Hampshire Water Transfer and Water Recycling Project

Invasive Non-Native Species (INNS) Biosecurity Plan

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Introduction

1. The purpose of this Invasive Non-Native Species (INNS) Biosecurity Plan is to ensure that risks associated with the introduction or spread of INNS during construction, testing and commissioning, operation and emergency events are clearly identified, avoided where reasonably practicable, and controlled to an acceptably low level. The Plan also provides assurance that the Project aligns with Environment Agency policy on raw water transfers, Natural England advice, and relevant legislative requirements.
2. For the purposes of this INNS Biosecurity Plan, INNS have been categorised into functional groups based on dispersal mechanisms and lifecycle characteristics, rather than adopting a species-specific approach to mitigation. This functional group framework ensures that proposed biosecurity measures remain effective over the lifetime of the Project, including in response to the emergence of new or currently unrecorded INNS.

INNS baseline

1. The INNS baseline is established through a desk-based review of species records for the Hermitage Stream and River Itchen catchments, which represent the source and receptor catchments of the Project respectively, and a horizon scanning literature review which identifies the potential future and emerging INNS threats relevant to the catchments and the water industry more broadly. The review confirms that a wide range of high-priority INNS are already present or established across the South East region, representing existing and ongoing regional pressures that are independent of the Project.
2. In line with Natural England advice, invasive and non-native aquatic pathogens, including fish and crayfish diseases are also considered as part of the baseline, despite limited routine monitoring data being available for these organisms.

INNS biosecurity management

1. The approach to INNS management during construction will be through the preparation and implementation of construction phase INNS method statement(s), which will set out site specific measures for the identification, management and control of INNS. These method statements will be developed and implemented by an Environmental Clerk of Works (ECoW). These measures are secured through this INNS Biosecurity Plan.
2. The approach to INNS management during the testing and commissioning phase will be through the use of either treated wastewater or potable water during pressure testing with all potable water stored in temporary water storage lagoons and subsequently collected, de chlorinated and disposed of at an appropriately licensed facility. Full system testing will use treated wastewater or source water as appropriate to ensure the residual risk of INNS introduction or spread is negligible.

3. During operation of the Project, INNS pathway mapping is supported by a risk assessment undertaken using the Environment Agency's Strategic Resource Option (SRO) Aquatic Invasive Non-Native Species Risk Assessment Tool (SAI RAT). The following approaches to INNS management during operation will be applied:
4. INNS Pathway Number (IPN) 3 Havant Thicket Reservoir; INNS risks at Havant Thicker Reservoir will be managed through Portsmouth Water's dedicated INNS Biosecurity Plan, with a focus on monitoring, prevention and responsive management. While complete eradication of INNS is neither reasonable nor proportionate given its use and accessibility, management will aim to reduce INNS presence to as low as reasonably practicable, recognising that some residual risk will remain.
5. IPN4 Transfer of source water from Havant Thicket Reservoir to Otterbourne WSW; INNS management during routine maintenance testing of the washouts is secured through the Operational Environmental Management Plan (OEMP), which ensures that washout water will be collected in tankers and disposed of in a suitably licenced facility to avoid direct environmental discharge.
6. IPN5 Otterbourne WSW waste management processes; INNS treatment will be applied to waste flows at Otterbourne WSW prior to discharge to the sewer network. The design of the Otterbourne WSW upgrade works will also allow for the future retrofitting of additional treatment (such as UV or chemical disinfection) should enhanced INNS or pathogen control become necessary over the operational lifetime of the Project.

The Emergency INNS Management Plan

1. The Emergency INNS Management Plan (EIMP) will set out the approach for managing INNS risks associated with emergency scenarios during operation of the Project where source water could be released to the natural environment, and will be prepared by the Contractor, in accordance with the Outline EIMP given in this INNS Biosecurity Plan. Such emergency scenarios include the WRP operating in run to waste mode, emergency drain down of pipeline sections via washouts, and power or equipment failure at Otterbourne WSW resulting in discharge of source water to the sewer network.
2. The EIMP will not seek to eliminate the possibility of INNS release during an emergency, but instead provides a structured, proportionate framework to contain, manage and, where necessary, control INNS should such an event occur.
3. The EIMP will include the following procedures and will be developed by the Contractor prior to any works or emergency incidents taking place:
    - Pre incident procedures.
    - Rapid assessment and identification of INNS.
    - Containment and eradication measures.
    - Post incident monitoring and follow up.
    - Communication and reporting procedures.

1 Introduction

1.1 Purpose of this document

1.1.1 This Invasive Non-Native Species (INNS) Biosecurity Plan has been prepared by Southern Water Services Limited (hereafter referred to as 'the Applicant') for the proposed Hampshire Water Transfer and Water Recycling Project (hereafter referred to as 'the 'Project'). It sets out the approach to the management of INNS for the construction and operation of the Project.

1.1.2 The objectives of the INNS Biosecurity Plan are:

1. To establish a sufficient baseline of INNS that may be introduced or spread during construction and operation of the Project, with consideration given to INNS functional groups rather than a species-specific approach.
2. To identify the pathways by which INNS may be introduced or spread by the Project.
3. To set out the approach to INNS management, including in emergency scenarios.
4. To secure the mitigation required to control INNS during the construction and operation of the Project.

1.1.3 This INNS Biosecurity Plan is relevant to both the construction and operational phases of the Project.

1.2 Description of the Project

1.2.1 The Project comprises the construction, operation and maintenance of the following components:

1. Water Recycling Plant and associated pumping stations.
2. Pipelines between Budds Farm Wastewater Treatment Works and the Water Recycling Plant site.
3. Pipelines between the Water Recycling Plant site and Bedhampton Springs, connecting to pipelines being delivered by Portsmouth Water between Bedhampton Springs and Havant Thicket Reservoir.
4. Pipeline between the Water Recycling Plant site and Otterbourne Water Supply Works.
5. Above Ground Plant comprising Intermediate Pumping Stations and Break Pressure Tanks located along the Pipeline between the Water Recycling Plant site and Otterbourne Water Supply Works.

1.2.2 The Project would also comprise the use of the following infrastructure:

1. Havant Thicket Reservoir (which has been consented separately by Portsmouth Water and is currently under construction) for the storage of recycled water.
2. The existing Eastney Long Sea Outfall, Eastney Pumping Station, and associated Eastney Transfer Tunnel for the release of reject water from the WRP site.

3. Pipelines and other related works (which have been consented separately by Portsmouth Water) for the transfer of recycled water and source water between Bedhampton Springs and Havant Thicket Reservoir.

1.2.3 The construction and operation of the Project would be supported by other temporary and permanent works.

1.2.4 The Project will require the demolition, disassembly and/or temporary relocation of a number of small structures.

1.2.5 A detailed description of the Project can be found in ES Chapter 3 Description of the Proposed Development, Volume I (Document reference 6.1, DCO Volume 6). The Application Glossary (Document reference 1.7, DCO Volume 1) sets out the abbreviations and definitions used in the DCO application for the Project.

1.3 INNS guidance

The Environment Agency's position statement on INNS and raw water transfers between isolated catchments

1.3.1 The Environment Agency's position statement *on Managing the risk of spread of Invasive Non-Native Species through raw water transfers* [1] outlines the EA's position on how it will manage the risks of raw water as a pathway for the spread of INNS. It indicates that the focus should be on any new pathways that a transfer creates, and not on the current distribution of INNS.

1.3.2 The Project will transfer source water from Havant Thicket Reservoir in the East Hampshire Rivers WFD operational management catchment to Otterbourne WSW in the Test and Itchen WFD operational management catchment. The Test and Itchen is specified as an isolated catchment in the Environment Agency's Isolated Catchment Management document [2], i.e. a catchment without any identified natural or artificial hydrological pathways connecting it to other catchments. Thus, the Project would transfer water between two catchments which would otherwise be isolated, or unconnected from each other.

1.3.3 The position statement states that new schemes that create a hydrological connection between isolated catchments are required to have mitigation measures in place to ensure that INNS cannot be spread by the new transfer, that environmental objectives in RBMPs are met, and that all other legislative requirements are met.

1.3.4 With respect to the Water Environment (Water Framework Directive) Regulations 2017, the position statement states that INNS, or their introduction, cannot be considered a modification to a water body under Regulation 19, which otherwise sets circumstances in which a failure to achieve Good ecological status/potential or prevent deterioration of status is not considered to be a breach of legal requirements.

1.3.5 It is relevant to compliance with the Environment Agency's position statement that the Project does not connect two waterbodies directly, and that the source water transferred to the Test and Itchen catchment will be conveyed through a sealed pipeline directly for treatment at Otterbourne WSW. This reduces the risk of INNS transfer considerably and is a material consideration to the formulation of INNS management for the Project.

Natural England's advice on INNS risks for RAPID

1.3.6 In March 2025 Natural England provided an advice note on INNS [3] for the Regulator's Alliance for Progressing Infrastructure Development (RAPID) All Company Working Group (ACWG) and others developing water resource schemes. The advice note provides supplementary guidance on the risk of spreading INNS through water transfers and further highlights the risk of spreading pathogens and impacting the genetic integrity of some isolated fish populations for SROs and other water transfer schemes.

1.3.7 The advice note states the risk assessment for INNS should comprise of three elements:

1. Assess existing INNS risk in the catchment and pathways created by the SRO, using the Strategic Resource Option Aquatic Invasive Species Risk Assessment (SAI-RAT) tool [4].
2. Assess the current and future risk of spreading INNS pathogens.
3. Assess how schemes may impact the ability to eradicate and control future INNS and prevent their spread.

1.3.8 The advice note recommends that INNS risk and mitigation are considered as early as possible and before designs are finalised. The design and management of schemes should incorporate as much natural ecosystem functionality as possible and include prevention methods where appropriate. Post-construction monitoring is recommended, alongside eradication plans for new and emerging threats.

1.3.9 The advice note also recommends including an assessment of the risk of spreading INNS pathogens, both current and future, including crayfish plague (*Aphanomyces astaci*). It states that any identified risks should have proposed mitigation measures and INNS risk management, including measures to address risks from recreation, angling and boating as well as water transfers.

1.3.10 In assessing the risk to the genetic integrity of fish populations, Natural England recommends that the INNS risk assessment will act as a proxy assessment for the risk and mitigation measures to protect fish genetic integrity. If the INNS risk (including larval stages and larger pathogens) is considered well-managed, the genetic integrity could be considered sufficiently protected.

1.4 Definition of INNS

1.4.1 For the purposes of the INNS Biosecurity Plan, INNS are defined as "any non-native animal or plant that has the ability to spread causing damage to the environment, the economy, our health and the way we live" [6].

1.4.2 INNS of concern which have already been introduced to Great Britain or have been highlighted as presenting a future risk are considered to be 'High Priority INNS' and are defined as:

1. Any species listed on Schedule 9 of the Wildlife & Countryside Act (as amended) 1981 [7].
2. Any species categorised as High Impact on the Water Framework Directive UKTAG aquatic alien species list [8].

3. Any species listed on the current list of Invasive Alien Species of Special Concern (Regulation (EU) 1143/2014) [9].

1.4.3 Although microorganisms are not considered as INNS under key legislation, the 2025 Natural England advice note on INNS for RAPID [8] states that a Project's overall management of INNS should include consideration of pathogenic microorganisms alongside plant and animal INNS. Therefore, consideration is also given to invasive non-native pathogens and their vectors of spread in the INNS Biosecurity Plan.

2 The INNS baseline

2.1 Establishing the INNS baseline

2.1.1 In order to establish the INNS baseline relevant to the Project, a desk study and a horizon scanning exercise were undertaken.

2.1.2 For the desk study, INNS records for the Hermitage Stream and River Itchen catchments (representing the source and receptor catchments respectively) was included using the following sources:

1. Biological records from the Hampshire Biodiversity Information Centre (HBIC)[1].
2. Open-source macroinvertebrate, macrophyte and fish data from the Environment Agency Ecology and Fish Data Explorer [16].
3. Any incidental INNS records from ecological surveys undertaken for the purposes of the environmental assessments for the Project. It should be noted that no comprehensive surveys for INNS were carried out, and therefore a precautionary approach has been taken to assumed presence, even where there were no positive records.

2.1.3 For the horizon scanning exercise, an evaluation of future potential INNS threats to the Hermitage and Itchen catchments was made using the following sources:

1. The INNS South East Regional Invasive Species Management Plan (RIMP) [16].
2. The Test and Itchen Invasive Species Partnership [17].
3. Roy (2014) horizon scanning study of future INNS threats to Great Britain [16].
4. UKWIR priority list of 10 INNS relevant to the water industry over the period 2015-2030 [17].

The South East region RIMP list

2.1.4 The Reducing and Preventing Invasive Alien Species Dispersal (RAPID) LIFE project [18] produced five regional RIMPs which aim to deliver regionally relevant information and advice for controlling INNS. The RIMP regions are based on Environment Agency management catchments, and the South East RIMP [19] includes the East Hampshire Rivers catchment and the Test and Itchen catchment which represents the source and receptor catchments of the Project respectively. The RIMP prioritises aquatic habitats and given the unlikely ingress of coastal and estuarine species to the freshwater habitats typical of the Project area, only species found in freshwater aquatic habitats were considered relevant to this assessment. Forty-four freshwater species are included on the RIMP list of INNS species already present in the South East region, and these species were assumed as the initial unconstrained INNS baseline for the Project. All other data sources listed above were cross-checked with the RIMPS list and any additional records of INNS identified within were also included in the INNS baseline.

[1] Biological records have been provided by agreement between Southern Water and the Hampshire Biodiversity Information Centre (HBIC) I Hampshire County Council (hants.gov.uk) [Accessed on: 27/03/2026].

2.1.5 Table 2-1 shows the INNS species included in the initial unconstrained INNS baseline. The table indicates which species are considered 'High Priority' INNS species. High Priority INNS species are defined as:

1. Any species listed on Schedule 9 of the Wildlife & Countryside Act (as amended) 1981 [7].
2. Any species categorised as High Impact on the Water Framework Directive UKTAG aquatic alien species list [8].
3. Any species listed on the current list of Invasive Alien Species of Special Concern (Regulation (EU) 1143/2014) [9].
4. Any species where the South East RIMP risk of introduction is considered High. The RIMP bands are based on how well established the species is in the region, and their predicted rate of colonisation.

Table 2-1 'High Priority' INNS species present in the South East region

Scientific Name	Common Name	RIMP Risk of Introduction	WCA Schedule. 9 species (year added to Schedule)	WFD UKTAG Risk	Invasive Alien Species of Special Concern
Elodea canadensis	Canadian pondweed	High	Yes (2010)	High	No
Lagarosiphon major	Curly waterweed	High	Yes (2005)	High	Yes
Hydrocotyle ranunculoides	Floating pennywort	High	Yes (2005)	High	Yes
Azolla filiculoides	Water fern	High	Yes (2005/ 2010)	High	No
Ludwigia grandiflora	Water primrose	Medium	Yes (2010)	High	Yes
Crassula helmsii	New Zealand pigmyweed	High	Yes (2005)	High	No
Elodea nuttallii	Nuttall's waterweed	High	Yes (2010)	High	Yes
Myriophyllum aquaticum	Parrot's feather	High	Yes (2010)	High	Yes
Sagittaria latifolia	Duck potato	Medium	Yes (2010)	N/A	No
Lysichton americanus	American Skunk Cabbage	High	No	High	Yes
Heracleum mantegazzianum	Giant hogweed	High	Yes (1981)	High	Yes

Scientific Name	Common Name	RIMP Risk of Introduction	WCA Schedule. 9 species (year added to Schedule)	WFD UKTAG Risk	Invasive Alien Species of Special Concern
Fallopia sachalinensis	Giant knotweed	High	Yes (2010)	High	No
Gunnera tinctoria	Giant rhubarb	High	Yes (2010)	High	Yes
Galega officinalis	Goat's rue	High	No		No
Impatiens glandulifera	Himalayan balsam	High	Yes (2010)	High	Yes
Persicaria wallichii	Himalayan knotweed	High	No	High	No
Reynoutria japonica syn. Fallopia japonica	Japanese knotweed	High	Yes (2010)	High	No
Impatiens capensis	Orange balsam	High	No	Low	No
Dreissena polymorpha	Zebra mussel	High	No	High	No
Procambarus clarkii	Red swamp crayfish	Medium	Yes (2010)	High	Yes
Pacifastacus leniusculus	Signal crayfish	High	Yes (1992)	High	Yes
Orconectes limosus	Spiny-cheek crayfish	Medium	Yes (2010)	Moderate	Yes
Orconectes virilis	Virile crayfish	Medium	No	High	Yes
Eriocheir sinensis	Chinese mitten crab	High	Yes (2010)	High	Yes
Trachemys scripta spp	Terrapin	Medium	No	N/A	Yes
Pelophylax ridibundus	Marsh frog	High	No	N/A	No
Oxyura jamaicensis	Ruddy duck	Medium	Yes (1981)	N/A	Yes
Alopochen aegyptiacus	Egyptian goose	High	Yes (1981)	N/A	Yes
Neovison vison	American mink	High	No	N/A	No

2.1.6 In 2014, Roy et al. [16] conducted a horizon scanning study of future INNS threats to Great Britain. Quagga mussel received maximum scores and was ranked the highest risk INNS.

2.1.7 UKWIR undertook a horizon scanning exercise in 2016 [17] which resulted in a priority list of 10 INNS relevant to the water industry over the period 2015-2030, shown in Table 2-2. The highest risk rankings are assigned to quagga and zebra mussel.

Table 2-2 Top ten priority list of INNS relevant to the water industry from 2015-2030.

Rank	Species	Taxonomic group
1	Quagga mussel *(Dreissena rostriformis bugensis)*	Animal – bivalve mollusc
2	Zebra mussel (Dreissena polymorpha)	Animal – bivalve mollusc
3	Himalayan balsam *(Impatiens glandulifera)*	Higher plant
4	Signal crayfish *(Pacifastacus leniusculus)*	Animal – decapod crustacean
5	Japanese knotweed *(Reynoutria japonica)*	Higher plant
6	Killer shrimp *(Dikerogammarus villosus)*	Animal – amphipod crustacean
7	New Zealand pigmyweed *(Crassula helmsii)*	Higher plant
8	Demon shrimp *(Dikerogammarus haemobaphes)*	Animal – amphipod crustacean
9	Floating pennywort *(Hydrocotyle ranunculoides)*	Higher plant
10	Giant hogweed *(Heracleum mantegazzianum)*	Higher plant

The Test and Itchen Invasive Species Partnership

2.1.8 The Test and Itchen Invasive Species Partnership is a project between the Test and Itchen Catchment Partnership, the Hampshire and Isle of Wight Wildlife Trust and various stakeholders, aimed at managing the threat and impact of INNS in the Test and Itchen river catchments.

2.1.9 The Partnership has been monitoring INNS in the Test and Itchen catchments since 2021, with 14 INNS species identified as posing the most significant risk. These species are:

1. American skunk-cabbage (*Lysichiton americanus)*
2. Giant hogweed (*Heracleum mantegazzianum)*
3. Giant knotweed (*Fallopia sachalinensis)*
4. Himalayan balsam (*Impatiens gladulifera)*
5. Japanese knotweed (*Fallopia japonica)*
6. Bohemian knotweed (*Fallopia x bohemica)*
7. Orange balsam (*Impatiens capensis)*

8. Monkey flower (*Mimulus guttatus)*
9. Red-osier dogwood (*Cornus sericea*)
10. Floating pennywort (*Hydrocotyle ranunculoides)*
11. New Zealand pygmyweed (*Crassula helmsii)*
12. Parrot's feather (*Myriophyllum aquaticum)*
13. Water fern (*Azolla filiculoides)*
14. American mink (*Neovison vison)*

2.1.10 It is recognised that three species on the action list from the Test and Itchen Partnership are not included on the RIMP list for the South East region, namely *Fallopia* x *bohemica*, *Mimulus guttatus*, and *Cornus sericea*. This is probably because of the focus of the RIMP list was on species found in aquatic habitats, whereas these species are predominately terrestrial, often found in river margins, but also capable of growing in damp terrestrial environments. For completeness, they will be considered as High Priority in the same way as the RIMP list species for the formulation of this INNS Biosecurity Plan.

2.2 INNS functional groups

2.2.1 In the context of INNS, categorising of species that share similar roles within an ecosystem, regardless of their taxonomic classification is useful to their management. These 'functional groups' are normally defined based on their ecological functions such as their feeding habits, reproductive strategies, habitat preferences, or in the case of INNS are defined largely on their dispersal mechanisms. Core INNS functional groups are sessile aquatic invertebrates, mobile aquatic invertebrates, aquatic macrophytes, riparian/marginal plants, fish and micro-organisms.

2.2.2 The SRO Aquatic INNS Risk Assessment Tools (SAI-RAT) use a novel INNS functional group mechanism, which subdivides the core functional groups into 26 INNS functional group categories (all published versions of the tool using these functional group sub categories but they are defined in the SAI-RAT Version 1 user guide [15]). The key INNS species identified in section **Error! Reference source not found.** and section **Error! Reference source not found.** as relevant to the Project have been assigned to their functional groups in Table 2-3. below. Categorising INNS into functional groups aids in developing targeted management strategies to mitigate the adverse effects of INNS, on the premise that mitigation strategies should be applicable to functional groups rather than on a species-by-species basis. This gives resilience to the biosecurity and mitigation plans should new species become established within the Project boundary.

Table 2-3 INNS Functional Groups sub-categories used in the SAI-RAT INNS risk assessment tools.

Functional Group sub-category	Taxonomic group	Mobility of adult	Size of juveniles/ infective units	Eggs/ no eggs	Key INNS species identified in the Project baseline
1	Animal	mobile	juv <1mm,	eggs	N/A

Functional Group sub-category	Taxonomic group	Mobility of adult	Size of juveniles/ infective units	Eggs/ no eggs	Key INNS species identified in the Project baseline
2	Animal	sessile	juv <1mm	eggs	*Dreissena polymorpha* *Dreissena rostriformis bugensis*
3	Animal	mobile	juv >1mm	eggs	*Oxyura jamaicensis* *Alopochen aegyptiacus*
4	Animal	sessile	juv >1mm	eggs	all INNS fish spp.
5	Animal	mobile	juv <1mm	no eggs	*Potamopyrgus antipodarum*
6	Animal	sessile	juv <1mm	no eggs	N/A
7	Animal	mobile	juv >1mm	no eggs	*Procambarus clarkia* *Pacifastacus leniusculus* *Orconectes limosus* *Eriocheir sinensis* *Trachemys scripta spp.* *Pelophylax ridibundus* *Neovison vison* *Chelicorophium curvispinum* *Crangonyx floridanus* *Dikerogammarus haemobaphes*
8	Animal	sessile,	juv >1mm	no eggs	N/A
9	Plant	seed	aquatic	annual	N/A
10	Plant	veg	aquatic	annual	N/A
11	Plant	seed + veg	aquatic	annual	N/A
12	Plant	seed	riparian	annual	*Impatiens glandulifera* *Persicaria wallichii* *Impatiens capensis*
13	Plant	veg	riparian	annual	N/A
14	Plant	seed + veg	riparian	annual	N/A
15	Plant	seed	aquatic	perennial	*Lagarosiphon major*

Functional Group sub-category	Taxonomic group	Mobility of adult	Size of juveniles/ infective units	Eggs/ no eggs	Key INNS species identified in the Project baseline
16	Plant	veg	aquatic	perennial	*Elodea canadensis* *Elodea nuttallii* *Myriophyllum aquaticum*
17	Plant	seed + veg	aquatic	perennial	*Hydrocotyle ranunculoides* *Azolla filiculoides* *Ludwigia grandiflora*
18	Plant	seed	riparian	perennial	*Lysichton americanus* *Heracleum mantegazzianum* *Cornus sericea*
19	Plant	veg	riparian	perennial	*Fallopia sachalinensis* *Reynoutria japonica syn. Fallopia japonica* *Fallopia x bohemica*
20	Plant	seed + veg	riparian	perennial	*Gunnera tinctoria* *Mimulus guttatus*
21	Plant	seed	aquatic + riparian	perennial	N/A
22	Plant	seed	aquatic + riparian	annual	N/A
23	Plant	veg	aquatic + riparian	perennial	*Galega officinalis*
24	Plant	veg	aquatic + riparian	annual	N/A
25	Plant	seed + veg	aquatic + riparian	perennial	*Crassula helmsii*
26	Plant	seed + veg	aquatic + riparian	annual	N/A

For animal groups the functional group categories are: mobility of adult/size of juveniles or infective units/reproductive strategy. For plant groups the functional group categories are: model of reproduction/habitat preference/growth pattern.

2.3 Pathogens

2.3.1 Pathogens that affect aquatic species are not routinely monitored in inland waters, nor are native fish populations routinely health checked by either the Environment Agency or Centre for Environment, Fisheries and Aquaculture Science (CEFAS) Fish Health Inspectorate (FHI). Therefore, no pathogen records were available to establish a baseline for the study area and assess the existing risk. However, the Natural England advice note [3] included an indicative list of pathogen species against which proposed INNS mitigation and eradication measures can be assessed.

2.3.2 The list was largely focused on pathogens that cause disease in fish. They were categorised based on the following regulatory framework:

1. Notifiable – High-priority threats that require mandatory legal reporting to the FHI. These include both exotic diseases not yet in the UK and endemic ones that cause significant economic or environmental damage.
2. Category 2 – Established, harmful non-native pathogens. They are managed through a containment strategy where any movement of infected fish requires specific permits and strict biosecurity conditions.
3. Novel – "New" or emerging threats that are not native and not widespread. Because their impact is often unknown or potentially severe, it is an offence to introduce fish carrying these into inland waters.

2.3.3 They were further categorised based on their geographical distribution in the UK as either ‘widespread’, ‘present’, ‘restricted’ or ‘free’ (i.e. absent). Details of the pathogen species included in the Natural England advice note are presented in Table 2-4.

Table 2-4 Pathogens against which proposed INNS mitigation and eradication measures could be assessed (Natural England, 2025) [3].

Pathogen	Type	Susceptible species	Distribution
Notifiable			
Bacterial kidney disease	Bacterium	Salmonids	Present
Spring viraemia of carp	Virus	Cyprinds, pike, wels catfish	Free; 1 control area
Koi herpesvirus	Virus	Carp	Widespread
Infectious salmon anaemia	Virus	Salmon	Free
Infectious haematopoeitic necrosis	Virus	Salmonids	Free
Viral haemorrhagic septicaemia	Virus	Salmonids	Free
Gyrodactylus salaris	Parasite	Salmonids	Free
Category 2			
Schyzocotyle acheilognathi	Parasite	Generalist	Restricted
Pomphorhynchus teretticolis	Parasite	Generalist	Widespread
Ergasilus sieboldi	Parasite	Generalist	Widespread
Ergasilus briani	Parasite	Generalist	Widespread
Monobothrium wageneri	Parasite	Tench	Restricted
Ergasilus gibbus	Parasite	European eel	Restricted
Anguillicoloides crassus	Parasite	European eel	Widespread
Anguillid herpesvirus (Ang-HV1)	Virus	European eel	Restricted
Aphanomyces astaci	Oomycete	Crayfish, especially white-clawed crayfish	Widespread
Novel			

Pathogen	Type	Susceptible species	Distribution
Carp edema virus	Virus	Carp	Restricted
Lactococcus garviae	Bacterium	Generalist	Free
Argulus spp. (currently unidentified)	Parasite	Generalist	Restricted
Eel virus European X	Virus	European eel	Restricted
Lernaea cyprinacea	Parasite	Generalist	Restricted
Pellucidhaptor pricei	Parasite	Comon bream	Restricted
Tracheliastes spp.	Parasite	Generalist	Restricted
Philometroides sanguineus	Parasite	Crucian carp	Restricted

3 INNS pathway mapping

3.1 INNS pathway mapping approach

3.1.1 In order to develop an appropriate management strategy in the INNS Biosecurity Plan, the potential pathways and activities which could contribute to the introduction or spread of INNS functional groups and pathogens have been mapped. The potential for the spread of INNS is acknowledged as a result of both construction and operational practices.

3.2 Identification of construction-phase INNS pathways

3.2.1 The pathways by which INNS and pathogens may be introduced or spread during construction have been identified as:

1. Transfer of INNS to/from construction sites on machinery, vehicles, footwear or clothing. Where INNS are known to be within or close to the site, there is a risk of plant seeds or fragments, animals or eggs being transported on machinery, vehicles or by foot, from one site/river catchment to another.
2. Introduction or spread of INNS or pathogens to watercourses during trenched open-cut installation of pipelines at watercourse crossings and construction of the SuDS outfall on the Hermitage Stream. This poses a risk of spreading INNS from one river catchment to another, or to sensitive habitats or locations downstream. There is also a risk of temporary alteration of the hydrological regime facilitating or altering the spread of INNS already present within the watercourse.
3. Introduction or spread of INNS or pathogens through water used during construction (e.g., for washing vehicles and machinery). Water used for construction purposes or to wash vehicles or equipment, the source of that water may act as a vector for the transportation of INNS to/from the site or elsewhere.
4. Introduction of INNS or pathogens via environmental mediums or materials brought to construction sites from external sources (e.g., soils or plants for landscaping and/or planting design). The source of topsoil used on site should be considered, particularly in relation to Japanese knotweed.
5. Removal of INNS from site in excavation spoils or cleared vegetation.

3.2.2 The biosecurity management actions to mitigate construction-phase INNS pathways will be secured by the INNS Biosecurity Plan and are given in section 4.2.

3.3 Identification of testing and commissioning-phase INNS pathways

3.3.1 Following completion of construction works, commissioning of the principal components of the Project will be required to ensure the components have been installed correctly prior to the commencement of operation. This would firstly comprise pressure testing the pipelines by filling and pressurising sections of the

Pipeline to check for leaks or other operational, followed by full system testing. Any release of water during testing and commissioning has the potential to release INNS to the natural environment. The following approach will be used in the management of INNS during testing and commissioning of the pipelines:

3.3.2 Pressure testing of the pipelines in the Project will comprise passing water through sections of the pipeline from the following sources to ensure that the risk of introduction of INNS is negligible:

1. The pipelines between Budds Farm WTW and the WRP site will use treated wastewater from Budds Farm WTW.
2. The pipelines between the WRP site and Bedhampton Springs will use potable water from Otterbourne WSW.
3. The pipeline between the WRP site and Otterbourne WSW will use potable water from Otterbourne WSW.

3.3.3 Water storage lagoons will be used to store the potable water used for the testing of the pipeline between the WRP site and Otterbourne WSW, and this water will be cleaned using a silt buster. The water storage lagoons will comprise a lined shallow bunded area of land with a volume that will vary depending on commissioning requirements. Water will be passed through the pipeline using temporary pumps and pipes, either directly to the pipelines or using installed washout valves. Once testing is complete, the potable water stored in the storage lagoons will be transferred to tankers for de-chlorination and then disposed of at a suitably licenced disposal facility.

3.3.4 Treated wastewater used for pressure testing of the pipelines between Budds Farm WTW and the WRP site and the Pipelines between the WRP site and Bedhampton Springs will be returned to Budds Farm WTW for release from the Eastney LSO.

3.3.5 Full system testing of the Project will use water from the following sources to ensure there is no risk of introducing INNS:

1. The Pipelines between Budds Farm WTW and the WRP site will use treated wastewater from Budds Farm WTW.
2. The Pipelines between the WRP site and Bedhampton Springs will use source water from Havant Thicket Reservoir.
3. The Pipeline between the WRP site and Otterbourne WSW will use source water from Havant Thicket Reservoir.

3.3.6 With the application of the above approach to INNS management during the testing and commissioning-phase, the residual risk of INNS introduction or spread is negligible.

3.4 Identification of operation-phase INNS pathways

3.4.1 The pathways by which INNS and pathogens may be introduced or spread during operation of the Project are described below. The INNS pathway mapping is supported by an INNS risk assessment, undertaken using the Environment Agency's SAI-RAT tool [16], available in Appendix A.

3.4.2 SAI-RAT is a quantitative and adaptive assessment tool used by the water industry to assesses the relative INNS risk ratings of the assets and raw water transfers in the context of SROs. It is not intended to be used as a definitive assessment of INNS risk to the Project due to the limitations discussed in Appendix A section A.1, but it is used in the pathways mapping exercise to provide additional information to the pathways identified, where relevant. The SAI-RAT INNS risk scores presented have been generated using Version 2 of the SAI-RAT tool.

3.4.3 A conceptual schematic of the operational phase of the Project is given in Appendix B The figure provides a visualisation of the operational processes of the Project and identifies any location where a new INNS pathway has been identified. All new INNS pathways are assigned an INNS Pathway Number (IPN) for the purposes of further assessment.

IPN1 Transfer of recycled water from WRP to Havant Thicket Reservoir

3.4.4 The WRP would receive treated wastewater from Budds Farm WTW, and using full-advanced treatment would provide an output of purified recycled water. Pipelines would be constructed between the WRP site and Bedhampton Springs, connecting to pipelines being delivered by Portsmouth Water between Bedhampton Springs and Havant Thicket Reservoir, to transfer the recycled water from the WRP site to Havant Thicket Reservoir and source water from Havant Thicket Reservoir back to the WRP site. The transfer of recycled water from the WRP to Havant Thicket Reservoir carries a low SAI-RAT risk score of 3.00.

3.4.5 The treated wastewater would be pumped through two filtering processes within the WRP. Firstly, micro-filtration, to remove remaining impurities that could block the membranes during reverse osmosis (RO). The water would then be subject to a RO process, which has an average pore size of 0.001 to 0.0001 microns, and would remove dissolved salts, impurities, bacteria and pharmaceuticals. After the RO, the next stage within the water recycling process is an advanced oxidation process (UV-AOP) involving the use of ultraviolet light and hydrogen peroxide to remove any remaining impurities.

3.4.6 It is expected that the RO and advanced oxidation processes to a granulation of 0.0001 microns is refined enough to remove even the smallest functional groups of plant and animal INNS. The initial micro-filtration and RO processes will also remove a volume of pathogen-bearing particles and resistant parasites from the water. UV-AOP generates hydroxyl radicals which are powerful oxidants against biological molecules including microorganisms, and many studies focusing on viruses and chemical contaminants relevant to human health identify the ultraviolet light and hydrogen peroxide combination as the most effective AOP for microbial inactivation, especially for viruses that are traditionally difficult to treat [21]. Although there is no available evidence in literature directly evaluating UV-AOP against specific fish or amphibian-specific pathogens, similar results would be expected. The transfer of recycled water to Havant Thicket Reservoir is therefore considered to pose a negligible INNs risk and no INNS mitigation is required.

IPN2 Releases from the WRP to the Solent through the Eastney LSO

3.4.7 Any reject water produced by the WRP would be discharged through a new connection to the existing Eastney TT and Eastney PS and released through the

Eastney LSO. In the event of an emergency shut down of the WRP, water within the WRP would also be returned via the same reject water pipeline by opening the run to waste valve. Reject water and water within the WRP would not be exposed to any possible additional INNS before it is released and does not present as a viable new INNS pathway. This water would then be released using the existing Eastney TT, Eastney PS and Eastney LSO. The run to waste would also be used to release water that does not meet the water quality requirements at the WRP. The WRP carries a low SAI-RAT risk score of 4.00.

3.4.8 The WRP operating in run to waste mode may also require drain down of sections of the pipeline connected to a new pumping station at the WRP (marked as HLPS in Appendix B), specifically the Bedhampton Springs to the WRP pipeline and the WRP to BPT/IPS-E section of the pipeline which both convey source water from Havant Thicket Reservoir. Drain down of these pipelines may be possible to the sewer network but is more likely that the reject water pipeline would be used to drain down the pipeline sections, discharging source water to the Solent through the Eastney TT, Eastney PS and the Eastney LSO.

3.4.9 Although there is a risk of source water from Havant Thicket Reservoir being discharged into the Solent internationally designated site through the Eastney LSO in this scenario, it is recognised that the Solent itself acts as a natural INNS mitigation measure as the majority of INNS functional groups identified in the baseline assessment in Section 2.2 would not persist in saline conditions.

3.4.10 The amphipod INNS species identified in the baseline assessment such as demon shrimp (*Dikerogammarus haemobaphes*) or killer shrimp (*Dikerogammarus villosus*) do have a high salt tolerance, however, and may be able to persist after discharge. The measures Portsmouth Water are putting in place to ensure the presence of INNS is as low as reasonably possible in the reservoir (as summarised in Paragraphs **Error! Reference source not found.** - **Error! Reference source not found.**) and the fact that the WRP operating in run to waste is a very unlikely occurrence reduces the INNS transfer risk in this case, but it does not eliminate the risk completely.

3.4.11 The management of INNS pathways during emergency shut down of the WRP will be through the preparation and implementation of an Emergency INNS Management Plan (EIMP) which will be developed in accordance with the Outline EIMP given in section 4.4.

IPN3 Havant Thicket Reservoir

3.4.12 The Project would use Havant Thicket Reservoir (which is being delivered by Portsmouth Water and currently under construction) for the storage of recycled water, before transfer to Otterbourne WSW. The recycled water would be combined with water sourced from Bedhampton Springs already contained within the reservoir. Groundwater poses a negligible INNS risk due to the highly unlikely presence of INNS at source. The operational Havant Thicket Reservoir will also be supplemented by a natural inflow from the upstream catchment, through the wetland habitat to the north of the reservoir.

3.4.13 The SAI-RAT Version 2 INNS risk assessment indicates that the operation of Havant Thicket Reservoir carries an INNS risk score of 27.95. Although the management of INNS at Havant Thicket Reservoir will be under Portsmouth

Water's operational control, the presence of INNS within the reservoir is a material concern for the purposes of the INNS Biosecurity Plan for the Project, given it is the same source (raw) water that will be abstracted and transferred to Otterbourne WSW.

3.4.14 Portsmouth Water has produced the Havant Thicket Reservoir INNS Biosecurity Plan for the reservoir project [18] which identifies the key pathways of INNS spread to and from Havant Thicket Reservoir during operation, and secures an INNS management approach to the Havant Thicket Reservoir project. The Havant Thicket Reservoir INNS Biosecurity Plan recognises that it would be unreasonable and disproportionate to seek to completely eradicate INNS from Havant Thicket Reservoir given its proposed use as an open water storage reservoir with public access and recreational use. But in utilising multiple INNS risk assessment tools, and assessing the effectiveness of the mitigation measures proposed, the Havant Thicket Reservoir INNS Biosecurity Plan aims to limit the likelihood of presence of INNS in the reservoir to as low as is reasonably practicable, while accepting that there will remain a residual risk of potential INNS presence.

3.4.15 The INNS management measures in the Havant Thicket Reservoir INNS Biosecurity Plan include:

1. Development of an INNS Monitoring Plan to monitor any spread of existing INNS and provide early detection of new INNS in the reservoir.
2. Formulation of the INNS Response Plan to define procedures and protocols to follow when new INNS or spread of existing INNS are observed, so that further spread is managed and controlled.
3. Physical management options such as implementation of washing facilities, check-clean-dry protocols and waste-management strategies.
4. The procurement of a survey boat to be permanently based at the reservoir to reduce the requirement for multiple boats entering the water thus reduce the active risk of INNS introduction through daily use of the reservoir by staff and visitors.

3.4.16 The source water to be transferred to Otterbourne WSW by the Project will be abstracted from Havant Thicket Reservoir using the same offtake structure as the Portsmouth Water transfers are abstracted from, in which screens of 50mm to 100mm spacings are currently proposed. This large screen spacing is unlikely to screen out any INNS except for large terrestrial mammals, therefore the potential for all other INNS functional groups to be present in the source water to be transferred to Otterbourne remains. The water in Havant Thicket Reservoir is an existing INNS pathway. Although the inclusion of recycled water from the WRP within Havant Thicket Reservoir is not considered in the Havant Thicket Reservoir INNS Biosecurity Plan, recycled water has been shown to pose no additional INNS risk (as set out in sections 3.4.4 to 3.4.6). Thus, no additional mitigation will be required. The potential presence of INNS in the source water is considered a material concern to the Project.

IPN4 Transfer of source water from Havant Thicket Reservoir to Otterbourne WSW

3.4.17 At maximum operation, the Project would transfer approximately 90Ml/d of source water from Havant Thicket Reservoir to Otterbourne WSW, which carries a SAI-RAT INNS risk score of 25.57. In order to transfer this volume of water the water would need to be pumped under high pressure. Along the pipeline route water would be pumped from the WRP site to intermediate pumping stations and break pressure tanks located at high points, where it then flows onwards using gravity. The functions of the break pressure tank overflows are to prevent backflow and over-topping. The overflows are provided as last-resort emergency devices; normal system controls would monitor water levels within the break pressure tanks, and overflow outlets would be utilised only in the event of an emergency. It is not anticipated that the overflows would operate during the operational life of the Project.

3.4.18 Along the route of the pipeline, a number of isolation valves, washout and air valve chambers would be required. Pipeline washouts are provided to drain down sections of the transfer pipeline and are in the order of a few to several hundred meters long. Isolation valves are provided at each end of these pipeline sections either side of a washout, so that a particular section can be drained down as required while keeping the pipeline section on the other side full and pressurised. The activities for which the washouts would be used during operation of the Project are as follows:

1. To facilitate testing and commissioning of the Project (testing and commissioning-phase INNS pathways are discussed in section 3.3).
2. For routine maintenance testing during operation. Regular testing of the washouts would be required in accordance with the relevant operating regime.
3. During emergency incidents such as in the event of damage to the pipeline. Washouts may be discharged to the environment without constraint where necessary to alleviate the situation, to protect public safety and to facilitate pipeline repair.

3.4.19 The washouts present a potential new INNS pathway, should source water be released from the washout to the surrounding natural environment. The risk is increased if the washout is located in the Test and Itchen operational WFD management catchment, as Havant Thicket Reservoir is located in the East Hampshire Rivers operational WFD management catchment and therefore there is a risk of introducing INNS from an outside catchment which would be otherwise isolated.

3.4.20 Based on survival times outside the host and temperature requirements, it is assumed that many pathogens that affect aquatic species could survive the Havant Thicket Reservoir to Otterbourne WSW transfer.

3.4.21 The following approach to INNS management of the washouts will be applied, as secured through the OEMP (Document reference 7.7, DCO Volume 7):

1. Any releases of source water resulting from routine maintenance testing of washout valves will be collected directly by a tanker, with no source water discharged to the environment (land or watercourse). This could require the installation of temporary works to connect the tanker to the washout valve.

Testing of a washout valve would result in the release of approximately 4.5m^3 of source water from the pipelines, requiring only one tanker. Testing of washouts will be required a minimum of every six months, or in accordance with the relevant operating regime.

2. It is expected that the washout valves would have a design life of 2,500 opening and closing cycles. Therefore, if valves are to be tested every six months, the valves would not need replacing during the intended lifetime of the Project unless testing identified the need for replacement.
3. The management of INNS pathways during emergency use of the washouts will be through the preparation and implementation of an Emergency INNS Management Plan (EIMP) which will be developed in accordance with the Outline EIMP given in section 4.4.

IPN5 Otterbourne WSW waste management processes

3.4.22 Otterbourne WSW carries a SAI-RAT INNS risk score of 10.20. The WSW treats source water to drinking water standards. At present, Otterbourne WSW has two treatment trains – one for surface water (from the River Itchen) and one for groundwater sources. The surface water treatment process includes clarification and filtration through rapid gravity filtration, and the ground water treatment process utilises microfiltration. The multibarrier approach to surface water treatment provides a combination of both physical and chemical processes makes survival of INNS extremely unlikely. Coagulation and clarification would remove suspended solids and larger organisms, and the rapid-gravity filtration would provide fine physical removal of remaining particles. Although this is not specific mitigation designed to control the presence of INNS, treatment to drinking water standards is widely accepted as sufficient to remove all animal and plant INNS. Even after the introduction of source water from Havant Thicket Reservoir to Otterbourne WSW, there is no risk of any INNS present in the water being transferred to the water supply network.

3.4.23 The waste from both treatment trains (sludge) is first dewatered, with recovered water sent back to the head of the surface water treatment train. The dewatered sludge waste is disposed into the local sewer network which is within the Chickenhall WTW catchment. Chickenhall WTW is a large conventional trickling filter works with tertiary sand filtration which processes raw sewage from the sewer network – including process waste and run to waste flows from Otterbourne WSW. The wastewater treatment process at Chickenhall WTW produces treated wastewater and sludge. The sludge undergoes a dewatering process before it is transferred to Budds Farm WTW by tanker; the wastewater produced in the dewatering process is returned to the head of Chickenhall WTW. The treated wastewater is finally discharged to the River Itchen.

3.4.24 The wastewater treatment process of trickling filter works and tertiary sand filtration is not considered effective in removing all INNS functional groups. The addition of source water from Havant Thicket Reservoir to Otterbourne WSW will introduce water from an outside catchment to the sewer network at Chickenhall WTW, with the potential risk of introducing INNS that are otherwise absent into the Itchen catchment. It is therefore considered that discharges from Otterbourne WTW to the sewer network present a new potential INNS pathway.

3.4.25 During significant storm conditions, if the incoming storm sewer flows exceed the works treatment capacity, incoming sewer flows will also discharge into the River Itchen via the same outfall as treated wastewater. The storm overflow will have some level of screening (inlet screens and Copa trawls) before discharge but not sufficient in remove all INNS functional groups. Once the Project is operational and source water from Havant Thicket Reservoir is introduced to Otterbourne WSW, the incoming sewer flows that discharge to the River Itchen present another potential new INNS pathway to the River Itchen.

3.4.26 The process waste from Chickenhall WTW will be tankered to Budds Farm WTW. The treatment at Budds Farm WTW involves anaerobic digestion – producing biogas (that is consumed on site) and cake. Considering the inclusion of any source water from Havant Thicket Reservoir in the system, the sludge cake product presents a new pathway of introducing or spreading INNS.

3.4.27 The approach to INNS management at Otterbourne WSW will be through the inclusion of INNS treatment to treat the waste flow that is produced by the existing treatment process, before entering the sewer network.

3.4.28 Once flows have passed through Otterbourne WSW, the waste stream will be subject to the following process to remove INNS: Lamella settlers to help settle the high solid loading from centrate, and two stages of filtering to remove any INNS or particles containing INNS. The first filtering process will use coarse 1mm Boll type pressure strainers and the second filtering process will use fine 25µm Boll type pressure strainers. All INNS will be removed from the liquid waste and processed into sludge.

3.4.29 Any liquid waste from the INNS treatment at Otterbourne WSW would be considered INNS free and discharged to the existing foul sewer network at Chickenhall WTW. Any sludge waste from the Lamella settlers or from the washwater from Boll type strainers will be returned to the head of the works for reprocessing through the waste management system at Otterbourne WSW. Any solid sludge arising from this process will be transferred to a suitable licensed disposal facility and any liquid waste arising from the waste management system will be sent back through the INNS treatment facility at Otterbourne WSW.

3.4.30 With the inclusion of INNS treatment at Otterbourne WSW, the waste management processes pathway poses a negligible risk of introducing and spreading INNS and no further mitigation is required.

3.4.31 The design of INNS treatment at Otterbourne WSW will allow space for UV or chlorine dosing disinfection to be retro-fitted at the Otterbourne INNS treatment area should pathogen treatment become a requirement in the future.

3.4.32 In the event of power or equipment failure at Otterbourne WSW, the plant will operate in run to waste mode and any overflow from the inlet balancing tank (which accepts inflow from both surface and groundwater sources) or washout from the inlet pipeline will ultimately bypass the treatment process and discharge source water to the sewer network. The management of INNS pathways during emergency use of the washouts will be through the preparation and implementation of an Emergency INNS Management Plan (EIMP) which will be developed in accordance with the Outline EIMP given in section 4.4.

4 INNS biosecurity management actions

4.1.1 The GB NNSS has produced the GB INNS Strategy [19], which indicates that the hierarchy to any INNS strategy should be:

1. Prevention
2. Surveillance, early detection and monitoring
3. Rapid response (following advice from the GB NNSS Rapid Response Working Group (RRWG) [20])
4. Long term management and control (e.g. large-scale eradication, containment, novel methods of control and mitigation, or implementation of biosecurity measures)

4.1.2 Prevention reduces adverse impacts and costs associated with eradication or removal plans and is particularly important in the aquatic environment where control and eradication are challenging. However, should measures to prevent the introduction of INNS be unsuccessful, accurate, up-to-date information on INNS presence and distribution is fundamental to making effective decisions that minimise their threat [19].

4.2 Construction-phase INNS management

4.2.1 The pathways by which INNS may be introduced or spread during construction of the Project have been identified in section 3.2. The approach to INNS management during construction will be through the development of construction-phase INNS method statements which will include site-specific measures to be implemented for the management of INNS.

Construction-phase INNS method statement(s)

4.2.2 Prior to construction commencing, site-specific INNS method statement(s) will be developed and implemented by the Environmental Clerk of Works (ECoW). The INNS method statement(s) will include an initial scoping assessment to identify the potential INNS risks to the site(s).

4.2.3 Should the potential for any INNS be identified, targeted surveys for INNS will be undertaken where the scoping assessment has identified a need for further information. Any INNS identified will be mapped and a procedure for documenting the potential risks, management and control measures of identified INNS incorporated into the INNS method statement(s) for works locations where such INNS are present.

4.2.4 The INNS method statement(s) will include a biosecurity protocol relevant to the site(s), for the purposes of informing all staff and contractors working on the Project of INNS-related measures to be implemented during daily work processes. The biosecurity protocol will include the biosecurity measures set out in Table 4-1 below and will align with the Applicant's own Environmental Management System Manual on INNS (currently EMS 224 [23][2]), which provides guidance to all staff, contractors

[2] or the latest applicable version.

and partners of the Applicant in the management of plant INNS, injurious plants, blue-green algae blooms and controlled drug plants.

4.2.5 The biosecurity protocol will include:

1. General INNS information and identification aids.
2. Good practice guidance in relation to INNS for all construction sites, including ‘Check-Clean-Dry’ protocols for all vehicles, machinery and personnel entering specific works areas.
3. INNS audit procedure for every INNS mitigation measure included and a process for which audits can be reviewed, completed and documented.
4. A mechanism for reporting and recording biosecurity incidents.
5. Bespoke biosecurity protocols, where relevant. This may include (but is not limited to):
    a. Protocol for the management and removal of INNS during accidental pollution events.
    b. Protocol for the disposal of contaminated wash water, including all silt and other solids (e.g. plant fragments) to prevent the spread of INNS.
    c. Protocol for best practice when working near water.
    d. Protocol for INNS management in the removal of materials from site.
    e. Species-specific Management Plans, where a species requires long-term management (e.g. Japanese knotweed).

Role of the Clerk of Works

4.2.6 An Environmental or Ecological Clerk of Works (ECoW) will be appointed and available for the duration of the construction phase, with responsibility to advise, supervise and report on the delivery of the INNS method statement(s).

4.2.7 The role of the ECoW (in relation to INNS), will include (but not be limited to):

1. Overseeing and applying the site-specific INNS method statement(s), including development of any protocols for species or location-specific INNS risks.
2. Implementing processes for INNS identification and reporting during construction.
3. Briefing contractors on the specific INNS issues on site and advising on the reporting protocol should INNS be encountered during construction. This could be through ‘toolbox’ talks or within site inductions.
4. Developing and issuing visual reference material and explaining use of plant identification apps to contractors to aid identification of INNS.
5. Applying strategies for the treatment or removal of INNS where they have been identified, with support from INNS specialists where necessary.
6. Auditing and updating biosecurity measures and procedures as necessary.
7. Stakeholder engagement.

Table 4-1 INNS general biosecurity measures to be included in the INNS method statement(s)

Potential new INNS Pathway	Hazard Description	Biosecurity measure to be included in the INNS method statement(s)		INNS Functional Groups Targeted
		Soft measures	Hard measures	
Transfer of INNS to/from construction sites on machinery, vehicles, footwear or clothing. Introduction or spread of INNS to watercourses during trenched open-cut installation of pipeline at watercourse crossings which poses a risk of spreading INNS from one river catchment to another, or to sensitive habitats or locations downstream. Temporary alteration of hydrological regime due to trenched open-cut installation of pipeline at watercourse crossings facilitates the spread of INNS already present within the watercourse.	Footwear, clothing, and equipment could spread soil, vegetation, and waterborne INNS and diseases. Tools could become contaminated by disease or INNS and spread. INNS could be spread in tyres treads or 'caterpillar' tracks on powered vehicles or on other parts of machinery that comes into contact with soil, vegetation or water. INNS could be released into a watercourse during accidental pollution events during construction.	• ECoW for construction phase to assume responsibility for INNS identification/management on construction sites. • Compulsory training for all site staff prior to work commencing detailing INNS risks, INNS identification and INNS reporting/management protocol. • Visual reference material made available to all site staff, including at existing assets. Consideration for use of plant identification apps to aid identification of INNS. • All current water industry guidance[3] in relation to site practices to be adhered to, such as: – reporting environmental incidents – permission to discharge to surface or groundwater – manage business and commercial waste – work on or near water – manage water on land • Protocol for the management and removal of INNS during accidental pollution events to be developed prior to construction. • Protocol for the disposal of contaminated wash water, including all silt and other solids (e.g. plant fragments) to prevent the spread of INNS to be developed prior to construction. • Protocol for best practice when working near water to be developed prior to construction.	• Implementation of 'Check Clean Dry' protocol for all vehicles and machinery before entering and exiting construction sites. Would require vehicle and machinery wash station to be set-up on site (e.g., pressure washer in a contained area, any water or materials collected to be disposed of appropriately). • Limitations on movement of vehicles and machinery on and off site until completion of work. • Implementation of 'Check-Clean-Dry' protocol[4] for all clothing and footwear before entering and exiting construction sites. Would require installation of boot wash facilities (running hot water is most effective). • Contractors to leave footwear and overclothes on site for duration of construction works. Clothes washing and drying facilities to be provided on site. • Consideration for the number of sites visited in a day and the order of those visits. For example, visit sites where INNS are known to be present last to reduce the risk of INNS spread to clean sites. • Exclusion and demarcation of areas where INNS have been identified or where contaminated soil, materials or water are located. • No contaminated runoff to enter drains or watercourses. • Construction design to maintain flows across trenched open-cut construction during installation of pipeline through use of pumps, pipes or flumes.	1-26 Where considering construction near watercourses : 1-7 (where present in the water); 9-11; 15-17; 21-22

[3] The Environment Agency does not provide 'good practice' guidance and all pollution prevention guidance (PPGs) that was previously maintained by the Environment Agency has been withdrawn from use. Current guidance and regulation for the water industry is available from GOV.UK [online] at: Water industry - GOV.UK [Accessed 27/11/2024].

[4] Southern Water have been a member of the NNSS led 'Check-Clean-Dry' Biosecurity Partnership since 2017. Details of application can be found at: Check Clean Dry » NNSS [Accessed 27/11/2024].

Potential new INNS Pathway	Hazard Description	Biosecurity measure to be included in the INNS method statement(s)		INNS Functional Groups Targeted
		Soft measures	Hard measures	
Introduction of INNS in raw water used during construction (e.g., for washing vehicles and machinery).	There is a risk of raw water used for construction purposes or to wash vehicles or equipment containing INNS which could be introduced or spread.	• All current water industry guidance[3] in relation to site practices to be adhered to, such as: – reporting environmental incidents – permission to discharge to surface or groundwater – manage business and commercial waste – work on or near water – manage water on land • Protocol for best practice when working near water to be developed prior to construction.	• Commitment to the use of potable water for all construction activities, including equipment and vehicle washing.	9-26
Introduction of INNS via environmental mediums/materials brought to construction sites from external sources (e.g., soils or plants for landscaping).	There is a risk of the imported material used during planting and landscaping regimes containing INNS.	• Protocol for INNS management in design features to be devised/audited prior to construction. • The risk of long-term management INNS species (such as Japanese knotweed) to be assessed prior to construction and species-specific management plans implemented at an early stage. • Use of topsoil that is certified free of INNS, particularly in relation to Japanese knotweed.	• Use of natural regeneration techniques where reasonably possible, taking into account the timescales for delivering relevant landscaping measures. • Where planting is necessary, use of native plants of local provenance, ensuring no INNS in planting scheme. • Planting should be undertaken in the appropriate planting season but as soon as possible following completion of the works to reduce the likelihood of undesired colonisation by INNS. • Introduced topsoil should be certified clear of INNS. • The re-use of excavated soil in other areas of the site should only be considered if it is certified free of INNS.	12-14; 18-22
Removal of INNS from site in excavation spoils or cleared vegetation.	INNS and diseases could be transported with vegetation on and offsite. Inappropriate disposal onsite could lead to regrowth / spread.	• Protocol for INNS management in the removal of materials from site to be devised/audited prior to construction.	• Surface vegetation and soils to be removed in a manner that will prevent spread, i.e. seed dispersing plants should be removed prior to seed pod establishing. • Cleared vegetation including INNS to be treated or disposed of accordingly. • Awareness that ineffective destruction may lead to regeneration of INNS. • If moving waste vegetation offsite, take care to avoid dropping any fragments, and that the Waste Duty of Care and relevant waste legislation is adhered to.	12-14; 18-22

4.3 Approach to pathogen management

4.3.1 The continued management and mitigation of INNS pathways which could also facilitate the spread of pathogens is considered to be appropriate pathogen management at this stage. This aligns with the EA position statement on INNS and raw water transfers [1] and the Natural England advice note on RAPID for the same [21].

4.3.2 The following measures set out this INNS Biosecurity Plan are also relevant to the management of pathogens by the Project:

1. Continued application of a layered, adaptive approach to INNS management using the source-pathway-receptor approach▪
2. Inclusion of physical management measures such as equipment disinfection, boot washing facilities and check-clean-dry protocols at Havant Thicket Reservoir to ensure the presence of INNS and pathogens in source water is low (managed by Portsmouth Water through the Havant Thicket Reservoir INNS Biosecurity Plan [18]).
3. Ensuring any releases of water from the washouts during commissioning or routine maintenance will be transferred to tankers for de-chlorination and then disposal at a suitably licensed facility.
4. Ensuring disposal of any waste streams from source water at Otterbourne WSW is disposed of at a suitably licenced facility.
5. Allowing space for UV or chlorine dosing disinfection to be retro-fitted at the Otterbourne INNS treatment area should pathogen treatment become a requirement in the future.

4.4 Approach to emergency INNS management

4.4.1 The following potential INNS pathways have been identified during emergency incidents:

1. Emergency shut down of the WRP resulting in activation of run to waste mode and source water being released to the Solent through the Eastney LSO.
2. Emergency drain down of isolated sections of the Havant Thicket Reservoir to Otterbourne WSW pipeline resulting in source water being discharged to the surrounding natural environment (land or water) through the washouts.
3. Power or equipment failure at Otterbourne WSW resulting in activation of run to waste mode and source water discharging to the sewer network.

4.4.2 The management of INNS pathways during emergency incidents will be through the preparation and implementation of an Emergency INNS Management Plan (EIMP) which will be developed by the Contractor, in accordance with the Outline EIMP given below.

4.4.3 It will not be the intention of the EIMP to remove the possibility of INNS being released, but to provide an approach for the control and eradication of INNS should source water be released to the natural environment during an emergency scenario.

Outline Emergency INNS Management Plan (EIMP)

4.4.4 The EIMP will set out the processes and procedures for managing INNS in an emergency incident, where source water is released to the natural environment. The EIMP will be appropriate to all INNS functional groups identified in the INNS baseline assessment given in section 2, including any new or emerging INNS threat species identified through the horizon scanning exercise, and any High Priority INNS species present in the South East region, as detailed in Table 2-1.

4.4.5 The EIMP will be informed by the Emergency Response Plan which will implement all reasonably practicable measures to mitigate environmental impacts after an emergency discharge of source water, include a suite of Incident Management procedures to manage water quality, in alignment with legislated plans and protocols and industry best practice should source water be released in an emergency incident. The Emergency Response Plan will be developed by the Contractor and secured through the OEMP (Document reference 7.7, DCO Volume 7).

4.4.6 The EIMP will include the following procedures and will be developed by the Contractor prior to any works or emergency incidents taking place:

- Pre-incident procedure for releasing and managing water during an emergency incident
- Procedure for the rapid assessment and identification of INNS
- Procedure for containment and eradication strategies
- Procedure for regular monitoring and follow-up
- Procedure for communication and reporting

Pre-incident procedure for releasing and managing water during an emergency incident

4.4.7 This will include:

- A process for recording the volumes of water released during an incident.
- A process for recording the duration of an incident.
- A procedure for management of the Havant Thicket Reservoir INNS monitoring data. The Havant Thicket Reservoir INNS Biosecurity Plan [18] includes an INNS Monitoring Plan to monitor the spread of new and existing INNS in Havant Thicket Reservoir.
- an alert procedure should any new or potential INNS risks be identified in Havant Thicket Reservoir.

Procedure for the rapid assessment and identification of INNS

4.4.8 This will include:

- A methodology for the rapid assessment and identification of INNS during an emergency incident. Rapid assessment techniques for identifying INNS will depend on the location and extent of the emergency incident and may include visual surveys, physical sampling and survey, molecular techniques such as eDNA or use of remote sensing to detect and track the spread of INNS.

Procedure for containment and eradication strategies

4.4.9 This will include:

- Procedures for the isolation and containment of INNS during and after an emergency incident. These procedures will be specific to the location and extent of the emergency incident but might include measures such as implementing physical barriers or buffer zones, hydrological controls such as water flow management or drainage systems or implementing restrictions on movement of soil, plants or other materials. Regular inspection and decontamination of equipment and vehicles will be necessary.
- Eradication techniques will be specific to the extent of INNS risk present but might include mechanical removal of INNS such as hand pulling or digging, chemical or soil treatments, or biological control measures such as the introduction of natural predators that target specific INNS.

Procedure for regular monitoring and follow-up

4.4.10 This will include:

- A plan for the regular monitoring of INNS at the release site or any habitats connected through viable pathways to ensure INNS are being effectively managed.
- Adaptive management will be employed to regularly review the effectiveness of the containment and INNS eradication strategies, and procedures will be adjusted as necessary.

Procedures for communication and reporting

4.4.11 This will include:

- A procedure to communicate any potential INNS introductions to regulatory bodies and other stakeholders, in particular the Environment Agency and Natural England.
- A mechanism to document all actions taken during the emergency INNS response and to coordinate and communicate any updates to the emergency scenario.

Appendix A INNS Risk Assessment

A.1 Strategic Resource Option (SRO) Aquatic Invasive Species Risk Assessment (SAI-RAT) overview

A.1.1 In order to quantify the risk associated with the introduction and spread of INNS from the Project, an INNS risk assessment was undertaken using the Environment Agency's Strategic Resource Option Aquatic (SRO) Invasive Species Risk Assessment (SAI-RAT) tool. SAI-RAT is a quantitative and adaptive assessment tool used by the water industry to assesses INNS risk measures of the assets and raw water transfers in the context of SROs.

A.1.2 SAI-RAT has been developed to account for the diversity of assets and raw water transfers options which may comprise any one SRO,and uses a single assessment process via a modular approach to provide a quantitative score of relative risk. The risk assessment can therefore be used to compare the relative risk ratings of different SROs.

A.1.3 At the onset of the Project, it was agreed with the Environment Agency that Version 1 of SAI-RAT would be suitable for use in this assessment, for consistency with the Portsmouth Water Havant Thicket Reservoir INNS Biosecurity Plan [18], and because Version 2 was not available until a late stage in the preparation of the assessment [27]. As such the Project was initially assessed using Version 1, enabling comparison with the Portsmouth Water assessment of the Havant Thicket Reservoir scheme.

A.1.4 In March 2026, the SAI-RAT assessment was re-run using the latest version of the tool (Version 2.01), thus enabling comparison with other SROs assessed by this version.

A.1.5 The results of the SAI-RAT assessments are intended to inform decision-making processes rather than to make decisions in their own right. Furthermore, INNS will be one of many factors which will need to be taken into consideration as part of the development of SROs, and therefore the results of the SAI-RAT assessments cannot be looked at in isolation.

A.1.6 All versions of SAI-RAT only account for operational pathways, thus construction-based risks are not considered. As such, the SAI-RAT assessments used here are not a definitive assessment of INNS risk to the Project; they are used alongside the consideration of operational INNS risks of the Project. The full assessment of operational INNS risks to the Project is given in section 3.4 of the INNS Biodiversity Plan (i.e. this document), including an assessment of existing assets and transfers which are not covered by the SAI-RAT tool.

A.1.7 The methodology and results of both SAI-RAT assessments are described below. It is important to note that there is no allowance for interpretation or classification of the overall risk scores within either tool version, as they were intended to be used for comparative purposes with and between other SROs. The associated guidance does not assign low, medium and high-risk bands. As such, the outputs of the tool versions can be used to compare the different components of the

Project, to provide a hierarchy of INNS risks between the different components, and to identify those that present a higher risk of INNS spread.

A.2 SAI-RAT Version 1 assessment

SAI-RAT Version 1 methodology overview

A.2.1 The Environment Agency SRO Aquatic INNS Risk Assessment user guide (Version 1, 2021) [16] was used as a guide for completion of the original SAI-RAT Version 1 assessment.

A.2.2 There are two risk scores produced by the SAI-RAT Version 1 assessment: the Asset Module and the Raw Water Transfer Module (RWT Module).

A.2.3 The Asset Module is the overall score assigned to each asset considering presence of high impact INNS, priority habitats, designated sites, maintenance on site, recreational activities, fish stocking, mammals/waterfowl and transfer of waste sludge to land.

A.2.4 The RWT Module is the overall score assigned to each raw water transfer considering the number of raw water transfer inputs into the source, the source and receptor type, the pathway type, volume of water, frequency of operation, transfer distance, presence of washouts outside the catchment, recreational activities, presence of high priority INNS at the source and along the pathway, designated sites at the receptor and, priority habitat along the pathway and at the receptor.

A.2.5 The overall risk scores produced by the tool represent an average of individual risk scores assigned to the different components of the Project (i.e., assets and raw water transfers).

SAI-RAT Version 1 assumptions

A.2.6 The following assumptions have been made for the assessment of the Combined and Separate options in the Version 1 assessment:

1. Version 1 of the tool only assessed new assets and raw water transfers, and gives only one unweighted score per asset or raw water transfer and therefore may under or over-estimate the complexity of INNS risks.
2. Where priority habitat is present in the vicinity of the pathway, i.e. at the receptor, a precautionary principle has been taken whereby priority habitat is assumed to be present along the pathway.
3. All RWTs (aside from the natural Havant Thicket Reservoir inflow) are assumed to be pipelines, therefore ‘pipeline’ has been selected for column K of tab ‘4. RWT_RA’.
4. All RWTs (aside from the natural Havant Thicket Reservoir inflow) are assumed to have ‘more than 3’ RWT inputs into the source. The natural Havant Thicket Reservoir inflow is assumed to have unknown RWT inputs into the source.
5. All RWTs are assumed to be isolated receptor catchments.

6. Volumes, frequencies and distances for the RWTs considered for the separate and combined options have been agreed in consultation with Southern Water and Portsmouth Water.
7. An assumption has been made that INNS are 'not recorded' at the source and along the pathway for the Water Recycling Plant to Havant Thicket Reservoir transfer as this pipeline carries purified recycled water that has been through extensive treatment and will therefore be free of INNS.
8. Groundwater flows to Hermitage Stream from Bedhampton Springs have not been considered as a run to waste in this assessment.
9. Further limitations are identified in the functional output of the operational risk scores.

SAI-RAT Version 1 Project components

A.2.7 For the purposes of the SAI-RAT Version 1 assessment and for consistency with the parallel assessment undertaken by Portsmouth Water, all new assets and raw water transfers under a 'Separate' and a 'Combined' project design approach were considered. The 'Separate' approach considered the assets and transfers proposed by the Project, whereas the 'Combined' approach considered the assets and transfers proposed by both the Applicant for the Project and by Portsmouth Water for the Havant Thicket Reservoir scheme collectively. Design information inputs were agreed between the Applicant and Portsmouth Water over a series of months and concluded in April 2024 and therefore reflects a preliminary design of the Project.

A.2.8 The following new assets and raw water transfers were included in the SAI-RAT Version 1 assessment:

Portsmouth Water

- Havant Thicket Reservoir
- Emergency draw down from Havant Thicket Reservoir to Riders Lane Stream
- Emergency draw down from Havant Thicket Reservoir to Hermitage Stream
- Compensatory flows from Havant Thicket Reservoir to Riders Lane Stream
- Raw water transfer from Havant Thicket Reservoir to Farlington WSW
- Farlington WSW to The Solent via Langstone Harbour
- Hermitage Stream to Havant Thicket Reservoir (natural inflow)

Southern Water (the Applicant)

- WRP
- Transfer of recycled water from the WRP to Havant Thicket Reservoir
- Raw water transfer from Havant Thicket Reservoir to Otterbourne WSW
- Run-to-waste transfer from WRP to The Solent

A.2.9 The following transfers were omitted from this assessment as they are not considered raw water transfers:

1. Two underground pipelines approximately 0.5 kilometres long to connect Budds Farm Wastewater Treatment Works and the Water Recycling Plant. The first will transfer treated wastewater from the wastewater treatment works to the Water Recycling Plant. The second will transfer reject water from the water recycling process back to the wastewater treatment works prior to release to sea via the existing Eastney LSO.
2. An underground pipeline approximately 3.5 kilometres long to transfer recycled water, from the new Water Recycling Plant to Havant Thicket Reservoir.
3. Transfer of groundwater from Bedhampton Springs to Havant Thicket Reservoir) due to its groundwater source and negligible INNS risk. Therefore, it was not included in the SAI-RAT Version 1 assessment.

A.2.10 Bedhampton Springs, Otterbourne WSW and Chickenhall WTW are existing assets and therefore were not included in the SAI-RAT V1 assessment.

SAI-RAT Version 1 outcomes

A.2.11 A summary of the asset module risk scores for the combined option is provided in Table 4-2.

Table 4-2 Asset Module Risk Scores for the SAI-RAT Version 1 Combined option

Rank	Asset Name	Asset Type	Owner	Risk Score	Risk Score %
1	Havant Thicket Reservoir	Reservoir (online waterbody)	Portsmouth Water	365	43.87
2	WRP	Water Treatment Works[5]	Southern Water	146	17.55
				SRO Maximum Asset Score	**43.87**
				SRO Average Asset Score	**30.71**

A.2.12 The highest asset score produced by the SAI-RAT Version 1 assessment for the combined option was 365 (43.87%) for Havant Thicket Reservoir. This is due to a combination of factors including the proposed asset size (1590000m2), assumed presence of high impact INNS, priority habitats, local designated sites, site maintenance, use of water safety equipment and presence of mammals/waterfowl on site.

A.2.13 A summary of the RWT module risk scores for the combined option is provided in Table 4-3.

Table 4-3 RWT Module Risk Scores for the SAI-RAT Version 1 Combined option

Rank	Raw Water Transfer Name	Raw Water Transfer Type	Owner	Risk Score	Risk Score %
1	Raw water transfer from Havant Thicket Reservoir to Otterbourne WSW	Pipeline	Southern Water	740.48	54.85

[5] Water Treatment Works has been used as proxy for Water Recycling Plant as an Asset Type in the SAI-RAT assessment tool as it assumes full treatment of INNS.

Rank	Raw Water Transfer Name	Raw Water Transfer Type	Owner	Risk Score	Risk Score %
2	Compensatory flows from Havant Thicket Reservoir to Riders Lane Stream	Pipeline (Compensatory Flow)	Portsmouth Water	693.56	51.38
3	Farlington WSW to The Solent via Langstone Harbour	Pipeline (Run to Waste)	Portsmouth Water	655.76	48.58
4	Transfer of recycled water from the WRP to Havant Thicket Reservoir	Pipeline	Southern Water	627.41	46.48
5	Run-to-waste transfer from WRP to The Solent	Pipeline (Run to Waste)	Southern Water	613.91	45.48
6	Emergency draw down from Havant Thicket Reservoir to Riders Lane Stream	Pipeline (Emergency Draw Down)	Portsmouth Water	612.56	45.38
7	Raw water transfer from Havant Thicket Reservoir to Farlington WSW	Pipeline	Portsmouth Water	605.48	44.85
8	Hermitage Stream to Havant Thicket Reservoir (natural inflow)	River (natural inflow)	Portsmouth Water	583.20	43.20
9	Emergency draw down from Havant Thicket Reservoir to Hermitage Stream	Pipeline (Emergency Draw Down)	Portsmouth Water	538.31	39.88
				SRO Maximum RWT Score	**54.85**
				SRO Average RWT Score	**46.67**

A.2.14 The highest RWT risk score produced by the SAI-RAT Version 1 assessment for the combined option was 740.4750 (54.85%) for the pipeline from Havant Thicket Reservoir to Otterbourne WSW. This is the highest RWT risk score because the pathway crosses management catchments, carried a large volume of raw water (51-11 Ml/d), is operated frequently (year round – intermittent) and the pipeline covers a higher distance than the majority of the other transfers (5-1-10km). There are also more than three washouts outside of the source operational and management catchments.

A.2.15 Other notable high scores include the compensatory flow from Havant Thicket Reservoir to Riders Lane Stream (693.5625, 51.38%) and the run to waste from Farlington Water Supply Works to The Solent (655.7625, 48.58%).

A.2.16 A summary of the asset module risk scores for the separate option is provided in Table 4-4.

Table 4-4 Asset Module Risk Scores for the SAI-RAT Version 1 Separate option

Rank	Asset Name	Asset Type	Owner	Risk Score	Risk Score %
1	Havant Thicket Reservoir	Reservoir (online waterbody)	Portsmouth Water	365	43.87
2	WRP	Water Treatment Works[6]	Southern Water	146	17.55
				SRO Maximum Asset Score	**43.87**
				SRO Average Asset Score	**30.71**

A.2.17 The highest asset risk score produced by the SAI-RAT Version 1 assessment for the separate option was 365 (43.87%) for Havant Thicket Reservoir. This is due to the same reasons as highlighted above for the Combined option assessment of the reservoir.

A.2.18 A summary of the RWT module risk scores for the separate option is provided in Table 4-5.

Table 4-5 RWT Module Risk Scores for the SAI-RAT Version 1 Separate option

Rank	Raw Water Transfer Name	Raw Water Transfer Type	Owner	Risk Score	Risk Score %
1	Raw water transfer from Havant Thicket Reservoir to Otterbourne WSW	Pipeline	Southern Water	740.48	54.85
2	Compensatory flows from Havant Thicket Reservoir to Riders Lane Stream	Pipeline (Compensatory Flow)	Portsmouth Water	693.56	51.38
3	Farlington WSW to The Solent via Langstone Harbour	Pipeline (Run to Waste)	Portsmouth Water	655.76	48.58
4	Transfer of recycled water from the WRP to Havant Thicket Reservoir	Pipeline	Southern Water	618.98	45.85
5	Run-to-waste transfer from WRP to The Solent	Pipeline (Run to Waste)	Southern Water	613.91	45.48
6	Emergency draw down from Havant Thicket Reservoir to Riders Lane Stream	Pipeline (Emergency Draw Down)	Portsmouth Water	612.56	45.38
7	Raw water transfer from Havant Thicket Reservoir to Farlington WSW	Pipeline	Portsmouth Water	591.98	43.85

[6] Water Treatment Works has been used as proxy for Water Recycling Plant as an Asset Type in the SAI-RAT assessment tool as it assumes full treatment of INNS.

Rank	Raw Water Transfer Name	Raw Water Transfer Type	Owner	Risk Score	Risk Score %
8	Hermitage Stream to Havant Thicket Reservoir (natural inflow)	River (natural inflow)	Portsmouth Water	583.20	43.20
9	Emergency draw down from Havant Thicket Reservoir to Hermitage Stream	Pipeline (Emergency Draw Down)	Portsmouth Water	538.31	39.88
				SRO Maximum RWT Score	**54.89**
				SRO Average RWT Score	**46.49**

A.2.19 The highest RWT risk score produced by SAI-RAT Version 1 assessment for the Separate option was 740.4750 (54.85%) for the pipeline from Havant Thicket Reservoir to Otterbourne WSW. This is the highest RWT risk score as the pathway crosses management catchments, carried a large volume of raw water (51-11 Ml/d), is operated frequently (year round – intermittent) and the pipeline covers a higher distance than the majority of the other transfers (5.1-10km). There are also more than three washouts outside of the source operational and management catchments.

A.2.20 Other notable high scores include the compensatory flow from Havant Thicket Reservoir to Riders Lane Stream (693.5625, 51.38%) and the run to waste from Farlington WTW to the Solent (655.7625, 48.58%).

A.2.21 The proposed Havant Thicket Reservoir to Otterbourne WSW raw water transfer was assigned a score of medium risk because it is the only proposed new connection between the source and receptor. This poses a medium level of risk to WFD compliance in these catchments and water bodies and any associated designated sites, as the transfer creates a risk of spread of INNS across WFD catchments which would not otherwise exist.

A.2.22 Havant Thicket Reservoir may become a potential source of INNS into the transfer due to its nature as an open water body. INNS may also be introduced during the construction works on machinery, equipment and personal protective equipment worn by the operatives. The potential risk of spread of INNS along the transfer could then arise where washouts would occur along the pipeline, leading to raw water from Havant Thicket Reservoir entering the environment around the washout locations. If INNS entered the environment in this way, they could go on to affect designated sites and protected species.

A.3 SAI-RAT Version 2.01 assessment

SAI-RAT Version 2.01 methodology overview

A.3.1 The Environment Agency's SRO Aquatic INNS Risk Assessment Tool Version 2 guidance [4] was used to enable completion of the updated SAI-RAT Version 2.01 assessment.

A.3.2 Similarly to Version 1, Version 2.01 requires source assets, RWTs and receptor assets to be identified and assessed. Assets are considered as any discrete water body, property, facility, or package of land where INNS could spread to or from. RWTs are defined as the intentional and artificial movement of water between assets, which could enable the spread of viable INNS from a source to a transfer route and receptor.

A.3.3 Complex schemes could comprise a number of asset and RWT components, which can be assessed collectively within the tool. The tool also allows 'in-line closed assets' (eg raw water pump stations (RWPS) located along RWTs, and 'secondary transfers' (RWTs connected to scheme components,but not created or altered by the scheme) to be included in assessments. However, no in-line closed assets or secondary transfers were identified or assessed for the Project.

A.3.4 The tool generates 'likelihood' scores for each asset, which indicates the likelihood that INNS could be spread on or off the asset. The tool combines the RWT input data and asset likelihood scores to generate the following five outputs:

1. The likelihood of INNS spread from the source.
2. The likelihood of INNS spread on/off the transfer route.
3. The severity of INNS impact upon the transfer route – indicates the cost of INNS spreading into recipient locations.
4. The severity of INNS impact upon the receptor – indicates the cost of INNS spreading into recipient locations.
5. An overall inherent risk score – combining likelihood and severity scores. Inherent risk scores are presented as a percentage of the highest potential score, with a higher score indicating a higher INNS transfer risk.

SAI-RAT Version 2.01 Project components

A.3.5 The SAI-RAT V2.01 assessment considered the 'Separate' project design approach, i.e. the assets and transfers proposed by the Applicant for the Project only. The following assets and RWT components were included in the SAI-RAT V2.01 assessment:

- WRP
- Havant Thicket Reservoir
- Otterbourne WSW
- Transfer of recycled water from the WRP to Havant Thicket Reservoir
- Raw water transfer from Havant Thicket Reservoir to Otterbourne WSW

A.3.6 The following transfers have been omitted from this assessment:

- Two underground pipelines approximately 0.5 kilometres long to connect Budds Farm Wastewater Treatment Works and the Water Recycling Plant. The first will transfer treated wastewater from the wastewater treatment works to the Water Recycling Plant. The second will transfer reject water from the water recycling process back to the wastewater treatment works prior to release to sea via the existing Eastney LSO.

SAI-RAT Version 2.01 outcomes

A.3.7 The asset likelihood scores produced by the tool are summarised in Table 4-6 and Table 4-7 below with the latter providing a more detailed breakdown of the contributing factors. The lowest score is associated with the WRP (4.00), with the highest likelihood score generated by Havant Thicket Reservoir (27.95). The higher risk of spread of INNS from the reservoir is potentially due to a combination of factors including the proposed asset size (1590000m^2), and activities taking place at this site, such as terrestrial recreation, staff/contractors entering water and use of water safety equipment.

Table 4-6 Asset Module Risk Scores for the SAI-RAT Version 2.01 Separate option

Rank	Asset Name	Asset Type	Owner	Risk Score %
1	Havant Thicket Reservoir	Reservoir (online waterbody)	Portsmouth Water	27.95
2	Water Recycling Plant	Water Treatment Works	Southern Water	4.00
3	Otterbourne WTW	Water Treatment Works	Southern Water	10.20
			SRO Maximum Asset Score	**27.95**
			SRO Average Asset Score	**14.05**

Table 4-7 Asset likelihood contributing factor scores for the SAI-RAT Version 2.01 Separate option

Contributing factor	Havant Thicket Reservoir	Water Recycling Plant	Otterbourne WTW
Staff/contractor visits	4	4	4
Staff/contractor enter water	4.8	N/A	N/A
Vehicle access	2.4	N/A	1.2
Angling presence	N/A	N/A	N/A
Angling matches	N/A	N/A	N/A
Live bait	N/A	N/A	N/A
Fish stocking	N/A	N/A	N/A
Boat presence	N/A	N/A	N/A
Water sports presence	N/A	N/A	N/A
Water safety equipment	4	N/A	N/A
Mammals and waterfowl	5	N/A	N/A
Sludge/sediment movement	N/A	N/A	5

Contributing factor	Havant Thicket Reservoir	Water Recycling Plant	Otterbourne WTW
Terrestrial recreation	5	N/A	N/A
Other long-term activities	N/A	N/A	N/A
Upstream Natural Waterbodies	2.5	N/A	N/A

A.3.8 Table 4-8presents the summary risk scores for each of the RWTs assessed, whilst Table 4-9 provides a more detailed breakdown of score contributions. The highest RWT risk score produced was 25.57 for the pipeline from Havant Thicket Reservoir to Otterbourne WTW. This is the highest RWT risk score because the pathway crosses management catchments, operated frequently (daily) and the pipeline covers a higher distance than the majority of the other transfers (30km compared to 5km).

A.3.9 Both transfers are via enclosed pipelines, therefore the spread of INNS is limited along the route, and the establishment of INNS is likely only to occur if there are INNS at the source or receptor already.

Table 4-8 RWT assessment results for the Sai-RAT Version 2.01 assessment

Rank	Raw Water Transfer Name	Raw Water Transfer Type	Owner	Likelihood of spread from source	Likelihood of spread on / off transfer route	Severity (of impact) upon transfer route	Severity (of impact) upon receptor	Risk Score
1	Havant Thicket Reservoir to Otterbourne WTW	Pipeline	Southern Water	43.78	7.37	5.78	5.23	25.57
2	WRP to Havant Thicket Reservoir	Pipeline	Southern Water	0.33	5.67	0.35	22.74	3.00

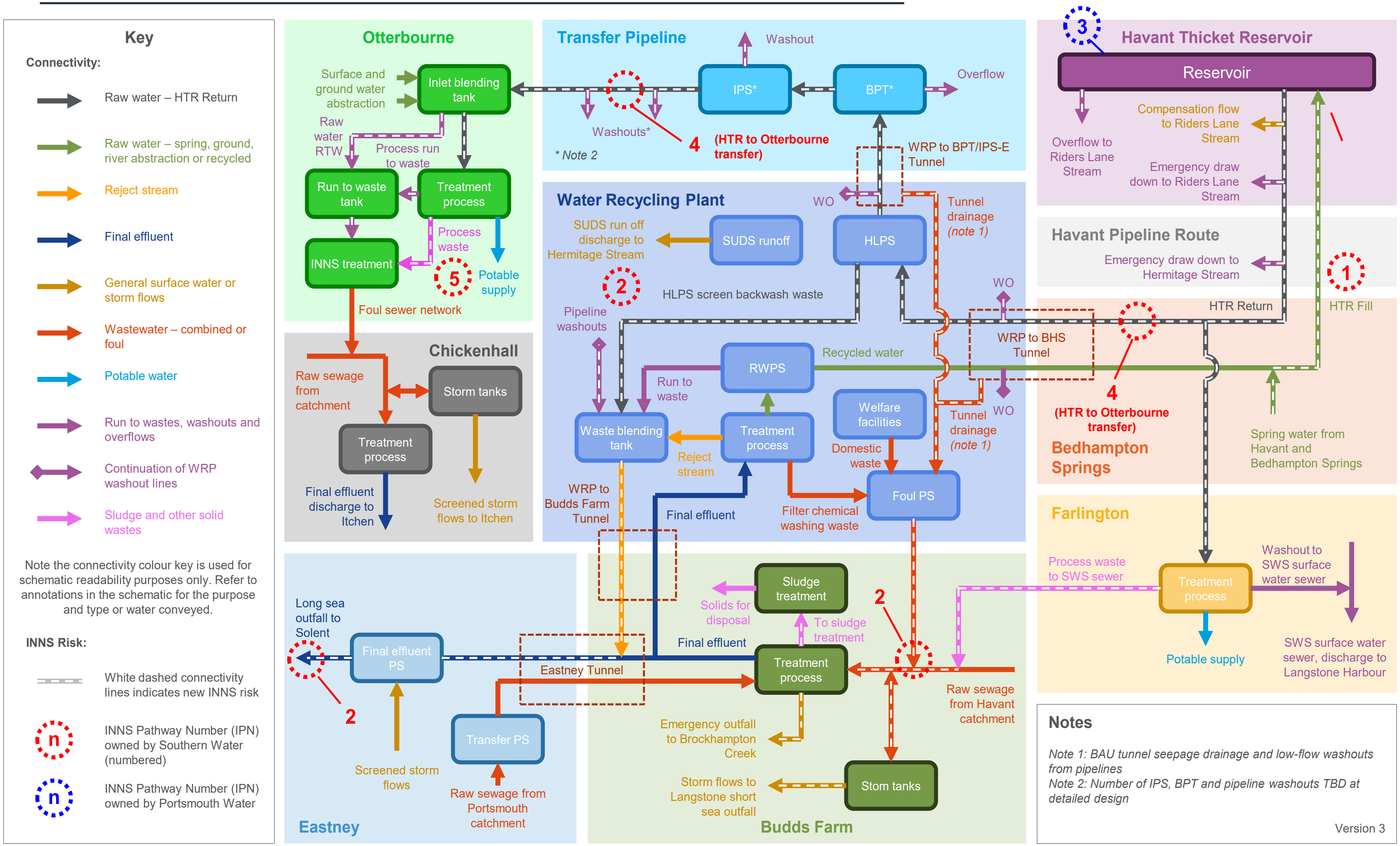
Table 4-9 RWT likelihood and severity score breakdowns for the SAI-RAT Version 2.01 assessment

Element of score contribution	Contributing criteria	RWT1: Havant Thicket Reservoir to Otterbourne WTW	RWT2: WRP to Havant Thicket Reservoir
RWT likelihood of spread from source score breakdown	Source asset score	12.58	1.8
	Abstraction location	1.0	N/A
	Abstraction depth	1.0	N/A
	Volume/frequency of transfer	29.2	29.2

Element of score contribution	Contributing criteria	RWT1: Havant Thicket Reservoir to Otterbourne WTW	RWT2: WRP to Havant Thicket Reservoir
	Transfer distance	N/A	1.67
RWT likelihood of spread on/off the pathway score breakdown	Volume/frequency of transfer	2.92	2.92
	Staff/contractor visit	0.25	0.25
	Staff/contractor enter water	N/A	N/A
	Vehicle access	N/A	N/A
	Angling presence	N/A	N/A
	Angling matches	N/A	N/A
	Live bait	N/A	N/A
	Fish stocking	N/A	N/A
	Boat presence	N/A	N/A
	Water sports presence	N/A	N/A
	Water safety equipment	N/A	N/A
	Mammals and waterfowl	N/A	N/A
	Sludge/sediment movement	2.5	2.5
	Terrestrial recreation	N/A	N/A
	Other long-term activities	1.5	N/A
	Adjoining natural water bodies	N/A	N/A
	Assets along transfer route	N/A	N/A
	Pathway water bodies crossed	0.2	N/A
RWT severity (of impact) upon pathway score breakdown	WFD-UKTAG INNS present at source	N/A	0.61
	Pathway designation	2.5	N/A
	Pathway Priority Habitat	1.6	1.6
	Pathway WFD status	1.68	1.26
RWT severity (of impact) upon receptor score breakdown	WFD-UKTAG INNS present at source	N/A	2.56
	Receptor designation	18	N/A
	Receptor Priority Habitat	9	9
	Receptor WFD status	N/A	12.8
	Isolated Receptor Catchment	10	10
	Transfer distance	5	0.83
	Source/receptor location	10	10
	Existing connections	N/A	N/A
	WFD-UKTAG INNS present along pathway	0.32	0.29

Appendix B Conceptual overview of the operational phase of the Project

[THIS SCHEMATIC WILL BE INPUTTED AS A LANDSCAPE PDF FOR SUBMISSION]



from Southern Water

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6 Glossary

Abbreviation	Full Term
ACWG	All Company Working Group
AGP	Above Ground Plant
AOP	Advanced Oxidation Process
BPT	Break Pressure Tank
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
DCO	Development Consent Order
EA	Environment Agency
ECoW	Environmental Clerk of Works
EIMP	Emergency INNS Management Plan
EMS	Environmental Management System
ES	Environmental Statement
FHI	Fish Health Inspectorate
GB NNSS	Great Britain Non-Native Species Secretariat
HBIC	Hampshire Biodiversity Information Centre
INNS	Invasive Non-Native Species
IPN	INNS Pathway Number
IPS	Intermediate Pumping Station
LSO	Long Sea Outfall
Ml/d	Megalitres per day
N/A	Not Applicable
OEMP	Outline Environmental Management Plan
PPG	Pollution Prevention Guideline
PRoW	Public Rights of Way
PS	Pumping Station
RAPID	Regulators’ Alliance for Progressing Infrastructure Development
RBMPs	River Basin Management Plans
RIMP	Regional Invasive Species Management Plan

Abbreviation	Full Term
RO	Reverse Osmosis
RRWG	Rapid Response Working Group
RWT	Raw Water Transfer
SAI-RAT	Strategic Resource Option Aquatic Invasive Species Risk Assessment Tool
SRO	Strategic Resource Option
TT	Transfer Tunnel
UKTAG	UK Technical Advisory Group
UV	Ultraviolet
WCA	Wildlife and Countryside Act
WFD	Water Framework Directive
WRP	Water Recycling Plant
WSW	Water Supply Works
WTW	Wastewater Treatment Works

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