



# INVASIVE NON-NATIVE SPECIES ASSESSMENT

Draft Water Resources Management Plan 2024

Severn Trent Water

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**Front Cover Image:**  
Upper Derwent Valley, Severn Trent

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[APPENDIX 1: INNS RISK ASSESSMENTS FOR FEASIBLE AND PREFERRED OPTIONS \(A3 SUMMARY PAGE PER OPTION\)](#)

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## EXECUTIVE SUMMARY

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This report sets out the Invasive Non-Native Species (INNS) risk assessment that has been completed to support Severn Trent's draft Water Resources Management Plan 2024 (draft WRMP24) which water companies in England and Wales are required to produce every five years.

Through an extensive optioneering process, considering a wide range of potential options to balance future supply and demand, Severn Trent have selected a feasible list of options and a preferred programme. The feasible list includes both demand side and supply side options, of which only the latter requires INNS assessments. The results generated from undertaking the INNS assessments of these supply-side options are presented in this report.

A high-level risk assessment approach was developed and undertaken on the feasible options to inform the SEA process and options appraisal and design and selection of the preferred plan. The outcomes of this risk assessment were reviewed and updated to reflect the residual risk after implementation of available, standard (best practice) mitigation measures which included those measures that can reduce the spread and distribution of INNS and limit the pathways of distribution during construction, operation and maintenance of the feasible options. Of the 81 options included in the feasible list, 2 options are considered to have moderate or higher risk of INNS transfer.

In determining the draft WRMP24 preferred plan of options, Severn Trent used the findings of the feasible options assessments to inform the programme appraisal process and to determine the preferred programme. All the preferred plan options are scored as presenting a minor or negligible post-mitigation risk for scheme construction and maintenance activities respectively, with the assumption that best practice mitigation will be in place. Post mitigation risk scores for the operation of all schemes are negligible or minor with the exception of Option 169 which has a post-mitigation risk score of moderate.

# 1. INTRODUCTION

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## 1.1 BACKGROUND AND PURPOSE OF REPORT

Like all water companies in England and Wales, Severn Trent is required<sup>1</sup> to prepare, maintain and publish a Water Resource Management Plan (WRMP). A WRMP sets out the strategy for water resource and demand management to ensure supplies of safe, clean drinking water are maintained to customers throughout the relevant company's region in a way that is economically, socially, and environmentally sustainable.

WRMPs are reviewed on a rolling five-year basis; Severn Trent published their most recent WRMP (WRMP19) in 2019. The next cycle of WRMPs (WRMP24) covers the period 2025 to 2050 and beyond. Severn Trent Water is now reviewing and updating their draft WRMP24 for submission in Autumn 2022<sup>2</sup>. Section 5.14 of the Water Resource Planning Guidelines (WRPG) version 10, published in April 2022<sup>3</sup>, states that water companies must review whether current abstraction operations and future solutions will risk spreading INNS or create pathways which increase the risk of spreading INNS. Severn Trent has undertaken pathway risk assessment across its business activities including existing raw water transfers and has developed biosecurity plans and for these transfers, as such the assessment within this report does not consider the risk relating to existing transfers.

Invasive non-native species (INNS) of flora and fauna are considered the second biggest threat after habitat loss and destruction of biodiversity worldwide. The annual cost of INNS to the Great Britain economy was estimated in 2010 to be £1.7 billion per year, of which around £5 million was attributed to the water industry management of INNS<sup>1</sup>. New and existing INNS also pose a threat to achieving Water Framework Directive (WFD) objectives. The UKWIR project completed by Ricardo Energy & Environment (2016)<sup>4</sup>, provided further evidence of the implications of INNS to the water industry.

Subsequently, the Environment Agency (EA) (2017) set out a position paper on the assessment of the risks of spreading INNS through existing water transfers. The position paper set out the scope, outcomes and timelines expected for risk assessments of raw water transfers and options appraisal that water companies should deliver in Asset Management Plan (AMP)<sup>7</sup>.

As a result, INNS became a new "driver" within the 2019 Price Review (PR19). In previous price reviews, there was some scope for limited INNS work, justified within the biodiversity drivers. Having a separate driver recognised the increasing evidence and understanding of the risks posed by INNS. The guidance supporting this driver is explicit in stating that "the most cost-beneficial and least damaging way to manage invasive species is to prevent their arrival and spread." This highlights the need to understand the pathways by which INNS can be transferred and hence be spread. Furthermore, the EA has specifically identified raw water transfers (RWTs) as a subgroup of pathways that should have priority risk assessments (RAs) to assess the potential for INNS to spread.

The INNS guidance indicates that all water companies will need to consider:

- Pathways of spread (understanding and reducing the risk from different pathways).
- Preventing spread (controlling, eradicating, or managing INNS to prevent spread where this will contribute to WFD prevention of deterioration); and
- Action on INNS to achieve conservation objectives of Sites of Special Scientific Interest (SSSI) and sites protected under the Habitats Directive.

This has led to INNS being considered in the Water Industry National Environmental Programme (WINEP) across the water industry with a particular focus on investigating the risks of spreading INNS through options appraisal for mitigation and companywide biosecurity plans to reduce the risk of distributing INNS through existing activities and operations.

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<sup>1</sup> Ofwat (2021). Water resources planning guideline Draft update November 2021

<sup>2</sup> draft WRMP24 will be submitted to Defra in early October 2022 for permission to publish

<sup>3</sup> Water resources planning guideline. Version 10 (2022). <https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline>. Accessed 20/10/2022.

<sup>4</sup> UKWIR (2016). Invasive and Non-Native Species (Inns) Implications on The Water Industry. Report produced by Ricardo Energy & Environment. Report Number 16/DW/02/82. October 2016

In April 2022 the EA set out a further INNS position paper in relation to the management of risk during new and existing raw water transfers. The position paper set out the levels of assurance required to prevent the spread of INNS during new and existing transfers between isolated and connected catchments. The paper states that mitigation between watercourses “be fail safe, resilient and completely effective for all life stages (large fragments/animals/microscopic organisms and larval stages)”.

## 1.2 PURPOSE OF THIS REPORT

The outcomes of the INNS risk assessment are summarised within the main text of this report, with further details (A3 summary page per option) provided in Appendix 1. This information supported Severn Trent in the selection of preferred options by identifying higher-risk options (from an INNS distribution perspective) which may require further mitigation.

## 2. SCREENING OF INNS FOR THE WRMP

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### 2.1 HIGH-LEVEL SCREENING

To ensure that INNS were sufficiently considered as part of the assessment of the feasible options, a high-level risk assessment approach was developed. The outcomes of the high-level risk assessment informed both SEA process and options appraisal and design.

We note that the Environment Agency have developed a risk assessment tool for the next stage (Gate-2) of the gated process for the assessments of Strategic Resource Options (SROs), but this tool provides a more detailed assessment of potential INNS pathways. The high-level risk assessment approach was, therefore, developed in view of the Environment Agency's guidelines for INNS assessment to provide a consistent, rapid approach to identifying INNS risks.

The high-level risk assessment was based on a simple questionnaire which was informed by the descriptions and scheme design information of each feasible option (and the associated components). The questionnaires cover three major aspects of each feasible option (**see**

**Table 2.1):**

- The construction of the option
- The operation of the option
- The maintenance of the option

Table 2.1: Summary of the questionnaire used in the high-level risk assessment (excluding mitigation measures)

Construction Questionnaire			
C-Q1	Does the option require the construction of new infrastructure	YES = Q2	NO = NO Risk
C-Q2	Are construction activities limited to within the confines of existing infrastructure? (e.g Improvements to an existing WTW).	Yes = Q4	NO = Q3
C-Q3	Are construction activities likely to involve the transport of materials such as transport of soils, vegetation or raw water.	Yes = High Risk	No = Medium Risk
C-Q4	Are construction activities likely to involve the transport of materials such as soils, vegetation or raw water to/from outside of the existing site.	Yes = Med	NO = Low Risk
Operation Questionnaire			
O-Q1	Does the option involve the transfer/abstraction of raw water?	YES = Q2	NO = Q3
O-Q2	Does the option utilise an open-channel transfer mechanism (eg. river, canal) AND/OR does the option terminate at an open reservoir/channel?	Yes = High Risk	No = Low Risk
O-Q3	Does the option utilise an open-channel transfer mechanism (eg transfer channel) AND/OR does the option terminate at an open reservoir?	Yes = Medium Risk	No = No Risk
Maintenance Questionnaire			
M-Q1	Does the maintenance activity require the movement of machinery, eg dredging, excavators, haulage?	YES = Q2	NO = Q3
M-Q2	Does the maintenance activity require the removal/transport of biological material? (e.g. screen debris, pipeline fouling)	Yes = High Risk	No = Medium Risk
M-Q3	Does the maintenance activity require the removal/transport of biological material? (e.g. screen debris, pipeline fouling)	Yes = High Risk	No = Low Risk

## 2.2 CONSIDERATION OF MITIGATION MEASURES

The outcomes of risk assessment were then reviewed / updated to reflect the residual risk after the implementation of mitigation measures. In updating/reviewing the risk assessment in view of available mitigation measures, standard (best practice) mitigation measures were considered. This included those measures that can reduce the spread and distribution of INNS and limit the pathways of distribution during construction, operation and maintenance of the feasible options. These standard measures include (for example):

- Pre-construction considerations:
  - Ensuring detailed checks and risk assessments are carried out for INNS within initial site feasibility assessments and surveys.
  - Where any INNS are present, ensuring contractors understand the risks and implications of managing it, as well as your legal requirements.
  - Where any INNS are identified as a risk of being introduced, spread within, or moved off site, ensure mitigation measures are considered at the early planning stage, and ensure enough time is given to implement them.
  - Consider phasing construction to allow time to deal with the presence and/or risk of spread of INNS.
  - Ensure INNS and locations (mapped) are incorporated within all relevant site method statements, including the site Ecological Protection Plan and Species Protection Plans, where appropriate.
  - Where a species requires long-term management (e.g. Japanese knotweed), ensuring a site management plan is put together that addresses all issues associated with it
  - Nominating a designated Clerk of Works/ecologist to manage the issue of INNS on your site from an early stage.

- Equipment / machinery used in construction or maintenance of options
  - Clear signs/markings should be used to warn staff working there that a site/area contains INNS (where known).
  - Where contaminated soil, materials or water are located, signage should be erected to indicate them.
  - Personnel working on or between sites should ensure their clothing and footwear are cleaned where appropriate to prevent spread
  - Tracked vehicles should not be used within areas known to contain INNS (especially where plan fragments are known to be present).
  - All vehicles leaving the construction and or operational sites and / or transporting infested soil/materials must be thoroughly pressure-washed in a designated wash-down area before being used for other work.
  - Where cross-contamination is possible (i.e. from one site to another), consider designating vehicles or machinery to specific sites where possible to prevent spread.
  - Material / water left after vehicles have been pressure-washed must be contained, collected and disposed of appropriately
  - All wash facilities including wastewater from washing vehicles, equipment or personnel should be managed in a responsible way so as not to not cause harm to the environment

Where Mitigation during construction is applicable this was considered in reference to the size of infrastructure, for example how effective are best practices likely to be in reducing risk for construction of a 54km pipeline as compared to construction of a 1km pipeline.

In addition to those standard measure listed above, it is noted that STW have completed investigations as part of the WINEP into INNS, INNS pathways and mitigation measures. This includes a company-wide objectives to improve and adhere to biosecurity protocols and the development of standard operating procedures to ensure that operations are tied into biosecurity practices.

It is also recognised that any soil or plant material contaminated with INNS can cause ecological damage and may be classified as controlled waste. This includes any waste material generated at either Water Treatment Works or Wastewater Treatment Works (in relation to effluent re-use options) including waste from the treatment process and from any intake screens. It has therefore been assumed that any construction, operational or maintenance waste containing INNS would be disposed of following best practice with consideration of biosecurity risks.

For the review of the feasible and preferred list of options, only standard (best practice) mitigation measures have been considered (as listed above). Where an option will result in a significant risk of INNS distribution and this risk cannot be mitigated in consideration of best practice measures, the risk assessment for that option has not been amended to reflect mitigation measures. This approach was adopted to identify where the design of the scheme will require further consideration and the risk can be reviewed once more information on the mitigation/treatment measures is available.

This includes, for example, options that include a raw water transfer where a new pathway/connection is established, and the scheme may require physical and or chemical treatment to reduce the risk. In such cases the location of infrastructure and current connectivity of waterbodies has also been considered within the post-mitigation risk categorisation. If an option in which abstraction and open storage occurs in the form of storage tanks or reservoir, the location in relation to the source as well as the size of storage has been considered, and the post mitigation risk score may be amended to reflect the relative risk. Similarly, if an option involves modification to an existing hydrological connection, i.e. increase to a reservoir release, the post mitigation risk score may be amended to reflect the relative risk in consideration of the current operation.

## 2.3 INNS BASLEINE DATA REVIEW

The baseline data review considered INNS occurrence records stored within the NBN Atlas covering a period of 11 years (1 January 2009 - present).

Species records and monitoring data were assessed to identify the spread of which species are likely to be facilitated by operational, construction and maintenance activities. The data review encompassed all known INNS occurrence records within 500m of the scheme infrastructure as well as all INNS records within the wider catchments in which the scheme operates.

INNS species listed under; Schedule 9 of the Wildlife and Countryside Act, WFD UKTAG Aquatic Alien Species, EU Invasive and Alien Species Regulation, MSFD – UK priority species, WFD UKTAG alarm species, GB NNS Alert species have been identified from the datasets for consideration.

A Kernel Density estimation algorithm was applied to the data captured during the NBN Atlas data review and project-specific monitoring using geographical information system (GIS) software. The algorithm provides an estimation and visual representation of density of INNS occurrence records based on the linear interpolation of occurrence data. Density is calculated based on the number of occurrence records in a location, with larger numbers of clustered points resulting in larger values which are represented in red, amber, yellow or green. Heatmaps were produced to summarise records within 500m of the scheme infrastructure and to summarise the INNS occurrence records for the operational catchments in which the scheme operates. This allows for the identification of regions with a higher density of recorded INNS occurrences based upon the number of records within a 250m radius. Though the heatmaps are able to show where a high number of occurrences have been recorded their accuracy in determining the actual density of INNS is dependent upon sampling effort, therefore the heatmaps only provide an indication of where INNS have been recorded and do not indicate actual INNS density.

## 2.4 ASSESSMENT OUTPUTS

The draft INNS screening has been completed for the list of feasible and preferred options. As stated above, the assessment has considered best practice mitigation measures and or embedded measures that already form part of the scheme design.

The risk assessment is, therefore, subject to review as more information is available regarding the measures that will be adopted to reduce control and/or eradicate INNS during the operation of an option. The current assessments were used to help inform Severn Trent selection of the preferred options list.

A separate A3 summary page of the risk assessment results for each of the feasible and preferred options has been provided as a separate Appendix to this report (Appendix 1). These A3 summary sheets include:

1. The name and reference number of the feasible option,
2. A “heatmap” to visualise the catchment risk associated with each feasible option,
3. A short list of species associated with the feasible option, including an indication of whether the species is likely to be distributed through the associated activities and the inherent risk score for each species (based on the Great Britain Non-Native Species Secretariat),
4. Notes on the key activities (construction, operation and maintenance) that are considered applicable to feasible option,
5. Notes on the key mitigation measures to be considered during activities (construction, operation and maintenance) and any information pertinent to scheme design,
6. A breakdown of the risk assessment for the construction, operation and maintenance activities with and without mitigation measures, and
7. A summary of the overall risk assessment as a Red, Amber, Green (RAG) rating (post mitigation).

## 3. FEASIBLE OPTIONS INNS ASSESSMENT OUTCOMES

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This section outlines:

- The options in the feasible list for Severn Trent's draft WRMP24 that have been subject to INNS assessment.
- The final outcomes of the INNS assessment for each of the options in the feasible list for Severn Trent's draft WRMP24.

### 3.1 FEASIBLE OPTIONS INCLUDED IN THE WFD COMPLIANCE ASSESSMENT

Through an extensive optioneering process, considering a wide range of potential options to balance future supply and demand, Severn Trent has selected the most suitable options to make up the feasible options list. This list includes both demand-side and supply-side options, of which only the latter requires an INNS Risk Assessment. The supply side options are presented in **Table 3.1**.

Table 3.1 List of STW draft WRMP24 feasible options which have been subject to an INNS Assessment

Option Type	WRMP24 Ref.	Option Name
Trunk Mains New	5	Derwent Valley Transfer Main
Reservoir enlargement	6	Upper Derwent Valley Reservoir Expansion (UDVRE)
GW enhancement	22	Recommission Elmhurst GW source
Water Treatment Works Capacity Increase	29	Homesford WTW capacity increase
New Reservoir	31C	E. Midlands Raw Water Storage (CQ)
New Reservoir	31D	E. Midlands Raw Water Storage (CHQ)
Water treatment works capacity increase	32	Little Eaton Expansion (supported by Carsington Reservoir)
Water treatment works capacity increase	33Z	Shelton WTW Expansion
Effluent Reuse	38	Minworth effluent re-use (Large scheme)
Effluent Reuse	39	Minworth effluent re-use (Medium scheme)
SW New	44	New R Sow abstraction and WTW near Stafford
SW New	54	River Soar to Cropston WTW
SW New	58	River Weaver to New WTW at Stoke
GW enhancement	64	Rehabilitation Milton GW Source
Water treatment works capacity increase	66	Strensham WTW Expansion
Bulk supply/transfer (potable)	79A	Wolves-Bham Strategic Link Main (large)
Bulk supply/transfer (potable)	79B	Wolves-Bham Strategic Link Main (small)
Reservoir enlargement	84A	Stanford Minor Dam Extension (84A)
Reservoir enlargement	84B	Lower Shustoke Minor Dam Extension (84B)
Reservoir enlargement	84C	Whitacre Minor Dam Extension (84C)
SW New	88	River Weaver to Tittesworth WTW
Water treatment works capacity increase	95B	Ogston WTW Expansion
Bulk supply/transfer (potable)	101	Kinsall Additional Resource (UU import)
New/enhanced pumping station	103	Mardy Support Link
Bulk supply/transfer (potable)	104	Newark Support Link
Bulk supply/transfer (potable)	105	Ruyton Support Link
Bulk supply/transfer (potable)	108	Stoke to Stafford link main
Bulk supply/transfer (potable)	110	Wolves to Stafford link main
Bulk supply/transfer (potable)	111	Melbourne to Staffs link main
Bulk supply/transfer (potable)	112	Croxtan GW to Hob Hill network
Bulk supply/transfer (potable)	117	Peckforton Bulk Import from UU
Trunk Mains New	120	River Severn to Draycote
Bulk supply/transfer (raw)	121	Mythe to Mitcheldean main
Reservoir enlargement	122A	Draycote Reservoir WL increase (6%)
Reservoir enlargement	122B	Draycote Reservoir WL increase (25%)
Reservoir enlargement	122C	Draycote Reservoir WL increase (50%)

Option Type	WRMP24 Ref.	Option Name
Reservoir enlargement	123A	Raise Dam at Tittesworth Reservoir (5%)
Reservoir enlargement	123B	Raise Dam at Tittesworth Reservoir (25%)
Bulk supply/transfer (raw)	128	Carsington to Tittesworth main (large)
Bulk supply/transfer (raw)	128Z	Carsington to Tittesworth main (small)
New/enhanced pumping station	132	Whaddon to Forest Transfer
Trunk Mains New	134A	Blackbrook reservoir to Cropston WTW
SW enhancement	142	Utilise Linacre Reservoirs
New Reservoir	143	W.Midlands Raw Water Storage
SW new	150	Little Haywood new WTW on Upper Trent
SW new	152	Hampton Loade to Sedgley network
Bulk supply/transfer (raw)	169	Terminate raw water export to Yorkshire Water
Reservoir enlargement	187A	Expand Carsington Reservoir (10000 MI)
Reservoir enlargement	187B	Expand Carsington Reservoir (16000 MI)
Reservoir enlargement	187C	Expand Carsington Reservoir (25000 MI)
SW new	190	Third party reservoir and new WTW's
GW enhancement	191	Increase Diddlebury/Munslow GW sources and remove network constraints.
Bulk supply/transfer (potable)	301A	UU import from Llanforda to Shelton (small)
Bulk supply/transfer (potable)	301B	UU import from Llanforda to Shelton (large)
Bulk supply/transfer (raw)	303A	UU release from Vyrnwy (75 MI/d)
Bulk supply/transfer (raw)	303B	UU release from Vyrnwy (40 MI/d)
Bulk supply/transfer (raw)	303C	UU release from Vyrnwy (25 MI/d)
Bulk supply/transfer (potable)	304	Ambergate to Mid-Notts transfer
Bulk supply/transfer (potable)	305	Heathy Lea to North Notts transfer
Bulk supply/transfer (potable)	309	Transfer from Hampton Loade WTW to Nurton network (large)
Bulk supply/transfer (potable)	309Z	Transfer from Hampton Loade WTW to Nurton network (small)
Trunk Mains New	313	DVA capacity increase to Heathy Lea (reduce Rivelin export)
Trunk main enhancement	314	Expand Bamford WTW and DVA capacity increase (terminate Rivelin export)
SW new	406	New abstraction and WTW on River Trent
Water treatment works loss recovery	420	Campion Hills WTW DO Recovery
Water treatment works loss recovery	423	Draycote WTW DO Recovery
Water treatment works loss recovery	426	Little Eaton WTW DO Recovery
Water treatment works loss recovery	429	Mythe WTW DO Recovery
Water treatment works loss recovery	430	Ogston WTW DO Recovery
Water treatment works loss recovery	431	Shelton WTW DO Recovery
Water treatment works loss recovery	434	Trimpley WTW DO Recovery
Water treatment works loss recovery	435	Whitacre WTW DO Recovery

Option Type	WRMP24 Ref.	Option Name
Combined	437	Finham FE to expanded Draycote Reservoir and WTW
Combined	439	Longdon Marsh and increase Frankley output by 190 MI/d
GW enhancement	523	UU Mow Cop groundwater sources treated water import
GW enhancement	528	New GW Source Soar - PT Sandstone nr Coalville
SW New	549A	Raw water transfer from Congleton to Tittesworth Reservoir (UU import)
SW New	549B	Treated water transfer from Congleton to Tittesworth Reservoir (UU import)
GW new	552	UU Bearstone treated water Import
GW new	556	ASL Capacity Increase - Hallgates to Oldbury
GW new	557	ASL Capacity Increase - Oldbury to Meriden

### 3.2 FEASIBLE OPTION INNS ASSESSMENT SUMMARY

This section presents a summary of the INNS assessment completed for all options included in the feasible list. Further detail of the outcome of risk assessments are reported in Appendix 1. The feasible option INNS assessment summary is presented in **Error! Reference source not found.**

Table 3.1 Feasible option INNS assessment summary

Option Name	Draft WRMP24 Ref.	Construction		Operation		Maintenance	
		Pre Mitigation	Post Mitigation	Pre Mitigation	Post Mitigation	Pre Mitigation	Post Mitigation
Derwent Valley Transfer Main	5	Major	Minor	Major	Major (uncertain)	Minor	Negligible
Upper Derwent Valley Reservoir Expansion (UDVRE)	6	Major	Minor	Minor	Negligible	Major	Negligible
Recommission Elmhurst GW source	22	Moderate	Negligible	Negligible	Negligible	Minor	Negligible
Homesford WTW capacity increase	29	Moderate	Negligible	Minor	Negligible	Major	Negligible
E. Midlands Raw Water Storage (CQ)	31C	Major	Minor	Major	Minor	Major	Negligible
E. Midlands Raw Water Storage (CHQ)	31D	Major	Minor	Major	Minor	Major	Negligible
Little Eaton Expansion (supported by Carsington Reservoir)	32	Minor	Negligible	Minor	Negligible	Moderate	Negligible
Shelton WTW Expansion	33Z	Major	Minor	Minor	Negligible	Major	Negligible
Minworth effluent re-use (Large scheme)	38	Major	Negligible	Negligible	Negligible	Major	Negligible
Minworth effluent re-use (Medium scheme)	39	Major	Negligible	Negligible	Negligible	Major	Negligible
New R Sow abstraction and WTW near Stafford	44	Major	Minor	Minor	Negligible	Major	Negligible
River Soar to Cropston WTW	54	Major	Minor	Minor	Negligible	Major	Negligible
River Weaver to New WTW at Stoke	58	Major	Negligible	Major	Minor	Major	Negligible
Rehabilitation Milton GW Source	64	Major	Negligible	Minor	Negligible	Major	Negligible
Strensham WTW Expansion	66	Major	Minor	Minor	Negligible	Major	Negligible
Wolves-Bham Strategic Link Main (large)	79A	Major	Minor	Negligible	Negligible	Moderate	Negligible

Option Name	Draft WRMP24 Ref.	Construction		Operation		Maintenance	
		Pre Mitigation	Post Mitigation	Pre Mitigation	Post Mitigation	Pre Mitigation	Post Mitigation
Wolves-Bham Strategic Link Main (small)	79B	Major	Minor	Negligible	Negligible	Moderate	Negligible
Stanford Minor Dam Extension (84A)	84A	Moderate	Negligible	Negligible	Negligible	Moderate	Negligible
Lower Shustoke Minor Dam Extension (84B)	84B	Moderate	Negligible	Negligible	Negligible	Moderate	Negligible
Whitacre Minor Dam Extension (84C)	84C	Moderate	Negligible	Negligible	Negligible	Moderate	Negligible
River Weaver to Tittesworth WTW	88	Major	Minor	Minor	Negligible	Major	Negligible
Ogston WTW Expansion	95B	Major	Negligible	Minor	Negligible	Major	Negligible
Kinsall Additional Resource (UU import)	101	Major	Negligible	Minor	Negligible	Minor	Negligible
Mardy Support Link	103	Moderate	Negligible	Negligible	Negligible	Minor	Negligible
Newark Support Link	104	Major	Minor	Negligible	Negligible	Moderate	Negligible
Ruyton Support Link	105	Major	Minor	Negligible	Negligible	Moderate	Negligible
Stoke to Stafford link main	108	Major	Minor	Negligible	Negligible	Moderate	Negligible
Wolves to Stafford link main	110	Major	Minor	Negligible	Negligible	Moderate	Negligible
Melbourne to Staffs link main	111	Major	Minor	Negligible	Negligible	Major	Negligible
Croxton GW to Hob Hill network	112	Major	Negligible	Minor	Negligible	Major	Negligible
Peckforton Bulk Import from UU	117	Major	Negligible	Negligible	Negligible	Minor	Negligible
River Severn to Draycote	120	Major	Minor	Minor	Minor	Major	Negligible
Mythe to Mitcheldean main	121	Major	Minor	Minor	Negligible	Major	Negligible
Draycote Reservoir WL increase (6%)	122A	Major	Minor	Negligible	Negligible	Major	Negligible
Draycote Reservoir WL increase (25%)	122B	Major	Minor	Negligible	Negligible	Major	Negligible
Draycote Reservoir WL increase (50%)	122C	Major	Minor	Negligible	Negligible	Major	Negligible
Raise Dam at Tittesworth Reservoir (5%)	123A	Moderate	Minor	Negligible	Negligible	Major	Negligible
Raise Dam at Tittesworth Reservoir (25%)	123B	Moderate	Minor	Negligible	Negligible	Major	Negligible
Carsington to Tittesworth main (large)	128	Major	Minor	Minor	Negligible	Major	Negligible
Carsington to Tittesworth main (small)	128Z	Major	Negligible	Minor	Negligible	Major	Negligible
Whaddon to Forest Transfer	132	Negligible	Negligible	Negligible	Negligible	Major	Negligible
Blackbrook reservoir to Cropston WTW	134A	Major	Minor	Minor	Negligible	Major	Negligible
Utilise Linacre Reservoirs	142	Major	Minor	Minor	Negligible	Major	Negligible
W.Midlands Raw Water Storage	143	Major	Minor	Major	Minor	Major	Negligible
Little Haywood new WTW on Upper Trent	150	Major	Minor	Minor	Negligible	Major	Negligible
Hampton Loade to Sedgley network	152	Major	Minor	Major	Negligible	Major	Negligible
Terminate raw water export to Yorkshire Water	169	Negligible	Negligible	Major	Moderate	Major	Negligible
Expand Carsington Reservoir (10000 MI)	187A	Moderate	Minor	Moderate	Negligible	Major	Negligible
Expand Carsington Reservoir (16000 MI)	187B	Moderate	Minor	Moderate	Negligible	Major	Negligible
Expand Carsington Reservoir (25000 MI)	187C	Moderate	Minor	Moderate	Negligible	Major	Negligible
Third party reservoir and new WTW's	190	Major	Minor	Minor	Negligible	Major	Negligible
Increase Diddlebury/Munslow GW sources and remove network constraints.	191	Minor	Negligible	Negligible	Negligible	Minor	Negligible

Option Name	Draft WRMP24 Ref.	Construction		Operation		Maintenance	
		Pre Mitigation	Post Mitigation	Pre Mitigation	Post Mitigation	Pre Mitigation	Post Mitigation
UU import from Llanforda to Shelton (small)	301A	Negligible	Negligible	Minor	Negligible	Major	Negligible
UU import from Llanforda to Shelton (large)	301B	Negligible	Negligible	Minor	Negligible	Major	Negligible
UU release from Vyrnwy (75 MI/d)	303A	Negligible	Minor	Major	Negligible	Major	Negligible
UU release from Vyrnwy (40 MI/d)	303B	Negligible	Minor	Major	Negligible	Major	Negligible
UU release from Vyrnwy (25 MI/d)	303C	Negligible	Minor	Major	Negligible	Major	Negligible
Ambergate to Mid-Notts transfer	304	Major	Minor	Negligible	Negligible	Moderate	Negligible
Heathy Lea to North Notts transfer	305	Major	Minor	Negligible	Negligible	Moderate	Negligible
Transfer from Hampton Loade WTW to Nurton network (large)	309	Major	Minor	Negligible	Negligible	Moderate	Negligible
Transfer from Hampton Loade WTW to Nurton network (small)	309Z	Major	Minor	Negligible	Negligible	Moderate	Negligible
DVA capacity increase to Heathy Lea (reduce Rivelin export)	313	Minor	Minor	Negligible	Negligible	Moderate	Negligible
Expand Bamford WTW and DVA capacity increase (terminate Rivelin export)	314	Moderate	Minor	Negligible	Negligible	Moderate	Negligible
New abstraction and WTW on River Trent	406	Major	Minor	Major	Negligible	Major	Negligible
Campion Hills WTW DO Recovery	420	Negligible	Negligible	Minor	Negligible	Major	Negligible
Draycote WTW DO Recovery	423	Moderate	Negligible	Negligible	Negligible	Major	Negligible
Little Eaton WTW DO Recovery	426	Moderate	Negligible	Negligible	Negligible	Major	Negligible
Mythe WTW DO Recovery	429	Moderate	Negligible	Negligible	Negligible	Major	Negligible
Ogston WTW DO Recovery	430	Negligible	Negligible	Negligible	Negligible	Major	Negligible
Shelton WTW DO Recovery	431	Moderate	Negligible	Negligible	Negligible	Major	Negligible
Trimply WTW DO Recovery	434	Moderate	Negligible	Negligible	Negligible	Major	Negligible
Whitacre WTW DO Recovery	435	Major	Negligible	Negligible	Negligible	Major	Negligible
Finham FE to expanded Draycote Reservoir and WTW	437	Major	Minor	Negligible	Negligible	Major	Negligible
Longdon Marsh and increase Frankley output by 190 MI/d	439	Major	Minor	Major	Minor	Major	Negligible
UU Mow Cop groundwater sources treated water import	523	Negligible	Negligible	Negligible	Negligible	Minor	Negligible
New GW Source Soar - PT Sandstone nr Coalville	528	Major	Negligible	Minor	Negligible	Major	Negligible
Raw water transfer from Congleton to Tittesworth Reservoir (UU import)	549A	Negligible	Negligible	Major	Minor	Minor	Negligible
Treated water transfer from Congleton to Tittesworth Reservoir (UU import)	549B	Negligible	Negligible	Negligible	Negligible	Minor	Negligible
UU Bearstone treated water Import	552	Negligible	Negligible	Negligible	Negligible	Minor	Negligible
ASL Capacity Increase - Hallgates to Oldbury	556	Major	Negligible	Negligible	Negligible	Minor	Negligible
ASL Capacity Increase - Oldbury to Meriden	557	Major	Negligible	Minor	Negligible	Minor	Negligible

Of the 81 options included in the feasible list, 2 options are considered to have moderate or higher risk of INNS transfer. A post mitigation operational risk summary taken from the A3 outputs (provided within a separate appendix to this report) is provided within **Table 3.3** below.

Table 3.2 Post mitigation risk assessment summary for schemes within the feasible list which are deemed to present a Moderate or Major INNS transfer risk.

Scheme	Post-mitigation operational risk	Risk assessment summary
5	Major	Scheme will establish a new pathway for the distribution of INNS between previous unconnected waterbodies. It is noted that there is an existing pathway of transfer to Carsington water, but the transfer of water in an upstream direction will create a new pathway for transferring INNS not currently present in the Derwent Valley reservoirs, with a secondary pathway through recreational users. Mitigation measures are uncertain (any mitigation measure will likely need to include the treatment of raw water to eradicate and/or control any propagules prior to discharge into Carsington). It is assumed that any waste generated through operation will be managed through standard measures and in accordance with the relevant waste regulations
169	Moderate	Moderate negative effects - Though this scheme will utilise the existing connection between the Derwent valley reservoirs and ST river Derwent abstractions additional volume discharged from the Derwent valley reservoirs may impact physical environment condition in favour of INNS as well as potentially increase propogule pressure in the downstream watercourse.

## 4. PREFERRED OPTIONS INNS ASSESSMENT OUTCOMES

This section outlines:

- The options in the preferred options list for Severn Trent's draft WRMP24 that have been subject to INNS assessment.
- The final outcomes of the INNS assessment for each of the options in the preferred for Severn Trent's draft WRMP24.

### 4.1 PREFERRED OPTIONS INCLUDED IN THE INNS ASSESSMENT

In determining the draft WRMP24 preferred plan of options, Severn Trent used the findings of the feasible options assessments to inform the programme appraisal process and to determine the preferred programme. Further details on options appraisal process and development of programmes can be found in the main draft WRMP24 documentation.

The preferred programme is made up of 43 supply-side options. The options included within the preferred programme along with a summary of the INNS assessments is presented in **Table 4.1**.

Table 4.1 Preferred option INNS assessment summary

Option Name	Draft WRMP 24 Ref.	Construction		Operation		Maintenance	
		Pre Mitigation	Post Mitigation	Pre Mitigation	Post Mitigation	Pre Mitigation	Post Mitigation
Shelton WTW Expansion	33Z	Major	Minor	Minor	Negligible	Major	Negligible
Draycote Reservoir WL increase (6%)	122A	Major	Minor	Negligible	Negligible	Major	Negligible
Carsington to Tittesworth main (large)	128	Major	Minor	Minor	Negligible	Major	Negligible
UU release from Vyrnwy (25 MI/d)	303C	Negligible	Minor	Major	Negligible	Major	Negligible
Heathy Lea to North Notts transfer	305	Major	Minor	Negligible	Negligible	Moderate	Negligible
Little Eaton WTW DO Recovery	426	Moderate	Negligible	Negligible	Negligible	Major	Negligible
Trimpley WTW DO Recovery	434	Moderate	Negligible	Negligible	Negligible	Major	Negligible
Whitacre WTW DO Recovery	435	Major	Negligible	Negligible	Negligible	Major	Negligible
Mardy Support Link	103	Moderate	Negligible	Negligible	Negligible	Minor	Negligible
Terminate raw water export to Yorkshire Water	169	Negligible	Negligible	Major	Moderate	Major	Negligible
UU import from Llanforda to Shelton (large)	301B	Negligible	Negligible	Minor	Negligible	Major	Negligible
New R Sow abstraction and WTW near Stafford	44	Major	Minor	Minor	Negligible	Major	Negligible
Ogston WTW Expansion	95B	Major	Negligible	Minor	Negligible	Major	Negligible
Upper Derwent Valley Reservoir Expansion (UDVRE)	6	Major	Minor	Minor	Negligible	Major	Negligible
Recommission Elmhurst GW source	22	Moderate	Negligible	Negligible	Negligible	Minor	Negligible
E. Midlands Raw Water Storage (CQ)	31C	Major	Minor	Major	Minor	Major	Negligible
River Weaver to New WTW at Stoke	58	Major	Negligible	Major	Minor	Major	Negligible
Rehabilitation Milton GW Source	64	Major	Negligible	Minor	Negligible	Major	Negligible
Strensham WTW Expansion	66	Major	Minor	Minor	Negligible	Major	Negligible
Wolves-Bham Strategic Link Main (large)	79A	Major	Minor	Negligible	Negligible	Moderate	Negligible
Stanford Minor Dam Extension (84A)	84A	Moderate	Negligible	Negligible	Negligible	Moderate	Negligible

Option Name	Draft WRMP 24 Ref.	Construction		Operation		Maintenance	
		Pre Mitigation	Post Mitigation	Pre Mitigation	Post Mitigation	Pre Mitigation	Post Mitigation
Lower Shustoke Minor Dam Extension (84B)	84B	Moderate	Negligible	Negligible	Negligible	Moderate	Negligible
Whitacre Minor Dam Extension (84C)	84C	Moderate	Negligible	Negligible	Negligible	Moderate	Negligible
Ruyton Support Link	105	Major	Minor	Negligible	Negligible	Moderate	Negligible
Peckforton Bulk Import from UU	117	Major	Negligible	Negligible	Negligible	Minor	Negligible
Raise Dam at Tittesworth Reservoir (25%)	123B	Moderate	Minor	Negligible	Negligible	Major	Negligible
Carsington to Tittesworth main (small)	128Z	Major	Negligible	Minor	Negligible	Major	Negligible
W.Midlands Raw Water Storage	143	Major	Minor	Major	Minor	Major	Negligible
Third party reservoir and new WTW's	190	Major	Minor	Minor	Negligible	Major	Negligible
Ambergate to Mid-Notts transfer	304	Major	Minor	Negligible	Negligible	Moderate	Negligible
Transfer from Hampton Loade WTW to Nurton network (small)	309Z	Major	Minor	Negligible	Negligible	Moderate	Negligible
New abstraction and WTW on River Trent	406	Major	Minor	Major	Negligible	Major	Negligible
Draycote WTW DO Recovery	423	Moderate	Negligible	Negligible	Negligible	Major	Negligible
UU Mow Cop BH Treated water import	523	Negligible	Negligible	Negligible	Negligible	Minor	Negligible
New GW Source Soar - PT Sandstone nr Coalville	528	Major	Negligible	Minor	Negligible	Major	Negligible
UU Bearstone treated water Import	552	Negligible	Negligible	Negligible	Negligible	Minor	Negligible
ASL Capacity Increase - Oldbury to Meriden	557	Major	Negligible	Minor	Negligible	Minor	Negligible
Blackbrook reservoir to Cropston WTW	134A	Major	Minor	Minor	Negligible	Major	Negligible
Campion Hills WTW DO Recovery	420	Negligible	Negligible	Minor	Negligible	Major	Negligible
E. Midlands Raw Water Storage (CHQ)	31D	Major	Minor	Major	Minor	Major	Negligible
Kinsall Additional Resource (UU import)	101	Major	Negligible	Minor	Negligible	Minor	Negligible
Expand Carsington Reservoir (25000 MI)	187C	Moderate	Minor	Moderate	Negligible	Major	Negligible

A detailed summary of the risk assessment for options within the preferred options list is provided with option assessment sheets in the Appendix (Appendix 1). As can be seen in Error! Reference source not found. all the options are scored as presenting a minor or negligible post-mitigation risk for scheme construction and maintenance activities respectively, with the assumption that best practice mitigation will be in place. Post mitigation risk scores for the operation of the schemes range from negligible to moderate. One of the feasible options, 169, scores a post-mitigation risk score of Moderate a summary of the risk assessment outcome for this option is provided in Error! Reference source not found. below.

Table 4.2 Post mitigation risk assessment summary for schemes within the feasible list which are deemed to present a Moderate or Major INNS transfer risk.

Scheme	Post-mitigation operational risk	Risk assessment summary
169	Moderate	Moderate negative effects - Though this scheme will utilise the existing connection between the Derwent valley reservoirs and ST river Derwent abstractions additional volume discharged from the Derwent valley reservoirs may impact physical environment conditions in favour of INNS as well as potentially increase propagule pressure in the downstream watercourse.



## Appendix 1: INNS risk assessments for feasible and preferred options (A3 Summary page per option)

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A separate A3 summary page of the risk assessment results for each of the feasible options has been provided as a separate Appendix

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