



# Emerging regional plan for consultation

Appendix 6: Environmental  
Destination

January 2022

## Appendix 6. Environmental Destination

Our Revised Water Resources Position Statement (February 2021) included an initial review of the national 'Environmental Destination' scenarios. Since then, we have built on this review to improve our understanding of the potential long-term abstraction pressures in our region, and the implications of these for our regional plan. In turn, alongside other workstreams, this work will serve as the basis for continued engagement with stakeholders to develop a shared ambition for the region. This appendix sets out our progress to date, at the January 2022 emerging plan consultation stage, including:

1. Overview of the national model scenarios
2. AMP7 WINEP status and links to Environmental Destination
3. Catchment Dashboards (current versions included alongside this appendix)
4. Identification of Environmental Destination scenarios
5. Developing our Ambition

### Overview

The EA national water resources scenarios illustrate potential changes in abstraction that may be required to ensure the water environment is sufficiently protected in the long-term. The potential changes are based on a modelled prediction of alterations in the hydrological cycle linked to climate change, changes in water demand and (in the case of the 'Enhanced' scenario) enhanced environmental flow targets at ecologically valuable or sensitive sites<sup>1</sup>. Using this information, the model estimates the reduction in abstraction required by each sector to ensure the long-term needs of the water environment are maintained.

The EA has been clear that these modelled scenarios are not intended to be confirmed final figures for any catchment. Instead, they are intended to start a broader conversation with stakeholders and regulators to understand what changes to abstraction may be required in the long term. Consequently, at this stage in the planning process the model outputs are the basis for:

- initial engagement with stakeholders and regulators to validate the national figures with local knowledge
- beginning (or continuing) dialogue with catchment partners to explore long-term ambitions
- selection and prioritisation of catchments requiring further investigation
- selection of scenarios to sensitivity test within the regional plan.

Our approach is consistent with that set out in the final guidance<sup>2</sup> and latterly the joint EA/NE/Defra letter to regional groups<sup>3</sup> (plus further communication from the EA<sup>4</sup>), on expectations around long term Environmental Destination. Sub-appendix A in this document outlines how we anticipate our final plans to align with these expectations.

### Review of national model

The national model estimates reductions in abstraction that might be required<sup>5</sup> by 2050 under the Business as Usual and Enhanced scenarios for each CAMS ledger area (broadly equivalent to WFD management catchment). **Table A6.1** summarises the estimates provided for the Water Resources North (WRnN) region, for both of these abstraction scenarios, under the Future Predicted (recent actual plus growth profiles) demand scenario. This shows estimates of potential reductions in the region of ~115Ml/d (BAU) and ~400Ml/d (Enhanced)<sup>6</sup>. In this and subsequent sections

<sup>1</sup> Including Protected Areas, Sites of Special Scientific Interest, chalk rivers and principal salmon rivers

<sup>2</sup> Long-term water resources environmental destination - Guidance for regional groups and water companies. October 2020 v1

<sup>3</sup> Defra, Natural England, Environment Agency – letter issued to regional groups, 12th August 2021.

<sup>4</sup> Environment Agency – Item from Environment Advisory Group meeting agenda 01/11/21: Expectations for long term environmental destination in final plans

<sup>5</sup> The estimated regional potential reduction in abstraction to recover to environmental flow indicators in low flow (Q95)

<sup>6</sup> We have taken the Future Predicted (FP), rather than Fully Licensed (FL), scenario as this is considered as a more representative long-term scenario. Should the regional or water company plans identify that licensed abstraction may increase above FP (yet within FL) during the planning period, such that this could materially increase the risk of waterbody flow non-compliance, these changes would be considered and assessed in line with the relevant WINEP and/or WRPG (water resources planning) guidelines.

we set out how, and justify why, our regional scenario for Environmental Destination differs from the both the BAU and Enhanced scenarios.

It can be seen from **Table A6.1** that the majority of reductions presented in the national model sit within relatively few catchments and, indeed, these catchments are largely in Yorkshire. Within the Yorkshire Grid zone, the estimated reductions range from 84MI/d (BAU) to 354MI/d (Enhanced). This includes an estimated reduction of ~200MI/d (Enhanced only) of public water supply (PWS) from the River Derwent catchment. The estimated reductions within the Kielder zone are 28 MI/d (BAU) – 41 MI/d (Enhanced). The Berwick and YW East Surface zone estimated reductions are 2MI/d and 1MI/d respectively, under both scenarios.

The relative sectoral use associated with the long-term deficits is summarised in our catchment dashboards for each management catchment. At the regional scale, PWS accounts for over 80% (BAU) and 90% (Enhanced) of the modelled deficits in the Future Predicted scenario. Non-PWS sector growth profiles are based on the best estimate growth factors in the Water Resources National Framework (WRNF)<sup>7</sup>.

**Table A6.1 WRNF 2050 estimated abstraction reduction (all sectors) by WFD Management Catchment**

Management Catchment	Business as Usual (MI/d)	Enhanced (MI/d)
Derwent	15	205
Idle and Torne <sup>8</sup>	40	60
Hull and East Riding	12	54
Aire and Calder	8	23
Tees	16	17
Wear	4	16
Swale, Ure, Nidd & Upper Ouse	7	9
Northumberland Rivers	8	8
Till	2	2
Wharfe and Lower Ouse	1	2
Don and Rother	1	1
Esk and Coast	1	1
Tyne	0	0

The scenarios are based on various assumptions around sectoral use/growth and the appropriateness of environmental flow targets. Through engagement with stakeholders, we are reviewing and validating these assumptions for each management catchment, though some relevant caveats across all catchments include:

- A significant proportion of public water supply within WReN is from impounding reservoirs. The national model does not account for the influence of reservoirs on downstream environments because these issues have typically already been addressed through WFD Heavily Modified Waterbodies and No Deterioration drivers/mitigation measures. Therefore, in catchments which are significantly influenced by impounding reservoirs – such as the Aire, Calder, Nidd and Don – the EFIs may not necessarily reflect the complex environmental requirements in these river systems.

<sup>7</sup> Understanding Future Water Demand Outside of the Water Industry, Defra (2020)

<http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=20172>

<sup>8</sup> The total estimated reduction for the Idle and Torne CAMS ledger (97MI/d BAU / 117MI/d Enhance) includes all WFD operational catchments in the Idle and Torne management catchment, noting only the River Idle and Isle of Axholme operational catchments are within the WREN boundary. Based on an initial review of the data and for the purposes of this report we have assumed that the WReN boundary reductions are ~40MI/d (BAU) and ~60MI/d (Enhanced) respectively.

- The above comment with regards to the limitations of the national model also applies to regulated rivers, such as the Tees and Wear.
- The 2050 environmental destination scenario is based on a single climate change ensemble member from UKCP09. However, climate change impacts are already built into the WREN supply-demand balance (following UKWIR guidance and using more recent data sources, including stochastic modelling) and therefore if the national model figures are taken at face value there is a risk of double counting the impacts of climate change.
- The abstraction sensitivity bands assigned to each waterbody under BAU and Enhance are based on environmental requirements. However, this does not necessarily account for other river uses/users and therefore the EFIs may not represent the most appropriate flow target in rivers used for navigation, amenity, flood protection, etc.
- AMP7 Water Resources WINEP schemes are ongoing; many of these were included as investigations following the EA's Sustainable Catchments review (a predecessor to the longer-term environmental destination scenarios). Therefore, some uncertainty will remain in relation to the impacts of abstraction in these catchments until these investigations are concluded.

## AMP7 WINEP Status

The outcomes from ongoing AMP7 Water Resources WINEP investigations (**Table A6.2**) could influence the magnitude of any loss to PWS DO (deployable output) in the regional plan. Until the investigations are completed (see table for statutory deadlines) the outcomes will remain uncertain and for this reason, we have not included any sustainability reductions linked to these investigations in the pre-reconciliation supply-demand balance.

Many of the waterbodies considered within the scope of the AMP7 investigations have also been identified as having potential long-term flow deficits in the national Environmental Destination scenarios. Where relevant, the AMP7 investigations will consider the long-term flow pressures linked to climate change to ensure consistency with the regional plan. We await further guidance from the EA on the inclusion of the Environmental Destination component in the AMP7 investigations and therefore this remains a source of uncertainty in the plan. The scope of any overlapping links between AMP7 investigations and Environmental Destination are indicated in **Table A6.2**.

The AMP7 water resources investigations consider various river, reservoir and groundwater sources. For most of these sources, the outcomes from the investigations are likely to have local rather than regional water resources implications, and therefore these will be considered through water company WRMPs rather than the WReN Regional Plan. However, we recognise that collectively the outcomes from these investigations – in particular for the larger and/or strategically important abstractions – could materially influence the regional water resources position. For this reason, we will include sensitivity-testing around the potential impact of larger sustainability reductions linked to the AMP7 WINEP investigations alongside additional or other potential reductions identified through Environmental Destination in the plan.

It should also be noted that in July 2021 the EA issued its draft WINEP methodology for consultation. The proposed methodology seeks to better align the WINEP with the regional planning framework and is designed to support the delivery of wider environmental outcomes (e.g., net zero, catchment resilience) and accommodate more catchment-orientated approaches over the longer-term. We will work collaboratively with the EA in developing the WINEP framework and the envisaged interaction with the regional planning process.

Table A6.2 AMP7 Water Resources WINEP investigations and links to Environmental Destination

Water Company	Title	Statutory completion date	Scope of investigation	Associated Management Catchment	Potential links to ED
YW	Hull Wellfield	March 2025	WFD ND investigation linked to GW abstraction	Hull & East Riding	GWDTE / ASB3 (chalk)
	Selby Wellfield	March 2025	WFD GW balance investigation	Aire and Calder	ASB2 / GWDTE
	Wolds Wellfield	March 2025	WFD ND investigation linked to GW abstraction	River Derwent / Hull & East Riding	ASB3 (chalk) / CSMG
	Doncaster Wellfield	March 2025	WFD GW balance investigation	Idle & Torne	GWDTE
	River Ouse	March 2025	WFD ND surface water risks linked to fully licensed operation.	Swale, Ure, Nidd and Upper Ouse / Wharfe and Lower Ouse	-
	River Derwent	Descoped from AMP7	Impact of YW abstraction on river function in Lower Derwent SAC	Derwent	ABS2 / CSMG targets in Lower Derwent
	Scammonden	March 2022	HMWB investigation – catchwater system in upper Colne valley	Aire and Calder	ASB3
	Little Don	March 2022	HMWB investigation – impounding reservoirs in Little Don (River Don headwaters)	Don and Rother	ASB3
	Scout Dike	March 2022	HMWB investigation – impounding reservoir in River Don headwaters	Don and Rother	ASB3
	Bellerby	March 2022	WFD surface water risks linked to GW abstraction	Swale, Ure, Nidd and Upper Ouse / Wharfe and Lower Ouse	GWDTE
NWL	West Beck	March 2022	Investigation to understand low flow impacts in SSSI	Hull & East Riding	CSMG/ ASB3 (chalk)
	North Tyne	March 2022	HMWB investigation –long-term effect on habitats downstream of Kielder Reservoir	Tyne	-
	River Derwent	March 2022	HMWB investigation – adaptive management	Tyne	-
	River Font	March 2022	HMWB investigation	N'umberland Rivers	-
	Smiddy Shaw and Hisehope	March 2022	HMWB investigation	Tyne	-
	Waskerley catchwaters	March 2022	HMWB investigation	Wear	-
Hartlepool	River Till / Fell Sandstone	March 2022	WFD investigation and Options Appraisal (Outstanding AMP6 NEP Investigation – Fully Licensed Test Pumping)	Fell Sandstone	-
	Skerne WFDGW Investigation	March 2022	Abstraction impacts to GWB and SWB Investigation - Skerne area	Skerne Magnesian Limestone / Tees Management Catchment	-

## Catchment Dashboards

For each WFD management catchment within WReN with estimated long-term deficits above 2Ml/d, we have developed dashboards to summarise the national model outputs, validate these with local knowledge and ultimately inform the development of the regional plan.

The catchment dashboards build on an earlier iteration of dashboards which considered current abstraction and pressures. Following emergence of the Environmental Destination guidance, and through consultation with stakeholders, it was considered more appropriate at this stage to focus on the long-term environmental pressures (specifically water availability) as informed by the national scenarios. We are continuing to develop the dashboards as part of the regional planning process and through consultation with regulators and stakeholders. Each dashboard includes:

- Spatial extent of abstraction with the catchment.
- Total and relative abstraction by sector (recent actual and future predicted).
- Modelled water balances within the management catchment by scenario (Business as Usual / Enhance) with those waterbodies with modelled long-term deficits >1Ml/d highlighted.
- Model-estimated reductions to recover to environmental flow targets by sector, by scenario.
- Initial local validation / stakeholder comment.

The draft dashboards accompany this January 2022 publication, and a summary of initial conclusions is provided in **Table A6.3** below. Management catchments with Enhanced scenario environmental deficits greater than 2Ml/d have been prioritised for review; where this initial review has identified potential long-term abstraction pressures and associated regional water resources implications, these have been included for scenario-testing. Catchments with the largest modelled long-term deficits will be taken forward as priority catchments for further engagement (in addition to sensitivity testing)<sup>9</sup>. We will also work with WRW and WRE to improve our understanding of the long-term pressures in the Idle & Torne management catchment.

It is important to note that at this stage of the regional planning process the dashboards summarise nationally modelled datasets as a basis for detailed review and engagement; they are not representative of our baseline or final supply-demand balance. We anticipate that the dashboards will be further iterated following publication of our emerging plan in January 2022 to reflect ongoing investigation and stakeholder engagement.

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<sup>9</sup> Technical workshops were held between Yorkshire Water, the Environment Agency and Natural England in November 2021 to examine the national modelled scenarios for three priority catchments (Derwent, Hull & East Riding, Aire & Calder). Key outcomes from these workshops are included in Table A6.3.

Table A6.3 Initial review of Environmental Destination scenarios by WFD management catchment

WFD Management Catchment	Summary
Derwent	<p>Long-term modelled flow deficits are identified in the downstream extent of River Derwent under BAU (recovery to ASB2) and ENH (recovery to CSMG) scenarios, both of which are linked to PWS abstraction. For the ENH scenario the national model estimates reductions in abstraction &gt;200MI/d would be required to achieve the CSMG targets for Lower Derwent SAC.</p> <p>The PWS abstraction associated with the long-term deficit was originally included in Yorkshire Water's (YW's) AMP7 water resources WINEP. However, it was descoped through agreement with the EA and NE, because there are other issues in the catchment – specifically the degree of impoundment and level control in the downstream reaches – that need further consideration before any review of the influence of the abstraction. Through the regional plan we will seek to understand the status of these issues and the implications for long-term water resources planning. We will also include sensitivity testing around the water resources impacts of these scenarios.</p> <p>A workshop between Yorkshire Water and regulators in November 2021 considered the future baseline of the Lower Derwent and in particular the role of two impounding structures (both owned by the EA), the presence and operation of which fundamentally influence the hydrological regime of the Lower Derwent protected areas. It was agreed that although no decision has been made on whether these structures will be retained in the long-term, their removal or modification in the future remains a possibility. Under the existing (impounded) conditions, however, neither the BAU (ASB3) nor Enhance (CSMG) scenarios are appropriate – these standards do not apply to level-controlled watercourses - and on this basis we propose to exclude any reductions in PWS abstraction from the Lower Derwent in our regional scenario. We will continue to engage with regulators and other stakeholders on this issue as the regional plan evolves.</p> <p>Some local waterbody deficits under BAU and ENH are also identified; these will be reviewed with stakeholders and regulators to establish the need for further investigation, though it was agreed with regulators at the technical workshops that these localised issues were unlikely to have any material influence the regional supply-demand balance.</p>
Aire and Calder	<p>Long-term modelled flow deficits are identified in i) the headwaters of the Aire/Colne/Calder and ii) the downstream extent of Aire prior to the confluence with the River Ouse. The BAU deficits are linked to recovery to ASB2/3, with additional ENH deficits linked to CSMG (Eshton Beck) and GWDTE (mid-Aire).</p> <p>The headwater catchment deficits are in waterbodies significantly influenced by impounding reservoirs/catchwaters, one of which is currently under investigation in YW's AMP7 WINEP. Other headwater waterbodies will be reviewed with stakeholders to understand the requirement for further investigation through the next WINEP or other drivers, though in the workshop with regulators it was agreed that these localised waterbodies deficits were unlikely to materially influence the regional supply-demand balance.</p> <p>It is envisaged that flow requirements in Eshton Beck (comprising Craven Limestone Complex SAC) will be considered by the EA and CRT through the New Authorisations Programme. The conclusions will be fed into the regional plan once the programme has been completed.</p> <p>There are various riparian SSSIs on the River Aire which associate with the ENH driver in various waterbodies in the mid-Aire. Further investigation will be required to understand the long-term flow requirements to support these sites, although it was agreed at the workshop that the outcome of these investigations would be unlikely to have any material influence the regional supply-demand balance.</p> <p>Abstraction and licensing on the mid- and lower-Aire is complex. The EA is currently updating its CAMS ledger for this area which is likely to improve the understanding of long-term flow pressures. In addition, it was identified during the workshop that at least one large abstraction licence for energy use has recently been revoked but that this is unlikely to be reflected in the WRNF scenarios used to support our Environmental Destination. Ongoing WINEP investigations will improve the understanding of surface water impacts from various YW groundwater abstractions in the Selby Wellfield. However, there will</p>

remain significant uncertainty around long-term water use, in particular in relation to the energy sector in the Lower Aire (note: estimated abstraction reductions for the Power Sector to recover to the EFIs increases from 0 MI/d to 36 MI/d when moving from the FP to FL scenario). Further engagement with the energy and other sectors will be required to improve understanding of the long-term water requirements in the catchment and any impact on the regional supply-demand balance.

On the basis of the evidence reviewed to date, for this iteration of the regional plan we have assumed that there are no reductions in abstraction required to achieve the Enhanced scenario, although sensitivity-testing of the loss of PWS DO linked to the groundwater abstractions currently under investigation in the WINEP will be undertaken.

<p>Hull and East Riding</p>	<p>Localised waterbody deficits are identified in the Upper Hull catchment (namely West Beck Upper and Lowthorpe/Kelk/Foston Becks) associated with recovery to CSMG targets in the Hull Headwaters SSSI. Various ongoing WINEP investigations will improve our understanding of any abstraction-related impacts and the implications for long-term water resources planning in the upper Hull catchments. The Hull Headwaters SSSI is likely to be the priority catchment for Yorkshire Water in terms of supporting progression of the emerging CaBA Chalk Stream Restoration Strategy, although for this catchment the restoration focus is likely to be as much, if not more, focussed on water quality and habitat restoration activity as on abstraction.</p> <p>We will carry out sensitivity-testing of the loss of PWS DO linked to the groundwater abstractions currently under investigation in the WINEP, in order to explore the potential impacts on the regional plan.</p> <p>Note: the CAMS ledger for the Upper Hull includes the tidal extent of the River Ouse / Humber Estuary around Howden. This waterbody has a modelled deficit though it was confirmed in the workshop with regulators that due to the tidal nature of this waterbody the CAMS/EFI framework for assessing surface water availability is not appropriate. Discounting this tidal waterbody and focussing specifically on waterbody balances in the Upper Hull tributaries, the long-term estimated required abstraction reductions are likely to be lower than the 54MI/d stated in the WRNF Enhanced Scenario. As is the case with Yorkshire Water's River Derwent abstractions, the level-controlled nature of the reach from which water is abstracted in the River Hull for PWS is such that the EFI-based targets may not necessarily be appropriate. The ongoing West Beck WINEP scheme is likely to improve the understanding of the impact of abstraction within the Hull Headwaters SSSI although further investigation beyond the scope of this scheme is likely to be required to understand the impacts of abstraction more broadly within the catchment in support of the Enhanced Scenario.</p> <p>On the basis of the evidence reviewed to date, for this iteration of the regional plan we have assumed that there are no reductions in abstraction required to achieve the Enhanced scenario, although sensitivity-testing of the loss of PWS DO linked to the groundwater abstractions currently under investigation in the WINEP will be undertaken.</p>
<p>Swale Ure Nidd and upper Ouse</p>	<p>Localised waterbody deficits are identified in tributaries of the River Ure and River Swale. The localised waterbody deficits identified in the River Burn (tributary of River Ure) were initially identified in the EA's 2016 Sustainable Catchments review and included in YW's AMP7 WINEP as HMWB mitigation measure implementation projects.</p> <p>The long-term deficit identified in Bedale/Newton/Burton Bk from Source to Brompton Bk (tributary of River Swale) was initially subject to a WINEP investigation by YW to understand the surface water impacts associated with a groundwater abstraction. This investigation has since concluded no impacts from abstraction and the PWS licence will be formalised in AMP7. Further investigation will be required to understand the long-term flow deficit identified in the River Skell.</p> <p>At this stage, based on the initial review of the environmental destination scenarios we do not consider there to be any scenario-testing required within this management catchment.</p>
<p>Idle and Torne</p>	<p>We will work with WRW and WRE to improve our understanding of the long-term pressure in the Idle &amp; Torne management catchment. Ongoing WINEP investigations by YW in the Doncaster Wellfield should improve our understanding of surface water-groundwater interactions and the implications for long-term flow pressures in this part of the region. On further inspection of the national model scenarios, the majority of estimated abstraction reductions to recover to the EFI under both BAU and Enhance are located within the WRE region; for this reason we have assumed no abstraction reductions will be required in</p>

	<p>WRSE. Scenario-testing of Environmental Destination is not proposed at this stage, though may be required at a later stage subject to further review and engagement with WRW/WRE.</p>
Tees	<p>A Minimum Maintained Flow (MMF) ensures that large PWS abstractions on the main fluvial Tees are supported and that there are no concerns about ecological impact from abstraction at very low flows (Q95) on the main river. As a result of the MMF, licencing restrictions are considered on a case-by-case basis but are not usually applied to demand on the main fluvial reach of the Tees. EA Area staff are currently reviewing the impacts of river regulation on the River Tees and investigating if any modifications are needed to the EFI currently applied to Assessment Point 5 (based on recovery to ASB2). This work is not expected to realise any regulatory change to individual licenses or operation of river regulation but would validate WR modelling assumptions.</p> <p>One area of specific availability concerns is the Greatham Beck sub-catchment on the North Bank of the Tees (i.e., sub-catchment of Greatham Creek) which is known to be impacted by public water supply groundwater abstractions. The sustainability of PWS abstractions from groundwater in the Hartlepool area is under investigation by Anglian Water and EA groundwater staff. Any reductions linked to abstractions affecting the main fluvial Tees are likely to be over-estimated on the basis such abstractions are already supported through the MMF applied to the Tees.</p> <p>On this basis we do not propose any scenario-testing of impacts at this stage, though this would be reviewed should any of the investigations described above identify long-term environmental risk.</p>
Till	<p>NWL's AMP6 NEP investigations have determined that the watercourses in the catchment are largely disconnected from groundwater for much of their length, with connectivity only present within the very terminal reaches of some of waterbodies. As a result, there is reasonable confidence that PWS abstractions do not impact the surface waterbodies at current abstraction rates. NWL is currently undertaking fully licensed test pumping of its fell sandstone sources with final EA sign off due by 31 March 2022. NWL also has an AMP7 implementation scheme to relocate a proportion of its annual licensed quantity from its Thornton Bog borehole to a new borehole at Felkington. If further sustainability reductions are required in the future, either due to an AMP7 WINEP outcome or Long Term Destination, NWL has identified though options appraisal further fell sandstone units that currently have no licensed abstraction. Consequently, future AMP investigations could be undertaken to investigate whether some annual licensed quantity could sustainably be relocated to these groundwater units. LTD for the Till will continue to be reviewed in light of NWL's ongoing WINEP investigations and implementation schemes and further refinement of the Fell Sandstone model that NWL has developed with BGS and the EA.</p>
Wear	<p>NWL is undertaking AMP7 investigations to investigate the risk of saline intrusion into the Magnesium Limestone aquifer as a result of abstractions in the northern extent of the Seaham Peterlee Coast operational catchment. On this basis we do not propose any scenario-testing of impacts at this stage, though this would be reviewed should any of the investigations described above identify long-term environmental risk.</p>
Northumberland Rivers	<p>The Coquet Lower Estuary operational catchment is assessed by the Northumberland CAMS Ledger. No Assessment Points are located within the Estuary although AP 2 is located immediately upstream at the tidal limit. Water availability assessments show there is limited water available at very low flows (Q95) across the Coquet hydrometric catchments (e.g., Coquet Lower Estuary and also the Coquet Lower and the Coquet Upper catchments), but water is available at higher flows. The restrictions at low flows are a result of a larger public water supply abstraction located on the River Coquet at Warkworth Dam (tidal limit) and the need to ensure sufficient flows to support this PWS.</p> <p>The Warkworth Dam PWS abstraction is not assessed at AP 2 as it impacts solely on the estuarine waterbody downstream. As a result of this abstraction flows within the estuary are assessed as not currently supporting the Ecological Flow Indicator (64.5Ml/d) at Fully Licensed volumes, although the EFI is supported at Recent Actual volumes. NWL are undertaking investigations into the feasibility of removing the tidal weirs as these structures have historically been linked to the PWS abstractions and associated infrastructure. Measures included in the AMP7 programme include confirming ownership, considering impacts on navigation and other infrastructure, and, investigating ecological impacts of low flows (Q95). This work should be completed between 2021 and 2022.</p> <p>On this basis we do not propose any scenario-testing of impacts at this stage, though this would be reviewed should any of the investigations described above identify long-term environmental risk.</p>

## Environmental Destination scenarios

The previous section sets out our current understanding of the WRNF scenarios and areas where we propose an alternative regional scenario. This section summarises this proposed regional baseline scenario and our proposed stress-test scenario, including where this diverges from the assumptions in the WRNF (see **Table A6.5**).

### Regional Environmental Baseline Scenario

For our regional scenario, we have assumed no reduction in abstraction is required across all sectors (including an allowance for forecasted growth) by 2050. This scenario does not constrain the level of ambition set out in the WRNF Enhanced Scenario, with the majority of waterbodies remaining compliant with the environmental flow indicators by 2050. Where certain waterbodies are identified as non-compliant with the long-term environmental flow indicators, we have justified why the modelled reductions in abstraction to recover to these targets may not be appropriate in **Table A6.3**.

WFD management catchments with modelled abstraction reductions  $\leq 2\text{MI/d}$  have been excluded on the basis that our Environmental Destination is unlikely to be sensitive to any low volume or localised reductions, which would be assessed where relevant under the WINEP or similar non-PWS investigations at a waterbody scale.

We consider that the regional scenario is one in which WReN continues to play a key role in protecting and enhancing the water environment, including ecologically valuable and sensitive sites in the long term. We recognise, however, that further investigation and engagement will be required to improve our understanding of the long-term needs of the water environment, not only in relation to abstraction but to other factors such as habitat condition and water quality.

### Enhanced Stress-test Scenario

Our initial review has identified areas of uncertainty and/or potential long-term flow pressures to scenario-test within the regional plan. On the basis of the evidence reviewed to date, we are proposing to include an Environmental Destination stress-test scenario which includes the following:

1. Loss of DO associated with PWS river abstraction licence in the lower River Derwent SAC, linked to CSMG target enhancements.
2. Loss of DO associated with PWS groundwater abstraction licence in the Hull and Easting Riding catchment, across YW's Wolds and Hull wellfields, linked to enhanced ASB3/Chalk enhancements
3. Loss of DO associated with PWS groundwater licence in Lower Aire, linked to YW's Selby Wellfield.

Further detail on these scenarios in relation to the impacts on abstraction is shown in **Table A6.4**. These impacts have been estimated using the EA's Waterbody Abstraction Tool which simulates the impacts on flow compliance with EFIs based on changes to abstraction and moderately low (Q70) and low (Q95) flow conditions. *The volumes included are solely for the purpose of scenario-testing this area of uncertainty in the planning process and do not relate in any way to any interim outcomes from any ongoing WINEP schemes, or commitments to change licences at this stage.*

Table A6.4 Environmental Destination scenarios for sensitivity-testing

WFD Management Catchment	Description
<b>Derwent</b>	<p>The 2050 predicted natural Q95 low flow is 272Ml/d at AP2 Sutton-Upon-Derwent (which assumes a naturalised flow series and does not account for the influence of existing level management), with an Q95 EFI of 245Ml/d linked to CSMG targets. The EA Waterbody Abstraction Tool estimates a future predicted Q95 flow of 60Ml/d, with the flow deficit largely associated with YW's surface water abstractions from the River Derwent. The estimated future predicted total daily PWS average abstraction is 212Ml/d at flows &lt;Q70, comprising ~69Ml/d from the downstream intake and ~142Ml/d from upstream intake at flows &lt;Q70.</p> <p>EA Waterbody Abstraction Tool estimates that the abstraction would need to be reduced to the following to recover to CSMG targets:</p> <ul style="list-style-type: none"> <li>- At Q70 flows: <ul style="list-style-type: none"> <li>o 70Ml/d at the upstream intake (~72Ml/d reduction from FP daily average)</li> <li>o 53Ml/d at the downstream intake (~17Ml/d reduction from FP daily average)</li> </ul> </li> <li>- At Q95 flows: <ul style="list-style-type: none"> <li>o 14Ml/d at the upstream intake (~128Ml/d reduction from FP daily average)</li> <li>o 27Ml/d at the downstream intake (~43Ml/d reduction from FP daily average)</li> </ul> </li> </ul>
<b>Hull &amp; East Riding</b>	<p>Various assessment points in the Upper Hull (AP3 Upper Hull, AP2 Upper West Beck, AP1 Kelk Beck, AP4 Driffield Canal) have linked/upstream waterbodies with potential GWDTE/ASB3 (Chalk) enhancements. River flows in the catchment are influenced by a combination of abstraction (in particular PWS and agriculture), level management and the interaction between the chalk aquifer and surface waters. For this reason, establishing the relationship between abstraction and river flow is complex.</p> <p>The EA Waterbody Abstraction Tool estimates that the abstraction may need to be reduced in certain waterbodies to recover to the enhanced EFIs. The tool suggests the deficits are linked to groundwater, rather than surface water, and based on a large number of small volume licences rather than a small number of large abstractions.</p> <p>For the purposes of the sensitivity-testing (and recognising that WINEP and other investigations are ongoing), a 50% reduction in future predicted abstraction from PWS abstractions across the Wolds and Hull Wellfield has been assumed.</p>
<b>Aire and Calder</b>	<p>Abstraction licencing in the Aire &amp; Calder catchment is complex. 'Face value' flow deficits are identified in the headwaters of the catchment (associated with PWS reservoir/catchwater abstraction) and at the downstream extent (associated with various abstractions for power and PWS). At this stage, it is acknowledged that the national model scenario does not accurately represent future flows in the catchment and the Environmental Destination scenario may require further iteration following updates to the CAMS ledger and conclusion of various WINEP investigations. Other potential considerations (e.g., environmental requirements for fish passage, or reservoir management for flood mitigation) are also unlikely to be factored into the model.</p> <p>For the purposes of the sensitivity-testing (and recognising that WINEP and other investigations are ongoing), a 50% reduction in future predicted abstraction from PWS abstractions from YW's Selby Wellfield has been assumed.</p>

**Table A6.5 2050 estimated abstraction reduction (all sectors) by WFD Management Catchment, by WREN Environmental Destination scenario (excluding catchments with Enhanced deficits  $\leq$  2MI/d)**

Management Catchment	WRNF BAU (MI/d)	WRNF Enhanced (MI/d)	Regional Baseline (MI/d)	Enhanced Stress-Test (MI/d)*
Derwent	15	205		
Aire and Calder	8	23		210 (PWS only)
Hull and East Riding	12	54		
Idle and Torne	40	60	-	
Tees	16	17		
Wear	4	16		-
Swale, Ure, Nidd & Upper Ouse	7	9		
Northumberland Rivers	8	8		

\*Volumes are modelled DO impacts in the Enhanced Stress-Test scenario

## Developing our Environmental Ambition

The Environmental Destination component of our regional plan has initiated a broader conversation with stakeholders and regulators to understand what changes to abstraction may be required in the long term. Within this and subsequent iterations of the plan we will take an evidence-based approach, alongside proactive engagement with relevant stakeholders, to understand the long-term needs of the environment and the most appropriate solutions to achieve a shared ambition.

### Understanding stakeholder priorities

In November 2021, we conducted an online survey with a targeted group of stakeholders to explore local concerns and aspirations by WFD management catchment. Initial observations include:

- Common view from respondents that flooding is the most significant pressure both currently and in the future.
- Common view that whilst water abstraction is not currently a significant pressure, it is likely to be in the future (though perceived to be less significant a risk than flooding).
- Perception that measures which would deliver the greatest long-term resilience include nature-based solutions, flood-plain reconnection, variable reservoir releases / linking flood mitigation with water resources plus improving water storage through better drainage.
- Common view that various organisations, and in particular NGOs and water companies through local partnerships, are best placed to deliver solutions.
- Perceived barriers to implementation of resilient solutions include resource (financial and human) and lack of catchment-scale strategic planning or inclusion of natural capital into decision making.

We will build on the initial outputs from this survey in subsequent engagement activities (and alongside individual water company business planning in support of the next Price Review).

### Anticipated Environmental Outcomes and Priority Actions

The outcome of our plan in the context of the Environmental Destination driver is that WReN will continue to support the principles of the Enhanced WRNF scenario whilst maintaining resilient water supplies.

In this appendix we have set out how and why we consider that the national framework data is inappropriate for direct use as Environmental Destination ‘numbers’, and we have validated this view with environmental regulators (namely EA and NE) for the highest priority catchments. Nonetheless, we do recognise the importance of ensuring that abstractions by all sectors remain sustainable. We will therefore continue to maintain an approach to reviewing abstractions that is based on locally appropriate data and discussions with stakeholders, to ensure that decisions around abstractions are robust and deliver the anticipated outcomes.

At this stage, on the basis of the evidence reviewed, we do not propose any reductions in abstraction in support of Environmental Destination. Importantly, however, this does not equate to a lack of ambition, rather that we will maintain an evidence-led approach within an adaptive planning framework to ensure that the long-term ambition for the environment is achieved. Examples of where WREN will continue to support these ambitions include:

- Building on the success of the return of Atlantic Salmon to the River Don by continuing to work in partnership across various catchments to support the removal of barriers to migration and improving spawning habitats through river restoration and the appropriate timing/volume of reservoir releases.
- Supporting Defra’s Chalk Stream Restoration strategy to protect and enhance the UK’s most northerly chalk stream habitats, acknowledging that for our region this is likely to be focussed more on water quality and habitat restoration activity rather than abstraction.
- Further improvements in water quality, quantity and biodiversity through water company catchment management schemes, both business as usual and through PR24.
- Continuing to grow our support for our region’s Rivers Trusts and CaBA to deliver meaningful improvements in river water quality and to remove obstructions, to provide the greatest ecological benefit to our region’s rivers.
- Continuing to explore alternative approaches to reservoir compensation flow management that could increase ecological, water resources and flood resilience in the region in the long-term.
- Continuing to work with upland stakeholders to deliver restoration of valuable blanket bog habitats, for a range of benefits including water quality, water retention, biodiversity and carbon sequestration.
- Improving our understanding of how WREN can support lowland peatlands through engagement with the Lowland Agricultural Peatland Task Force.
- Co-creating individual water company business plans with stakeholders in support of the next Price Review (PR24) to ensure local knowledge and aspirations accounted for in our investment plans.

Our anticipated short, medium and long-term priorities in support of Environmental Destination are summarised in Table A6.6 below.

**Table A6.6 Short, Medium and Long-Term priorities**

Short Term (0 – 5 years)	Medium Term (5 – 15 years)	Long Term (15 years +)
<ul style="list-style-type: none"> <li>• Complete AMP7 WINEP investigations to improve understanding of individual and cumulative impact of abstraction licences and relevance to regional plan.</li> <li>• Implement AMP7 WINEP Implementation Scheme (e.g., Berwick Fell Sandstone)</li> <li>• Prioritise further investigation for AMP8 based on perceived level of environmental risk / opportunity.</li> <li>• Continued engagement with stakeholders to understand long-term aspirations and trade-offs, in particular for priority catchments.</li> </ul>	<ul style="list-style-type: none"> <li>• Undertake AMP8 investigations, where appropriate, in support of Enhanced scenario.</li> <li>• Improve understanding of future use from other sectors and incorporate into plan.</li> <li>• Continue to review plans within adaptive planning framework, iterating the approach to environmental destination as required.</li> <li>• Reflect outcomes of AMP7 investigations in company water resources plans / regional plan</li> </ul>	<ul style="list-style-type: none"> <li>• Continue to review plans within adaptive planning framework, iterating the approach to environmental destination as required.</li> <li>• Continue to implement co-created WINEPs</li> </ul>

- Co-creation of individual company WINEPs for AMP8 / align with regional plan.
- Explore alignment of regional planning activities with other initiatives (e.g., chalk stream restoration strategy and lowland peatland taskforce), where appropriate.
- Undertake further investigation, where identified as being required following finalisation of first regional plan.
- Implement co-created WINEP

## Sub-Appendix A

### Condensed requirements of final Environmental Destination Guidance

No	Requirement	WREN Commentary
1	Describe the environmental outcomes relating to abstraction you are proposing for the region and understand the abstraction deficits which your priority actions will need to address	Addressed throughout this Appendix, and specifically in 'Regional Baseline Scenario' section
2	Explain the decision-making process and rationale you used	Addressed throughout this Appendix
3	You should distinguish between outcomes needed to meet current regulatory requirements and those required in the long term	Addressed throughout this Appendix, and specifically in 'AMP7 WINEP status' section
4	Where you have constrained your ambition, you need to clearly explain what you have decided not to include in your proposals and why	WREN's ambition is not constrained – see 'Regional Baseline Scenario' section
5	Set out .... long-term priorities required to achieve the long-term destination, including proposed abstraction changes and other actions required to protect and improve the environment	Addressed throughout this Appendix, and specifically in 'Developing our Ambition' section
6	Outline the uncertainties and a plan to reduce those uncertainties over time	Addressed throughout this Appendix, and specifically in 'Developing our Ambition' section
7	Clearly state whether the proposed actions are expected to achieve the long-term destination	See 'Developing our Ambition' section
8	Set out the short, medium ... priorities required to achieve the long-term destination, including proposed abstraction changes and other actions required to protect and improve the environment:	See 'Developing our Ambition' section
9	Clearly state whether the proposed actions set out in your regional plan are expected to achieve the long-term destination and, if not, what further work is needed to help make this happen (further investigation, more advanced modelling for example)	See 'Developing our Ambition' section

# How to find out more

More information about Water Resources North, including our publications and how you can contact us, is available on our website, [www.waterresourcesnorth.org](http://www.waterresourcesnorth.org).

