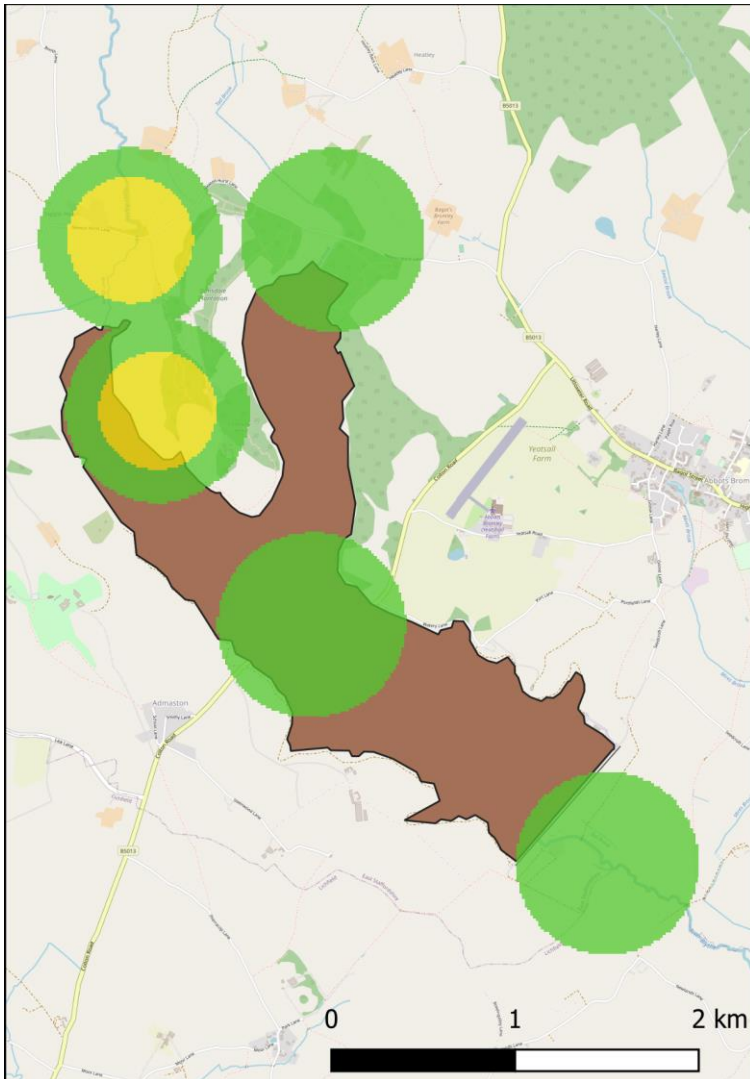


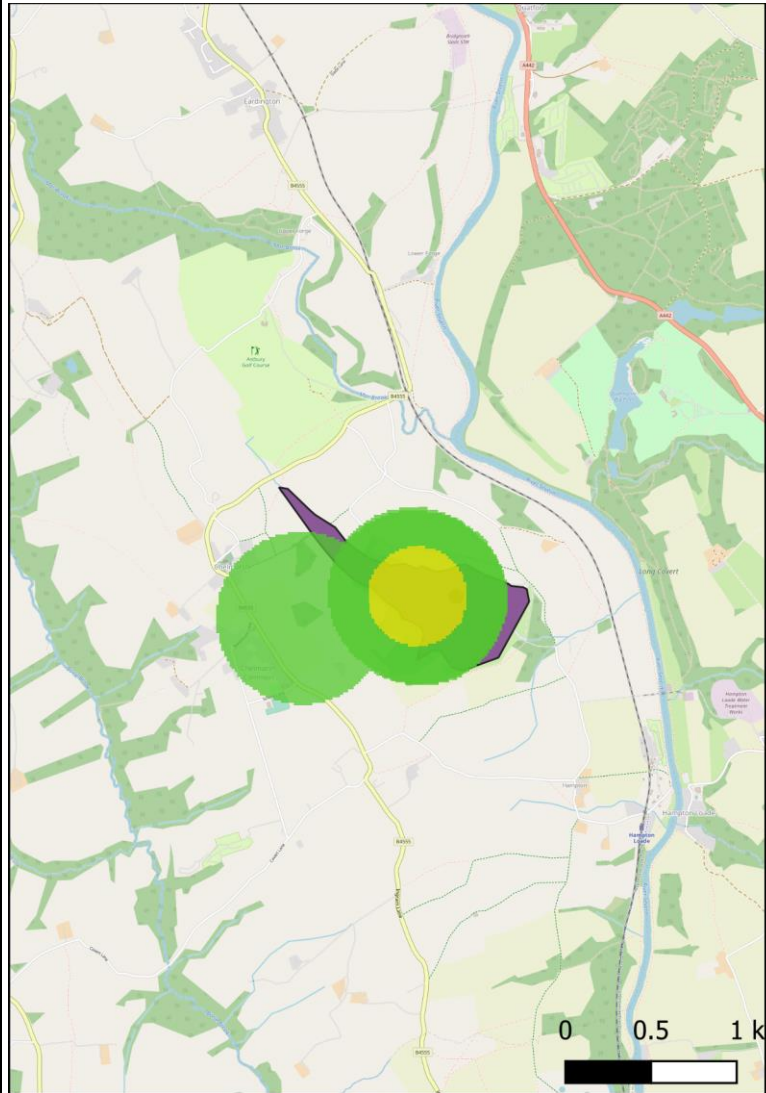
Appendix 1 Individual A3 summary Sheets

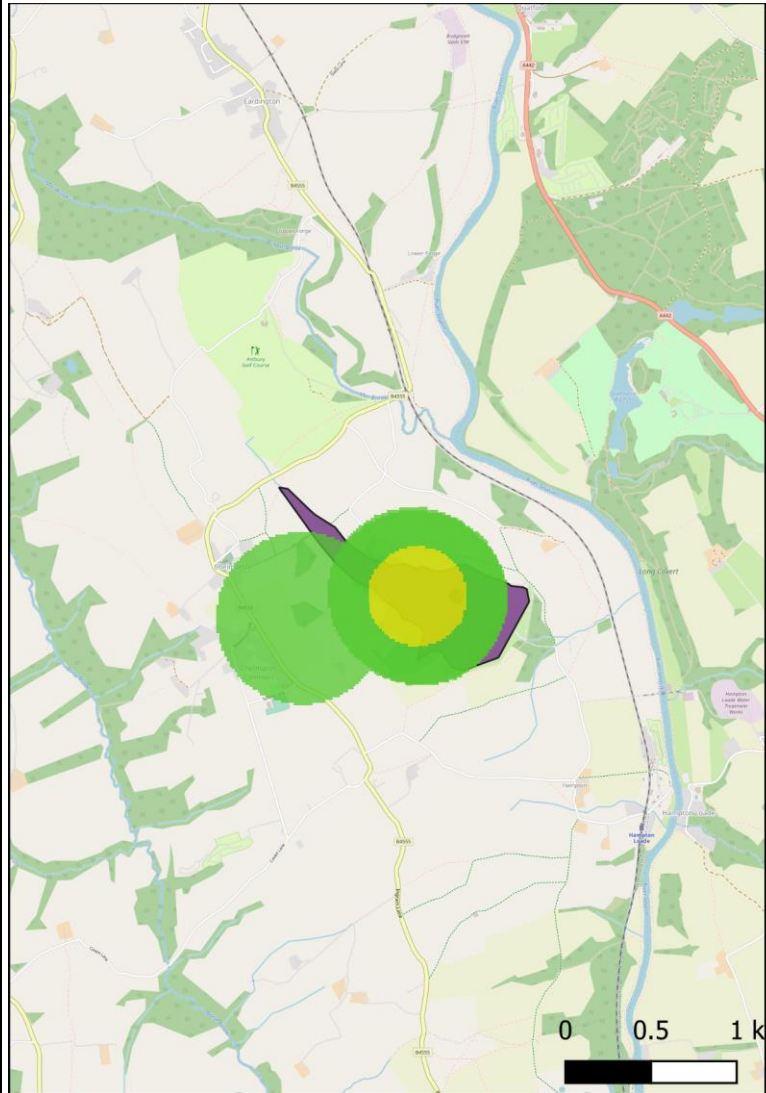
Table A1 List of SSW draft WRMP24 feasible options for which an a3 INNS Assessment has been completed and included within this appendix.

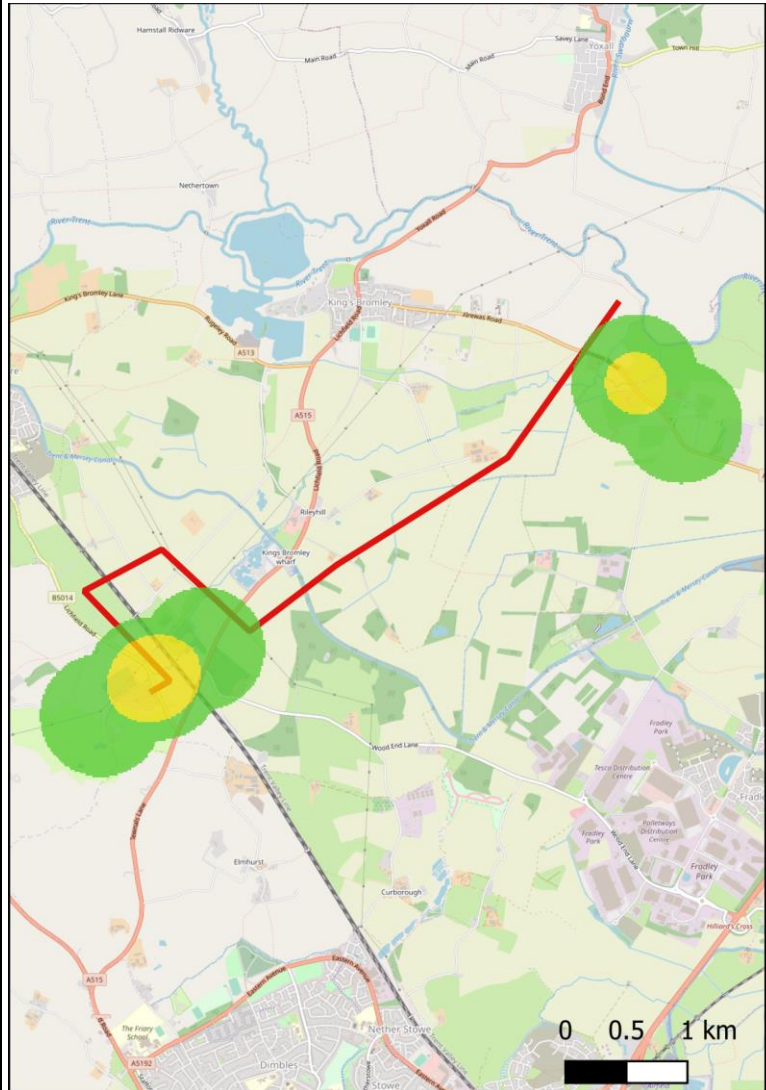
Option Category	Draft Ref.	WRMP24 Option Name
River Abstraction	2.1.1.1	40 MI/d capacity raw water abstraction from the Trent to Blithfield
Reservoir storage	2.2.1.1	Increase storage at Blithfield: Increase dam height by 1m
Reservoir storage	2.2.2.1	Increase storage at Blithfield: Increase dam height by 2m
Reservoir storage	2.3.1	Chelmarsh Reservoir 15 MI/d - <2m raising
Reservoir storage	2.3.2	Chelmarsh Reservoir 30 MI/d - up to 2m raising
Reservoir storage	6.1.1	40 MI/d capacity treatment works on the Trent, with 6-month bankside storage. 40MI/d intake on the River Trent between Rugeley and Yoxall
Reservoir storage	6.1.3	70 MI/d capacity treatment works on the Trent, with 6-month bankside storage. 70MI/d intake on the River Trent between Alrewas and Burton.
Third Party	7.1.2.1	Third Party Option: Canal & River Trust: Birmingham Blithfield surplus
Third Party	7.1.5	Canal & Rivers Trust: Chasewater options
Third Party	7.5.1.1	UU Vyrnwy reservoir raw water release 15 MI/d to River Severn to support SSW
Third Party	7.5.1.2	UU Vyrnwy reservoir raw water release 30 MI/d to River Severn to support SSW
Third Party	7.5.1.3	UU Vyrnwy reservoir raw water release 45 MI/d to River Severn to support SSW
Third Party	7.5.1.4	UU Vyrnwy reservoir raw water release 75 MI/d to River Severn to support SSW
Third Party	8.1.1	Third-party option: potable import in Burton-upon-Trent
Third Party	8.1.5	Drill new GW source with licence trade from Third Party Company X
Third Party	8.3.1a	New raw water storage reservoir close to the River Trent

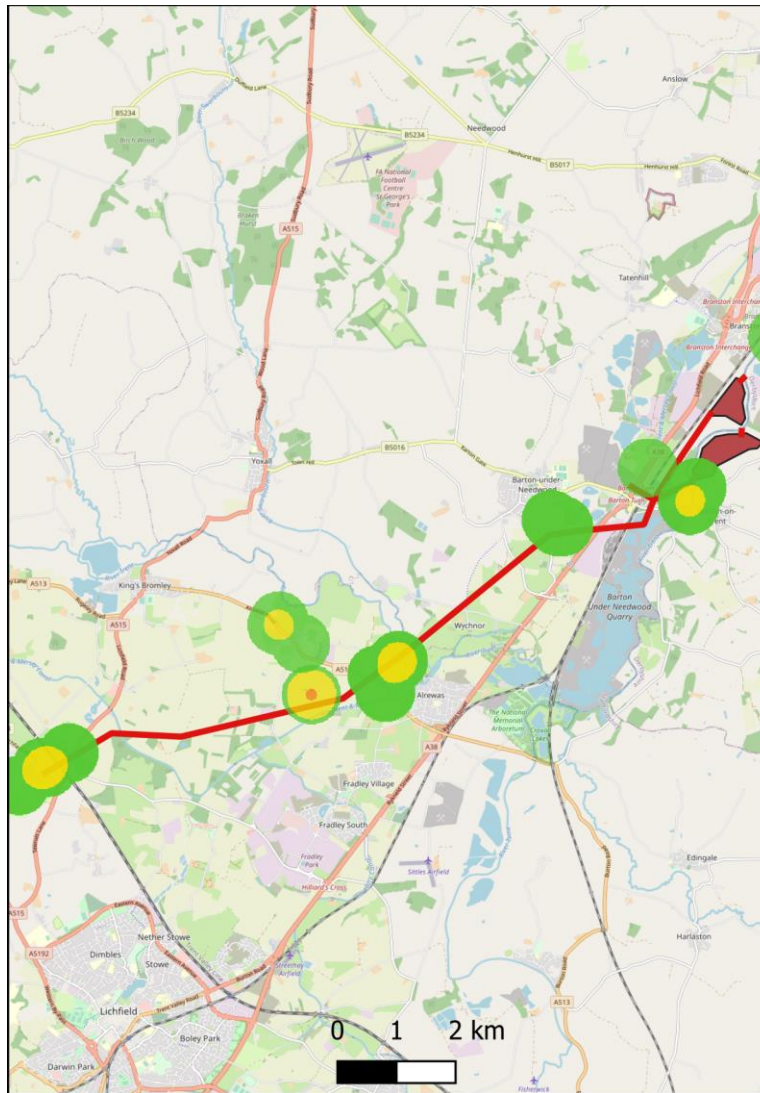
Scheme Reference		Option Name		Source Type	
2.1.1.1		40 MI/d new sw abst R.Trent to Blithfield Reservoir.		Surface water	
Option Description					
Blithfield reservoir is the primary source of raw water for Seedy Mill WTW. Blithfield reservoir has a capacity of approximately 18,200 MI and sources water from the River Blithe and Tad Brook. Output at Seedy Mill WTW is seasonally limited due to a lack of raw water availability and this option seeks to promote an alternative source of raw water into the reservoir from the River Trent. An existing abstraction point on the River Trent at Nethertown can be used by SST to support Seedy Mill WTW. This abstraction point can also be used to introduce River Trent water into Blithfield reservoir. However, the mode of operation to fill the reservoir requires flow reversal in the pipelines and causes restricted raw water transfer between Blithfield reservoir and Seedy Mill WTW for the duration of the reservoir filling. Any new water from the River Trent would be subject to a Hands-Off Flow at the Yoxall gauge, thereby limiting option yield. The proposed option is to provide a new 40MI/d surface water abstraction on the River Trent, including: a river intake (380kW pump (760kW pumping station)) and raw water pumping station connected to a new dedicated pipeline to Blithfield reservoir (3.8km, 900mm). A new inlet into Blithfield reservoir will be installed. However, the abstraction on the Trent would be restricted for much of the summer by the Trent flow restrictions. The exact location of the new river intake will need to be determined through further investigation and third-party consultation; however, for the purpose of this option assessment a notional location to the north-west of Rugeley has been selected. Permanent land take would be required for the river intake and associated plant/building. The pump back capacity would also need to be established, as the option would not add extra water if it resulted in cutback to the existing Blithe pump back. The River Trent has a high proportion of treated sewage effluent, which gives rise to water quality concerns, particularly associated with introducing River Trent water to Blithfield reservoir which is also used for recreational activities. Similarly, there may be Invasive Non-Native Species (INNS) transfer implication which should be assessed during subsequent option development. The River Trent and Blithfield reservoir are likely to offer different types of habitat thereby presenting less opportunity for INNS populations to become established as a result of the transfer.					
Activity Based Risk Assessment Summary					
Construction Pre-Mitigation: There is a major pre-mitigation risk of INNS transfer occurring at the construction phase as the option requires the construction of new infrastructure outside of any existing site/compound and is likely to result in the transfer of biological material through the transport of significant quantities of topsoil, aggregates, vegetation or raw water. Post-Mitigation: Although extensive construction activities are required which result in increased distribution of terrestrial and aquatic INNS, the risk is considered minor assuming best practice biosecurity measures will be adopted during construction.					
Operation Pre-Mitigation: There is a High Risk of INNS transfer occurring during the operation of the option resulting from the abstraction/transfer of raw water utilising an open channel transfer mechanism and/or terminating at an open reservoir or channel. Post-Mitigation: The scheme will establish a new pathway for the distribution of INNS. There is no existing pathway of transfer to Blithefield Reservoir from the River Trent, the transfer of water in an upstream direction will create a new pathway for transferring INNS which may not currently be present at the reservoir and within the downstream watercourse. Mitigation to prevent the transfer of INNS propagules during the transfer in order to reduce the INNS transfer risk.					
Maintenance Pre-Mitigation: There is a major pre-mitigation risk of INNS transfer occurring during maintenance resulting from the use of machinery such as dredges and excavators and the transport of biological material such as screen debris and pipeline fouling. Post-Mitigation: It is assumed that maintenance will be undertaken under best practice mitigation measures in view of the company-wide biosecurity plan and waste materials potentially containing INNS propagules such as screen debris or mechanical filtration solids will be handled appropriately.					
Activity based Risk Assessment Summary					
Construction Activity Risk					
Pre-Mitigation		Major Risk		Post Mitigation	
				Minor	
Operational Activity Risk					
Pre-Mitigation		Major Risk		Post Mitigation	
				Major	
Maintenance Activity Risk					
Pre-Mitigation		Major Risk		Post Mitigation	
				Negligible	
INNS Record Risk Assessment Summary					
A total of 6 INNS have been recorded within 500 meters of the proposed scheme infrastructure. Occurrence density mapping shows concentrations of INNS at Blithfield Reservoir. Plant species such as sycamore and Spanish bluebell are likely to represent a risk during the construction phase due to the likelihood of being spread during the movement of plant equipment, soils, and aggregates. Similarly, during construction terrestrial insect species Harlequin Ladybird and Horse chestnut leaf miner are likely to represent a transfer risk. During the operation phase aquatic and riparian species such as New Zealand mudsnail and Canadian pondweed are likely to present a risk due to the likelihood of being spread during the transfer of raw water. During maintenance phase, plant species Canadian pondweed may present a potential risk due to the likelihood of being spread during maintenance related activities, such as dredging and clearing screen debris. Additionally, although not captured within the search area the River Trent and wider catchment contains numerous high risk invasive species including quagga mussel, Himalayan Balsam, Japanese knotweed and numerous other which may present a risk at all stage of the scheme. The application of mitigation during each phase is likely to reduce the potential risk of spread of the species listed to a varying extent.					
INNS Occurrence Records					
Common Name		Scientific Name		Occurences	
New Zealand Mudsnail		Potamopyrqus antipodarum		20	
Harlequin Ladybird		Harmonia axyridis		4	
Sycamore		Acer pseudoplatanus		4	
Horse-Chestnut Leaf-miner		Cameraria ohridella		4	
Canadian Pondweed		Elodea canadensis		2	
Spanish Bluebell		Hyacinthoides hispanica		1	

Scheme Reference	Option Name	Source Type	RAG Score	Minor	
2.2.1.1	Blithfield Reservoir - 1m raising	Surface water			
Option Description			Construction required	Yes	
Blithfield Reservoir has a stated capacity of 18,172Ml and a surface area of 3,200,000m2 when full to its current top water level of 95.25mAOD. It is used for water supply and recreation and is built across the River Blithe and Tad Brook. The reservoir, built around 1953, is retained by an earth fill embankment with puddle clay core about 16m high and 856m long. The reservoir is crossed by a roadembankment, 487m long, that is characterised by a causeway formed of a bridge approximately 70m long. This option intends raising the reservoir full supply level by approximately 1m. This will enlarge the actual storage volume of 18,172 Ml to provide an additional 3,180 Ml storage. It is envisaged that the main items included in the works will be as follows: - Raising of the main embankment dam by 1m by forming a reinforced concrete wall, connected to the clay core by interlocking plastic sheet piles, and earthworks to the downstream slope of the embankment. - Raising of the draw off tower, the footbridge and its piers, the main and auxiliary spillways, and the bridges over the spillways. To raise the main and auxiliary spillways a new fuse gate has been envisaged. A new set of props between the raised spillway side walls has been assumed. - Raising of the stilling basin side walls, and extension of the stilling basin approximately 3m downstream. - Raising of the road embankment on the upstream slope, including the existing causeway bridge. Consequently, the road would be shifted about 2.5m upstream. - Two borrow pits have been considered near both embankments in dry land outside of the reservoir. To be conservative, the volume of fill material borrowed was assumed to be twice the granular material needed for the raising of the embankments. - An allowance for land acquisition and compensation to affected landowners. It is currently assumed that there would be no change to abstraction licensing. Any additional land take would potentially be within existing SST land holding.			Raw Water Transfer?	No	
			Maintenance required?	Yes	
			  Legend <= 5 Recorded Occurrences w <= 5 Recorded Occurrences within 500m 5 - 25 Recorded Occurrences within 500m 25 - 50 Recorded Occurrences within 500m - Blithfield Reservoir Figure Title: Invasive Non-Native species record density and Scheme 2.2.1 option elements. Date: April 2022 Crown Copyright Ordnance Survey (2021)		
Activity Based Risk Assessment Summary					
Construction Pre-Mitigation: There is a minor pre-mitigation risk of INNS transfer occuring at the construction phase as the option requires the construction of new infrastructure inside of an existing site but does not involve the haulage of significant quantaties of materials such as top soils, vegetation and rawwater. Post-Mitigation: Although extensive construction activities are required which result in increased distribution of terrestrial and aquatic INNS, the risk is considered as minor assuming best practice biosecurity measures will be adopted during construction.					
Operation Pre-Mitigation: There is a negligible risk of INNS transfer occuring during the operation as the option does not involve the abstration/transfer of raw water and does not utilise open channel transfer mechanisms and does not terminate at an open channel or reservoir. Post-Mitigation: Increasing the capacity of Blithfield reservoir may in effect increase the potential habitat for aquatic and riparian INNS with in turn may increase the primary and secondary transfer risk. Provided the additional volume is utilised for the supply of Seedy Mill WTW and is not utilised for the downstream transfer and assuming best practice biosecurity measures (such as signs, wash down facilities for recreational users, etc). the risk to the downstream catchment and INNS distribution overall is Minor.					
Maintenance Pre-Mitigation: There is a major pre-mitigation risk of INNS transfer occuring during maintenance resulting from the use of machinery such as dredges and excavators and the transport of biological material such as screen debris and pipeline foulings. Post-Mitigation: It is assumed that maintenance will be undertaken under best practice mitigation measures in view of the company wide biosecurity plan and waste materials potentially containing INNS propogules such as screen debris or mechanical filtration solids will be handled appropriately.					
Activity based Risk Assessment Summary					
Construction Activity Risk					
Pre-Mitigation		Minor Risk	Post Mitigation		
			Minor		
Operational Activity Risk					
Pre-Mitigation		Negligible Risk	Post Mitigation		
			Negligible		
Maintenance Activity Risk					
Pre-Mitigation		Major Risk	Post Mitigation		
			Negligible		
INNS Record Risk Assessment Summary					
A total of 6 INNS have been recorded within 500 meters of the proposed scheme infrastructure. Occurrence density mapping shows concentrations of INNS at Blithfield Reservoir. Plant species such as sycamore and Spanish bluebell are likely to represent a risk during the construction phase due to the likelihood of being spread during the movement of plant equipment, soils, and aggregates. Similarly, during construction terrestrial insect species Harlequin Ladybird and Horse chestnut leaf miner are likely to represent a transfer risk. Aquatic species such as New Zealand mudsnail and Canadian pondweed are likely to present a risk due to the likelihood of being spread by construction required around the waterbody. These species also present risks during the operation of the reservoir as INNS could be transferred through recreational activities at the reservoir. During maintenance phase, plant species Canadian pondweed may present a potential risk due to the likelihood of being spread during maintenance related activities, such as dredging and clearing screen debris. Additionally, although not captured within the search area the River Trent and wider catchment contains numerous high risk invasive species including quagga mussel, Himalayan Balsam, Japanese knotweed and numerous other which may present a risk at all stage of the scheme. The application of mitigation during each phase is likely to reduce the potential risk of spread of the species listed to a varying extent.			INNS Occurrence Records		
			Common Name	Scientific Name	Occurences
			New Zealand Mudsnail	Potamopyrgus antipodarum	20
			Harlequin Ladybird	Harmonia axyridis	4
			Sycamore	Acer pseudoplatanus	4
			Horse-Chestnut Leaf-miner	Cameraria ohridella	4
			Canadian Pondweed	Elodea canadensis	2
			Spanish Bluebell	Hyacinthoides hispanica	1

Scheme Reference	Option Name	Source Type	RAG Score	Minor	
2.3.1	Chelmarsh reservoir 15MI/d	Surface water			
Option Description			Construction required	Yes	
This option is aimed to raise the reservoir full supply level by approximately 1 m. This will enlarge the actual storage volume of 3,063 MI to provide an additional 420 MI storage. The storage capacity has been estimated using GIS based tools included within AutoCAD Civils 3D software. AutoCAD drawings have been prepared based on the Ordnance Survey mapping and the record drawings to perform a design sketch of the raised dams. These sketches were used to form the bill of quantities to allow a high-level cost estimate of this option. It is envisaged that the main items included in the works will be as follows: - Raising of the main embankment dam by 1 m by forming a reinforced concrete wall, connected to the clay core by interlocking plastic sheet piles, and earthworks to the downstream slope of the embankment. - Raising of the overflow and inlet towers, the footbridges, and their piers. - Extension of the culvert and stilling basin approx. 3 m downstream. - Raising of the subsidiary dams on the downstream slope. Consequently, the road would be shifted about 2.5m upstream. - Two borrow pits have been considered near the embankments in dry land outside of the reservoir. To be conservative, the volume of fill material borrowed was assumed to be twice the granular material needed for the raising of the embankments. Land acquisition and compensation to affected landowners.			Raw Water Transfer?	No	
			Maintenance required?	Yes	
Activity Based Risk Assessment Summary					
Construction <i>Pre-Mitigation:</i> There is a major pre-mitigation risk of INNS transfer occurring at the construction phase as the option requires the construction of new infrastructure outside of any existing site/compound and is likely to result in the transfer of biological material through the transport of significant quantities of topsoil, aggregates, vegetation or raw water. <i>Post-Mitigation:</i> Although extensive construction activities are required which result in increased distribution of terrestrial and aquatic INNS, the risk is considered as minor assuming best practice biosecurity measures will be adopted during construction. Operation <i>Pre-Mitigation:</i> There is a Medium risk of INNS transfer occurring during the operation of the option resulting from termination of the option at an open reservoir or channel. <i>Post-Mitigation:</i> Increasing the capacity of the Chelmarsh reservoir may in effect increase the potential habitat for aquatic and riparian INNS with in turn may increase the primary and secondary transfer risk. Provided the additional volume is utilised through the supply network and is not utilised for the downstream transfer and assuming best practice biosecurity measures (such as signs, wash down facilities for recreational users, etc). the risk to the downstream catchment and INNS distribution overall is Minor. Maintenance <i>Pre-Mitigation:</i> There is a major pre-mitigation risk of INNS transfer occurring during maintenance resulting from the transport of biological material such as screen debris and pipeline fouling. <i>Post-Mitigation:</i> It is assumed that maintenance will be undertaken under best practice mitigation measures in view of the company-wide biosecurity plan and waste materials potentially containing INNS propagules such as screen debris or mechanical filtration solids will be handled appropriately.			  Legend Heatmap Band 1 (Gray) <= 5 Recorded Occurrences within 500m 5 - 25 Recorded Occurrences within 500m 25 - 50 Recorded Occurrences within 500m > 50 Recorded Occurrences within 500m 2.3.1 ● Chelmarsh Reservoir point ■ Chelmarsh Reservoir Figure Title: Invasive Non-Native species record density and Scheme 2.3.1 option elements. Date: April 2022 Crown Copyright Ordnance Survey (2021)		
Activity based Risk Assessment Summary					
Construction Activity Risk					
Pre-Mitigation		Major Risk	Post Mitigation		Minor
Operational Activity Risk					
Pre-Mitigation		Moderate Risk	Post Mitigation		Negligible
Maintenance Activity Risk					
Pre-Mitigation		Major Risk	Post Mitigation		Negligible
INNS Record Risk Assessment Summary					
A total of 6 INNS have been recorded within 500 meters of the proposed scheme infrastructure. Occurrence density mapping shows concentrations of INNS at Chelmarsh reservoir and neighbouring agricultural land. Plant species such as ground elder, sycamore and cherry laurel are likely to represent a risk during the construction phase due to the likelihood of being spread during the movement of plant equipment, soils, and aggregates. Zebra Mussel is recorded present at the reservoir and represent a risk during all stages of the scheme. The application of mitigation during each phase is likely to reduce the potential risk of the spread of the species listed to a varying extent.					
INNS Occurrence Records					
Common Name		Scientific Name		Occurences	
Zebra Mussel		<i>Dreissena polymorpha</i>		12	
Ground Elder		<i>Aegopodium podagraria</i>		1	
Cherry Laurel		<i>Prunus laurocerasus</i>		1	
Sycamore		<i>Acer pseudoplatanus</i>		1	
Lilac		<i>Syringa vulgaris</i>		1	
Douglas Fir		<i>Pseudotsuga menziesii</i>		1	

Scheme Reference	Option Name	Source Type	RAG Score	Minor	
2.3.2	Chelmarsh Reservoir 30MI/d	Surface water			
Option Description			Construction required	Yes	
This option is aimed to raise the reservoir full supply level by approximately 2 m. This will enlarge the actual storage volume of 3,063 MI to provide an additional 890 MI storage. The storage capacity has been estimated using GIS based tools included within AutoCAD Civils 3D software. AutoCAD drawings have been prepared based on the Ordnance Survey mapping and the record drawings to perform a design sketch of the raised dams. These sketches were used to form the bill of quantities to allow a high-level cost estimate of this option. It is envisaged that the main items included in the works will be as follows: - Raising of the main embankment dam by 2 m by earthworks to the crest and downstream slope of the embankment. - Raising of the overflow and inlet towers, the footbridges, and their piers. - Extension of the culvert and stilling basin approx. 10 m downstream. - Raising of the subsidiary dams on the downstream slope. Consequently, the road would be shifted about 5.0m upstream. - Two borrow pits have been considered near the embankments in dry land outside of the reservoir. To be conservative, the volume of fill material borrowed was assumed to be twice the granular material needed for the raising of the embankments. Land acquisition and compensation to affected landowners.			Raw Water Transfer?	No	
			Maintenance required?	Yes	
Activity Based Risk Assessment Summary			  Legend Heatmap Band 1 (Gray) <= 5 Recorded Occurrences within 500m 5 - 25 Recorded Occurrences within 500m 25 - 50 Recorded Occurrences within 500m > 50 Recorded Occurrences within 500m 2.3.2 ● Chelmarsh Reservoir point ■ Chelmarsh Reservoir Figure Title: Invasive Non-Native species record density and Scheme 2.3.2 option elements. Date: April 2022 Crown Copyright Ordnance Survey (2021)		
Activity based Risk Assessment Summary			INNS Occurrence Records		
Construction Activity Risk			Common Name	Scientific Name	Occurrences
Pre-Mitigation	Major Risk	Post Mitigation	Zebra Mussel	<i>Dreissena polymorpha</i>	12
Operational Activity Risk			Ground Elder	<i>Aegopodium podagraria</i>	1
Pre-Mitigation	Moderate Risk	Post Mitigation	Cherry Laurel	<i>Prunus laurocerasus</i>	1
Maintenance Activity Risk			Sycamore	<i>Acer pseudoplatanus</i>	1
Pre-Mitigation	Major Risk	Post Mitigation	Lilac	<i>Syringa vulgaris</i>	1
INNS Record Risk Assessment Summary			Douglas Fir	<i>Pseudotsuga menziesii</i>	1
A total of 6 INNS have been recorded within 500 meters of the proposed scheme infrastructure. Occurrence density mapping shows concentrations of INNS at Chelmarsh reservoir and neighbouring agricultural land. Plant species such as ground elder, sycamore and cherry laurel are likely to represent a risk during the construction phase due to the likelihood of being spread during the movement of plant equipment, soils, and aggregates. Zebra Mussel is recorded present at the reservoir and represent a risk during all stages of the scheme. The application of mitigation during each phase is likely to reduce the potential risk of the spread of the species listed to a varying extent.					

Scheme Reference	Option Name	Source Type	RAG Score	Minor
6.1.1	Trent 40 MI/d - new sw intake with 14 day bankside storage and treatment works	Surface water		
Option Description			Construction required	Yes
This option seeks to make use of the available water in the River Trent by installing a new 40 MI/d capacity treatment works adjacent to the River Trent between Rugeley and Yoxall. Due to the likely summer season HoF restrictions to abstraction a new bankside storage reservoir will be required. Water quality on the River Trent is poor so treatment needs are expected to result in high cost for the option for both capital investment and the operational cost requirements. The proposed option is to install a new river abstraction (40MI/d) on the River Trent which discharges via a new pipeline (0.1km, 900mm, 115kW) into a new bankside storage reservoir (8,052MI, equating to 183 days at 40 MI/d and 10% of ‘dead’ storage). The storage reservoir (161ha) is to be sized to provide 6 months storage to enable continued treatment works output when the River Trent is subject to HoF. There may be opportunity to use former gravel workings in the area, both for land and for first stage settlement of river water. However, it should be noted that abstractions from gravel aquifers or former quarry lakes will not be exempt from HoF restrictions, so a new dedicated storage reservoir is likely to be required. A new water treatment works (10ha) with design capacity of 40 MI/d (1MW power supply) will be constructed. The exact works will need to be designed in accordance with water quality data which requires further investigation and study. A notional treatment plant comprising clarifiers, filters, GAC plant, Manganese contactor and chlorine disinfection has been included for the purpose of this option assessment. A new pipeline connection (0.2km, 900mm) will be required between the bankside storage and WTW. New pipelines will be required between the new treatment works and the existing SST distribution grid. It is proposed that two connections are installed. The first to the network supplying Burton on Trent (25 MI/d, 4.7km, 750mm and a 210kW pump (420kW pumping station)) thereby reducing demand on Seedy Mill WTW, the second to Seedy Mill WTW for distribution into the rest of the SST grid (15 MI/d, 5.0km, 600mm and new 90kW pump (180kW pumping station)). Further investigation is required to establish suitable sites for the proposed storage and treatment works. For the purpose of this option assessment, a notional location near to Kings Bromley has been suggested. Land acquisition will be required for this option for both the treatment works and bankside storage. Linear land compensation is also required for the construction of the new pipelines. New links into the power supply grid will be required at the abstraction point and at the new treatment works. An overall delivery period of 10 years.			Raw Water Transfer?	Yes
			Maintenance required?	Yes
			  Legend Heatmap Band 1 (Gray) <= 5 Recorded Occurrences within 500m 5 - 25 Recorded Occurrences within 500m 25 - 50 Recorded Occurrences within 500m > 50 Recorded Occurrences within 500m 6.1.1 Pipeline Figure Title: Invasive Non-Native species record density and Scheme 6.1.1 option elements. Date: April 2022 Crown Copyright Ordnance Survey (2021)	
Activity Based Risk Assessment Summary				
Construction Pre-Mitigation: There is a major pre-mitigation risk of INNS transfer occurring at the construction phase as the option requires the construction of new infrastructure outside of any existing site/compound and is likely to result in the transfer of biological material through the transport of significant quantities of topsoil, aggregates, vegetation or raw water. Post-Mitigation: Although extensive construction activities are required which result in increased distribution of terrestrial and aquatic INNS, the risk is considered minor assuming best practice biosecurity measures will be adopted during construction.				
Operation Pre-Mitigation: There is a High Risk of INNS transfer occurring during the operation of the option resulting from the abstraction/transfer of raw water utilising an open channel transfer mechanism and/or terminating at an open reservoir or channel. Post-Mitigation: The scheme creates a new pathway for the distribution of INNS between the River Trent and a new waterbody which could in turn provide secondary distribution pathways for introducing new INNS into the River Trent during releases into the river. The risk is considered minor given the nature of the river Trent at the source and the assumption that the storage reservoir will not be utilised for recreational activities.				
Maintenance Pre-Mitigation: There is a major pre-mitigation risk of INNS transfer occurring during maintenance resulting from the use of machineries such as dredges and excavators and the transport of biological material such as screen debris and pipeline fouling. Post-Mitigation: It is assumed that maintenance will be undertaken under best practice mitigation measures in view of the company-wide biosecurity plan and waste materials potentially containing INNS propagules such as screen debris or mechanical filtration solids will be handled appropriately.				
Activity based Risk Assessment Summary				
Construction Activity Risk				
Pre-Mitigation	Major Risk	Post Mitigation	Minor	
Operational Activity Risk				
Pre-Mitigation	Major Risk	Post Mitigation	Minor	
Maintenance Activity Risk				
Pre-Mitigation	Major Risk	Post Mitigation	Negligible	
INNS Record Risk Assessment Summary				
A total of 3 INNS have been recorded within 500 meters of the proposed scheme infrastructure. Occurrence density mapping shows concentrations of INNS close to Seedy Mill WTW and along the A513 which intersects the pipeline route. Terrestrial species such Himalayan balsam and harlequin ladybird are likely to represent a risk during the construction phase due to the likelihood of being spread during the movement of plant equipment, soils, and aggregates. New Zealand mudsnail and Himalayan Balsam may present a risk during operation if unexpected discharges occur. During maintenance phase, Himalayan balsam, and New Zealand mudsnail may present a potential risk due to the likelihood of being spread during maintenance related activities, such as dredging and clearing screen debris. Additionally, although not captured within the search area the River Trent and wider catchment contains numerous high risk invasive species including quagga mussel, Himalayan Balsam, Japanese knotweed and numerous other which may present a risk at all stage of the scheme. The application of mitigation during each phase is likely to reduce the potential risk of spread of the species listed to a varying extent.				
INNS Occurrence Records				
Common Name	Scientific Name	Occurences		
New Zealand Mudsnail	<i>Potamopyrgus antipodarum</i>	19		
Himalayan Balsam	<i>Impatiens glandulifera</i>	12		
Harlequin Ladybird	<i>Harmonia axyridis</i>	1		

Scheme Reference	Option Name	Source Type	RAG Score	Minor		
6.1.3	Trent 70 MI/d - new sw intake with 14-day bankside storage and treatment works	Surface water				
Option Description			Construction required	Yes		
This option seeks to make use of the available water in the River Trent by installing a new 70 MI/d capacity treatment works adjacent to the River Trent between Alrewas and Burton. Due to the likely summer season HoF restrictions to abstraction a new bankside storage reservoir will be required. Water quality on the River Trent is poor so treatment needs are expected to result in high cost for the option for both capital investment and the operational cost requirements. The proposed option is to install a new river abstraction on the River Trent which discharges into a new bankside storage reservoir (14,090 MI, equating to 183 days at 70 MI/d and 10% of 'dead' storage). The storage reservoir (282ha) is to be sized to provide 6 months storage to enable continued treatment works output when the River Trent is subject to HoF. This is to be separated into two reservoir units. Bankside storage 1 would comprise of: a new river intake (200kW) and pumping into bankside storage 1, a new pipeline (0.1km, 1,200mm) between river intake and bankside storage 1, a new inlet to bankside storage 1, a new outlet from bankside storage and associated pumping (200kW), and a new pipeline (1.7km, 1,200mm) between bankside storage and WTW. Bankside storage 2 would comprise of: a new river intake (200kW) and pumping into bankside storage 2, a new pipeline (0.1km, 1200mm) between river intake and bankside storage 2, a new inlet to bankside storage 2, a new outlet from bankside storage and associated pumping (200kW) and a new pipeline (0.8km, 1,200mm) between bankside storage and WTW. There may be opportunity to use former gravel workings in the area, both for land and for first stage settlement of river water. However, it should be noted that abstractions from gravel aquifers or former quarry lakes will not be exempt from HoF restrictions, so a new dedicated storage reservoir will be required. A new water treatment works (10ha) with design capacity of 70 MI/d will be constructed. The exact works will need to be designed in accordance with water quality data which requires further investigation and study. A notional treatment plant comprising clarifiers, filters, GAC plant, Manganese contactor and chlorine disinfection has been included for the purpose of this option assessment. New pipelines will be required between the new treatment works and the existing SST distribution grid. It is proposed that two connections are installed. The first to the network supplying Burton on Trent (25MI/d, 0.5km, 750mm and a 220kW pump (440kW pumping station)) thereby reducing demand on Seedy Mill WTW, the second to Seedy Mill WTW for distribution into the rest of the SST grid (45 MI/d, 11.8km, 900mm and new 300kW pump (600kW pumping station)). Further investigation is required to establish suitable sites for the proposed storage and treatment works. For the purpose of this option assessment a notional location near to Walton on Trent has been suggested. Land acquisition will be required for this option for both the treatment works and bankside storage. Linear land compensation is also required for the installation of the new pipelines. New links into the power supply grid will be required at the abstraction point and at the new treatment works. The average deployable output (DO) is anticipated to be 60 MI/d (70 MI/d peak). An overall delivery period of 10 years.			Raw Water Transfer?	Yes		
			Maintenance required?	Yes		
Activity Based Risk Assessment Summary Construction <i>Pre-Mitigation:</i> There is a major pre-mitigation risk of INNS transfer occurring at the construction phase as the option requires the construction of new infrastructure outside of any existing site/compound and is likely to result in the transfer of biological material through the transport of significant quantities of topsoil, aggregates, vegetation or raw water. <i>Post-Mitigation:</i> Although extensive construction activities are required which result in increased distribution of terrestrial and aquatic INNS, the risk is considered minor assuming best practice biosecurity measures will be adopted during construction. Operation <i>Pre-Mitigation:</i> There is a High Risk of INNS transfer occurring during the operation of the option resulting from the abstraction/transfer of raw water utilising an open channel transfer mechanism and/or terminating at an open reservoir or channel. <i>Post-Mitigation:</i> The scheme creates a new raw water transfer pathway for the distribution of INNS between the River Trent and two new waterbodies which could in turn provide secondary distribution pathways for introducing new INNS into the River Trent during releases into the river. The risk is considered minor given the distance of the proposed pipeline and the nature of the river Trent at the source and the assumption that the storage reservoir will not be utilised for recreational activities. Maintenance <i>Pre-Mitigation:</i> There is a major pre-mitigation risk of INNS transfer occurring during maintenance resulting from the use of machinery such as dredges and excavators and the transport of biological material such as screen debris and pipeline fouling. <i>Post-Mitigation:</i> It is assumed that maintenance will be undertaken under best practice mitigation measures in view of the company-wide biosecurity plan and waste materials potentially containing INNS propagules such as screen debris or mechanical filtration solids will be handled appropriately.						
						
			Legend <= 5 Recorded Occurrences within 500m <= 5 Recorded Occurrences within 500m 5 - 25 Recorded Occurrences within 500m 25 - 50 Recorded Occurrences within 500m 70Mld Trent at Alrewas storage 70Mld Trent at Alrewas pipeline			
			Figure Title: Invasive Non-Native species record density and Scheme 6.1.3 option elements.			
			Date: April 2022 Crown Copyright Ordnance Survey (2021)			
Activity based Risk Assessment Summary						
Construction Activity Risk						
Pre-Mitigation	Maior Risk	Post Mitigation	Minor			
Operational Activity Risk						
Pre-Mitigation	Maior Risk	Post Mitigation	Minor			
Maintenance Activity Risk						
Pre-Mitigation	Maior Risk	Post Mitigation	Nealigible			
INNS Record Risk Assessment Summary						
A total of 10 INNS have been recorded within 500 meters of the proposed scheme infrastructure. Occurrence density mapping shows concentrations of INNS close to along the A515 which intersects the pipeline route, around Alrewas town centre and near Barton-under-Needwood quarry. Terrestrial species such Himalayan balsam, sycamore and harlequin ladybird are likely to represent a risk during the construction phase due to the likelihood of being spread during the movement of plant equipment, soils, and aggregates. Aquatic species like New Zealand musnail, signal crayfish and Nuttall's waterweed may present a risk during operation of the scheme as the scheme creates a new pathway for these INNS. During the maintenance phase, Himalayan balsam, Nuttall's waterweed and New Zealand mudsnail may present a potential risk due to the likelihood of being spread during maintenance-related activities, such as dredging and clearing screen debris. Additionally, although not captured within the search area the River Trent and wider catchment contains numerous other high-risk invasive species including quagga mussel, and Japanese knotweed which may present a risk at all stage of the scheme. The application of mitigation during each phase is likely to reduce the potential risk of the spread of the species listed to a varying extent.			INNS Occurrence Records			
			Common Name	Scientific Name	Occurences	
			New Zealand Mudsnail	<i>Potamopvraus antipodarum</i>	19	
			Himalavan Balsam	<i>Impatiens alandulifera</i>	14	
			Svcamore	<i>Acer pseudoplatanus</i>	10	
			Horse-Chestnut Leaf-miner	<i>Cameraria ohridella</i>	8	
			Least Duckweed	<i>Lemna minuta</i>	6	
			Signal Crayfish	<i>Pacifastacus leniusculus</i>	5	
			Harlequin Ladybird	<i>Harmonia axyridis</i>	4	
			Nuttall's waterweed	<i>Elodea nuttallii</i>	4	
			Lily Beetle	<i>Lilioceris lili</i>	3	
			Western Conifer Seed Bua	<i>Leptoallossus occidentalis</i>	2	

Scheme Reference	Option Name	Source Type	RAG Score	Major
7.1.2.1	Canal & Rivers Trust (CRT): Birmingham to Blithfield or Central Works via canal network.	Third party		
Option Description			Construction required	Yes
This option seeks to make surplus water in the Birmingham Canal Network (BCN) available for water supply purposes. Surplus in the BCN can be supported by the CRT’s Bradley borehole and Chasewater Reservoir. The CRT have suggested using the canal network to transfer the water from source to locations more suitable for SST. This option proposes transferring the water to the Trent and Mersey canal where it can be abstracted by SST and used to supplement flows into Blithfield Reservoir. This could potentially be a more attractive alternative to taking water from the River Trent, particularly when the River Trent is subject to Hands-off Flow (HoF) restrictions. However, the dry year yield has been discounted owing to assumption of a 1 in 20-year restrictions by CRT. The option requires upgrades to the canal network to facilitate the transfer to the Trent and Mersey Canal. This broadly requires the provision of an upgraded pumping station (4 kW pump (88 kW pumping station)), lock bypasses, appropriate control equipment and a new abstraction point. Permanent land take would be required for the canal intake. There will be two inlet arrangements at the canal and at the reservoir. SST would also need to provide a new pipeline (6.2km, 450mm) from the abstraction point to Blithfield Reservoir. Once within Blithfield Reservoir the canal water would be blended with other inflows and treated at Seedy Mill WTW before onward distribution into water supply. The CRT have indicated that a transfer of up to 15 Ml/d is available. An overall delivery period of 10 years.			Raw Water Transfer?	Yes
			Maintenance required?	Yes
			 Legend <= 5 Recorded Occurrences within 500m <= 5 Recorded Occurrences within 500m 5 - 25 Recorded Occurrences within 500m 25 - 50 Recorded Occurrences within 500m Blithfield Reservoir and Staffordshire and Worcestershire Canal inlets Blithfield Reservoir main to Staffordshire and Worcestershire Canal Figure Title: Invasive Non-Native species record density and Scheme 7.1.2 option elements. Date: April 2022 Crown Copyright Ordnance Survey (2021)	
Activity Based Risk Assessment Summary				
Construction <i>Pre-Mitigation:</i> There is a major pre-mitigation risk of INNS transfer occurring at the construction phase as the option requires the construction of new infrastructure outside of any existing site/compound and is likely to result in the transfer of biological material through the transport of significant quantities of topsoil, aggregates, vegetation or raw water. <i>Post-Mitigation:</i> Although extensive construction activities are required which result in increased distribution of terrestrial and aquatic INNS, the risk is considered as minor assuming best practice biosecurity measures will be adopted during construction. Operation <i>Pre-Mitigation:</i> There is a High Risk of INNS transfer occurring during the operation of the option resulting from the abstraction/transfer of raw water utilising an open channel transfer mechanism and/or terminating at an open reservoir or channel. <i>Post-Mitigation:</i> The use of a canal as a transfer mechanism in this scenario poses a high risk, although there is an existing canal, the use of a canal for the transfer of raw water will provide a primary and secondary pathway for the transfer of INNS. Additionally, abstraction and transfer to Blithfield reservoir represent a new distribution pathway from a canal with significant boating traffic and numerous secondary pathways for the distribution of INNS. Mitigation is limited to standard best practice biosecurity measures (such as signs, wash-down facilities for recreational users, etc) which are likely to be only effective in reducing secondary pathway risks. Maintenance <i>Pre-Mitigation:</i> There is a major pre-mitigation risk of INNS transfer occurring during maintenance resulting from the use of machineries such as dredges and excavators and the transport of biological material such as screen debris and pipeline fouling. <i>Post-Mitigation:</i> It is assumed that maintenance will be undertaken under best practice mitigation measures in view of the company-wide biosecurity plan and waste materials potentially containing INNS propagules such as screen debris or mechanical filtration solids will be handled appropriately.				
Activity based Risk Assessment Summary				
Construction Activity Risk				
Pre-Mitigation	Major Risk	Post Mitigation	Minor	
Operational Activity Risk				
Pre-Mitigation	Major Risk	Post Mitigation	Major	
Maintenance Activity Risk				
Pre-Mitigation	Major Risk	Post Mitigation	Negligible	
INNS Record Risk Assessment Summary				
A total of 10 INNS have been recorded within 500 meters of the proposed scheme infrastructure. Occurrence density mapping shows concentrations of INNS around Blithfield Reservoir and around the River Sow in Shugborough Park. Terrestrial species such Himalayan balsam, ground elder and harlequin ladybird are likely to represent a risk during the construction phase due to the likelihood of being spread during the movement of plant equipment, soils, and aggregates. Aquatic species like New Zealand mud snail, signal crayfish and Nuttall’s waterweed present a risk during the operation of the scheme as the scheme creates a new pathway for these INNS, using a canal to transport raw water. During the maintenance phase, Himalayan balsam, Nuttall’s waterweed and New Zealand mudsnail may present a potential risk due to the likelihood of being spread during maintenance-related activities, such as dredging and clearing screen debris. The application of mitigation during each phase is likely to reduce the potential risk of the spread of the species listed to a varying extent.				
INNS Occurrence Records				
Common Name		Scientific Name	Occurences	
Harlequin Ladybird		<i>Harmonia axyridis</i>	18	
New Zealand Mudsnail		<i>Potamopyrqus antipodarum</i>	6	
Himalayan Balsam		<i>Impatiens glandulifera</i>	5	
Lily Beetle		<i>Lilioceris lili</i>	2	
Ground Elder		<i>Aegopodium podagraria</i>	1	
Canadian Pondweed		<i>Elodea canadensis</i>	1	
Signal Crayfish		<i>Pacifastacus leniusculus</i>	1	
Rosemary Beetle		<i>Chrysolina americana</i>	1	
Nuttall's waterweed		<i>Elodea nuttallii</i>	1	
Snowberry		<i>Symphoricarpos albus</i>	1	



Legend

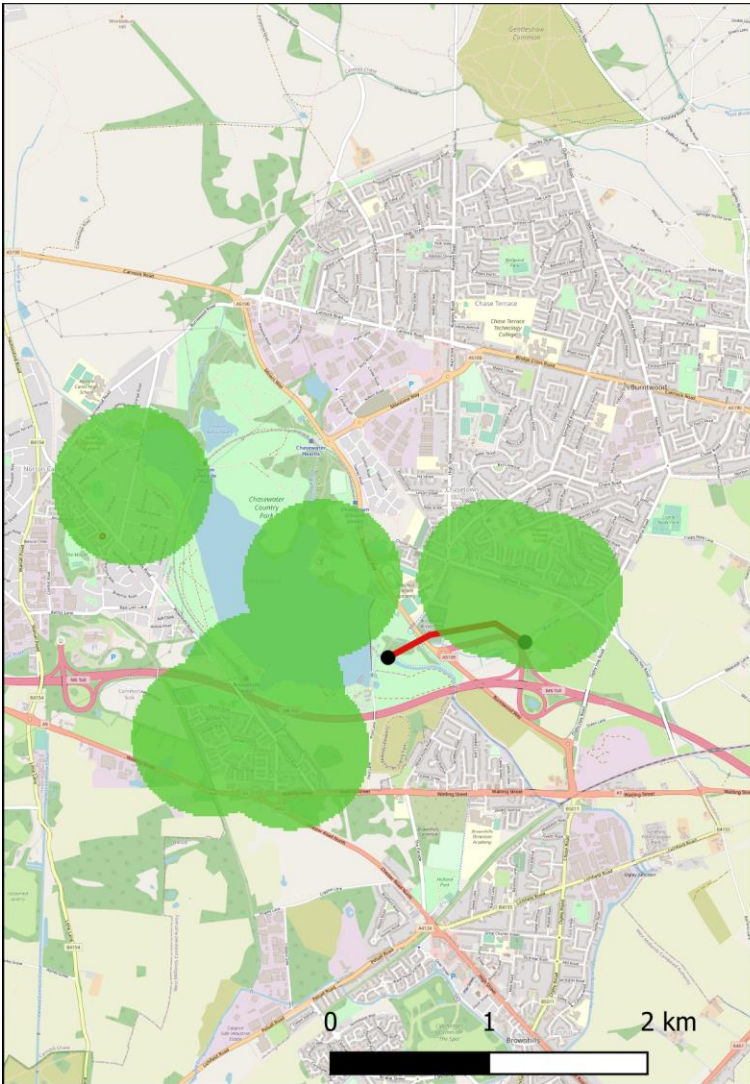
- <= 5 Recorded Occurences within 500m
- <= 5 Recorded Occurences within 500m
- 5 - 25 Recorded Occurences within 500m
- 25 - 50 Recorded Occurences within 500m
- Blithfield Reservoir and Staffordshire and Worcestershire Canal inlets
- Blithfield Reservoir main to Staffordshire and Worcestershire Canal

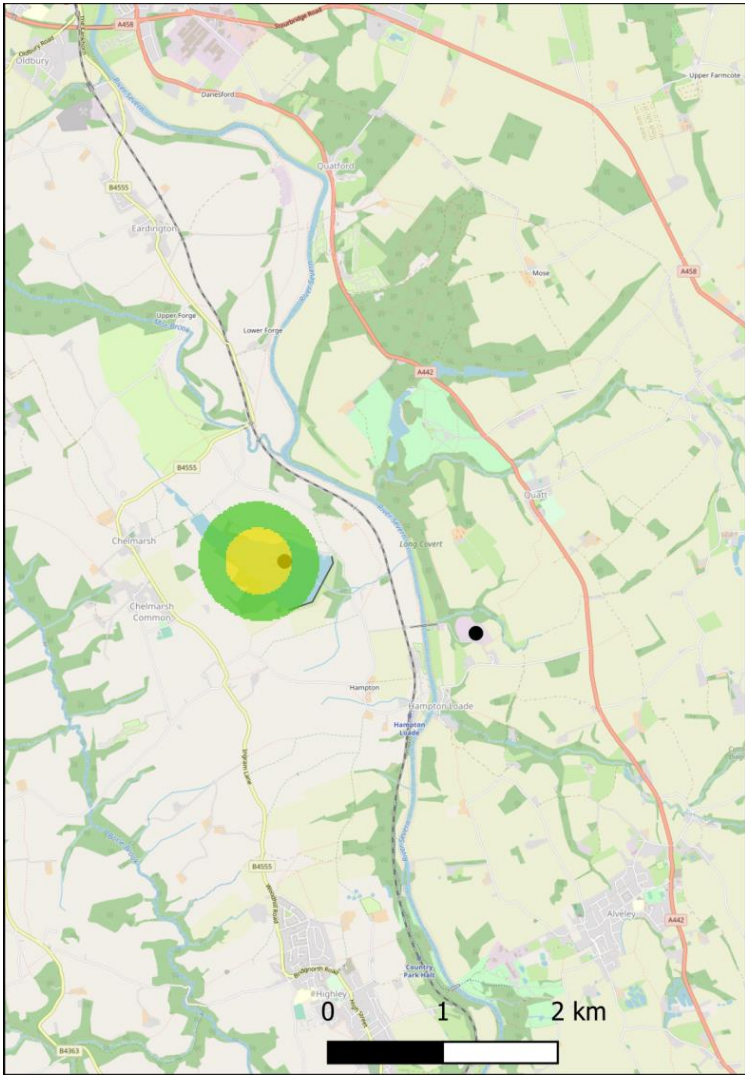
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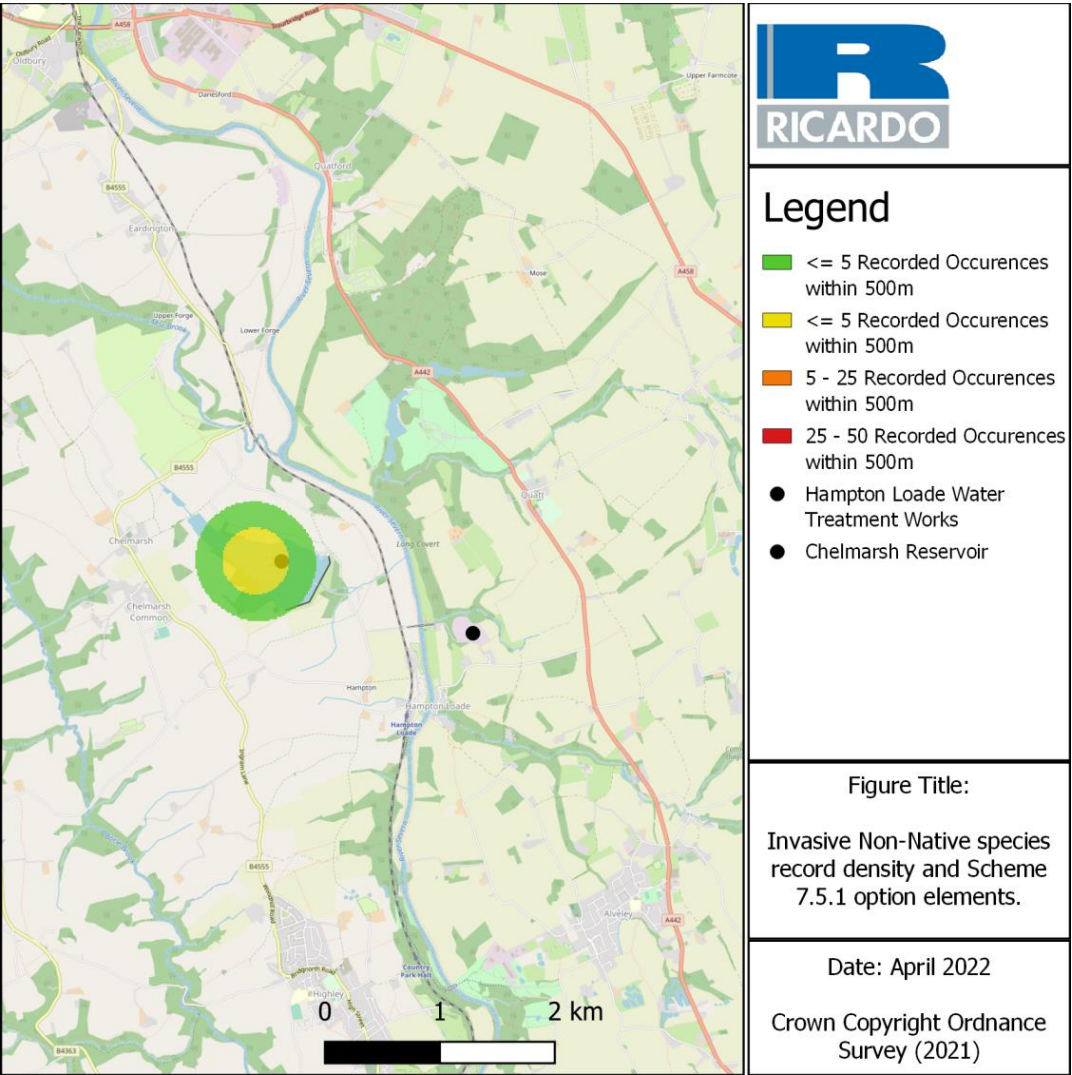
Invasive Non-Native species record density and Scheme 7.1.2 option elements.

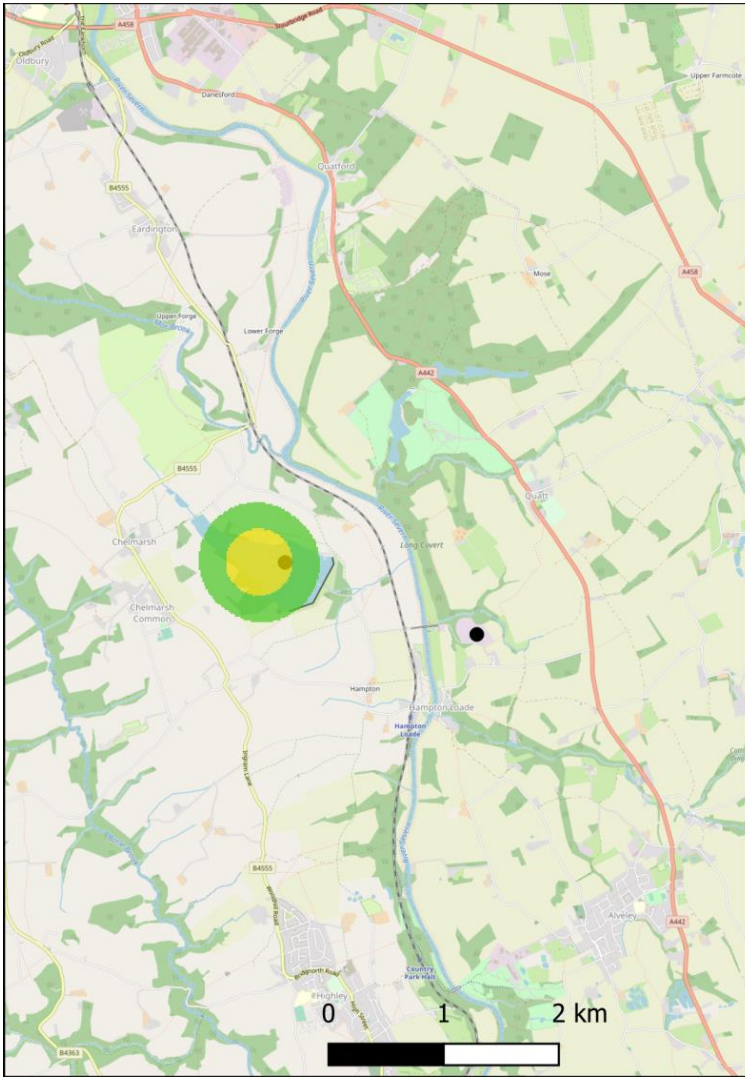
Date: April 2022

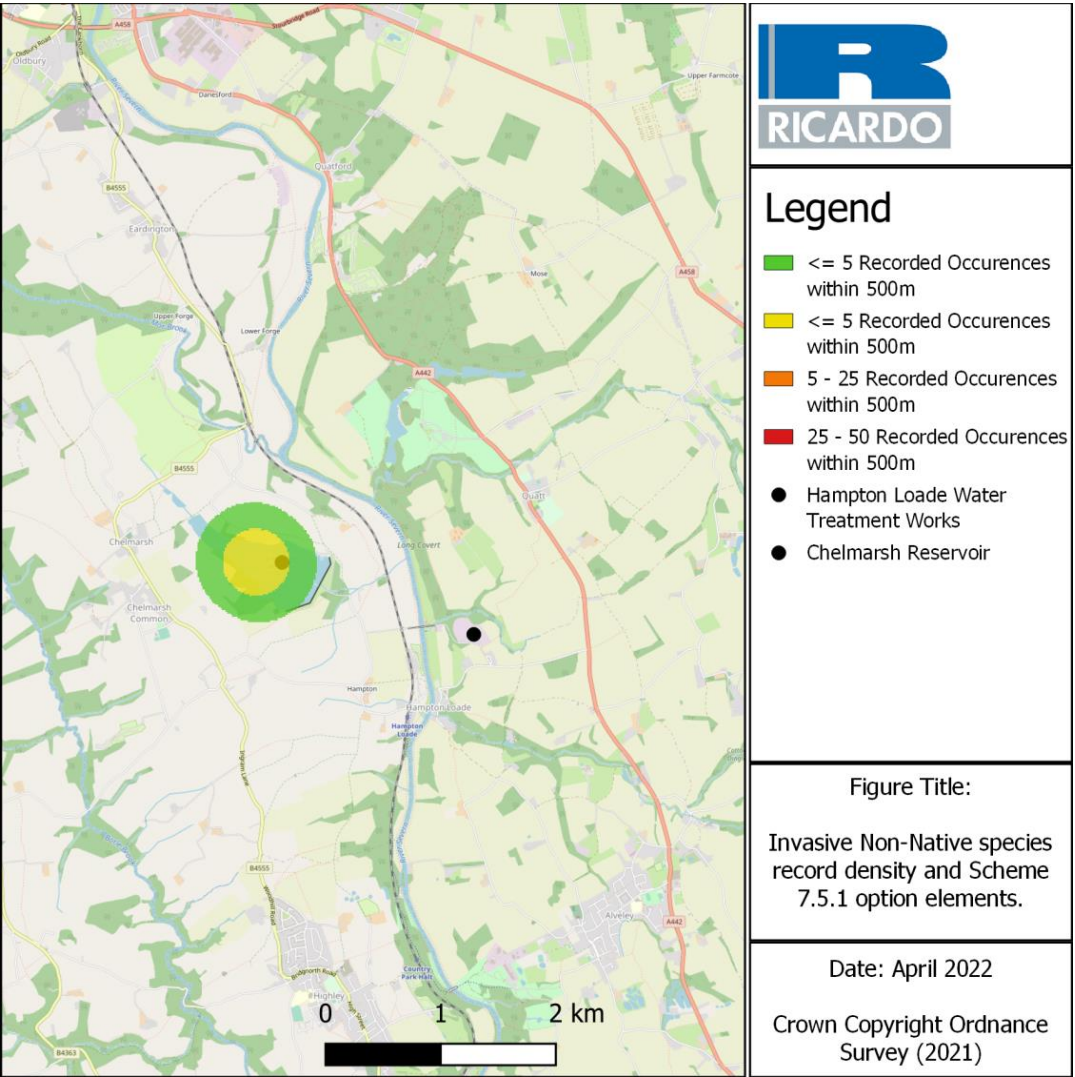
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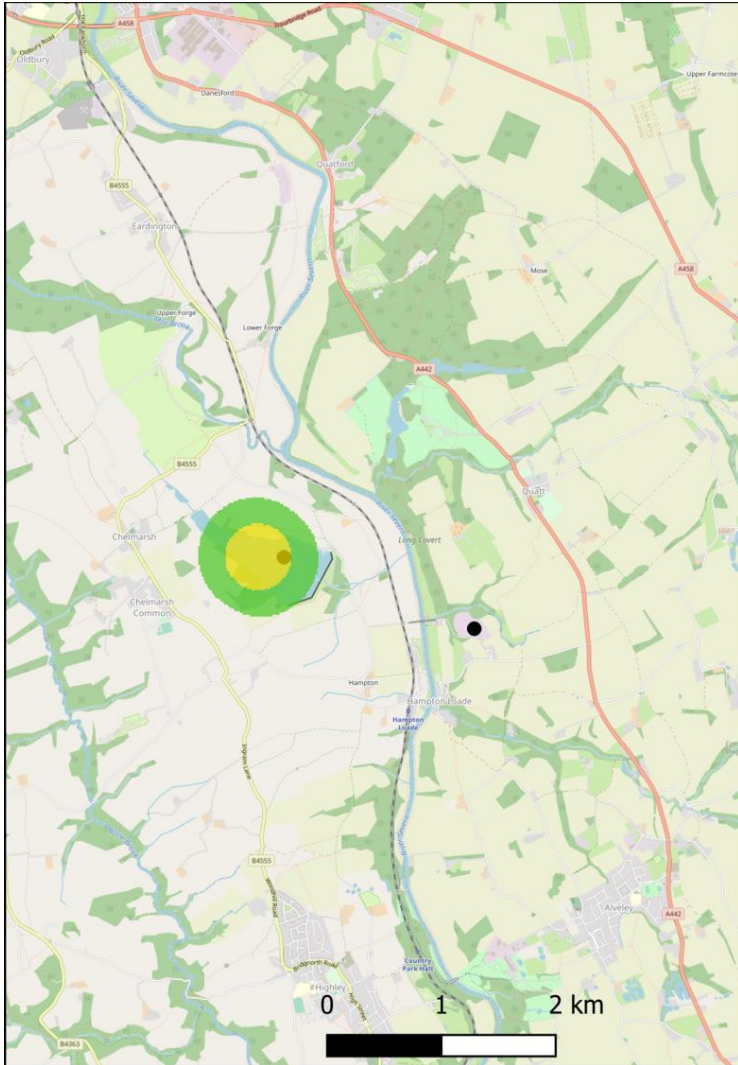
Scheme Reference	Option Name	Source Type	RAG Score	Major
7.1.5	Canal & Rivers Trust (CRT): Chasewater surplus to Crane Brook	Third party		
Option Description			Construction required	Yes
CRT to provide surplus from Chasewater Reservoir to SSW. Surplus would be fed from the reservoir to the Wryley & Essington Canal which would then in turn discharge to Cranes Brook. This would free up additional water in the catchment for SSW. The reservoir outflow is released via an automated structure from the Wryley & Essington Canal to the Crane Brook. Detailed hydrological modelling has not been undertaken to determine the surplus, but it is likely to be in the region of 2- 5 MI/d. The main items included in the work are envisaged to be: 1.0km of new 450mm dia pipeline between the Chasewater outlet and Crane Brook. To be conveyed by gravity. - Two inlet arrangements (canal and a discharge to the brook. - Drill new borehole at Pipehill, with new borehole pumps, new headworks and new building. 0.9m of new 450mm dia main to connect new borehole to the existing Pipehill treatment plant. - New 14kW pump (28kW pumping station at new borehole. - Existing treatment at Pipehill WTW. - Existing distribution network from Pipehill BH WTW. - Compensation for linear pipeline scheme - Land for SSW access around Crane Brook site (priced as 1 ha at £20k/ha) - Land for new BH site			Raw Water Transfer?	Yes
			Maintenance required?	Yes
			  Legend <= 5 Recorded Occurrences within 500m <= 5 Recorded Occurrences within 500m 5 - 25 Recorded Occurrences within 500m 25 - 50 Recorded Occurrences within 500m - Chasewater outlet to Crane Brook - Main from Canal network to Crane Brook headwaters Figure Title: Invasive Non-Native species record density and Scheme 7.1.5 option elements. Date: April 2022 Crown Copyright Ordnance Survey (2021)	
Activity Based Risk Assessment Summary				
Construction <i>Pre-Mitigation:</i> There is a major pre-mitigation risk of INNS transfer occurring at the construction phase as the option requires the construction of new infrastructure outside of any existing site/compound and is likely to result in the transfer of biological material through the transport of significant quantities of topsoil, aggregates, vegetation or raw water. <i>Post-Mitigation:</i> Although extensive construction activities are required which result in increased distribution of terrestrial and aquatic INNS, the risk is considered as minor assuming best practice biosecurity measures will be adopted during construction. Operation <i>Pre-Mitigation:</i> There is a High Risk of INNS transfer occurring during the operation of the option resulting from the abstraction/transfer of raw water utilising an open channel transfer mechanism and/or terminating at an open reservoir or channel. <i>Post-Mitigation:</i> The use of a canal as a transfer mechanism in this scenario poses a high risk, although there is an existing canal, the use of a canal for the transfer of raw water will provide a primary and secondary pathway for the transfer of INNS. Additionally, the discharge of raw water to Craner Brook represents a new INNS distribution pathway from a canal with significant boating traffic and numerous secondary pathways for the distribution of INNS. Mitigation is limited to standard best practice biosecurity measures (such as signs, wash-down facilities for recreational users, etc) which are likely to only be effective in reducing secondary pathway risks. Maintenance <i>Pre-Mitigation:</i> There is a major pre-mitigation risk of INNS transfer occurring during maintenance resulting from the use of machineries such as dredges and excavators and the transport of biological material such as screen debris and pipeline fouling. <i>Post-Mitigation:</i> It is assumed that maintenance will be undertaken under best practice mitigation measures in view of the company-wide biosecurity plan and waste materials potentially containing INNS propagules such as screen debris or mechanical filtration solids will be handled appropriately.				
Activity based Risk Assessment Summary				
Construction Activity Risk				
Pre-Mitigation		Major Risk	Post Mitigation	
			Minor	
Operational Activity Risk				
Pre-Mitigation		Major Risk	Post Mitigation	
			Major	
Maintenance Activity Risk				
Pre-Mitigation		Major Risk	Post Mitigation	
			Negligible	
INNS Record Risk Assessment Summary				
A total of 4 INNS have been recorded within 500 meters of the proposed scheme infrastructure. Occurrence density mapping shows concentrations of INNS at Chasewater reservoir. Invertebrate species such as lily beetle and harlequin ladybird are likely to represent a risk during the construction phase due to the likelihood of being spread during the movement of plant equipment, soils, and aggregates. Aquatic species Zebra mussel and New Zealand mudsnail are likely to pose a risk during the operation of the scheme due to the transfer of raw water. These aquatic species also pose a risk during the maintenance of the scheme due to the requirement of dredging and the removal of screen debris. The application of mitigation during each phase is likely to reduce the potential risk of the spread of the species listed to a varying extent.				
INNS Occurrence Records				
Common Name		Scientific Name		Occurences
Lily Beetle		<i>Lilioceris lili</i>		4
Zebra Mussel		<i>Dreissena polymorpha</i>		2
Harlequin Ladybird		<i>Harmonia axyridis</i>		1
New Zealand Mudsnail		<i>Potamopyrgus antipodarum</i>		1

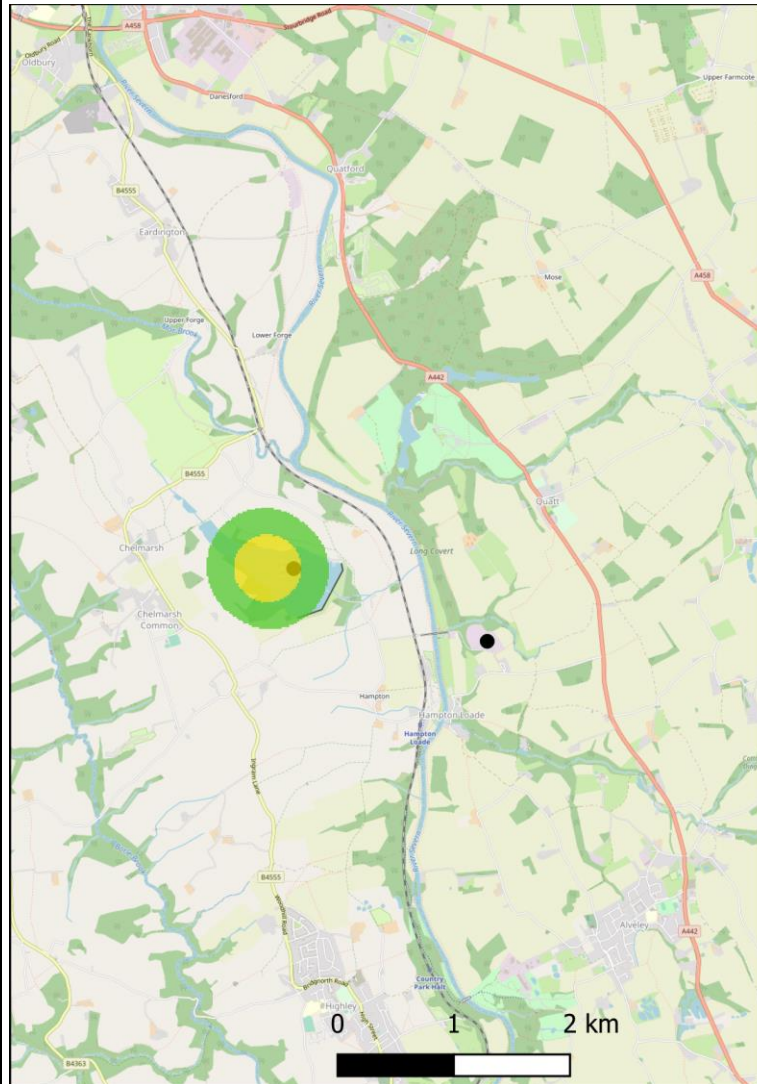
Scheme Reference	Option Name	Source Type	RAG Score	Negligible		
7.5.1.2	UU - 30 Ml/d raw water transfer to Hampton Loade via River Severn	Third party				
Option Description			Construction required	No		
This option assumes that UU release raw water release into the River Severn, making it available for abstraction downstream by SST. Water can then be abstracted for treatment at Hampton Loade WTW. For costing purposes, it is assumed there are no capital works associated with this item, as existing intake sites will be used to abstract the water. Any works / asset improvements required by UU will be considered by UU and form part of the commercial agreement between the two companies. Only OPEX costs are associated with this option. An estimate of payments to UU has been derived for inclusion in the option modelling but this will need to form part of negotiations and resulting commercial agreements. The assessment is based on the assumption that the water supplied by United Utilities is abstracted sustainably and all precautions have been taken in order to supply water of similar or better quality than that found in River Severn, as well as mitigating against the risk of spreading invasive nonnative species. Downstream, it is assumed that SST existing River Severn intake will be used to abstract water for treatment at Hampton Loade WTW (and potentially for storage in Chelmarsh Reservoir). Consideration needs to be given to the capacity of Hampton Loade WTW to treat the additional water that is abstracted. Option 7.5.1 is therefore linked to all options involving the existing or a rebuilt Hampton Loade WTW. Therefore, this option needs to take account of available treatment capacity and licensed volumes. An overall delivery period of 5 years (no CAPEX).			Raw Water Transfer?	Yes		
			Maintenance required?	No		
Activity Based Risk Assessment Summary			  Legend ■ <= 5 Recorded Occurrences within 500m ■ <= 5 Recorded Occurrences within 500m ■ 5 - 25 Recorded Occurrences within 500m ■ 25 - 50 Recorded Occurrences within 500m ● Hampton Loade Water Treatment Works ● Chelmarsh Reservoir Figure Title: Invasive Non-Native species record density and Scheme 7.5.1 option elements. Date: April 2022 Crown Copyright Ordnance Survey (2021)			
Activity based Risk Assessment Summary						
Construction Activity Risk						
Pre-Mitigation	Negligible Risk	Post Mitigation				Negligible
Operational Activity Risk						
Pre-Mitigation	Major Risk	Post Mitigation	Negligible			
Maintenance Activity Risk						
Pre-Mitigation	Major Risk	Post Mitigation	Negligible			
INNS Record Risk Assessment Summary			INNS Occurrence Records			
No INNS have been previously recorded within 500m of the scheme.			Common Name	Scientific Name	Occurences	

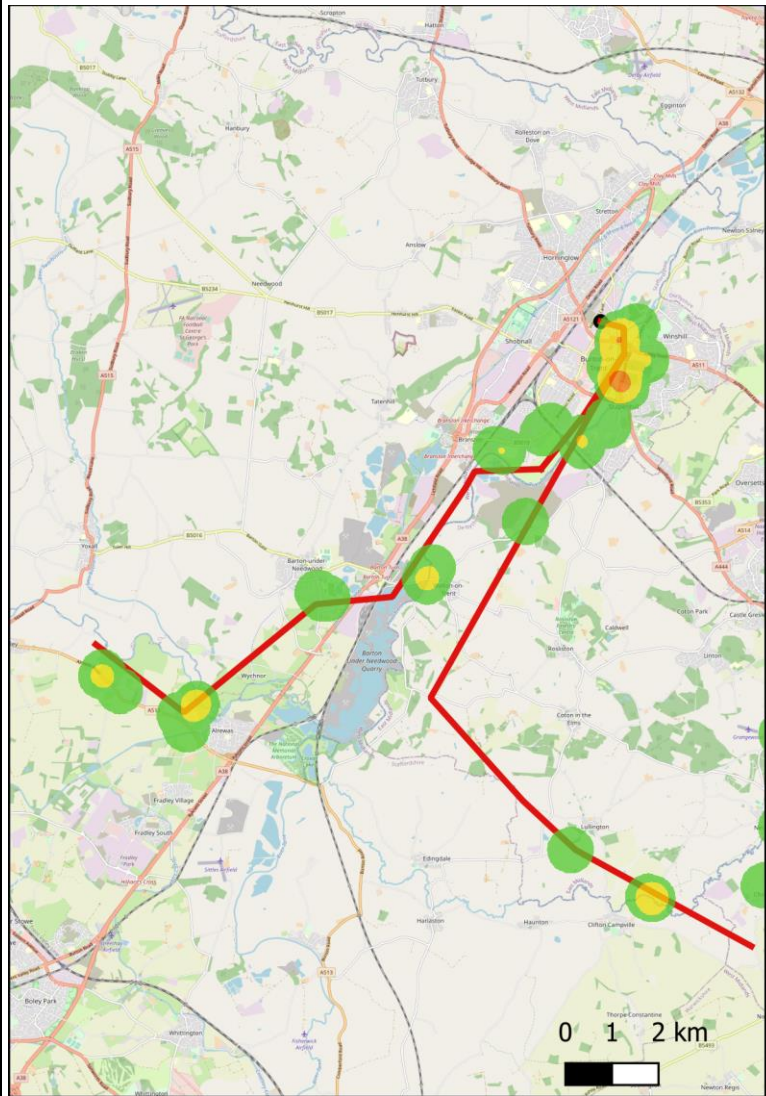


Scheme Reference	Option Name	Source Type	RAG Score	Negligible				
7.5.1.1	UU - 15 Ml/d raw water	Third party	Construction required	No				
This option assumes that UU release raw water release into the River Severn, making it available for abstraction downstream by SST. Water can then be abstracted for treatment at Hampton Loade WTW. For costing purposes, it is assumed there are no capital works associated with this item, as existing intake sites will be used to abstract the water. Any works / asset improvements required by UU will be considered by UU and form part of the commercial agreement between the two companies. Only OPEX costs are associated with this option. An estimate of payments to UU has been derived for inclusion in the option modelling but this will need to form part of negotiations and resulting commercial agreements. The assessment is based on the assumption that the water supplied by United Utilities is abstracted sustainably and all precautions have been taken in order to supply water of similar or better quality than that found in River Severn, as well as mitigating against the risk of spreading invasive nonnative species. Downstream, it is assumed that SST existing River Severn intake will be used to abstract water for treatment at Hampton Loade WTW (and potentially for storage in Chelmarsh Reservoir). Consideration needs to be given to the capacity of Hampton Loade WTW to treat the additional water that is abstracted. Option 7.5.1 is therefore linked to all options involving the existing or a rebuilt Hampton Loade WTW. Therefore, this option needs to take account of available treatment capacity and licensed volumes. An overall delivery period of 5 years (no CAPEX).			Raw Water Transfer?	Yes				
			Maintenance required?	No				
			  Legend <= 5 Recorded Occurrences within 500m <= 5 Recorded Occurrences within 500m 5 - 25 Recorded Occurrences within 500m 25 - 50 Recorded Occurrences within 500m - Hampton Loade Water Treatment Works - Chelmarsh Reservoir Figure Title: Invasive Non-Native species record density and Scheme 7.5.1 option elements. Date: April 2022 Crown Copyright Ordnance Survey (2021)					
Activity Based Risk Assessment Summary								
Construction <i>Pre-Mitigation:</i> There is a negligible pre-mitigation risk at the construction phase as the option does not require the construction of new infrastructure. <i>Post-Mitigation:</i> As it is assumed that no capital works are required for the implementation of this scheme the risk of distribution of INNS is negligible Operation <i>Pre-Mitigation:</i> There is a High Risk of INNS transfer occurring during the operation of the option resulting from the abstraction/transfer of raw water utilising an open channel transfer mechanism and/or terminating at an open reservoir or channel. <i>Post-Mitigation:</i> Minor negative effects- the River Severn and River Vyrnwy is already in connection through compensation releases and River Severn Regulation releases. The additional volume could result in a slight increase in propagules being transported downstream. Risk will be negligible once raw water is treated at the WTWs Maintenance <i>Pre-Mitigation:</i> There is a major pre-mitigation risk of INNS transfer occurring during maintenance resulting from the transport of biological material such as screen debris and pipeline fouling. <i>Post-Mitigation:</i> It is assumed that maintenance will be undertaken under best practice mitigation measures in view of the company-wide biosecurity plan and waste materials potentially containing INNS propagules such as screen debris or mechanical filtration solids will be handled appropriately.								
Activity based Risk Assessment Summary								
Construction Activity Risk								
Pre-Mitigation	Negligible Risk	Post Mitigation					Negligible	
Operational Activity Risk								
Pre-Mitigation	Major Risk	Post Mitigation					Negligible	
Maintenance Activity Risk								
Pre-Mitigation	Major Risk	Post Mitigation					Negligible	
INNS Record Risk Assessment Summary								
No INNS have been previously recorded within 500m of the scheme.								
INNS Occurrence Records								
Common Name	Scientific Name	Occurences						



Scheme Reference	Option Name	Source Type	RAG Score	Negligible		
7.5.1.3	UU River Severn - 45 MI /d	Third party				
Option Description			Construction required	No		
This option assumes that UU release raw water release into the River Severn, making it available for abstraction downstream by SST. Water can then be abstracted for treatment at Hampton Loade WTW. For costing purposes, it is assumed there are no capital works associated with this item, as existing intake sites will be used to abstract the water. Any works / asset improvements required by UU will be considered by UU and form part of the commercial agreement between the two companies. Only OPEX costs are associated with this option. An estimate of payments to UU has been derived for inclusion in the option modelling but this will need to form part of negotiations and resulting commercial agreements. The assessment is based on the assumption that the water supplied by United Utilities is abstracted sustainably and all precautions have been taken in order to supply water of similar or better quality than that found in River Severn, as well as mitigating against the risk of spreading invasive nonnative species. Downstream, it is assumed that SST existing River Severn intake will be used to abstract water for treatment at Hampton Loade WTW (and potentially for storage in Chelmarsh Reservoir). Consideration needs to be given to the capacity of Hampton Loade WTW to treat the additional water that is abstracted. Option 7.5.1 is therefore linked to all options involving the existing or a rebuilt Hampton Loade WTW. Therefore, this option needs to take account of available treatment capacity and licensed volumes. An overall delivery period of 5 years (no CAPEX).			Raw Water Transfer?	Yes		
			Maintenance required?	No		
Activity Based Risk Assessment Summary			  Legend ■ <= 5 Recorded Occurrences within 500m ■ <= 5 Recorded Occurrences within 500m ■ 5 - 25 Recorded Occurrences within 500m ■ 25 - 50 Recorded Occurrences within 500m ● Hampton Loade Water Treatment Works ● Chelmarsh Reservoir Figure Title: Invasive Non-Native species record density and Scheme 7.5.1 option elements. Date: April 2022 Crown Copyright Ordnance Survey (2021)			
Construction Pre-Mitigation: There is a negligible pre-mitigation risk at the construction phase as the option does not require the construction of new infrastructure. Post-Mitigation: As it is assumed that no capital works are required for the implementation of this scheme the risk of distribution of INNS is negligible						
Operation Pre-Mitigation: There is a High Risk of INNS transfer occurring during the operation of the option resulting from the abstraction/transfer of raw water utilising an open channel transfer mechanism and/or terminating at an open reservoir or channel. Post-Mitigation: Minor negative effects- the River Severn and River Vyrnwy is already in connection through compensation releases and River Severn Regulation releases. The additional volume could result in a slight increase in propagules being transported downstream. Risk will be negligible once raw water is treated at the WTWs						
Maintenance Pre-Mitigation: There is a major pre-mitigation risk of INNS transfer occurring during maintenance resulting from the transport of biological material such as screen debris and pipeline fouling. Post-Mitigation: It is assumed that maintenance will be undertaken under best practice mitigation measures in view of the company-wide biosecurity plan and waste materials potentially containing INNS propagules such as screen debris or mechanical filtration solids will be handled appropriately.						
Activity based Risk Assessment Summary						
Construction Activity Risk						
Pre-Mitigation	Negligible Risk	Post Mitigation				Negligible
Operational Activity Risk						
Pre-Mitigation	Major Risk	Post Mitigation				Negligible
Maintenance Activity Risk						
Pre-Mitigation	Major Risk	Post Mitigation	Negligible			
INNS Record Risk Assessment Summary			INNS Occurrence Records			
No INNS have been previously recorded within 500m of the scheme.			Common Name	Scientific Name	Occurences	

Scheme Reference	Option Name	Source Type	RAG Score	Negligible	
7.5.1.4	UU - 75 Ml/d raw water transfer to Hampton Loade via River Severn	Third party			
Option Description			Construction required	No	
This option assumes that UU release raw water release into the River Severn, making it available for abstraction downstream by SST. Water can then be abstracted for treatment at Hampton Loade WTW. For costing purposes, it is assumed there are no capital works associated with this item, as existing intake sites will be used to abstract the water. Any works / asset improvements required by UU will be considered by UU and form part of the commercial agreement between the two companies. Only OPEX costs are associated with this option. An estimate of payments to UU has been derived for inclusion in the option modelling but this will need to form part of negotiations and resulting commercial agreements. The assessment is based on the assumption that the water supplied by United Utilities is abstracted sustainably and all precautions have been taken in order to supply water of similar or better quality than that found in River Severn, as well as mitigating against the risk of spreading invasive nonnative species. Downstream, it is assumed that SST existing River Severn intake will be used to abstract water for treatment at Hampton Loade WTW (and potentially for storage in Chelmarsh Reservoir). Consideration needs to be given to the capacity of Hampton Loade WTW to treat the additional water that is abstracted. Option 7.5.1 is therefore linked to all options involving the existing or a rebuilt Hampton Loade WTW. Therefore, this option needs to take account of available treatment capacity and licensed volumes.			Raw Water Transfer?	Yes	
			Maintenance required?	No	
Activity Based Risk Assessment Summary			  Legend <= 5 Recorded Occurrences within 500m <= 5 Recorded Occurrences within 500m 5 - 25 Recorded Occurrences within 500m 25 - 50 Recorded Occurrences within 500m ● Hampton Loade Water Treatment Works ● Chelmarsh Reservoir Figure Title: Invasive Non-Native species record density and Scheme 7.5.1 option elements. Date: April 2022 Crown Copyright Ordnance Survey (2021)		
Construction					
Pre-Mitigation: There is a negligible pre-mitigation risk at the construction phase as the option does not require the construction of new infrastructure.					
Post-Mitigation: As it is assumed that no capital works are required for the implementation of this scheme the risk of distribution of INNS is negligible					
Operation					
Pre-Mitigation: There is a High Risk of INNS transfer occurring during the operation of the option resulting from the abstraction/transfer of raw water utilising an open channel transfer mechanism and/or terminating at an open reservoir or channel.					
Post-Mitigation: Minor negative effects- the River Severn and River Vyrnwy is already in connection through compensation releases and River Severn Regulation releases. The additional volume could result in a slight increase in propagules being transported downstream. Risk will be negligible once raw water is treated at the WTWs					
Maintenance					
Pre-Mitigation: There is a major pre-mitigation risk of INNS transfer occurring during maintenance resulting from the transport of biological material such as screen debris and pipeline fouling.					
Post-Mitigation: It is assumed that maintenance will be undertaken under best practice mitigation measures in view of the company-wide biosecurity plan and waste materials potentially containing INNS propagules such as screen debris or mechanical filtration solids will be handled appropriately.					
Activity based Risk Assessment Summary					
Construction Activity Risk					
Pre-Mitigation	Negligible Risk	Post Mitigation	Negligible		
Operational Activity Risk					
Pre-Mitigation	Major Risk	Post Mitigation	Negligible		
Maintenance Activity Risk					
Pre-Mitigation	Major Risk	Post Mitigation	Negligible		
INNS Record Risk Assessment Summary			INNS Occurrence Records		
No INNS have been previously recorded within 500m of the scheme.			Common Name	Scientific Name	Occurences

Scheme Reference	Option Name	Source Type	RAG Score	Minor
8.1.1	Third Party Company X BH link to existing treatment plant infrastructure	Third party	Construction required	Yes
The proposed scheme is to form an agreement with Company X, whereby a bulk supply of potable water is provided to SSW. In order to facilitate the supply, new pipework and/or pumping plant would be required, to connect into the SSW network. In exchange for the bulk supply, SSW would compensate Company X by providing a mains water supply of an equivalent amount. The scale and feasibility of this option is dependent on several factors, including: - The amount of water that can be made available by Company X, under the current abstraction licences. - The mains supply that would be needed from SSW as compensation (and the extent to which this gives a net DO benefit to SSW). - The number of abstraction points in and around Burton-upon-Trent that could be utilised and the practicalities of connecting into the SSW network. - Managing water quality risks and overcoming operational constraints.			Raw Water Transfer?	No
			Maintenance required?	Yes
				
Activity Based Risk Assessment Summary				
Construction Pre-Mitigation: There is a major pre-mitigation risk of INNS transfer occurring at the construction phase as the option requires the construction of new infrastructure outside of any existing site/compound and is likely to result in the transfer of biological material through the transport of significant quantities of topsoil, aggregates, vegetation or raw water. Post-Mitigation: Although extensive construction activities are required which result in increased distribution of terrestrial and aquatic INNS, the risk is considered minor assuming best practice biosecurity measures will be adopted during construction. Operation Pre-Mitigation: There is a negligible risk of INNS transfer occurring during the operation as the option does not involve the abstraction/transfer of raw water and does not utilise open channel transfer mechanisms and does not terminate at an open channel or reservoir. Post-Mitigation: No negative effects - as the scheme involves the transfer of potable water within a closed system. Maintenance Pre-Mitigation: There is a minor pre-mitigation risk of INNS transfer occurring during maintenance of the option as there is no requirement for the use of machinery such as dredges and excavators and the transport of biological material such as screen debris and pipeline Post-Mitigation: It is assumed that maintenance will be undertaken under best practice mitigation measures in view of the company-wide biosecurity plan and waste materials potentially containing INNS propagules such as screen debris or mechanical filtration solids will be handled appropriately.				
Activity based Risk Assessment Summary				
Construction Activity Risk				
Pre-Mitigation		Major Risk	Post Mitigation	
			Minor	
Operational Activity Risk				
Pre-Mitigation		Negligible Risk	Post Mitigation	
			Negligible	
Maintenance Activity Risk				
Pre-Mitigation		Minor Risk	Post Mitigation	
			Negligible	
INNS Record Risk Assessment Summary				
A total of 11 INNS which may represent a transfer risk have been recorded within 500 meters of the proposed scheme infrastructure. Occurrence density mapping shows concentrations of INNS close to Winhill and at various points along the proposed pipeline routes. Terrestrial species such as New Zealand willowherb, Emerald ash borers, invasive garden ant and Douglas fur may present a transfer risk during the construction and maintenance of the scheme During the operation there is likely to be no immediate risk of transfer of the species listed due to the supply source. The application of mitigation during each phase is likely to reduce the potential risk of the spread of the species listed to a varying extent.				
INNS Occurrence Records				
Common Name		Scientific Name		Occurences
Golden club		Orontium aquaticum		40
Swamp Stonecrop		Crassula helmsii		32
Monarch Butterfly		Danaus plexippus		16
Douglas Fir		Pseudotsuga menziesii		10
Rusty Crayfish		Orconectes rusticus		8
Invasive garden ant		Lasius neglectus		6
Rapha Whelk		Rapana venosa		6
New Zealand Willowherb		Epilobium brunnescens		4
Killer shrimp		Dikeroqammarus villosus		4
Emerald ash borer		Agrilus planipennis		1

Scheme Reference	Option Name	Source Type	RAG Score	Minor
8.1.5	Drill new GW source with licence trade from Third Party Company X	Third party	Construction required	Yes
Option Description			Raw Water Transfer?	No
The proposed scheme is to develop a new groundwater source in the Burton-upon-Trent area, licensing it through spare licence capacity (secured through third party licence trading or similar agreement). The scheme requires identification and purchase of an appropriate area of land in the Burton-upon-Trent area, to enable 2 Nr new boreholes ti be drilled (to enable a duty / standby arrangement). Pumps, pipework, power supply, switchgear and other associated equipment would be installed. Water abstracted would then be pumped for treatment at the existing South Staffs works at Chilcote. This would require construction of a raw water main, sized to accommodate 3 MI/d. The notional concept is for a 17.5km length of 300mm diameter main. An alternative option would be to install treatment plant at the site, subject to land being available. In the absence of more detailed water quality information at this stage, the concept design assumed similar treatment being needed as for the Warton scheme.			Maintenance required?	Yes
Activity Based Risk Assessment Summary				
Construction <i>Pre-Mitigation:</i> There is a major pre-mitigation risk of INNS transfer occurring at the construction phase as the option requires the construction of new infrastructure outside of any existing site/compound and is likely to result in the transfer of biological material through the transport of significant quantities of topsoil, aggregates, vegetation or raw water. <i>Post-Mitigation:</i> Although extensive construction activities are required which result in increased distribution of terrestrial and aquatic INNS, the risk is considered minor assuming best practice biosecurity measures will be adopted during construction. Operation <i>Pre-Mitigation:</i> There is a negligible risk of INNS transfer occurring during the operation as the option does not involve the abstraction/transfer of raw water and does not utilise open channel transfer mechanisms and does not terminate at an open channel or reservoir. <i>Post-Mitigation:</i> No negative effects - as the scheme involves the abstraction and transfer of groundwater water within a closed system. Maintenance <i>Pre-Mitigation:</i> There is a minor pre-mitigation risk of INNS transfer occurring during maintenance of the option as there is no requirement for the use of machinery such as dredges and excavators and the transport of biological material such as screen debris and pipeline <i>Post-Mitigation:</i> It is assumed that maintenance will be undertaken under best practice mitigation measures in view of the company-wide biosecurity plan and waste materials potentially containing INNS propagules such as screen debris or mechanical filtration solids will be handled appropriately.				
Activity Based Risk Assessment Summary				
Construction Activity Risk				
Pre-Mitigation	Major Risk	Post Mitigation	Minor	
Operational Activity Risk				
Pre-Mitigation	Negligible Risk	Post Mitigation	Negligible	
Maintenance Activity Risk				
Pre-Mitigation	Minor Risk	Post Mitigation	Negligible	
INNS Record Risk Assessment Summary				
A total of 11 INNS which may represent a transfer risk have been recorded within 500 meters of the proposed scheme infrastructure. Occurrence density mapping shows concentrations of INNS close to Winshill and at various points along the proposed pipeline routes. Terrestrial species such as New Zealand willowherb, Emerald ash borers, invasive garden ant and Douglas fur may present a transfer risk during the construction and maintenance of the scheme During the operation there is likely to be no immediate risk of transfer of the species listed due to the supply source. The application of mitigation during each phase is likely to reduce the potential risk of the spread of the species listed to a varying extent.				
			INNS Occurrence Records	
Common Name		Scientific Name	Occurences	
New Zealand Mudsnaill		<i>Potamopyrgus antipodarum</i>	21	
Lily Beetle		<i>Lilioceris lili</i>	10	
Harlequin Ladybird		<i>Harmonia axyridis</i>	7	
Nuttall's waterweed		<i>Elodea nuttallii</i>	4	
Sycamore		<i>Acer pseudoplatanus</i>	3	
Heath Star Moss		<i>Campylopus introflexus</i>	2	
Himalayan Balsam		<i>Impatiens glandulifera</i>	2	
Ground Elder		<i>Aegopodium podagraria</i>	1	
Cherry Laurel		<i>Prunus laurocerasus</i>	1	
Snowberry		<i>Symphoricarpos albus</i>	1	

