

SRN42 WINEP Wider Environmental Enhancement Enhancement Business Case

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from
**Southern
Water** 

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Glossary

Acronym	Term
WINEP	Water Industry National Environment Programme
EA	Environment Agency
NE	Natural England
DWMP	Drainage and Wastewater Management Plan
SOAF	Storm overflow assessment framework
MCERT	EA's monitoring certification scheme
A-WINEP	Advanced WINEP
CIP	Chemicals investigations programme
SSSI	Site of special scientific interest
WFD	Water framework directive
UPM	Urban pollution monitoring
RNAG	Reason for not achieving good ecological status
ASP	Activated sludge plant
TAL	Technically achievable limit
PST	Primary settlement tank

1. Executive summary

This enhancement business case covers the wider statutory environmental improvements and activities to gain understanding that are included within the WINEP.

We have one improvement scheme to prevent eel entrainment in a wastewater treatment works and a large programme of studies and investigations that will improve our knowledge of the impacts of our activities on the local environment. These studies and investigations are integral to the WINEP and provide an important role in terms of supporting the development of WINEP for the following AMP period.

There are limited options for investigations, as their scope is defined partly by the WINEP driver requiring the investigation and partly by the specific local environmental conditions. We are requesting efficient costs developed through benchmarking with recent outturn investigation costs.

There are 371 investigations in our business plan for AMP8. Many of these are required to meet the guidance issued by the EA, especially in relation to storm overflows. A summary of the number of investigations and improvements by driver are listed in Table 1-1.

Table 1-1: Summary of the WINEP drivers for our wastewater WINEP investment proposals

WINEP area	AMP8 totex, £m (2022/23 prices)	WINEP drivers	Number of WINEP actions
Improving understanding, enhancing catchments and working in partnership	66.3	25YEP_INV	2
		BW_NDINV	7
		BW_INV2	1
		EE_IMP	1
		EE_INV	1
		HD_INV	13
		SSSI_INV	32
		SW_INV	3
		MCZ_INV	14
		NERC_INV	1
		WFD_INV	43
		WFD_INV CHEM	13
		WFD_INV N-Tal	4
		WFDGW_INV	7
		WFDGW_NDINV	20
EnvAct_INV	210		

Summary of Enhancement Case	
Name of Enhancement Case	(Wastewater) WINEP
Summary of Case	<ul style="list-style-type: none"> We propose to carry out a comprehensive programme of statutory investigations to gain understanding of the impacts of our activities on the local environment. We are investing to prevent harm to eels which are accessing one of our treatment works through final effluent discharge arrangements.
Expected Benefits	<ul style="list-style-type: none"> Investigations are important activities that will inform our PR29 WINEP and make sure our customers pay only where there is a demonstrable link between our activities and risks of environmental harm. We will be playing our part to protect eel populations and facilitating an environment where nature can thrive.
Associated Price Control	Wastewater network plus and Bioresources
Enhancement TOTEX	£66.3 million
Enhancement CAPEX	£17.5 million
Enhancement OPEX	£48.8 million
Is this enhancement proposed for a direct procurement for customer (DPC)?	No. None of the investments are sufficiently material to consider delivery through DPC.

2. Introduction and Background

This document explains:

- (a) how we have developed the needs for enhancement investment
- (b) the process for options development,
- (c) how we have ensured our costs are efficient, and
- (d) how customers are protected from non- or late delivery.

This enhancement business case covers the wider environmental improvements and activities to gain understanding that are included within the WINEP, such as investigations.

We propose studies and investigations where there is uncertainty over the impact of our activities on the environment. These studies are to inform future WINEP investments. We also explain in this section the improvement activities for specific environmental risks that are not related to storm overflows, or our treatment works effluent permits, for example meeting Eels Regulations requirements to prevent eels entering our wastewater treatment works.

Studies and investigations are integral to the WINEP and provide an important role in terms of supporting the development of WINEP for the following AMP period. The studies and investigations in AMP7 that have informed our AMP8 WINEP include:

- 22 SSSI, habitats or marine conservation zone investigations;
- 282 treatment works flow monitoring investigations;
- 40 bathing water studies;
- 10 shellfish water studies;
- Invasive non-native species (INNS) investigations covering 14 stretches of river and 10 recreation and maintenance pathways;
- 36 Storm overflow assessment framework (SOAF) studies;
- 16 Industrial Emissions Directive (IED) surveys

The specific wastewater categories of expenditure covered in this business case are listed in the following extract from the CWW3 data table.

Table 2-1 Enhancement costs described in this document

Enhancement cost category	AMP8 totex, £m 2022/23 prices
Chemicals and emerging contaminants monitoring, investigations, options appraisals; (WINEP/NEP) wastewater	3.8
Nitrogen technically achievable limit monitoring, investigation or options appraisal; (WINEP/NEP) wastewater	3.6
Catchment management - chemicals source control; (WINEP/NEP) wastewater	0
Catchment management - nutrient balancing; (WINEP/NEP) wastewater	0
Catchment management - catchment permitting; (WINEP/NEP) wastewater	0
Catchment management - habitat restoration; (WINEP/NEP) wastewater	0
Fish outfall screens; (WINEP/NEP) wastewater	1.8
Investigations, other (WINEP/NEP) - desk-based studies only wastewater	8.5
Investigations, other (WINEP/NEP) - survey, monitoring or simple modelling wastewater	11.8

Enhancement cost category	AMP8 totex, £m 2022/23 prices
Investigations, other (WINEP/NEP) - multiple surveys, and/or monitoring locations, and/or complex modelling wastewater	36.7
Contribution to third party schemes under WINEP/NEP only (not covered elsewhere) wastewater	0
River connectivity (e.g. for fish passage); (WINEP/NEP) wastewater	0
Restoration management (marine conservation zones etc) (WINEP/NEP) wastewater	0
Access and amenity for WINEP/NEP only (not covered elsewhere) wastewater	0
25 year environment plan; (WINEP/NEP) wastewater	0
Advanced WINEP (not covered elsewhere) wastewater	0

The cost of the storm overflow investigations are included within this data table, hence we have included them in this enhancement case, rather than the case on storm overflows.

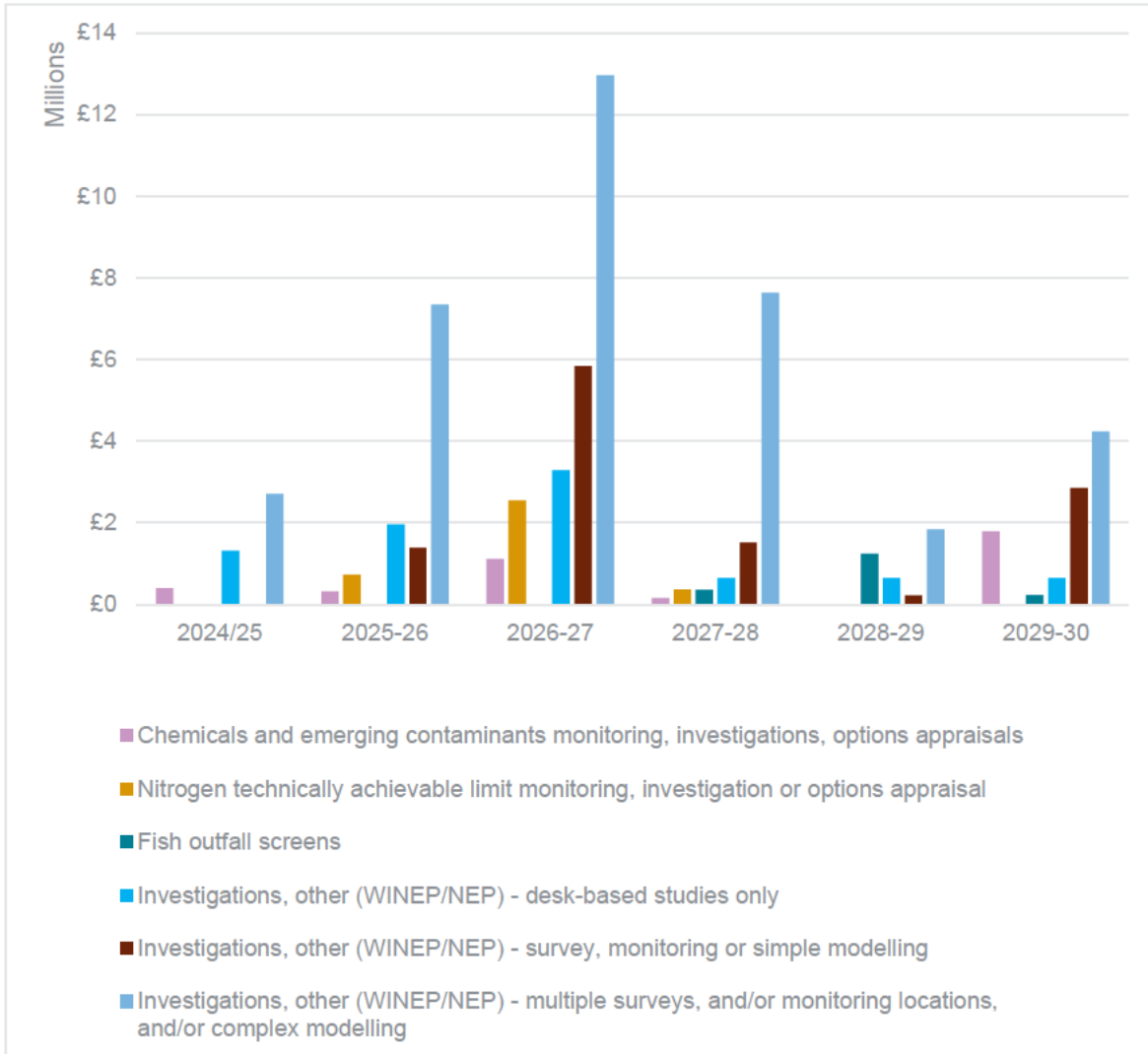
This enhancement case is impacted less by the affordability issues, and so only three investigations have been phased into AMP9. We have phased the 3 investigations into potential inland bathing waters into AMP9 since they relate to non-statutory requirements. Otherwise we have kept the number of investigations in line with the EA guidance. However, given the number of investigations and the deliverability issues (i.e. the capacity within the industry to deliver these), we have said in our phased plan that we may need an extra year to complete all these investigations.

This WINEP enhancement case considers a wide range of activities essential to help us understand drivers of future investment, as well as providing wider environmental benefits outside the typical treatment works or network upgrades. They are not as material as most other sections in this business case but are key to helping us prepare for the future.

We provide details of:

- one improvement activity which relates to how our assets interact with eel populations in the environment,
- Our proposal to facilitate a more integrated approach to managing and identifying strategic and project related opportunities for collaborative working with partner organisations to protect and enhance three internationally important harbours on the south-coast.
- A large programme of investigations which will inform AMP9 WINEP improvement programmes.

Figure 2-1: Wider environmental improvements and gaining understanding AMP8 totex by year



3. Protecting and Enhancing the Wider Environment

3.1. Need for investment

We have one improvement scheme that falls outside the more traditional wastewater improvement activities within our WINEP as outlined below.

Fish outfall screens (wastewater)

The Eels (England and Wales) Regulations 2009 came into force on 15 January 2010, and the requirements of the UK continue to apply post-Brexit. These requirements are to identify and address actions to halt and reverse the decline in the European eel stock, aiming to meet a target set for the number of mature adult eels leaving each river basin to return to spawn at sea.

The EA has been working across all sectors to identify how we can protect eel to help to restore the stock to a sustainable level. As a result of its work, we have been asked to include one enhancement proposal in AMP8 to meet the requirements of the Eels regulations. A new risk has come to light that our assets may be impacting eel migration. The improvement scheme is at Aylesford to prevent eel entrainment. Recent investigations have found that eels are accessing the site via the effluent outfall pipe and being trapped within process equipment. Interventions are required to prevent their continued entrainment.

25-year Environment Plan partnership working

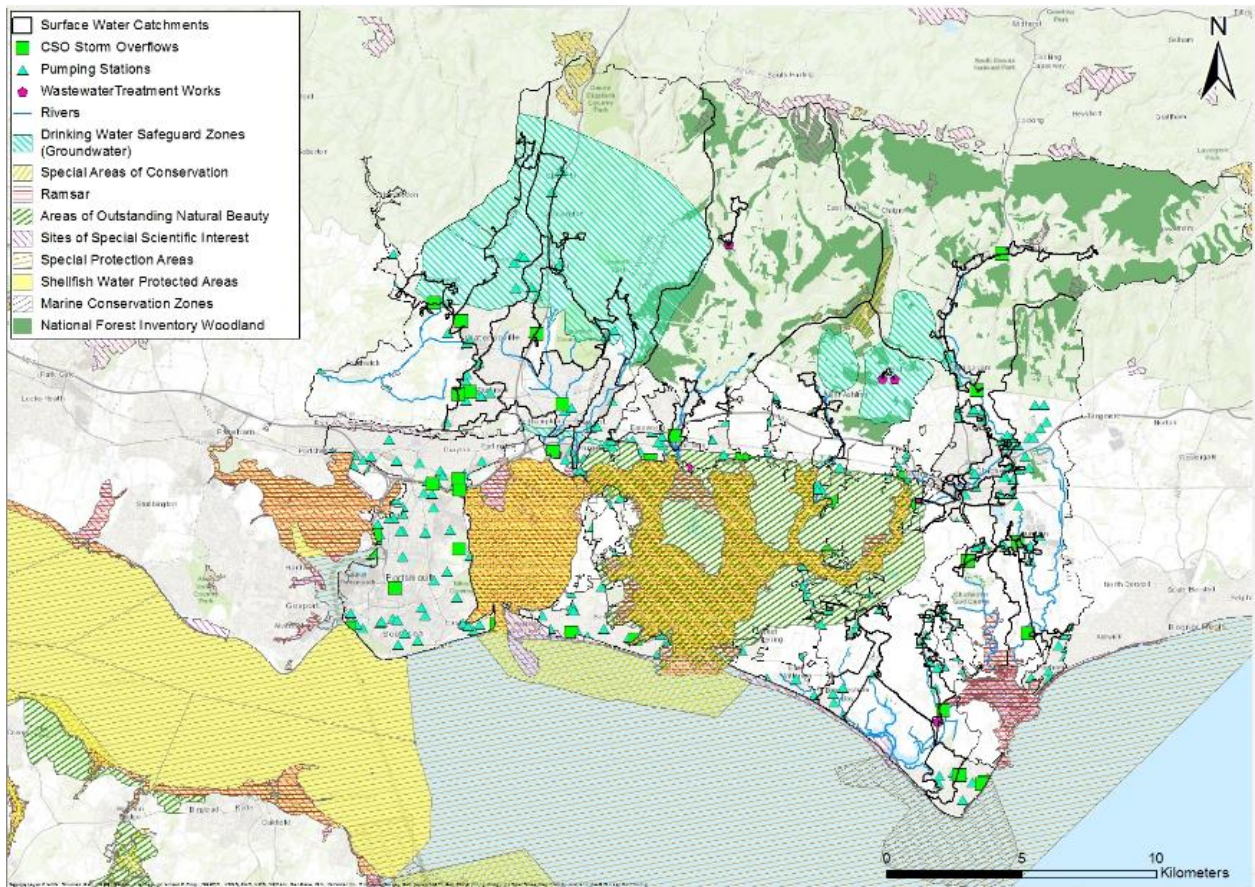
The rare chalk stream catchments of the south coast and the internationally significant harbours into which they drain are unique features of our operational area. Within our investigations programme we are developing a Three Harbours Integrated Strategy with partner organisations for the three internationally designated harbours on the south-coast:

- Chichester Harbour
- Langstone Harbour
- Pagham Harbour

The harbours of Chichester, Langstone and Pagham are afforded some of the highest level of environment protection in the UK. Chichester Harbour is one of the most important sites for wildlife and is globally important for migratory birds. This is recognised in its multiple nature conservation designations, and its status as an Area of Outstanding Natural Beauty (AONB), as shown in Figure 3-1.

Chichester Harbour is situated centrally within a landscape network connecting to the catchments serving Langstone Harbour and Pagham Harbour which are also designated for their nature conservation interests. The landscape across all three harbours, supports a wide range of priority habitats - coastal and floodplain grazing marsh, coastal saltmarsh, mudflats, reedbeds and saline lagoons.

Figure 3-1: Environmental and landscape designations surrounding the three harbours



We are operating to the permits issued by the EA, but the ecological condition of the harbours has still declined due to the synergistic and cumulative range of pressures from a wide range of sources. These impacts are particularly acute in Chichester Harbour where the most recent NE assessment has identified the site as unfavourable declining condition. (ref Natural England (2021) Condition review of Chichester Harbour, Natural England Research Report NERR090)

There is strong evidence of deteriorating habitat condition and conservation status within the estuarine habitats of the harbours, particularly linked to:

- Hyper-eutrophic levels of dissolved inorganic nitrogen in the harbour environment, leading to smothering of habitats, changes in benthic fauna, changes in prey distribution for wild birds;
- Wider water quality impacts linked to ammonia.
- Bacteria and faecal coliforms impacting on shellfisheries and recreational users.
- Synergistic negative effects from coastal squeeze and development, land use change and intensification, coastal process disruption, recreational pressure and climate change.

In AMP7 we have worked to reduce the impact of our activities on the area focusing on catchment, storm overflows and WTW schemes. However, these individual schemes are only a part of the solution to a much bigger problem which requires a faster and more integrated approach.

We proposed a project as an Advanced WINEP (A-WINEP) to facilitate a more integrated approach to reducing nitrate in groundwater, one of the key issues. This project for £445k is included in our cost tables (as an investigation cost), although the EA notified us on 6 September 2023 that our bid for funding has been

unsuccessful. We have not removed the proposed £445k cost for this project from our PR24 data tables at this late stage in the process. We will not carry out this project in AMP8.

However, we will continue with our work, funded through WINEP under the 25YEP investigation driver, with the partner organisations, to facilitate a more integrated approach to managing and identifying strategic and project related opportunities for collaborative working with others over an extended timeframe. This facilitation will enable us to co-ordinate our investments in the harbours areas with partner organisations, especially our work to reduce discharges from storm overflows, enhancing wastewater treatment and water quality monitoring.

John Nelson, Chairman of the Chichester Harbour Board:

“Chichester Harbour is one of the largest, most beautiful and environmentally important natural sites in southern England. It makes a major contribution to the regional economy, to recreation (both on and off the water) and to the health and wellbeing of local people. The Harbour is currently being threatened; environmentally and public health-wise by deteriorating water quality. The Three Harbours initiative to reduce sewage outflows and nutrient inputs is absolutely fundamental to the future of the Harbour and has our fullest support.”

Customers want nitrate remove schemes to target environmentally sensitive areas of interest

Removal of nitrates is much less widely known by customers as an issue vs storm overflows. Upon finding out more about it, it is important to customers that any measures taken on nutrient removal have maximum positive impact on the environment. Therefore, doing the work in environmentally sensitive areas of interest and where there are high environmental benefits makes a lot of sense – and these are prioritised by customers. We see the same story with stakeholders who understand the complexity in more detail, but equally want to see the environment benefits out first.

They want companies to work with other parties to address the issues When customers explore in more depth and find out that water companies are not the sole source of nutrients means that many customers also want to see other contributory parties playing a major role.

“I would say generally that that, by far, the biggest factor in this kind of issue is with the environment is agriculture. So I don't know if water companies can work more in tandem with farming.” Household customer

When going above basic requirements we hear strong support from customers. They tell us that to only put forward a plan that delivers minimum requirements is for most customers not showing ambition or aspiration – especially important for a private sector company. In testing of our 2025-2030 plans, customers told us that nutrient reduction, whilst impressive, may not have the necessary impact if agriculture, industry etc. don't also change their practices.

Our customers expect us to demonstrate environmental leadership. They see us and the sector as the experts, therefore we must use that expertise to evaluate the right options. Customers recognise the role they and others play, but expect the water sector and government to take the lead – and then they will play their part.

“It's not just our planet. If we're causing this damage, then we should do something about it. But it's not just water companies as it has to be a partnership with agriculture, industry and others responsible too.” Household Customer

Future Customers:

Their challenge to us and the industry

Through six waves of research, young people have build knowledge of:

How the water industry works.	Issues faced by the water industry.	Water industry priorities.
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Their focus

Reverse existing environmental damage.	Climate change.	Consequences of environmental degradation.
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Their view of the industry

Government and organisations should lead on environmental protection but currently it's not taken seriously enough. There is low trust in government and water industry.

I feel large corporations such as Southern Water should reduce more carbon than they create to repay for years of not caring about the climate

What are they not seeing

Young people who don't pay bills don't think of financial implications of prioritising the environment

Three key demands of the industry

- 1** We want change to be faster and more radical. The industry has the correct targets but is moving too slowly. We need systemic change to tackle the climate crisis.
- 2** We want consumption of water to be fairer to the planet. They want a symbiotic, rather than exploitative relationship between industry and the environment.
- 3** We want consumption of water to be fairer to each other. They want to ensure that everyone has access to water and that everyone plays an equal part in conservation.

I think it will be challenging to get major corporations/businesses to change in time... We need to be prepared for what lies ahead.

We do need to be prepared for climate change, and especially protecting people vulnerable to it. e.g. disabled, living in poverty



3.2. Best option for customers

Fish outfall screens (wastewater)

There are limited feasible options available for the prevention of eel entrainment. For river abstractions we have installed 3mm screens which are an effective, mature solution.

The options we considered and the selected option are outlined in the table below. Due to the similar costings between the two approaches considered, we have selected the established technology as our preferred solution.

Table 3-1 Eel protection options considered

#	Option	Decision	Whole life costs, £m	Description
1	Fine screen on effluent discharge pipe	Selected	2.1	2-D 3mm screen on effluent.
2	Hydraulic break provided between treatment processes and discharge	Considered	2.1	Hydraulic break so that eels cannot reach treatment processes through final effluent discharge

25-year environment plan

We have included in our business plan an investigation, working in partnership with others, to understand effective interventions to improve the internationally important Harbours environments.

We are a key member organisation of the 3 Harbour Strategic group and actively participate in the Three Harbours Technical Working group that meets regularly. Our investment to facilitate a more integrated approach is welcomed by the Chichester Harbour Trust and the Chichester Harbour Board, as well as West Sussex CC, EA and other members of the group. They will be involved in shaping and steering the investigation project as it develops.

Environment Officer, Langstone Harbour Board:

"I am pleased to see that Southern Water are planning investment in both Budd's Farm WTW and elsewhere in the catchment. Using nature-based solutions and a catchment approach to tackle stormwater will alleviate pressures on WTW sites and will enable Southern Water to process wastewater more efficiently and be less of a need to use CSOs to discharge untreated wastewater into our environmentally designated harbours. I am also pleased to see Southern Water invest in tackling high levels of legacy nitrates in groundwater, which have historically been a large issue in the Three Harbours not meeting WFD targets. Langstone Harbour is recognised nationally and internationally for its natural habitats and species. The Harbour provides refuge for thousands of migrating birds during the winter and is one of the most important places on the South coast for nesting birds in the summer. Langstone also provides a wide range of socioeconomic benefits, and its natural habitats provide a large carbon sequestration capability. I hope that this investment by Southern Water will improve habitat connectivity and biodiversity across the Three Harbours and wider catchment." July 2023.

Consideration of delivery through DPC

These proposals are relatively low materiality and not appropriate for delivery through DPC.

3.3. Cost efficiency

Our standard enhancement solution costing approach, described in [Part B of the SRN15 Cost and Option Methodology Technical Annex](#) was followed to estimate the costs of the wider environmental investment programme to protect eels from being entrained in wastewater treatment works. This approach involves pricing solutions based on the best available information for the expected scope and the cost of that scope, and applying standardised allowances based on analysis of historical data for indirect costs, risks and overheads. The level of design development completed determines the granularity of scope that is available and therefore the specific costing approach to use. Costs are predicted using our libraries of standardised and regularly updated cost models developed from historical cost data augmented with industry information where required. These cost libraries are benchmarked internally and externally by our Cost Intelligence Team to understand relative cost efficiency, and further benchmarking has been performed for the chosen option.

Fish outfall screens (wastewater)

As described above, we are proposing one scheme to install screens to prevent eels from entering the effluent pipe at Aylesford WTW. There is a specific problem on this site, where the hydraulic arrangement of the outlet works and recirculation pumping stations allows large numbers of eels to get into tanks throughout the site. While we have experience of installing eel screens on clean water intake sites in AMP7, we have not previously been required to install a 3mm 2-D eel screen on the outfall pipe from a wastewater treatment works. As a fallback in case a conventional eel screen proves to be unsuitable in this location, we have also identified a feasible alternative option to introduce a hydraulic break on the existing outfall pipe that the eels would not be able to bypass. The cost of both the eel screen and the alternative option are similar, and are in line with actual costs for installation of eel screens on clean water sites in AMP7, at £2.1m.

25-year environment plan

We have developed costs using our extensive knowledge of working with other organisations and developing an integrated approach. The costs for this work are £363k over the 5 years to facilitate other investments in the area.

3.4. Customer protection

Our WINEP proposals for partnership working and protection of eels do not link directly to a performance commitment. We will be monitored against delivery of our WINEP actions by the EA, but to additionally protect customers against non-delivery of these actions we propose an overarching WINEP price control deliverable (PCD). This WINEP PCD is described in [SRN38 Water Industry National Environment Programme \(WINEP\) Technical Annex](#).

4. Investigating Future Wastewater Needs

As part of the statutory WINEP process, we are required to investigate the impact of our activities on the environment. These investigations steer us to a better understanding of what mitigations we are responsible for and the costs and benefits of future improvements we will be required to make. Such investigations are an important aspect of the WINEP development process which help to ensure customers pay efficient costs for future improvements and that the solutions deliver optimal benefits.

4.1. Need for investment

For improvement investments to be included in the WINEP we needed high confidence of a link between our activity and the need for action to address water quality risks. Such links require robust data and to be supported by modelling where appropriate. To help us improve confidence, there are a number of WINEP drivers that require us to undertake investigations. These are statutory requirements and will inform future WINEPs. They therefore qualify for enhancement funding as part of the WINEP.

The level of confidence required will depend on the scale of the action required. An investigation rather than an improvement scheme is more appropriate when there is:

- low confidence in the failure to meet targets.
- low confidence there is link between the water quality or habitat condition and our activity.

In some areas, our assessment of environmental risks has shown there are risks to the environment but not conclusively demonstrated that our assets and activities need to change. It is here that we propose investigations, surveys, sampling, monitoring and modelling to provide a more comprehensive understanding of the environmental risks and whether the risks are increased by our activities. Such investigations will help to develop future improvement programmes as well as indicate where there is no clear benefit from us investing in making improvements.

We have discussed these with the EA and NE to ensure we are in line with their expectations and to demonstrate how evidence is insufficient to make improvements before these investigations are carried out.

The investigations are required due to a number of different drivers, such as WFD water quality status and the state of protected areas such as habitats sites and SSSIs, as shown in Table 4-1.

Table 4-1: Wastewater investigation lines in the WINEP

WINEP Driver	Description	Number of AMP8 investigations
25YEP_INV	25-Year Environment Plan. Facilitating a more integrated approach to managing and identifying strategic and project related opportunities for collaborative working	1
BW_INV2	Investigations of impact of SW for waters at risk of deterioration to a planning class of "Poor"	1
BW_INV5	Impact of SW assets on new areas likely to receive bathing water designation	0 (three phased into AMP9)
BW_NDIV	Investigations for waters failing their baseline bathing water class.	7
EE_INV	Assessing risk of eel entrainment and investigating actions to prevent it.	1
EnvAct_INV1	Continuous water quality monitoring – national investigations and trials	2
EnvAct_INV2	Continuous water quality monitoring – local complex inland clustering investigations	1
EnvAct_INV3	Continuous water quality monitoring – local coastal areas	1
EnvAct_INV4	Investigations on reducing storm overflow spills to protect the environment so that they have no local adverse ecological impact.	210
HD_INV	Investigating impact of our treatment works on protected habitats	13
MCZ_INV	Investigating impact of our treatment works on marine conservation zones	14
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	3
SSSI_INV	Investigating impact of our activities on SSSIs	44
SW_INV	Investigating impact of our activities on shellfish waters	3
WFD_INV	Investigating actions to improve water body status	43
WFD_INV_CHEM	Investigations and monitoring for emerging pollutants and chemicals in wastewater	13
WFD_INV_MP	Investigating the fate of microplastics through sludge treatment, in groundwater and in wastewater treatment	3
WFD_INV_N-Tal	Contributions to industry-wide investigation into reducing TAL level through effective nitrogen reduction	4
WFDGW_INV	Groundwater good status investigation relating to water resource or water quality	7
TOTAL		371

Chemicals and emerging contaminants monitoring, investigations, and options appraisals

We will be carrying out the AMP8 WINEP chemical investigations as part of the Chemical Investigations Programme (CIP). CIP is the UK water industry's response to current and emerging legislation on trace chemical substances in the water environment and has brought together the 10 large water and wastewater companies in England and Wales (including ourselves) with regulators (Defra, the EA and Natural Resources Wales).

The investigations led by CIP are conducted jointly by all of the water and wastewater companies to investigate a range of chemical substances, often contained in many domestic products, that find their way into sewage and biosolids and reach rivers and streams; who or what is responsible for them getting there in the first place; and what can be done to reduce concentrations, if needed.

To help to address this challenge, the 10 water and wastewater companies in England and Wales together have funded a long-term programme of work as shown in the Table 4-2 below. We have played a full part in these investigations which have included trials of treatment processes and comprehensive sampling of wastewater for a range of trace chemical pollutants in various locations across the region.

Table 4-2: Chemical investigation programmes

Phase	Total Budget	Timeline	Outcome
CIP1	£25 million	2010 - 2015	Determined the sources/pathways of chemicals getting into rivers via Wastewater Treatment Works and characterised treated wastewater in terms of these chemicals.
CIP2	£140 million	2015 - 2020	600 Wastewater Treatment Works prioritised for further investigation to better understand the potential scale of the challenge. Also carried out technology trials at Wastewater Treatment Works to determine potential solutions to remove trace chemical substances before treated wastewater is released into rivers.
CIP3	£25 million	2020 - 2022	Filling remaining gaps in knowledge, particularly around microplastics and understanding anti-microbial resistance in current wastewater treatment processes.

The EA has led the industry-wide process working with companies to identify substances to be monitored and investigated during AMP8. It produced an initial list of investigations for each water company that meets statutory requirements and also looks to reduce the loads of more persistent chemicals entering the environment rather than transferring pollution within or between catchments. The EA worked with us to define the scope of our investigations and to identify and agree the sites that have been included in the PR24 WINEP.

This process resulted in 13 investigations, one of which will study the fate of microplastics.

We are the only company with a site meeting the requirements for one of the types of trial in the national programme – the transport of microplastics from treated sewage effluent discharged to groundwater. This trial will require complex upgradient and downgradient monitoring of the chalk aquifer water quality around Morestead Road WTW.

The design of the investigations has been carried out through industry collaborative projects, and we have been asked to make a proportionate contribution as calculated by the EA and based on company size to ensure a fair contribution from each water sector customer across the whole of England.

Bathing and shellfish waters investigations

Our customer engagement shows bathing water quality to be a high priority in our region. Beaches and coasts in the southeast are a key driver of the local economy and our customers continue to view maintaining and improving bathing water quality as important. This was a theme that came out strongly in our DWMP stakeholder conversations where stakeholders and the public indicate that bathing water quality is a priority for them (see [Have your say \(southernwater.co.uk\)](https://www.southernwater.co.uk))

We propose 7 bathing waters investigations, to ensure our activities are not putting bathing water quality at risk at beaches that are not consistently meeting good or excellent bathing water standard and equally to understand the impacts from other parties.

Where there is not yet sufficient confidence or understanding of the reasons for failure to consistently meet microbial standards, we propose three shellfish waters investigations at Portsmouth Harbour, Langstone Harbour and Margate. They will characterise the impact of our assets on shellfish waters, undertake an options appraisal and identify and recommend actions, if any, to be included in the next AMP period. Our investigations will also characterise the reasons for deterioration/risk of deterioration in shellfish waters, undertake an options appraisal and identify and recommend actions to be included in the next AMP period. We will need to assess what we need to do to consistently meet the Shellfish Directions microbial standard within technical feasibility constraints.

Habitats investigations (SSSI, HD, MCZ, NERC)

We discussed with NE's its nature recovery list which considered the protected sites in our region and where risks to their condition were potentially linked to our activities. We agreed a programme of investigations to explore these further where evidence we and they have collected so far provides low confidence in that link.

Investigations are proposed based on a number of factors, for example:

- Water quality sampling by NE confirming water quality issues, but unclear as to source of the impacts
- Concern over treatment works effluent discharge locations in comparison to habitat
- High number of spills from storm overflows but no direct link found between the spills and poor condition of the habitat.

Investigating technically achievable limit (TAL) for nitrogen

We are keen to play our part in industry-wide trials investigating whether it is possible to consistently meet permit levels lower than the current technically achievable limit of 10mg/l total nitrogen (N). We have a number of sites with total N permits and are familiar with the process technologies to meet current TAL permits of 10mg/l. Nitrogen is the nutrient of concern in many of the protected areas in the south east and so we understand the importance of finding suitable processes to reduce the impact of our activities on the environment.

The national research proposals, pilots and trials are intended to better facilitate future regulatory decisions and to help all companies understand which interventions would result in the desired outcomes.

We propose four elements to the N-TAL trials:

- Contributing to industry wide data analysis and reporting
- Running pilot trials of [REDACTED] technology at Petersfield WTW
- Running full-scale [REDACTED] at Peel Common WTW
- Optimising the [REDACTED] at Milford Road Pennington WTW

These all help to inform the national trials.

Environment Act investigations (Storm overflows)

Discharges from storm overflows contain diluted sewage, which can contain harmful pathogens, such as viruses and bacteria. This can pose health risks to people who use our water bodies for recreation, and also lead to ecological harm due to their impact on water chemistry.

We have identified, by applying the EA WINEP guidance, the need for EnvAct_INV4 investigations covering 210 storm overflows in AMP8, out of 495 sites that require investigations within the full 25-year programme. An investigation is required where storm overflows discharge into or within 50m of a sensitive water feature in one of six categories:

- Reasons for Not Achieving Good (RNAG)
- Storm Overflow Assessment Framework (SOAF)
- Sites of Special Scientific Interest (SSSI)
- Internationally designated sites e.g. SAC/SPA/RAMSAR
- Chalk streams
- Sensitive areas (eutrophic).

We have also included storm overflows with a local priority issue as identified via RNAG or AMP7 SOAF investigations.

An investigation is required to confirm the actions and spill target necessary to protect the environment so that the storm overflow has no local adverse ecological impact. The investigations may lead to an improvement scheme in AMP8 or AMP9.

Overflows for which Urban Pollution Monitoring (UPM) analysis has been conducted and the results indicate that further improvements are required are prioritised for improvement actions. However, all storm overflows for which no UPM analysis has been conducted require further investigation and we have therefore included them as proposals in our WINEP. These investigations are a statutory requirement. They will help us establish the local requirements to meet the criteria of protecting the environment, particularly shellfish waters, and that our storm overflows have no adverse ecological impact.

Our AMP8 programme includes investigations that cover 210 storm overflows.

Eels investigation

As explained in section 3.1. above, we are required by the Eels Regulations to identify and address actions to halt and reverse the decline in the European eel stock. In line with EA guidance we have included an AMP8 investigation into wastewater treatment works discharges and water abstraction intakes and their impact on eels to identify if any improvements are required in future AMPs. We have added the costs for this investigation to our wastewater WINEP because the majority of the assets that we will be investigating are our wastewater treatment sites.

Water Framework investigations

To justify improvement investment we need sufficient evidence and technical justification to confirm that the action is needed to achieve, or contribute to the achievement of, the relevant water body objective in the river basin management plans, or improving the water body as part of the overarching goal of achieving good status.

In some cases we need corroborating evidence of an environmental problem (e.g. eutrophication where there is failure of a nutrient standard). There must also be a clear link to our assets, notably treatment works discharges, as causal factors in the failure/problem.

We have included investigations in the WINEP where water quality modelling carried out in AMP7 was inconclusive, and where flows and local conditions are complex and an improvement action could not be fully

justified. These WFD investigations cover sanitary determinands and phosphorus in particular. Investigations are proposed where there is insufficient data or no clear trend from previous studies and where conditions have changed since decisions were made on previous investment needs.

4.2. Best option for customers

Our AMP8 investigations programme will help to define the improvements we will undertake in future periods through monitoring and modelling to understand the needs in our catchments.

We are proposing investigations that cover emerging chemicals, assessing eel entrainment at wastewater treatment works, trials for nitrogen removal technologies, and a large number of studies looking into more standard sector matters, including the condition of habitats and WFD water quality status assessments.

We are familiar with procuring different types of investigation which vary according to the parameters of concern, the type of receiving water/habitat and complexity of hydrological interactions.

We have assessed the scope of AMP8 investigations through a GIS-based review of the location, knowledge of our assets and how they interact with the local environment. Based on this and our considerable experience of investigations, we have categorised each investigation into:

- desk-based studies only
- survey, monitoring or simple modelling
- multiple surveys and/or monitoring locations, and/or complex modelling.

The numbers in each category are reported in CWW20 and a sample of them shown in For each investigation type we assume a similar scope of work involved as has been successfully delivered in AMP7 investigations under the same driver or topic (i.e. an AMP8 SSSI investigation will require similar sampling and investigation to an AMP7 SSSI investigation, etc.).

The exact scope of each investigation will not be known until an initial scoping exercise has been undertaken. This is because each investigation will be bespoke to the available sampling locations and environmental risks under consideration. Despite such uncertainty, we have applied our experience to specify the expected requirements across the investigations programme and are confident this results in a suitable scope of work.

The WINEP investigations programme is suitable for enhancement funding because it will inform future WINEP enhancement investments.

Table 4-3. below. The complexity is driven by the number of our assets and interactions between them and the issue under investigation whether, for example, the performance of a bathing water or the condition of a habitat/SSSI. Complexity has also been moderated by reference to new guidance on Transitional and coastal (TRaC) waters.

For each investigation type we assume a similar scope of work involved as has been successfully delivered in AMP7 investigations under the same driver or topic (i.e. an AMP8 SSSI investigation will require similar sampling and investigation to an AMP7 SSSI investigation, etc.).

The exact scope of each investigation will not be known until an initial scoping exercise has been undertaken. This is because each investigation will be bespoke to the available sampling locations and environmental risks under consideration. Despite such uncertainty, we have applied our experience to specify the expected requirements across the investigations programme and are confident this results in a suitable scope of work.

The WINEP investigations programme is suitable for enhancement funding because it will inform future WINEP enhancement investments.

Table 4-3: Our assessment of the complexity of a sample of AMP8 investigations

	High	Medium	Low
25 Year Environment Plan	1	0	0
Marine conservation zones	1	12	1
Habitats	4	4	5
SSSI	12	25	4
Bathing waters	1	1	6
Shellfish waters	1	2	0
NERC	0	1	0
Chemicals	0	2	1
Eels	0	1	0
WFD, WFD Nitrogen TAL trials and WFD microplastics investigations	2	46	2
Totals	22	94	19

Consideration of delivery through DPC

Our WINEP investigations are not sufficiently material to qualify for DPC by default. They are dispersed and varied activities that we do not consider appropriate for third party delivery.

4.3. Cost efficiency

Our approach to costing investigations is primarily informed by outturn costs of AMP7 investigations. We have assessed outturn investigation costs in areas where we will be carrying out a similar scope of investigation in AMP8 to produce mean outturn costs per study. We then vary our cost estimate according to complexity (as described in section 4.2 above) to develop our AMP8 cost estimates. Based on our experience of the variation in costs during AMP7 investigations we have assumed high complexity investigation costs are 25% greater than the mean AMP7 investigation cost, and low complexity costs 25% lower. There is a wide variation in costs due to the need for monitoring to collect data (often for at least 12 months) and for modelling, hence the need to apply a +/- 25% factor. This approach allowed a cost per study, or cost per site, to be derived, as shown in



Table 4-4: Outturn costs of investigations and ranges used to inform AMP8 costs..

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AMP6/AMP7 Topic	Nr. Sites in AMP6 and AMP7 programmes	Project outturn, including AMP6, £	Lower estimate of cost per study (low complexity), £	Average cost per study (medium complexity), £	Higher estimate of cost per study (high complexity), £
		2022/23 prices	-25%	Average	25%
CIP3	14	1,795,003	96,161	128,214	160,268
BW	37	3,207,292	65,013	86,684	108,354
SSSI	6	1,348,946	168,618	224,824	281,030
UPM	7	2,331,405	249,793	333,058	416,322
WFD	6	1,246,010	155,751	207,668	259,585
SOAF	61	3,078,232	37,847	50,463	63,079
SW	10	1,168,463	87,635	116,846	146,058
MCZ scoping	1	120,399	90,299	120,399	150,498

We asked our AMP7 investigation suppliers to review our AMP8 estimates at high level and check our assumptions to increase our confidence in the costs we are proposing in our business plan. This led to some changes in cost estimates, for example increasing costs of the Swale habitats investigation by 50% to account for the complexity of marine monitoring compared to a typical habitat investigation.

There were some exceptions to this overall approach, notably a complex MCZ investigation at Pagham Harbour and a similarly complex SSSI investigation at Chichester and Langstone Harbours – this was due to a difference in the evidence base and therefore assumed detail of the study. Pagham had an AMP7 scoping study drawn up looking into the likelihood of the site failing due to our operations. The outcome of this was that a detailed study was required. This further investigation requires:

- High frequency monitoring of water quality
- Hydrodynamic model development for the harbour (including model simulations to investigate the impacts of different Pagham Harbour entrance morphologies)
- Bathymetry survey of Pagham Harbour to provide data for the hydrodynamic model
- Seagrass survey of the entire harbour establishing coverage and health.
- Saltmarsh survey of Pagham Harbour to determine extent and identify if accretion is occurring
- Sediment chemistry and particle size analysis survey
- Benthic survey to identify the presence and location of other designated features
- Catchment walkovers and stakeholder liaison:
- SIMCAT model update to determine source apportionment
- Scenario modelling using the hydrodynamic and other models, to determine the relative impact of SWS assets on the MCZ features in Pagham Harbour,

The cost estimate for this study for Pagham Harbour is £785k.

It has been assumed that for the remaining sites, a scoping study, similar to the AMP7 Pagham study, is required in the first instance. These costs were then subject to the same complexity assessment as other studies.

We explain below where costs for bespoke investigations were developed using a different approach.

We have also used the AMP7 sampling costs as a basis of determining total sampling costs in conjunction with the preliminary technical specification for CIP4. We have assessed the numbers of samples required and calculated the costs of analysis using assumptions of difference in the specific determinand sample costs. In addition we reviewed the AMP7 ratio of cost between sampling and laboratory work, and identified that sampling costs around 25% of the total laboratory costs. We used the same ratio to determine a total cost for the AMP8 programme.

Storm overflow investigations

Each storm overflow with an improvement scheme under the 'no local adverse ecological impact' EnvAct_IMP2 driver in the PR24 WINEP needs to have an investigation under the EnvAct_INV4 driver. These investigations need to include a UPM study following the Urban Pollution Management framework (UPM Manual Version 3 (fwr.org)). We have included these investigations in our PR24 WINEP. These need to be completed by April 2027 in order to inform the works in PR24 and PR29.

The cost for a storm overflow investigation is dependent upon the availability of hydraulic models of the network, the quality of the model, the data availability and detailed assessments of the receiving water (e.g. flow rates, WQ classifications, WQ sample data).

We have used our knowledge of model availability and quality in our cost assessments for these investigations. The EnvAct_INV4 investigations replace the previous AMP7 storm overflow drivers, and as such the costs for delivery were also calculated based on experience of delivering these previous studies.

We developed the costs for low and high complexity investigations. The low complexity is based on the Storm Overflow Assessment Framework (SOAF) investigations in AMP7, and the complex based on UPM studies completed in previous AMPs. We determined the average cost of the L1 and L2 UPM component of the SOAF studies and averaged this cost across the number of assets in the study to get an average cost per asset. Similarly, we determined the total outturn costs of the AMP7 UPM studies and averaged the cost per asset to derive an approximate cost per study for each storm overflow. This provided a cost estimate for the high complexity level 3 and level 4 UPM studies. The cost estimation is set out in Table 4-6. We then applied knowledge of model availability and quality in a process to create three categories (simple, moderate and complex) and applied the costs accordingly. The cost of moderate investigations is the average cost of the SOAF and the UPM. This is because SOAF activities may be required for some assets and therefore costs need to be captured.

Table 4-6 Calculation of costs for storm overflow investigations

Source	Complexity	Includes	Average Cost Per Asset, 2022/23 prices
SOAF	Low (L1 or L2)	<ul style="list-style-type: none"> Sewer flow survey Network reverification Use of simple WQ model with assumed WQ data SOAF phase 1, 2, 3 (UPM is only 1c and 2c) – this accounts for ~70% of the cost Overheads and project management 	£28,835 (average UPM component cost from SOAF investigation)
UPM Study	High (L3 or L4)	<ul style="list-style-type: none"> Sewer flow survey Network reverification Land access, WQ monitoring (sondes), auto-sampling in CSOs Detailed WQ modelling Overheads and project management 	£80,449

4.4. Customer Protection

Our WINEP investigations do not link directly to a performance commitment. We will be monitored against delivery of our WINEP actions by the EA, but to additionally protect customers against non-delivery of investigations we propose an overarching WINEP price control deliverable (PCD). This WINEP PCD is described in [SRN38 Water Industry National Environment Programme \(WINEP\) Technical Annex](#).

5. Conclusion

Section	Key Commentary
Introduction & Background	<p>Our AMP8 WINEP provides an opportunity to make step change in our knowledge of the environmental impacts and the actions we may need to take in AMP9 to meet our environmental obligations.</p> <p>There are a significant number of investigations to complete in AMP8, as a result of the requirements set out in the EA WINEP Guidance and the Defra SODRP.</p> <p>We have phased 3 investigations into potential inland bathing waters into AMP9. Otherwise we have kept the number of investigations in line with the EA guidance. However, given the number of investigations and the deliverability issues, we have said in our phased plan that we may need an extra year to complete all these investigations.</p>
Need for Enhancement Investment	<p>The need for investigations is set out in the EA's WINEP guidance to develop a statutory programme to deliver our obligations under the WISER.</p> <p>Where it is suspected or confirmed that we are having an impact on the environment, and the solution is uncertain, we have an obligation to complete an investigation to inform improvements the following AMP. We have developed the programme of investigations with the EA and NE.</p> <p>For storm overflows, the investigations follow the instructions from the EA, and Defra's Storm Overflow Discharge Reduction Plan. These investigations are required to confirm the spills targets to prevent harm to the environment, and inform work in AMP8 and for PR29.</p>
Best Option for Customers	<p>The investigations are supported by our customers to monitor, explore and understand the impacts on the environment and actions to take to protect and enhance the environment.</p>
Cost Efficiency	<p>We have challenged our costs using benchmarks from:</p> <ul style="list-style-type: none"> • Internal outturn data • Third party water industry-wide data • Applying top down efficiencies to our costs; • APR outturn data and • Ofwat's PR19 benchmark models where appropriate. <p>In addition we have applied efficiency assumptions to future costs compared to historical costs.</p> <p>We have a long history of studies and investigations and have worked with existing suppliers to develop accurate cost estimates based on the understand of scope and activities known at the time of developing the WINEP.</p>
Customer Protection	<p>Customer protection is covered elsewhere in our PR24 business case.</p>