
PR24

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A3-05 ENHANCEMENT CASE WN - WINEP PROTECTED AREAS AND BIODIVERSITY

NES18



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1. INTRODUCTION

This business case sets out the enhancement investment required to meet our environmental obligations under various legislation as captured against the following six WINEP drivers:

- Drinking Water Protected Areas (DrWPA)
- Biodiversity (NERC)
- European Sites (Habitats Directive)
- Sites of Specific Scientific Interest (SSSI)
- Invasive Non-native Species (INNS)
- Eels Regulations (Eels Regulations)

The Drinking Water Protected Areas (DrWPA) driver relates to actions that protect and improve the quality of water abstracted for drinking water supply. Land uses including agriculture within our drinking water catchments continue to pose a risk to the quality of water we abstract for drinking. Therefore, during AMP8 we intend to continue our AMP7 efforts to put measures in place to protect our drinking water sources that are challenged by land use practices in their catchments. This business case sets out the enhanced investment required to reduce contamination across our drinking water catchments with regards to nutrients, pesticides, sediment and microbiological parameters and, where we have had repeated water quality exceedances in our drinking water sources, to investigate the root cause.

The Biodiversity (NERC) driver relates to activities that respond to risks and issues for biodiversity related to water company operations. As a water company, we already have a duty of care to conserve biodiversity however this will be strengthened further through use of this driver, which is required to keep to the Environment Act 2021. Therefore, during AMP8 we intend to continue our AMP7 efforts to put measures in place to improve biodiversity across the regions we operate that may also deliver wider benefits including to drinking water quality. This business case sets out the enhanced investment required to implement measures to reduce the impact of our activities on fauna or flora as confirmed in the previous AMP and investigate how we can continue to do so across our regions.

The European Sites (Habitats Directive) driver relates to actions to maintain or restore the habitats and species of European sites at favourable conservation status across their natural range in the UK. As a water company, we already have a duty of care to help protect, conserve and restore European sites. This business case sets out the enhanced investment required to implement measures to reduce the impact our activities are having on European sites, and to carry out investigations to confirm our impacts on other sites and how to reduce them.

The Sites of Special Scientific Interest (SSSI) driver relates to actions to conserve and enhance SSSIs including peatland. Peat degradation reduces habitat quality, negatively impacts biodiversity and reduces the capacity for carbon storage and sequestration. Leaching from peat bogs also causes water quality issues, including high colour and dissolved organic carbon levels in water courses which, as a water company, can be costly and energy intensive to remove. This business case sets

out the enhanced investment required to continue our AMP7 efforts to conserve and enhance peatland condition in our Northumbrian Region and to understand how recreation may be impacting on SSSI condition in Essex and Suffolk.

The Invasive Non-Native Species (INNS) driver relates to actions to reduce the risk of spreading invasive non-native species (INNS) due to our activities and to reduce their impact on our assets and the areas in which we operate. Invasive non-native species of flora and fauna are considered the second biggest threat to biodiversity worldwide, after habitat loss and destruction. The annual cost of invasive non-native species to the GB economy was estimated in 2010 to be £1.7bn per year. It is estimated that INNS are a contributing pressure in over a quarter of water bodies not achieving good status under the Water Framework Directive, and over 70% of water bodies are at risk of deterioration due to the impact of INNS¹. This business case sets out the enhanced investment required to enhanced biosecurity and reduce the risk INNS present to our infrastructure.

The Eels Regulations (Eels) driver relates to actions to stop or reverse the decline in European Eel (*Anguilla anguilla*) stock by contributing to the target set for the number of 40% of mature eels (by biomass) returning to spawn at sea. Lakes and reservoirs can provide productive growing habitats for European Eels, however recruitment of eel has declined by over 95% since the early 1980s, due to a combination of commercial exploitation and habitat loss from man-made obstructions². This now critically endangered species has a catadromous lifecycle, meaning it requires migration between freshwater and marine habitats at both juvenile and adult life stages to reproduce. This business case sets out the enhanced investment required to implement measures to improve European Eel escapement from Abberton and Hanningfield Reservoirs to contribute to mature eel escapement targets across Europe. Implementation of these measures is required to keep to the *Eels (England and Wales) Regulations 2009*³.

Meeting our obligations for Protected Areas and Biodiversity will require an investment of **£25.885m** over AMP8, in 2022 prices. These costs are summarised in Table 1 below.

TABLE 1: SUMMARY OF COSTS TO ACHIEVE OUR PROTECTED AREAS AND BIODIVERSITY-RELATED OBLIGATIONS OVER AMP8

Driver	Total (£M)
DrWPA	5.476
NERC	5.985
HD	11.813
SSSI	0.611
INNS	1.834
EE	0.166
Total	25.885

¹ PR24 WINEP driver guidance - Invasive NonNative Species (Environment Agency, 2022)

² AMP6 Abberton Eel Investigation Summary Report, Piper Rosewarne Aquatic Research Ltd. (Piper, A. & Rosewarne, P., 2017)

³ [The Eels \(England and Wales\) Regulations 2009](#)

2. NEED FOR ENHANCEMENT INVESTMENT

2.1. ALIGNMENT WITH STATUTORY PLANNING FRAMEWORKS

The Environment Agency (EA) and Natural England (NE) translate legislation and UK government priorities set out in the Water Industry Strategic Environmental Requirement (WISER). WISER describes the legal obligations, government targets and statutory (S or S+) requirements water companies must achieve during each 5 yearly price review. It also sets out the non-statutory (NS) (with or without government support) requirements a water company should consider provided there is customer support for this action. WISER therefore underpins the government's Strategic Policy Statement which specifies the government's priorities for the water industry and the framework and policy priorities within which Ofwat should operate. The Water Industry National Environment Programme (WINEP) methodology enables water companies to develop, fund and implement sustainable solutions to address the problems. It does this by setting out the overarching process to design, develop, and deliver water company actions to protect and improve the environment.

Individual needs against WINEP drivers are assigned a driver code as shorthand to describe the driver and the need type. There are a range of driver codes which allow for the delivery of actions to meet the requirements for the protection of designated sites and biodiversity covering:

- Drinking Water Protected Areas (DrWPA)
- Biodiversity (NERC)
- European Sites (HD)
- Sites of Specific Scientific Interest (SSSI)
- Invasive Non-Native Species (INNS)
- Eels Regulations (Eels)

All six drivers within this business case are associated with the protection, enhancement and/or restoration of habitats and species to meet our obligations under English legislation as summarised in Section 2.5. The WINEP driver codes relevant to the six drivers in this business case, and their alignment to Ofwat PR24 enhancement categories, are outlined in Table 2 to Table 7 below.

There are four suffix codes that can be added to the overall driver code to indicate the action (solution) required for the need. For the drivers covered by this business case, these are IMP (improvement), INV (investigate), ND (no deterioration) and MON (monitoring). Some of these driver codes, shown in Table 2 to Table 7, are 'Statutory', meaning that action must be taken. Other codes are 'Statutory+' which means the options to address needs under these codes are subject to cost benefit assessment and will only be implemented if they are demonstrated to be cost beneficial. Our needs in AMP8 against 'Statutory+' driver codes are considered cost beneficial and are therefore statutory as demonstrated through our AMP7 investigations.

TABLE 2: STATUTORY WINEP DRIVER CODES RELEVANT TO THE DRINKING WATER PROTECTED AREAS DRIVER NEEDS IN AMP8 – NOTE THAT ONLY DRIVERS RELATED TO AMP8 NEEDS ARE INCLUDED IN THE TABLE

Driver Code	Description	Statutory / Statutory+	Tier 1 Outcome	Required by dates	PR24 Data Tables Enhancement Category
DrWPA_INV	Investigations for 'at risk' DrWPAs or groundwater safeguard zones to identify actions to prevent deterioration and/or to reduce treatment.	Statutory	Water company actions to protect and improve the quality of water abstracted for water supply	By April 30 2027, to help inform PR29 planning	Investigations – survey, monitoring or simple modelling
DrWPA_ND	Implementation of actions through a catchment scheme, or a wastewater treatment works, to prevent deterioration (or improve following a deterioration) in water quality to avoid an increase in the level of water purification treatment	Statutory		By March 31 2030, to be delivered in AMP8	Drinking Water Protected Areas

TABLE 3: STATUTORY WINEP DRIVER CODES RELEVANT TO THE BIODIVERSITY DRIVER NEEDS IN AMP8 – NOTE THAT ONLY DRIVERS RELATED TO AMP8 NEEDS ARE INCLUDED IN THE TABLE

Driver Code	Description	Statutory / Statutory+	Tier 1 Outcome	Required by dates	PR24 Data Tables Enhancement Category
NERC_INV	Investigations and/or options appraisal for changes to permits or licences, and/or other action that contributes towards biodiversity duties, requirements and priorities.	Statutory+	Conserve and enhance biodiversity	By April 30 2027, to help inform PR29 planning	Investigations – survey, monitoring or simple modelling
NERC_IMP	Changes to permits or licences, and/or other action that contributes towards biodiversity duties, requirements and priorities.	Statutory+		By March 31 2030, to be delivered in AMP8	Biodiversity and conservation

TABLE 4: STATUTORY WINEP DRIVER CODES RELEVANT TO THE EUROPEAN SITES DRIVER NEEDS IN AMP8 – NOTE THAT ONLY DRIVERS RELATED TO AMP8 NEEDS ARE INCLUDED IN THE TABLE

Driver Code	Description	Statutory / Statutory+	Tier 1 Outcome	Required by dates	PR24 Data Tables Enhancement Category
HD_INV	Investigation and / or options appraisal to determine impacts of water company activities, or permit / licence conditions/standards on a European site or Ramsar site or to determine the costs and technical feasibility of meeting targets.	Statutory	Maintain or restore favourable conservation status at European sites	By April 30 2027, to help inform PR29 planning	Investigations – survey, monitoring or simple modelling
HD_IMP	Action to contribute to restoration of a European site or Ramsar site to move towards meeting the conservation objectives	Statutory		By March 31 2030, to be delivered in AMP8	Biodiversity and conservation OR Wetland creation

TABLE 5: STATUTORY WINEP DRIVER CODES RELEVANT TO THE SITES OF SPECIAL SCIENTIFIC INTEREST DRIVER NEEDS IN AMP8 – NOTE THAT ONLY DRIVERS RELATED TO AMP8 NEEDS ARE INCLUDED IN THE TABLE

Driver Code	Description	Statutory / Statutory+	Tier 1 Outcome	Required by dates	PR24 Data Tables Enhancement Category
SSSI_INV	Investigations and/or options appraisal to determine impacts of water company activities or permit or licence conditions/standards on a SSSI or to determine the costs and technical feasibility of meeting targets.	Statutory+	Maintain or restore SSSIs to favourable condition	By April 30 2027, to help inform PR29 planning	Investigations - survey, monitoring or simple modelling
SSSI_IMP	Actions to contribute to restoration of a SSSI to favourable condition.	Statutory+		By March 31 2030, to be delivered in AMP8	Biodiversity and conservation

TABLE 6: STATUTORY WINEP DRIVER CODES RELEVANT TO THE INVASIVE NON-NATIVE SPECIES DRIVER NEEDS IN AMP8 – NOTE THAT ONLY DRIVERS RELATED TO AMP8 NEEDS ARE INCLUDED IN THE TABLE

Driver Code	Description	Statutory / Statutory+	Tier 1 Outcome	Required by dates	PR24 Data Tables Enhancement Category
INNS_INV	Investigations - Includes pathway analysis, prevention of deterioration and actions to achieve conservation objectives	Statutory	Water company contribution to achieve improvement objectives or prevent deterioration	By April 30 2027, to help inform PR29 planning	Investigations - survey, monitoring or simple modelling
INNS_MON	Surveillance - Set up of surveillance programmes	Statutory+		By March 31 2026 to help inform PR29 planning	Investigations - survey, monitoring or simple modelling
INNS_ND	Delivery - Actions to prevent deterioration by reducing the risks of spread of INNS and reducing the impacts of INNS	Statutory		By March 31 2030, to be delivered in AMP8	Invasive Non-Native Species

TABLE 7: STATUTORY WINEP DRIVER CODES RELEVANT TO THE EELS' REGULATIONS DRIVER NEEDS IN AMP8 – NOTE THAT ONLY DRIVERS RELATED TO AMP8 NEEDS ARE INCLUDED IN THE TABLE

Driver Code	Description	Statutory / Statutory+	Tier 1 Outcome	Required by dates	PR24 Data Tables Enhancement Category
EE_IMP	Schemes to improve diversion structures to prevent the entrainment of eel (for example screening intakes) and to address barriers to the passage of eel (for example building and maintaining eel passes)	Statutory+	Ensure structures meet requirements of fish and eel legislation	By March 31 2030, to be delivered in AMP8	Eels/fish entrainment screens OR Eels/fish passes

2.2. OUR PROGRESS DURING AMP7

During AMP7, we have been pursuing improvements against each WINEP driver covered by this business case and progress made against each driver during AMP7 is detailed below.

This progress has been predominantly through partnership working, particularly using grant funding to promote land management practices that better protect our land and water. Partnership working forms a key part of our activities as we recognise that we can achieve more if we align our efforts with our stakeholders who are working towards common goals, aiming to improve the condition of the environment in our catchment areas, including opportunities to leverage match funding.

2.2.1 Drinking Water Protected Areas

Funding under the AMP7 WINEP was restricted to designated Safeguard Zones; in the NW region: Warkworth (Coquet) and Whittle Dene, and in the ESW region: Blackwater, Chelmer, Stour, Abberton and Waveney. Our WINEP catchment programme was delivered by our small team of in-house Catchment Officers.

Partnership working is a key element of our drinking water programme as we must engage with and influence landowners, land managers and others to achieve change on-the-ground. During AMP7, we therefore continued working in partnership with stakeholders in our drinking water catchments to improve water quality or prevent deterioration. An important element of this was engaging with farmers in our drinking water catchments. During AMP7, we have done this in a couple of ways:

- **Field to Tap grant scheme:** We forecast to spend £1.92m on our Field to Tap grant scheme, through which we have been providing grants for farm equipment, infrastructure and land management improvements. This was informed by our £113,000 programme of in-catchment water quality monitoring (in addition to regulatory monitoring at abstraction points) and supported by a £334,000 budget for staff and admin costs, which enabled us to deliver events, training and advice days, and one-to-one farm visits to give advice on fertiliser and pesticide management and grant funding opportunities (either via Field to Tap or agri-environment schemes). We also worked alongside local Natural England Catchment Sensitive Farming Officers to co-ordinate and align our activities. Over this AMP, there has been uncertainty about uptake of the Field to Tap grant scheme by farmers. This is due to many reasons outside our control, including variation in seasonal farming, the cost of concrete and a revision to how much grant funding each farm can use to reflect the cost of living (from £15k to £20k). We are trying to address these issues, but we do not expect to spend the forecasted Field to Tap grant scheme amount over AMP7.
- **Targeted farmer engagement:** During AMP7, we confirmed a direct connection between land use activities in the Berwick area and the unconfined sandstone aquifer below it from which we abstract groundwater for drinking water supply. To avoid farming increasing the nitrate levels in this groundwater source, we undertook targeted engagement to influence farmers to switch to products with lower nitrate levels and soil testing on their farms. Farmer uptake has been high, and we have been observed the impact this is having on groundwater quality in the area. Our investigation ended

in March 2022, however we continue to engage with farmers in this area using our operational budget, as we recognise the impact this is having on the quality of our source water.

2.2.2 Biodiversity

In AMP7 we set up the Branch Out Priority Habitats fund, originally started in 2013, to provide grants for the creation or restoration of 250 hectares (ha) of priority habitat in the catchments in which our operations can have an impact. This was hugely successful in enabling projects to go ahead and attracting extra funding to the regions. In the first three years, our grants (total £170k) attracted an extra £1.5m of investment into habitat restoration and creation in our regions. We intend to be more ambitious in AMP8, in line with the aims of the Environment Act, and support projects that provide landscape scale connectivity to help build a resilient natural world. This will build on the positive outcomes achieved and relationships built in AMP7.

Two AMP7 projects aimed to deliver holistic environmental improvements to benefit biodiversity as well as water quality. The South Tyne Holistic Water Management Project (£123,428 on grants) focused on land and riparian improvements across the South Tyne catchment, where fine sediments entering the watercourse were causing issues at our abstraction pumps at Ovingham further downstream. The Blackwater Holistic Water Management Project (£35k on grants, uptake has been slow) focused on land and riparian improvements across the Blackwater catchment, aiming to reduce the impacts of diffuse pollution. We are developing a restoration plan which will establish the foundations to deliver this project.

We also carried out five investigations in AMP7 under the NERC WINEP driver:

- An investigation into the potential to enhance the biodiversity value of our landholdings in the Essex and Suffolk regions by improving the management of grassland at some of our operational sites. We carried out baseline surveys (including soil health) to enable the benefits of improved management strategies to be assessed. While it will take a number of years to see the full impact of this type of management change, in AMP8 we propose to build on our initial findings of this work.
- An ecological investigation on the River Rede in Northumberland to assess the impacts on aquatic ecology, especially freshwater pearl mussel (FWPM), due to routine scouring of a pipeline that runs adjacent to the river. Through a collaborative partnership with the EA, where we invested £1200, we amended the scouring operation and as a result no longer discharge scoured material into the river and discharge to land instead. There may however be legacy impacts including iron rich sediment from historic scour operations and we are carrying out further research during AMP7 to inform action that could be taken in AMP8 to improve water quality in the River Rede for the benefit of FWPM.
- An investigation and feasibility study into the impact of the weirs on the estuarine section of the River Coquet. The investigation identified that the lower tidal weir, downstream of Warkworth, is having a detrimental impact on intertidal habitat and fish passage.
- An investigation into our abstraction at Wortham, Suffolk and an National Vegetation Classification plant survey in 2019 on nearby Hall Farm Meadow. This identified a decline in the wetland condition of the Hall Farm Meadow site between

1988 and the present; that the flushed fen meadow community, which the compensation discharge was intended to help protect, is no longer present; and that the existing compensation discharge is of no benefit to the current habitat at Hall Farm Meadow. Photos from site visits to Hall Farm Meadow in April 2019 and July 2021 indicate significant differences in site vegetation. We do not know what has caused these recent changes as we do not own or manage this land. We plan to resurvey the site which will inform our need in AMP8 to improve biodiversity on this site.

- An investigation into our surface water abstractions on the Roman River and from groundwater at Ball Lane in Essex. This indicated that our abstractions are likely to be impacting flows and habitat conditions in the Roman River water body. Actions to address the impacts of our surface abstraction at full licence and improve fish and eel passage will be delivered elsewhere in our AMP8 WINEP, however even with additional flow, measures delivering hydromorphological and habitat improvements would be of benefit to biodiversity.

2.2.3 European Sites

Investigations into our groundwater abstractions

During AMP7 we undertook investigations to identify and quantify the potential impacts of our groundwater abstractions on Water Framework Directive (WFD) flow compliance in associated surface waterbodies in Norfolk and Suffolk. While there are European sites downstream of these abstractions, we were not required during AMP7 to investigate potential impacts of our abstractions under the Habitats Regulations. Where flows in rivers were not compliant with the defined Environmental Flow Indicator (EFI) at modelled recent actual abstraction, an options appraisal was carried out and options developed for inclusion in our AMP8 WINEP however under the WFD_WRFflow driver, to meet our obligations under WFD.

Meeting Ormesby Broad abstraction licence conditions

A condition of our Ormesby Broad abstraction licence (and an outcome from the previous Review of Consents process) is that a bathymetric survey of relevant parts of the Trinity Broads is carried out at an agreed frequency to ensure that sediment accumulation does not result in an inability to maintain the minimum water depth required for the standing open water feature. The most recent bathymetric survey was completed during March 2023 as part of our base expenditure (not WINEP). Depending on the outcome of this (and any subsequent) survey, further work may be required as part of our AMP8 WINEP to ensure that water depths can be managed to meet the requirements of our abstraction licence.

2.2.4 Sites of Special Scientific Interest

As mentioned in Section 2.2.1 for DrWPA, partnership working forms a key part of our drinking water catchment management activities and this includes the management of SSSIs within catchments. For example during AMP7, our WINEP investment contributed to the protection of SSSIs in our Northumbrian region by enabling us to support the work of the North Pennines Peat Partnership via a financial contribution. We provided £300k each year over three years to the partnership. The Partnership used our funding to leverage additional monies and deliver a large-scale programme of peat

restoration across the North Pennines under Pennine PeatLIFE⁴. We were therefore able to co-deliver projects in Upper Teesdale and Upper Swaledale across a target area covering 829km², of which 67% is designated as SSSI, including the Upper Teesdale and Lune Forest SSSIs. Match funding allowed significantly more work to be delivered than we could have achieved alone: approximately 250 ha of peatland restored compared to just 30 ha that could have been restored via a standalone scheme.

2.2.5 Invasive Non-Native Species

During AMP7, we completed a range of activities to address the risks associated with INNS. This began when we published our company-wide INNS strategy in 2020 which includes commitments to:

- Design, implement and maintain business processes to ensure the risk of INNS to operations, assets and the wider environment are identified and managed in a proportionate way.
- Identify and address the key pathways by which INNS are spread and promote biosecurity to reduce the risk of introducing or spreading INNS.
- Work with partner organisations in our catchments, and in the wider environment in which we operate, to prevent or reduce the spread of INNS and to manage, and where possible eradicate, INNS where they occur.
- Work at a national scale with other water companies and Government agencies to share best practice and knowledge on potential new INNS.

We have started to address our first commitment associated with business processes by developing training material to educate our people on the risks associated with INNS and measures they can take to prevent their spread e.g., ensuring equipment, clothing and footwear are cleaned before moving between locations. Our contractors are signposted to the government on-line training module⁵.

We have started to address our second commitment associated with INNS pathways through completing an extensive review and risk assessment of all activities at our sites to identify those presenting the highest risk of spreading INNS. This enabled us to:

- Develop INNS Pathway Action Plans (completed 2022) which capture mitigation measures to reduce INNS risk at both company-wide and site-specific scales.
- Begin designing signage to raise awareness of the presence or INSS and the risk of spreading it. These will be installed as appropriate when the biosecurity assets (below) are installed.
- Prioritise the installation of biosecurity facilities in AMP7 and identify those required to be installed during AMP8.
- Prioritise the installation of wash down facilities in AMP7 and identify those required to be installed during AMP8.

⁴ [Pennine PeatLIFE – North Pennines AONB](#)

⁵ [NNS eLearning \(nonnativespecies.org\)](#)

During AMP7, we also completed INNS risk assessments and biosecurity options appraisals for all our raw water transfers (RWT). This work identified the highest risk RWTs (i.e. our priorities for mitigation) and provided initial recommendations for the types of mitigations that may be feasible at each RWT. However, the options appraisals focused on well-established measures such as screening, barriers and water treatment, and it is recognised by the EA and the water industry that effective mitigation options for existing RWTs are limited and still in development., informing our AMP8 need for cross-company collaboration on RWT biosecurity (08NW104002 and 08ES100003 in Section 2.6.5).

We have started to address our third commitment associated with partnership working to reduce the spread of INNS through our roll out of our Branch Out INNS Grant Scheme in 2020. Our scheme offers funding to organised groups, typically volunteers, carrying out actions to reduce or remove INNS within our catchments. In the first three years, we gave approximately £45k towards 19 different projects. While we don't ask for match funding, there has been a further £800k put towards these projects by others over the same time period.

We have started to address our fourth commitment associated with sharing knowledge and best practice at a national scale by working with other water companies and the Environment Agency via an INNS working group to scope two collaborative projects for AMP8.

2.2.6 Eels Regulations

In AMP6, we completed eel population surveys in Hanningfield and Abberton reservoirs, our two pumped storage reservoirs in our Essex and Suffolk Regions (ESW), and confirmed the presence of mature eel populations. These reservoirs are now considered high priority sites for action, and during AMP7 we focused our efforts on identifying suitable opportunities to integrate eel ingress and egress at these reservoirs. We completed a desk-based investigation to identify and appraise options, with the intention that the solutions would be agreed with the EA and implemented in AMP8. We also delivered projects to install new eel exclusion screens at the river intakes which transfer water to Abberton and Hanningfield reservoirs, including at Stratford St Mary. Finally, we are currently supporting a research project with the EA and the Zoological Society of London (ZSL) looking at eel behaviour in Abberton Reservoir, which will directly inform how we deliver the preferred solution for AMP8.

Our AMP7 efforts have been focused on our Essex and Suffolk region as the reservoirs within our Northumbrian region (NW) are considered lower priority for eels due to there not being significant populations of eels.

2.3. OUR ASSUMPTIONS FOR BASE SPEND IN AMP8

a) *Does the proposed enhancement investment or any part of it overlap with activities to be delivered through base, and where applicable does the company identify the scale of any implicit allowance?*

The assumptions we have made to allocate investment to base or enhancement cases in AMP8 is outlined in Table 8. We assume that continuing our now business-as-usual activities that deliver against needs from previous AMPs will be covered by base investment. This includes ongoing monitoring (water quality or other benefits) or land management. Our AMP8 efforts to continue to deliver against the drivers covered in this business case that align with base expenditure are outlined in Section 2.4.

As the WINEP needs within this business case align with our statutory obligations (outlined in Section 2.1), they fall to enhancement expenditure.

TABLE 8: OUR ASSUMPTIONS AROUND BASE AND ENHANCEMENT INVESTMENT

Base	Enhancement
<ul style="list-style-type: none"> Ongoing water quality or environmental health monitoring following previous AMP enhancement investment Ongoing site management from previous AMP enhancement investment Items funded at previous price reviews 	<ul style="list-style-type: none"> Needs aligned with statutory obligations Improving water supply resilience against impacts of climate change

We have not received investment funding from Ofwat to address our AMP8 WINEP needs in the past.

2.4. BASE EXPENDITURE FOR AMP8

Base investment required for each of the drivers in AMP8 is outlined below.

2.4.1 Drinking Water Protected Areas

During AMP8, our base investment will enable us to:

- continue our engagement with farmers to address potential risks to drinking water quality outside ‘At Risk’ DrWPAs or Safeguard Zones; and
- continue our regulatory water quality monitoring at drinking water abstraction points.

2.4.2 Biodiversity

We will continue to fund projects from base expenditure through AMP8 that deliver both a wildlife and community benefit through our Branch Out grant scheme, given its success through AMP7 (Section 2.2.2).

We have carried out conservation cutting of grasslands in areas that are not considered directly operational for many years. We will continue this work through AMP8, and these sites will provide information to help us show the benefits to biodiversity that can be delivered through a sympathetic grassland management regime.

In the South Tyne and Blackwater catchments we will continue to engage with farmers and land/river management organisations/charities. We will continue to support improvements which will reduce fine sediment and/or diffuse pollution inputs to these rivers, as part of our base catchment activities.

Following a review of how we operate the Rede pipeline scouring process, discharges from scouring will now be to land only and as a result further water quality monitoring of the scour activity is not required, although further water quality and ecological monitoring is likely to be carried out to assess the efficacy of any habitat improvements work we carry out in AMP8 to mitigate for the historic impacts of the scour operation.

2.4.3 European Sites

It is possible that a further bathymetric survey of relevant parts of the Trinity Broads will be required during AMP8, to keep to abstraction licence conditions. If this is needed, we would fund this from base expenditure.

Our site management activities at the Trinity Broads - including habitat management, aquatic macrophyte surveys, wetland bird survey (WeBS) counts and research – are also funded from base expenditure, in line with an agreed Management Plan.

We monitor a range of water quality determinands on a regular basis at sites around the Trinity Broads including Ormesby Broad, Filby Bridge, Lily Broad, Ormesby Little Broad, Rollesby Broad, Spring Dyke and Town Dyke.

We carry out a range of environmental monitoring and groundwater monitoring at nine groundwater and surface water abstractions that have been identified as potentially associated with the Broads Special Areas of Conservation (SAC). This is funded from base expenditure to keep to existing abstraction licences. This includes, for example:

- recording the daily water level at Ormesby Broad;
- recording of hourly water levels at the Geldeston Meadows observation borehole; and
- regular recording of water levels in ditches in Geldeston Meadows SSSI.

We also maintain and operate the Geldeston Meadows compensation discharge and associated infrastructure from our base expenditure. This provides additional water to maintain ditch water levels on the Geldeston Meadows SSSI (part of the Broads SAC) when groundwater levels in the Geldeston Meadows observation borehole drop below an agreed trigger level.

Since 2004, we have carried out regular bird counts at Abberton Reservoir using a mixture of consultant ornithologists and volunteers. Due to the large discrepancies in bird numbers between the different counting methods, the consultant ornithologist continues to survey the site for the six key months of each year for waterfowl.

2.4.4 Sites of Special Scientific Interest

During AMP8, our base investment will enable us to:

- continue our water quality monitoring programme, established following our AMP7 efforts as outlined in Section 2.2.4 above, to inform activities in our catchments and at our water treatment works to maintain our SSSIs; and
- continue our site management at the Trinity Broads that enable recreational users to enjoy the site. The warden will provide information to recreational visitors, manage a boat numbering system and liaise with stakeholders who have rights to access the water.

2.4.5 Invasive Non-Native Species

During AMP8, our base investment will enable us to:

- continue to manage or eradicate the presence of INNS where it has been confirmed at our sites and where we have a known effective treatment option; and
- continue our partnership projects to remove INNS on shared waterways.

2.4.6 Eel Regulations

Our base expenditure in AMP8 will cover the ongoing maintenance of the eel exclusion screens on the Blackwater, Chelmer, Stour, Waveney and Bure rivers, some of which are still being delivered during AMP7 (as included in Section 2.2.6).

2.5. NEED FOR ENHANCEMENT EXPENDITURE IN AMP8

b) Is the scale and timing of the investment fully justified, and for statutory deliverables is this validated by appropriate sources (for example in an agreed strategic planning framework)?

2.5.1 Our Drinking Water Protected Areas obligations

The Drinking Water Protected Areas driver requires water companies to take action to protect and improve the quality of water abstracted for water supply⁶. Water company actions can target surface water and/or groundwater quality and should be location specific, have clear outcomes and delivery timescales, and address substances with the potential to impact drinking water treatment including wholesomeness. Actions can aim to either:

- prevent deterioration in water quality to avoid an increase in the level of water purification treatment; or
- improve water quality so the level of purification treatment can be reduced over time.

⁶ PR24 WINEP driver guidance – Drinking Water Protected Areas (Environment Agency, 2022)

Options under the DrWPA_ND driver code must target Drinking Water Protected Areas (DrWPA) that are designated 'at risk' and have a Safeguard Zone established for the substance(s) being addressed. Investigations under the DrWPA_INV driver code must also relate to an 'at risk' DrWPA or groundwater safeguard zone.

This driver relates to our obligation under the *Water Supply (Water Quality) Regulations 2016*⁷ (the 'Water Supply Regulations') to ensure water supplied to customers is wholesome. This means it does not contain micro-organisms or other substances at a concentration or value which would constitute a potential danger to human health; or at a concentration or value above the prescribed concentrations and values set out in Schedule 1 of the Water Supply Regulations. The Water Supply Regulations are the instrument by which European Council Directive 98/83/EC on the quality of water intended for human consumption (the Drinking Water Directive) is transposed into law in England.

To support the implementation of these regulations, Drinking Water Protected Areas (DrWPA) have been designated by the EA to protect drinking water sources to:

- ensure that, under the water treatment regime applied, the drinking water produced meets the requirements of the Water Supply (Water Quality) Regulations 2016;
- ensure the necessary protection of the supply by avoiding deterioration in water quality to reduce the level of purification treatment required in producing drinking water; and
- for groundwater, reverse upward trends in pollution and meet good chemical status.

In addition, the government's 25 Year Environment Plan⁸ (25YEP) sets a goal of achieving clean and plentiful water through 'improving at least three quarters of our waters to be close to their natural state as soon as is practicable'. Achieving the goal includes reaching or exceeding objectives for rivers, lakes, coastal and groundwater that are specially protected, whether for biodiversity or drinking water as per the river basin management plans (RBMP).

2.5.2 Our Biodiversity obligations

The NERC (biodiversity) driver enables water companies to contribute towards the conservation and enhancement of biodiversity via changes to permits or licences, other actions and/or investigations.

The Biodiversity (NERC) driver is a statutory+ driver that can be used to deliver actions and/or investigations to respond to biodiversity risks and issues related to water company operations, thereby contributing towards the conservation or enhancement of biodiversity⁹. Actions under Statutory+ drivers, such as changes to permits or licences, must be demonstrated to be cost beneficial (as outlined in Section 2.1). Actions under the NERC driver may contribute to:

⁷ [Water Supply \(Water Quality\) Regulations 2016 \(legislation.gov.uk\)](https://www.legislation.gov.uk)

⁸ [25 year environment plan \(www.gov.uk\)](https://www.gov.uk)

⁹ PR24 WINEP driver guidance – Biodiversity (Environment Agency, 2022)

- Restoring, maintaining or enhancing priority habitats
- Increasing the quantity, quality and connectivity of habitats
- Increasing the abundance and/or distribution of priority species
- Improving the conservation status of species
- Restoring natural functions of water and wetland ecosystems

This reflects our obligation under Section 40 of the *Natural Environment and Rural Communities Act 2006* (NERC Act)¹⁰ to 'have regard' to 'conserving biodiversity' when exercising our functions. The Environment Act 2021 strengthens this to a 'duty to conserve and enhance biodiversity'. This change requires water companies to consider what action they can take, consistent with their functions, to further the conservation and enhancement (rather than just maintenance) of biodiversity. This may involve conserving, restoring or enhancing a particular type of habitat or a population of a particular species, particularly targeting the priority habitats and species identified under Section 41 of the NERC Act.

An important aspect of the Environment Act 2021 is the government's power to set long-term, legally binding environmental targets. This is set out in the government's Environmental Improvement Plan¹¹, published in January 2023. There must be at least one long-term biodiversity target, in addition to the existing target to halt species decline by 31 December 2030. Water companies must also 'have regard' to Local Nature Recovery Strategies.

The 25YEP published in 2019 was used as the first 'Environmental Improvement Plan', as required by the Environment Act 2021. This was reviewed and revised with the publication of a new Environment Improvement Plan at the end of January 2023. Thriving plants and wildlife is one of the 10 inter-linked goals of the plan. This goal includes a target to create or restore 500,000 hectares of wildlife-rich habitat outside of protected sites, as part of a Nature Recovery Network, to more effectively link and buffer existing protected sites and landscapes. As well as helping wildlife to thrive, the network has the potential to contribute to wider benefits, such as carbon capture, pollination, water quality improvements, water resource resilience, flood attenuation, and wider public enjoyment and understanding. There is also a commitment to take action to recover threatened, iconic, or economically important species of animals, plants and fungi, and where possible to prevent human induced extinction or loss of known threatened species in England.

*Biodiversity2020: A Strategy for England's wildlife and ecosystem services*¹² built on the Natural Environment White Paper and included specific outcomes for the condition and connectivity of wildlife habitats and the status of wildlife. A new nature strategy is currently in development to follow on from this. The targets for 2020 included:

- 90% of priority habitats in favourable or recovering condition;

¹⁰ [Natural Environment and Rural Communities Act 2006 \(legislation.gov.uk\)](#), accessed 24 May 2023.

¹¹ [Environmental Improvement Plan 2023 - GOV.UK \(www.gov.uk\)](#), accessed 24 May 2023.

¹² [Biodiversity 2020: A strategy for England's wildlife and ecosystem services](#) (Defra, 2011)

- more, bigger, and less fragmented areas for wildlife, with no net loss of priority habitat and an increase in the overall extent of priority habitats by at least 200,000 ha; and
- an overall improvement in the status of our wildlife and will have prevented further human-induced extinctions of known threatened species.

A code of practice on conservation, access and recreation under the Water Industry Act also places a duty on water companies to conserve and where practicable enhance biodiversity, having regard to national or local targets.

2.5.3 Our European Sites obligations

The European Sites (Habitats Directive) (HD) driver requires water companies to take action to contribute to maintaining or restoring favourable conservation status at European sites¹³. This includes investigations where appropriate to determine impacts of our activities on a European site or Ramsar site, and/or to determine the costs and technical feasibility of meeting targets.

This reflects water companies' obligations under the *Conservation of Habitats and Species Regulations 2017*¹⁴ (the 'Habitats Regulations') which implement the land and marine aspects of the *EU Habitats Directive*. Under the Habitats Regulations, competent authorities, including the EA and water companies, have a duty to help protect, conserve and restore European sites. European sites include, but are not limited to, Special Areas of Conservation (SAC) and Special Protection Areas (SPA). The Habitats Regulations treat Ramsar sites as European sites. In addition, each European site (on land) is underpinned by one or more sites of special scientific interest (SSSI).

2.5.4 Our Sites of Special Scientific Interest obligations

The Sites of Special Scientific Interest (SSSI) driver¹⁵ requires water companies to take action to contribute to maintaining or restoring SSSIs to favourable condition and therefore meet their obligations under English legislation.

As a water company, we have duties to take reasonable steps to conserve and enhance SSSIs under *The Wildlife and Countryside Act 1981*¹⁶ (as amended) and *The Water Industry Act 1991*¹⁷. The *Wildlife and Countryside Act 1981* requires statutory undertakers (including water companies) and public bodies 'to take reasonable steps, consistent with the proper exercise of their functions, to further conservation and enhancement of the flora, fauna or geological or physiological features' of SSSIs. The *Water Industry Act 1991* describes the general environmental and recreational duties of water companies, including to 'further the conservation and enhancement of natural beauty and the conservation of flora, fauna and geological or physiographical features of special interest'. It also includes environmental duties with respect to SSSI.

¹³ PR24 WINEP Guidance - European sites (Environment Agency, 2022)

¹⁴ [Conservation of Habitats and Species Regulation \(legislation.gov.uk\)](https://www.legislation.gov.uk/uksi/2017/1003/contents/made)

¹⁵ PR24 WINEP Guidance – Sites of Special Scientific Interest (Environment Agency, 2022)

¹⁶ [Wildlife and Countryside Act 1981 \(legislation.gov.uk\)](https://www.legislation.gov.uk/ukpga/1981/69/contents)

¹⁷ [Water Industry Act 1991 \(legislation.gov.uk\)](https://www.legislation.gov.uk/ukpga/1991/42/contents)

Further to this regulatory obligation, thriving plants and wildlife is one of the ten inter-linked goals of the 25YEP. Meeting the objectives for SSSIs will contribute to the goal of restoring 75% of the total area of terrestrial and freshwater protected sites to favourable condition by 2042.

The Biodiversity2020 strategy also includes targets related to SSSIs: for at least 50% of SSSIs to be in favourable condition and 95% in favourable or recovering condition by 2020.

2.5.5 Our Invasive Non-Native Species obligations

The Invasive Non-Native Species (INNS) driver¹⁸ requires actions to reduce the risk of spreading INNS due to our activities and to reduce their impact on our assets and the areas in which we operate.

This reflects international and national obligations and laws to control the spread of INNS. The retained *EU Invasive Alien Species Regulations* (the 'IAS Regulations') aim to limit spread, implement controls and prevent risks from INNS. *The Wildlife and Countryside Act 1981 (as amended)*¹⁹ and the *Invasive Alien Species (Enforcement and Permitting) Order 2019*²⁰ provide a comprehensive regulatory regime to tackle species of special concern in Great Britain. The IAS Regulations and the *GB Invasive Non-native Species Strategy*²¹ focus on understanding, management, and mitigation of pathways of spread. INNS actions within the WINEP also contribute to the 25YEP goals of 'Clean and Plentiful Water', 'Thriving Plants and Wildlife', and 'Enhancing Biosecurity'.

2.5.6 Our Eels obligations

The EE (eels) driver²² requires water companies to ensure their structures meet the requirements of fish and eel legislation to enable European targets around seaward escapement to be met.

The *EC Council Regulation (1100/2007)*²³ (EC Eel Regulation) was established in response to the severe eel population decline, adopting measures to protect and recover eel stocks. This legislation has been implemented for England and Wales via the *Eels Regulations (England and Wales) 2009* (the "Eels Regulations"). Under these regulations water companies are obliged to play their part in increasing the number of adult eels returning to spawn at sea. The requirements under the Eels Regulations are to identify and address actions to halt and reverse the decline in European eel stock, with the aim to meet a target set for 40% of mature adult eels leaving each river basin to return to spawn at sea. Where a dam or obstruction impedes, or is likely to impede, the passage of eels, those responsible can be required to take remedial action to allow eels to pass. To be legally compliant with the Eels Regulations, from 1st January 2015, all our intakes (capable of abstracting at

¹⁸ PR24 WINEP Guidance – Invasive Non-Native Species (Environment Agency, 2022)

¹⁹ [Wildlife and Countryside Act 1981 \(legislation.gov.uk\)](https://www.legislation.gov.uk/ukpga/1981/61)

²⁰ [Invasive Alien Species \(Enforcement and Permitting\) Order 2019 \(legislation.gov.uk\)](https://www.legislation.gov.uk/uksi/2019/1013)

²¹ [The Great Britain Invasive Non-Native Species Strategy \(www.gov.uk\)](https://www.gov.uk/government/consultations/the-great-britain-invasive-non-native-species-strategy)

²² PR24 WINEP Guidance – Eel Regulations (Implementation) (Environment Agency, 2022)

²³ [Council Regulation \(EC\) No 1100/2007 of 18 September 2007 establishing measures for the recovery of the stock of European eel \(legislation.gov.uk\)](https://www.legislation.gov.uk/eu/reg/2007/1100)

least 20 m³ per day) and outfalls must therefore be screened for eels unless exempt from the requirement. In addition, the EA may serve us a notice to remove the barrier or to install an eel pass.

2.6. OUR AMP8 NEEDS

- d) Does the need and/or proposed investment overlap or duplicate with activities already funded at previous PRs?*
- g) Is the investment driven by factors outside of management control? Is it clear that steps been taken to control costs and have potential cost savings (eg spend to save) been accounted for?*

Below we outline our AMP8 needs under each driver. These needs have not been funded at previous price reviews. Enhancement investment into addressing these needs will not overlap with investment from other activities.

2.6.1 Drinking Water Protected Areas

We have identified 14 needs against the DrWPA driver that we intend to deliver in AMP8. Our needs are outlined in Table 9, alongside their issue and root cause, and the Action ID that has been assigned to the need as part of our WINEP submission to the EA. Majority of our needs are in our Northumbrian region and are investigations.

Our catchment and asset teams, with consultant support, identified the need to address risks to drinking water treatment from agriculture across our regions based on raw water quality sampling data and experience from AMP6 and AMP7. Our AMP7 work focused on specific areas as outlined in Section 2.2.1, and there is a need to expand this work to protect all drinking water sources where there are raw water challenges from nutrients, pesticides, pathogenic micro-organisms and sediment. This has led to a region-wide no deterioration need for both our Northumbrian (08NW104058) and Essex and Suffolk (08ES100206) regions in AMP8.

At some abstraction points, deterioration in raw water quality, and/or concentrations of determinands in raw water above the Water Supply Regulations have been recorded, but there is insufficient information or evidence to support an implementation scheme. Therefore, 12 drinking water investigations have been proposed across our regions to understand the nature of the deteriorations, identify pollutant sources and pathways, and assess potential mitigation options.

Some of our DrWPA investigations link to needs under other WINEP drivers. Our need to investigate the sources of colour and carbon at our abstractions (08NW104050) will inform the spatial targeting of peat restoration activity under SSSI_IMP (08NW104010 in Section 2.6.4). The Ormesby Broad drinking water investigation (08ES100205) will be carried out alongside the two environmental water quality investigations at the Trinity Broads: into water clarity, sediment and nutrients under HD_INV (08ES100012 in Section 2.6.3), and into recreational pressure under SSSI_INV (08ES100011 in Section 2.6.4). We have separated our needs to fall under appropriate drivers to avoid duplicating or overlapping investment.

TABLE 9: DEFINING THE NEEDS FOR THE DRINKING WATER PROTECTED AREAS DRIVER

	Risk / Issue	Root Cause	Need	WINEP Action ID
	DrWPA_ND			
	1 Nutrients, pesticides, sediment, bacteria and protozoa pose a risk to the quality of the raw water we abstract for drinking water supply. This poses a challenge to treatment processes, risks non-compliance with drinking water standards and can cause operational issues, require additional treatment (which is costly and energy intensive), and/or result in more frequent maintenance of current assets being required.	Agricultural diffuse and point source pollution impacting surface water and groundwater bodies from which we abstract water for drinking water supply. Root causes include excessive nutrient inputs; inappropriate timing of operations; poor yard management; ground left bare over winter; and poor soil health.	Reduce contamination of our drinking water sources in the Northumbrian region with nutrients, pesticides, sediment and microbiological parameters due to agricultural diffuse and point source pollution.	08NW104058
	DrWPA_INV			
Northumbrian	2 Elevated levels of colour and organic carbon posing a challenge to drinking water treatment at WTW across the Northumbrian region: Fontburn, Gunnerton, Warkworth, Horsley, Whittle Dene, Honey Hill, Wear Valley and Lartington WTW. Current peat restoration work may not be targeting the areas having the greatest impact on drinking water quality.	Peat degradation causing leaching of colour and organic carbon into water courses. Targeting of peat restoration not possible as it is not known which areas are having the greatest impact on drinking water quality.	Understand the main sources of colour and organic carbon to our abstractions to enable targeting of peat restoration activities proposed under SSSI_IMP.	08NW104050
	3 Deterioration in water quality at Derwent Reservoir (multiple determinands) posing potential risk to treatment.	Diffuse and/or point source pollution causing water quality deterioration (exact causes unknown)	Understand the causes of water quality deterioration at Derwent reservoir and assess potential impact of climate change. Identify potential solutions for delivery in AMP9.	08NW104052
	4 Seasonally low levels of alkalinity (hardness) and conductivity at Horsley WTW, posing a challenge to drinking water treatment. Risk of exacerbation by climate change.	Releases from Kielder reservoir into the North Tyne in autumn affecting the quality of water abstracted at Horsley WTW.	Understand the causes of seasonal alkalinity lows at Horsley WTW, and assess the potential impact of climate change. Identify potential solutions for delivery in AMP9.	08NW104053
	5 Risk to treatment at Honey Hill WTW due to elevated pesticide levels.	Impact of Tyne transfer on water quality at Honey Hill, due to higher pesticide levels in the water exported from the River Tyne to Honey Hill WTW via Riding Mill and Airyholm reservoir.	Understand the impact of the Tyne transfer on pesticide risk at Airyholm reservoir and Honey Hill WTW, and potential impact of climate change. Identify potential solutions for delivery in AMP9.	08NW104054

	Risk / Issue	Root Cause	Need	WINEP Action ID	
Northumbrian	6	Potential risk to treatment from deteriorating raw water quality at Lartington WTW, including algal blooms, taste and odour causing compounds and pesticides.	Diffuse and/or point source pollution (details unknown)	Understand the nature and causes of water quality deterioration at Lartington WTW, and identify potential solutions for delivery in AMP9.	08NW104055
	7	Seasonally elevated levels of sulphates, taste and odour issues and algal growth. Risk that the issue is exacerbated by increased ferric sulphate dosing at STW to meet more stringent phosphorus removal targets in AMP8.	Diffuse and/or point source pollution (details unknown), plus potential for additional inputs due to increased STW phosphorus removal requirements	Understand the causes of elevated algae and sulphate levels in raw water at Lumley WTW and identify potential options for delivery in AMP9	08NW104057
	8	Impact of abstractions in the Wear on flows, river geomorphology and habitat, WFD ecological status, and water quality (at times of low flow) at Lumley WTW.	Diffuse and/or point source pollution, and low flows / degraded river habitats due to abstractions.	Assess the potential for co-ordinated management of compensation flows across the Wear catchment, for potential implementation in AMP9.	08NW104056

	Risk / Issue	Root Cause	Need	WINEP Action ID
	DrWPA_ND			
	9 Nutrients, pesticides, sediment, bacteria and protozoa pose a risk to the quality of the raw water we abstract for drinking water supply. This poses a challenge to treatment processes, risks non-compliance with drinking water standards and can cause operational issues, require additional treatment (which is costly and energy intensive), and/or result in more frequent maintenance of current assets being required.	Agricultural diffuse and point source pollution of surface water and groundwater bodies from which we abstract water for drinking water supply. Root causes include: excessive nutrient inputs; inappropriate timing of operations; poor yard management; ground left bare over winter; and poor soil health.	Reduce contamination of our drinking water sources in the Essex and Suffolk region with nutrients, pesticides, sediment and microbiological parameters due to agricultural diffuse and point source pollution.	08ES100206
	DrWPA_INV			
Essex and Suffolk	10 Algal blooms at Abberton reservoir which pose a challenge to treatment at Layer WTW.	Elevated nutrient levels due to diffuse / point source pollution (exact causes unknown).	Understand the causes of algal blooms at Abberton reservoir and identify potential solutions for delivery in AMP9.	08ES100200
	11 Elevated nitrate and algae levels at Langford WTW (Chelmer and Blackwater intakes), posing a challenge to treatment and causing algal blooms at Hanningfield reservoir.	Diffuse / point source pollution (exact causes unknown).	Understand the sources of nitrate and causes of algal blooms at Langford WTW, and identify potential solutions for delivery in AMP9.	08ES100201
	12 Elevated nutrient levels causing algal blooms at Lound WTW.	Diffuse / point source pollution (exact causes unknown).	Understand the sources of nutrients and algae at Lound WTW, and identify potential solutions for delivery in AMP9.	08ES100203
	13 High and deteriorating levels of algae, geosmin and methyl isoborneol causing taste and odour issues at Ormesby WTW.	Water quality deterioration with unknown causes	Understand the causes of algae and taste and odour issues at Ormesby WTW, and identify potential solutions for delivery in AMP9.	08ES100204
	14 Elevated and rising nitrate levels at the Belaugh boreholes, supplying Ormesby WTW. Risk to security of supply in the area, as Ormesby WTW is a stand-alone site in a water scarce area.	Diffuse / point source pollution (exact causes unknown).	Understand the sources of nutrients to the Belaugh groundwater abstraction supplying Ormesby WTW, and identify potential solutions for delivery in AMP9.	08ES100205

2.6.2 Biodiversity

We have identified 13 needs against the biodiversity driver that we intend to deliver in AMP8. Our needs are outlined in Table 10, alongside their issue and root cause, and the Action ID that has been assigned to the need as part of our WINEP submission to the EA. Our needs are close to evenly spread across our regions and are mainly IMP needs.

Three of our AMP8 needs were informed by our PR19 (AMP7) investigations (Section 2.2.2) as outlined below:

- In AMP8, we intend to implement the initial findings from our PR19 (AMP7) investigation into enhancing the biodiversity of our landholdings in our Essex and Suffolk regions by improving the condition of our grassland sites and landholdings in these regions (08ES100006).
- In AMP8, we intend to implement measures to remove or minimise the detrimental impacts on fish passage and ecology caused by the Coquet Weir (08NW104011) which our PR19 (AMP7) investigation concluded was having an ecological impact despite no longer serving a purpose for our business.
- In AMP8 we intend to implement learnings from our PR19 (AMP7) investigation at Roman River, which indicated our abstractions are impacting flows and habitat conditions, by improving aquatic and riparian habitat conditions to improve ecological function and therefore enhance biodiversity in the Roman River (08ES100111).

Two of our AMP8 needs were informed by AMP7 improvement works, with optioneering carried out during the PR24 planning process:

- In AMP8, we intend to extend our AMP7 efforts in the South Tyne and Blackwater Holistic Water Management Projects into the North Tyne catchment as our initial sediment fingerprinting study identified that sediment at Ovingham is sourced from both the North and South Tyne catchments. This has led to our AMP8 need in the North Tyne River (08NW104006) that aims to create similar benefits for biodiversity that we have achieved in our AMP7 schemes.
- In AMP8, we intend to extend our AMP7 efforts to reduce our impact on the River Rede from our routine pipeline scouring by implementing measures to mitigate the impacts of our historical scour operations on freshwater pearl habitat in AMP8 (08NW104007).

Our remaining six AMP8 needs were identified via workshops with internal and external stakeholders, discussions with other water companies, and with input from the EA. This includes a potential improvement scheme at Hall Farm Meadow (08ES100013) if deemed required by the investigation we will carry out in AMP8 (08ES100009) to establish the current biodiversity value of the site and carry out an options appraisal to inform how best to manage biodiversity on the site in future.

Delivering two of our biodiversity needs will also enable us to deliver against other WINEP drivers: addressing the North Tyne fine sediment issue (08NW104006) will impact drinking water abstraction and therefore the DrWPA driver, and addressing the impacts caused by the Coquet weir (08NW104011) will help us deliver against Water Resource Artificial and

Heavily Modified Water Bodies and Water Framework Directive Physical Habitat and Fish Passage drivers²⁴. In addition, our two NERC_IMP needs associated with the North Tyne fine sediment issue (08NW104006) and another with fine sediment and metals in the Redesdale catchment (08NW104007), will be delivered in conjunction with our AMP8 investigation at Catcleugh reservoir (08NW104108) under the Water Resources Artificial and Heavily Modified Water Bodies driver²⁵.

²⁴ These drivers are covered in our [Water - WINEP - Water Framework Directive](#) business case

²⁵ The Water Resources Artificial and Heavily Modified Water Bodies driver is covered in our [Water - WINEP - Water Framework Directive](#) business case.

TABLE 10: DEFINING THE NEEDS FOR THE BIODIVERSITY DRIVER

	Risk / Issue	Root Cause	Need	WINEP Action ID	
	NERC_IMP				
Northumbrian	1	Elevated fine sediment levels in the North Tyne are impacting on in-river habitat and protected species, and on drinking water supply by causing sedimentation at pumping stations.	There is aggravated erosion of riverbanks along the North Tyne River leading to fine sediment inputs.	Reduce sediment loads into the North Tyne River to improve habitat condition and protect species.	08NW104006
	2	Risk of fine sediment and metals causing deterioration to freshwater pearl mussel habitat in the Redesdale catchment	Historic scour operations on the Redesdale raw water pipeline	Mitigate impacts of fine sediment and metals from historic scour operations on the Redesdale pipeline on freshwater pearl mussel habitat in the Redesdale catchment.	08NW104007
	3	Risk of habitat fragmentation and loss of connectivity across our Northumbrian operating area including catchments	Agricultural intensification and urban development in the region (including but not limited to our land) has led to increased habitat fragmentation and loss of connectivity	Improve habitat condition and extent at a landscape scale to increase connectivity and better support biodiversity across our Northumbrian operating area including catchments.	08NW104005
	4	Risk that there may be a decline in numbers of swifts, swallows and martins in the Northumbrian region due to a reduction in feeding sites (often waterbodies)	An increase in land developments has led to a reduction in feeding sites (often waterbodies)	Enhance and increase the area of habitats (including feeding sites) for swifts, swallows and martin populations.	08MU100398
	5	Partial barriers to fish passage and loss of intertidal habitat are having a detrimental impact on the ecological status of the Coquet estuary.	A large unused semi-tidal weir is present on the Coquet Estuary.	Remove or minimise the detrimental impacts on fish passage and ecology caused by the Coquet semi-tidal weir.	08NW104011
	NERC_INV				
Essex and Suffolk	6	Risk of habitat fragmentation and loss of connectivity across our Northumbrian owned sites	Land currently in FBT agreements with no conservation / biodiversity objectives	Investigation to understand opportunities for biodiversity enhancement on our owned assets.	08NW104008
	7	There has been an observed decline in the key wetland indicator species of the privately owned Hall Farm Meadow site between 1988 and the present.	Root cause of species decline is unconfirmed. The site appears to be drier than in 1980 when it was designated a County Wildlife Site (CWS). The link between this and our abstraction at Wortham (since 1999) is implied but not proven.	Investigation to establish the current biodiversity value of the Hall Farm Meadow site and confirm why there has been a decline in wetland species. Identify how best to manage the site for biodiversity going forwards via an options appraisal.	08ES100009

	Risk / Issue	Root Cause	Need	WINEP Action ID	
	NERC_IMP				
Essex and Suffolk	8	Currently environmental and biodiversity data is held in multiple spreadsheets, making it challenging to locate and keep up to date with any changes. Risk of hindering the ability to monitor biodiversity changes and to identify any improvements needed.	Lack of consolidated system to capture environmental and biodiversity data.	We need one electronic system to store and manage environmental and biodiversity data to enable a clear view of changes and improvements required	08ES100007
	9	Risk that poor habitat/site management on our owned grassland sites may lead to degradation and loss of species.	We own approximately 2000 sites across our operating area. Some of these operational sites are in conservation management and some are not.	Improve condition of our grassland sites and landholdings to achieve biodiversity and carbon benefits.	08ES100006
	10	Risk of habitat fragmentation and loss of connectivity across our ESW operating area including catchments.	Historical agricultural intensification alongside urban development in the region has led to habitat fragmentation and loss of connectivity.	Improve habitat condition and extent at a landscape scale to increase connectivity and better support biodiversity across our ESW operating area including catchments.	08ES100008
	11	Risk that there may be a decline in numbers of swifts, swallows and martins in our ESW region due to a reduction in feeding sites (often waterbodies)	An increase in land developments has led to a reduction in feeding sites (often waterbodies)	Enhance and increase the area of habitats (including feeding sites) for swifts, swallows and martin populations	08MU100302
	12	There has been an observed decline in the key wetland indicator species of the privately owned Hall Farm Meadow site between 1988 and the present.	Root cause of decline is unconfirmed. Our AMP8 investigation (08ES100009) aims to confirm.	Mitigate impacts identified through the investigation (08ES100009) on Hall Farm Meadow site and improve condition of the site to better support biodiversity.	08ES100013
	13	Physical modification and poor habitat conditions in the Roman River water body are hindering ecological function.	Our abstractions from the Roman River and from groundwater at Ball Lane have in the past impacted flows and habitat conditions in the Roman River water body. Actions to address flows and fish passage are being delivered elsewhere in the AMP8 WINEP.	Improve aquatic and riparian habitat conditions in the lower Roman River, to improve ecological function and enhance biodiversity.	08ES100111

2.6.3 European Sites

We have identified five needs against the European Sites driver that we intend to deliver in AMP8. Our needs are outlined in Table 11, alongside their issue and root cause, and the Action ID that has been assigned to the need as part of our WINEP submission to the EA. All our needs are in our Essex and Suffolk regions.

The way in which we identified our needs under this driver varies. Three needs, two related to the Broads Special Area of Conservation (SAC) (08ES100018 and 08ES100019) and one related to sedimentation in the Trinity Broads (08ES100020), were identified by the EA.

The EA have investigated the impacts of abstraction on the Ant Broads and Marshes SSSI within the Broads SAC. Through this work they have identified that nine of our abstractions licences in Essex and Suffolk could be at risk of requiring sustainability changes to meet the requirements of the Habitats Regulations. The EA wrote to us on 16 November 2022 to inform us and to instruct that we include two needs in our AMP8 WINEP: one to carry out an options appraisal following their investigation on the Broads SAC (08ES100018), and one to implement the actions of the options appraisal 08ES100019). These needs are therefore dependent on the outcomes of the EA's investigation into the impact of abstractions on the Broads SAC due to be completed in 2024.

The EA also requested that we include a need related to sedimentation in the Trinity Broads (08ES100020) in November 2022. This is related to the licence condition at the Trinity Broads to maintain water depths to enable abstraction while maintaining the SSSI status for water fowl.

The remaining two INV needs (08ES100010 and 08ES100012) were identified by our teams based on observed challenges during AMP7.

TABLE 11: DEFINING THE NEEDS FOR THE EUROPEAN SITES DRIVER

	Risk / Issue	Root Cause	Need	WINEP Action ID	
Essex and Suffolk	HD_INV				
	1	It is unknown if 9 of our drinking water abstractions in the Essex and Suffolk region are hydraulically connected to, and negatively impacting, the Broads Special Area of Conservation (SAC). There is a risk that we may be required to reduce or stop our abstractions.	9 of our drinking water abstractions in the Essex and Suffolk region may be hydraulically connected to the Broads SAC. Following the recent Judicial Review, the EA will confirm via an Abstraction Impact Assessment by late 2024.	If the EA confirm hydraulic connectivity between our drinking water abstractions and the Broads SAC, we will need to understand the nature of the impacts of our abstractions, if any, on the SAC and appraise potential solutions to mitigate the impacts.	08ES100018
	2	Differences in bird count methodologies applied at Abberton Reservoir may be giving the impression that numbers are declining when they are not. This presents the risk of Abberton Reservoir being deemed 'unfavourable'.	Surveys completed by volunteers may be less robust than those by experienced consultants, leading to perceived changes in bird populations.	Assess options for verifying consultant / volunteer wetland bird counts at Abberton Reservoir to understand real changes in bird populations.	08ES100010
	3	A recent sudden deterioration in water clarity at Lily Broad, is preventing Trinity Broads SSSI meeting 'favourable' condition.	Catchment or indigenous increases in sediment, nitrate and phosphorus loads to the Trinity Broads.	Investigate the source of sediment and water quality issues (nitrate and phosphorus) in the Trinity Broads and the deterioration of water clarity at Lily Broad.	08ES100012
	HD_IMP				
	4	There is a risk that the EA will confirm that 9 of our drinking water abstractions are hydraulically connected to, and negatively impacting on, the Broads SAC and we will be required to mitigate the impacts.	Following the recent Judicial Review, the EA will confirm via an Abstraction Impact Assessment by late 2024. It is suspected that our abstractions may be contributing to decline condition of the Broads SAC due to insufficient flows.	Following confirmation from the EA whether 9 of our drinking water abstractions are hydraulically connected to, and negatively impacting on, the Broads SAC, we will need to mitigate the impacts as recommended by our AMP8 investigation above (08ES100018).	08ES100019
5	Sedimentation in the Trinity Broads decreases water depth, preventing abstraction and reducing the quality of the protected site.	There is a condition within our abstraction licence for the Trinity Broads to maintain water depths to enable abstraction while protecting the features of the site.	Take action to ensure water depths in the Trinity Broads meet the obligations of licence condition.	08ES100020	

2.6.4 Sites of Special Scientific Interest

We have identified two needs against the SSSI driver that we intend to deliver in AMP8. Our needs are outlined in Table 12, alongside their issue and root cause, and the Action ID that has been assigned to the need as part of our WINEP submission to the EA. We have one IMP need in our Northumbrian region, and an INV in our Essex and Suffolk region.

In the Northumbrian region, our AMP8 need (08NW104010) was identified from our AMP7 programme of peat restoration to further improve the condition of the blanket bog (peatland) SSSIs in the Upper Tees and Upper Wear catchments. In particular, there is a need to target this work to protect our drinking water abstractions from high levels of organic carbon and colour, and this work will be informed by an investigation (08NW104050 in Section 2.6.1) under the DrWPA driver for AMP8.

In our Essex and Suffolk region, our AMP8 need to understand the impacts recreation have on the condition of the Trinity Broads SSSI (08ES100011) was identified due to our region receiving an increasing number of applications for recreational licences but not being certain on the potential impacts of recreation on the SSSI. This investigation will be carried out alongside two other water quality investigations in the Broads area: the Ormesby Broad drinking water investigation (08ES100205 in Section 2.6.1) and the investigation into water clarity, sediment and nutrients at the Trinity Broads (08ES100012 in Section 2.6.3).

TABLE 12: DEFINING THE NEEDS FOR THE SITES OF SPECIAL SCIENTIFIC INTEREST DRIVER

	Risk / Issue	Root Cause	Need	WINEP Action ID	
SSSI_IMP					
Northumbrian	1	Peatland (blanket bog) SSSIs in the upper Tees and upper Wear catchments are in poor condition, drying out and losing organic matter via erosion and leaching. Consequent high levels of colour and dissolved organic carbon in watercourses poses a challenge to drinking water treatment at Lartington WTW and Wear Valley WTW.	Historic poor management of peat bogs including through creation of drainage channels, exacerbated by climate change	Halt or reverse peatland degradation in the Upper Tees and Wear drinking water catchments and reduce challenge to drinking water treatment from colour and organic carbon.	08NW104010
	SSSI_INV				
Essex and Suffolk	2	We are receiving new requests for recreational licences in the Trinity Broads and this is causing concern around the risk posed by new (and current) recreation on SSSI condition (disturbance, water quality, habitat condition and INNS risk).	There is a gap in our understanding on the level of recreation that can be sustained on the Trinity Broads without impacting SSSI condition.	Understand risks to SSSI condition posed by recreational activities on the Trinity Broads. Ascertain appropriate recreation levels and management strategies to avoid deterioration.	08ES100011

2.6.5 Invasive Non-Native Species

We have identified 12 needs against the INNS driver that we intend to deliver in AMP8. Our needs are outlined in Table 13, alongside their issue and root cause, and the Action ID that has been assigned to the need as part of our WINEP submission to the EA. Most are ND needs and are in our Northumbrian region.

Most of our AMP8 needs were identified through PR19 investigations and other AMP7 work, particularly following the development of our company-wide INNS strategy and Pathway Action Plans, and an initial Branch Out Invasive Non-Native Species Grant Scheme grant scheme (as outlined in Section 2.2.5). This has resulted in six ND needs, 3 for each region: embedding our biosecurity strategy into operations (08NW104002 and 08ES100003); and INNS control in the catchments (08NW104003 and 08ES100004); and reduce risk of spreading INNS at higher risk sites (those used for recreation) (08NW104004 and 08ES100005).

We identified our two MON needs, to provide INNS early warning techniques in each region (08MU100399 and 08MU100301), and two INV needs, to trial biosecurity measures to reduce risks associated with raw water transfers in each region (08MU100400 and 08MU100300), following discussion with the EA and other water companies via water industry wide working groups.

Finally, our asset and conservation teams identified our two INV needs for localised investigations to control the spread of INNS (08NW104000 and 08NW104001) based on observed challenges at our Northumbrian operational sites.

TABLE 13: DEFINING THE NEEDS FOR THE INVASIVE NON-NATIVE SPECIES DRIVER

	Risk / Issue	Root Cause	Need	WINEP Action ID	
Northumbrian	INNS_INV				
	1	Risk of <i>Crassula helmsii</i> spreading to other water bodies from Derwent Reservoir. Options to successfully control or eradicate <i>Crassula</i> at Derwent reservoir have not yet been identified as management can be very challenging, and chemical options are not possible at the site as it is used for drinking water supply.	Presence of <i>Crassula helmsii</i> at Derwent Reservoir	Identify feasible options for controlling the invasive water weed <i>Crassula helmsii</i> at Derwent Reservoir via biological or mechanical means.	08NW104000
	2	Risk of spread of signal crayfish downstream of Scaling Dam	Signal crayfish present in Scaling Dam with potential egress routes to the downstream water body.	Identify feasible options to reduce the risk of the spread of signal crayfish from Scaling Dam.	08NW104001
	3	Risk of spread of INNS via our raw water transfers (RWT) in the Northumbrian region. There is currently limited knowledge within the water industry on feasible biosecurity options for RWT.	RWT can spread aquatic INNS within and between water bodies.	Identify and assess biosecurity measures to reduce the risk of spread of aquatic INNS via RWT.	08MU100400
	INNS_MON				
	4	Risk of new aquatic INNS arriving from other locations, with potential negative impacts on our assets in the Northumbrian region and the environment.	INNS may spread via natural or anthropogenic pathways, and this can be exacerbated by climate change	Provide early warning for INNS i.e., detect new arrivals before they become established. For some species, monitoring approaches and techniques need developing.	08MU100399
INNS_ND					
5	Risk of spreading INNS through our operations in the Northumbrian region. There is a requirement to ensure full and ongoing implementation of our company-wide INNS strategy developed in 2020 to minimise the risk of spreading INNS through our activities and protect our assets. There is currently a lack of resourcing to achieve this.	Our operations (e.g., capital projects, site surveys, sampling, sludge disposal, leisure activities, grounds maintenance) in the Northumbrian region can pose a risk of the spread and proliferation of aquatic INNS.	Ensure biosecurity strategy is embedded into company culture and operations in the Northumbrian region.	08NW104002	
6	Risk of INNS in our Northumbrian region negatively impacting on our assets and the wider environment.	INNS are present in our catchments in the Northumbrian region. There is a lack of regional co-ordination or long-term strategy in INNS control.	Reduce INNS presence in our catchments in our Northumbrian region to reduce the impact on our assets and the wider environment.	08NW104003	

	Risk / Issue	Root Cause	Need	WINEP Action ID
Northumbrian	7 Risk of transfer of INNS to/from water bodies we manage in the Northumbrian region that are used for recreational activities (reservoirs and lakes).	INNS can be spread in our region by recreational activities e.g. via equipment being moved between water bodies. There is a lack of appropriate biosecurity facilities sites in the Northumbrian region.	Implement measures identified via the Pathway Action Plans (work started in AMP7) to reduce the risk of spread of INNS to/from our Northumbrian water bodies used for recreation (considered high risk).	08NW104004
	INNS_INV			
	8 Risk of spread of INNS via our raw water transfers (RWT) in our Essex and Suffolk regions. There is currently limited knowledge within the water industry on feasible biosecurity options for RWT.	RWT can spread aquatic INNS within and between water bodies.	Identify and assess biosecurity measures to reduce the risk of spread of aquatic INNS via RWT.	08MU100300
	INNS_MON			
	9 Risk of new aquatic INNS arriving from other locations, with potential negative impacts on our assets in ESW and the environment.	INNS may spread via natural or anthropogenic pathways, and this can be exacerbated by climate change	Provide early warning for INNS i.e., detect new arrivals before they become established. For some species, monitoring approaches and techniques need developing.	08MU100301
	INNS_ND			
Essex and Suffolk	10 Risk of spreading INNS through our operations in ESW. There is a requirement to ensure full and ongoing implementation of the company-wide INNS strategy developed in 2020 to minimise the risk of spreading INNS through our activities and protect our assets. There is currently a lack of resourcing to achieve this.	Our operations (e.g., capital projects, site surveys, sampling, sludge disposal, leisure activities, grounds maintenance) in ESW can pose a risk of the spread and proliferation of aquatic INNS.	Ensure biosecurity strategy is embedded into company culture and operations in the Essex and Suffolk regions.	08ES100003
	11 Risk of INNS in our Essex and Suffolk region negatively impacting on our assets and the wider environment.	INNS are present in our catchments in the Essex and Suffolk region. There is a lack of regional co-ordination or long-term strategy in INNS control.	Reduce INNS presence in our catchments in the Essex and Suffolk region to reduce the impact on our assets and the wider environment.	08ES100004
	12 Risk of transfer of INNS to/from water bodies we manage in the Essex and Suffolk region that are used for recreational activities (reservoirs and lakes).	INNS can be spread in our ESW region by recreational activities e.g. via equipment being moved between water bodies. There is a lack of appropriate biosecurity facilities at some sites in our Essex and Suffolk region.	Implement measures identified via the Pathway Action Plans (work started in AMP7) to reduce the risk of spread of INNS to/from our Essex and Suffolk water bodies used for recreation (considered high risk).	08ES100005

2.6.6 Eels Regulations

We have identified two needs against the Eels driver that we intend to deliver in AMP8. Our needs are outlined in Table 14, alongside their issue and root cause, and the Action ID that has been assigned to the need as part of our WINEP submission to the EA. Our two need and are in our Essex and Suffolk region.

As described in Section 2.2.6, during AMP6 and AMP7 we focused our efforts on preventing any more eels from getting into Abberton and Hanningfield Reservoirs, by constructing eel exclusion screens on the river intakes that feed into these reservoirs. In addition, we undertook an investigation and options appraisal into options to enable the seaward migration of the eels currently resident in Abberton and Hanningfield reservoirs. Therefore, the needs identified for AMP8 are for us to keep to the Eels Regulations by improving eel escapement from Abberton and Hanningfield Reservoirs (08ES100001 and 08ES100002), following recommendations from our AMP7 investigation and options appraisal.

TABLE 14: DEFINING THE NEEDS FOR THE EELS' DRIVER

	Risk / Issue	Root Cause	Need	WINEP Action ID	
	EE_IMP				
Essex and Suffolk	1	Eels residing in Abberton Reservoir are not able to complete their seaward migration	Presence of the dam structure at Abberton Reservoir preventing eel escapement	Improve eel escapement from Abberton Reservoir to contribute to silver eel escapement targets.	08ES100001
	2	Eels residing in Hanningfield Reservoir are not able to complete their seaward migration	Presence of the dam structure at Hanningfield Reservoir preventing eel escapement	Improve eel escapement from Hanningfield Reservoir to contribute to silver eel escapement targets.	08ES100002

2.6.7 Link to long term delivery strategy

e) Is the need clearly identified in the context of a robust long-term delivery strategy within a defined adaptive pathway?

This investment is needed as part of the 'protecting the local environment' investment area under our [Long Term Delivery Strategy](#) (LTS) core pathway. This investment is required to:

- protect and improve the quality of water abstracted for drinking water supply;
- respond to risks and issues for biodiversity related to water company operations;
- maintain or restore the habitats and species of European sites at favourable conservation status across their natural range in the UK;
- conserve and enhance SSSIs including peatland;
- to reduce the risk of spreading invasive non-native species (INNS) due to our activities and to reduce their impact on our assets and the areas in which we operate, and
- stop or reverse the decline in European Eel (*Anguilla anguilla*) stock by contributing to the target set for the number of 40% of mature eels (by biomass) returning to spawn at sea.

Our long-term delivery strategy describes our investment areas as being built on a foundation of partnership working, innovation, and productivity improvement. It is clear that working effectively with partner organisations will become increasingly important, and we can deliver more by working with others towards mutually beneficial goals and for less cost to customers in their bills. We do this by bringing together different funding streams and working with partners who can make non-financial contributions. The success of this approach in AMP7 is clear across each of the areas in this enhancement case, and we will continue to do this as our preferred approach.

Over the long term, building effective and long-lasting partnerships can support our long-term expectations that the current appetite for (and scale of) environmental investment will continue. We can maximise the benefits and strengthen – rather than displace – other organisations who might be better placed to act in future. These partnerships help to build resilience, by building a network and supply chain who can provide a broader and deeper range of resources and expertise in response to uncertainty. Bringing together diverse groups can also challenge established thinking and ways of working and can support innovation and new ways of working with nature.

We consider this is low / no regret investment because it is needed to meet statutory requirements in 2025-30.

We have a legal obligation to deliver this investment by 2030 to meet our environmental obligations as captured against the following six WINEP drivers:

- Drinking Water Protected Areas (DrWPA)
- Biodiversity (NERC)

- European Sites (Habitats Directive)
- Sites of Specific Scientific Interest (SSSI)
- Invasive Non-native Species (INNS)
- Eels Regulations (Eels Regulations)

This enhancement case includes only statutory investments that are required in 2025-30 under the WINEP programme, including some investigations to understand future needs in more detail, and so allowing us to prepare for AMP9 and beyond.

We therefore consider this investment is necessary in 2025-30 to deliver our LTDS.

The investigations carried out in 2025-30 may identify areas where further investment is required beyond 2030.

2.7. CUSTOMER SUPPORT FOR THE NEED

f) Where appropriate, is there evidence that customers support the need for investment (including both the scale and timing)?

These projects are all a consequence of statutory requirements, and so we have not discussed the specific needs with customers. That is because our research shows that customers expect us to meet our statutory obligations, and it is not appropriate to discuss delaying or phasing investment where there are no alternatives to meet the statutory requirement to deliver our part of WINEP.

Our research shows that customers support investment in the environment, including wider environmental and social benefits – though they do not necessarily think they should always pay for this through their water and wastewater bills. In particular, our customers rank improving the quality of rivers as one of their “medium” priorities ([prioritisation of common PCs](#), NES44).

In our [qualitative affordability and acceptability testing](#) (NES49), customers supported our “preferred” plan which included these investigations. Customers found this plan acceptable because it focused on the right things, is good for future generations, and is environmentally friendly. Customers who did not find this plan acceptable said that this was expensive, and water companies should pay out of their own profits. We did not ask specifically about these investigations (as our individual items were limited only to the largest investments), but customers supported maintaining rivers (NES49). In our [quantitative research](#) (NES50), 74% of customers supported our preferred plan, including this investment.

3. BEST OPTION FOR CUSTOMERS

To determine the best option for customers to address each need in Table 9 to Table 14, we applied different optioneering methodologies depending on the driver code whether the need requires investigation or implementation, and for the latter, whether the work is informed by previous (PR19) investigations.

For a number of implementation needs (under IMP or ND driver codes), optioneering was carried out in AMP7 as part of a PR19 investigation. These options appraisals aligned with the WINEP Options Development guidance i.e., developing a longlist of options; screening to produce a shortlist of options; and undertaking a cost-benefit assessment. Therefore, for the needs where this work had been completed, the outcomes were used to inform option selection.

For implementation needs where optioneering had not been carried out as part of a PR19 investigation, we applied a methodology based on the principles of HM Treasury's *The Green Book: Central Government Guidance on Appraisal and Evaluation*²⁶ and the *WINEP Options Development Guidance*²⁷, as outlined in Figure 1. Table 15 displays the WINEP options development principles we have incorporated. A full description of each step and the output from it is contained in the following sections. Where appropriate, optioneering (particularly creating a longlist of options) was informed by discussions with external stakeholders. In the Northumbrian region, this was primarily via the North East Catchments Hub (NECH). NECH is a stakeholder panel we established to support on PR24 planning, particularly to embed nature-based solutions and partnership working into our WINEP. It brings together different stakeholder groups and is facilitated by the Rivers Trusts.

Where there is a clear need to investigate and address a knowledge gap (options under the INV driver codes), we worked with the EA and consultants from Mott MacDonald and Stantec to scope up an appropriate and proportionate investigation scope.

There are also a few instances where the EA has specified the option to address a need. Where this is the case, we have called this out below.

²⁶ HM Treasury, The Green Book, Central Government Guidance on Appraisal and Evaluation 2022

²⁷ Environment Agency, July 2022, *Water Industry National Environment Programme (WINEP), Options Development Guidance*.

FIGURE 1: PROCESS FOR DEVELOPING AND FILTERING OPTIONS TO ADDRESS OUR IMPLEMENTATION NEEDS

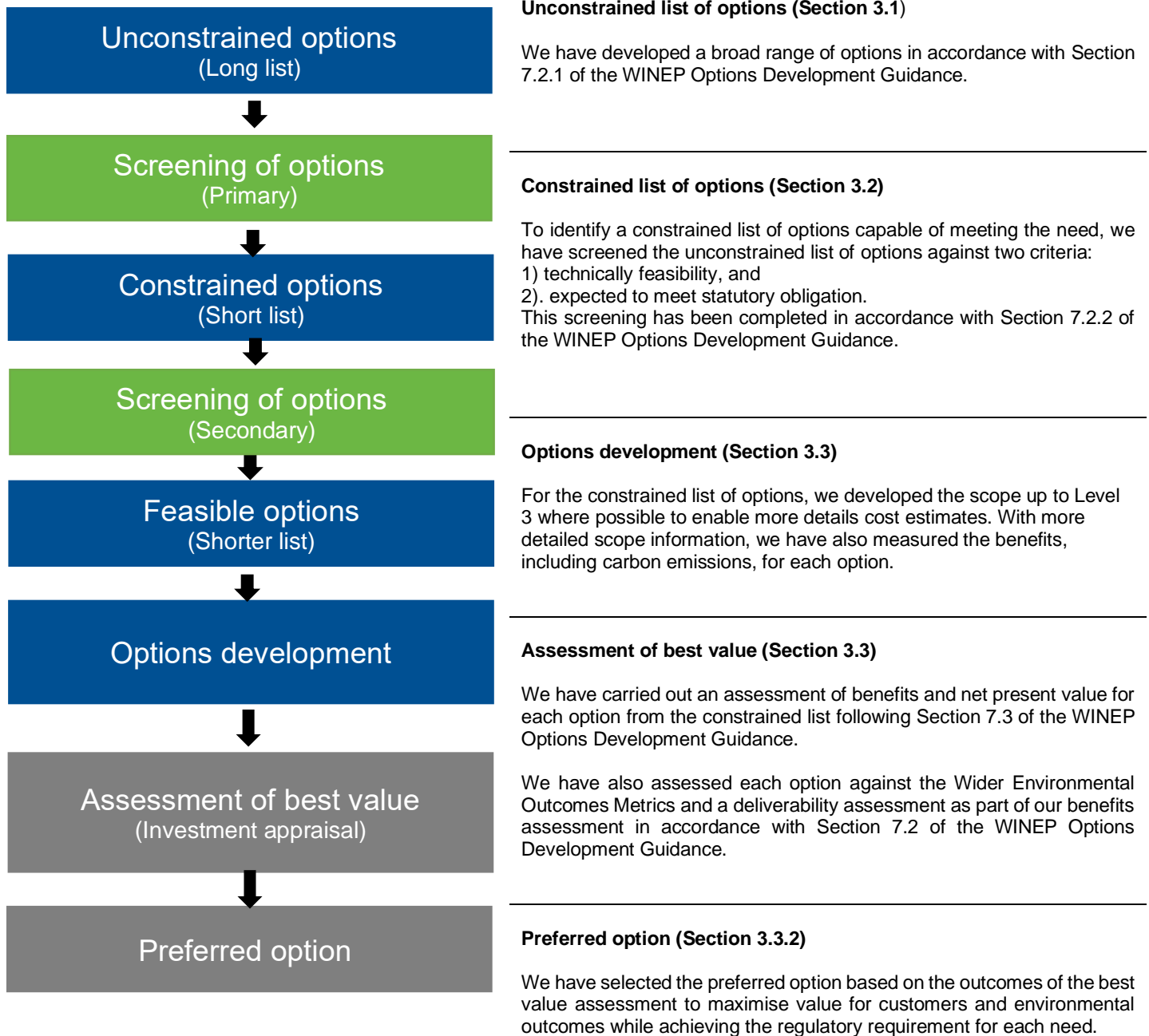


TABLE 15: WINEP OPTIONS DEVELOPMENT PRINCIPLES

Expectation	How this has been met
Environmental net gain	Our Value Framework enables an assessment of environmental net gain for options through assessing the potential environmental impacts of each option with consideration for natural environment, net zero, catchment resilience, access, amenity and engagement. We use this assessment to choose the option that provides the greatest overall environmental benefit/cost ratio.
Natural capital	We have assessed each of our options against the full range of natural capital metrics and wider environmental objectives as part of our WINEP assessment to the Environment Agency.
Catchment and nature-based solutions	We have considered a range of solutions within our catchments to address the need including stopping abstraction, establishing new abstractions and participating in catchment partnership projects as shown in Section 3.1.
Proportionality	We have taken a proportional approach to options development based on Green Book principles. Further information on our optioneering is outlined in Section 3.
Evidence	We present evidence on our reasoning to discard options within Section 3.2, and evidence how we developed option costs in Section 3.3. Additional evidence of our options development process including data used is available in our Options Development Report and Options Assessment. Our WINEP submission has been independently audited by a third party (Jacobs) and there are no outstanding actions.
Collaboration	We have collaborated with the EA and other stakeholders to define our AMP8 needs as outlined in Section 3.4. We will continue to collaborate with our stakeholders as part of the delivery process.

3.1. BROAD RANGE OF OPTIONS

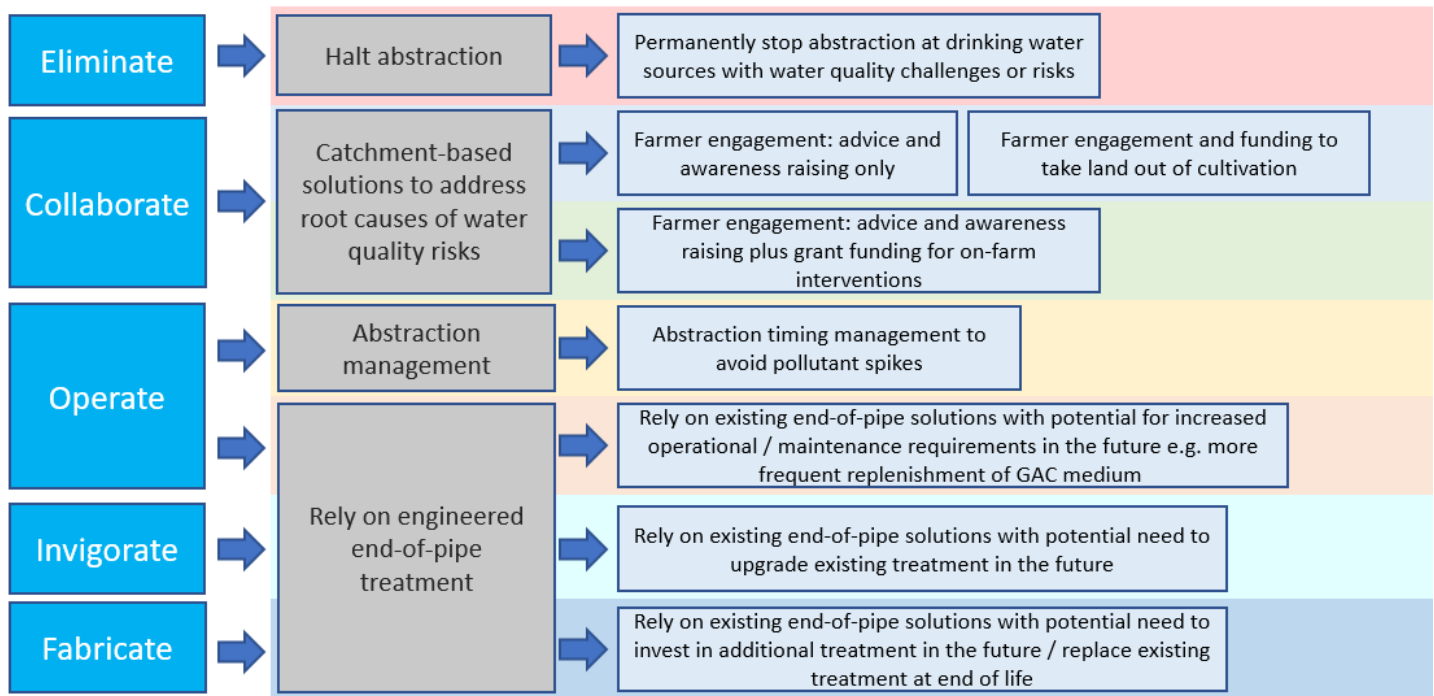
a) Has the company considered an appropriate range of options to meet the identified need?

3.1.1 Drinking Water Protected Areas

DrWPA_ND Needs

We identified our list of unconstrained options to address our two DrWPA_ND needs (08NW104058 and 08ES100206) from Section 2.6.1) during PR24 following the WINEP Options Development Guidance. This involved incorporating learnings from our AMP6 and AMP7 work (Section 2.2.1), and learnings from other water companies and government bodies to protect or improve drinking water quality through consultation with stakeholders, including the EA and our consultants, where appropriate. Our list of unconstrained options to address our two DrWPA_ND needs is demonstrated in Figure 2 alongside our Totex Hierarchy categories, to demonstrate a broad range of options considered.

FIGURE 2: THE UNCONSTRAINED LONG LIST OF OPTIONS IDENTIFIED TO ADDRESS THE DRINKING WATER PROTECTED AREAS NO DETERIORATION NEED, AND THEIR ALIGNMENT TO THE TOTEX HIERACHY CATEGORIES



Our unconstrained options consider solutions with differing levels of costs and benefits categorised as follows:

- Eliminate - measures that remove the need. In this case, eliminating the need would mean ceasing to abstract water from our drinking water sources.
- Collaborate - work with stakeholders to address the need including co-funding. Costs can be shared with third parties either to deliver the same or an additional level of social and environmental benefit. For this driver, this means working with farmers and land managers through awareness raising and providing grant funding to address the root causes of raw water quality risks and issues.
- Operate – this considers amendments or improvements to operational management practices. In this case altering the timing of water abstractions to avoid pollutant spikes and reduce the challenge to treatment. This may not be possible for all sites (especially those critical to supply) or all pollutants.
- Invigorate - invest in existing infrastructure to improve performance. For this driver, this would involve investing in existing infrastructure to improve pollutant removal. This may not be possible for all sites and all pollutants.
- Fabricate – new treatment assets to augment or replace existing to achieve better performance. This option is likely to have the highest costs and embedded carbon and may not be possible for all pollutants.

DrWPA_INV Needs

Options to address our 12 DrWPA_INV needs (Section 2.6.1) were identified during PR24 planning following the WINEP Options Development Guidance. As these needs require investigations, and therefore have one distinct solution, they were not subject to further optioneering. A summary of the solutions against each DrWPA_INV need is included in Table 16.

Where possible, we will continue to work in partnership with relevant stakeholders across AMP8 to carry out these investigations to maximise the benefits delivered by our investment into addressing these needs. This will include:

- possibly working with the North Pennines Areas of Natural Beauty (AONB) Partnership or Great North Bog Partnership to investigate sources of colour and organic carbon at our abstraction points (08NW104050),
- working with the Coal Authority and Tyne River Trust to investigate causes of water quality deterioration at Derwent reservoir (08NW104052), and
- working with Anglian Water, who is the wastewater operator in the Essex and Suffolk region, if our investigations into nitrates suggest the source is from human waste (wastewater) (08ES100200, 08ES100201, 08ES100203, 08ES100204 and 08ES100205).

TABLE 16: THE OPTIONS TO ADDRESS THE DRINKING WATER PROTECTED AREAS INVESTIGATION (DRWPA_INV) NEEDS

	Need	WINEP Action ID	Option (type of investigation)
	2 Understand the main sources of colour and organic carbon to our abstractions to enable targeting of peat restoration activities proposed under SSSI_IMP.	08NW104050	Investigation into the sources of colour and organic carbon affecting drinking water abstractions on the Tyne, Tees, Wear and Coquet rivers. Identification of hotspots and opportunities (including consultation with partners) to address colour and DOC issues via peat restoration, enabling a targeted approach in AMP8 and onwards.
	3 Understand the causes of water quality deterioration at Derwent reservoir and assess potential impact of climate change. Identify potential solutions for delivery in AMP9.	08NW104052	Investigation into the causes of water quality issues and deterioration at Derwent reservoir. Identification of contaminants, potential sources and transport pathways and assessment of the potential impact of climate change. Including an investigation into the rate and sources of sedimentation at the reservoir. Options appraisal to identify solutions for potential delivery in AMP9, including engaging with the Coal Authority and/or the Tyne Rivers Trust as appropriate, and potentially including trials.
	4 Understand the causes of seasonal alkalinity lows at Horsley WTW, and assess the potential impact of climate change. Identify potential solutions for delivery in AMP9.	08NW104053	Investigation into alkalinity and conductivity at Horsley WTW, focussing on the impact of the Kielder scheme. Also considering the potential impact of climate change if low flows lead to a greater reliance on the Kielder scheme. Options appraisal for delivery in AMP9 if appropriate.
Northumbria	5 Understand the impact of the Tyne transfer on pesticide risk at Airyholm reservoir and Honey Hill WTW, and	08NW104054	Investigation into the pesticide risk at Airyholm reservoir and Honey Hill WTW, including an assessment of the impact of the Tyne transfer, and the potential exacerbating impact of climate change (i.e., if reliance on Tyne transfer increases).

	Need	WINEP Action ID	Option (type of investigation)
	potential impact of climate change. Identify potential solutions for delivery in AMP9.		Options appraisal for potential delivery in AMP9, considering a potential recommendation from the Zonal Study investigation around supporting Honey Hill using Tunstall reservoir, reducing reliance on the Tyne transfer.
6	Understand the nature and causes of water quality deterioration at Lartington WTW, and identify potential solutions for delivery in AMP9.	08NW104055	Investigation into the causes of deterioration at Lartington WTW in algae, geosmin, MIB (taste & odour) and pesticides, and identification of potential solutions for delivery in AMP9.
7	Understand the causes of elevated algae and sulphate levels in raw water at Lumley WTW and identify potential options for delivery in AMP9	08NW104057	Investigation into the causes of elevated sulphate and algae levels in raw water at Lumley WTW and identification of potential options for delivery in AMP9. Linking to the Wear abstractions investigation (see below).
8	Assess the potential for co-ordinated management of compensation flows across the Wear catchment, for potential implementation in AMP9.	08NW104056	Investigation into the potential for co-ordinated management of compensation flows in the catchment to minimise impacts of abstractions on the Lumley abstraction and wider environment (flows, river habitat, water quality)
10	Understand the causes of algal blooms at Abberton reservoir and identify potential solutions for delivery in AMP9.	08ES100200	Investigation into causes of algal blooms at Abberton reservoir. Identification of the sources of algae to the reservoir, and factors affecting algal growth (nutrient levels, reservoir management). Identification of appropriate mitigation options for potential delivery in AMP9.
11	Understand the sources of nitrate and causes of algal blooms at Langford WTW, and identify potential solutions for delivery in AMP9.	08ES100201	Investigation into the sources and pathways of nutrients and algae to the River Blackwater and Chelmer intakes. Identification of potential options (catchment interventions or reservoir management) for delivery in AMP9.
12	Understand the sources of nutrients and algae at Lound WTW, and identify potential solutions for delivery in AMP9.	08ES100203	Investigation into the sources and pathways of nutrients in raw water at Lound WTW and identification of potential options for delivery in AMP9.
13	Understand the causes of algae and taste and odour issues at Ormesby WTW, and identify potential solutions for delivery in AMP9.	08ES100204	Investigation into the causes of high levels of algae, geosmin and methyl isoborneol in the raw water supplying Ormesby WTW from the Ormesby Broad and/or River Bure abstractions. Identification of potential options for delivery in AMP9. Note that there are separate investigations proposed into the impact of recreational activity on water quality at the Trinity Broads, and sudden drop in water clarity at Lily Broad under the SSSI_INV driver
14	Understand the sources of nutrients to the Belaugh groundwater abstraction supplying Ormesby WTW, and identify potential solutions for delivery in AMP9.	08ES100205	Investigation into the sources and pathways of elevated nutrient levels to the Belaugh boreholes. Identification of potential options for delivery in AMP9 and identification of hotspots i.e., areas of the catchment in which interventions should be targeted to achieve the greatest benefits.

Essex and Suffolk

3.1.2 Biodiversity

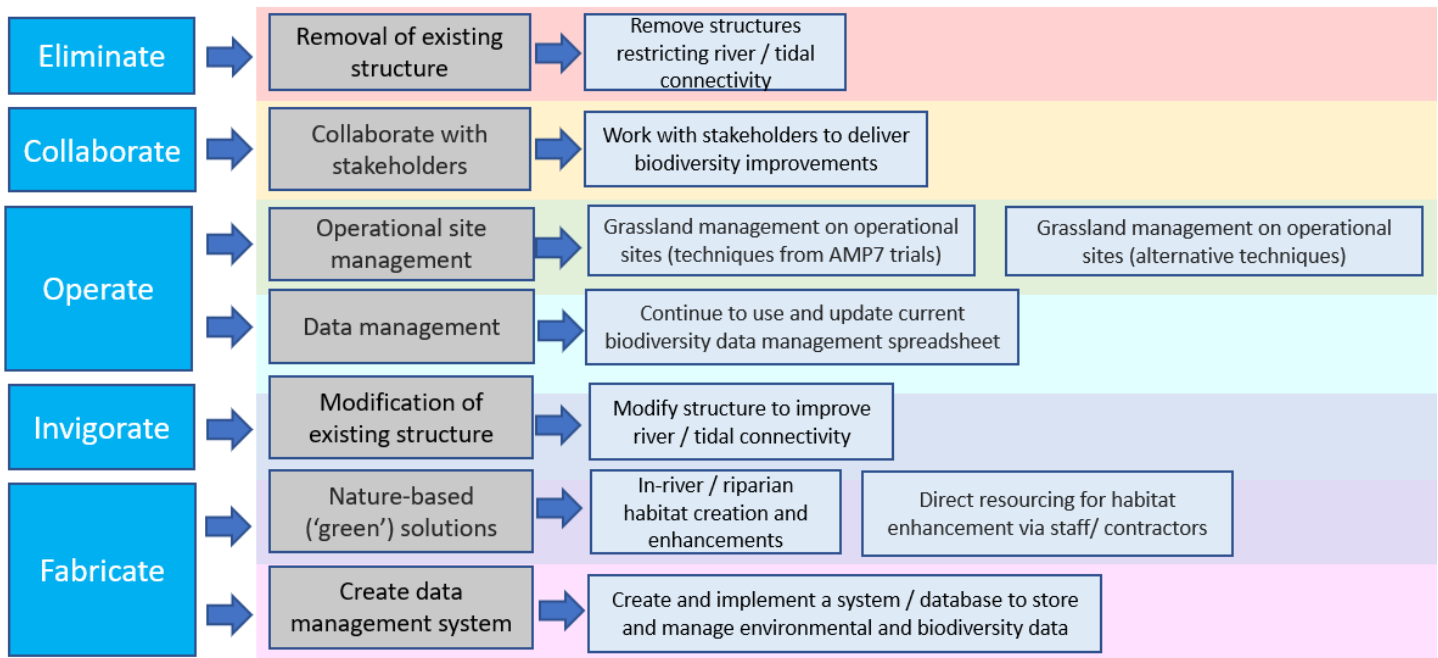
NERC_IMP Needs

We identified our list of unconstrained options to address our 11 NERC_IMP needs following WINEP Options Development Guidance. Options to address three of our NERC_IMP needs, relevant to Coquet River (08NW104011), improving grassland (08ES100006) and Roman River (08ES100111), were identified following PR19 investigations at these sites (Section 2.2.2) and in line with AMP7 WINEP Options Development Guidance.

Options to address our other 7 NERC_IMP needs, not including Hall Farm Meadow (08ES100013), were identified during PR24 planning using a range of sources including learnings from recent (non-WINEP) investigations, and in consultation with stakeholders where appropriate. For the need relating to swifts, swallows and martins (08MU100302), options were identified through discussion with an industry collaborative group through the WaterUK Conservation Access & Recreation Group.

For our Hall Farm Meadow NERC_IMP need (08ES100013), the identification of suitable options will be dependent on the outcomes of our options appraisal under NERC_INV during AMP8 (08ES100009), as outlined in Section 2.2.2. Until the outcomes of our investigation are available there remains uncertainty about the nature and scale of the options. However, as we need to prepare for AMP8, we have suggested some possible options that could be suitable to address the need, including solutions that are carried out by our own people or contractors, or solutions carried out through our established partnerships. Our list of unconstrained options to address our 11 NERC_IMP needs is demonstrated in Figure 3 alongside our Totex Hierarchy categories, to demonstrate a broad range of options considered.

FIGURE 3: THE UNCONSTRAINED LONG LIST OF OPTIONS IDENTIFIED TO ADDRESS THE BIODIVERSITY IMPLEMENTATION NEEDS, AND THEIR ALIGNMENT TO THE TOTEX HIERACHY CATEGORIES



Our unconstrained options consider solutions with differing levels of costs and benefits categorised as follows:

- **Eliminate** - measures that remove the need. In this case, eliminating the need would mean removing structures that are causing the need. This is relevant to the Coquet River (08NW104011) need. In other cases, there are no options that would eliminate the need to fulfil our duty to conserve or restore biodiversity.
- **Collaborate** - working with stakeholders to address the need including co-funding. Costs can be shared with third parties either to deliver the same or an additional level of social and environmental benefit. There is significant scope to work with partners to meet the needs under this driver, including securing co-funding, working with land managers and collaborating with environmental organisations.
- **Operate** – this covers amending operational management practices. For the NERC_IMP needs this could involve allocating our people time for the co-ordination or implementation of habitat improvement work across our operational areas (08NW104005 and 08ES100008). This also covers how data is stored and managed to support our operations, which relates to our need for an electronic system to store and manage environmental and biodiversity data (08ES100007).
- **Invigorate** – invest in the existing infrastructure to improve performance and address the need. These options can provide an increased level of benefit but may be of a lower cost than fabricate options. In this case modifying existing infrastructure to improve river / tidal connectivity relates to the Coquet River (08NW104011) need.
- **Fabricate** – new assets to deliver against the needs. This includes options involving in-channel river restoration (while also requiring collaboration) that involve creating significant in-channel structures or bringing in significant additional material such as gravel augmentation. These types of schemes have both an environmental (e.g., carbon) cost and an

environmental benefit. This criterion also includes new software assets that can deliver against needs, which includes a new database or system to address our need for one electronic system to store and manage environmental and biodiversity data (08ES100007).

NERC_INV Needs

Options to address our two NERC_INV needs (Section 2.6.2) were identified during PR24 planning following the WINEP Options Development Guidance. As these needs require investigations, and therefore have one distinct solution, they were not subject to further optioneering. A summary of the solutions against each NERC_INV need is included in Table 17.

TABLE 17: THE OPTIONS TO ADDRESS THE BIODIVERSITY INVESTIGATION (NERC_INV) NEEDS

	Need	WINEP Action ID	Option (type of investigation)
Northumbria	6 Investigation to understand opportunities for biodiversity enhancement on our owned assets.	08NW104008	Investigation to understand opportunities for biodiversity enhancement on our NW owned assets and landholdings. To include investigating baseline habitat condition, prioritising sites; reviewing current stewardship schemes; and identifying links to the wider landscape. Will require additional resourcing (1 FTE for one year).
Essex and Suffolk	7 Investigation to establish the current biodiversity value of the Hall Farm Meadow site and confirm why there has been a decline in wetland species. Identify how best to manage the site for biodiversity going forwards via an options appraisal.	08ES100009	Investigation to establish the current biodiversity value of the Hall Farm Meadow site and confirm why there have been decline in conservation interest and how best to manage the site for biodiversity going forwards.

3.1.3 European Sites

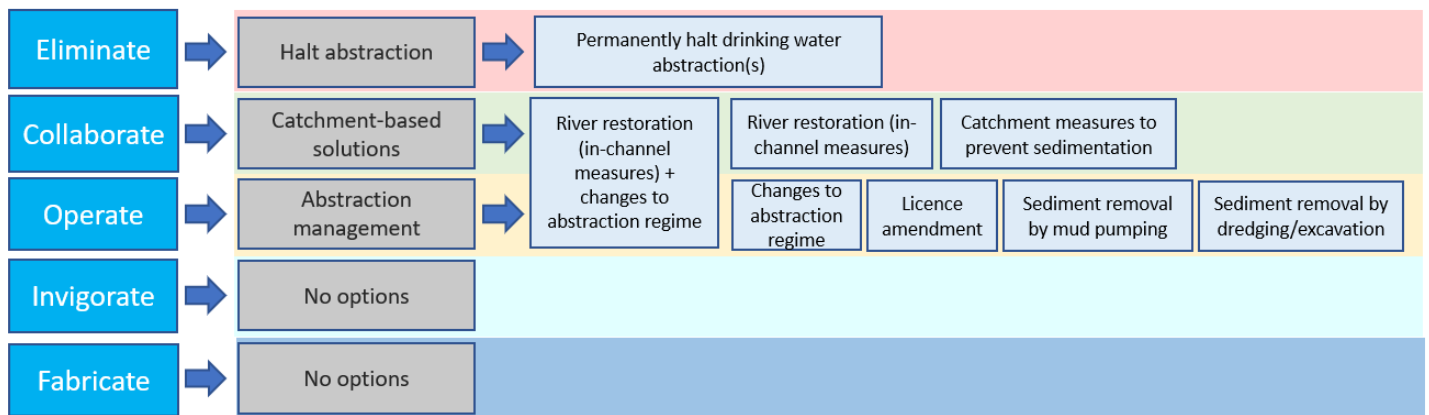
HD_IMP Needs

The unconstrained long list of options to address the HD_IMP need relating to Trinity Broads sedimentation (08ES100020 in Section 2.6.3) was identified during PR24 following the WINEP Options Development Guidance. This involved incorporating learnings mainly from our AMP7 work (Section 2.2.3). It also included learnings from previous efforts to remove sediment and maintain water levels at the site, which was gathered through discussions between our Conservation Team and the EA. Our list of unconstrained options to address the HD_IMP need relating to Trinity Broads sedimentation is demonstrated in Figure 4 alongside our Totex Hierarchy categories, to demonstrate a broad range of options considered.

For our second HD_IMP need relating to the impact of our abstractions on the Broads SAC (08ES100019), the identification of suitable options will be dependent on the outcomes of our options appraisal under HD_INV during AMP8 (08ES100018), which is dependent on the EA confirming hydraulic connectivity between our abstractions and the Broads SAC, as outlined in Section 2.6.3. The EA’s investigation is expected to be completed in 2024. Until the outcomes of the EA investigation are published there remains significant uncertainty about the nature and scale of the options, however, as we need to prepare for AMP8, we have suggested some possible options that could be suitable to address the need.

While we and the EA accept that the most likely outcome of their investigation will be a requirement to appraise options for reducing abstraction at the affected sites (which is covered by our HD_INV need 08ES100018), for the purpose of defining options and costs for AMP8 we have suggested options that would potentially be deliverable within the EA’s stated AMP8 timeframe. These options focus on a variety of river restoration options. These are presented alongside the unconstrained options for the other HD_IMP need in Figure 4 alongside our Totex Hierarchy categories.

FIGURE 4: THE UNCONSTRAINED LONG LIST OF OPTIONS IDENTIFIED TO ADDRESS THE EUROPEAN SITES IMPLEMENTATION NEEDS, AND THEIR ALIGNMENT TO THE TOTEX HIERACHY CATEGORIES



Our unconstrained options consider solutions with differing levels of costs and benefits categorised as follows:

- **Eliminate** - identification of measures that remove the need. In this case, this would mean permanently halting our abstractions. This is relevant to both HD_IMP needs.
- **Collaborate** - work with stakeholders to address the need including co-funding. Costs can be shared with third parties either to deliver the same or an additional level of social and environmental benefit. There is scope to collaborate with environmental groups and land managers to carried out riparian or in-river habitat enhancements to address the Broads SAC need (08ES100019), and scope for catchment measures to prevent sedimentation and address the Trinity Broads need (08ES100020).
- **Operate** – this would cover improved operational management practices. Operational solutions at Trinity Broads would include sediment removal, which can be achieved by mud pumping. For the Broads SAC, this would include changing the abstraction regime at the nine abstraction points or changing their licences.
- **Invigorate** - invest in the existing infrastructure to improve performance. These options will provide an increased level of benefit but may be of a lower cost than fabricate options. In this case, invigorating existing infrastructure will not help to address the HD_IMP Needs.
- **Fabricate** - new assets to augment or replace existing. These options are likely to have the highest costs. In this case, new infrastructure will not help to address the HD_IMP Needs.

HD_INV Needs

Options to address our three HD_INV needs (Section 2.6.3) were identified during PR24 planning following the WINEP Options Development Guidance. As these needs require investigations, and therefore have one distinct solution, they were not subject to further optioneering. A summary of the solutions against each HD_INV need is included in Table 18.

TABLE 18: THE OPTIONS TO ADDRESS THE EUROPEAN SITES INVESTIGATION (HD_INV) NEEDS

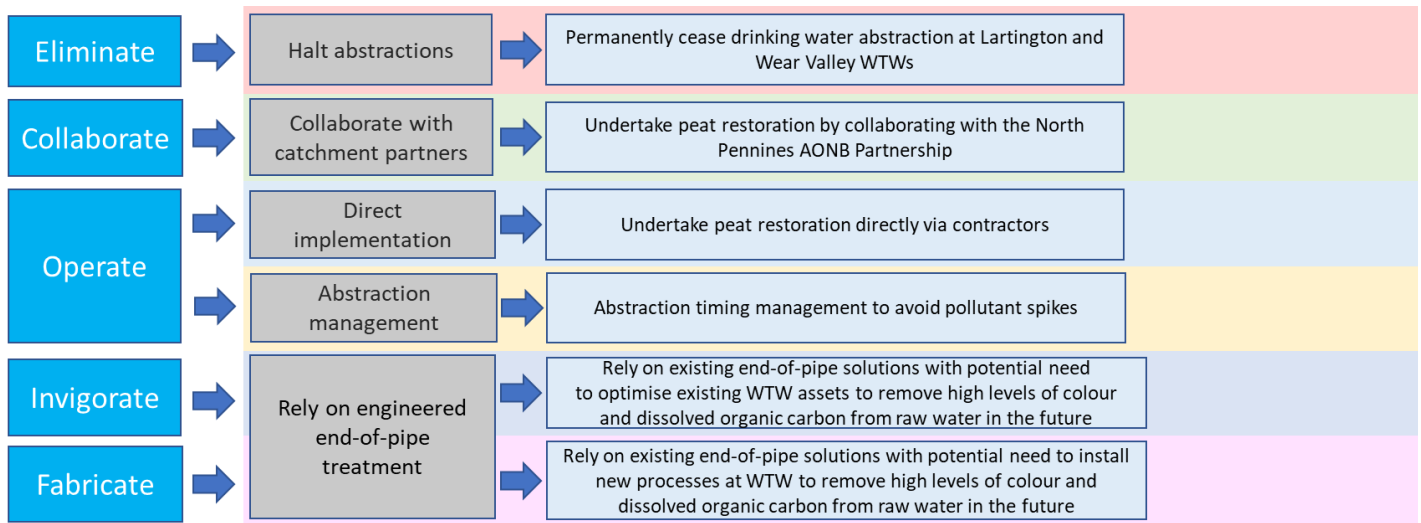
	Need	WINEP Action ID	Option (type of investigation)
Essex and Suffolk	1 If the EA confirm hydraulic connectivity between our drinking water abstractions and the Broad SAC, we will need to understand the nature of the impacts of our abstractions, if any, on the SAC and appraise potential solutions to mitigate the impacts.	08ES100018	Carry out an options appraisal following the Environment Agency led investigation on The Broads SAC
	2 Assess options for verifying consultant / volunteer wetland bird counts at Abberton Reservoir to understand real changes in bird populations.	08ES100010	Investigation into options for verifying consultant/volunteer wetland bird (WeBS) counts (fieldwork gathered data) to give greater confidence in data and allow for volunteers to be used in future in place of consultants.
	3 Investigate the source of sediment and water quality issues (nitrate and phosphorus) in the Trinity Broads that is influencing the deterioration of water clarity at Lily Broad.	08ES100012	Investigation into source of water clarity deterioration at Lily Broad, and water quality deterioration across the Trinity Broads (N, P & sediment). Carry out catchment characterisation (land use and pathway assessment) to understand potential sources and pathways for contamination. Identify and appraise mitigation options for potential delivery in AMP9.

3.1.4 Sites of Special Scientific Interest

SSSI_IMP Need

We identified our list of unconstrained options to address our SSSI_IMP need (08NW104010 from Section 2.2.4) during PR24 following the WINEP Options Development Guidance. This included incorporating learnings from our AMP7 work and was in consultation with stakeholders where appropriate. In particular, we took learnings from our programme of peat restoration with the North Pennines AONB that continued during AMP7 (as summarised in Section 2.2.5). Our list of unconstrained options to address our SSSI_IMP need is demonstrated in Figure 5 alongside our Totex Hierarchy categories, to demonstrate a broad range of options considered.

FIGURE 5: THE UNCONSTRAINED LONG LIST OF OPTIONS IDENTIFIED TO ADDRESS THE SITES OF SPECIAL SCIENTIFIC INTEREST IMPLEMENTATION NEED, AND THEIR ALIGNMENT TO THE TOTEX HIERACHY CATEGORIES



Our unconstrained options consider solutions with differing levels of costs and benefits categorised as follows:

- **Eliminate** – identification of measures that remove the need. Eliminating the need would mean permanently halting abstractions in the upper Tees and upper Wear.
- **Collaborate** – work with stakeholders to address the need including co-funding. There is significant scope to carry out peat restoration in collaboration with others, building on our AMP7 collaborative work programme and existing partnerships with the North Pennines AONB and other stakeholders.
- **Operate** – this would cover improved operational management practices. Operational solutions include undertaking peat restoration directly, and not collaboratively with others, and changing the abstraction regime at the water treatment works (WTW) to avoid pollutant spikes caused by peat degradation impacting the quality of runoff.
- **Invigorate** – investing in the existing infrastructure to improve performance. This would involve optimising existing assets at our WTW in the future to improve treatment performance, specifically the removal of organic matter and colour caused by peat degradation impacting the quality of runoff. This would safeguard our use of this drinking water supply as the quality continues to deteriorate in the future as peat continues to degrade.
- **Fabricate** – new assets to augment or replace existing. This would involve relying on constructing new treatment assets in the future to safeguard treatment performance, specifically the removal of organic matter and colour caused by peat degradation impacting the quality of runoff. This would safeguard our use of this drinking water supply as the quality continues to deteriorate in the future as peat continues to degrade.

SSSI_INV Need

Options to address our SSSI_INV need (Section 2.6.4) were identified during PR24 planning following the WINEP Options Development Guidance. As these needs require investigations, and therefore have one distinct solution, they were not subject to further optioneering. A summary of the solutions against each SSSI_INV need is included in Table 19.

TABLE 19: THE OPTION TO ADDRESS THE SSSI INVESTIGATION (SSSI_INV) NEED

	Need	WINEP Action ID	Option (type of investigation)
Essex and Suffolk	2 Understand risks to SSSI condition posed by recreational activities on the Trinity Broads. Ascertain appropriate recreation levels and management strategies to avoid deterioration.	08ES100011	Investigation into the impacts of current and potential new recreational uses of the Trinity Broads on water quality, ecology and INNS risk. Assess current levels of recreation - who uses and/or has the right to use the site and how. Identification of the appropriate level of recreation that should be allowed to protect the SSSI and SAC, in terms of both water quality and avoiding the risk of introduction and spread of INNS, and how this can be managed and enforced

3.1.5 Invasive Non-Native Species

INNS_MON and INNS_ND Needs

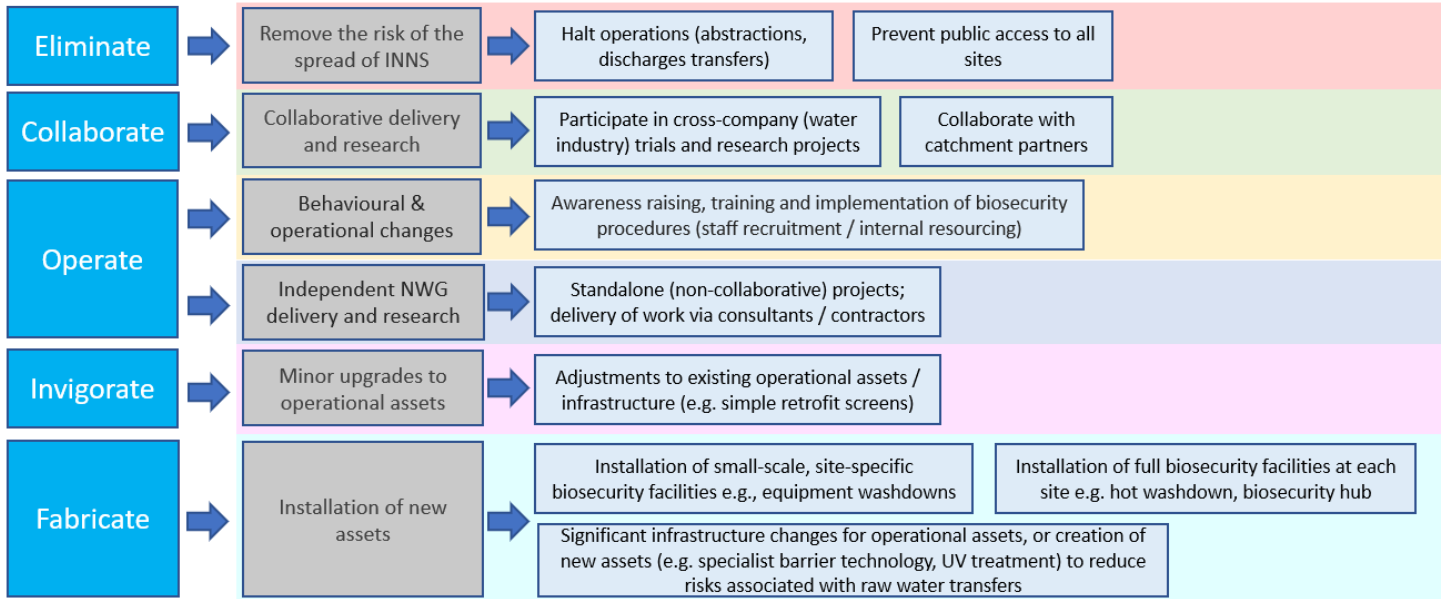
We identified our list of unconstrained options to address our two INNS_MON and six INNS_ND needs (Section 2.6.5) during PR24 following the WINEP Options Development Guidance.

Options to address our two INNS_MON needs (08MU100399 and 08MU100301), to provide INNS early warning techniques in each region, were identified through discussions with the EA and other water companies via water industry wide working groups including the INNS Steering Group. The EA expects water companies to work together through the Aquatic Biosecurity Partnership to develop these.

Options to address the six INNS_ND needs were identified primarily through considering learnings from PR19 investigations (as outlined in Section 2.2.5), other AMP7 work, as well as through consultation with stakeholders where appropriate. For example, our progress during AMP7 (Section 2.2.5) included development of our company-wide INNS Strategy and Pathway Action Plans which have informed how we can embed biosecurity considerations into our operations including the number and type of biosecurity facilities required at our higher risk sites (08NW104004 and 08ES100005). Our AMP7 progress also included the launch of our Branch Out INNS Grant Scheme learnings from which have informed the scale and scope of funding required in AMP8 for INNS control in our catchments (08NW104003 and 08ES100004), particularly the need for extensive, catchment-scale and long-term efforts to achieve real and long-lasting control.

Our list of unconstrained options to address our two INNS_MON and six INNS_ND needs is demonstrated in Figure 6 alongside our Totex Hierarchy categories, to demonstrate a broad range of options considered.

FIGURE 6: THE UNCONSTRAINED LONG LIST OF OPTIONS IDENTIFIED TO ADDRESS THE SITES OF SPECIAL SCIENTIFIC INTEREST MONITORING (INNS_MON) AND NO DETERIORATION (INNS_ND) NEEDS, AND THEIR ALIGNMENT TO THE TOTEX HIERARCHY CATEGORIES



Our broad range of options considers options with differing levels of costs and benefits categorised as follows:

- **Eliminate** - identification of measures that remove the need. Eliminate options are likely to have the lowest costs to deliver the benefit. In this case, eliminating the needs would mean halting our operations and/or preventing public access to our sites.
- **Collaborate** - work with stakeholders to address the need including co-funding. Costs can be shared with third parties either to deliver the same or an additional level of social and environmental benefit. In this case, there is scope to collaborate with environmental groups and make use of volunteers to carry out INNS control within the catchments in which we operate.
- **Operate** – this includes amending operational management practices to address a need. For the INNS driver, operational solutions include awareness raising and training to encourage operational (behavioural) change to address the needs (08NW104002 and 08ES100003), or developing/delivering inhouse projects to address the needs rather than collaborating with stakeholders.
- **Invigorate** - invest in the existing infrastructure to improve performance. These options can provide an increased level of benefit compared to operate options and can be of a lower cost than fabricate options. In this case, this could include adjustments to existing infrastructure such as simple screens.
- **Fabricate** - new assets to deliver against the need. These options are likely to have the highest costs. In this case, this covers installation of biosecurity facilities and equipment (relatively small scale) but also more significant amendments to infrastructure (particularly for raw water transfers) to reduce the risk of the spread of INNS.

INNS_INV Needs

Options to address our 4 INNS_INV need (Section 2.6.5) were identified during PR24 planning following the WINEP Options Development Guidance. Options to address two INNS_INV needs to reduce the spread of *Crassula helmsii* at Derwent Reservoir (08NW104000) and of signal crayfish from Scaling Dam (08NW104001) were identified by discussions between our Conservation Teams and consultants. Options to address two INNS_INV needs to identify and assess biosecurity measures (08MU100400 and 08MU100300), were identified through discussions with the EA and other water companies via water industry wide working groups including the INNS Steering Group. As our INNS_INV needs require investigations, and therefore have one distinct solution, they were not subject to further optioneering. A summary of the solutions against each INNS_INV need is included in Table 20.

TABLE 20: THE OPTIONS TO ADDRESS THE INVASIVE NON-NATIVE SPECIES INVESTIGATION (INNS_INV) NEEDS

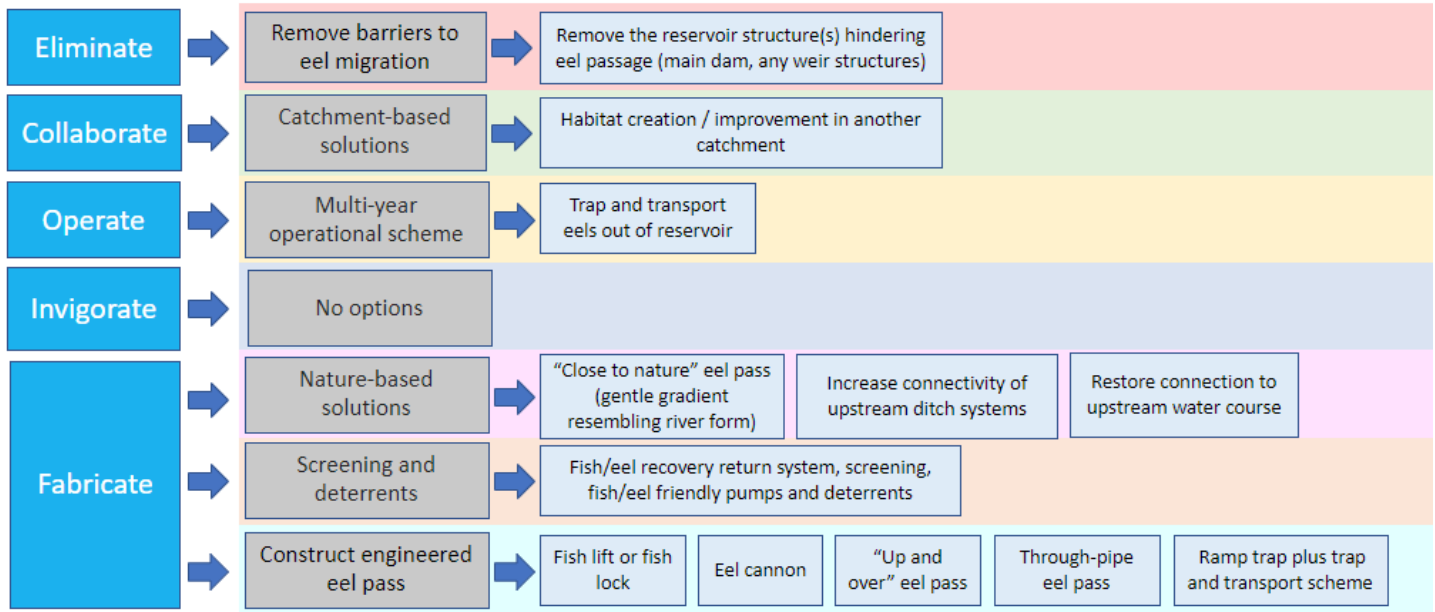
	Need	WINEP Action ID	Option (type of investigation)
Northumbrian	1 Identify feasible options for controlling the invasive water weed <i>Crassula helmsii</i> at Derwent Reservoir via biological or mechanical means.	08NW104000	Investigation into feasible options for the control of <i>Crassula helmsii</i> at Derwent Reservoir for potential delivery in AMP9.
	2 Identify feasible options to reduce the risk of the spread of signal crayfish from Scaling Dam.	08NW104001	Feasibility study on the removal of non-native signal crayfish from Scaling Dam and appraisal of options to prevent spread to Staithe Beck, for potential delivery in AMP9.
	3 Identify and assess biosecurity measures to reduce the risk of spread of aquatic INNS via RWT.	08MU100400	Contribution to cross company investigation into feasible biosecurity measures for Raw Water Transfers. This investigation will be commissioned nationally by the EA and UK Water INNS group, and will include trials of 5-6 interventions and production of guidance manual of mitigation techniques.
Essex and Suffolk	8 Identify and assess biosecurity measures to reduce the risk of spread of aquatic INNS via RWT.	08MU100300	Contribution to cross company investigation into feasible biosecurity measures for Raw Water Transfers. This investigation will be commissioned nationally by the EA and UK Water INNS group, and will include trials of 5-6 interventions and production of guidance manual of mitigation techniques.

3.1.6 Eels Regulations

We identified our list of unconstrained options to address our two EE_IMP needs (Section 2.6.6) identified following PR19 investigations at these sites (Section 2.2.6) and in line with AMP7 WINEP Options Development Guidance. In AMP7 we undertook an investigation and options appraisal into engineered solutions to enable the seaward migration of the eels currently resident in Abberton and Hanningfield reservoirs, which has provided our unconstrained long list of options for this driver. This involved reviewing the outcomes of relevant literature reviews and previous investigations at our sites and considered ways of enabling both ingress and egress at these reservoirs. Our drafted list of options was developed further during an initial consultation workshop involving representatives from our water resources, conservation, operations and

engineering teams, the EA and Natural England. Our list of unconstrained options to address our two EE_IMP needs is demonstrated in Figure 7 alongside our Totex Hierarchy categories, to demonstrate a broad range of options considered.

FIGURE 7: THE UNCONSTRAINED LONG LIST OF OPTIONS IDENTIFIED TO ADDRESS THE EELS REGULATIONS IMPLEMENTATION (EE_IMP) NEEDS, AND THEIR ALIGNMENT TO THE TOTEX HIERARCHY CATEGORIES



Our broad range of options considers options with differing levels of costs and benefits categorised as follows:

- **Eliminate** - identification of measures that remove the need. Eliminate options are likely to have the lowest costs to deliver the benefit. In this case, eliminating the needs would mean removing the main dam structure (and other barriers) at the reservoirs,
- **Collaborate** - work with stakeholders to re-assign the issue or co-fund. Costs can be shared with third parties either to deliver the same or an additional level of social and environmental benefit. Collaboration through catchment-based solutions are possible, including habitat creation/enhancement in another catchment (to improve eel outcomes overall) which could be carried out collaboratively with catchment partners.
- **Operate** – this would cover improved operational management practices to address the need. In this case, operational measures could include introducing an eel trap and transport scheme to move eels from the reservoirs.
- **Invigorate** - invest in the existing infrastructure to improve performance. These options will provide an increased level of benefit but may be of a lower cost than fabricate options. In this case, invigorating existing infrastructure will not help to address the EE_IMP needs.
- **Fabricate** - new assets to augment or replace existing. These options are likely to have the highest costs. We have considered a range of new green to grey infrastructure to address the needs. This includes nature-based solutions to improve connectivity to/within the upstream watercourses and/or a naturalised style eel pass, to a range of engineered

eel passes. Green options will have lower carbon and potentially higher biodiversity and amenity benefits. Traditional grey options are likely to have highest certainty that service-related benefits will be realised. Innovative options have the potential for greater benefits and lower costs but have the lower certainty that benefits will be realised.

3.2. PRIMARY SCREENING OF OPTIONS

Primary screening was completed for the needs with IMP or ND driver codes in accordance with the AMP8 WINEP Options Development Guidance²⁸. In some cases, options appraisal had already been carried out as part of PR19 investigations and this was reviewed to ensure the screening carried out aligned with the new guidance. Screening involved judging each option in the unconstrained (long) lists for each need shown in Section 3.1 against the following two criteria to ensure that each option is:

- technically feasible (to implement), and
- expected to meet the statutory obligation.

If an option does not meet these criteria, then it has been discarded. This screening process produced a constrained (short) list of options for each need. The outcomes of the primary screening of the options for each driver are outlined in the subsections that follow. Note that investigations are not subject to full optioneering, and solutions are outlined in Section 3.1.

Secondary screening of the remaining options was carried out to determine their costs and the benefits the option would deliver. This was completed to understand whether the options were obviously higher in cost, carbon or would deliver less benefit compared to other options. This process produced a feasible list of options for each need. Our assessment of benefits is included in Section 3.3.1 and our approach to costing is outlined in Section 4. These have then been used to inform the cost benefit appraisal to determine the preferred option in Section 3.3.2.

3.2.1 Drinking Water Protected Areas

The outcomes of primary screening of the unconstrained options to meet the two DrWPA_ND needs (as outlined in Section 3.1.1) are summarised in Table 21. This screening was carried out in 2022 following the AMP8 WINEP Options Development Guidance.

²⁸ WINEP Options Development Guidance - Section 7, Environment Agency, July 2022

TABLE 21: THE OUTCOMES OF THE PRIMARY SCREENING PROCESS FOR OUR DRWPA_ND NEEDS

Totex Hierarchy Category	Option	Technically Feasible?	Meets Statutory Obligation?	Primary Screening Outcome	
Eliminate	1	Permanently stop abstraction at drinking water sources with water quality challenges or risks	No	No	Rejected: Not feasible as we have a regulatory obligation to supply drinking water to our customers. Will not address raw water deterioration impacts.
	2	Farmer engagement: advice and awareness raising only	Yes	No	Rejected: Without funding, changes to agricultural practices are likely to be limited, therefore this option is unlikely to reduce risks to drinking water quality and enable us to meet our obligations.
Collaborate	3	Farmer engagement and funding to take land out of cultivation	Yes	Yes	Carried forward
	4	Farmer engagement: advice and awareness raising plus grant funding for on-farm interventions	Yes	Yes	Carried forward
Operate	5	Abstraction timing management to avoid pollutant spikes	No	No	Rejected: Not possible to avoid all pollutant spikes, and for most sites it is not feasible to do this while maintaining a constant supply of drinking water
	6	Reply on existing end-of-pipe solutions with potential for increased operational / maintenance requirements in the future e.g. more frequent replenishment of GAC medium	Yes	No	Rejected: Does not meet need as will not prevent raw water deterioration. Might not always be feasible to address raw water challenges via engineered treatment (not all determinands are treatable). Does not contribute to wider environmental outcomes (WEO).
Invigorate	7	Rely on existing end-of-pipe solutions with potential need to upgrade existing treatment in the future	Yes	No	Rejected: Does not meet need as will not prevent raw water deterioration. Might not always be feasible to address raw water challenges via engineered treatment (not all determinands are treatable). Does not contribute to WEO.
Fabricate	8	Rely on existing end-of-pipe solutions with potential need to invest in additional treatment in the future / replace existing treatment at end of life	Yes	No	Rejected: Does not meet need as will not prevent raw water deterioration. Might not always be feasible to address raw water challenges via engineered treatment (not all determinands are treatable). Does not contribute to WEO.

Options that did not satisfy the two criteria were rejected through this primary screening processes and have been captured in a Rejection Register for future reference. Of the eight options in the unconstrained list, two are expected to address both criteria and are therefore carried through for secondary screening. The short-listed options to address each DrWPA_ND need are summarised in Table 22.

TABLE 22: THE SHORT LIST OF OPTIONS TO ADDRESS THE DRINKING WATER PROTECTED AREAS NO DETERIORATION (DRWPA_ND) NEEDS

	Need	WINEP Action ID	Totex Hierarchy Category	Option
Northumbrian	1	08NW104058	Collaborate	3 Farmer engagement and funding to take land out of cultivation
				4 Farmer engagement: advice and awareness raising plus grant funding for on-farm interventions
Essex and Suffolk	9	08ES100206	Collaborate	3 Farmer engagement and funding to take land out of cultivation
				4 Farmer engagement: advice and awareness raising plus grant funding for on-farm interventions

3.2.2 Biodiversity

The outcomes of the primary screening of the unconstrained options to meet the NERC_IMP needs (as outlined in Section 3.1.2) are summarised in Table 23. This screening was carried out in 2022 following the AMP8 WINEP Options Development Guidance.

TABLE 23: THE OUTCOMES OF THE PRIMARY SCREENING PROCESS FOR OUR BIODIVERSITY IMPLEMENTATION NEEDS (NERC_IMP)

Totex Hierarchy Category	Option	Technically Feasible?	Meets Statutory Obligation?	Primary Screening Outcome
Eliminate	1 Remove structures restricting river / tidal connectivity	Yes	Yes	Carried forward
Collaborate	2 Work with stakeholders to deliver biodiversity improvements	Yes	Yes	Carried forward
Operate	3 Grassland management on operational sites (techniques from AMP7 trials)	Yes	Yes	Carried forward
	4 Grassland management on operational sites (alternative techniques)	Yes	Part	Rejected: uncertainty around meeting statutory objectives
	5 Continue to use and update current biodiversity data management spreadsheet	Yes	Part	Rejected: uncertainty around meeting statutory objectives

Totex Hierarchy Category	Option	Technically Feasible?	Meets Statutory Obligation?	Primary Screening Outcome
Invigorate	6 Modify structure to improve river / tidal connectivity	Yes	Yes	Carried forward
	7 In-river / riparian habitat creation and enhancements	Yes	Yes	Carried forward
Fabricate	8 Direct resourcing for habitat enhancement via staff/contractors	Yes	Yes	Carried forward
	9 Create and implement a system / database to store and manage environmental and biodiversity data	Yes	Yes	Carried forward

Options that did not satisfy the two criteria were rejected through this primary screening processes and have been captured in a Rejection Register for future reference. Of the nine options in the unconstrained list, seven are expected to address both criteria and are therefore carried through for secondary screening. The short-listed options for each NERC_IMP need are as summarised in Table 24.

TABLE 24: THE SHORT LIST OF OPTIONS TO ADDRESS OUR BIODIVERSITY IMPLEMENTATION (NERC_IMP) NEEDS

Need	WINEP Action ID	Totex Hierarchy Category	Option
Northumbrian	08NW104006	Collaborate	2 Work with stakeholders to deliver biodiversity improvements
		Fabricate	7 In-river / riparian habitat creation and enhancements
	08NW104005	Collaborate	2 Work with stakeholders to deliver biodiversity improvements
		Fabricate	8 Direct resourcing for habitat enhancement and creation via staff/ contractors
4 Enhance and increase the area of habitats (including feeding sites) for swifts, swallows and martin populations.	08MU100398	Collaborate	2 Work with stakeholders to deliver biodiversity improvements
		Fabricate	8 Direct resourcing for habitat enhancement and creation via staff/contractors

Northumbrian	5	Remove or minimise the detrimental impacts on fish passage and ecology caused by the Coquet semi-tidal weir.	08NW104011	Eliminate	1	Remove structures restricting river / tidal connectivity
				Invigorate	6	Modify structure to improve river / tidal connectivity
Essex and Suffolk	6	We need one electronic system to store and manage environmental and biodiversity data to enable a clear view of changes and improvements required	08ES100007	Fabricate	9	Create and implement a system / database to store and manage environmental and biodiversity data
	7	Improve condition of our grassland sites and landholdings to achieve biodiversity and carbon benefits.	08ES100006	Operated	3	Grassland management on operational sites (techniques from AMP7 trials)
	8	Improve habitat condition and extent at a landscape scale to increase connectivity and better support biodiversity across our ESW operating area including catchments.	08ES100008	Collaborate	2	Work with stakeholders to deliver biodiversity improvements
				Fabricate	8	Direct resourcing for habitat enhancement and creation via staff/ contractors
	9	Enhance and increase the area of habitats (including feeding sites) for swifts, swallows and martin populations	08MU100302	Collaborate	2	Work with stakeholders to deliver biodiversity improvements
				Fabricate	8	Direct resourcing for habitat enhancement and creation via staff/ contractors
10	Mitigate impacts identified through the investigation (08ES100009) on Hall Farm Meadow site and improve condition of the site to better support biodiversity.	08ES100013	Collaborate	2	Work with catchment partners to deliver restoration measures	
11	Improve aquatic and riparian habitat conditions in the lower Roman River, to improve ecological function and enhance biodiversity.	08ES100111	Fabricate	9	Direct resourcing for habitat enhancement and creation via staff/contractors	
					In-river / riparian habitat enhancements	

3.2.3 European Sites

The outcomes of the primary screening of the unconstrained options to meet the HD_IMP needs (as outlined in Section 3.1.3) are summarised in Table 25. This screening was carried out in 2022 following the AMP8 WINEP Options Development Guidance, although note that the screening for the need relating to the impact of abstractions on the Broads SAC (08ES100019) is provisional only as this is subject to the finding of the EA investigation and our planned options appraisal for AMP8 (08ES100018).

TABLE 25: THE OUTCOMES OF THE PRIMARY SCREENING PROCESS FOR EUROPEAN SITES NEEDS

Totex Hierarchy Category	Option	Technically Feasible?	Meets Statutory Obligation?	Primary Screening Outcome
Eliminate	1 Permanently halt drinking water abstraction(s)	No	Yes	Rejected: not feasible as abstractions used for drinking water supply water. Substantial reductions in abstraction at any of the identified nine licences within AMP8 would likely cause an immediate supply demand deficit.
	2 River restoration (in-channel measures)	Yes	Yes	Carried forward ²⁹
Collaborate	3 Catchment measures to prevent sedimentation	No	No	Rejected: no guarantee of success and expected to take a long time to implement which risks meeting statutory obligations in AMP8
Collaborate/ Operate	4 River restoration (in-channel measures) + changes to abstraction regime	Yes	Yes	Carried forward ¹¹
	5 Changes to abstraction regime	Yes	Yes	Carried forward ¹¹
Operate	6 Licence amendment	No	No	Rejected: not expected to be a feasible and due to risks to supply and ecological designations.
	7 Sediment removal by mud pumping	Yes	Yes	Carried forward
	8 Sediment removal by dredging/excavation	Yes	Yes	Carried forward

If the outcome of the EA’s investigation suggests that significant sustainability reductions are required, given our tight supply demand balance position in our Northern Central Water Resource Zone (WRZ), there is significant uncertainty about the extent of any sustainability reductions that we would be able to deliver by the target date of March 2030. The affected licences comprise seven groundwater abstraction licences within the Bure and Waveney catchments and our major surface water abstractions on the River Bure, Ormesby Broad and the River Waveney. They represent the bulk of the water available within our Northern Central WRZ. Initial conversations with EA staff have indicated that potential options might include abstraction reductions on individual licences of between 60% and 100% by March 2030. We would be unable to accommodate reductions on this scale as we do not have, and will not be able to develop, an alternative means of supplying affected customers within this timeframe. It is likely that we would have to apply for derogations under article 6(4) of the Habitats Directive.

Options that did not satisfy the two criteria were rejected through this primary screening processes and have been captured in a Rejection Register for future reference. Of the eight options in the unconstrained list, five are expected to satisfy both

²⁹ Suggested options as subject to findings of the EA investigation and our options appraisal planned for AMP8 (08ES100018).

³⁰ The potential sustainability reductions under the Habitats Directive are in addition to the ‘No deterioration’ licence reductions also required on the same groundwater licences by March 2030 under the WFD, which are covered under the AMP8 WINEP WFD_ND_WRF low driver and the amendments to the Hands off flow conditions on our Waveney surface water licence under the WFD_IMP_WRF flow driver, which is an outcome of our AMP7 WINEP investigation.

criteria and are therefore carried through for secondary screening. The short listed options for each WFD_IMP_WRFflow need are summarised in Table 26.

TABLE 26: THE SHORT LIST OF OPTIONS TO ADDRESS THE EUROPEAN SITES IMPLEMENTATION NEEDS (HD_IMP)

Driver	Need	WINEP Action ID	Totex Hierarchy Category	Option
Essex and Suffolk	Following confirmation from the EA whether nine of our drinking water abstractions are hydraulically connected to, and negatively impacting on, the Broads SAC, we will need to mitigate the impacts as recommended by our AMP8 investigation above (08ES100018).	08ES100019	Collaborate	2 River restoration (in-channel/riparian measures)
			Collaborate	4 River restoration (in-channel/riparian measures) and changes to abstraction regime
			Operate	5 Changes to abstraction regime
	2	Take action to ensure water depths in the Trinity Broads meet the obligations of licence condition.	08ES100020	Operate

3.2.4 Sites of Special Scientific Interest

The outcomes of the primary screening of the unconstrained options to meet the SSSI_IMP need (as outlined in Section 3.1.4) are summarised in Table 27. This screening was carried out in 2022 following the AMP8 WINEP Options Development Guidance.

TABLE 27: THE OUTCOMES OF THE PRIMARY SCREENING PROCESS FOR THE SSSI_IMP NEED

Totex Hierarchy Category	Option	Technically Feasible?	Meets Statutory Obligation?	Primary Screening Outcome
Eliminate	1 Permanently cease drinking water abstraction at Lartington and Wear Valley WTWs	No	No	Rejected: Not feasible as we have a regulatory obligation to supply drinking water to its customers and these are critical sources
Collaborate	2 Carry out peat restoration via a collaboration with the North Pennines AONB Partnership	Yes	Yes	Carried forward
	3 Carry out peat restoration directly via contractors	Yes	Yes	Carried forward
Operate	4 Abstraction timing management to avoid pollutant spikes	No	No	Rejected: This will not directly address the need and therefore not prevent raw water deterioration. Not possible to avoid all pollutant spikes, and it is not feasible to do this while maintaining a constant supply of drinking water.

Totex Hierarchy Category	Option	Technically Feasible?	Meets Statutory Obligation?	Primary Screening Outcome
Invigorate	5 Rely on existing end-of-pipe solutions with potential need to optimise existing WTW assets to remove high levels of colour and dissolved organic carbon from raw water in the future	No	No	Rejected: This will not directly address the need and therefore not prevent raw water deterioration. Would not contribute to WEO. May not be possible to sufficiently reduce organic carbon / colour levels via treatment.
Fabricate	6 Rely on existing end-of-pipe solutions with potential need to install new processes at WTW to remove high levels of colour and dissolved organic carbon from raw water in the future	No	No	Rejected: This will not directly address the need and therefore not prevent raw water deterioration. Would not contribute to WEO. May not be possible to sufficiently reduce organic carbon / colour levels.

Options that did not satisfy the two criteria were rejected through this primary screening processes and have been captured in a Rejection Register for future reference. Of the six options in the unconstrained list, two are expected to address both criteria and are therefore carried through for secondary screening. The short listed options for SSSI_IMP need is summarised in Table 28.

TABLE 28: THE SHORT LIST OF OPTIONS TO ADDRESS SSSI IMPLEMENTATION NEED (SSSI_IMP)

Driver	Need	WINEP Action ID	Totex Hierarchy Category	Option
Northumbrian	Halt or reverse peatland degradation in the Upper Tees and Wear drinking water catchments and reduce challenge to drinking water treatment from colour and organic carbon.	08NW104010	Collaborate	2 Carry out peat restoration via a collaboration with the North Pennines AONB Partnership
			Operate	3 Carry out peat restoration directly via contractors

3.2.5 Invasive Non-Native Species

The outcomes of the primary screening of the unconstrained options to meet the INNS needs (as outlined in Section 3.1.5) are outlined in Table 29. This screening was carried out in 2022 following the AMP8 WINEP Options Development Guidance although initial options appraisal for some of the needs was carried out during AMP6 and AMP7 investigations and other work, specifically development of the company wide INNS strategy³¹ and Pathway Action Plans³².

³¹ Northumbrian Water Group’s Invasive Non-Native Species Strategy, 2020

³² Northumbrian Water Group’s Invasive Non-Native Species Pathway Action Plans, 2022

TABLE 29: THE OUTCOMES OF THE PRIMARY SCREENING PROCESS FOR THE INVASIVE NON-NATIVE SPECIES NEEDS

Totex Hierarchy Category	Option	Technically Feasible?	Meets Statutory Obligation?	Primary Screening Outcome
Eliminate	1 Halt operations (abstractions, discharges transfers)	No	Yes	Rejected: Not feasible to halt operations as NWG have a duty to supply water to customers
	2 Prevent public access to all sites	No	Yes	Rejected: Water companies have a duty to provide appropriate public access and leisure facilities. Restricting public access will not reduce risk associated with operational activities at NWG sites.
Collaborate	3 Participate in cross-company (water industry) trials and research projects	Yes	Yes	Carried forward
	4 Collaborate with catchment partners	Yes	Yes	Carried forward
Operate	5 Awareness raising, training and implementation of biosecurity procedures (staff recruitment / internal resourcing)	Yes	Yes	Carried forward
	6 Standalone (non-collaborative) projects; delivery of work via consultants / contractors	Yes	Yes	Carried forward
Invigorate	7 Adjustments to existing operational assets / infrastructure (e.g. simple retrofit screens)	Yes	No	Rejected: Unlikely to fully address any of the needs. Across the water industry, there is a gap in our understanding of the most appropriate and effective biosecurity measures for raw water transfers
Fabricate	8 Installation of small-scale, site-specific biosecurity facilities e.g., equipment washdowns	Yes	Yes	Carried forward
	9 Installation of full biosecurity facilities at each site e.g. hot washdown, biosecurity hub	Yes	Yes	Carried forward
	10 Significant infrastructure changes for operational assets, or creation of new assets (e.g. specialist barrier technology, UV treatment) to reduce risks associated with raw water transfers	No	No	Rejected: Across the water industry, the technical feasibility and effectiveness of raw water transfer biosecurity measures (particularly new technologies and significant infrastructure changes), has not been fully assessed.

Options that did not satisfy the two criteria were rejected through this primary screening processes and have been captured in a Rejection Register for future reference. Of the ten options in the unconstrained list, six are expected to address both criteria and are therefore carried through for secondary screening. The short-listed options for each INNS need are summarised in Table 30.

TABLE 30: THE SHORT LIST OF OPTIONS TO ADDRESS THE INVASIVE NON-NATIVE SPECIES MON AND ND NEEDS

	Need	WINEP Action ID	Totex Hierarchy Category	Option
INNS_MON				
Northumbrian	1	08MU100399	Collaborate	3
	2	08MU100301		
Essex and Suffolk	2	08MU100301		Participate in cross-company (water industry) trials and research projects. ³³
INNS_ND				
Northumbrian	3	08NW104002	Collaborate	4
			Operate	6
	4	08NW104003	Operate	5
			Operate	6
	5	08NW104004	Fabricate	8
			Fabricate	9
Essex and Suffolk	6	08ES100003	Collaborate	4
			Operate	6

³³ The EA expects water companies to work together through the Aquatic Biosecurity Partnership to develop these techniques.

Essex and Suffolk	7	Reduce INNS presence in our catchments in the Essex and Suffolk region to reduce the impact on our assets and the wider environment.	08ES100004	Operate	5	Collaborate with catchment partners
				Operate	6	Standalone (non-collaborative) projects; delivery of work via consultants / contractors
	8	Implement measures identified via the Pathway Action Plans (work started in AMP7) to reduce the risk of spread of INNS to/from our Essex and Suffolk water bodies used for recreation (considered high risk).	08ES100005	Fabricate	8	Installation of small-scale biosecurity facilities e.g., equipment washdowns
				Fabricate	9	Installation of full biosecurity facilities at each site e.g. hot washdown, biosecurity hub

3.2.6 Eels Regulations

The outcomes of the primary screening of the unconstrained options to meet the EE_IMP needs (as outlined in Section 3.1.6) are summarised in Table 31. This screening was carried out in 2021/22 as part of two PR19 investigations (one for each of the two sites³⁴), i.e., before the AMP8 WINEP Options Development guidance was released, but following a similar process using similar criteria.

TABLE 31: THE OUTCOMES OF THE PRIMARY SCREENING PROCESS FOR EELS REGULATIONS AT ABBERTON AND HANNINGFIELD RESERVOIRS

Totex Hierarchy Category	Option	Technically Feasible?	Meets Statutory Obligation?	Primary Screening Outcome
Eliminate	1 Remove the reservoir structure(s) hindering eel passage (main dam, any weir structures)	No	Yes	Rejected - Abberton and Hanningfield Reservoirs store raw water from drinking water supply, and we cannot maintain supply if we lose storage from these reservoirs.
Collaborate	2 Habitat creation / improvement in another catchment	Yes	No	Rejected - Unlikely that this mitigation could provide a benefit comparable to the size of suitable eel habitat lost.
Operate	3 Trap and transport eels out of reservoir	Yes	Yes	Carried forward
Fabricate	4 "Close to nature" eel pass (gentle gradient resembling river form)	Yes	Yes	Carried forward.
	5 Increase connectivity of upstream ditch systems	No	No	Rejected - An abstract option unlikely to be suitable or feasible for the reservoirs in question
	6 Restore connection to upstream water course	Yes	No	Rejected - This solution does not facilitate the seaward escapement of silver eel nor enhance recruitment of juvenile eel. Until these initial issues are addressed, it is not recommended to restore connectivity to upstream water courses

³⁴ Abberton Reservoir Eel Literature Review & Options Appraisal, Stantec, 2022
 Hanningfield Reservoir Eel Literature Review & Options Appraisal, Stantec, 2022

Totex Hierarchy Category	Option	Technically Feasible?	Meets Statutory Obligation?	Primary Screening Outcome
	7 Fish/eel recovery return system, screening, fish/eel friendly pumps and deterrents	Yes	No	Rejected - Installation of these measures would not restore connectivity to downstream or improve migration of silver eel and therefore does not meet need.
	8 Fish lift or fish lock	No	No	Rejected - Not feasible due to constraints about navigation of the roadway. Considerable levels of engineering, costs and maintenance required.
	9 Eel cannon	No	No	Rejected - A temporary measure only; not completely suitable for use at either reservoir. Suitability for upstream elver migration is unlikely.
	10 "Up and over" eel pass	Yes	Yes	Carried forward.
	11 Through-pipe eel pass	No	No	Rejected – not feasible as would incur reduced water storage resilience and likely require draw-off stoppages
	12 Ramp trap plus trap and transport scheme	Yes	Yes	Carried forward.

Options that did not satisfy the two criteria were rejected through this primary screening processes and have been captured in a Rejection Register for future reference. Of the 12 options in the unconstrained list, four are expected to address both criteria and are therefore carried through for secondary screening. The short-listed options for each EE_IMP need are summarised in Table 32.

TABLE 32: THE SHORT LIST OF OPTIONS TO ADDRESS EELS REGULATIONS IMPLEMENTATION NEEDS

Need	WINEP Action ID	Totex Hierarchy Category	Option
Essex and Suffolk	1 Improve eel escapement from Abberton Reservoir to contribute to silver eel escapement targets.	Operate	3 Trap and transport eels out of reservoir
			4 "Close to nature" eel pass (gentle gradient resembling river form)
		Fabricate	10 "Up and over" eel pass
			12 Ramp trap plus trap and transport scheme
	2 Improve eel escapement from Hanningfield Reservoir to contribute to silver eel escapement targets.	Operate	3 Trap and transport eels out of reservoir
			4 "Close to nature" eel pass (gentle gradient resembling river form)
		Fabricate	10 "Up and over" eel pass
			12 Ramp trap plus trap and transport scheme

3.3. BEST VALUE FOR CUSTOMERS

Has a robust cost–benefit appraisal been carried out to select the proposed option? There should be evidence that the proposed solution represents best value for customers, communities and the environment over the long term? Is third-party technical assurance of the analysis provided?

3.3.1 Benefits Scoring

For each option carried forward to this stage we have completed a benefits assessment using our Value Framework³⁵ which contains performance commitments, Wider Environmental Outcomes³⁶ and other metrics. We have incorporated the Wider Environmental Outcomes Metrics³⁷ into our Value Framework, which is embedded into our portfolio optimisation tool, Copperleaf, used to carry out appraisal of options. Table 33 shows the range of benefits, including their quantification and monetisation values, we have used for the assessment of Protected Areas and Biodiversity short-listed options (as included in Section 3.2). These include biodiversity, CRI Score, and other benefits. We believe our assessment of biodiversity benefit using the WEO approach is more informed and representative than our Biodiversity Value Measure currently available, so we have used this instead.

TABLE 33: RANGE OF BENEFITS IDENTIFIED FOR PROTECTED AREAS AND BIODIVERSITY-RELATED DRIVERS

Value measures	WEO measure	Description	Unit	Value	Link to WEO	Performance Commitment?
-	Biodiversity	Change in biodiversity units (BU)	BU	Not monetised	Natural Environment	No
Improved Water Environment	-	Length of water environment improved	Km	Not monetised	Natural environment, Catchment resilience	No
CRI Score	-	Reduction of instances of Drinking Water Inspectorate (DWI) noncompliance	Num	Not monetised	Natural environment, Catchment resilience	Yes
Embedded Emissions	-	tCO ₂ e /year	tCO ₂ e	£256.20 ³⁸	Net zero	No

Table 34 summarises the value measures we have used to measure benefit for the different options to address our Protected Areas and Biodiversity needs, and how these align with the Wider Environmental Outcomes. We have applied the listed value measures as far as possible across these options however subject to the extent of data available at this time. There are instances where we have not been able to apply them consistently. Some options were not able to be assessed due to the nature of the solution and the inherent data limitations to enable assessment, such as partnership working. For the benefits assessment, Table 34 shows that we first score the impact of continuing business as usual and then we score each

³⁵ Copperleaf Technologies Inc., 2002, Northumbrian Water Limited Value Framework Definition Document, v1.6.

³⁶ As per the WINEP Options Assessment Guidance March 2022

³⁷ WINEP Wider Environmental Outcome Metrics V2.1 issued 07.04.2022

³⁸ £ value per tonne of CO₂e in 2025/26, annual increase (varying rate) reaching £378.6/t CO₂e in 2054/55.

of the relevant options. Benefits are scored over time for a 30-year time horizon. This scoring considers the certainty of benefits being realised for different types of options.

Below we provide a summary of some of the benefits assessment outcomes for options against the different driver codes in this case:

- **DrWPA:** The two short-listed options to address the need to reduce contamination of our drinking water sources in each region (08NW104058 and 08ES100206) have been designed to deliver the same benefit of improved water quality by the end of the AMP through improving the same length of water environment (38.7km in NW and 92.3km in ESW). Therefore, despite having completed an assessment based on CRI Score and Improved Water Environment measures, we have not been able to distinguish between the options and expect both to deliver the same degree of benefit to the Wider Environmental Outcomes of Natural Environment and Catchment Resilience. Differentiation between the options will be achieved through reviewing their costs.
- **NERC:** We have assessed the benefit the preferred options for the following needs will deliver through using the Biodiversity and Improved Water Environment measures (Table 33): 08NW104006, 08NW104007 and 08ES100006. Our assessment of biodiversity benefits has highlighted that the option to 'remove structures restricting river / tidal connectivity' will deliver greater benefit in terms of habitat improvement (34 BU equivalent to a 31% improvement) when addressing our need to reduce ecological impacts caused by Coquet semi-tidal weir (08NW104011) compared to 'modifying the structure to improve river / tidal connectivity' (3.5 BU equivalent to 16% improvement).
- **HD:** As we are waiting for confirmation from the EA whether up to 9 of our drinking water abstractions are impacting the Broads SAC (08ES100019), we have not been able to scope our 3 short-listed options enough to complete a benefits assessment at this point. If we do get confirmation, we will be able to refine the scopes and expect to utilise our Improved Water Environment measure, at least, to assess the benefit and differentiate between the options.
- **SSSI:** We have not been able to distinguish between our two options to halt or reverse peatland degradation in the Upper Tees and Wear drinking water catchments (08NW104010) through assessing biodiversity. This is because we intend to address the same size area over the AMP and deliver the same degree of biodiversity benefit in terms of habitat improvement (27.7 BU equivalent to 8% improvement), it just depends on whether we do this alongside the North Pennines AONB Partnership or outsource the work to contractors. Unfortunately, we have not been able to measure the carbon benefit due to limitations with existing carbon models. However, we recognise these options will support a healthy and functioning peatland and provide carbon sequestration benefits critical to supporting our journey to Net Zero, which aligns with the Wider Environmental Outcome. Therefore, cost will be the differentiator between the two options.
- **INNS:** We have been able to assess benefits for options that require physical assets. Solutions that include collaboration or engagement do not have scopes detailed enough to allow us to assess benefit at this point. Once the scopes are better defined, we can assess benefit. For the solutions that include installation of biosecurity facilities (08ES100005 and 08NW104004), we have assessed embedded carbon emissions using the Embodied Emissions measure. This has highlighted that the option to 'install tailored site-specific biosecurity facilities' will result in significantly less embedded

carbon emissions compared to address the need to reduce the risk of spread of INNS in our regions. This reflects the use of fewer assets/materials to address the need compared to full installation everywhere.

- **EE:** There are four short-listed options to improve eel escapement from Abberton (08ES100001) and Hanningfield Reservoirs (08ES100002). Due to limitations in project scope, we have only been able to estimate carbon emissions for the 'trap and transport eels out of reservoir' option (0.17 tCO_{2e}/year). However, we expect the three other options which require installation of new assets (ramps and passes) to address the need to result in greater embodied carbon emissions compared to the trap and transport option.

TABLE 34: THE VALUE MODELS USED TO MEASURE BENEFITS OF OUR SHORTLISTED OPTIONS AND THEIR ALIGNMENT WITH THE WINEP WIDER ENVIRONMENTAL OUTCOMES

Short-listed Options	Related WINEP Action IDs	NWG Value Framework measures	WINEP Wider Environmental Outcomes
Continue business as usual As is position	All	Water quality (Improved Water Environment) Embedded Emissions	Biodiversity (Natural Environment, Net Zero, Catchment Resilience)
DrWPA			
Farmer engagement Incentivising changes to land management or use	08NW104058, 08ES100206	Improved Water Environment CRI Score	Natural Environment Catchment Resilience
NERC			
Remove structures restricting river / tidal connectivity	08NW104011	-	Biodiversity (Natural Environment)
Modify structure to improve river / tidal connectivity	08NW104011	-	Biodiversity (Natural Environment)
Grassland management on operational sites (techniques from AMP7 trials)	08ES100006	-	Biodiversity (Natural Environment)
Work with stakeholders to deliver biodiversity improvements	08NW104006	Improved Water Environment Embedded Emissions	Biodiversity (Natural Environment, Catchment Resilience)
In-river / riparian habitat creation and enhancements	08NW104007, 08ES100111	Improved Water Environment	Biodiversity (Natural Environment, Catchment Resilience)
SSSI			
Peatland restoration Partnership working or outsourcing to contractors	08NW104010	-	Biodiversity (Natural Environment, Net Zero, Catchment Resilience)
INNS			
Installation of biosecurity facilities Site specific and full biosecurity facilities	08NW104004, 08ES100005	Embedded Emissions	Net Zero
EE			
Eel escapement measures Trap and transport, passes and ramps	08ES100001, 08ES100002	Embedded Emissions	Net Zero

3.3.2 Cost benefit appraisal to select preferred option

For each of the technically feasible options we have carried out a robust cost benefit appraisal within our portfolio optimisation tool to select the preferred option. This calculates an NPV over 30 years, in accordance with the PR24 Guidance, and cost to benefit ratio for each option. The ratio is calculated by dividing the present value of the profile of benefits by the present value of the profile of costs over the appraisal period of 30 years.

Costs and benefits have been adjusted to 2022-23 prices using the CPIH³⁹ Index financial year average. The impact of financing is included in the benefit to cost ratio calculation. Capital expenditure has been converted to a stream of annual costs, where the annual cost is made up of depreciation/RCV run-off costs and allowed returns over the life of the assets. Depreciation (or run-off) costs are calculated using the straight-line depreciation over the appraisal period. To discount the benefits and costs over time, we have used the social time preference rate as set out in 'The Green Book'.

The NPVs and cost benefit ratios for all short-listed options to address our IMP, MON and ND needs within this case have been generated by our portfolio optimisation tool and are included in Section 6. It is worth noting that, as outlined in Section 3.3.1, we may not have been able to complete the same degree of benefits assessment, or incorporate all benefits in the calculation across all short-listed options for some needs due to data limitations, for example for partnership working options. This means that the NPVs shown are primarily driven by cost, and this is reflected in the negative NPVs and low cost to benefit ratios in each case.

Our preferred solutions are also highlighted in Section 6 and in all but two cases, we have identified the preferred options as being those that will deliver the greatest value as determined by having the highest NPV. As an example, our preferred option to address our eels needs at Abberton (08ES100001) and Hanningfield (08ES100002) is to implement 'trap and transport' (Table 52). These options have the highest NPVs of -£0.069m and -£0.068m respectively. The alternative options require greater investment to implement and are therefore not favoured. For the 'close to nature' alternative, there will be significant engineering, excavation and redirection of water resource work required to implement the solution, which will require ongoing maintenance to ensure performance. In the case of an 'up and over' eel pass or a 'ramp trap plus trap and transport scheme, these require pumping flow and therefore a power supply. Our preferred options to 'trap and transport' at these sites has been agreed with the EA as the Alternative Measure by Other Means (AMbOM) at both reservoirs, which meets our obligations under the Eel Regulations by contributing to the target to increase the number of adult eels returning to spawn at sea.

The two exceptions, where our preferred options have the lowest NPV of the short-listed options are for our NERC_IMP need to minimise the detrimental impacts on fish passage caused by the Coquet semi-tidal weir (08NW104011) (Table 48), and our HD_IMP need to mitigate the impacts of our abstractions on the Broads SAC (08ES100019) (Table 49).

³⁹ Consumer Prices Index including owner occupiers' housing costs.

Our preferred option to meet the need of minimising the detrimental impacts on fish passage and ecology caused by Coquet semi-tidal weir (08NW104011) is to remove the semi-tidal weir rather than modify it. This is because we recognise the greater benefit to biodiversity that will be delivered through removing the weir completely, as outlined in Section 3.3.1. As the Coquet semi-tidal weir is an asset we no longer use, we believe the additional investment to remove the structure completely will be worthwhile.

Our HD_IMP need (08ES100019) is dependent on the outcome of our INV need on the Broads SAC (08ES100018), as discussed in Section 2.6.3. We were requested by the EA to include both needs in AMP8, which are dependent on the outcomes of their investigation into the impact of abstractions on the Broads SAC due to be completed in AMP7. To account for these needs in AMP8, as outlined in Section 3.1.3, we have carried out an appraisal of options that could be delivered during AMP8 in anticipation of our need to implement measures to minimise the impact on the Broads SAC. Our preferred option is the most expensive as it includes a combination of the other two short-listed options. Once the recommendations from the EA investigation and outcomes of our INV are available, we will be able to confirm our preferred option to minimise the impact on the Broads SAC.

NPVs for the INV solutions are not presented as they are not expected to deliver a benefit in AMP8, rather they will inform future work, and therefore did not require a benefits assessment as outlined in the WINEP Options Development Guidance. This means that our solutions to our INV needs represent our preferred options. Costs for these options are included in Section 3.3.3 below.

We have had independent third party (Jacobs) assurance carried out on our AMP8 WINEP programme to ensure suitability and reliability of our programme, and to confirm that we have followed the WINEP Options Development Guidance. This exercise utilised a sample of our water WINEP drivers, including DrWPA, NERC, HD and SSSI within this case.

3.3.3 Costs for preferred options

A summary and breakdown of costs to deliver our AMP8 needs against each driver within this business case are outlined in Table 35 to Table 40 below. The cost to address our AMP8 needs is broken down to show the investment required over AMP8, and to maintain them over the next 30 years (up to 2055, end of AMP13). A 30 year cost profile has been included to match the 30 year profile applied to the benefits assessments for these needs and solutions (Section 3.3.1), and the cost benefit assessment (Section 3.3.2).

TABLE 35: BREAKDOWN OF COSTS REQUIRED TO DELIVER OUR DRINKING WATER PROTECTED AREAS NEEDS IN AMP8 (COSTS ARE ROUNDED TO THE NEAREST £)

Need	WINEP Action ID	Option	Capex (AMP8) (£)	Opex (AMP8) (£)	Totex (AMP8) (£)	Totex (up to 2055 – end of AMP13) (£)
DrWPA_ND						
1	08NW104058	Farmer engagement: advice and awareness raising plus grant funding for on-farm interventions	1,365,060	909,255	2,274,315	2,274,315
DrWPA_INV						
2	08NW104050	Investigation into the sources of colour and organic carbon affecting drinking water abstractions on the Tyne, Tees, Wear and Coquet rivers. Identification of hotspots and opportunities (including consultation with partners) to address colour and DOC issues via peat restoration, enabling a targeted approach in AMP8 and onwards	105,098	0	105,098	105,098
3	08NW104052	Investigation into the causes of water quality issues and deterioration at Derwent reservoir. Identification of contaminants, potential sources and transport pathways and assessment of the potential impact of climate change. Including an investigation into the rate and sources of sedimentation at the reservoir. Options appraisal to identify solutions for potential delivery in AMP9, including engaging with the Coal Authority and/or the Tyne Rivers Trust as appropriate, and potentially including trials	160,790	0	160,790	160,790

Northumbrian

	Need	WINEP Action ID	Option	Capex (AMP8) (£)	Opex (AMP8) (£)	Totex (AMP8) (£)	Totex (up to 2055 – end of AMP13) (£)
Northumbrian	4	08NW104053	Investigation into alkalinity and conductivity at Horsley WTW, focussing on the impact of the Kielder scheme. Also considering the potential impact of climate change if low flows lead to a greater reliance on the Kielder scheme. Options appraisal for delivery in AMP9 if appropriate	79,048	0	79,048	79,048
	5	08NW104054	Investigation into the pesticide risk at Airyholm reservoir and Honey Hill WTW, including an assessment of the impact of the Tyne transfer, and the potential exacerbating impact of climate change (i.e., if reliance on Tyne transfer increases). Options appraisal for potential delivery in AMP9, considering a potential recommendation from the Zonal Study investigation around supporting Honey Hill using Tunstall reservoir, reducing reliance on the Tyne transfer	97,912	0	97,912	97,912
	6	08NW104055	Investigation into the causes of deterioration at Lartington WTW in algae, geosmin, MIB (taste & odour) and pesticides, and identification of potential solutions for delivery in AMP9	129,351	0	129,351	129,351
	7	08NW104057	Investigation into the causes of elevated sulphate and algae levels in raw water at Lumley WTW and identification of potential options for delivery in AMP9. Linking to the Wear abstractions investigation	114,080	0	114,080	114,080

	Need	WINEP Action ID	Option	Capex (AMP8) (£)	Opex (AMP8) (£)	Totex (AMP8) (£)	Totex (up to 2055 – end of AMP13) (£)
Northumbrian	8 Assess the potential for co-ordinated management of compensation flows across the Wear catchment, for potential implementation in AMP9.	08NW104056	Investigation into the potential for co-ordinated management of compensation flows in the catchment to minimise impacts of abstractions on the Lumley abstraction and wider environment (flows, river habitat, water quality)	213,242	0	213,242	213,242
	9 Reduce contamination of our drinking water sources in the Essex and Suffolk region with nutrients, pesticides, sediment and microbiological parameters due to agricultural diffuse and point source pollution.	08ES100206	Farmer engagement: advice and awareness raising plus grant funding for on-farm interventions	1,235,069	681,941	1,917,010	1,917,010
	DrWPA_INV						
Essex and Suffolk	10 Understand the causes of algal blooms at Abberton reservoir and identify potential solutions for delivery in AMP9.	08ES100200	Investigation into causes of algal blooms at Abberton reservoir. Identification of the sources of algae to the reservoir, and factors affecting algal growth (nutrient levels, reservoir management). Identification of appropriate mitigation options for potential delivery in AMP9	64,675	0	64,675	64,675
	11 Understand the sources of nitrate and causes of algal blooms at Langford WTW, and identify potential solutions for delivery in AMP9	08ES100201	Investigation into the sources and pathways of nutrients and algae to the River Blackwater and Chelmer intakes. Identification of potential options (catchment interventions or reservoir management) for delivery in AMP9	114,619	0	114,619	114,619
	12 Understand the sources of nutrients and algae at Lound WTW, and identify potential solutions for delivery in AMP9.	08ES100203	Investigation into the sources and pathways of nutrients in raw water at Lound WTW and identification of potential options for delivery in AMP9	62,879	0	62,879	62,879

	Need	WINEP Action ID	Option	Capex (AMP8) (£)	Opex (AMP8) (£)	Totex (AMP8) (£)	Totex (up to 2055 – end of AMP13) (£)
Essex and Suffolk	13 Understand the causes of algae and taste and odour issues at Ormesby WTW, and identify potential solutions for delivery in AMP9.	08ES100204	Investigation into the causes of high levels of algae, geosmin and methyl isoborneol in the raw water supplying Ormesby WTW from the Ormesby Broad and/or River Bure abstractions. Identification of potential options for delivery in AMP9. Note that there are separate investigations proposed into the impact of recreational activity on water quality at the Trinity Broads, and sudden drop in water clarity at Lily Broad under the SSSI_INV driver	91,624	0	91,624	91,624
	14 Understand the sources of nutrients to the Belaugh groundwater abstraction supplying Ormesby WTW, and identify potential solutions for delivery in AMP9.	08ES100205	Investigation into the sources and pathways of elevated nutrient levels to the Belaugh boreholes. Identification of potential options for delivery in AMP9 and identification of hotspots i.e., areas of the catchment in which interventions should be targeted to achieve the greatest benefits	51,022	0	51,022	51,022
TOTAL				3,884,469	1,591,196	5,475,665	5,475,665

TABLE 36: BREAKDOWN OF COSTS REQUIRED TO DELIVER OUR BIODIVERSITY NEEDS IN AMP8 (COSTS ARE ROUNDED TO THE NEAREST £)

Need	WINEP Action ID	Option	Capex (AMP8) (£)	Opex (AMP8) (£)	Totex (AMP8) (£)	Totex (up to 2055 – end of AMP13) (£)		
NERC_IMP								
Northumbrian	1	Reduce sediment loads into the North Tyne River to improve habitat condition and protect species.	08NW104006	Work with stakeholders to deliver biodiversity improvements	524,303	302,656	826,960	826,960
	2	Mitigate impacts of fine sediment and metals from historic scour operations on the Redesdale pipeline on freshwater pearl mussel habitat in the Redesdale catchment.	08NW104007	In-river / riparian habitat creation and enhancements	504,714	174,609	679,323	679,323
	3	Improve habitat condition and extent at a landscape scale to increase connectivity and better support biodiversity across our Northumbrian operating area including catchments.	08NW104005	Work with stakeholders to deliver biodiversity improvements	0	375,000	375,000	375,000
	4	Enhance and increase the area of habitats (including feeding sites) for swifts, swallows and martin populations	08MU100398	Work with stakeholders to deliver biodiversity improvements	0	80,043	80,043	80,043
	5	Remove or minimise the detrimental impacts on fish passage and ecology caused by the Coquet semi-tidal weir.	08NW104011	Remove structures restricting river / tidal connectivity	2,343,315	0	2,343,315	2,343,315

Need	WINEP Action ID	Option	Capex (AMP8) (£)	Opex (AMP8) (£)	Totex (AMP8) (£)	Totex (up to 2055 – end of AMP13) (£)
6	08NW104008	Investigation to understand opportunities for biodiversity enhancement on our owned assets.	48,507	0	48,507	48,507
7	08ES100009	Investigation to establish the current biodiversity value of the Hall Farm Meadow site and confirm why there has been a decline in wetland species. Identify how best to manage the site for biodiversity going forwards via an options appraisal.	25,152	0	25,152	25,152
NERC_IMP						
8	08ES100007	We need one electronic system to store and manage environmental and biodiversity data to enable a clear view of changes and improvements required	0	78,111	78,111	78,111
9	08ES100006	Improve condition of our grassland sites and landholdings to achieve biodiversity and carbon benefits.	0	562,396	562,396	562,396

Essex and Suffolk

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Need	WINEP Action ID	Option	Capex (AMP8) (£)	Opex (AMP8) (£)	Totex (AMP8) (£)	Totex (up to 2055 – end of AMP13) (£)
10	08ES100008	Work with stakeholders to deliver biodiversity improvements	250,000	0	250,000	250,000
11	08MU100302	Work with stakeholders to deliver biodiversity improvements	0	30,043	30,043	30,043
12	08ES100013	Work with catchment partners to deliver restoration measures	198,604	0	198,604	198,604
13	08ES100111	In-river / riparian habitat enhancements	458,503	29,304	487,807	487,807
TOTAL			4,353,098	1,632,162	5,985,261	5,985,261

TABLE 37: BREAKDOWN OF COSTS REQUIRED TO DELIVER OUR EUROPEAN SITES NEEDS IN AMP8 (COSTS ARE ROUNDED TO THE NEAREST £)

Need	WINEP Action ID	Option	Capex (AMP8) (£)	Opex (AMP8) (£)	Totex (AMP8) (£)	Totex (up to 2055 – end of AMP13) (£)
HD_INV						
1	08ES100018	Carry out an options appraisal following the Environment Agency led investigation on The Broads SAC	91,195	0	91,195	91,195
2	08ES100010	Investigation into options for verifying consultant/volunteer wetland bird (WeBS) counts (fieldwork gathered data) to give greater confidence in data and allow for volunteers to be used in future in place of consultants.	55,693	0	55,693	55,693
3	08ES100012	Investigation into source of water clarity deterioration at Lily Broad, and water quality deterioration across the Trinity Broads (N, P & sediment). Carry out catchment characterisation (land use and pathway assessment) to understand potential sources and pathways for contamination. Identify and appraise mitigation options for potential delivery in AMP9.	59,286	0	59,286	59,286

Essex and Suffolk

Need	WINEP Action ID	Option	Capex (AMP8) (£)	Opex (AMP8) (£)	Totex (AMP8) (£)	Totex (up to 2055 – end of AMP13) (£)
HD_IMP						
4	08ES100019	River restoration (in-channel measures) (subject to findings of the EA investigation and our options appraisal planned for AMP8)	4,416,248	£706,600	5,122,848	5,122,848
5	08ES100020	Sediment removal by mud pumping	6,483,958	0	6,483,958	6,483,958
TOTAL			11,106,380	706,600	11,812,980	11,812,980

TABLE 38: BREAKDOWN OF COSTS REQUIRED TO DELIVER OUR SITES OF SPECIAL SCIENTIFIC INTEREST NEEDS IN AMP8 (COSTS ARE ROUNDED TO THE NEAREST £)

	Need	WINEP Action ID	Option	Capex (AMP8) (£)	Opex (AMP8) (£)	Totex (AMP8) (£)	Totex (up to 2055 – end of AMP13) (£)
SSSI_IMP							
Northumbrian	1	Halt or reverse peatland degradation in the Upper Tees and Wear drinking water catchments and reduce challenge to drinking water treatment from colour and organic carbon.	08NW104010	562,396	0	562,396	562,396
			Carry out peat restoration via a collaboration with the North Pennines AONB Partnership				
SSSI_INV							
Essex and Suffolk	2	Understand risks to SSSI condition posed by recreational activities on the Trinity Broads. Ascertain appropriate recreation levels and management strategies to avoid deterioration.	08ES100011	48,507	0	48,507	48,507
			Investigation into the impacts of current and potential new recreational uses of the Trinity Broads on water quality, ecology and INNS risk				
TOTAL				610,903	0	610,903	610,903

TABLE 39: BREAKDOWN OF COSTS REQUIRED TO DELIVER OUR SITES OF INVASIVE NON-NATIVE SPECIES NEEDS IN AMP8 (COSTS ARE ROUNDED TO THE NEAREST £)

	Need	WINEP Action ID	Option	Capex (AMP8) (£)	Opex (AMP8) (£)	Totex (AMP8) (£)	Totex (up to 2055 – end of AMP13) (£)
	INNS_INV						
Northumbrian	1	08NW104000	Identify feasible options for controlling the invasive water weed <i>Crassula helmsii</i> at Derwent Reservoir via biological or mechanical means.	62,430	0	62,430	62,430
			Investigation into feasible options for the control of <i>Crassula helmsii</i> at Derwent Reservoir for potential delivery in AMP9				
	2	08NW104001	Identify feasible options to reduce the risk of the spread of signal crayfish from Scaling Dam.	49,854	0	49,854	49,854
			Feasibility study on the removal of non-native signal crayfish from Scaling Dam and appraisal of options to prevent spread to Staithes Beck, for potential delivery in AMP9				
	3	08MU100400	Identify and assess biosecurity measures to reduce the risk of spread of aquatic INNS via RWT.	300,000	0	300,000	300,000
			Contribution to cross company investigation into feasible biosecurity measures for Raw Water Transfers. This investigation will be commissioned nationally by the EA and UK Water INNS group, and will include trials of 5-6 interventions and production of guidance manual of mitigation techniques				
	INNS_MON						
	4		Provide early warning for INNS i.e., detect new arrivals before they become established. For some species, monitoring approaches and techniques need developing. The EA expects water companies to work together through the Aquatic Biosecurity Partnership to develop these techniques.	15,831	0	15,831	15,831
		08MU100399	Participate in cross-company (water industry) trials and research projects ⁴⁰				

⁴⁰ The EA expects water companies to work together through the Aquatic Biosecurity Partnership to develop these techniques.

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INNS_ND								
Northumbrian	5	Ensure biosecurity strategy is embedded into company culture and operations in the Northumbrian region.	08NW104002	Awareness raising, training and implementation of biosecurity procedures (staff recruitment / internal resourcing)	0	246,805	246,805	246,805
	6	Reduce INNS presence in our catchments in the Northumbrian region to reduce the impact on our assets and the wider environment.	08NW104003	Collaborate with catchment partners	0	150,000	150,000	150,000
	7	Implement measures identified via the Pathway Action Plans (work started in AMP7) to reduce the risk of spread of INNS to/from our Northumbrian water bodies used for recreation (considered high risk).	08NW104004	Installation of tailored site-specific biosecurity facilities e.g., equipment washdowns, signage	236,405	0	236,405	236,405
INNS_INV								
Essex and Suffolk	8	Identify and assess biosecurity measures to reduce the risk of spread of aquatic INNS via RWT.	08MU100300	Contribution to cross company investigation into feasible biosecurity measures for Raw Water Transfers. This investigation will be commissioned nationally by the EA and UK Water INNS group, and will include trials of 5-6 interventions and production of guidance manual of mitigation techniques	150,000	0	150,000	150,000

INNS_MON

9	Provide early warning for INNS i.e., detect new arrivals before they become established. For some species, monitoring approaches and techniques need developing. The EA expects water companies to work together through the Aquatic Biosecurity Partnership to develop these techniques.	08MU100301	Participate in cross-company (water industry) trials and research projects ⁴¹	7,915	0	7,915	7,915
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INNS_ND

Essex and Suffolk	10	Ensure biosecurity strategy is embedded into company culture and operations in the Essex and Suffolk regions.	08ES100003	Awareness raising, training and implementation of biosecurity procedures (staff recruitment / internal resourcing)	0	122,701	122,701	122,701
	11	Reduce INNS presence in our catchments in the Essex and Suffolk region to reduce the impact on our assets and the wider environment.	08ES100004	Collaborate with catchment partners	0	150,000	150,000	150,000
	12	Implement measures identified via the Pathway Action Plans (work started in AMP7) to reduce the risk of spread of INNS to/from our Essex and Suffolk water bodies used for recreation (considered high risk).	08ES100005	Installation of tailored site-specific biosecurity facilities e.g., equipment washdowns, signage	341,926	0	341,926	341,926
	TOTAL				1,164,361	669,506	1,833,867	1,833,867

⁴¹ The EA expects water companies to work together through the Aquatic Biosecurity Partnership to develop these techniques.

TABLE 40: BREAKDOWN OF COSTS REQUIRED TO DELIVER OUR EELS REGULATIONS NEEDS IN AMP8 (COSTS ARE ROUNDED TO THE NEAREST £)

	Need	WINEP Action ID	Option	Capex (AMP8) (£)	Opex (AMP8) (£)	Totex (AMP8) (£)	Totex (up to 2055 – end of AMP13) (£)	
	EE_IMP							
Essex and Suffolk	1	Eels residing in Abberton Reservoir are not able to complete their seaward migration	08ES100001	Trap and transport eels out of reservoir	82,953	0	82,953	82,953
	2	Eels residing in Hanningfield Reservoir are not able to complete their seaward migration	08ES100002	Trap and transport eels out of reservoir	82,953	0	82,953	82,953
	TOTAL			165,906	0	165,906	165,906	

3.4. THIRD PARTY FUNDING

We intend to continue to work in partnership with our relevant stakeholders as much as possible to deliver our AMP8 needs. This partnership working at times presents the opportunity for third party funding. For example, where possible, we will align farmer engagement activities to deliver our DrWPA needs with other organisations also providing advice and grant funding such as Catchment Sensitive Farming and potentially other water companies. In ESW we have been working in partnership at the Trinity Broads, Burgh Common and Muckfleet Marshes since 1995, particularly with regards to SSSI. Through the Trinity Broads Project Board, we work in partnership with the Norfolk Wildlife Trust, Natural England, EA, Broads Authority and Water Management Alliance. The Board sets out the ecological and environmental management activities planned for the Trinity Broads to meet its conservation objectives over the next five years. The partners work together to deliver the agreed aims of the Management Plan, sharing knowledge and expertise, and where possible financial and other resources. We will continue to explore opportunities for third party funding during AMP8 delivery.

3.5. DIRECT PROCUREMENT FOR CUSTOMERS

We assessed this programme against the DPC guidance (see our [assessment report](#), NES38). This report concludes there are no opportunities for direct procurement for customers relevant to this programme because the projects are small value and less than <£200m of whole life totex.

3.6. DELIVERABILITY ASSESSMENT

In accordance with the WINEP options development guidance we have carried out a deliverability assessment. This has considered:

- The technical feasibility of implementing an intervention (Section 3.2) – all of the preferred options are technically feasible to implement.
- The certainty that benefits for each option will be realised. This has been assessed as part of the likelihood scoring in our benefits assessment (Section 3.3.1).
- Lessons learned from AMP7 efforts (Section 2.2) to encourage efficiency.
- The confidence with which we can deliver by 2030.
- Capacity of the supply chain to deliver to support efficiency.
- Early start to ensure delivery by the due dates.

3.7. CUSTOMERS VIEWS INFORMING OPTION SELECTION

h) Where appropriate, have customer views informed the selection of the proposed solution, and have customers been provided sufficient information (including alternatives and its contribution to addressing the need) to have informed views?

Our customer engagement is summarised in section 2.7.

4. COST EFFICIENCY

4.1. COST METHODOLOGY

A full description of our costing methodology is contained in appendix [A3 - Costs](#) (NES04). The costs for our options to address our Protected Areas and Biodiversity-related needs are Level 3, except for our MON and some IMP solutions, and have been assured by a third party (Mott MacDonald). Table 41 provides a list of the assumptions we applied to the costs for each option. A summary of the costing methodology for our options to address different driver needs is provided below.

TABLE 41: SUMMARY OF ASSUMPTIONS APPLIED TO EACH INVESTIGATION COST BUILD

Cost Element	Assumption
Project Management	<ul style="list-style-type: none"> 15% of total cost excluding risk and uncertainty Will be covered by operational expenditure
Risk	10% of total cost including project management
Uncertainty	20% of total cost including project management and excluding risk

4.1.1 For Investigations (INV)

We developed an investigation costing matrix to inform the cost build for all our AMP8 water WINEP investigations. This includes for all options to address our INV and NDINV needs for each driver. The matrix is based on our experience of typical investigation steps, degrees of complexity and costs. It therefore provides us with a standardised approach to inform costs. A summary of the costing matrix that informed our INV costings is shown in Table 42.

TABLE 42: INVESTIGATION COSTING MATRIX (£)

Cost Element	Complexity		
	Low	Medium	High
Desk assessment	5,000	10,000	15,000
Monitoring ⁴²	4,500 – 18,000	7,500 – 60,000	12,000 - 180,000
Modelling ⁴³	10,000 – 40,000	25,000 - 50,000	50,000 – 150,000
Options appraisal	5,000	10,000	15,000
Reporting	2,000	15%	20%

These cost elements as required, and assumptions as per Table 41, were added together to inform overall option costs. A summary of costs for our INV needs is included in Section 3.3.3.

⁴² Cost varies across the degrees of complexity due to the variation in monitoring (water quality, monitoring etc) that may be required. We assume low complexity involves monitoring 3 sites, medium 6 sites, and high 10 sites.

⁴³ Cost varies across the degrees of complexity due to the variation in modelling (water quality, 3D etc) that may be required.

4.1.2 For No Deterioration (ND)

During AMP8, we intend to deliver against ND needs for DrWPA and INNS. Our short-listed ND options require partnership working or engagement and incentivisation activities to achieve a no deterioration outcome. Therefore, we have used our experience on similar projects and professional judgement to inform costs. The unit rates and assumptions used to develop costs for our two short-listed options to address our DrWPA_ND needs (08NW104058 and 08ES100206) for ‘farmer engagement and funding to take land out of conservation’ and ‘farmer engagement: advice and awareness raising plus grant funding for on-farm interventions’ is outlined in Table 43.

TABLE 43: THE UNIT RATES AND ASSUMPTIONS APPLIED TO OUR DRWPA_ND NEEDS

Item	Unit	Unit cost (£)	Duration (yrs)
Catchment Advisor	FTE	291,016	5
Pesticide sprayer washdown areas including biobed/biofilter	Per area	24,034	One-off cost
Yard renewal	Per m2	65	One-off cost
Cover cropping	per ha, per yr	72	5
Sediment traps, per item	Per item	240	One-off cost
Bunds, per item	Per item	1,408	One-off cost
Buffer strips	Per item	419	5
Arable reversion	per ha per yr	400	5
Reduced N inputs	per ha per yr	60	5
Variable rate N (precision farming)	per ha per yr	10	5
N inhibitors	per ha per yr	28	5
Events, communications materials,	per catchment, per yr	500	5
Taking land out of cultivation	Per ha	29,653	5

These cost elements as required, and assumptions as per Table 41, were added together to inform overall option costs.

We have completed a similar exercise to build costs for our two short-listed options to install full or tailored biosecurity facilities at all our water bodies used for recreation to reduce the risk of spreading INNS across our two regions (08NW104004 and 08ES100005). The unit rates and assumptions used to develop costs for these two short-listed options in each region is summarised in Table 44.

TABLE 44: THE UNIT RATES AND ASSUMPTIONS APPLIED TO OUR INNS_ND NEEDS TO REDUCE INNS SPREAD AT WATER BODIES WITH RECREATION (08NW104004 AND 08ES100005)

Item	Unit cost (£)
Hot water pressure washer	4,920
Designated washdown area for larger equipment (watersports) - cold water spray, direct to soakaway/pumped to soakaway	24,100
Hot water washdown, direct to soakaway/pumped to soakaway	4,620
Water supply to sites with no existing supply via bowser and soakaway	2,870
Feasibility assessment of providing utilities (running water, power supply) to sites with no existing supplies	1,500
Biosecurity hub - Basic building/structure allowing for visual inspection and manual removal of organisms	36,000
Addition of trough and running water (hot) to biosecurity hub (A6)	4,620
Boot brush + installation	500
Signage per site	1,000
Investigate 3rd party options	1,000
Develop material on ecological importance of site (site specific)	1,000
Site based equipment for anglers to use e.g. keep nets, cables for mudweights	500

These cost elements as required, and assumptions as per Table 41, were added together to inform overall option costs.

4.1.3 For Monitoring (MON)

During AMP8, we intend to deliver against our MON need in NW and ESW for an INNS early warning system (08MU100399 and 08MU100301). Our single short-listed option to address this need requires participating in cross-company trials and research projects. We have followed EA guidance to determine the option costs, which is to encourage water companies to collaborate through the Aquatic Biosecurity Partnership. The EA is allocating a total of £300k for all water companies to use over the AMP to address assets at risk of INNS arrival. Therefore, we have determined the cost split across all water companies using the Water UK funding formula to allocate contributions. We have assumed that we are eligible to access 7.92% of the total funds over the AMP to address INNS risk, which totals £23,746. Therefore, we have split this between our NW and ESW areas as 0.67% and 0.33% respectively. A summary of costs for our MON needs is included in Section 3.3.3.

4.1.4 For Implementation (IMP)

To determine a cost for solutions to address our IMP needs, we have used our experience from previous project work and professional judgement. For the majority of our AMP8 IMP options, including all our EE_IMP options, costs were determined as part of AMP7 investigations and options appraisal. For example, we have used our AMP7 trials to inform the costs for grassland management to address our need to improve the condition of our grassland sites and landholdings (08ES100006). Our AMP7 efforts are summarised in Section 2.2.2. These costs have been uplifted to 2022 prices and assumptions for risk and uncertainty applied as shown in Table 42.

The exceptions to this include the following:

- **NERC:** For the two short-listed options to modify or remove Coquet semi-tidal weir (08NW104011), high level costs have been estimated based on our review of similar projects completed nationally and internationally. With consideration that the semi-tidal weir itself is considered relatively small (up to 1 m in height), we have assumed the whole life cost of the weir modification and weir removal to be £1m and £1.5m respectively in 2022 prices.
- **HD:** We have used our experience from a similar project in AMP6 to inform costs for 'sediment removal by mud pumping' to address the need to ensure water depths in the Trinity Broads (08ES100020). We have assumed a series of tasks will be required for preparation, including a bathymetric survey, design, land access agreements, engagement and monitoring, before any mud-pumping (£2.64m in 2022 prices). We have also incorporated the learning from our AMP6 project to include enabling works to provide level area for settlement bags (£1.6m in 2022 prices), and costs for activities to prevent sedimentation (£5,000 in 2022 prices).
- **SSSI:** For our two short-listed options to halt or reverse peatland degradation in the Upper Tees and Wear drinking water catchments (08NW104101) we have used our experience working with the North Pennines AONB Partnership to inform option costs. To continue to work with the AONB partnership, we have applied the unit rate cost of £1,500 per hectare in 2018 prices to restore peatland, and that water quality monitoring to measure the benefits of restored peatland in each catchment will cost £30,000. For consultants to do this work instead, we have assumed it will be 25% more expensive than the cost of partnership working.

4.2. COST BENCHMARKING

In developing our enhancement costs for PR24, we have carried our benchmarking in line with the Infrastructure & Projects Authority (IPA) best practice guidance⁴⁴. The following benchmarking activities have been incorporated into our process to ensure our costs are robust and efficient. Benchmarking activities have included the following, covered in our [Cost Benchmarking Report](#) (NES63):

- Pre-Benchmarking of our cost models
- Sample Project Benchmarking
- Econometric Benchmarking
- Peer/Supplier Benchmarking

Pre-benchmarking of our iMOD cost models was carried out prior to commencement of the cost estimation process for PR24 business cases. Mott MacDonald benchmarked both Direct and Indirect costs (client and contract overheads) against data from a number of comparatively sized water and wastewater companies to determine our relative position. The conclusion of the pre-benchmarking exercise was that cost estimates generated from the iMOD cost models are in line with industry costs, and therefore the use of iMOD was appropriate for costing our PR24 programme.

⁴⁴ Best Practice in Benchmarking, Government Project Delivery Framework. www.assets.publishing.service.gov.uk

In addition to pre-benchmarking a representative range of projects were sampled from selected business cases and bottom-up benchmarking estimates produced from Mott MacDonald's sector database to allow comparison with our iMOD generated project costs. The sample group of projects included 30 from our WINEP programme across Water and Wastewater. The sample project benchmarking exercise concluded that our costs are generally in line with or less than the benchmark data, with an average 13% cost efficiency for projects within the sample group.

For most elements of our WINEP programme, including investigations and implementations, we were not able to make direct comparisons with industry benchmarks due to the lack of equivalent comparator data. For this reason, we defined a standard approach for investigations across our water WINEP programme to categorise investigations by scale and complexity and assign to a banded cost category. This is described in Section 4.1.1. Additionally, we completed an internal benchmarking exercise to inform the cost of salaries which inform our options to reduce contamination in our drinking water sources in NW (08NW104058) and in ESW (08ES100206). This is outlined in Section 4.1.2.

5. CUSTOMER PROTECTION

- a) Are customers protected (via a price control deliverable or performance commitment) if the investment is cancelled, delayed or reduced in scope?
- b) Does the protection cover all the benefits proposed to be delivered and funded (eg primary and wider benefits)?
- c) Does the company provide an explanation for how third-party funding or delivery arrangements will work for relevant investments, including how customers are protected against third-party funding risks?

5.1. PERFORMANCE COMMITMENTS

Performance commitments (PCs) incentivise water companies to improve performance and maximise outcomes for customers and the environment. Our WINEP programme is set by the EA, which determines the statutory and non-statutory investments we should make. The EA assures that WINEP actions are delivered to the agreed timeframe, and environmental obligations are met. As such, there are no performance commitments that will directly ensure protection of our customers through delivery of our WINEP programme.

Therefore, in Section 5.2 we propose a Price Control Deliverable to ensure protection for customers.

5.2. PRICE CONTROL DELIVERABLE

Our approach to determining Price Control Deliverables (PCD) is outlined in Section 12.3 of [A3 – costs](#) (NES04). In Table 45 below, we assess our protected areas and biodiversity enhancements to test if the benefits are linked to PCs, against Ofwat’s materiality of 1%, and to understand if there are outcome measures that can be used. Our assessment has highlighted that the benefits we expect to deliver through our AMP8 WINEP programme will not be measured through PCs. Therefore, we propose a PCD to ensure protection for customers through delivery of our WINEP programme.

TABLE 45: ASSESSMENT OF BENEFITS AGAINST THE PCD CRITERIA

Enhancement scheme	Benefits linked to PC?	Materiality	Possible outcomes?
Water WINEP – protected areas and biodiversity (NES18)	Pass – benefits are environmental or investigations	Fail – 0.7%	Outcome difficult to measure effectively and varies between schemes (particularly investigations). Customers could be protected through an output measure based on delivery of schemes.

Our WINEP programme is set by the Environment Agency, which determines the statutory and non-statutory investments we should make. The EA assures that WINEP actions are delivered to the agreed timeframe, and environmental obligations are met. We therefore propose a PCD that makes sure that costs are returned to customers either where the EA has decided that a project is no longer required, or where we have not delivered to the agreed timeframe and/or environmental obligations have not been met (according to the EA). A summary of our PCD for WINEP programme delivery is outlined in Table 46.

TABLE 46: SUMMARY OF THE PRICE CONTROL DELIVERABLE FOR OUR WINEP PROGRAMME DELIVERY TO PROTECT CUSTOMERS

Description of price control deliverable	Delivery of WINEP projects as specified in our WINEP enhancement cases (NES17, NES18, NES19, NES28, NES29, NES30, NES31, NES34).
Measurement and reporting	We will report on the delivery of WINEP projects at the next price review (PR29), including specifying the individual projects that have been delivered, not delivered, or that the EA has decided are no longer required (under the EA’s WINEP alterations process). This is in addition to the WINEP guidance which specifies how we will need to report progress against delivery of the WINEP actions, and tracking and reporting WINEP delivery in a transparent and auditable manner.
Conditions on allowance	Projects must be delivered to the specification agreed with the Environment Agency under WINEP.
Assurances	The Environment Agency will confirm that WINEP actions have been delivered to the agreed timeframe, and that environmental obligations have been met. As set out in the WINEP guidance , there will be regular liaison between water companies and the EA to discuss progress, risks and issues associated with delivery of the WINEP programme and to identify any alterations. The EA uses the WINEP measures sign-off, technical review and audit guidance for assurance that the environmental obligations as set out in the WINEP are completed as planned.
Price control deliverable payment rate	We will return funds back to customers for individual projects, as specified in Table 34 to Table 39 above (for NES18) – 48 individual schemes to be delivered by the dates specified.
Impact on performance in relation to performance commitments	There are some impacts on performance commitments, for biodiversity, carbon emissions, and river water quality.

We propose a single PCD for most of our WINEP programme delivery (with the exception of storm overflows). This should:

- Be set according to **individual project costs**, rather than a “per project” unit cost. This is because these costs vary considerably, and a single rate would create an incentive to deliver more of the cheapest projects (at the expense of more expensive projects). Ofwat’s guidance in IN23/05 identifies this incentive and expects us to set out scheme level deliverables where costs vary significantly across schemes (so our approach here is consistent with the guidance). If we did not aggregate WINEP schemes, there would be no PCD covering NES18 because this would not be material on its own.
- **Not include an automatic penalty for non-delivery** (beyond returning the costs to customers). This is because this PCD includes projects where the EA has decided these are no longer required, which should not lead to a penalty. If we did not deliver a project that is required (and where we had not agreed a change with the EA), we would not meet our statutory obligations and so this does not require an extra incentive to deliver.
- **Change according to the EA’s WINEP alterations process**. In 2020-25, our ODI for WINEP delivery does not automatically take into account projects that are removed from WINEP by the EA – but this should be for the EA to determine. Costs should be returned to customers for projects that are not required, without further interventions needed from Ofwat.

This is an aggregated PCD across all our WINEP schemes except for storm overflows. We chose to aggregate these PCDs because most of our WINEP enhancement cases or projects would not be individually material, and these share the same reporting, assurance, and conditions.

6. APPENDIX A – NET PRESENT VALUES AND PREFERRED OPTION

TABLE 47: NET PRESENT VALUES AND PREFERRED OPTIONS FOR THE DRINKING WATER PROTECTED AREAS NO DETERIORATION (DRWPA_ND) NEEDS

	Need	WINEP Action ID	Option	Net Present Value (30 years) (£)	Benefit to Cost Ratio	Chosen option	
Northumbrian	1	08NW104058	3	Farmer engagement and funding to take land out of cultivation	-21.694m	0.00	Alternative
			4	Farmer engagement: advice and awareness raising plus grant funding for on-farm interventions	-1.902m	0.00	Preferred
Essex and Suffolk	9	08ES100206	3	Farmer engagement and funding to take land out of cultivation	-13.475m	0.00	Alternative
			4	Farmer engagement: advice and awareness raising plus grant funding for on-farm interventions	-1.600m	0.00	Preferred

TABLE 48: NET PRESENT VALUES AND PREFERRED OPTIONS FOR THE BIODIVERSITY IMPLEMENTATION (NERC_IMP) NEEDS

	Need	WINEP Action ID	Option	Net Present Value (30 years) (£)	Benefit to Cost Ratio	Chosen option
Northumbrian	1	08NW104006	2 Work with stakeholders to deliver biodiversity improvements	-0.692m	0.00	Preferred
	2	08NW104007	7 In-river / riparian habitat creation and enhancements	-0.567m	0.00	Preferred
	3	08NW104005	2 Work with stakeholders to deliver biodiversity improvements	-0.322m	0.00	Preferred
			8 Direct resourcing for habitat enhancement and creation via staff/ contractors	-0.403m	0.00	Alternative
	4	08MU100398	2 Work with stakeholders to deliver biodiversity improvements	-0.069m	0.00	Preferred
			8 Direct resourcing for habitat enhancement and creation via staff/contractors	-0.084m	0.00	Alternative
5	08NW104011	1 Remove structures restricting river / tidal connectivity	-1.925m	0.00	Preferred	
		6 Modify structure to improve river / tidal connectivity	-1.283m	0.00	Alternative	
Essex	6	08ES100007	9 Create and implement a system / database to store	-0.067m	0.00	Preferred

	enable a clear view of changes and improvements required			and manage environmental and biodiversity data			
7	Improve condition of our grassland sites and landholdings to achieve biodiversity and carbon benefits.	08ES100006	3	Grassland management on operational sites (techniques from AMP7 trials)	-0.483m	0.00	Preferred
8	Improve habitat condition and extent at a landscape scale to increase connectivity and better support biodiversity across our ESW operating area including catchments.	08ES100008	2	Work with stakeholders to deliver biodiversity improvements	-0.205m	0.00	Preferred
			8	Direct resourcing for habitat enhancement and creation via staff/ contractors	-0.268m	0.00	Alternative
9	Enhance and increase the area of habitats (including feeding sites) for swifts, swallows and martin populations	08MU100302	2	Work with stakeholders to deliver biodiversity improvements	-0.026m	0.00	Preferred
			8	Direct resourcing for habitat enhancement and creation via staff/ contractors	-0.042m	0.00	Alternative
10	Mitigate impacts identified through the investigation (08ES100009) on Hall Farm Meadow site and improve condition of the site to better support biodiversity.	08ES100013	2	Work with catchment partners to deliver restoration measures	-0.155m	0.00	Preferred
			8	Direct resourcing for habitat enhancement and creation via staff/contractors	-0.206m	0.00	Alternative
11	Improve aquatic and riparian habitat conditions in the lower Roman River, to improve ecological function and enhance biodiversity.	08ES100111	9	In-river / riparian habitat enhancements	-0.402m	0.00	Preferred

TABLE 49: NET PRESENT VALUES AND PREFERRED OPTIONS FOR THE EUROPEAN SITES IMPLEMENTATION NEEDS (HD_IMP)

	Need	WINEP Action ID	Option	Net Present Value	Benefit to Cost Ratio	Chosen option	
				(30 years) (£)			
Essex and Suffolk	1	08ES100019	2	River restoration (in-channel/riparian measures)	-4.129m	0.00	Alternative
			4	River restoration (in-channel/riparian measures) and changes to abstraction regime	-4.545m	0.00	Preferred
					-0.237m	0.00	Alternative
			5	Changes to abstraction regime			
	2	08ES100020	7	Sediment removal by mud pumping	-5.326m	0.00	Preferred

TABLE 50: NET PRESENT VALUES AND PREFERRED OPTIONS FOR THE SSSI IMPLEMENTATION NEED (SSSI_IMP)

	Need	WINEP Action ID	Option	Net Present Value	Benefit to Cost Ratio	Chosen option	
				(30 years) (£)			
Northumbrian	1	08NW104010	2	Carry out peat restoration via a collaboration with the North Pennines AONB Partnership	-0.462	0.00	Preferred
					-0.577m	0.00	Alternative
			3	Carry out peat restoration directly via contractors			

TABLE 51: NET PRESENT VALUES AND PREFERRED OPTIONS FOR OUR INNS MON AND ND NEEDS

	Need	WINEP Action ID	Option	Net Present Value (30 years) (£)	Benefit to Cost Ratio	Chosen option
INNS_MON						
Northumbrian	1	08MU100399	3 Participate in cross-company (water industry) trials and research projects. ⁴⁵	-0.014m	0.00	Preferred
	2	08MU100301		-0.007m	0.00	Preferred
Essex and Suffolk						
INNS_ND						
Northumbrian	3	08NW104002	4 Awareness raising, training and implementation of biosecurity procedures (staff recruitment / internal resourcing)	-0.219m	0.00	Preferred
	6		Standalone (non-collaborative) projects; delivery of work via consultants / contractors	-0.394m	0.00	Alternative
	4	08NW104003	5 Collaborate with catchment partners	-0.129m	0.00	Preferred
	6		Standalone (non-collaborative) projects; delivery of work via consultants / contractors	-0.161m	0.00	Alternative
	5	08NW104004	8 Installation of small-scale, site-specific biosecurity facilities e.g., equipment washdowns	-0.194m	0.00	Preferred

⁴⁵ The EA expects water companies to work together through the Aquatic Biosecurity Partnership to develop these techniques.

	our Northumbrian water bodies used for recreation (considered high risk).		9	Installation of full biosecurity facilities at each site e.g. hot washdown, biosecurity hub	-1.197m	0.00	Alternative	
Essex and Suffolk	6	Ensure biosecurity strategy is embedded into company culture and operations in the Essex and Suffolk regions.	08ES100003	4	Awareness raising, training and implementation of biosecurity procedures (staff recruitment / internal resourcing)	-0.126m	0.00	Preferred
				6	Standalone (non-collaborative) projects; delivery of work via consultants / contractors	-0.197m	0.00	Alternative
	7	Reduce INNS presence in our catchments in the Essex and Suffolk region to reduce the impact on our assets and the wider environment.	08ES100004	5	Collaborate with catchment partners	-0.127m	0.00	Preferred
				6	Standalone (non-collaborative) projects; delivery of work via consultants / contractors	-0.159m	0.00	Alternative
	8	Implement measures identified via the Pathway Action Plans (work started in AMP7) to reduce the risk of spread of INNS to/from our Essex and Suffolk water bodies used for recreation (considered high risk).	08ES100005	8	Installation of small-scale biosecurity facilities e.g., equipment washdowns	-0.281m	0.00	Preferred
				9	Installation of full biosecurity facilities at each site e.g. hot washdown, biosecurity hub	-1.211m	0.00	Alternative

TABLE 52: COST BENEFIT RATIOS AND PREFERRED OPTIONS FOR THE EELS REGULATIONS IMPLEMENTATION NEEDS

Need	WINEP Action ID	Option	Net Present Value	Benefit to Cost Ratio	Chosen option	
			(30 years) (£)			
Essex and Suffolk	1	3	-0.069m	0.00	Preferred	
		4	-0.612m	0.00	Alternative	
		10	-0.548m	0.00	Alternative	
		12	-0.215m	0.00	Alternative	
	2	08ES100002	3	-0.068m	0.00	Preferred
			4	-0.653m	0.00	Alternative
			10	-0.592m	0.00	Alternative
			12	-0.217m	0.00	Alternative