in a reduction in the quality or extent of the habitat as a result of alteration to the environmental conditions, given the high groundwater table present at this site, particularly within the marsh habitats present at the site. The reduction in water may result in the influx of opportunistic terrestrial grass species as the site may undergo succession should recharge rates not be sufficient. Negligible effects are identified for Rye Meads SSSI. The HRA Appropriate Assessment (Ricardo, 2022) considers impacts on the SSSIs alongside the Natura 2000 sites. It indicates no significant impacts on SSSIs are anticipated as there intermittent hydrological connectivity between the SSSI and groundwater levels, groundwater levels are mostly below surface level and there is limited drawdown, therefore impacts on supporting habitat will not be significant. The EAR identifies minor (uncertain) effects on the Lee Valley SPA and Ramsar. The HRA Stage 1 Screening (Ricardo, 2022) identified that increased abstraction during drought could potentially impact qualifying features of the Lee Valley SPA and Ramsar site located 2.5km downstream of the option. The qualifying species include Great bittern, Gladwell and Northern Shoveler; which all are wintering species and all are groundwater dependant. Appropriate Assessment (Ricardo, 2022) was undertaken and no significant impacts on the integrity of the Lee Valley SPA and Ramsar site are anticipated based on previous drought scenarios, short overlapping timeframes with overwintering waterbirds, the intermittent nature of hydrological connectivity and the fact that groundwater levels will be below surface level. Increased abstraction has the potential to have minor to major (but uncertain) impacts upon chalk river priority habitat as per the THUN EAR (2022). There is also potential for minor (uncertain) effects on Floodplain grazing marsh, Ponds and Wet woodland. Impacts to species expected from natural drought conditions have the potential to be exacerbated by abstraction. These effects are considered to be minor compared to natural drought conditions as abstraction targets peak demand periods (although potential for prolonged use during the 6 months the drought permits are in operation). The THUN EAR (2022) indicted that the impacts of drought permit implementation on brown trout, bullhead, brook lamprey, grayling, WFD fish, macroinvertebrate and macrophyte communities, Norfolk hawker dragonfly, Great crested newt, Common toad, Common frog and Soprano pipistrelle bat will be negligible to major (but uncertain). Impacts on Floodplain grazing marsh NERC Act priority habitat is assessed as minor to moderate (but uncertain). These conclusions are made on a precautionary basis given the uncertainty surrounding the groundwater modelling results which are considered highly conservative. The EAR identified the potential for minor (but uncertain) effects on Himalayan Balsam INNS. The implementation of this drought option may increase the spread of these INNS as a result of increase in favourable habitat condition, for example, through an increase in exposed riparian area/river banks.	Precautionary monitoring and mitigation measures have been proposed for agreement with the EA. Mitigation measures will be feature, location, species and community specific, and will be targeted only to those impacts that arise specifically as a result of drought permit implementation (as opposed to those arising due to environmental drought pressures). An Environmental Monitoring Plan (EMP) has been prepared as part of the EAR which sets out monitoring on a precautionary basis prior to implementation of the drought permit to establish the prevailing baseline conditions, as well as the monitoring to be carried out during implementation (particularly to inform and trigger any potential mitigation measures) and post-implementation.	0	0	0	-
Soil	Protect and enhance the functionality, quantity and quality of soils	0	0	0	0	The option is within Grade 3 agricultural land, however it is not anticipated there will be any effects. There are no historic landfill sites within 200m.	NA	0	0	0	0
Water	Increase resilience and reduce flood risk	0	0	0	0	The option is within Flood Zone 1 and is located in an area with very low risk of surface water flooding.	N/A	0	0	0	0
	Protect and enhance the quality of the water environment and water resources	0	0	0	--	Modelling was used to inform the EARs which has been used to inform the SEA. The model has a more complex representation of the Chalk aquifer than previous models, however there are problems with the calibration of flows, in particular low flows, which are generally underestimated by the model. It should be noted that for this reason, the results presented in the EARs and the SEA are generally highly conservative and/or uncertain and would represent the worst-case scenario rather than the expected outcome. Reduced flows as a result of the option are possible. Water quality impacts may occur as a result of low flows, however impacts associated with the option are likely to be less than what would occur with natural drought. During drought the natural condition will tend to drying of the headwaters moving progressively downstream with a perennial head predicted to be maintained. Downstream flows will be lower with river perching potentially leading to pooling and dry reaches. The THUN EAR (2022) concluded on a precautionary basis due to the model calibration, the following potential impacts on hydrogeology/hydrology in the river reaches within the identified study area: Up to major and temporary (but uncertain) in the River Rib Reach 1; Negligible and temporary in the River Lea Reach 1; Up to moderate and temporary (but uncertain) in the River Lea Reach 2 and up to minor and temporary (but uncertain) in the River Ash Reach 1. There are major to minor impacts identified on water quality in the THUN EAR for the River Rib Reach 1; negligible to minor in River Lea Reach 2; negligible in Ash Reach 1 and none for the River Lea Reach 1. However, as noted, these impacts are provided as a worst case scenario as a result of the modelling. Option is within SPZ 1, however the option will not result in any effects to the SPZ. The option is within a NVZ.	Demand management will be enhanced alongside the drought permit to reduce the volume required for abstraction. Mitigation will be focussed on specific ecological impacts associated with flow reductions arising from the implementation of the drought permit. Water quality and river flows/groundwater level monitoring will be taken throughout, including baseline monitoring, during the onset of the drought, during the drought permit implementation, and finally post drought.	0	0	0	--
	Deliver reliable and resilient water supplies	0	0	+	0	Drought permit option will allow for the delivery of water supplies during drought periods. However, this is not a long term resilient solution.	N/A	0	0	+	0
Air	Reduce and minimise air emissions	0	0	0	0	The option is over 500m from an AQMA. No new infrastructure required therefore neutral effect.	N/A	0	0	0	0
Climatic Factors	Reduce embodied and operational carbon emissions	0	0	0	-	No carbon data available. There is no new infrastructure associated with the option therefore no construction related emissions are identified. However, carbon may be generated during the operational phase from increased abstraction and processing and a minor negative effect is therefore identified.	Investigate use of renewables during operation for energy supply. As the electricity grid is decarbonised, greener energy will be available.	0	0	0	-
	Reduce vulnerability to climate change risks and hazards	0	0	0	-	The option will reduce resilience of the environment by abstracting water during a drought period. The option is located within an area classed as having priority habitat which is of high vulnerability to climate change.	Monitor river levels and implement appropriate mitigation as required during a drought period.	0	0	0	-
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	0	0	0	0	The option is within the South Suffolk and North Essex Clayland national landscape character area. The option is not likely to effect the setting, character or views of the landscape. There is no new infrastructure required for the option therefore there is not likely to be any impacts	N/A	0	0	0	0
Historic Environment	Conserve, protect and enhance the historic environment, including archaeology	0	0	0	0	The option is not within 500m of any historic assets therefore no effects are anticipated. The THUN EAR (2022) also considers additional heritage features within the study area of the THUN option including: Thundridgebury moated enclosure and associated remains of Thundridgebury House. St Mary and All Saints' Church and graveyard, Thundridge Scheduled Monument; Youngsbury Registered Park and Garden; and Poles Park Registered Park and Garden . The EAR identifies that none of these assets are likely to be impacted over the duration of the drought options implementation and therefore are classed as not sensitive. Neutral effects are therefore identified, however it is recognised that there are potential for effects if there are other water / drought sensitive assets, such as preserved organic and palaeoenvironmental remains, or known or unrecorded and deeply buried archaeology, are present. It should also be noted that drought permits will be implemented in severe drought conditions and the additional impact of the drought permits on these assets is not likely to be significant. However, this is unknown at this stage and further assessment may required at a more detailed stage.	Further baseline collection and assessment will be required at a more detailed stage to explore the hydrological influence around the drought permits in relation to these types of assets. Implement appropriate mitigation if required. Consult with Historic England.	0	0	0	0
Population and Human Health	Maintain and enhance the health and wellbeing of the local community, including	0	0	0	0	There is no new infrastructure required for the option therefore there is not likely to be any impacts on the local community.	N/A	0	0	0	0
	Maintain and enhance tourism and recreation	0	0	0	-	Drought permit option could affect recreation, angling and other water based activities. The THUN EAR (2022) identifies the potential for negligible to low impacts on recreation as a result of the option. Residents are aware of low flows and drought will worsen flow naturally. A minor negative effect has been identified.	Continued communication with the local community to increase awareness.	0	0	0	-
Material Assets	Minimise resource use and waste production	0	0	0	0	There is no new infrastructure required for the option therefore unlikely to have effect on waste production or resource use.	N/A	0	0	0	0
	Avoid negative effects on built assets and infrastructure	0	0	0	0	There is no new infrastructure require for the option therefore unlikely to have effects on built assets and infrastructure.	N/A	0	0	0	0

Assessment Cover Information	
Option Name	WHIH
Water company	Affinity
Option Description	The WHIH source is located in the River Beane catchment. Under the terms of the drought permit, Affinity Water would seek to uplift abstraction for public water supply by 14.82 Ml/d from the current annual average licensed rate of 2 Ml/d. As a potential mitigation option, Affinity Water propose to discharge up to 3 Ml/d to the River Beane as river support whilst the permit is in operation and during the recovery phase, if the full drought permit volume is not required for supply. This would provide a source of water to the river environment at a time when it is likely to be naturally dry.

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Comment	Mitigation	Residual Construction Effects		Residual Operational Effects	
		+	-	+	-			+	-	+	-
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	0	0	0	--	Modelling was used to inform the EARs which has been used to inform the SEA. The model has a more complex representation of the Chalk aquifer than previous models, however there are problems with the calibration of flows, in particular low flows, which are generally underestimated by the model. It should be noted that for this reason, the results presented in the EARs and the SEA are generally highly conservative and/or uncertain and would represent the worst-case scenario rather than the expected outcome. Benington High Wood SSSI is within 2km upstream of the option therefore abstraction at the source is not anticipated to have a significant effect. The WHIH EAR (2022) identifies negligible effects on Amwell Quarry SSSI and Rye Meads Meadows SSSI and GWDTE. The HRA Stage 1 Screening (Ricardo, 2022) identified no likely significant impacts on N2K sites. Increased abstraction has the potential to have minor to major (uncertain) impacts upon chalk river priority habitat. Option is within 500m of priority habitat including deciduous woodland and coastal and floodplain grazing marsh. Negligible to minor (uncertain) effects identified for Coastal and floodplain grazing marsh, Lowland fens, Reedbeds, Ponds and Wet woodland. Potential effects on habitats resulting from increased abstraction during period of drought when the environment is likely to be under stress. Impacts to species expected from natural drought conditions have the potential to be exacerbated by abstraction. These effects are considered to be minor compared to natural drought conditions as abstraction targets peak demand periods (although potential for prolonged use across the 6 month duration of the drought permit). The WHIH EAR (2022) identified the potential for minor to major (but uncertain) impacts on the following species: Brown trout, Bullhead, Brook lamprey, Grayling, European water vole, Common barbel. WFD Fish, Macroinvertebrates, Macrophytes and Phytobenthos communities are also identified to be at risk of minor to major (but uncertain) impacts. Minor to major (uncertain) effects identified for Great crested newt, Common toad, Common frog, Fine lined pea mussel, Norfolk hawker dragonfly and Soprano pipistrelle bat. These conclusions are made on a precautionary basis given the uncertainty surrounding the groundwater modelling results which are considered highly conservative. The EAR identified the potential for minor (but uncertain) effects on Himalayan Balsam INNS. The implementation of this drought option may increase the spread of these INNS as a result of increase in favourable habitat condition, for example, through an increase in exposed riparian area/river banks.	Precautionary monitoring and mitigation measures have been proposed for agreement with the EA. Mitigation measures will be feature, location, species and community specific, and will be targeted only to those impacts that arise specifically as a result of drought permit implementation (as opposed to those arising due to environmental drought pressures). An Environmental Monitoring Plan (EMP) has been prepared as part of the EAR which sets out monitoring on a precautionary basis prior to implementation of the drought permit to establish the prevailing baseline conditions, as well as the monitoring to be carried out during implementation (particularly to inform and trigger any potential mitigation measures) and post-implementation. As a potential mitigation option, Affinity Water propose to discharge up to 3 Ml/d to the River Beane as river support whilst the permit is in operation and during the recovery phase, if the full drought permit volume is not required for supply. This would provide a source of water to the river environment at a time when it is likely to be naturally dry.	0	0	0	-
Soil	Protect and enhance the functionality, quantity and quality of soils	0	0	0	0	The option is within Grade 3 agricultural land and non-agricultural land, however the option will not likely lead to the disturbance of soils. The option is over 200m from authorised and historic landfill sites.	N/A	0	0	0	0
Water	Increase resilience and reduce flood risk	0	0	0	-	Option is within Flood Zone 3 therefore at risk from flooding from rivers or the sea. The option is located within an area at very low risk of surface water flooding.	Implement measures to reduce flood risk, however likely that residual flood risk will remain therefore minor effects identified.	0	0	0	-
	Protect and enhance the quality of the water environment and water resources	0	0	0	---	Modelling was used to inform the EARs which has been used to inform the SEA. The model has a more complex representation of the Chalk aquifer than previous models, however there are problems with the calibration of flows, in particular low flows, which are generally underestimated by the model. It should be noted that for this reason, the results presented in the EARs and the SEA are generally highly conservative and/or uncertain and would represent the worst-case scenario rather than the expected outcome. Potential for impacts on water flow and quality as a result of abstraction increase. Following review of groundwater modelling outputs, the EAR assessment concluded on a precautionary basis due to the model calibration, the following potential impacts on Hydrogeology/ Hydrology in the river reaches within the identified study area: Beane Reach 1 Beane (River Beane from Luffenhall to confluence with Stevenage Brook) - major and temporary impacts (but uncertain) due to the potential for the additional abstraction to extend the period of drying and potential reduction in flows; Stevenage Brook Reach 1 (Stevenage Brook from confluence with the River Beane up to Stevenage) – major and temporary (but uncertain) impacts due to the potential reduction in flows; Beane Reach 2 Beane (River Beane from confluence with Stevenage Brook to Watton at Stone) - major and temporary (but uncertain) due to the potential for the additional abstraction to extend the period of drying and potential reduction in flows; Beane Reach 3 (River Beane from Watton at Stone to Stapleford) - major and temporary (but uncertain) due to the potential reduction in flows; Beane Reach 4 (River Beane from Stapleford to confluence with the Lea) - major and temporary (but uncertain) due to the potential reduction in flows; Lea Reach 1 (River Lea from confluence with the Beane to the New River intake) - minor and temporary (but uncertain) due to the potential reduction in flows; and Lea Reach 2 (River Beane from Stapleford to confluence with the Lea) - major and temporary (but uncertain) due to the potential reduction in flow velocity. Potential effects on the water regime were considered and identified some hydromorphological and water quality pressures (dissolved oxygen, orthophosphate and ammonia, varying on a reach by reach basis). However, as noted, these impacts are provided as a worst case scenario as a result of the modelling. Option is within SPZ 1, however the option will not result in any effects to the SPZ. The option is within a NVZ.	Demand management will be enhanced alongside the drought permit to reduce the volume required for abstraction. Mitigation will be focussed on specific ecological impacts associated with flow reductions arising from the implementation of the drought permit. Water quality and river flows/groundwater level monitoring will be taken throughout, including baseline monitoring, during the onset of the drought, during the drought permit implementation, and finally post drought. As a potential mitigation option, Affinity Water propose to discharge up to 3 Ml/d to the River Beane as river support whilst the permit is in operation and during the recovery phase, if the full drought permit volume is not required for supply. This would provide a source of water to the river environment at a time when it is likely to be naturally dry.	0	0	0	--
	Deliver reliable and resilient water supplies	0	0	+	0	Drought permit option will allow for the delivery of water supplies during drought periods, therefore, there may be a short-term temporary positive effect on water supplies, however it is not a long-term resilient solution and would only be actioned under extreme drought conditions.	N/A	0	0	+	0
Air	Reduce and minimise air emissions	0	0	0	0	The option is over 500m from an AQMA. No new infrastructure required therefore neutral effect.	N/A	0	0	0	0
Climatic Factors	Reduce embodied and operational carbon emissions	0	0	0	-	No carbon data available. There is no new infrastructure associated with the option therefore no construction related emissions are identified. However, carbon may be generated during the operational phase from increased abstraction and processing and a minor negative effect is therefore identified.	Investigate use of renewables during operation for energy supply. As the electricity grid is decarbonised, greener energy will be available.	0	0	0	-
	Reduce vulnerability to climate change risks and hazards	0	0	0	-	The option will reduce resilience of the environment by abstracting water during a drought period. The option is in an area with priority habitat which is identified as having high vulnerability to climate change.	Monitor river levels	0	0	0	-
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	0	0	0	0	The option is within the South Suffolk and North Essex Claylands national landscape character area. However, no impacts on these designations are anticipated. Limited potential for visual impact due to the nature of the works.	N/A	0	0	0	0
Historic Environment	Conserve, protect and enhance the historic environment, including archaeology	0	0	0	0	The option is within 200m of grade II listed buildings and structures and within 500m of Benington Lordship Registered Park and Garden. The WHIH EAR also considers additional heritage features within the study area of the WHIH option including: Benington Castle: A motte and bailey castle west of Church Green Scheduled Monument; and Moated Enclosures, Well Wood and Chapel Wood, Watton-at-Stone Scheduled Monument. The EAR identifies that none of these assets are likely to be impacted over the duration of the drought options implementation and therefore are classed as not sensitive. Neutral effects are therefore identified, however it is recognised that there are potential for effects if there are other water / drought sensitive assets, such as preserved organic and palaeoenvironmental remains, or known or unrecorded and deeply buried archaeology, are present. It should also be noted that drought permits will be implemented in severe drought conditions and the additional impact of the drought permits on these assets is not likely to be significant. However, this is unknown at this stage and further assessment may required at a more detailed stage.	Further baseline collection and assessment will be required at a more detailed stage to explore the hydrological influence around the drought permits in relation to these types of assets. Implement appropriate mitigation if required. Consult with Historic England.	0	0	0	0
Population and Human Health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	0	0	0	0	There is no new infrastructure required for the option therefore there is not likely to be any impacts on the local community.	N/A	0	0	0	0
	Maintain and enhance tourism and recreation	0	0	0	-	Drought permit option could affect recreation, angling and other water based activities. The WHIH EAR (2022) identifies the potential for negligible to low impacts on recreation as a result of the option. Residents are aware of low flows and drought will worsen flow naturally. A minor negative effect has been identified.	Continued communication with the local community to increase awareness.	0	0	0	-
Material Assets	Minimise resource use and waste production	0	0	0	0	There is no new infrastructure required for the option therefore unlikely to have effect on waste production or resource use.	N/A	0	0	0	0
	Avoid negative effects on built assets and infrastructure	0	0	0	0	There is no new infrastructure require for the option therefore unlikely to have effects on built assets and infrastructure.	N/A	0	0	0	0

Assessment Cover Information	
Option Name	SBUC
Water company	Affinity Water
Option Description	SBUC pumping station is located adjacent to the River Dour and is subject to a both a hands off flow constraint and river support clause on the abstraction licence. This constrains abstraction when the flow in the river is low, and also requires discharge to the Dour of half the volume of water which is abstracted for public water supply. Under the terms of the permit, this condition would be temporarily suspended. This would make an additional 2 Ml/d of water available for supply purposes during a drought event.

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Comment	Mitigation	Residual Construction Effects		Residual Operational Effects	
		+	-	+	-			+	-	+	-
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	0	0	0	--	Dover to Kingsdown Cliffs SSSI, Lydden and Temple Ewell Downs SSSI and Alkham, Lydden and Swingfield Woods SSSI all within 5000m. However, no adverse effects on linkages to designated sites, and/or their qualifying features. The HRA Stage 1 Screening (Ricardo, 2022) identified two Natura 2000 sites within 3km of the option: Lydden and Temple Ewell Downs SAC (~2.5km NW) and Dover to Kingsdown Cliff SAC & SSSI (~2.9 SE). These sites are not water dependent, and no hydrological links were identified, therefore no likely significant effects were concluded for both sites. Impacts to species expected from natural drought conditions could be exacerbated by reduced river support. These effects are considered to be minor compared to natural drought conditions as abstraction targets peak demand periods (although potential for prolonged use over the 6 month duration the drought permit would be implemented). The draft SBUC EAR identified the potential for negligible to major impacts on WFD fish, macroinvertebrates, Macrophytes and Phytobenthos communities. Potential negligible to moderate effects were identified for fish and other aquatic ecological features (Macroinvertebrates, Macrophytes and Phytobenthos). These conclusions are made on a precautionary basis. There is potential for effects on chalk streams as per the draft SBUC EAR (2018). Option within 500m of priority habitats, including deciduous woodland and good quality semi-improved grassland. However, the Draft SBUC EAR (2018) identifies the potential for negligible effects on priority habitats. No additional risk of transfer of INNS.	Precautionary monitoring and mitigation measures have been proposed for agreement with the EA. Mitigation measures will be feature, location, species and community specific, and will be targeted only to those impacts that arise specifically as a result of drought permit implementation (as opposed to those arising due to environmental drought pressures). An Environmental Monitoring Plan (EMP) has been prepared as part of the EAR which sets out monitoring on a precautionary basis prior to implementation of the drought permit to establish the prevailing baseline conditions, as well as the monitoring to be carried out during implementation (particularly to inform and trigger any potential mitigation measures) and post-implementation.	0	0	0	-
Soil	Protect and enhance the functionality, quantity and quality of soils	0	0	0	0	The option is located on urban land and does not overlap any agricultural land. The option is over 200m from authorised landfill sites or historic landfill sites.	N/A	0	0	0	0
Water	Increase resilience and reduce flood risk	0	0	0	0	The option is located with Flood Zone 1 therefore at low risk of flooding from rivers or the sea. It is also located in an area with a low risk of surface water flooding.	N/A	0	0	0	0
	Protect and enhance the quality of the water environment and water resources	0	0	0	---	The draft SBUC EAR (2018) concluded, on a precautionary basis, the potential for major and temporary effects on hydrology / hydrogeology in the Reach 1 Lower Dour from SBUC to the tidal limit as a result of the option. It also identified the potential for negligible to moderate effects on water quality. However, as noted, these impacts are on a precautionary basis. The option is within SPZ 1, however the option will not result in any effects to the SPZ. The option is not within a NVZ.	Demand management will be enhanced alongside the drought permit to reduce the volume required. Mitigation will be focussed on specific ecological impacts associated with flow reductions arising from the implementation of the drought permit. Water quality and river flows/groundwater level monitoring will be taken throughout, including baseline monitoring, during the onset of the drought, during the drought permit implementation, and finally post drought.	0	0	0	--
	Deliver reliable and resilient water supplies	0	0	+	0	Drought permit option will allow for the delivery of water supplies during drought periods but isn't a long term resilient water supply	N/A	0	0	+	0
Air	Reduce and minimise air emissions	0	0	0	0	The option is over 500m from an AQMA. No new infrastructure required therefore neutral effect.	N/A	0	0	0	0
Climatic Factors	Reduce embodied and operational carbon emissions	0	0	0	-	No carbon data available. There is no new infrastructure associated with the option therefore no construction related emissions are identified. However, carbon may be generated during the operational phase and a minor negative effect is therefore identified.	Investigate use of renewables during operation for energy supply. As the electricity grid is decarbonised, greener energy will be available.	0	0	0	-
	Reduce vulnerability to climate change risks and hazards	0	0	0	-	The option will reduce resilience of the environment by reducing river support during a drought period. The option is identified to be an in area where priority habitats are considered to have medium to high vulnerability to climate change effects.	Monitor river levels and implement appropriate mitigation as required during a drought period.	0	0	0	-
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	0	0	0	0	The option is within the North Downs national landscape character area. The option is not likely to effect the setting, character or views of the landscape. There is no new infrastructure required for the option therefore there is not likely to be any impacts.	N/A	0	0	0	0
Historic Environment	Conserve, protect and enhance the historic environment, including archaeology	0	0	0	0	The option is within 500m of Buckland House (Grade II) and Parish Church of St Andrew Buckland (Grade II*) listed structure(s). The SBUC EAR also considers additional heritage features within the study area of the SBUC option including: Maison Dieu Scheduled Monument; St Martin's Priory (remains of) Scheduled Monument; The Painted House, N of Market Street Scheduled Monument; St Martin's Church Scheduled Monument; The Bath House, N of Market Street Scheduled Monument; Saxon shore fort bastion, Queen Street Scheduled Monument; South-western section of the Roman Fort of the Classis Britannica, near Albany Place Scheduled Monument; St James' Church Scheduled Monument; Dover Castle Scheduled Monument; Fort Burgoyne Scheduled Monument; Fairburn-type crane, Wellington Dock Scheduled Monument; Archcliffe Fort Scheduled Monument; and Fortifications, Roman lighthouse and medieval chapel on Western Heights Scheduled Monument. The EAR identifies that none of these assets are likely to be impacted over the duration of the drought options implementation and therefore are classed as not sensitive. Neutral effects are therefore identified, however it is recognised that there are potential for effects if there are other water / drought sensitive assets, such as preserved organic and palaeoenvironmental remains, or known or unrecorded and deeply buried archaeology, are present. It should also be noted that drought permits will be implemented in severe drought conditions and the additional impact of the drought permits on these assets is not likely to be significant. However, this is unknown at this stage and further assessment may required at a more detailed stage.	Further baseline collection and assessment will be required at a more detailed stage to explore the hydrological influence around the drought permits in relation to these types of assets. Implement appropriate mitigation if required. Consult with Historic England.	0	0	0	0
Population and Human Health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	0	0	0	0	There is no new infrastructure required for the option therefore there is not likely to be any impacts on the local community.	N/A	0	0	0	0
	Maintain and enhance tourism and recreation	0	0	0	0	Drought permit option could affect recreation, angling and other water based activities. However, the draft SBUC EAR (2018) identified negligible effects for angling and recreation therefore neutral effect identified. Residents are aware of low flows and drought will worsen flow naturally.	Continued communication with the local community to increase awareness.	0	0	0	0
Material Assets	Minimise resource use and waste production	0	0	0	0	There is no new infrastructure required for the option therefore unlikely to have effect on waste production or resource use.	N/A	0	0	0	0
	Avoid negative effects on built assets and infrastructure	0	0	0	0	There is no new infrastructure require for the option therefore unlikely to have effects on built assets and infrastructure.	N/A	0	0	0	0

Assessment Cover Information	
Option Code	SDRE
Water company	Affinity Water
Option Description	The SDRE source is also located in the catchment of the River Dour. The source is subject to a HoF constraint which limits output when local groundwater levels are low. Under the terms of the permit, this condition would be temporarily suspended. This would provide an additional 2 Ml/d of water for supply purposes during a drought event.

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Comment	Mitigation	Residual Construction Effects		Residual Operational Effects	
		+	-	+	-			+	-	+	-
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	0	0	0	--	The option is located approximately 3.5km from Folkestone to Etchinghill Escarpment SSSI which is a GWDTE. Folkestone Warren SSSI, Alkham, Lydden and Swingfield Woods SSSI, and Lydden and Temple Ewell Downs SSSI are also within 5km. The SDRE EAR (2018) identified that the option would not have an effect on these SSSIs. Option within a SSSI IRZ. The HRA Stage 1 Screening (Ricardo, 2022) identified no likely significant effects on Parkgate Downs SAC, Lydden and Tempel Ewell Downs SAC, Kingsdown Cliff SAC as they are not water dependent, and no hydrological links were identified. The Folkestone to Etchinghill Escarpment SAC is a GWDTE site, however the HRA identified no likely significant effect. There is potential for effects on chalk streams as per the SDRE EAR (2018). The EAR (2018) also identified the potential for negligible to major effects on WFD fish, macroinvertebrates, Macrophytes and Phytobenthos communities. Negligible to moderate effects are identified for fish and other aquatic ecological features (Macroinvertebrates, Macrophytes and Phytobenthos). These conclusions are made on a precautionary basis. Option within 500m of priority habitats, including deciduous woodland and good quality semi-improved grassland. However, the SBUC EAR (2018) identifies negligible effects on priority habitats. The option within 500m of 'Drellingore Wood' Ancient Woodland. No direct impact likely. Very low additional INNS transfer risk, as the water is sourced from groundwater.	Precautionary monitoring and mitigation measures have been proposed for agreement with the EA. Mitigation measures will be feature, location, species and community specific, and will be targeted only to those impacts that arise specifically as a result of drought permit implementation (as opposed to those arising due to environmental drought pressures). An Environmental Monitoring Plan (EMP) has been prepared as part of the EAR which sets out monitoring on a precautionary basis prior to implementation of the drought permit to establish the prevailing baseline conditions, as well as the monitoring to be carried out during implementation (particularly to inform and trigger any potential mitigation measures) and post-implementation.	0	0	0	-
Soil	Protect and enhance the functionality, quantity and quality of soils	0	0	0	0	The option is within Grade 3 agricultural land. No new infrastructure required therefore neutral effect. The option is over 200m from an authorised landfill site or historic landfill sites.	N/A	0	0	0	0
Water	Increase resilience and reduce flood risk	0	0	0	0	The option is located with Flood Zone 1 therefore at low risk of flooding from rivers or the sea. It is also located in an area with a very low risk of surface water flooding.	N/A	0	0	0	0
	Protect and enhance the quality of the water environment and water resources	0	0	0	---	The EAR (2018) identified potential for reduced flows and reduction in water quality. For the hydrology / hydrogeology, the EAR concluded, on a precautionary basis, the following potential impacts as a result of the option: Minor and temporary impacts in Reach 1 Kearsney Stem; Moderate and temporary impacts in Reach 2 Upper Dour; Major impacts in Reach 3A Braided section and in Reach 3A Braided section. Potential negligible to moderate impacts on water quality were identified across all the four reaches reviewed as part of the EAR. However, as noted, these impacts are provided on a precautionary basis. Option is within SPZ 1, however the option will not result in any effects to the SPZ. The option is not within a NVZ.	Demand management will be enhanced alongside the drought permit to reduce the volume required. Mitigation will be focussed on specific ecological impacts associated with flow reductions arising from the implementation of the drought permit. Water quality and river flows/groundwater level monitoring will be taken throughout, including baseline monitoring, during the onset of the drought, during the drought permit implementation, and finally post drought.	0	0	0	--
	Deliver reliable and resilient water supplies	0	0	+	0	Drought permit option will allow for the delivery of water supplies during drought periods, however it is not a long-term resilient solution.	N/A	0	0	+	0
Air	Reduce and minimise air emissions	0	0	0	0	The option is over 500m from an AQMA. No new infrastructure required therefore neutral effect.	N/A	0	0	0	0
Climatic Factors	Reduce embodied and operational carbon emissions	0	0	0	-	No carbon data available. There is no new infrastructure associated with the option therefore no construction related emissions are identified. However, carbon may be generated during the operational phase and a minor negative effect is therefore identified.	Investigate use of renewables during operation for energy supply. As the electricity grid is decarbonised, greener energy will be available.	0	0	0	-
	Reduce vulnerability to climate change risks and hazards	0	0	0	-	The option will reduce resilience of the environment by abstracting water during a drought period. The option is not within an area identified as having priority habitat which is vulnerable to climate change.	Monitor river levels	0	0	0	-
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	0	0	0	0	Option is within the North Downs landscape character areas and within the Kent Downs AONB. However, this is not considered a groundwater dependent site and any potential impacts are considered negligible as per the SDRE EAR (2018).	N/A	0	0	0	0
Historic Environment	Conserve, protect and enhance the historic environment, including archaeology	0	0	0	0	The option is over 500m from historic assets therefore no effects are anticipated. The SDRE EAR also considers additional heritage features within the study area of the SDRE option including: Kearnsey Court Registered Park and Garden; Bowl barrow 200m south west of Little Watersend Scheduled Monument; St Radegund's Abbey, Poulton Scheduled Monument; Bowl barrow at Minnis Beeches Scheduled Monument; Bowl barrow 150m north east of Red House Farm Scheduled Monument; Two bowl barrows 400m north of Milgate Farm in Reinden Wood Scheduled Monument; Maison Dieu Scheduled Monument; St Martin's Priory (remains of) Scheduled Monument; The Painted House, N of Market Street Scheduled Monument; St Martin's Church Scheduled Monument; The Bath House, N of Market Street Scheduled Monument; Saxon shore fort bastion, Queen Street Scheduled Monument; South-western section of the Roman Fort of the Classis Britannica, near Albany Place Scheduled Monument; St James' Church Scheduled Monument; Dover Castle Scheduled Monument; Fort Burgoyne Scheduled Monument; Fairarm-type crane, Wellington Dock Scheduled Monument; Archcliffe Fort Scheduled Monument; and Fortifications, Roman lighthouse and medieval chapel on Western Heights Scheduled Monument. The EAR identifies that none of these assets are likely to be impacted over the duration of the drought options implementation and therefore are classed as not sensitive. Neutral effects are therefore identified, however it is recognised that there are potential for effects if there are other water / drought sensitive assets, such as preserved organic and palaeoenvironmental remains, or known or unrecorded and deeply buried archaeology, are present. It should also be noted that drought permits will be implemented in severe drought conditions and the additional impact of the drought permits on these assets is not likely to be significant. However, this is unknown at this stage and further assessment may required at a more detailed stage.	Further baseline collection and assessment will be required at a more detailed stage to explore the hydrological influence around the drought permits in relation to these types of assets. Implement appropriate mitigation if required. Consult with Historic England.	0	0	0	0
Population and Human Health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	0	0	0	0	There is no new infrastructure required for the option therefore there is not likely to be any impacts on the local community.	N/A	0	0	0	0
	Maintain and enhance tourism and recreation	0	0	0	0	Drought permit option could affect recreation, angling and other water based activities. However, the SBUC EAR (2018) identified negligible effects for angling and recreation. Residents are aware of low flows and drought will worsen flow naturally.	Continued communication with the local community to increase awareness.	0	0	0	0
Material Assets	Minimise resource use and waste production	0	0	0	0	There is no new infrastructure required for the option therefore unlikely to have effect on waste production or resource use.	N/A	0	0	0	0
	Avoid negative effects on built assets and infrastructure	0	0	0	0	There is no new infrastructure require for the option therefore unlikely to have effects on built assets and infrastructure.	N/A	0	0	0	0

Assessment Cover Information	
Option code:	SLYE
Water company	Affinity Water
Option Description	The SLYE source is located in the River Dour catchment and is subject to a Hands off Level (HoL) constraint, which limits output when local groundwater levels are low. Under the terms of the permit, this condition would be temporarily suspended. This would provide an additional 3.5 Ml/d of water for supply purposes during a drought event.

SEA Topic	SEA Objective	Construction Effects		Operational Effects		Comment	Mitigation	Residual Construction Effects		Residual Operational Effects	
		+	-	+	-			+	-	+	-
Biodiversity, flora and fauna	Protect and enhance biodiversity, priority species, vulnerable habitats and habitat connectivity (no loss and improve connectivity where possible)	0	0	0	--	The option directly encroaches upon Allham, Lydden and Swingfield Woods SSSI (1.5% unfavourable-declining, 21.94% unfavourable-recovering, 76.56% favourable) and therefore has the potential to be impacted by the option. The site is not a GWDTE. However, the Draft SLYE EAR (2018) outlines that terrestrial vegetation at the site would mainly be dependent on local groundwater levels and these would likely be low during implementation of the drought permit. The additional impact of the drought permit on this designated site is not considered to be significant. Lydden and Temple Ewell Downs SSSI is within 2km and forms part of the Lydden & Temple Ewell Downs SAC, however no significant effects are identified. Option is within SSSI IRZ. Lydden Temple Ewell NNR is within 1.7km, however no impacts identified. The HRA Stage 1 Screening (Ricardo, 2022) identified no likely significant effects on the Parkgate Downs SAC, Lydden and Temple Ewell Downs SAC as this site is not water dependent, and no hydrological links were identified. The Draft EAR (2021) identified negligible effects for priority habitats. There is also potential for effects on chalk streams. The draft EAR also identified potential for negligible to moderate impacts on WFD Fish, Macroinvertebrates, Macrophytes and Phytobenthos. These conclusions are made on a precautionary basis. The implementation of this drought option is not anticipated to increase the spread of INNS.	Precautionary monitoring and mitigation measures have been proposed for agreement with the EA. Mitigation measures will be feature, location, species and community specific, and will be targeted only to those impacts that arise specifically as a result of drought permit implementation (as opposed to those arising due to environmental drought pressures). An Environmental Monitoring Plan (EMP) has been prepared as part of the EAR which sets out monitoring on a precautionary basis prior to implementation of the drought permit to establish the prevailing baseline conditions, as well as the monitoring to be carried out during implementation (particularly to inform and trigger any potential mitigation measures) and post-implementation.	0	0	0	-
Soil	Protect and enhance the functionality, quantity and quality of soils	0	0	0	0	The option is within Grade 3 agricultural land. No new infrastructure required therefore neutral effect. The option is over 200m from an authorised landfill site or historic landfill sites.	N/A	0	0	0	0
Water	Increase resilience and reduce flood risk	0	0	0	-	The option is located with Flood Zone 1 therefore at low risk of flooding from rivers or the sea. The option is located in area identified as having a high risk of surface water flooding.	Implement measures to reduce flood risk, however likely that residual flood risk will remain therefore minor effects identified.	0	0	0	-
	Protect and enhance the quality of the water environment and water resources	0	0	0	---	The Draft SLYE EAR (2018) identified, on a precautionary basis, the potential for the following effects on hydrogeology/ hydrology in the following waterbodies: moderate and temporary impacts in Reach 1 Kearsney Stem and Reach 2 Upper Dour; Major impact in Reach 3A Braided section and Reach 3B Lower Dour. Potential negligible to moderate effects have been identified for water quality in all the four reaches reviewed as part of the draft SLYE EAR. However, as noted, these impacts are provided on a precationary basis. Option is within SPZ 1, however the option will not result in any effects to the SPZ. The option is not within a NVZ.	Demand management will be enhanced alongside the drought permit to reduce the volume required. Mitigation will be focussed on specific ecological impacts associated with flow reductions arising from the implementation of the drought permit. Water quality and river flows/groundwater level monitoring will be taken throughout, including baseline monitoring, during the onset of the drought, during the drought permit implementation, and finally post drought.	0	0	0	--
	Deliver reliable and resilient water supplies	0	0	+	0	Drought permit option will allow for the delivery of water supplies during drought periods, however it is not a long-term resilient solution.	N/A	0	0	+	0
Air	Reduce and minimise air emissions	0	0	0	0	The option is over 500m from an AQMA. No new infrastructure required therefore neutral effect.	N/A	0	0	0	0
Climatic Factors	Reduce embodied and operational carbon emissions	0	0	0	-	No carbon data available. There is no new infrastructure associated with the option therefore no construction related emissions are identified. However, carbon may be generated during the operational phase and a minor negative effect is therefore identified.	Investigate use of renewables during operation for energy supply. As the electricity grid is decarbonised, greener energy will be available.	0	0	0	-
	Reduce vulnerability to climate change risks and hazards	0	0	0	-	The option will reduce resilience of the environment by abstracting water during a drought period. The option is located within an area which priority habitats are identified to have low-moderate vulnerability to climate change effects.	Monitor river levels	0	0	0	-
Landscape	Conserve, protect and enhance landscape, townscape and seascape character and visual amenity	0	0	0	0	Option is within the North Downs national landscape character area and within the Kent Downs AONB. However, this is not considered a groundwater dependent site and any potential impacts are considered negligible as per the Draft SLYE EAR (2018). The option is not likely to effect the setting, character or views of the landscape	N/A	0	0	0	0
Historic Environment	Conserve, protect and enhance the historic environment, including archaeology	0	0	0	0	There are no historic assets within 500m of the option. The SLYE EAR also considers additional heritage features within the study area of the SLYE option including: Kearsney Court Registered Park and Garden; Bowl barrow 200m south west of Little Watersend Scheduled monument; St Radegund's Abbey, Poulton Scheduled Monument; Bowl barrow at Minnis Beeches Scheduled Monument; Bowl barrow 150m north east of Red House Farm Scheduled Monument; Two bowl barrows 400m north of Millgate Farm in Reinden Wood Sheduled Monument; Maison Dieu Scheduled Monument; St Martin's Priory (remains of) Scheduled Monument; The Painted House, N of Market Street Scheduled Monument; St Martin's Church Scheduled Monument; The Bath House, N of Market Street Scheduled Monument; Saxon shore fort bastion, Queen Street Scheduled Monument; South-western section of the Roman Fort of the Classis Britannica, near Albany Place Scheduled Monument; St James' Church Scheduled Monument; Dover Castle Scheduled Monument; Fort Burgoyne Scheduled Monument; Fairburn-type crane, Wellington Dock Scheduled Monument; Archcliffe Fort Scheduled Monument; and Fortifications, Roman lighthouse and medieval chapel on Western Heights Scheduled Monument. The EAR identifies that none of these assets are likely to be impacted over the duration of the drought options implementation and therefore are classed as not sensitive. Neutral effects are therefore identified, however it is recognised that there are potential for effects if there are other water / drought sensitive assets, such as preserved organic and palaeoenvironmental remains, or known or unrecorded and deeply buried archaeology, are present. It should also be noted that drought permits will be implemented in severe drought conditions and the additional impact of the drought permits on these assets is not likely to be significant. However, this is unknown at this stage and further assessment may required at a more detailed stage.	Further baseline collection and assessment will be required at a more detailed stage to explore the hydrological influence around the drought permits in relation to these types of assets. Implement appropriate mitigation if required. Consult with Historic England.	0	0	0	0
Population and Human Health	Maintain and enhance the health and wellbeing of the local community, including economic and social wellbeing	0	0	0	0	There is no new infrastructure required for the option therefore there is not likely to be any impacts on the local community.	N/A	0	0	0	0
	Maintain and enhance tourism and recreation	0	0	0	0	Drought permit option could affect recreation, angling and other water based activities. However, the draft SLYE EAR (2018) identified negligible effects for angling and recreation. Residents are aware of low flows and drought will worsen flow naturally.	Continued communication with the local community to increase awareness.	0	0	0	0
Material Assets	Minimise resource use and waste production	0	0	0	0	There is no new infrastructure required for the option therefore unlikely to have effect on waste production or resource use.	N/A	0	0	0	0
	Avoid negative effects on built assets and infrastructure	0	0	0	0	There is no new infrastructure require for the option therefore unlikely to have effects on built assets and infrastructure.	N/A	0	0	0	0