Indicative Catchment Statistics for Nutrient Pollution

Protected areas with diffuse water pollution plans or nutrient neutrality advice

Date: September 2024

Version: 1.1

We are the Environment Agency. We protect and improve the environment.

We help people and wildlife adapt to climate change and reduce its impacts, including flooding, drought, sea level rise and coastal erosion.

We improve the quality of our water, land and air by tackling pollution. We work with businesses to help them comply with environmental regulations. A healthy and diverse environment enhances people's lives and contributes to economic growth.

We can’t do this alone. We work as part of the Defra group (Department for Environment, Food & Rural Affairs), with the rest of government, local councils, businesses, civil society groups and local communities to create a better place for people and wildlife.

Published by:

Environment Agency
Horizon House, Deanery Road,
Bristol BS1 5AH

www.gov.uk/environment-agency

Further copies of this report are available from our publications catalogue: www.gov.uk/government/publications or our National Customer Contact Centre: 03708 506 506

Email: enquiries@environment-agency.gov.uk

Contents

Executive summary

We have provided indicative, catchment-scale source apportionment and estimated diffuse sector reductions required to meet protected area water quality targets. This is to support a general understanding of catchments and is not intended to give the level of detail needed to inform specific on-the-ground measures. This will help those designing or co-ordinating nutrient mitigation schemes, working on Diffuse Water Pollution Plans (DWPPs) and working on site restoration.

We have highlighted the dominant sources of nutrients under the ‘recent’ scenario, to closely represent what is currently happening in catchments. The results should be regarded as indicative. They will be superseded by further modelling work for DWPPs where indicated, which will also incorporate the ‘at permit’ scenario simulations of the point sector fully utilising all permit headroom and the benefits of water industry investment to reduce point source pollution since 2020 (AMP7) and in the future (PR24).

We used Simcat SAGIS models calibrated using monitoring data up to 2020. We applied the revised ‘polluter pays principle’ methodology to define the ‘fair share’ percentage reduction required by each broad sector. We compared the diffuse sector figures to outputs from Farmscoper, which show what may be achieved by improvements to land management.

We have also presented the reduction required by the point sector for each catchment. However, this report does not set out the reductions that have been achieved by the AMP7 water company investment measures nor future PR24 schemes, including the proposed improvements to wastewater treatment works to comply with the Levelling up and Regeneration Act. The work for the DWPPs will consider these further.

We have not quantified the additional nutrient contributions from any future development and growth including housing. Any additional future nutrient load will be assessed through the planning process led by the Local Planning Authority or through our permitting process.

The results show that rural land use sources of nutrients dominate most catchments, particularly the rivers. A small number of catchments have diffuse urban sources indicated and point sources are important in most catchments.

In almost all catchments, we estimate the ‘fair share’ reduction required by the diffuse sector to be several times greater than the estimated reduction in losses achieved when applying catchment-wide rural land management measures. This is where additional and/ or alternative measures would need to be explored to achieve the diffuse sector share of the target.

Methodology

Catchments

The catchments included in this report are protected areas in unfavourable condition due to diffuse pollution and where an Environment Agency led, or joint Environment Agency-Natural England Diffuse Water Pollution Plan (DWPP) is being prepared. Several of these catchments are where Natural England nutrient neutrality advice applies for overnight accommodation and were also designated in 2023 as Sensitive Catchment Areas under the Water Industry Act 1991 (Table 1).

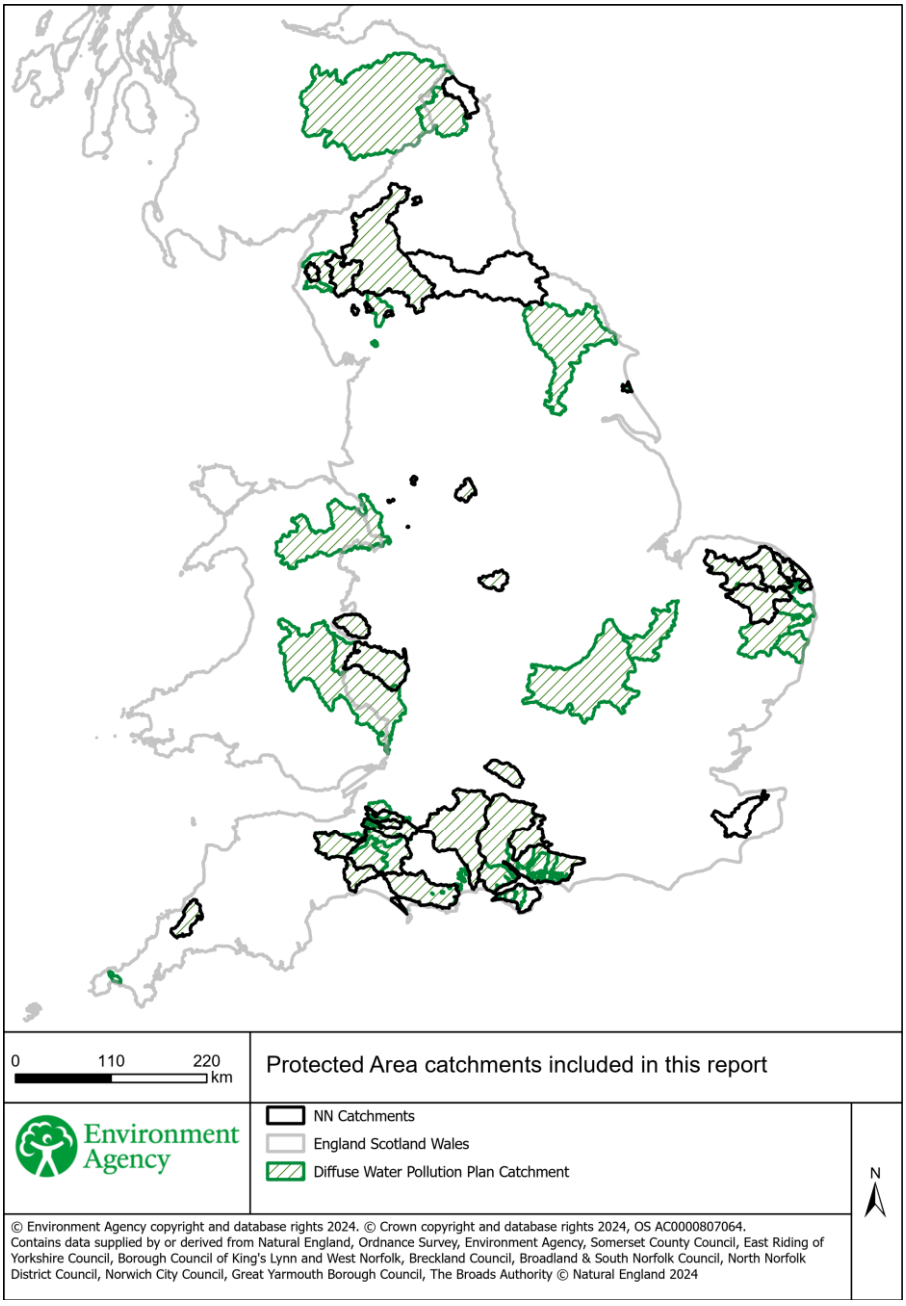

Figure 1: Protected Area Catchments included in this report.

Table 1: Protected area catchments included in this report.

Protected Area	EA Led/ Joint DWPP	NE NN Advice Applies	Sensitive Catchment (WRA 1991)	Further modelling expected 24/5
River Avon (Hampshire)	Yes	Yes	Yes	
River Axe	Yes	Yes	Yes	
River Camel	Yes	Yes	Yes	Yes
River Clun	Yes	Yes		Yes
River Dee	Yes			Yes
River Derwent (Yorkshire)	Yes			Yes
River Derwent & Bassenthwaite Lake	Yes	(part of)	(part of)	Yes
River Eden	Yes	Yes	Yes	
River Ehen	Yes			Yes
River Itchen	Yes	Yes	Yes	Yes
River Kent	Yes	(part of)	(part of)	
River Lambourn	Yes	Yes	Yes	
River Mease	Yes	Yes	Yes	Yes
River Tweed (England)	(part of)			
River Wensum	Yes	Yes	Yes	
River Wye	Yes	(part of)		
Wye Valley (Peaks)	Yes	Yes		
The Broads		Yes	Yes	
Ant Broads & Marshes	Yes	Yes	Yes	
Bure Broads & Marshes	Yes	Yes	Yes	
Yare Broads & Marshes	Yes	Yes	Yes	
Chesil & The Fleet	Yes			Yes
Esthwaite		Yes		Yes
Hornsea Mere	Yes			
Lindisfarne		Yes		
Ouse Washes	Yes			Yes
Poole Harbour	Yes	Yes	Yes	
Solent (Freshwater inputs)	Yes	Yes	Yes	Yes
Somerset Levels & Moors		Yes	Yes	
Stodmarsh		Yes	Yes	
Teesmouth & Cleveland Coast		Yes	Yes	
Waveney (several SSSIs)	Yes			Yes

We have not included the following DWPP catchments in this report because they are not represented in Simcat SAGIS: Abbotts Moss, Brown Moss, Dorset Heaths, Leighton Moss, Marazion Marsh, Oak Mere and Wybunbury Moss. The completion of these DWPPs is led by Natural England. Similarly, we have not included Roman Walls Loughs and Rostherne Mere, which are subject to nutrient neutrality advice, for the same reason.

Simcat SAGIS Modelling

We have used the PR19 and the PR24 Simcat SAGIS models for this work. Through 2024 we will further validate the models for the catchments where DWPPs are yet to be completed. The figures presented here should be regarded as provisional and may be superseded following more detailed modelling work.

We calibrated the models following nationally agreed model build and model calibration standards. The calibration process optimises the level of agreement between measured and simulated values through reasonable and systematic adjustments to model parameters and data. We do this by adjusting the model inputs in which we have least confidence, those representing diffuse source of pollution. To assess confidence in the models, we compare the level of agreement between measured and simulated values. While Simcat SAGIS modelling has provided a robust framework for use in decision-making for wastewater investment planning for several Price Review cycles, there is less certainty in the estimates of loadings from diffuse sources. Hence, there is less confidence in using the models to assess the outcomes of measures that target diffuse sources, as we have done here and for the DWPPs.

For this work, we have used the Simcat SAGIS models to produce results for a single scenario, the 2020 calibrated baseline period using 2014 – 2018 flow data and water and discharge quality data up to 2020. This ‘recent scenario’ is the closest approximation we have of the current situation for the diffuse sector inputs and concentrations. While the benefits of any late delivery AMP6 schemes on overall in-river concentrations may not be represented by this work, this will have minimal influence on the diffuse sector concentrations, diffuse sector share and the diffuse sector reductions estimated.

The more detailed DWPP modelling through 2024, where undertaken, will incorporate assessing the benefits from AMP7 investment measures, proposed PR24 measures and potential reductions in diffuse inputs as estimated using Farmscoper V5 for a range of measure uptake scenarios. This future work will set out the specific diffuse sector reductions required to achieve target compliance along designated reaches in the protected sites alongside the catchment averages presented here.

Data used in Simcat SAGIS models

We have updated the SAGIS models with Environment Agency and Water Company data and calibrated them using the latest UKWIR flow and water quality calibration tools. The calibration process has optimised the level of agreement between measured and simulated values through reasonable and systematic adjustments to model parameters and data. The process is, however, not intended to force-fit modelled and measured values and the level of agreement is in some instances imperfect. For the Diffuse Water Pollution Plan catchments, we are reviewing the model calibration to understand model performance, which is central to interpreting the results. Any steps taken to improve the model calibration will be detailed in the catchment-specific report(s). A catchment

approach, such as that applied in this report, will minimise uncertainties at individual locations in a model.

Sensitivity analysis can be used to quantify model uncertainties and to understand the significance of the uncertainties to decision making. This will be progressed as necessary in the DWPP-specific modelling.

PR19 Modelling

We have produced the PR19 modelled datasets from a SAGIS model that we have calibrated using:

- SAGIS version SAGIS2015
- SIMCAT Version 14.8

PR19 Data sources

Diffuse - UKWIR 2012 build. Arable and livestock information is from the ADAS PSYCHIC and NEAP-N models based on the 2010 (P) and 2015 (N) agricultural census data. The other diffuse sectors are based on bespoke methodologies developed within the UKWIR SAGIS project. The methodologies are based on small studies and national assumptions, subsequently the outputs for the intermittent and urban loads should be treated with caution and future model development will seek to improve the way these are represented.

Point sources - STW flows and quality 2010 to 2012 observed where available. We have used older observed data in preference to defaults if data for this time period is not available.

River quality - 2010 to 2012 observed quality. We have used additional data from outside this time period to provide resolution in locations where there is no data available within this time period.

Flows - National RBD SIMCAT model diffuse flows (from Low Flows software) calibrated using 2010 to 2012 observed gauging data. We have excluded flows from the report due to third party license issues.

PR24 Modelling

We have produced the PR24 modelled datasets from a SAGIS model that we have calibrated using:

- SAGIS version 3
- SIMCAT Version 15.7

PR24 Data sources

Diffuse - UKWIR 2021 build. Arable and livestock information is from the ADAS PSYCHIC and NEAP-N models based on the 2010 (P) and 2015 (N) agricultural census data. The other diffuse sectors are based on bespoke methodologies developed within the UKWIR SAGIS project. The methodologies are based on small studies and national assumptions, subsequently the outputs for the intermittent and urban loads should be treated with caution.

Point sources – STW certified measured flows 2014 to 2018; quality 2014 to 2020 observed where available. If data is not available for this time period, we have used older observed data in preference to defaults.

River quality - April 2014 to March 2020 observed quality. If data for this time period is not available, we have used additional data to provide resolution in those locations where no data is available.

River Flows - National RBD SIMCAT model diffuse flows (from Low Flows software) calibrated using 2014 to 2018 observed gauging data. We have excluded flows from the report due to third party license issues.

Confidence on these and the other data sources in Simcat SAGIS are shown in Table 2.

Table 2: Data used in PR24 Simcat SAGIS

Data Set	Data used	Comments	Confidence in the data set
River Flows	EA Flow Gauging Station data for period 2014-2018	Used to calibrate the flows in the models	High
River and Lake Quality (England)	2014-2020 EA monitoring data	Used to calibrate water quality in the rivers and lakes	High
Large Water Company Sewage Treatment Works (STW) Flows	Certified measured flows 2014-2018 & 2020 -2023	Used to characterise the inputs	High
Small / Private STWs (package treatment plants) Flows	Permitted flow or estimated flow from population	Used to characterise the inputs	Medium

Data Set	Data used	Comments	Confidence in the data set
STW Quality	2014-2020 monitoring data. Where no monitoring data, defaults used.	Used to characterise the inputs	Medium – High High where monitoring data is used
Industrial discharges	2014-2020 monitoring data. Where no monitoring data, permit data used.	Used to characterise the inputs	High
Storm Overflows	Annual loadings and spill durations derived using national datasets and assumptions	Used to characterise the inputs	Low-High High where updated using local data
Rural Land Run-off (e.g. from farmland, forestry, grassland, moorland)	Annual 1 km loadings from the ADAS PSYCHIC (2010) and NEAP-N model (2015).	Diffuse inputs are included in the model at a waterbody scale with loadings spread evenly along each modelled reach	Medium
Septic Tanks	Estimated annual loadings from unsewered properties	Diffuse inputs are included in the model at a waterbody scale with loadings spread evenly along each modelled reach	Low-Medium
Urban Run-off (e.g. contaminated surface water from towns and villages)	Estimated annual loadings from impermeable surfaces in urban areas	Diffuse inputs are included in the model at a waterbody scale with loadings spread evenly along each modelled reach	Low

Data Set	Data used	Comments	Confidence in the data set
Highways (run off from motorways and trunk roads only)	Outputs from the HAWRAT model	Diffuse inputs are included in the model at a waterbody scale with loadings spread evenly along each modelled reach	Low
Atmospheric Deposition (nitrate only)	Annual 1 km loadings from the ADAS NEAP-N (2015) models.	Diffuse inputs are included in the model at a waterbody scale with loadings spread evenly along each modelled reach	Medium

Farmscoper Modelling

We have used Farmscoper v5 to assess diffuse agricultural pollutant loads and quantify the impacts of farm mitigation methods across ten scenarios. Outputs from this work are being used by those working on the Diffuse Water Pollution Plans.

Farmscoper has been subject to external peer review through the publication of a description of Farmscoper and its application within a leading scientific journal (Gooday et al., 2014), and the majority of the component models and methods used within Farmscoper have been published in the external literature. Therefore, the assumptions and methods used within Farmscoper, and the conclusions derived from it and its component models are based on sound scientific principles. Farmscoper was developed as an advisory tool to aid policy makers, as it incorporates assumptions and data appropriate for broad-scale applications and comparisons between differing representative systems and environments. However, it is now being used more extensively and for a wider range of purposes than it was originally intended for, therefore the consequences of assumptions and other uncertainties in Farmscoper outputs need to be considered in specific decision-making contexts. Any users of Farmscoper outputs need to understand the assumptions, uncertainty, and limitations at the relevant scale of interest.

We have presented outputs for four of the scenarios in this report to give a ‘best’ and ‘worst case’ estimation of the reduction in nutrient losses from different rates of agricultural mitigation measure uptake (Table 3).

Scenario 3 estimates high regulatory compliance (85% uptake of regulatory measures), a 25% uptake of Farming Rules for Water (FRfW) ‘reasonable’ Regulatory measures, and current rates of uptake of all voluntary and other measures represented in Farmscoper V5.

Scenario 4 estimates full regulatory compliance (100% uptake of regulatory measures), a 25% uptake of Farming Rules for Water 'reasonable' Regulatory measures, and current rates of uptake of all voluntary and other measures represented in Farmscoper V5.

Scenario 8 estimates an optimistic view with a high (85%) uptake of regulatory measures, a 25% uptake of Farming Rules for Water 'reasonable' Regulatory measures, and 70% uptake of voluntary measures represented in Farmscoper V5.

Scenario 10 estimates a theoretical maximum reduction in losses from agricultural land if there were to be 100% uptake of all measures in Farmscoper.

Table 3: Measure uptake rates from the Farmscoper V5 scenarios represented.

Scenario	Regulatory Measures	Farming Rules for Water 'reasonable' measures	Voluntary Measures	Other Measures
Scenario 3 – High Regulatory	85%	25%	Current	Current
Scenario 4 – Full Regulatory	100%	25%	Current	Current
Scenario 8 – Optimistic	85%	25%	70%	Current
Scenario 10 – Theoretical Maximum	100%	100%	100%	100%

Confidence in the Farmscoper outputs (Table 4) is based on the accuracy of the census and location data for the catchment:

- High: >100 farms
- Medium: 25 – 100 farms
- Low: < 25 farms
- N/a: too small to be modelled

Table 4: Catchments modelled in Farmscoper V5.

Catchments	Type	Confidence
River Avon (Hampshire)	River	High
River Axe	River	High
River Camel	River	High

Catchments	Type	Confidence
River Clun	River	High
River Dee	River	High
River Derwent (Yorkshire)	River	High
River Derwent & Bassenthwaite Lake	River	High
River Eden	River	High
River Ehen	River	Medium
River Itchen	River	High
River Kent	River	High
River Lambourn	River	High
River Mease	River	High
River Tweed	River	High
River Wensum	River	High
River Wye	River	High
Wye Valley (Peaks)	River	High
The Broads	Estuaries, Wetlands and Lakes	High
Ant Broads & Marshes SSSI	Estuaries, Wetlands and Lakes	Medium
Bure Broads & Marshes SSSI	Estuaries, Wetlands and Lakes	High
Yare Broads & Marshes SSSI	Estuaries, Wetlands and Lakes	High
Chesil & The Fleet	Estuaries, Wetlands and Lakes	Low
Hornsea Mere	Estuaries, Wetlands and Lakes	Low
Ouse Washes	Estuaries, Wetlands and Lakes	High
Poole Harbour	Estuaries, Wetlands and Lakes	High
Solent (Freshwater inputs)	Estuaries, Wetlands and Lakes	High
Somerset Levels & Moors	Estuaries, Wetlands and Lakes	High
Stodmarsh	Estuaries, Wetlands and Lakes	High
Teesmouth	Estuaries, Wetlands and Lakes	High
Waveney (several SSSIs)	Estuaries, Wetlands and Lakes	High

Source Apportionment

We have presented source apportionment figures by input sector loads. We have greatest confidence in the point sector loads where monitoring data is available. Confidence reduces where the quality and flow from the sector is based on estimates, such as the diffuse sectors (Table 5). Apportioning the input loads gives an indication of which sector is the dominant nutrient source.

The in-river modelled concentrations arise from the input loads, after the influence of river dilution and natural decay processes in the river, and after calibration factors have been applied to optimise the level of agreement between measured and simulated values. We have presented the in-river concentration source apportionment as a sector catchment average because of uncertainties in diffuse inputs and to be consistent with the revised 'polluter pays principle' methodology.

Apportionment by concentration and by load can be different because inputs from different sources tend to occur under differing river flow conditions. Inputs from treatment works occur continuously whereas inputs from diffuse sources tend to occur under higher river flow conditions where there is a higher level of dilution available in the receiving water. This means that, on balance, a kilogram of phosphorus discharged from a treatment works will have a relatively greater impact on the in-river concentration than the equivalent input from diffuse sources.

Compliance Statistics and Sector Reductions

We have followed the revised 'polluter pays principle' methodology to estimate the sector share of the targets as a catchment average. We estimated the baseline (2009) sector share of the target using data from the PR19 models. We estimated the recent sector concentration from the PR24 calibration models. From these figures we have estimated the catchment average reduction required by the diffuse and point sectors. The catchment scale diffuse sector reduction applies equally to all diffuse sub-sectors.

Simcat SAGIS produces outputs for phosphate, ammonia, and nitrate. Where needed, we estimated total nitrogen values from the sum of total ammonia and nitrate values.

As these figures are a catchment average reduction there will locations in the catchment that will need to achieve a greater reduction, and some where a lesser reduction will be needed depending on the recent overall quality at that location. Moreover, there may be locations in a catchment where the point sector investment alone delivers the overall site target and so reductions by the diffuse are not required, for example where the point sector discharges are subject to uniform emission standards.

The more detailed DWPP modelling will present overall compliance and sector compliance at plotting points within the designated reaches of each designated site alongside the overall catchment average statistics.

Targets

We have used the Common Standards Monitoring Guidance (CSMG) targets for phosphate, nitrate, and total nitrogen (where available) which are variable across the different catchments. The targets are agreed for water dependent protected areas by Natural England and the Environment Agency and have been collated online on the Catchment Data Explorer https://environment.data.gov.uk/catchment-planning/downloads/Habitats_site_European_site_Protected_Area_Targets.xlsx

Catchment Average Targets

Each DWPP catchment has specific water quality target(s). The catchment average target is based on the target values attributed to each modelled plotting point (spaced no more than 1km along all modelled reaches). We attribute the modelled plotting points in designated reaches the target value for the corresponding SSSI unit. We then propagate these target values upstream to the modelled plotting points in the undesignated reaches because the upstream quality must improve for the target water quality to be met in the designated reaches.

This catchment average approach is referred to in the revised ‘polluter pays principle’ methodology.

Table 5: Point and diffuse sub-sectors with confidence in the sector data.

Sector	Sub-sector	Description	Confidence in data
Point	STWs – Sewage Treatment Works	Large, predominantly water company managed, domestic discharges.	Medium – High High where monitoring data is used.
Point	Intermittent Discharges (Storm Overflows)	Inputs from sewerage network storm overflows and storm tanks at STWs.	Low – High High where updated using local data.
Point	Industry	Permitted industrial discharges.	High
Diffuse	Rural Land Use	Inputs from farmland, forestry, grassland etc.	Medium
Diffuse	Urban Runoff	Estimation of urban run-off from impermeable surfaces potentially contaminated from misconnected drains.	Low
Diffuse	Septic Tanks	Estimation of unsewered properties	Low-Medium
Diffuse	Highways	Estimation of inputs from motorway and truck road run off only.	Low
Diffuse	Atmospheric deposition (nitrogen only).	Estimation of inputs from atmospheric deposition.	Medium

Results

We have collated outputs for each of the River Catchments and the Estuarine, Wetland and Lake Catchments and presented summary tables and figures below.

Several catchments have draft Diffuse Water Pollution Plans dating from circa 2014/15, based on modelling using the PR19 models. There may be differences in the catchment scale source apportionment and the percentage sector reductions presented in these Plans and the figures presented here. These differences may be for several reasons, including:

- Modelling improvements between the PR19 and PR24 models
- Revisions to the ‘polluter pays principle’ methodology
- Changes to site targets
- Improvements to sector inputs such as water company investment

The modelling improvements that are most likely to have affected these results are as follows:

- Headwater areas and flows have been recalculated using an improved methodology.
- Headwater input loads are now divided up and allocated to the sectors.
- Loadings from rural land are now modelled and correlated with river flows using power curves rather than non-parametric distribution files.
- Storm overflows are now included in all our models.
- A new suite of calibration tools has been developed which calibrate against the whole of the water quality distribution curve, not just the mean.

Source Apportionment

We have presented source apportionment figures by input sector loads, using figures from the PR24 calibration models to highlight the dominant sources of nutrients under the ‘recent’ scenario. This closely represents what is currently happening in catchments as it is based on data up to 2020 (2021 in some cases).

The river catchment input load source apportionment (Table 6, Table 7 and Figure 2) is based on modelled outputs at the downstream end of each catchment. The estuarine, wetland and lake input load source apportionments (Table 8, Figure 3 and Figure 4) are based on modelled outputs at the entry point(s) to the designated site and direct discharges where applicable.

Phosphorus input load source apportionment is dominated by diffuse sources of nutrients, particularly from rural land use. This is with the notable exception of the Camel, Kent, and Poole Harbour catchments, where point sources dominate at the catchment scale. The Hampshire Avon, Itchen, Mease, Broads and Stodmarsh catchments have notable

contributions from ‘urban’ sources, which include estimates of inputs from impermeable surfaces (roads) and potentially misconnected drainage, this is to be expected in catchments where there are large conurbations.

In the estuarine, wetland and lake catchments, the total nitrogen input load source apportionment is dominated by rural land use inputs with the exception of the Teesmouth catchment, where there are large industrial and wastewater treatment works discharging directly to the estuary.

Table 6: River catchments phosphate input load source apportionment (recent scenario, PR24 calibration models).

Catchment	Point	Rural Land Use	Urban	Septic Tanks	Other
River Avon (Hampshire)	20%	46%	28%	3%	3%
River Axe	14%	83%	1%	1%	0%
River Camel	73%	21%	4%	1%	0%
River Clun	12%	80%	6%	2%	0%
River Dee	16%	83%	0%	1%	0%
River Derwent (Yorkshire)	44%	53%	2%	1%	0%
River Derwent & Bassenthwaite Lake (DWPP catchment)	56%	43%	0%	0%	0%
River Derwent & Bassenthwaite Lake (NN catchment)	48%	50%	0%	0%	0%
River Eden	43%	55%	2%	1%	0%
River Ehen	25%	73%	1%	1%	0%
River Itchen	36%	30%	20%	4%	11%
River Kent (DWPP catchment)	69%	30%	0%	1%	0%
River Kent (NN catchment)	15%	83%	0%	2%	0%
River Lambourn	14%	70%	14%	2%	0%
River Mease	22%	43%	30%	5%	0%
River Tweed (England)	14%	83%	1%	2%	0%
River Wensum	18%	68%	13%	1%	0%
River Wye/ Lugg (DWPP catchment)	21%	75%	2%	2%	0%
River Wye/ Lugg (Lugg NN catchment)	14%	81%	2%	2%	0%
Wye Valley (Peaks)	35%	48%	16%	1%	0%

Table 7: River catchments nitrate input load source apportionment (recent scenario, PR24 calibration models).

Catchment	Point	Rural Land Use	Urban	Septic Tanks	Other
River Clun	2%	98%	0%	0%	0%

Table 8: Estuarine, Wetland and Lake catchments phosphate and total phosphorus input load source apportionment (recent scenario, PR24 calibration models).

Catchment	Determinand	Point	Rural Land Use	Urban	Septic Tanks	Other	Notes
Broads	Orthophosphate (OP)	44%	41%	14%	2%	0%	
Ant Broads & Marshes SSSI	Orthophosphate (OP)	64%	8%	23%	4%	0%	TP targets converted to OP target for DWPP assessment
Yare Broads & Marshes SSSI	Orthophosphate (OP)	46%	41%	13%	1%	0%	TP targets converted to OP target for DWPP assessment
Bure Broads & Marshes SSSI	Orthophosphate (OP)	26%	50%	20%	4%	0%	TP targets converted to OP target for DWPP assessment
Chesil & The Fleet	Total Phosphorus (TP)						Simcat SAGIS modelling not available
Esthwaite	Total Phosphorus (TP)	70%	29%	0%	2%	0%	
Hornsea Mere	Total Phosphorus (TP)						Simcat SAGIS modelling not available
Ouse Washes	Orthophosphate (OP)	57%	27%	14%	2%	0%	TP targets converted to OP target for DWPP assessment
Poole Harbour	Orthophosphate (OP)	75%	23%	1%	1%	0%	Poole Harbour target expressed as OP
Somerset Levels & Moors	Orthophosphate (OP)	33%	54%	11%	2%	0%	TP targets converted to OP target

Catchment	Determinand	Point	Rural Land Use	Urban	Septic Tanks	Other	Notes
							for DWPP assessment
Stodmarsh	Orthophosphate (OP)	56%	24%	17%	3%	0%	
Waveney Sites (several SSSI)	Orthophosphate (OP)	29%	64%	4%	2%	0%	TP targets converted to OP target for DWPP assessment
Broads	Total Nitrogen (TN)	21%	73%	4%	0%	2%	
Chesil & The Fleet	Total Nitrogen (TN)						Simcat SAGIS modelling not available
Hornsea Mere	Total Nitrogen (TN)						Simcat SAGIS modelling not available
Poole Harbour	Total Nitrogen (TN)	21%	76%	0%	0%	3%	
Solent	Total Nitrogen (TN)	13%	77%	2%	0%	6%	
Stodmarsh	Total Nitrogen (TN)	39%	55%	2%	0%	4%	
Teesmouth & Cleveland Coast	Total Nitrogen (TN)	61%	33%	1%	0%	5%	

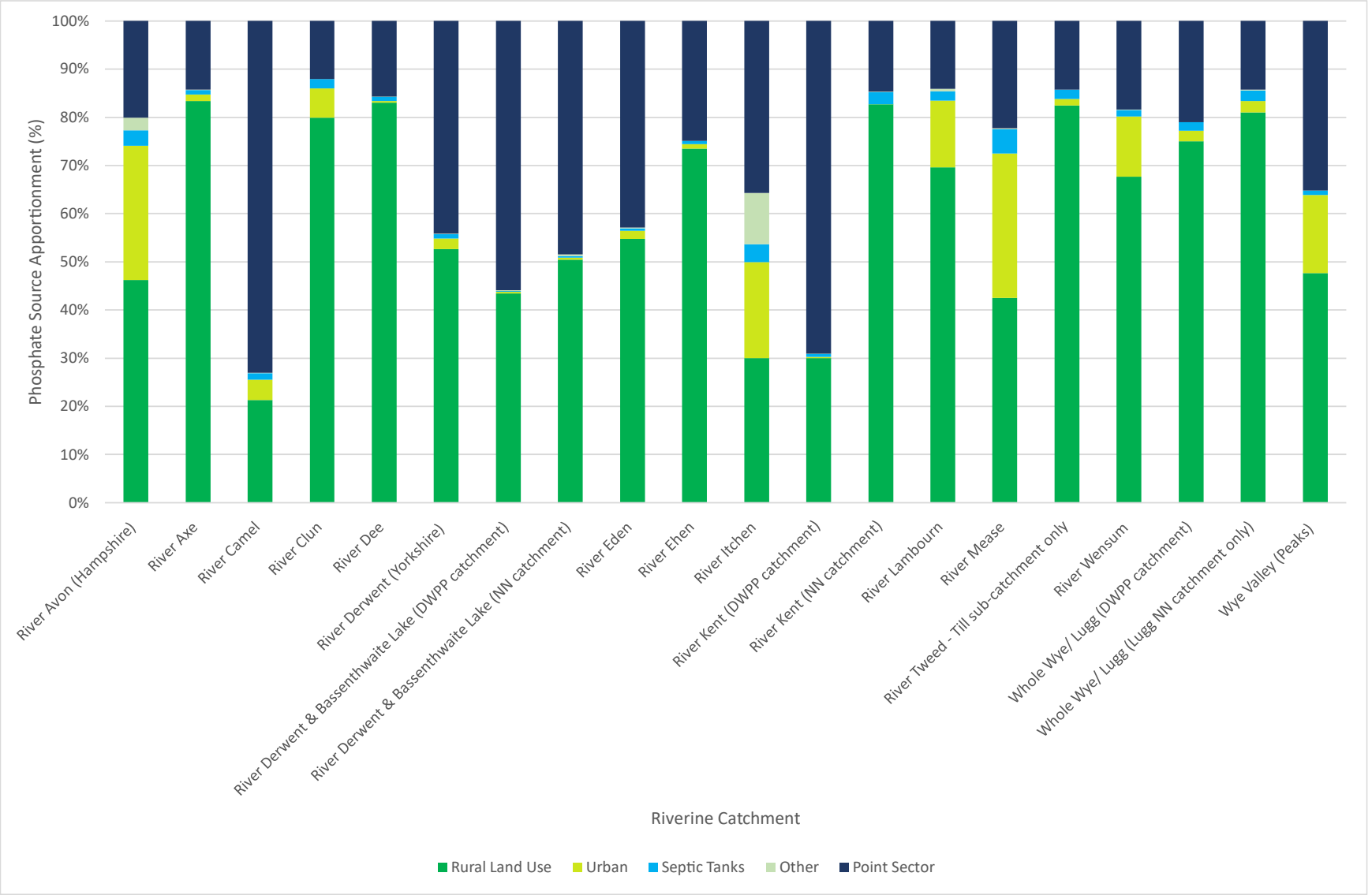

Figure 2: Phosphate input load source apportionment in the riverine catchments (recent scenario, PR24 calibration models).

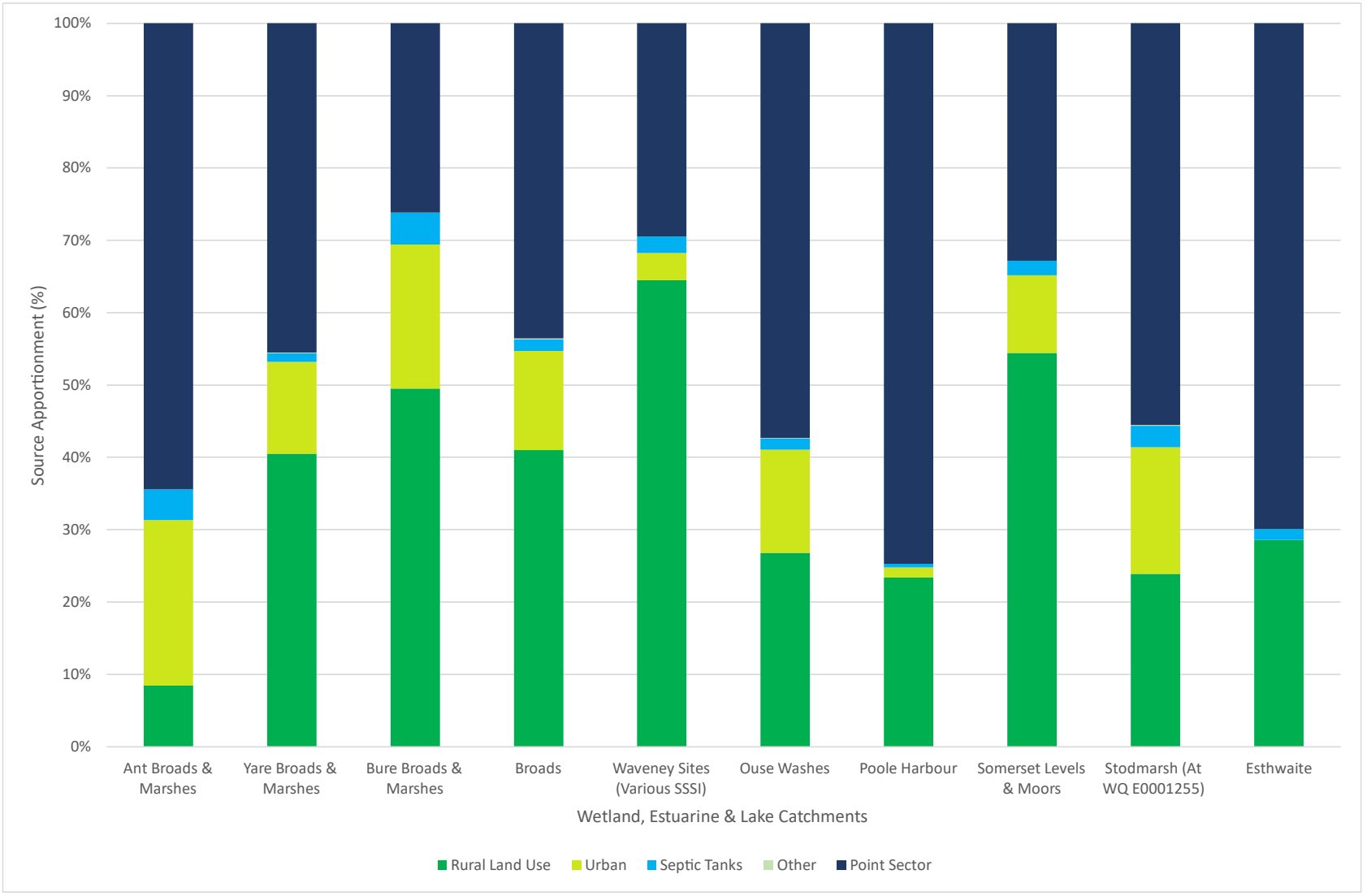

Figure 3: Phosphate/ total phosphorus (Esthwaite only) input load source apportionment in the estuarine, wetland and lake catchments (recent scenario, PR24 calibration models).

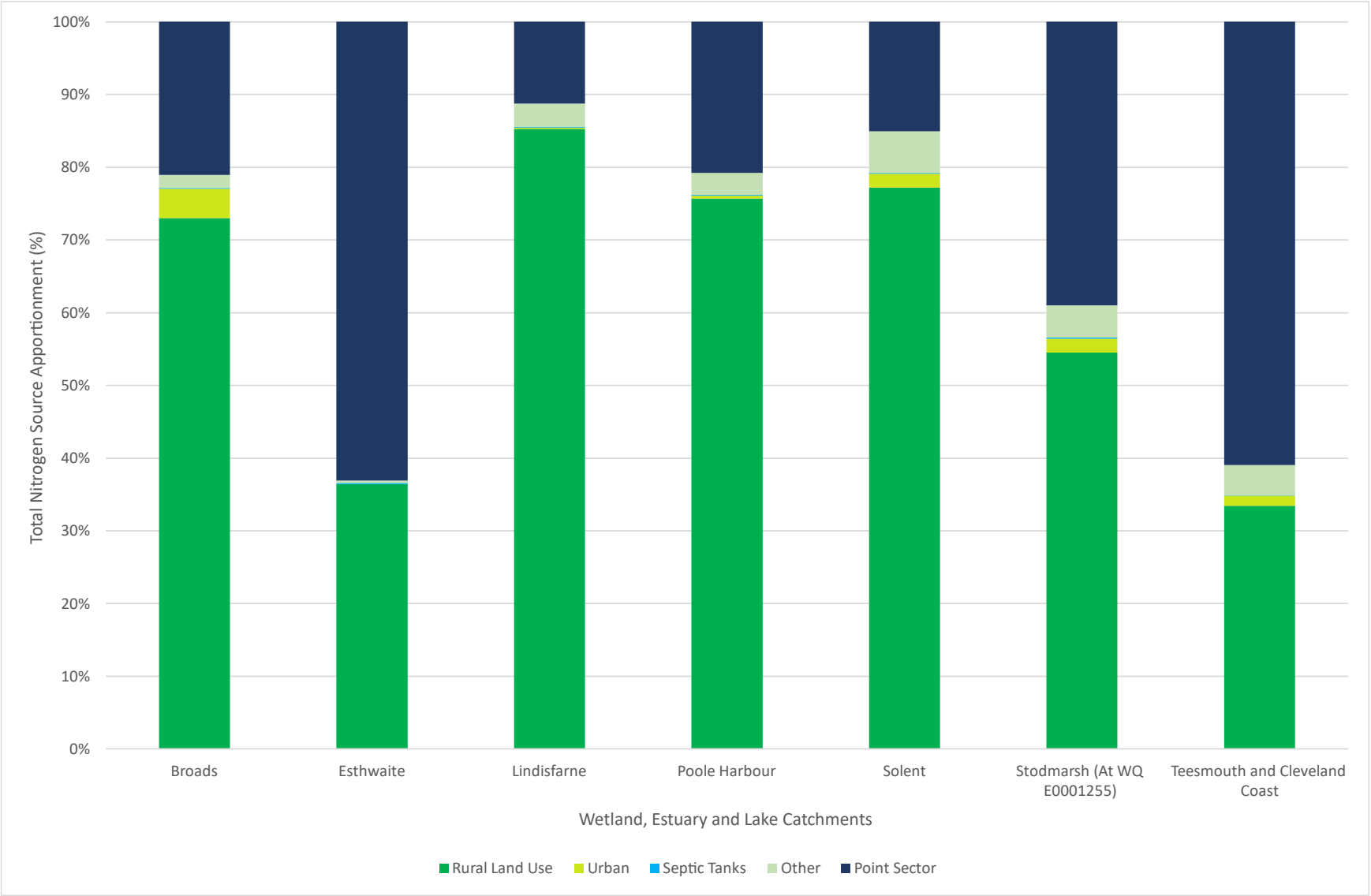

Figure 4: Total nitrogen input load source apportionment in the estuarine, wetland and lake catchments (recent scenario, PR24 calibration models).

Compliance Statistics and Sector Reductions

We have followed the revised ‘polluter pays principle’ methodology to derive a close approximation of the current catchment scale percentage reductions needed by the point and diffuse sectors to achieve the sector share of the target. Through comparison with the catchment scale Farmscoper outputs, this gives an indication of how achievable the reductions are for the agriculture sub-sector by applying the farm mitigation measures available in Farmscoper V5. These measures only represent those required to comply with water-related regulations and in current agri-environment incentive schemes. This comparison gives a residual percentage reduction required to meet the diffuse sector share.

There are currently no tools available to help us evaluate how achievable the reductions needed are for the other diffuse sub-sectors.

We will conduct further analysis to assess the benefits of water company investment in achieving the point sector reductions required in the more detailed DWPP modelling.

River Catchments - Phosphorus

Table 9 summarises the catchment scale diffuse sector reduction required for each catchment alongside the reduction in nutrient losses estimated from the four Farmscoper V5 scenarios. The reductions required to achieve the catchment scale diffuse sector share of the target ranges from 0 to 90% across the catchments.

Where catchments have 0% diffuse reduction indicated at the catchment scale, the more detailed DWPP modelling will reveal the sub-catchment(s) where reductions are required. For example, the overall catchment reduction needed for the Kent catchment is 0% but the more detailed DWPP modelling has shown that a 34% reduction is required in the Flodder Beck sub-catchment.

The percentage reduction in losses estimated using Farmscoper V5 ranges from 8 to 44% across the river catchments. The residual diffuse sector reductions required under the high regulatory compliance scenario (scenario 3) are up to 79% (Clun catchment). Under the Theoretical Maximum scenario (scenario 10), the residual diffuse sector reduction is up to 57% (Dee catchment). These residual reductions will not be required uniformly across catchments. The detailed modelling through 2024 will confirm the reductions needed at the sub-catchment scale.

River Catchments – Nitrogen

The Clun Special Area of Conservation (SAC) is the only riverine site with a nitrogen-related target due to the presence of Freshwater Pearl Mussel. There are two nitrogen-related targets that could apply in the catchment:

1. 1.5mg/l Total Oxidised Nitrogen (TON) as an annual average – referenced in the 2022 Conservation Objectives: Supplementary Advice
2. 0.125mg/l nitrate as a median – referenced in Common Standards Monitoring Guidance for Freshwater Fauna

Using the tighter of these targets (0.125mg/l nitrate as a median) means that an 97% reduction in diffuse sector inputs is required to meet the diffuse sector share of the nitrate target (Table 10). With the less stringent target, this reduces to a 54% diffuse sector reduction. We are working with Natural England to understand which target is the most appropriate for the unique local conditions of the Clun Freshwater Pearl mussel habitat, given the tighter target is based on generalised international data.

The high regulatory compliance Farmscoper scenario (scenario 3) estimates a 3% reduction, and the Theoretical Maximum scenario (scenario 10) estimates a 13% reduction. We therefore estimate the residual reduction to be between 41-94%, depending on the target and the Farmscoper scenario applied in the catchment (Table 10).

Estuarine, Wetland and Lake catchments – Phosphate and Total Phosphorus

Similarly, Table 11 summarises the catchment scale diffuse sector reductions required for the estuarine, wetland and lake sites alongside the reduction in nutrient losses estimated from the four Farmscoper V5 scenarios. The catchment scale diffuse reductions required to achieve the catchment diffuse sector share of the target range from 3 to 85%.

For the Site of Special Scientific Interest (SSSI) sub-catchments of the Broads, we have converted the total phosphorus SSSI targets for the lakes to phosphate targets to be applied in the respective rivers at the compliance points. Similarly, we have taken a precautionary approach for the Ouse Washes, with the total phosphorus Ouse Washes target applied as a phosphate target at Earith where there is connectivity between the Great Ouse and the Ouse Washes.

The percentage reduction in losses estimated from Farmscoper V5 ranges from 8 to 42%. The residual diffuse sector reductions required under the high regulatory compliance scenario (scenario 3) are up to 71% (Yare Broads and Marshes catchment). Under the Theoretical Maximum scenario (scenario 10), the residual diffuse sector reduction is up to 70% (Somerset Levels and Moors catchment). These residual reductions will not be required uniformly across catchments. The detailed modelling through 2024 will confirm the reductions needed at the sub-catchment scale in those catchments where we are undertaking further modelling.

Estuarine, Wetland and Lake catchments – Total Nitrogen

Similarly, Table 12 summarises the catchment scale diffuse sector reductions required for the estuarine, wetland and lake sites alongside the reduction in nutrient losses estimated

from the Farmscoper V5 scenarios. The catchment scale reductions required to achieve the diffuse sector share of the target range from 3 to 87%.

The percentage reduction in losses estimated from the Farmscoper V5 scenarios ranges from 5 - 21%. The residual diffuse sector reductions required under the high regulatory compliance scenario (scenario 3) are up to 84%, under the Theoretical Maximum scenario (scenario 10), the residual diffuse sector reduction is up to 70% (both in The Broads SAC catchment). These residual reductions will not be required uniformly across catchments. The detailed modelling through 2024 will confirm the reductions needed at the sub-catchment scale in those catchments where we are undertaking further modelling.

In almost all catchments, we estimate the fair share reduction required by the diffuse sector to be several times greater than the estimated reduction in losses achieved when applying catchment-wide rural land use measures, even when applying the most optimistic of measure uptake rates. This is where additional and/ or alternative measures would need to be explored to achieve the diffuse sector share of the target, for example through spatially targeted conversion of farmland to semi-natural habitat and woodland or habitat creation within and alongside farming.

Table 9: River catchments phosphorus diffuse sector catchment statistics. While some overall catchment average figures indicate zero reduction required, there will be sub-catchments where reductions are required, we will confirm these through more detailed modelling in 2024.

Catchment	Diffuse Sector Share Target (mg/l)	Diffuse Sector Reduction Required	Farmscoper Modelled Outputs				Residual Diffuse Reduction Required
			FS Sc3	FS Sc4	FS Sc8	FS Sc10	
River Avon (Hampshire)	0.024	62%	9%	12%	23%	42%	20-53%
River Axe	0.033	69%	16%	20%	23%	41%	28-53%
River Camel	0.013	0%	11%	14%	21%	44%	0%
River Clun	0.005	90%	11%	14%	22%	42%	48-79%
River Dee	0.010	85%	13%	16%	17%	28%	57-72%
River Derwent (Yorkshire)	0.019	39%	10%	12%	20%	35%	4-29%
River Derwent & Bassenthwaite Lake (DWPP catchment)	0.013	0%	11%	13%	14%	23%	0%
River Derwent & Bassenthwaite Lake (NN catchment)	0.014	0%	11%	13%	14%	23%	0%
River Eden	0.016	38%	14%	17%	18%	29%	9-24%
River Ehen	0.004	0%	7%	9%	10%	17%	0%
River Itchen	0.018	46%	8%	10%	23%	43%	3-38%
River Kent (DWPP catchment)	0.011	0%	12%	15%	16%	30%	0%
River Kent (NN catchment)	0.007	29%	12%	15%	16%	30%	0-17%
River Lambourn	0.017	78%	10%	12%	22%	41%	37-68%
River Mease	0.024	83%	10%	12%	19%	32%	51-73%
River Tweed (England)	0.020	8%	8%	10%	18%	34%	0%
River Wensum	0.010	76%	9%	12%	21%	37%	39-67%
Whole Wye/ Lugg (DWPP catchment)	0.018	66%	10%	13%	18%	34%	32-56%
River Lugg	0.013	85%	11%	14%	23%	42%	43-74%
Wye Valley (Peaks)	0.008	65%	11%	13%	15%	30%	35-54%

Table 10: River catchments nitrate diffuse sector catchment statistics. Total Oxidised Nitrogen (TON) is comprised of nitrate and nitrite concentrations. SAGIS-Simcat produces nitrate outputs only, these have been used against the TON target. Nitrite levels are comparatively very low in the environment.

Catchment	Determinand	Statistic	Diffuse Sector Share Target (mg/l)	Diffuse Sector Reduction Required	Farmscoper Modelled Outputs FS Sc3	FS Sc4	FS Sc8	FS Sc10	Residual Diffuse Reduction Required
River Clun	nitrate	median	0.074	97%	3%	4%	6%	13%	84-94%
River Clun	TON	mean	1.365	54%	3%	4%	6%	13%	41-51%

Table 11: Estuarine, wetland and lake catchments phosphate and total phosphorous diffuse sector catchment statistics. The Fleet is not represented in Simcat SAGIS and so it has not been possible to apportion the sector concentration. We have estimated sector loads that indicate a 78% reduction in diffuse loads is necessary.

Catchment	Diffuse Sector Share Target (mg/l)	Diffuse Sector Reduction Required	Farmscoper Modelled Outputs FS Sc3	FS Sc4	FS Sc8	FS Sc10	Residual Diffuse Reduction Required
Broads (Bure, Trinity, Yare, Ant & Upper Thurne Broads only)	0.009	78%	9%	11%	20%	36%	69-42%
Ant Broads & Marshes	0.008	26%	7%	9%	20%	28%	0-19%
Yare Broads & Marshes	0.01	80%	9%	11%	20%	34%	71-46%
Bure Broads & Marshes	0.011	57%	8%	10%	22%	42%	15-49%
Chesil and the Fleet (Total Phosphorus)	TBC	TBC	11%	14%	16%	27%	TBC
Esthwaite (Total Phosphorus)	0.013	0%					
Hornsea Mere (Total Phosphorus)	TBC	TBC	9%	11%	17%	28%	TBC
Ouse Washes	0.029	66%	8%	10%	18%	31%	35-58%
Poole Harbour	17kg/d	48%	12%	15%	24%	46%	2-36%
Somerset Levels and Moors	0.025	85%	15%	19%	23%	39%	46-70%
Stodmarsh (Total Phosphorus)	0.025	65%	10%	18%	31%	37%	28-55%
River Waveney (at Geldeston Meadows SSSI)	0.041	35%	8%	10%	18%	29%	6-27%

Table 12: Estuarine, wetland and lake catchments total nitrogen diffuse sector catchment statistics.

Site to which nutrient neutrality advice applies	Diffuse Sector Share Target	Diffuse Sector Reduction	Farmscoper Modelled Outputs				Residual Diffuse Reduction Required
			FS Sc3	FS Sc4	FS Sc8	FS Sc10	
Broads (Bure, Trinity, Yare, Ant & Upper Thurne Broads only. Target taken from the designated Broads.)	0.697mg/l	87%	3%	4%	8%	17%	70-84%
Chesil and the Fleet	TBC	TBC	5%	7%	10%	21%	TBC
Esthwaite	0.362	0%	Unavailable	Unavailable	Unavailable	Unavailable	TBC
Hornsea Mere	TBC	TBC	4%	6%	11%	20%	TBC
Lindisfarne	TBC	TBC	Unavailable	Unavailable	Unavailable	Unavailable	TBC
Poole Harbour	1200kg/d	48%	2%	3%	6%	15%	33-46%
Solent	TBC	TBC	3%	4%	9%	20%	TBC
Stodmarsh	0.75mg/l	75%	3%	4%	9%	17%	58-72%
Teesmouth & Cleveland Coast	TBC	TBC	5%	7%	11%	18%	TBC

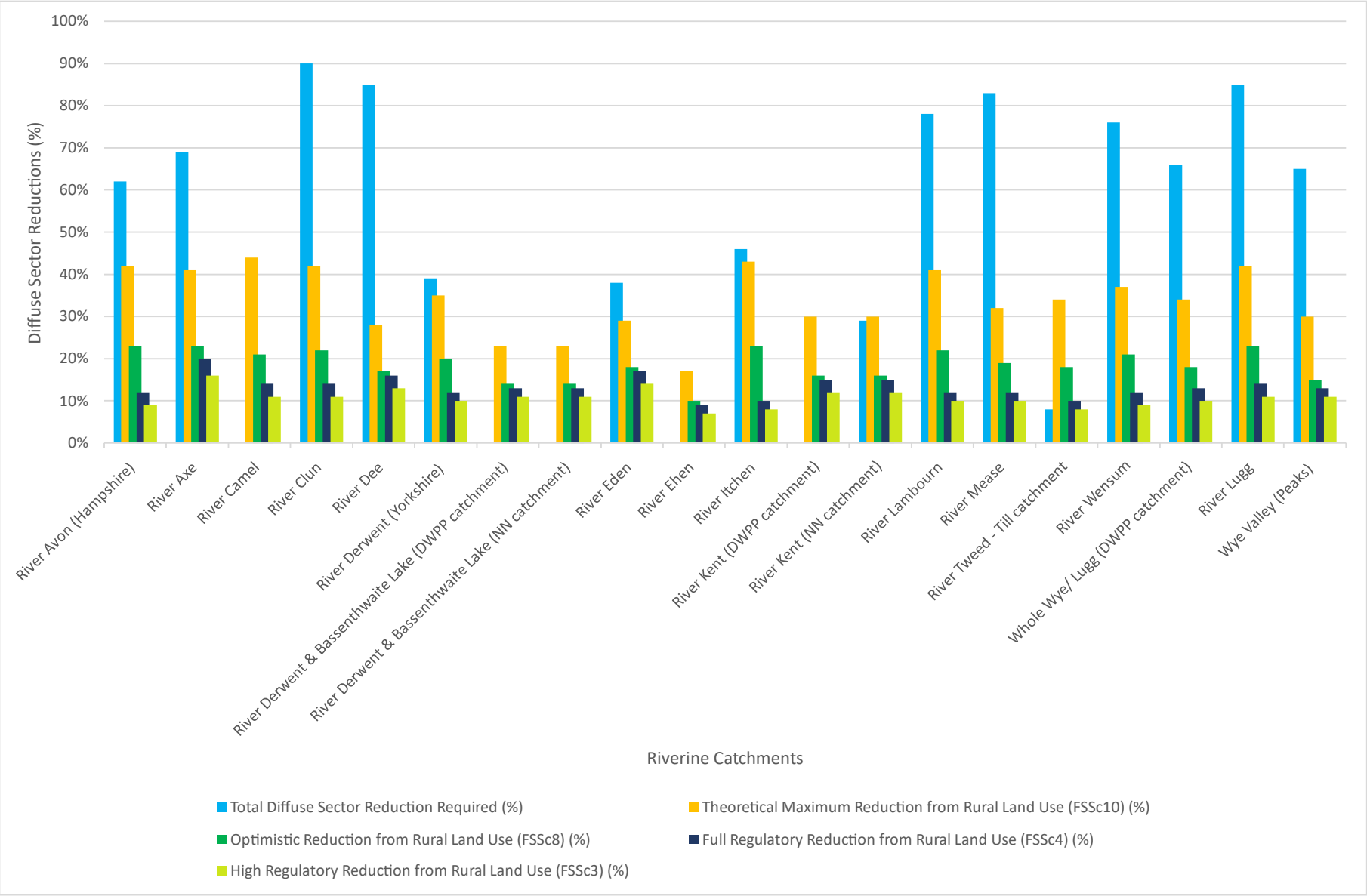

Figure 5: Total diffuse sector percentage reductions required for phosphorus in each riverine catchment alongside estimated reductions in losses from Farmscoper v5 under different agricultural mitigation measure uptake rate scenarios.

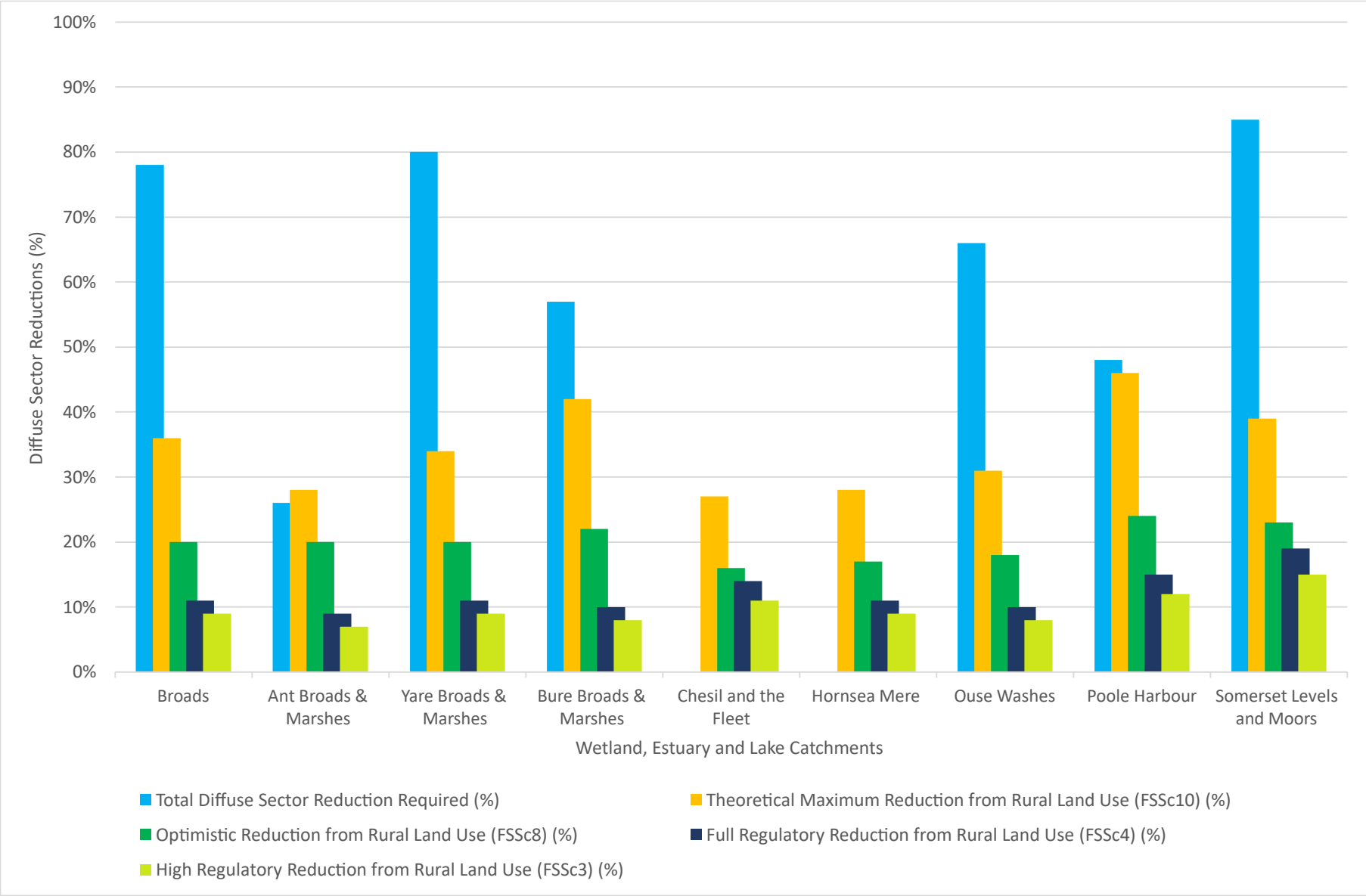

Figure 6: Total diffuse sector percentage reductions required for phosphorus in each estuarine, wetland and lake catchment alongside estimated reductions in losses from Farmscoper v5 under different agricultural mitigation measure uptake rate scenarios.

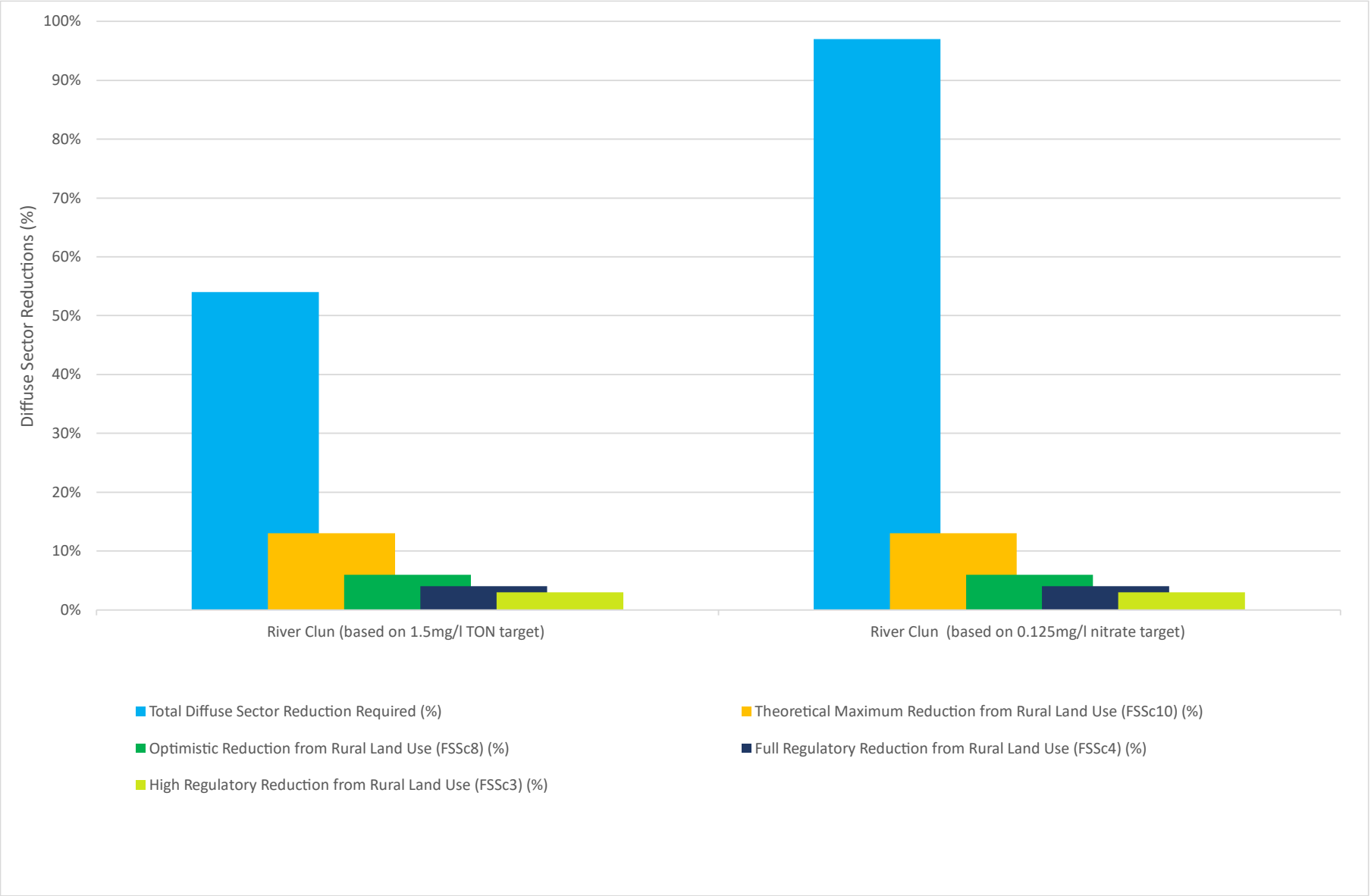

Figure 7: Total diffuse sector percentage reductions required in the Clun alongside estimated reductions in losses from Farmscoper v5 under different agricultural mitigation measure uptake rate scenarios, based on the TON target (left) and separately, the nitrate target (right).

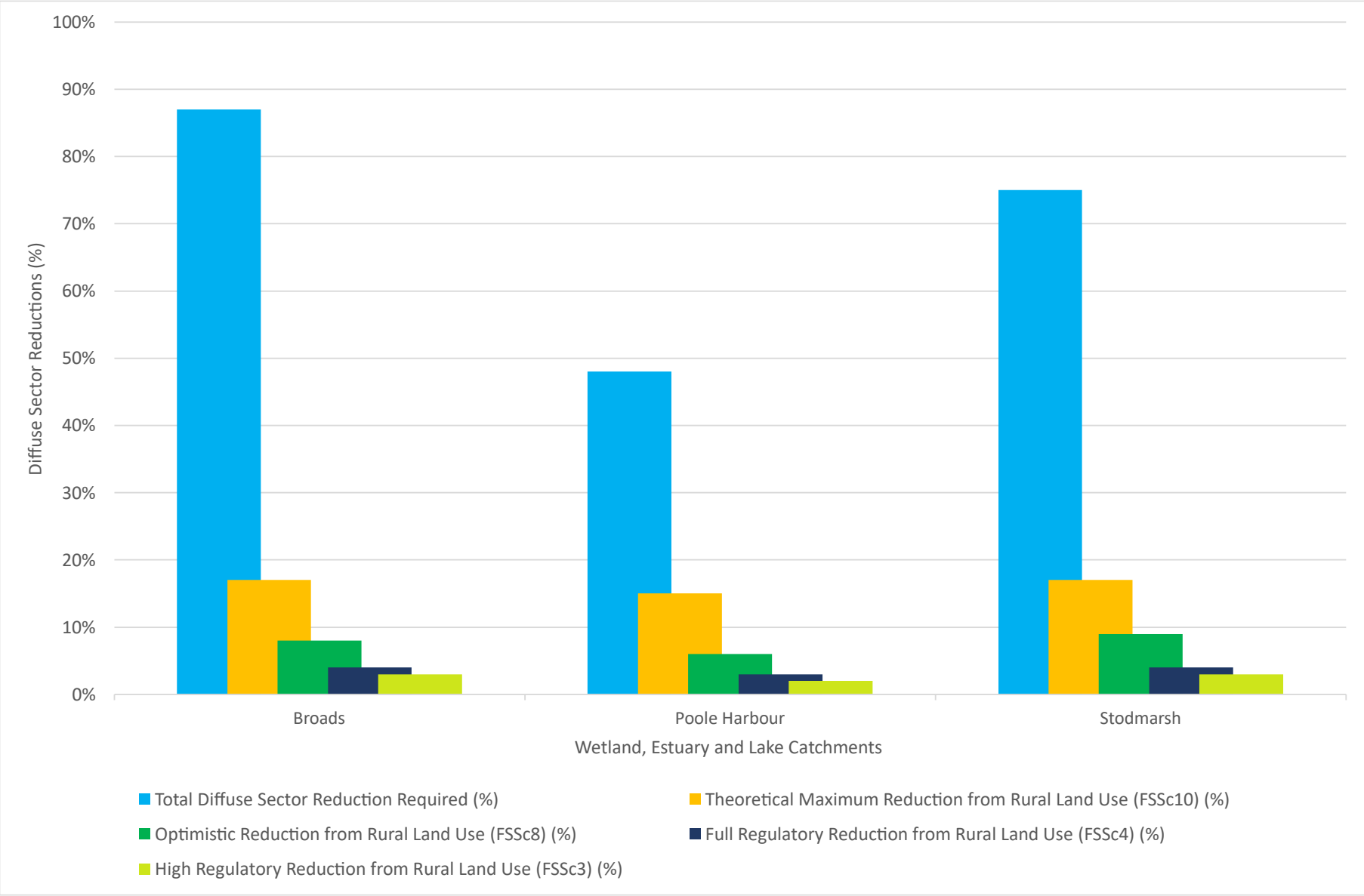

Figure 8: Total diffuse sector percentage reductions required for total nitrogen in each estuarine and wetland catchment alongside estimated reductions in losses from Farmscoper v5 under different agricultural mitigation measure uptake rate scenarios.

River Catchments

River Avon (Hampshire)

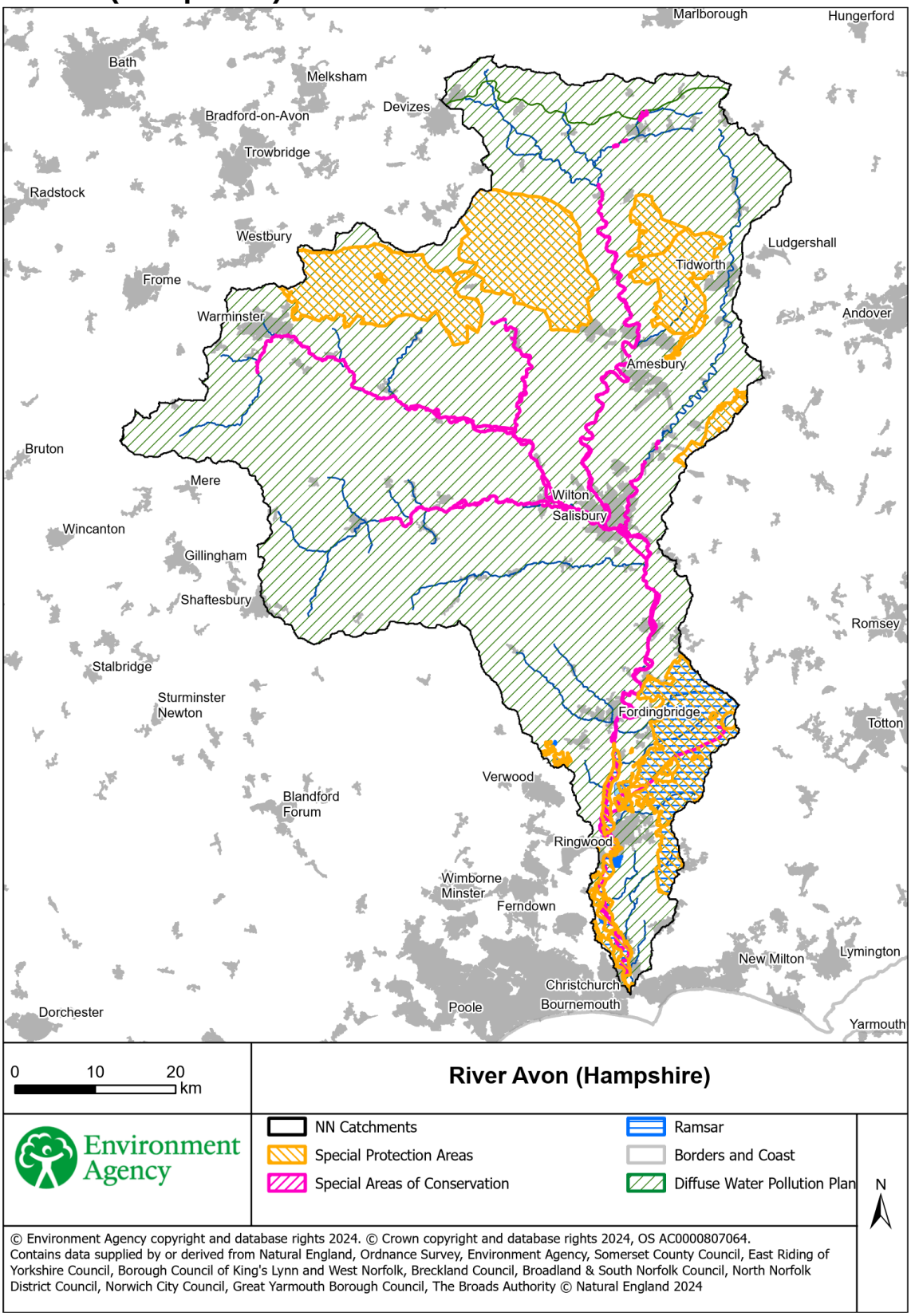

Figure 9: Hampshire Avon Catchment

No further modelling under the DWPP programme is proposed for the Hampshire Avon in 2024.

Table 13: Indicative input load source apportionment for the Hampshire Avon catchment based on catchment endpoint figures (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate (input load)	20%	46%	28%	3%	3%

Table 14: Indicative phosphate catchment average statistics and sector reductions for the Hampshire Avon catchment.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target (consistent with those used in PR24 planning)	50%	50%	
Sector Share of Mean Target (mg/l)	0.024	0.024	0.048
Modelled Recent Sector Mean Concentration (mg/l)	0.063	0.027	
Sector Reduction Required	62%	11%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	9%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	12%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	23%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	42%	n/a	
Residual % Diffuse Sector Reduction	20-53%	n/a	

River Axe

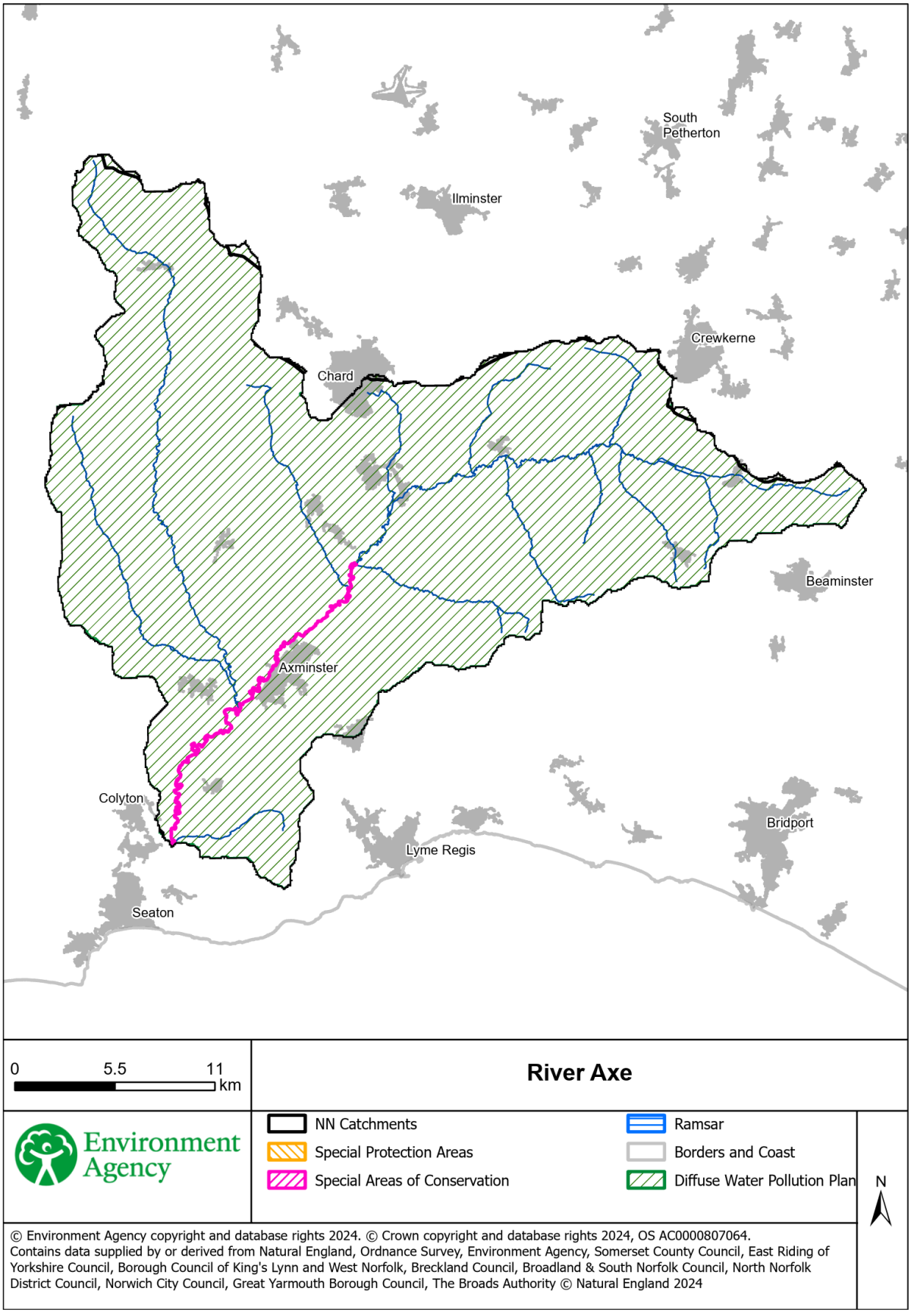

Figure 10: River Axe Catchment

No further modelling under the DWPP programme is proposed for the River Axe in 2024.

Table 15: Indicative input load source apportionment for the River Axe catchment based on catchment endpoint (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	14%	83%	1%	1%	0%

Table 16: Phosphate catchment average statistics and sector reductions for the River Axe.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	66%	34%	
Sector Share of Mean Target (mg/l)	0.033	0.017	0.05
Modelled Recent Sector Mean Concentration (mg/l)	0.105	0.016	
Sector Reduction Required	69%	0%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	16%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	20%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	23%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	41%	n/a	
Residual % Diffuse Sector Reduction	28-53%	n/a	

River Camel

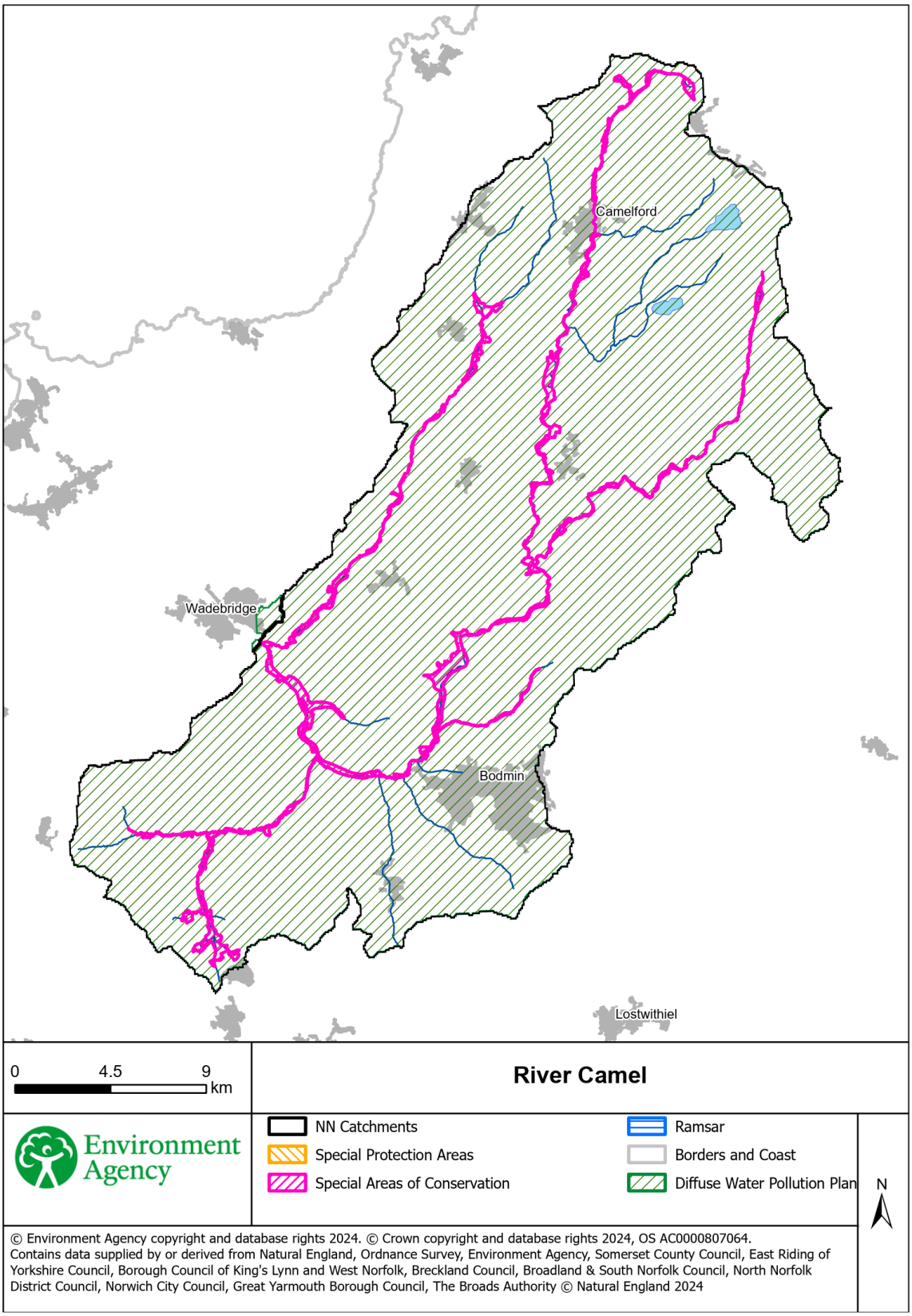

Figure 11:River Camel Catchment

Table 17: Indicative input load source apportionment for the River Camel catchment based on catchment endpoint (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	73%	21%	4%	1%	0%

Table 18: Indicative phosphate catchment average statistics and sector reductions for the River Camel catchment.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	52%	48%	
Sector Share of Mean Target (mg/l)	0.013	0.011	0.024
Modelled Recent Sector Mean Concentration (mg/l)	0.012	0.010	
Sector Reduction Required	0%	0%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	11%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	14%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	21%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	44%	n/a	
Residual % Diffuse Sector Reduction	0%	n/a	

Where at the catchment average scale it appears that sector reductions are not required, the detailed DWPP modelling will confirm the sub-catchment areas where the sector share is exceeded and where measures need to be identified.

River Clun

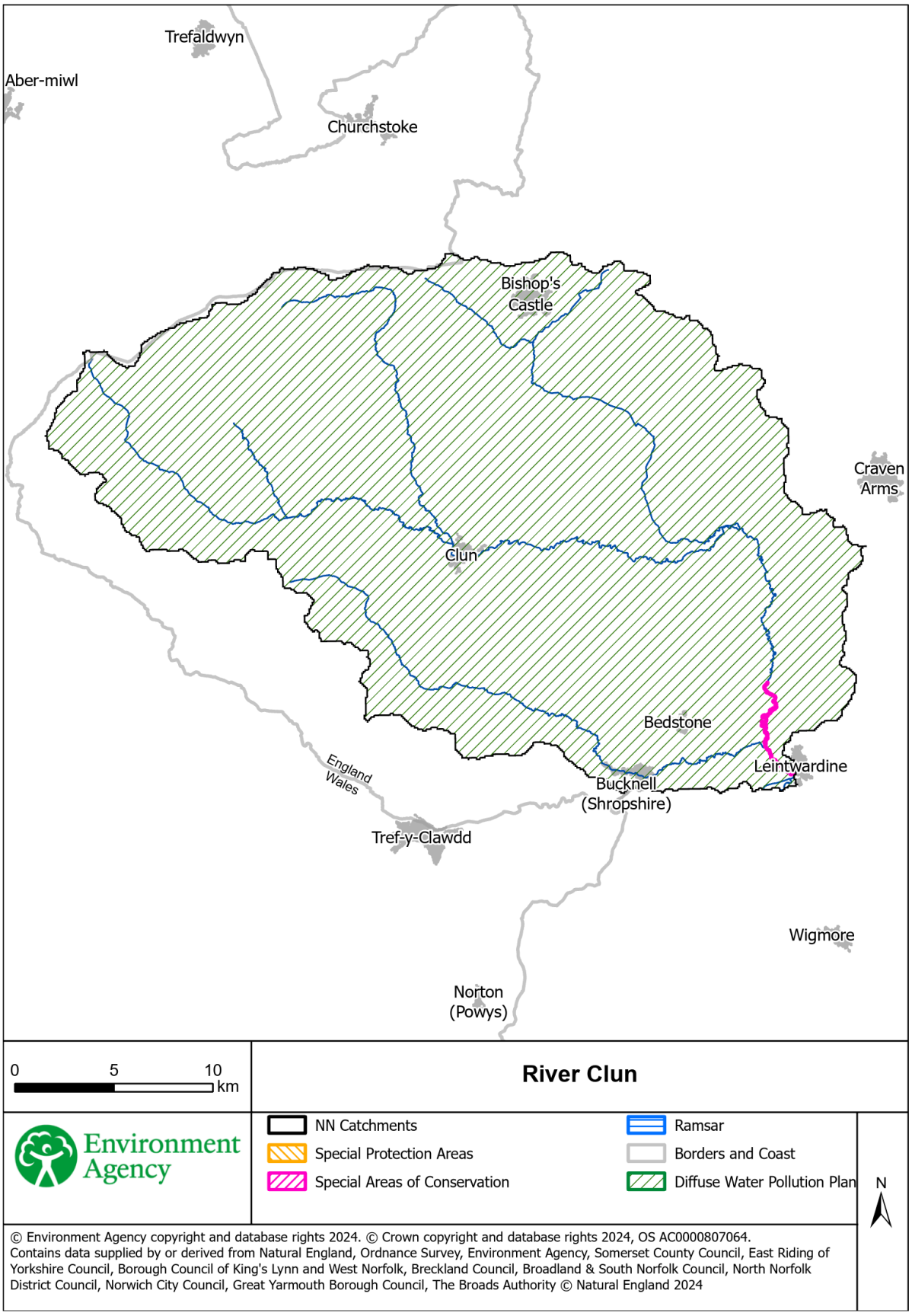

Figure 12: River Clun Catchment

Table 19: Indicative input load source apportionment for the River Clun catchment based on catchment endpoint (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	12%	80%	6%	2%	0%
Nitrate	2%	98%	0%	0%	0%

Table 20: Indicative phosphate catchment average statistics and sector reductions for the Clun catchment.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	50%	50%	
Sector Share of Mean Target (mg/l)	0.005	0.005	0.01
Recent Modelled Sector Mean Concentration (mg/l)	0.05	0.005	
Sector Reduction Required	90%	0%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	11%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	14%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	22%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	42%	n/a	
Residual % Diffuse Sector Reduction	48-79%	n/a	

Table 21: Indicative nitrate catchment average statistics and sector reductions for the Clun.

	Diffuse	Point	Diffuse	Point
Potential Target	Nitrate 0.125mg/l	Nitrate 0.125mg/l	TON 1.5mg/l	TON 1.5mg/l
Statistic	Median	Median	Mean	Mean
Baseline (2009) Sector Share of the Target	59%	41%	91%	9%
Sector Share of Mean Target (mg/l)	0.074	0.051	1.365	0.135
Modelled Recent Sector Mean Concentration (mg/l)	2.731	0.006	2.972	0.120
Sector Reduction Required	97%	0%	54%	0%
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	3%	n/a	3%	n/a
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	4%	n/a	4%	n/a
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	6%	n/a	6%	n/a
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	13%	n/a	13%	n/a
Residual % Diffuse Sector Reduction	84-94%	n/a	41-51%	n/a

Where at the catchment average scale it appears that sector reductions are not required, the detailed DWPP modelling will confirm the sub-catchment areas where the sector share is exceeded and where measures need to be identified.

River Dee

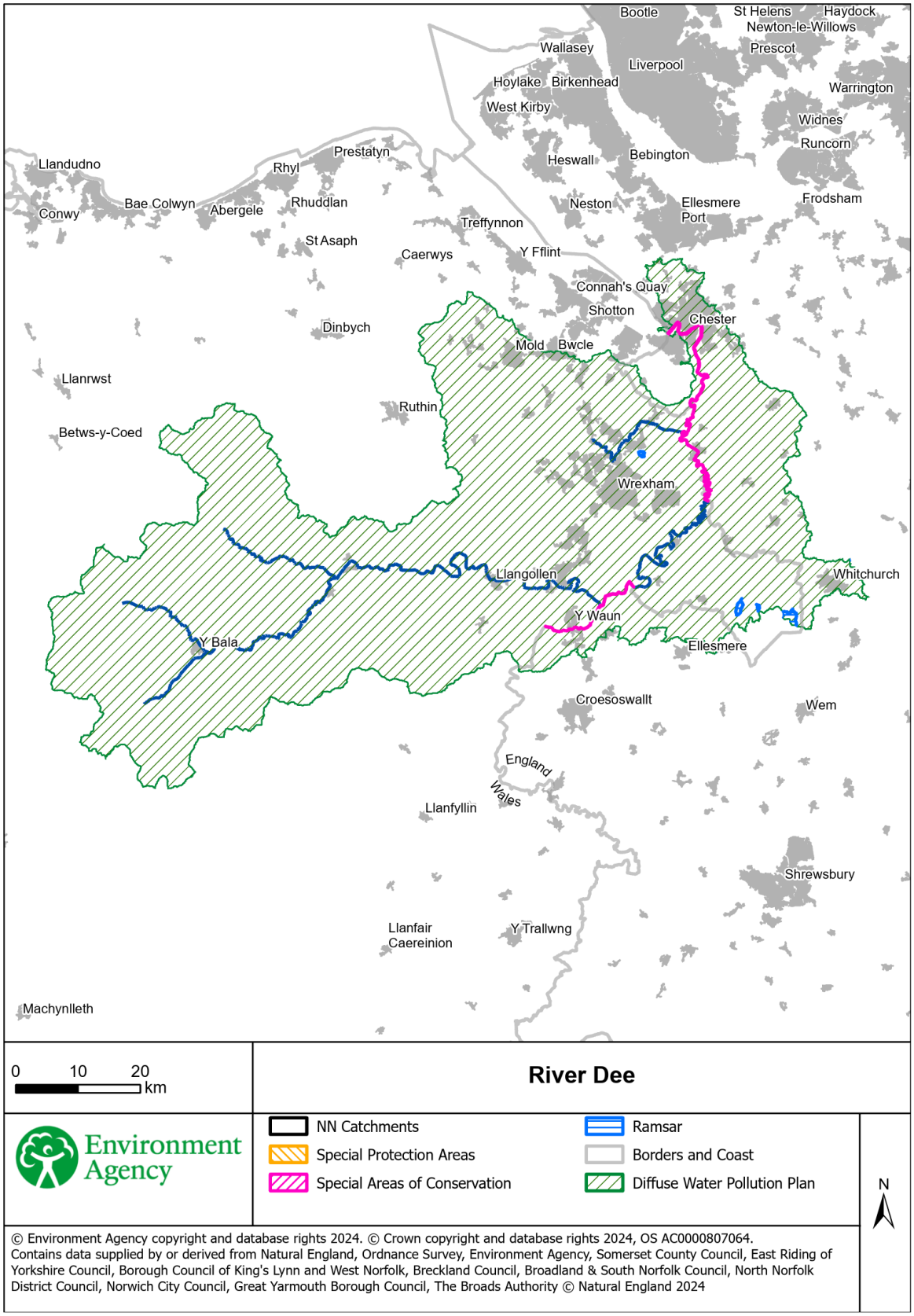

Figure 13: River Dee Catchment

Table 22: Indicative input load source apportionment based on River Dee catchment endpoint (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	16%	83%	0%	1%	0%

Table 23: Indicative phosphate catchment average statistics and sector reductions for the Dee catchment.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	50%	50%	
Sector Share of Mean Target (mg/l)	0.01	0.01	0.02
Modelled Recent Sector Mean Concentration (mg/l)	0.066	0.026	
Sector Reduction Required	85%	62%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	13%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	16%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	17%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	28%	n/a	
Residual % Diffuse Sector Reduction	57-72%	n/a	

River Derwent (Yorkshire)

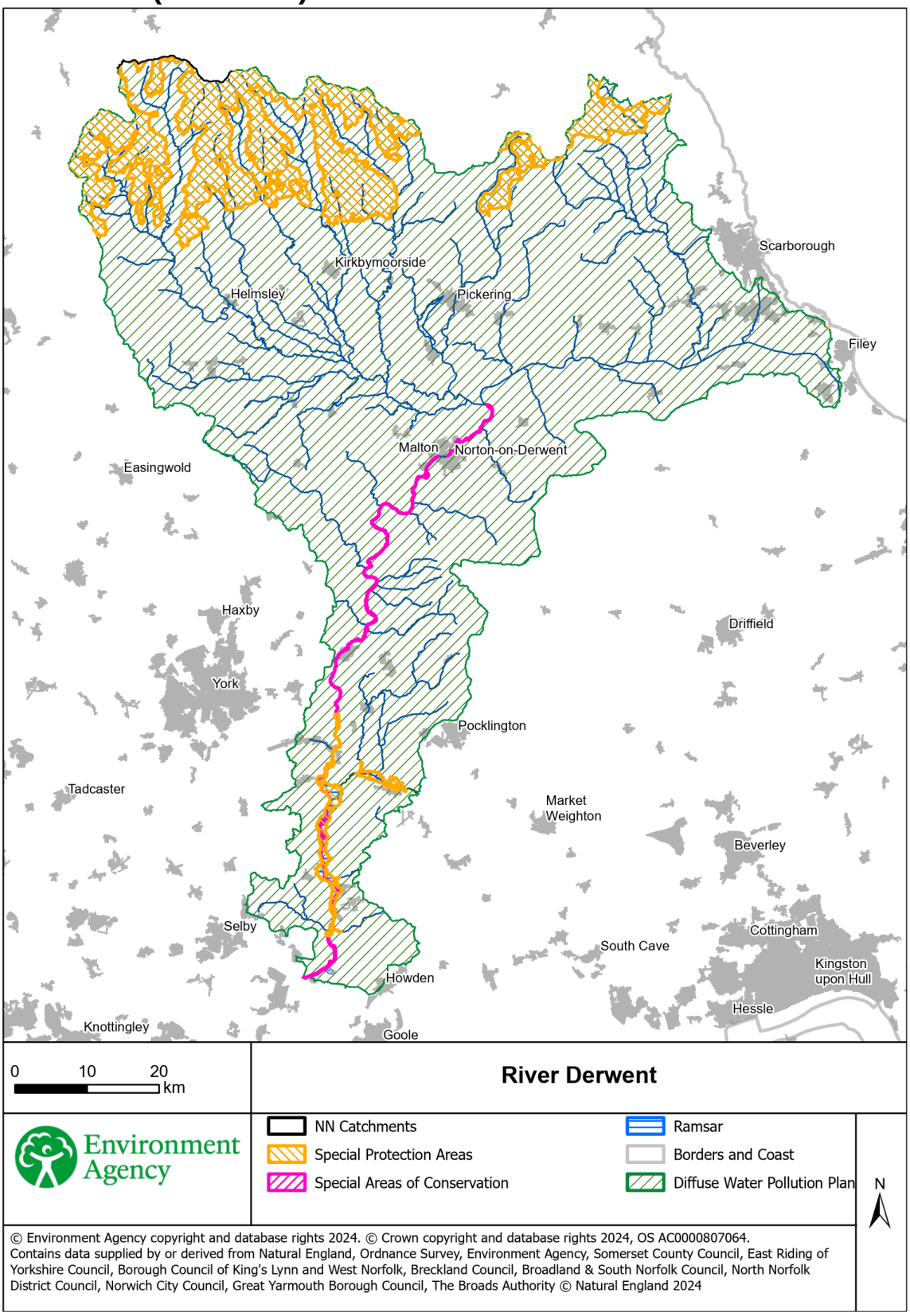

Figure 14: River Derwent Catchment

Table 24: Indicative input load source apportionment for the River Derwent (Yorkshire) catchment based on catchment endpoint (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	44%	53%	2%	1%	0%

Table 25: Indicative phosphate catchment average statistics and sector reductions for the River Derwent (Yorkshire) catchment.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	38%	62%	
Sector Share of Mean Target (mg/l)	0.019	0.031	0.05
Modelled Recent Sector Mean Concentration (mg/l)	0.031	0.033	
Sector Reduction Required	39%	7%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	10%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	12%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	20%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	35%	n/a	
Residual % Diffuse Sector Reduction	4-29%	n/a	

River Derwent & Bassenthwaite Lake

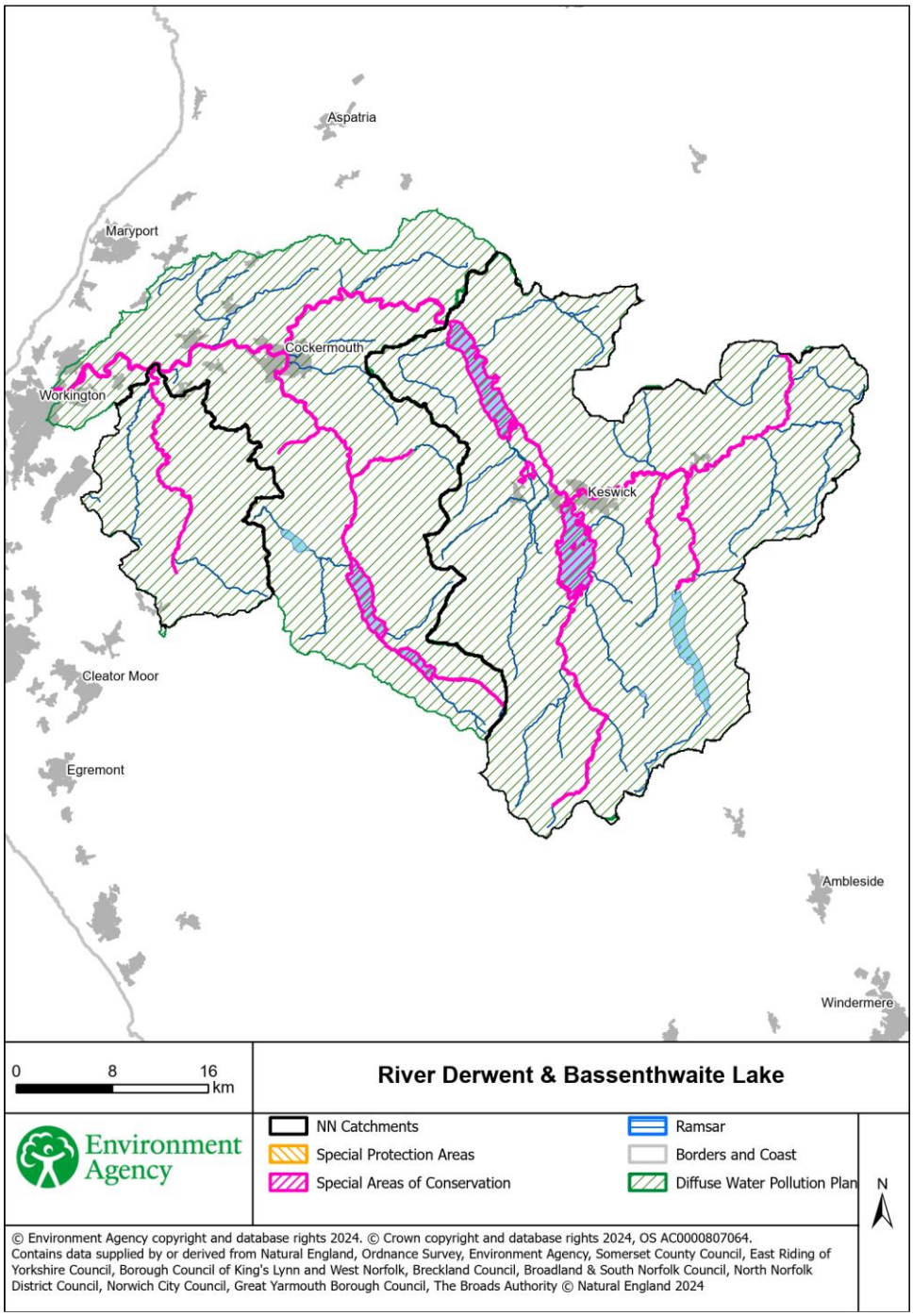

Figure 15: River Derwent and Bassenthwaite Lake Catchment

The figures presented here are catchment averages for the combined riverine-lake catchment. The detailed DWPP modelling, planned for summer 2024, will consider the compliance of and loads to Bassenthwaite Lake more specifically.

While the catchment average figures indicate that no diffuse reduction is required, the detailed DWPP modelling will likely highlight specific reaches and sub-catchments where reductions are required (as demonstrated by the detailed modelling for the River Kent).

Table 26: Indicative input load source apportionment for the combined River Derwent and Bassenthwaite Lake catchment based on catchment endpoint (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
DWPP Catchment	56%	43%	0%	0%	0%
Nutrient Neutrality Catchment	48%	50%	0%	0%	0%

Table 27: Indicative phosphate catchment average statistics and sector reductions for the River Derwent & Bassenthwaite Lake DWPP catchment.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	76%	24%	
Sector Share of Mean Target (mg/l)	0.013	0.004	0.017
Modelled Recent Sector Mean Concentration (mg/l)	0.011	0.006	
Sector Reduction Required	0%	28%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	11%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	13%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	14%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	23%	n/a	
Residual % Diffuse Sector Reduction	0%	n/a	

Where at the catchment average scale it appears that sector reductions are not required, the detailed DWPP modelling will confirm the sub-catchment areas where the sector share is exceeded and where measures need to be identified.

Table 28: Phosphate catchment average statistics and sector reductions for the River Derwent & Bassenthwaite Lake catchment where Nutrient Neutrality advice applies. Based on Farmscoper V5 Outputs for the whole DWPP catchment, not just the catchment where Nutrient Neutrality advice applies.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	78%	22%	
Sector Share of Mean Target (mg/l)	0.014	0.004	0.018
Modelled Recent Sector Mean Concentration (mg/l)	0.006	0.005	
Sector Reduction Required	0%	13%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	11%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	13%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	14%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	23%	n/a	
Residual % Diffuse Sector Reduction	0%	n/a	

River Eden

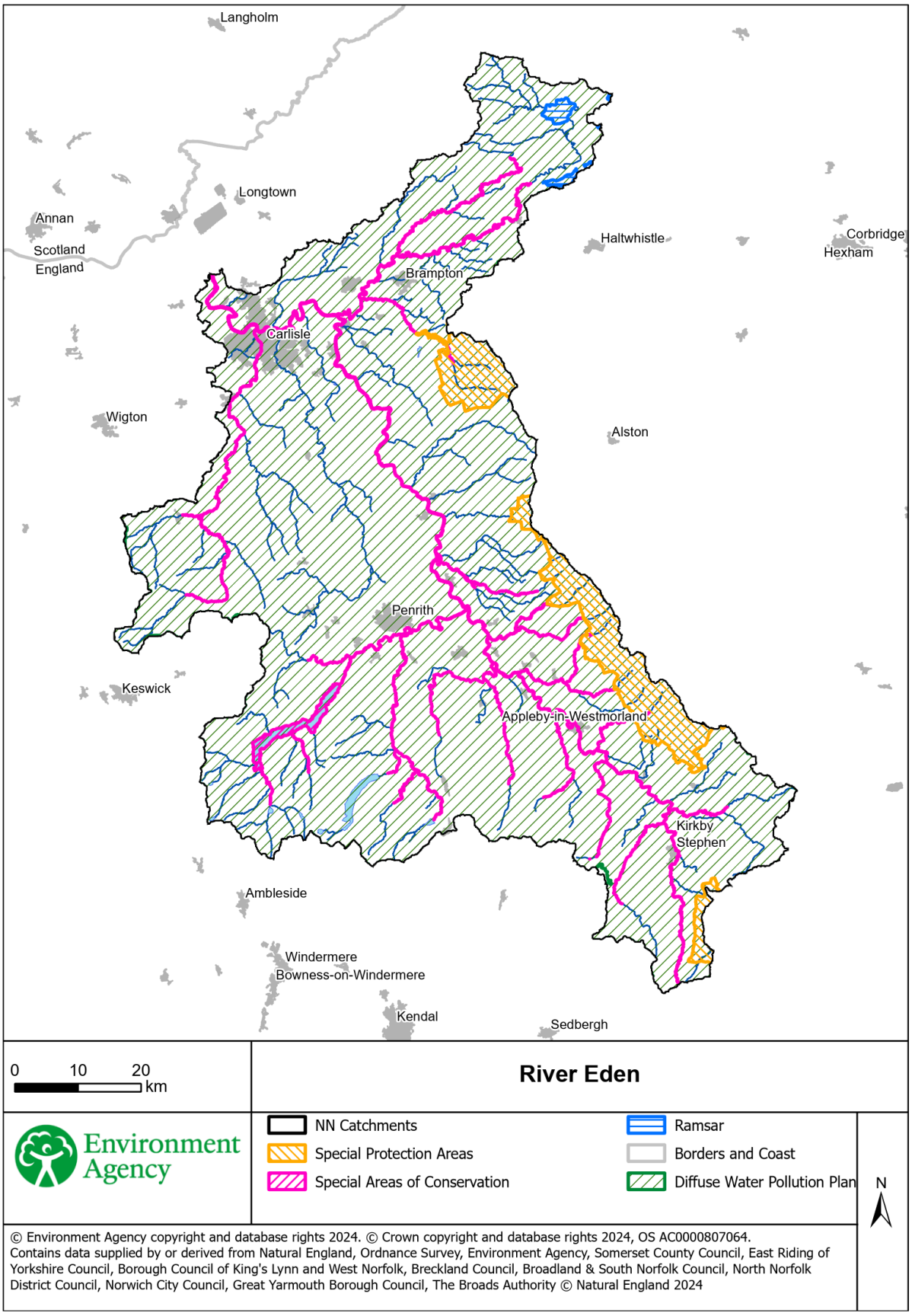

Figure 16: River Eden Catchment

Table 29: Indicative input load source apportionment for the River Eden based on catchment endpoint (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	43%	55%	2%	1%	0%

Table 30: Indicative phosphate catchment average statistics and sector reductions for the River Eden catchment

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	72%	28%	
Sector Share of Mean Target (mg/l)	0.016	0.006	0.022
Modelled Recent Sector Mean Concentration (mg/l)	0.025	0.007	
Sector Reduction Required	38%	16%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	14%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	17%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	18%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	29%	n/a	
Residual % Diffuse Sector Reduction	9-24%	n/a	

River Ehen

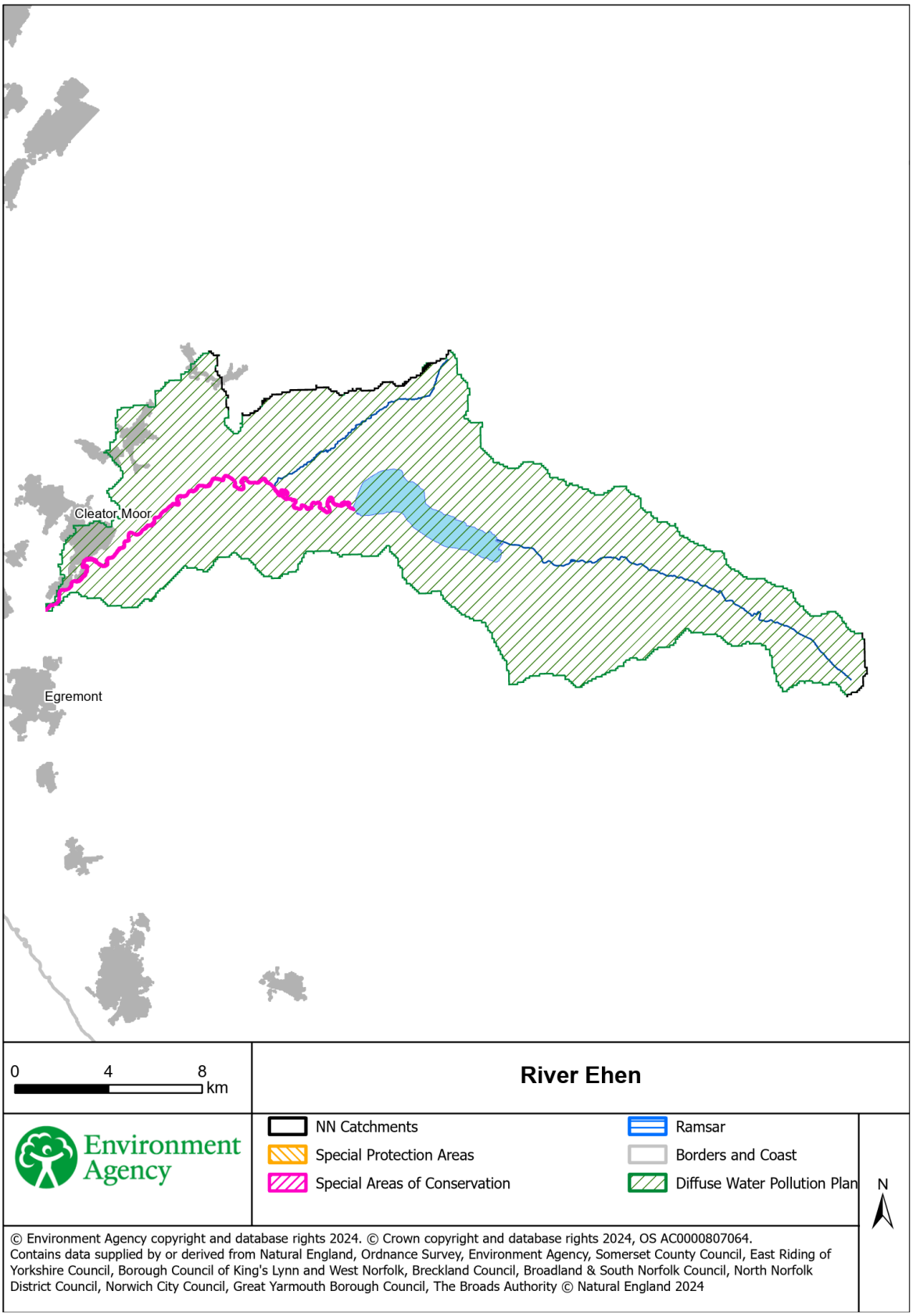

Figure 17: River Ehen Catchment

Table 31: Indicative input load source apportionment for the River Ehen based on catchment endpoint (recent scenario, PR24 calibration models)..

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	25%	73%	1%	1%	0%

Table 32: Indicative phosphate catchment average statistics and sector reductions for the River Ehen catchment.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	83%	17%	
Sector Share of Mean Target (mg/l)	0.004	0.001	0.005
Modelled Recent Sector Mean Concentration (mg/l)	0.003	0.001	
Sector Reduction Required	0%	n/a	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	7%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	9%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	10%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	17%	n/a	
Residual % Diffuse Sector Reduction	0%	n/a	

Where the catchment average figures indicate that no diffuse reduction is required, the detailed DWPP modelling will likely highlight specific reaches and sub-catchments where reductions are required (as demonstrated by the detailed modelling for the River Kent).

River Itchen

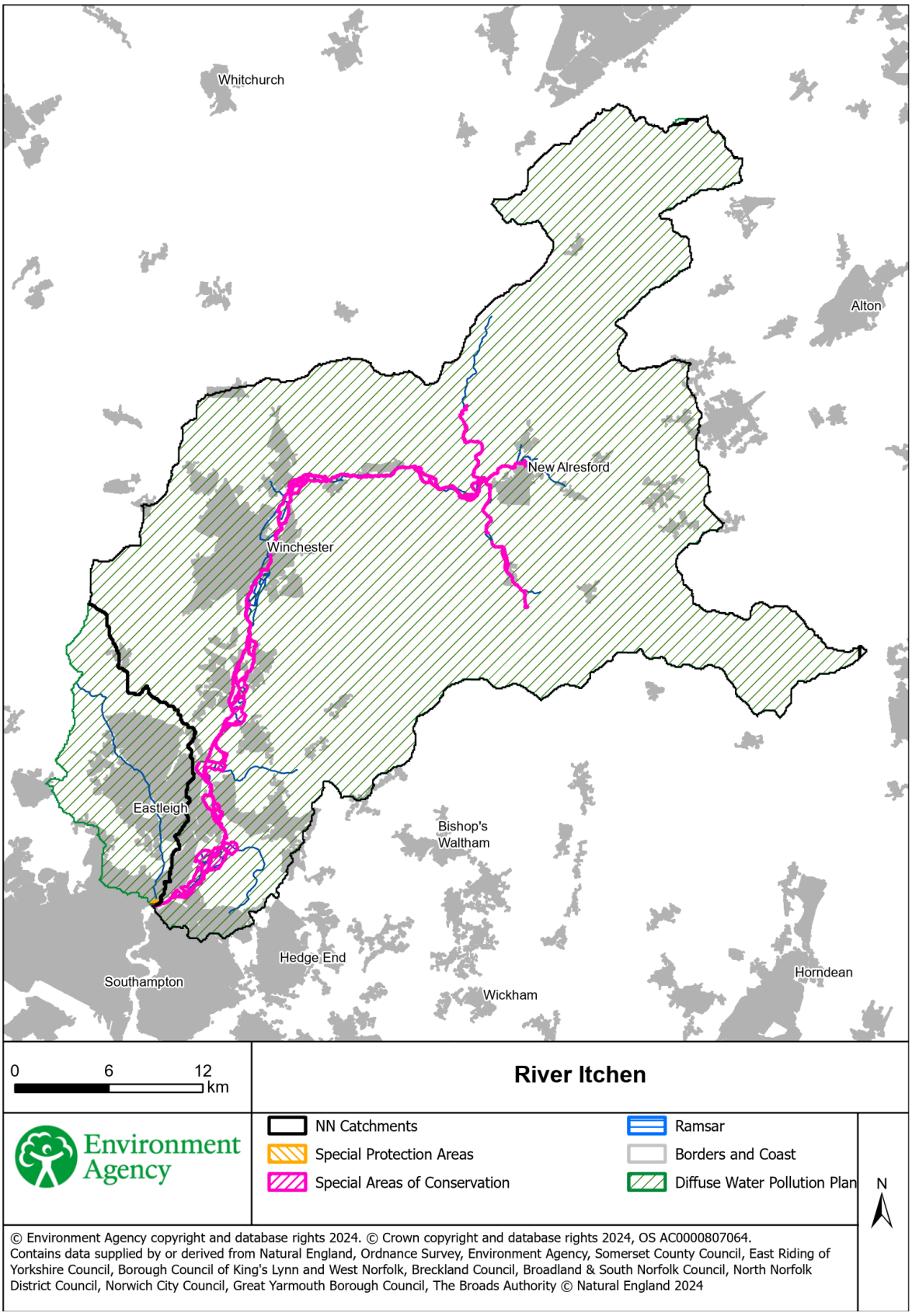

Figure 18: River Itchen Catchment

Table 33: Indicative input load source apportionment for the River Itchen based on catchment endpoint (recent scenario, PR24 calibration models)..

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	36%	30%	20%	4%	11%*

*Other inputs are predominantly a representation of the 'diffuse' component of the cress and fish farm discharges that arises from the abstracted borehole water rather than the farm processing.

Table 34: Indicative phosphate catchment average statistics and sector reductions for the River Itchen.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	50%	50%	
Sector Share of Mean Target (mg/l)	0.018	0.018	0.035
Modelled Recent Sector Mean Concentration (mg/l)	0.033	0.007	
Sector Reduction Required	46%	n/a	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	8%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	10%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	23%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	43%	n/a	
Residual % Diffuse Sector Reduction	3-38%	n/a	

River Kent

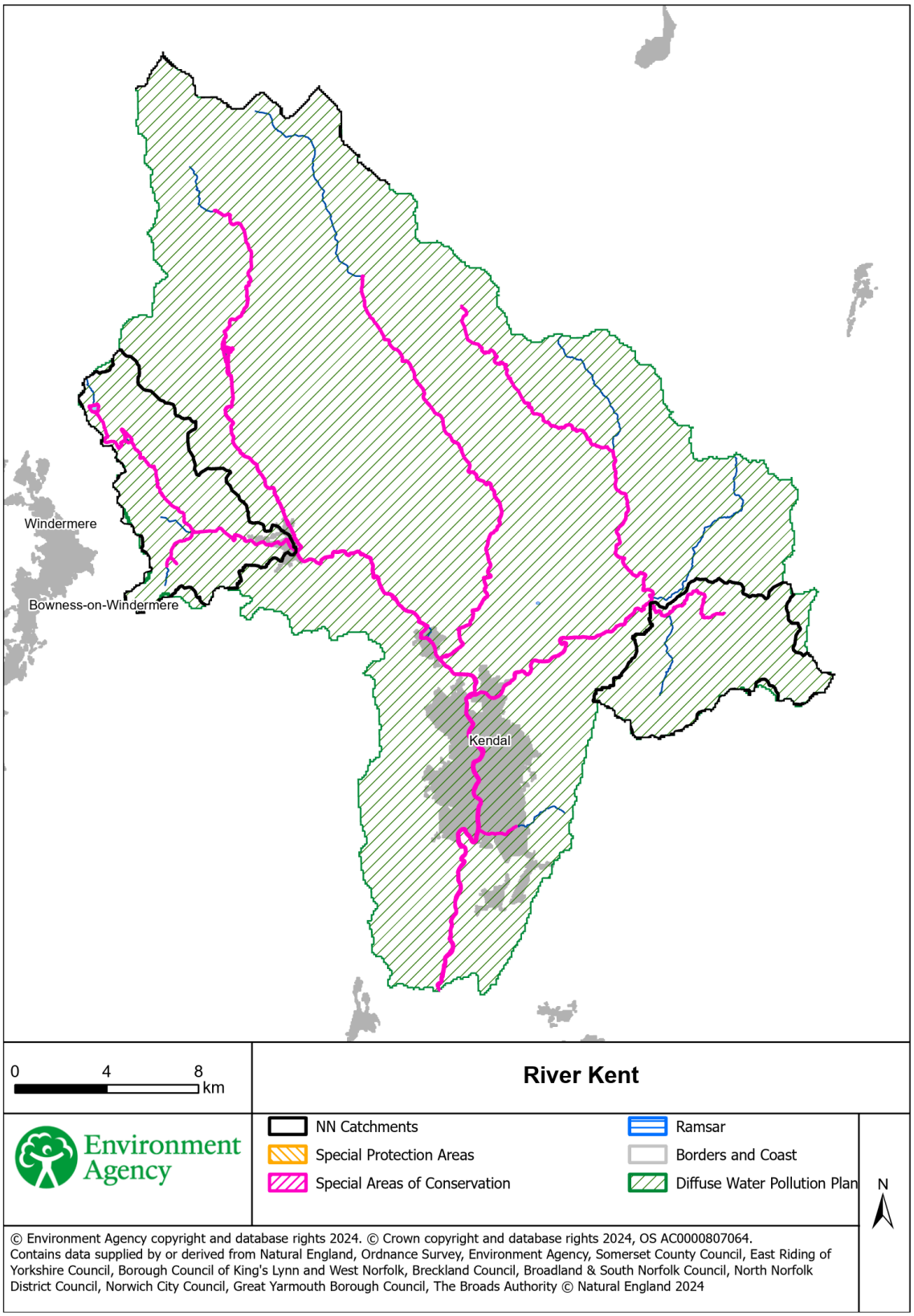

Figure 19: River Kent Catchment

No further modelling under the DWPP programme is proposed for the River Kent in 2024.

Table 35: Indicative input load source apportionment for the River Kent based on catchment endpoint (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
DWPP Catchment	69%	30%	0%	1%	0%
Nutrient Neutrality Catchment only	15%	83%	0%	2%	0%

Table 36: Phosphate catchment average statistics and sector reductions for the River Kent DWPP catchment.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	62%	38%	
Sector Share of Mean Target (mg/l)	0.011	0.007	0.017
Modelled Recent Sector Mean Concentration (mg/l)	0.008	0.003	
Sector Reduction Required	0%	n/a	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	12%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	15%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	16%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	30%	n/a	
Residual % Diffuse Sector Reduction	0%	n/a	

Where the catchment average figures indicate that no diffuse reduction is required, the detailed DWPP modelling has shown that a 34% reduction is required in the Flodder Beck sub-catchment.

Table 37: Indicative phosphate catchment average statistics and sector reductions for the River Kent, where nutrient neutrality advice applies only. Based on Farmscoper V5 Outputs for the whole DWPP catchment, not just the catchment where Nutrient Neutrality advice applies.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	54%	46%	
Sector Share of Mean Target (mg/l)	0.007	0.006	0.012
Modelled Recent Sector Mean Concentration (mg/l)	0.009	0.002	
Sector Reduction Required	29%	n/a	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	12%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	15%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	16%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	30%	n/a	
Residual % Diffuse Sector Reduction	0-17%	n/a	

River Lambourn

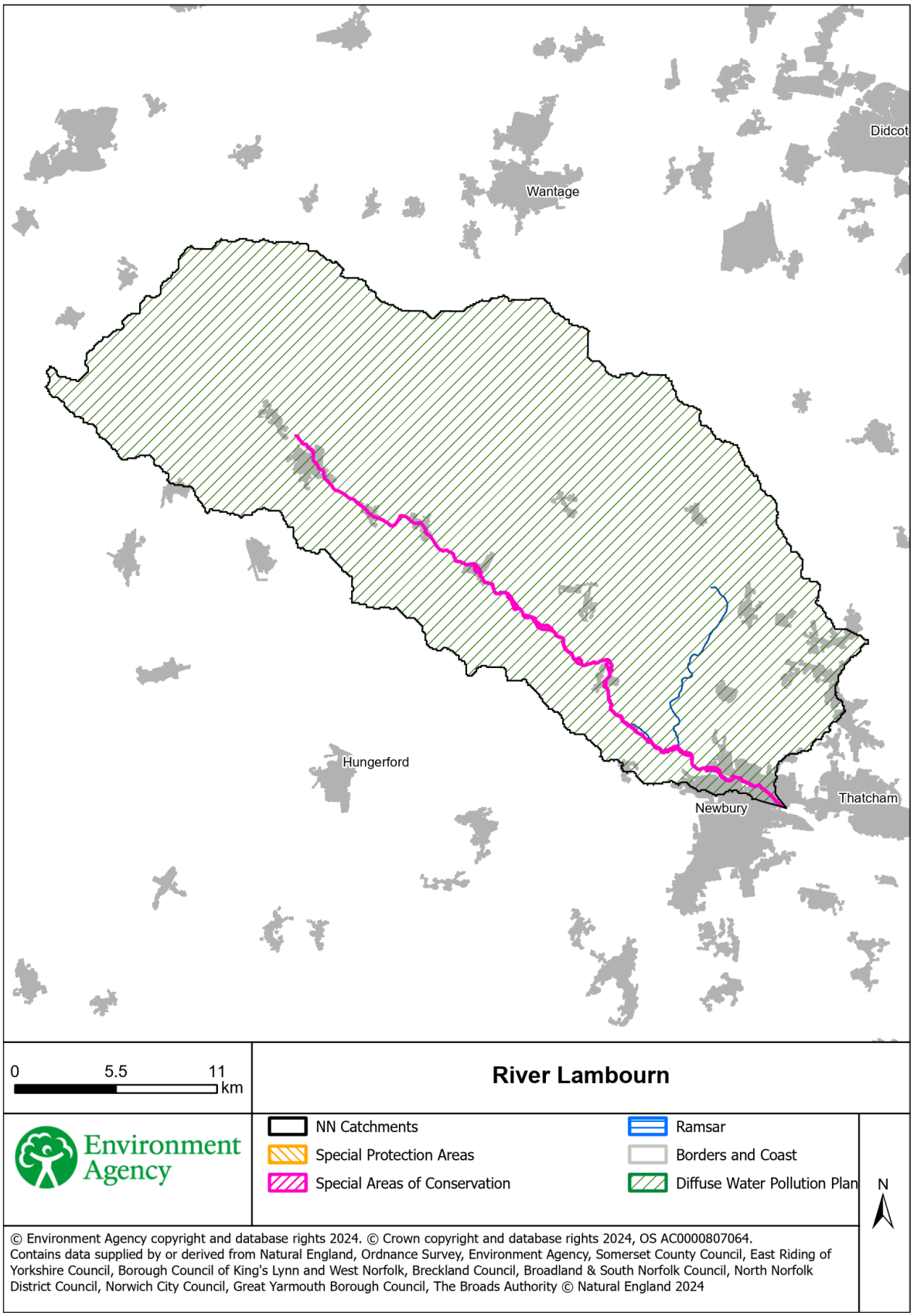

Figure 20: River Lambourn Catchment

No further modelling of the River Lambourn catchment is proposed for 2024, the site does not fall within the DWPP Programme.

Table 38: Indicative input load source apportionment for the River Lambourn based on catchment endpoint (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	14%	70%	14%	2%	0%

Table 39: Indicative phosphate catchment average statistics and sector reductions for the River Lambourn.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	61%	39%	
Sector Share of Mean Target (mg/l)	0.017	0.011	0.028
Modelled Recent Sector Mean Concentration (mg/l)	0.079	0.018	
Sector Reduction Required	78%	38%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	10%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	12%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	22%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	41%	n/a	
Residual % Diffuse Sector Reduction	37-68%	n/a	

River Mease

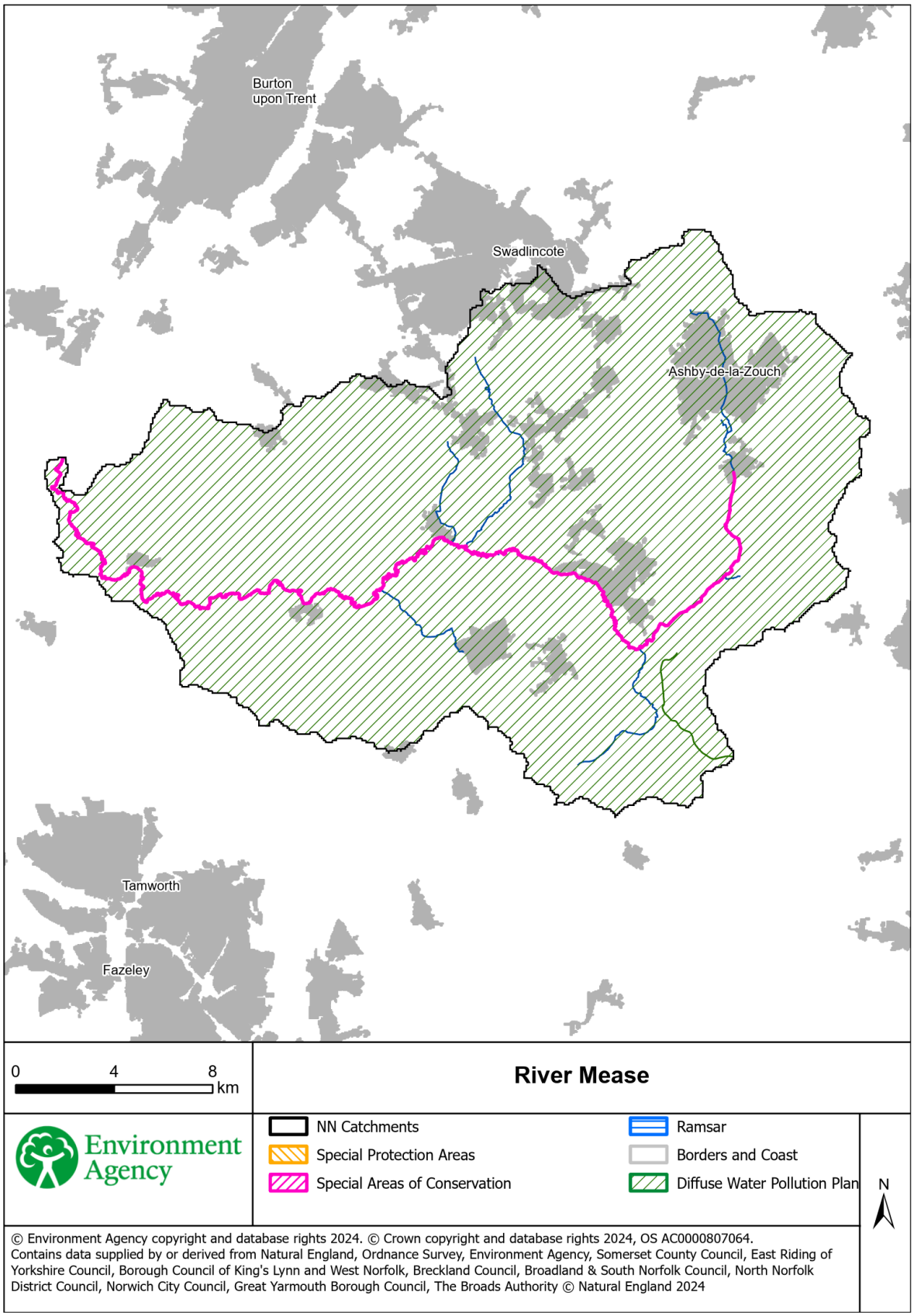

Figure 21: River Mease Catchment

Table 39: Indicative input load source apportionment based on catchment endpoint (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	22%	43%	30%	5%	0%

Table 40: Indicative phosphate catchment average statistics and sector reductions for the River Mease catchment.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	50%	50%	
Sector Share of Mean Target (mg/l)	0.024	0.024	0.048
Modelled Recent Sector Mean Concentration (mg/l)	0.140	0.053	
Sector Reduction Required	83%	55%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	10%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	12%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	19%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	32%	n/a	
Residual % Diffuse Sector Reduction	51-73%	n/a	

River Tweed – Till sub-catchment only

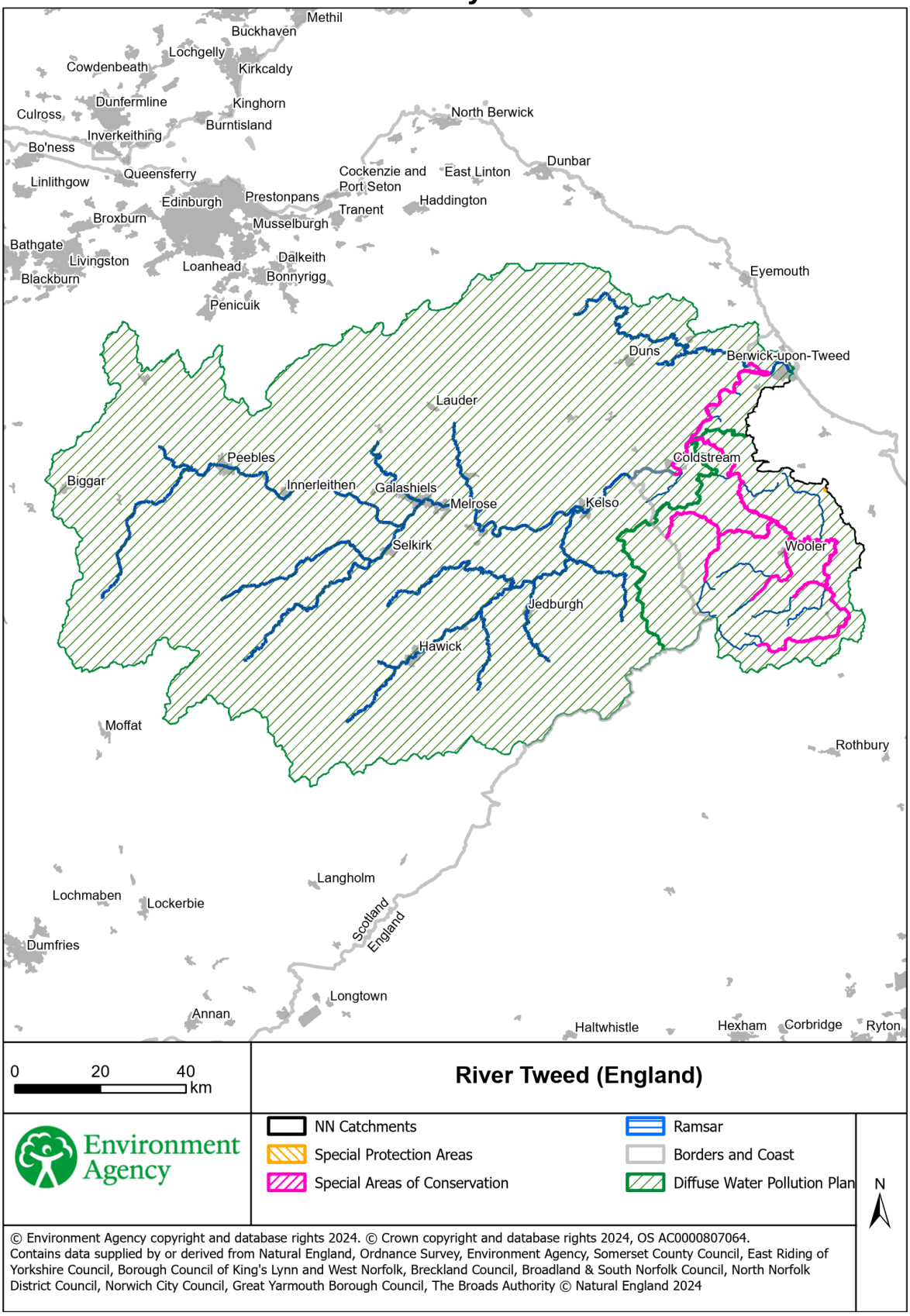

Figure 22: River Tweed Catchment

Table 41: Indicative input load source apportionment for the River Tweed (Till sub-catchment only) based on catchment endpoint (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	14%	83%	1%	2%	0%

Table 42: Indicative phosphate catchment average statistics and sector reductions for the River Tweed (Till catchment only).

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	94%	6%	
Sector Share of Mean Target (mg/l)	0.02	0.001	0.021
Modelled Recent Sector Mean Concentration (mg/l)	0.022	0.002	
Sector Reduction Required	8%	40%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	8%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	10%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	18%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	34%	n/a	
Residual % Diffuse Sector Reduction	0%	n/a	

River Wensum

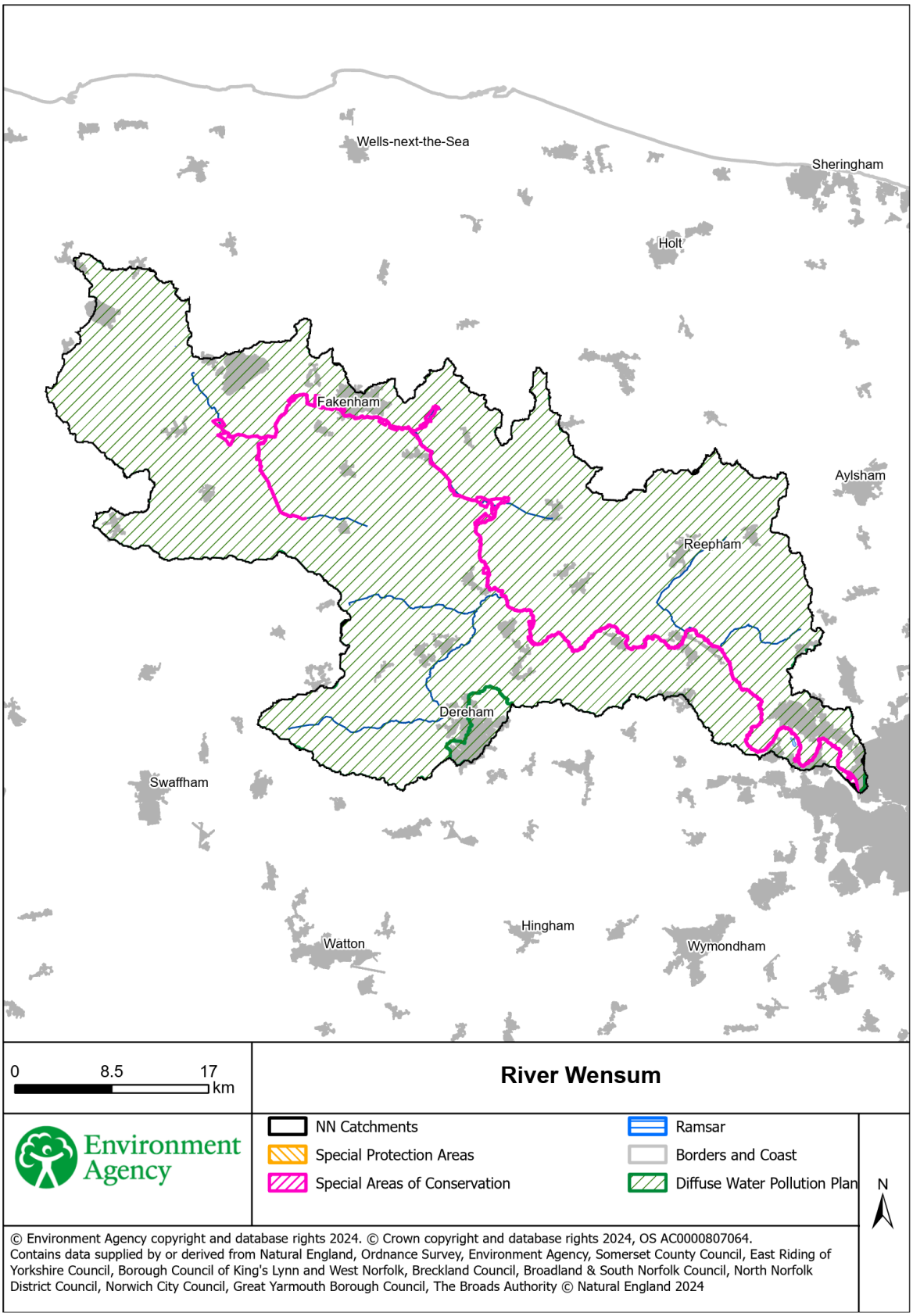

Figure 23: River Wensum Catchment

No modelling under the DWPP programme is proposed for the River Axe in 2024.

Table 43: Indicative input load source apportionment for the River Wensum based on catchment endpoint (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	18%	68%	13%	1%	0%

Table 44: Indicative phosphate catchment average statistics and sector reductions for the River Wensum.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	48%	52%	
Sector Share of Mean Target (mg/l)	0.01	0.01	0.02
Modelled Recent Sector Mean Concentration (mg/l)	0.04	0.017	
Sector Reduction Required	76%	39%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	9%		
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	12%		
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	21%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	37%	n/a	
Residual % Diffuse Sector Reduction	39-67%	n/a	

River Wye (inc. River Lugg)

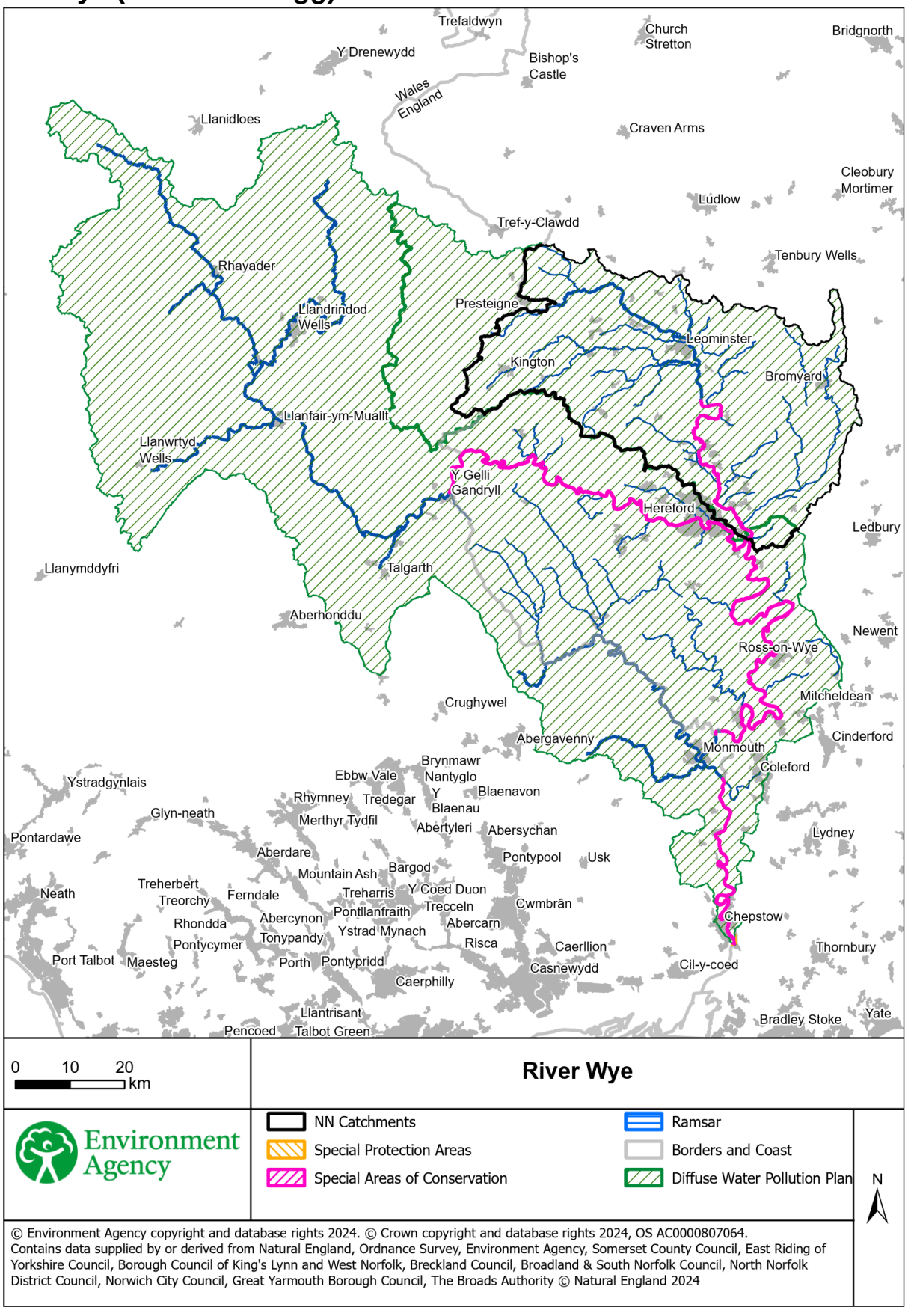

Figure 24: River Wye Catchment

No further modelling under the DWPP programme is proposed for the River Wye in 2024.

Table 45: Indicative input load source apportionment for the Rivers Wye and Lugg based on catchment endpoint (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
DWPP Catchment	21%	75%	2%	2%	0%
Nutrient Neutrality Catchment only (Lugg)	14%	81%	2%	2%	0%

Table 46: Indicative phosphate catchment average statistics and sector reductions for the River Wye DWPP catchment.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	75%	25%	
Sector Share of Mean Target (mg/l)	0.018	0.006	0.024
Modelled Recent Sector Mean Concentration (mg/l)	0.054	0.011	
Sector Reduction Required	66%	43%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	10%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	13%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	18%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	34%	n/a	
Residual % Diffuse Sector Reduction	32-56%	n/a	

Table 47: Indicative phosphate catchment average statistics and sector reductions for the River Lugg catchment only, where nutrient neutrality advice applies.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	50%	50%	
Sector Share of Mean Target (mg/l)	0.013	0.013	0.027
Modelled Recent Sector Mean Concentration (mg/l)	0.090	0.022	
Sector Reduction Required	85%	39%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	11%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	14%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	23%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	42%	n/a	
Residual % Diffuse Sector Reduction	43-74%	n/a	

Wye Valley (Peaks)

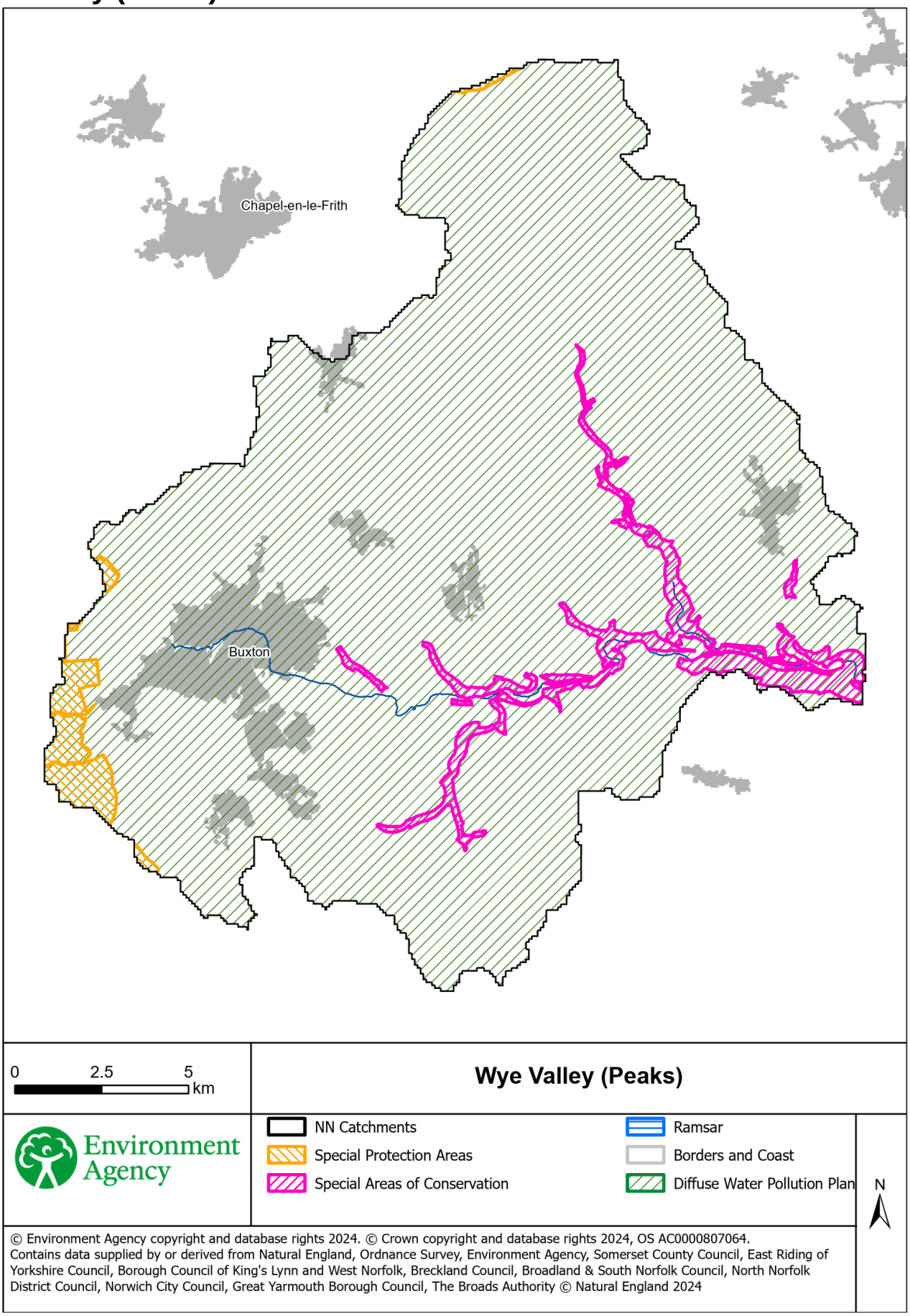

Figure 25: River Wye (Peak District) Catchment

Table 48: Indicative input load source apportionment for the River Wye (Peak District) based on catchment endpoint (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	35%	48%	16%	1%	0%

Table 49: Indicative phosphate catchment average statistics and sector reductions for the Wye Valley (Peak District).

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	50%	50%	
Sector Share of Mean Target (mg/l)	0.008	0.008	0.015
Modelled Recent Sector Mean Concentration (mg/l)	0.022	0.02	
Sector Reduction Required	65%	63%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	11%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	13%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	15%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	30%	n/a	
Residual % Diffuse Sector Reduction	35-54%	n/a	

Estuarine, Wetland and Lake Catchments

Ant Broads and Marshes SSSI

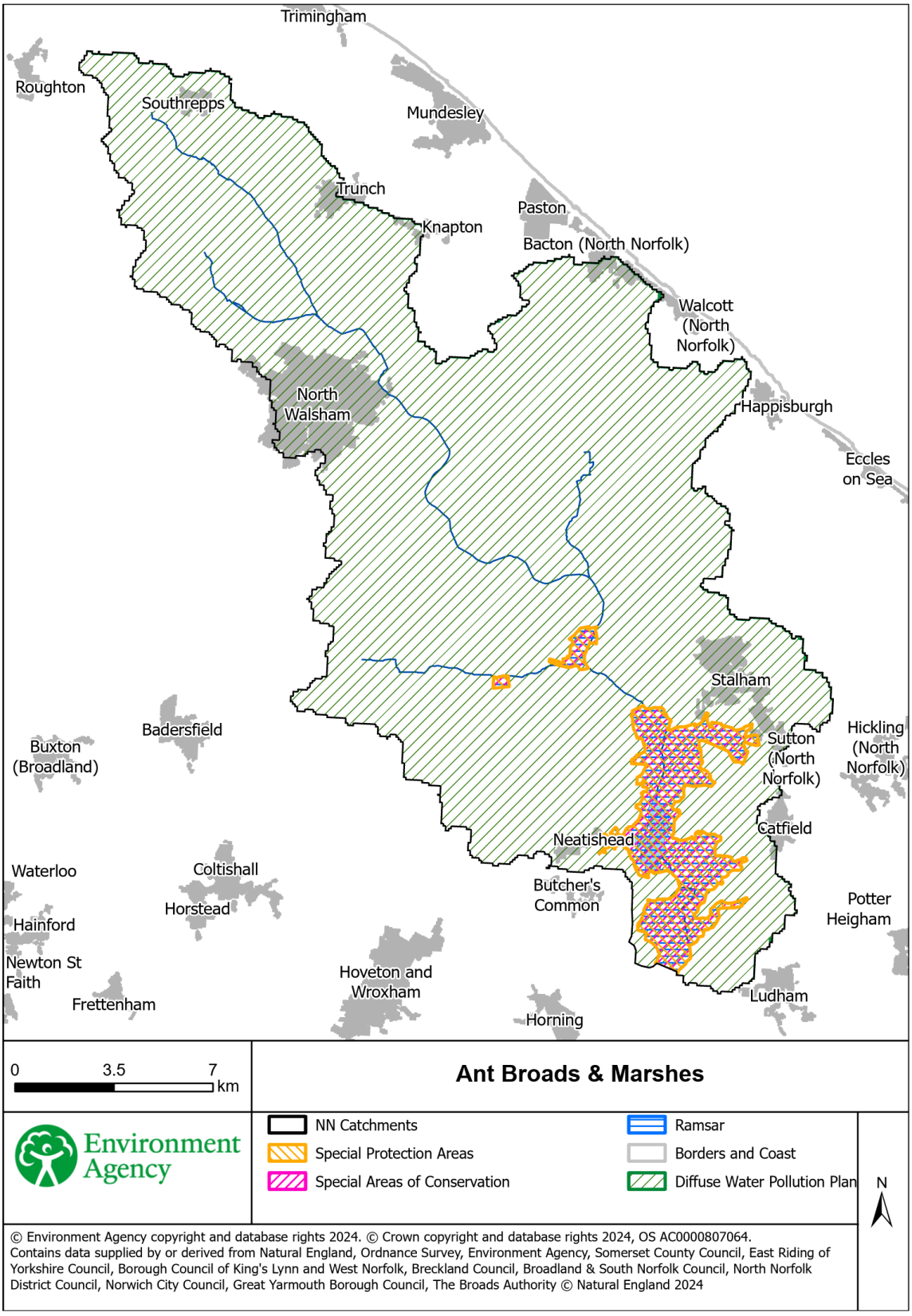

Figure 26: Ant Broads and Marshes Catchment

No further modelling under the DWPP programme is proposed for the Ant Broads and Marshes SSSI in 2024.

Table 50: Indicative input load source apportionment for the Ant Broads and Marshes based on catchment endpoint (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	64%	8%	23%	4%	0%

Table 51: Phosphate catchment average statistics and sector reductions for the Ant Broads and Marshes catchment, a component of The Broads nutrient neutrality catchment.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	50%	50%	
Sector Share of Mean Target (mg/l)	0.008	0.008	0.015
Modelled Recent Sector Mean Concentration (mg/l)	0.01	0.031	
Sector Reduction Required	26%	76%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	7%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	9%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	20%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	28%	n/a	
Residual % Diffuse Sector Reduction	0-19%	n/a	

Bure Broads and Marshes SSSI

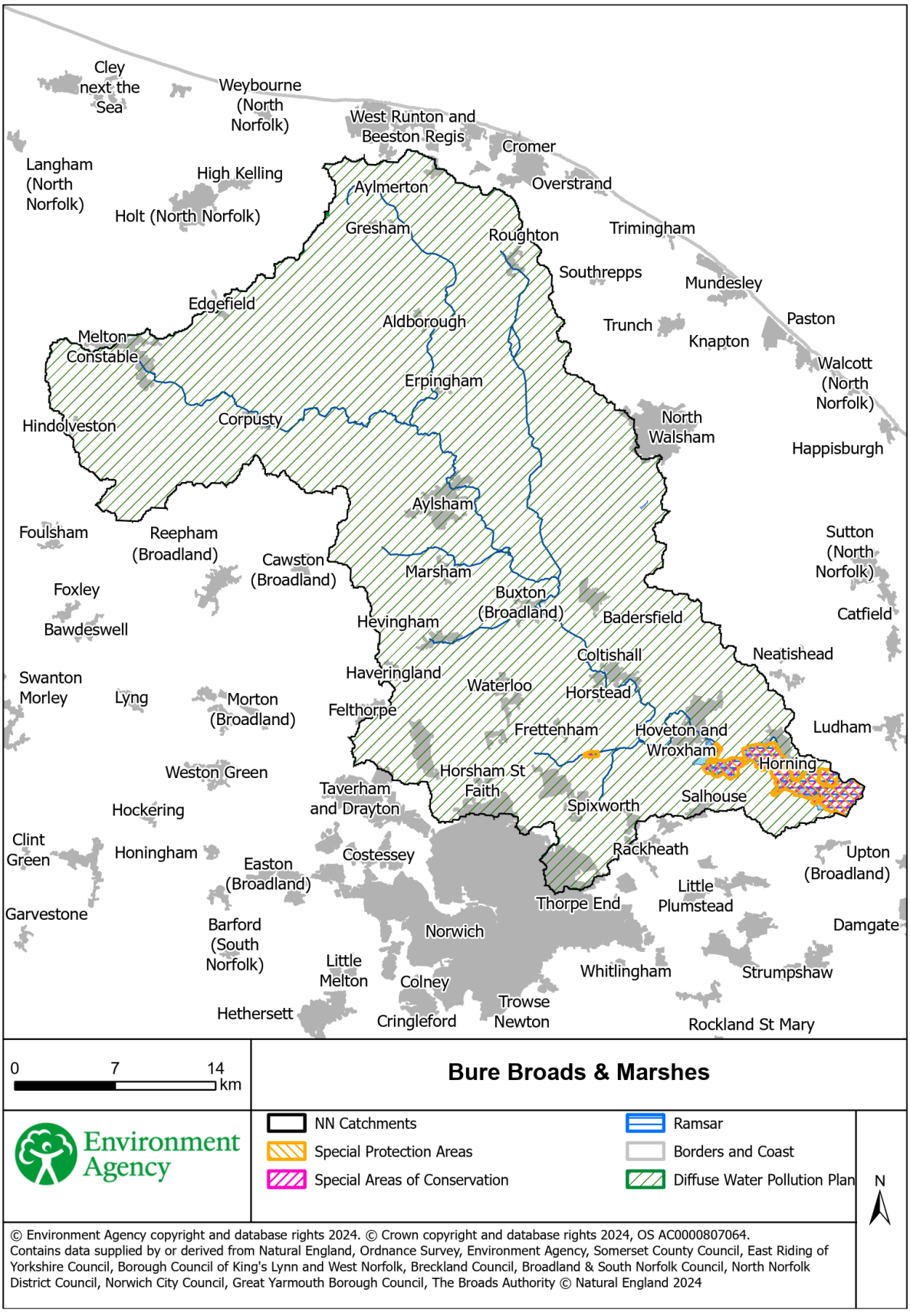

Figure 27: Bure Broads and Marshes Catchment

No further modelling under the DWPP programme is proposed for the Bure Broads and Marshes SSSI in 2024.

Table 52: Indicative input load source apportionment for the Bure Broads and Marshes based on catchment endpoint (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	26%	50%	20%	4%	0%

Table 53: Indicative phosphate catchment average statistics and sector reductions for the Bure Broads and Marshes catchment, a component of The Broads nutrient neutrality catchment.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	63%	37%	
Sector Share of Mean Target (mg/l)	0.011	0.006	0.017
Modelled Recent Sector Mean Concentration (mg/l)	0.025	0.01	
Sector Reduction Required	57%	40%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	8%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	10%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	22%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	42%	n/a	
Residual % Diffuse Sector Reduction	15-49%	n/a	

Broads SAC (Bure, Trinity, Yare, Ant & Upper Thurne Broads)

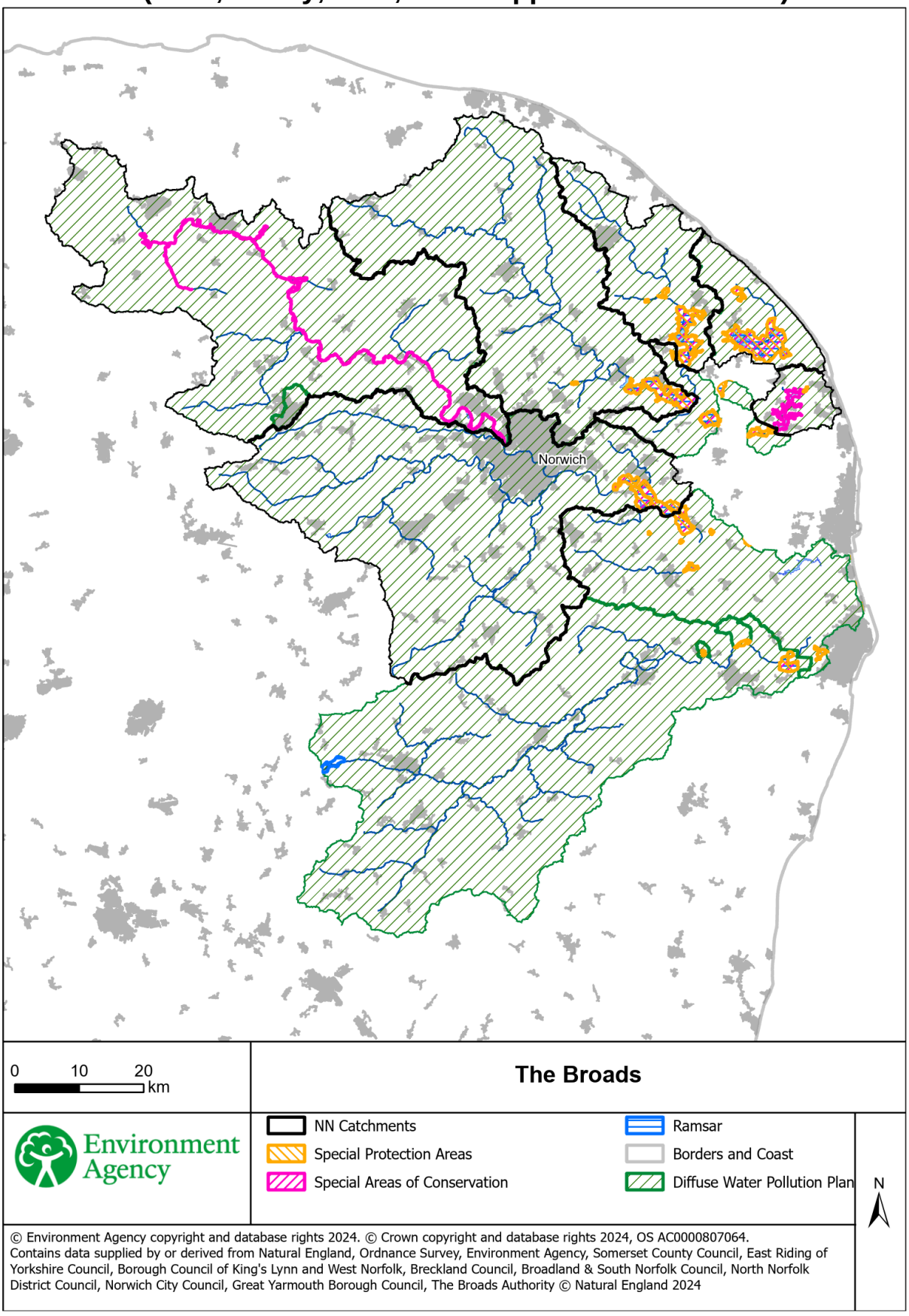

Figure 28: Broads Catchment

No further modelling under the DWPP programme is proposed for the Broads in 2024.

Table 54: Indicative input load source apportionment for The Broads based on catchment endpoint (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	44%	41%	14%	2%	0%
Total Nitrogen	21%	73%	4%	0%	2%

Table 55: Indicative phosphate catchment average statistics and sector reductions for The Broads catchment where nutrient neutrality advice applies.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	50%	50%	
Sector Share of Mean Target (mg/l)	0.009	0.009	0.019
Modelled Recent Sector Mean Concentration (mg/l)	0.043	0.039	
Sector Reduction Required	78%	76%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	9%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	11%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	20%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	36%	n/a	
Residual % Diffuse Sector Reduction	58-42%	n/a	

Table 56: Indicative total nitrogen catchment average statistics and sector reductions for The Broads catchment where nutrient neutrality advice applies.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	65%	35%	
Sector Share of Mean Target (mg/l)	0.697	0.376	1.07
Modelled Recent Sector Mean Concentration (mg/l)	5.293	0.515	
Sector Reduction Required	87%	27%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	3%		
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	4%		
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	8%		
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	17%		
Residual % Diffuse Sector Reduction	70-84%		

Chesil & The Fleet

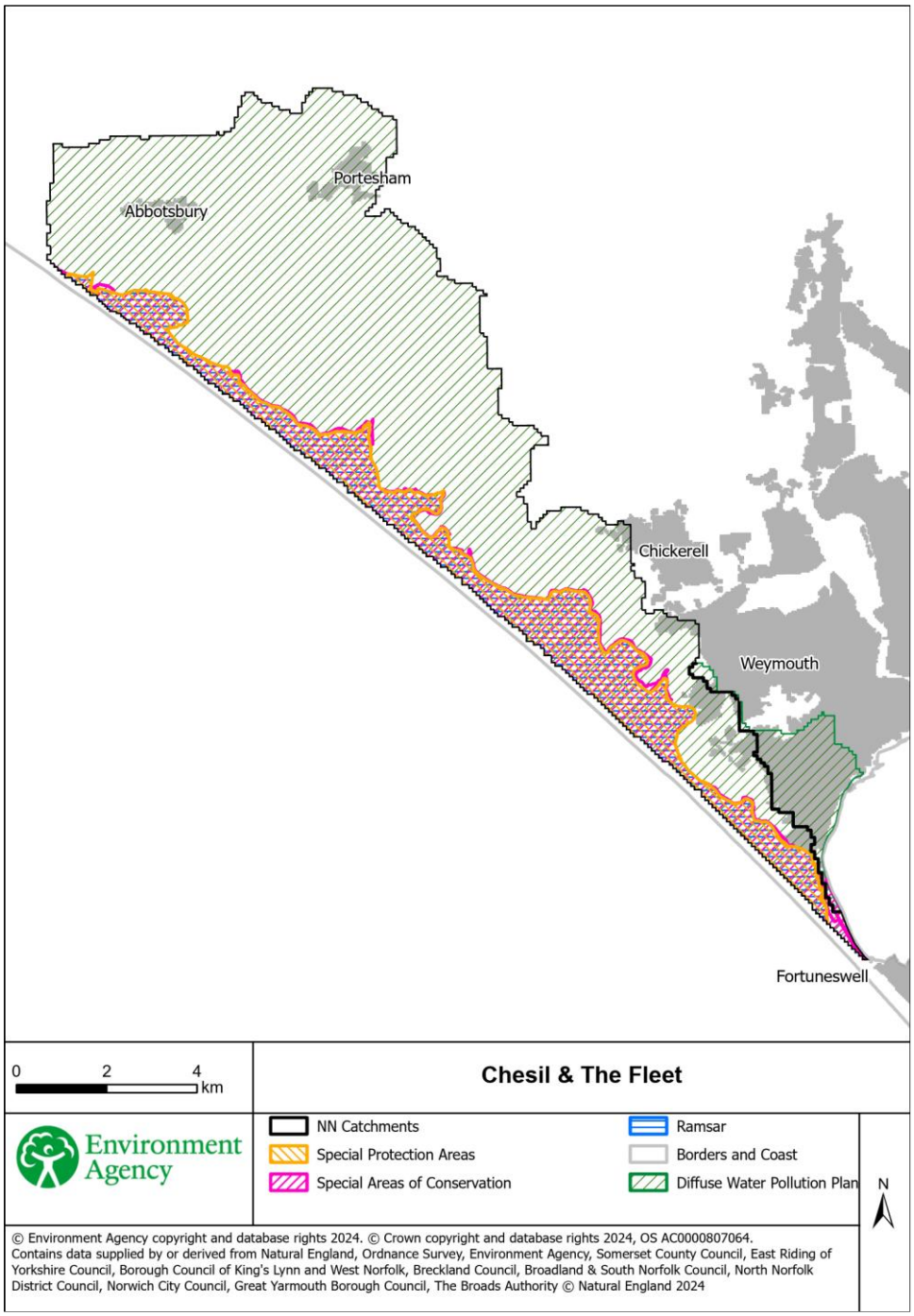

Figure 29: Chesil and the Fleet Catchment

Table 57: Indicative source apportionment based on estimated loads to the Inner Fleet.

	Point Sources	Diffuse
Total Phosphorus	2%	98%
Total Nitrogen	14%	86%

Our Simcat SAGIS models are not suitable for modelling the Fleet Lagoon. Work is ongoing to explore whether there are other suitable modelling tools.

Esthwaite

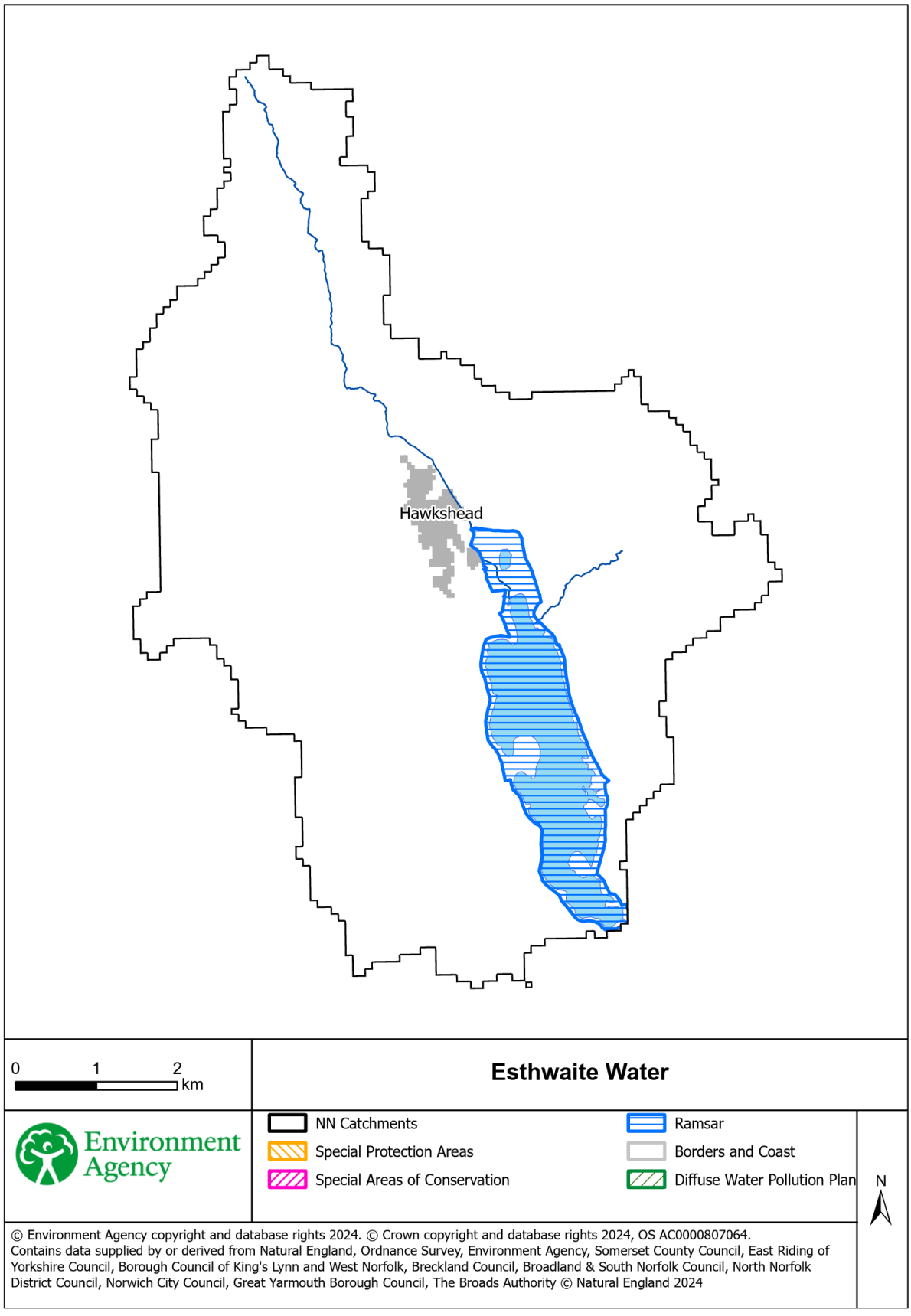

Figure 30: Esthwaite Catchment

Table 58: Indicative input load source apportionment for Esthwaite (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Total Phosphorus	70%	29%	0%	2%	0%
Total Nitrogen	63%	36%	0%	0%	0%

Table 59: Indicative total phosphorus catchment average statistics and sector reductions for Esthwaite.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	86%	14%	
Sector Share of Mean Target (mg/l)	0.013	0.002	0.015
Modelled Recent Sector Mean Concentration (mg/l)	0.006	0.005	
Sector Reduction Required	0%	0%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	Not available	Not available	Not available
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	Not available	Not available	Not available
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	Not available	Not available	Not available
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	Not available	Not available	Not available
Residual % Diffuse Sector Reduction	Not available	Not available	Not available

Table 60: Indicative total nitrogen catchment average statistics and sector reductions for Esthwaite.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	47%	53%	
Sector Share of Mean Target (mg/l)	0.36	0.41	0.77
Modelled Recent Sector Mean Concentration (mg/l)	0.06	0.06	
Sector Reduction Required	0%	0%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	Not available	Not available	Not available
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	Not available	Not available	Not available
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	Not available	Not available	Not available
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	Not available	Not available	Not available
Residual % Diffuse Sector Reduction	Not available	Not available	Not available

Hornsea Mere

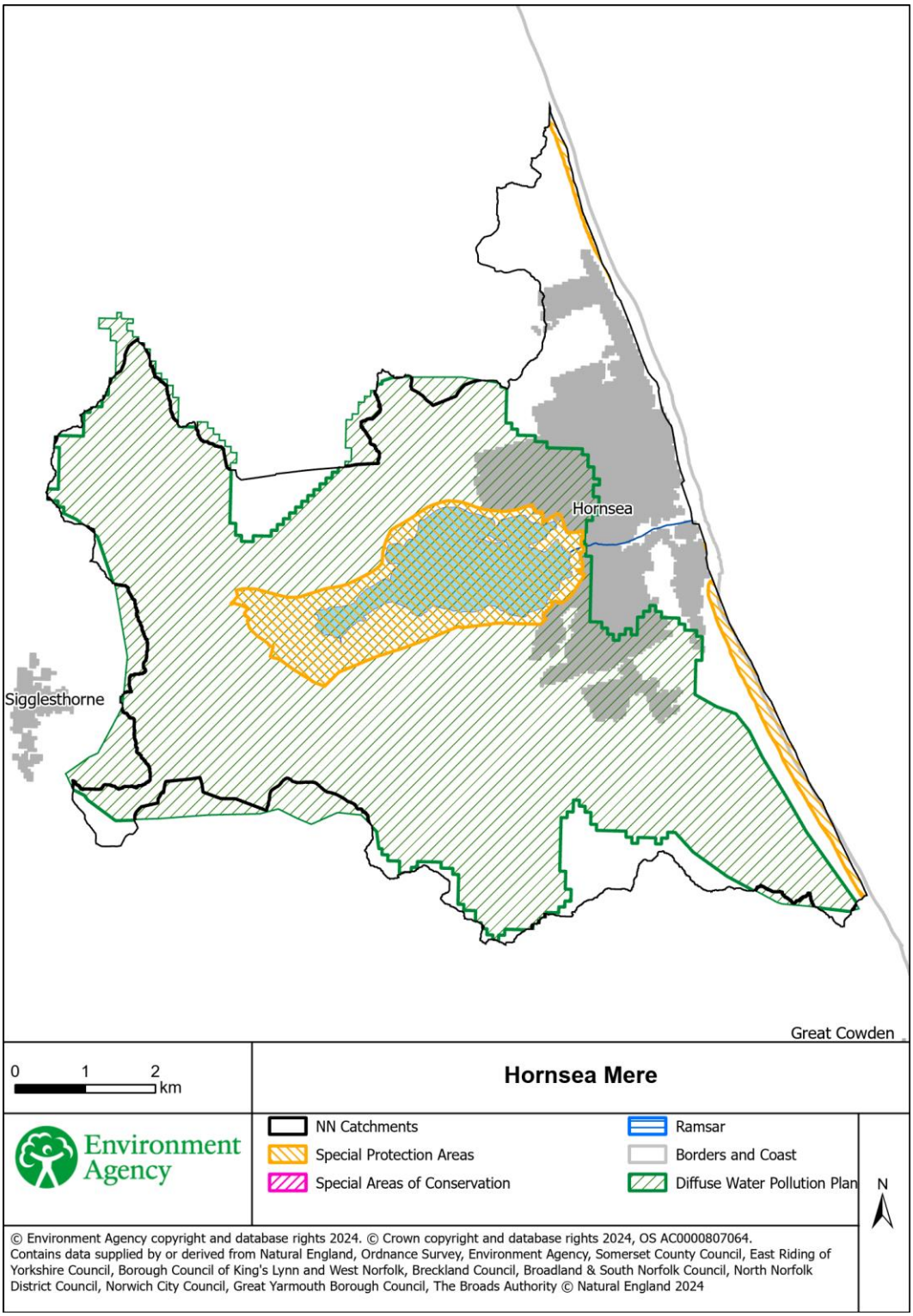

Figure 31: Hornsea Mere Catchment

The representation of Hornsea Mere in the Simcat SAGIS model is not satisfactory for us to present the data here. Work is ongoing to better understand the site and finalise the DWPP.

Lindisfarne

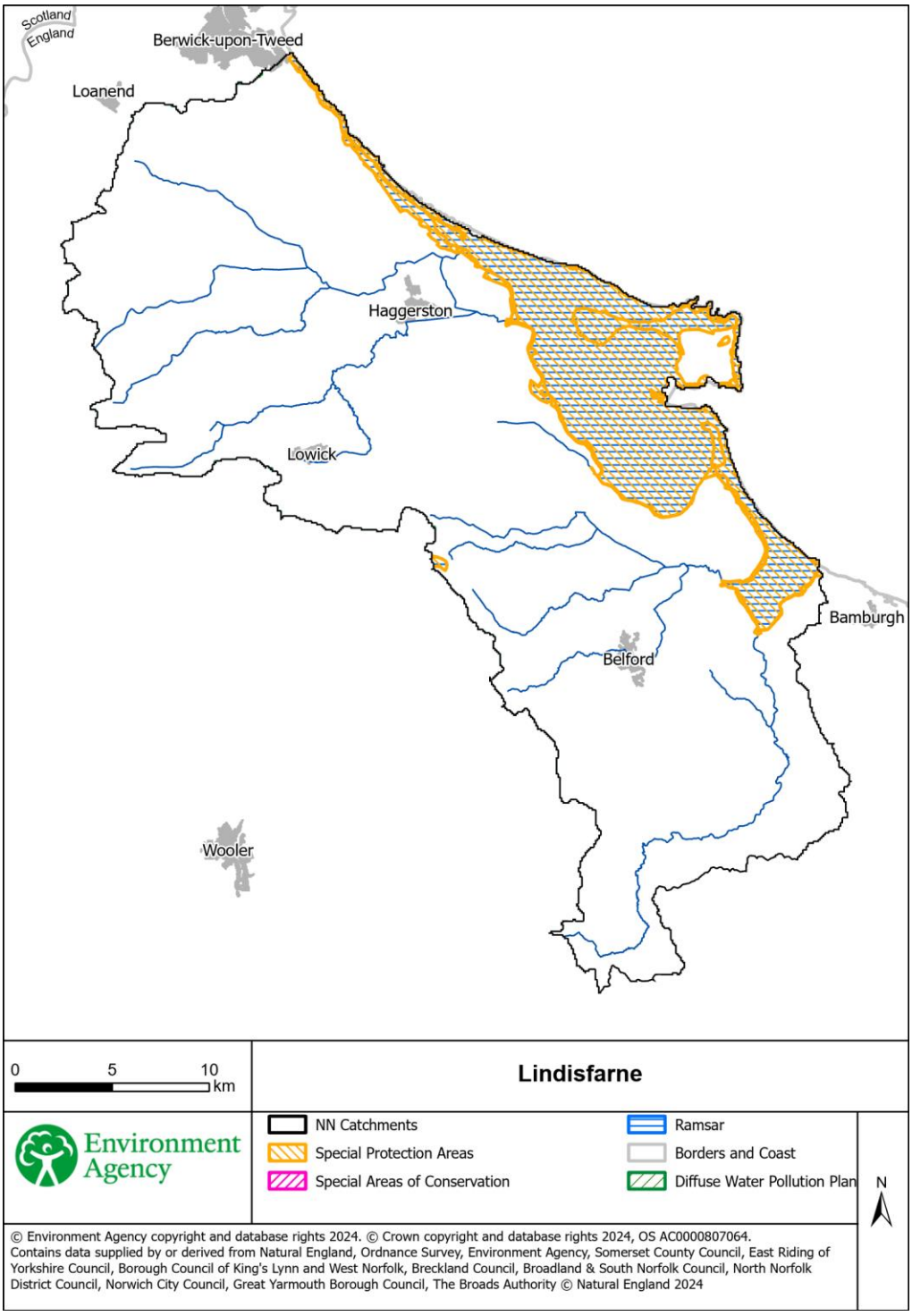

Figure 32: Lindisfarne Catchment

Table 61: Indicative input load source apportionment for Lindisfarne (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other

Total Nitrogen	11%	85%	0%	0%	3%

Ouse Washes

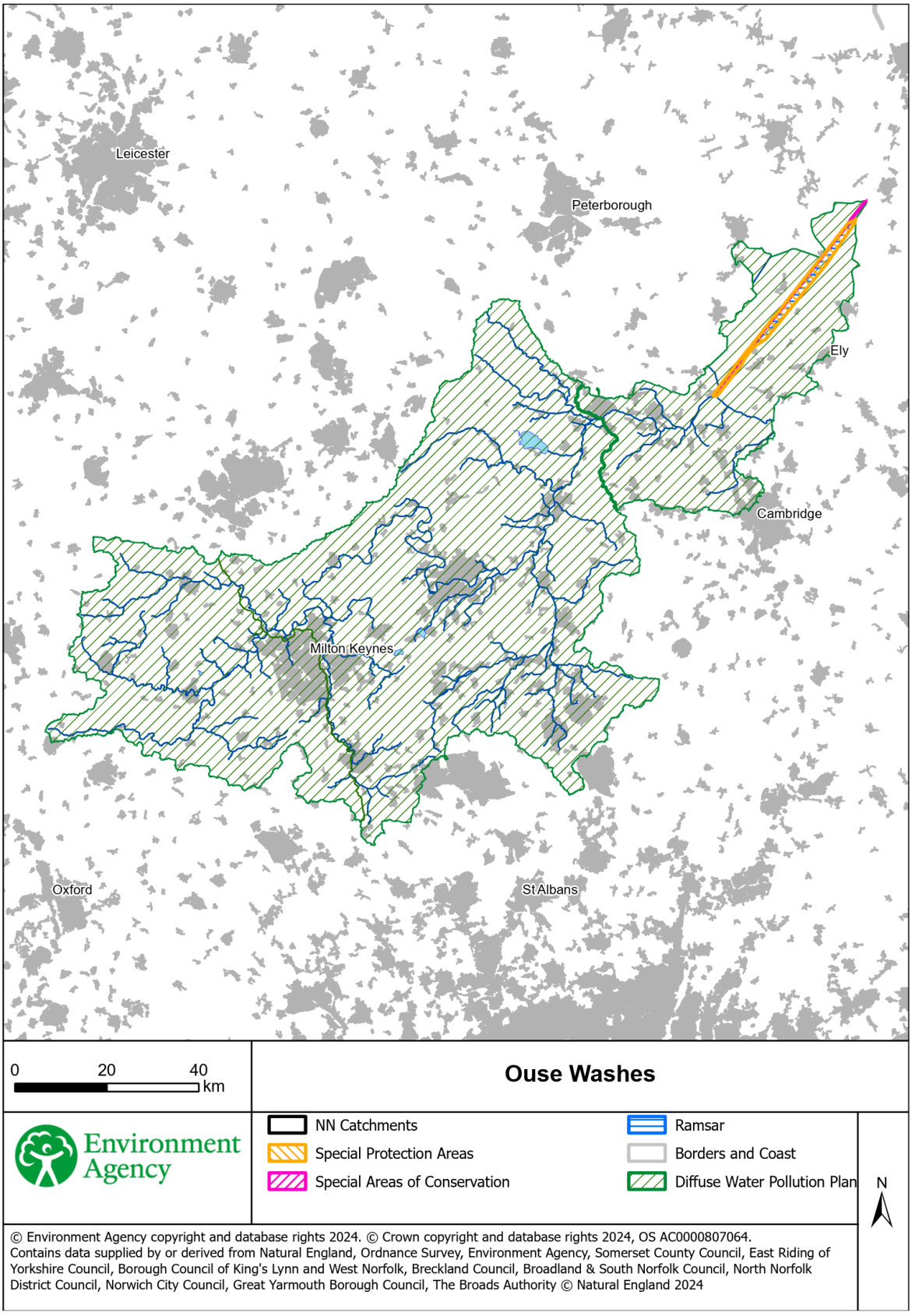

Figure 33: Ouse Washes Catchment

Table 62: Indicative input load source apportionment for the Ouse Washes at Earith (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphorus	57%	27%	14%	2%	0%

Table 63: Indicative phosphorus catchment average statistics and sector reductions for the Ouse Washes.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	29%	71%	
Sector Share of Mean Target (mg/l)	0.029	0.071	0.1
Modelled Recent Sector Mean Concentration (mg/l)	0.086	0.165	
Sector Reduction Required	66%	57%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	8%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	10%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	18%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	31%	n/a	
Residual % Diffuse Sector Reduction	35-58%		

Poole Harbour

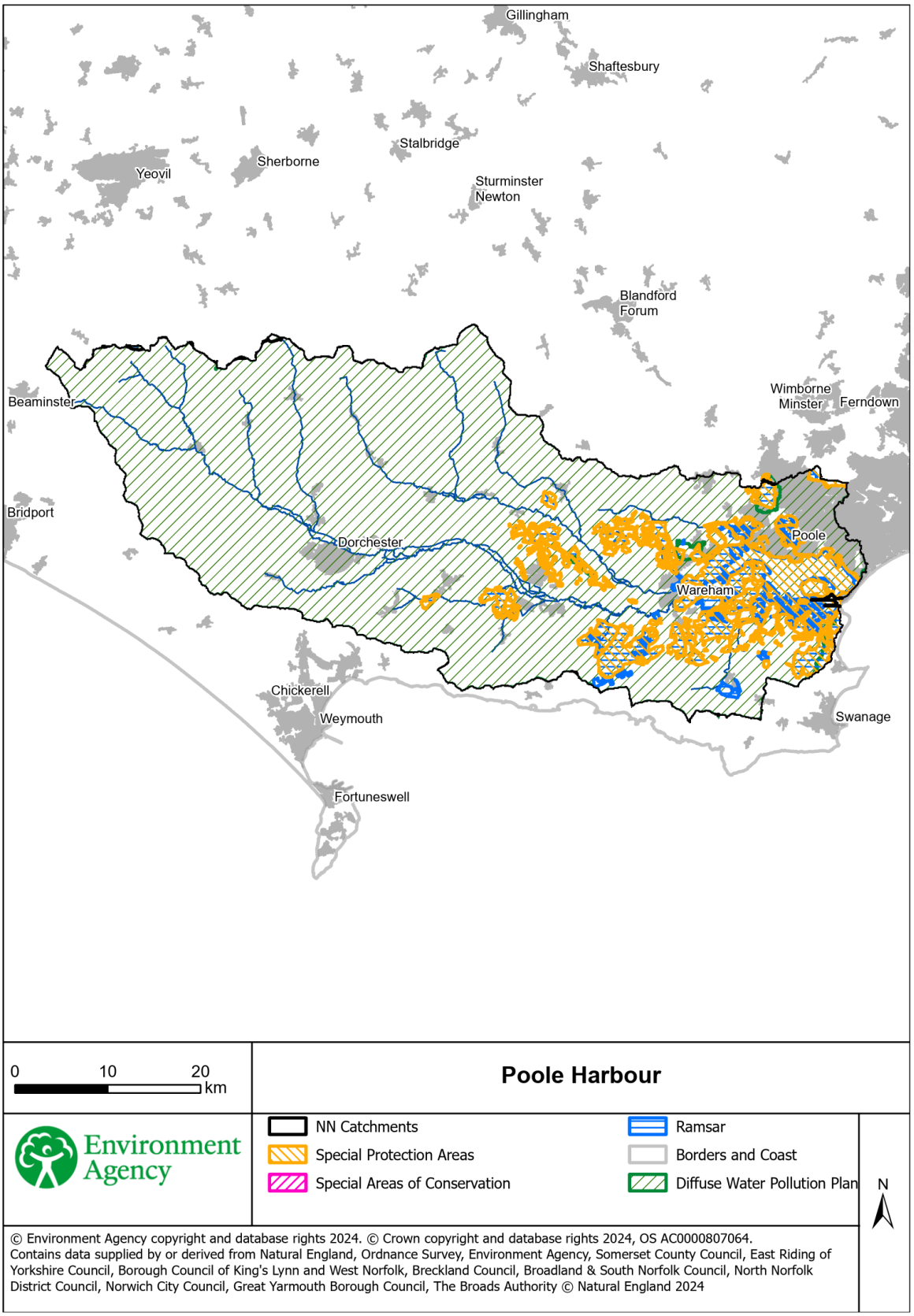

Figure 34: Poole Harbour Catchment

No further modelling under the DWPP programme is proposed for Poole Harbour in 2024.

Table 64: Indicative input load source apportionment from all freshwater inputs and direct discharges to Poole Harbour (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	75%	23%	1%	1%	0%
Total Nitrogen	21%	76%	0%	0%	3% (Atmospheric deposition)

Table 65: Indicative phosphorus catchment average statistics and sector reductions for Poole Harbour based on loads (inc. direct discharges). Target from Restoring the water quality of Poole Harbour, Results of technical investigation and recommendations, April 2021, EA & NE.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	28%	72%	
Sector Share of Mean Target (T/yr)	6	16	22
Modelled Recent Sector Mean Concentration (mg/l)	12	52	
Sector Reduction Required	49%	70%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	12%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	15%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	24%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	46%	n/a	
Residual % Diffuse Sector Reduction	2-36%		

Table 66: Indicative total nitrogen catchment average statistics and sector reductions for Poole Harbour based on loads (inc. direct discharges). Target from Restoring the water quality of Poole Harbour, Results of technical investigation and recommendations, April 2021, EA & NE.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	80%	20%	
Sector Share of Mean Target (T/yr)	1200	300	1500
Modelled Recent Sector Mean Concentration (mg/l)	2298	533	
Sector Reduction Required	48%	44%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	2%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	3%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	6%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	15%	n/a	
Residual % Diffuse Sector Reduction	33-46%		

Solent

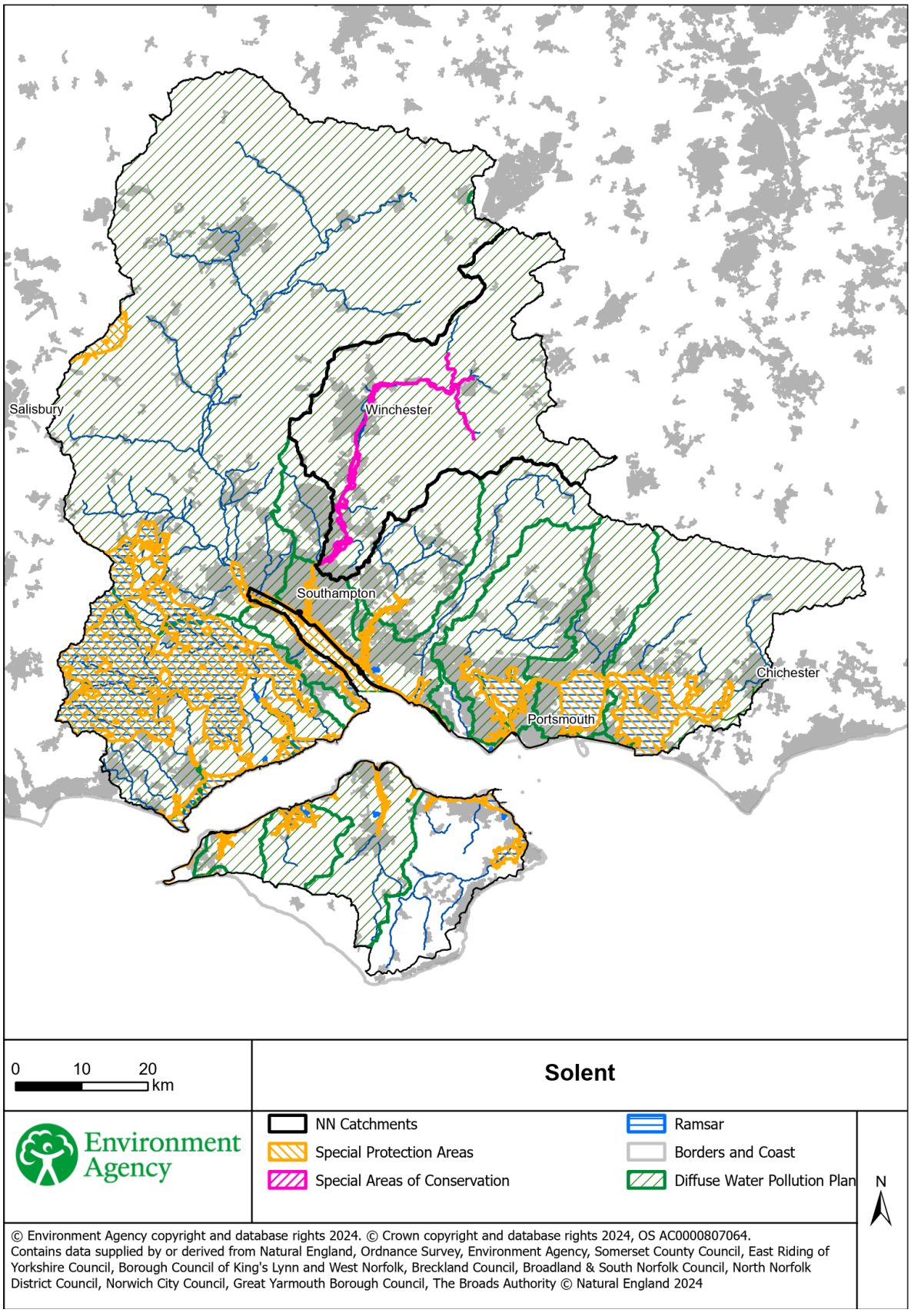

Figure 35: Solent Catchments

No further modelling under the DWPP programme is proposed for the Solent in 2024, while we await targets.

Table 67: Indicative input load source apportionment by load from all freshwater inputs and direct discharges (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Total Nitrogen	15%	77%	2%	0%	8%

Table 68: Indicative total nitrogen catchment average statistics and sector reductions for the Solent. Awaiting target confirmation to provide diffuse sector reductions required.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	tbc		
Sector Share of Mean Target (mg/l)	tbc		
Modelled Recent Sector Mean Concentration (mg/l)			
Sector Reduction Required			
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	3%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	4%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	9%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	20%	n/a	
Residual % Diffuse Sector Reduction	tbc		

Somerset Levels & Moors

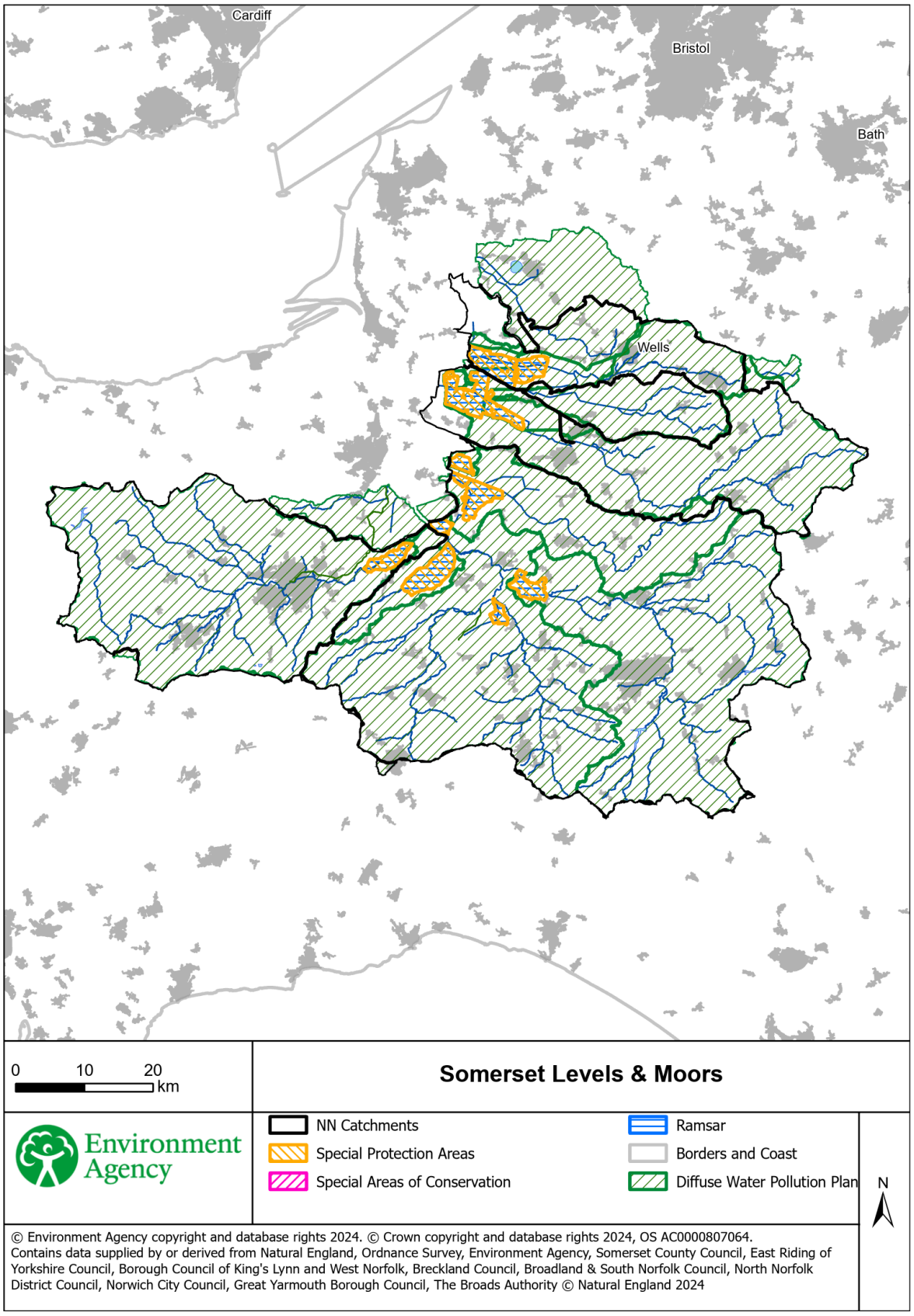

Figure 36: Somerset Levels and Moors Catchments

No further modelling of the Somerset Levels and Moors catchment is proposed for 2024, the site does not fall within the DWPP Programme.

Table 69: Indicative input load source apportionment by load for the Somerset Levels and Moors (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	33%	54%	11%	2%	0%

Table 70: Indicative phosphate catchment average statistics and sector reductions for the Somerset Levels and Moors nutrient neutrality catchment.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	50%	50%	
Sector Share of Mean Target (mg/l)	0.025	0.025	0.05
Modelled Recent Sector Mean Concentration (mg/l)	0.167	0.101	
Sector Reduction Required	85%	77%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	15%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	19%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	23%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	39%	n/a	
Residual % Diffuse Sector Reduction	46-70%	n/a	

Stodmarsh

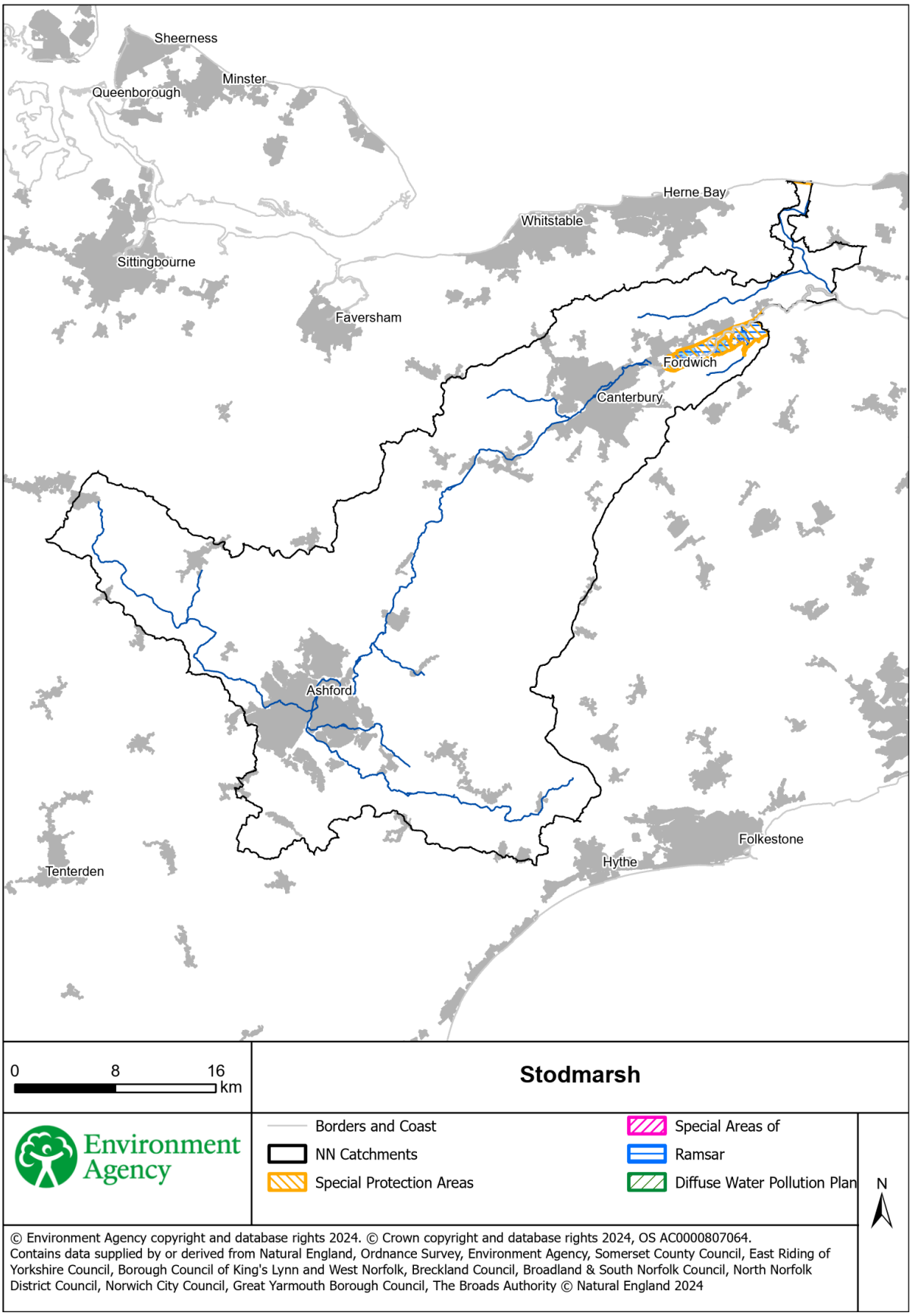

Figure 37: Stodmarsh Catchment

No further modelling of the Stodmarsh is proposed for 2024, the site does not fall within the DWPP Programme.

Table 71: Indicative input load source apportionment for Stodmarsh at point WQE0001255 (compliance assessment point) and including direct discharges (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	56%	24%	17%	3%	0%
Total Nitrogen	39%	55%	2%	0%	4%

Table 72: Indicative phosphate statistics and sector reductions for Stodmarsh at point WQE0001255 (compliance assessment point). Total phosphorus CSMG target has not been converted to orthophosphate.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	50%	50%	
Sector Share of Mean Target (mg/l)	0.025	0.025	0.049
Modelled Recent Sector Mean Concentration (mg/l)	0.071	0.202	
Sector Reduction Required	65%	88%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	10%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	18%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	31%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	37%	n/a	
Residual % Diffuse Sector Reduction	28-55%	n/a	

Table 70: Indicative total nitrogen catchment average statistics and sector reductions for Stodmarsh.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	50%	50%	
Sector Share of Mean Target (mg/l)	0.75	0.75	1.5
Modelled Recent Sector Mean Concentration (mg/l)	3.033	4.408	
Sector Reduction Required	75%	83%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	3%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	4%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	9%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	17%	n/a	
Residual % Diffuse Sector Reduction	58-72%		

Teesmouth Catchment

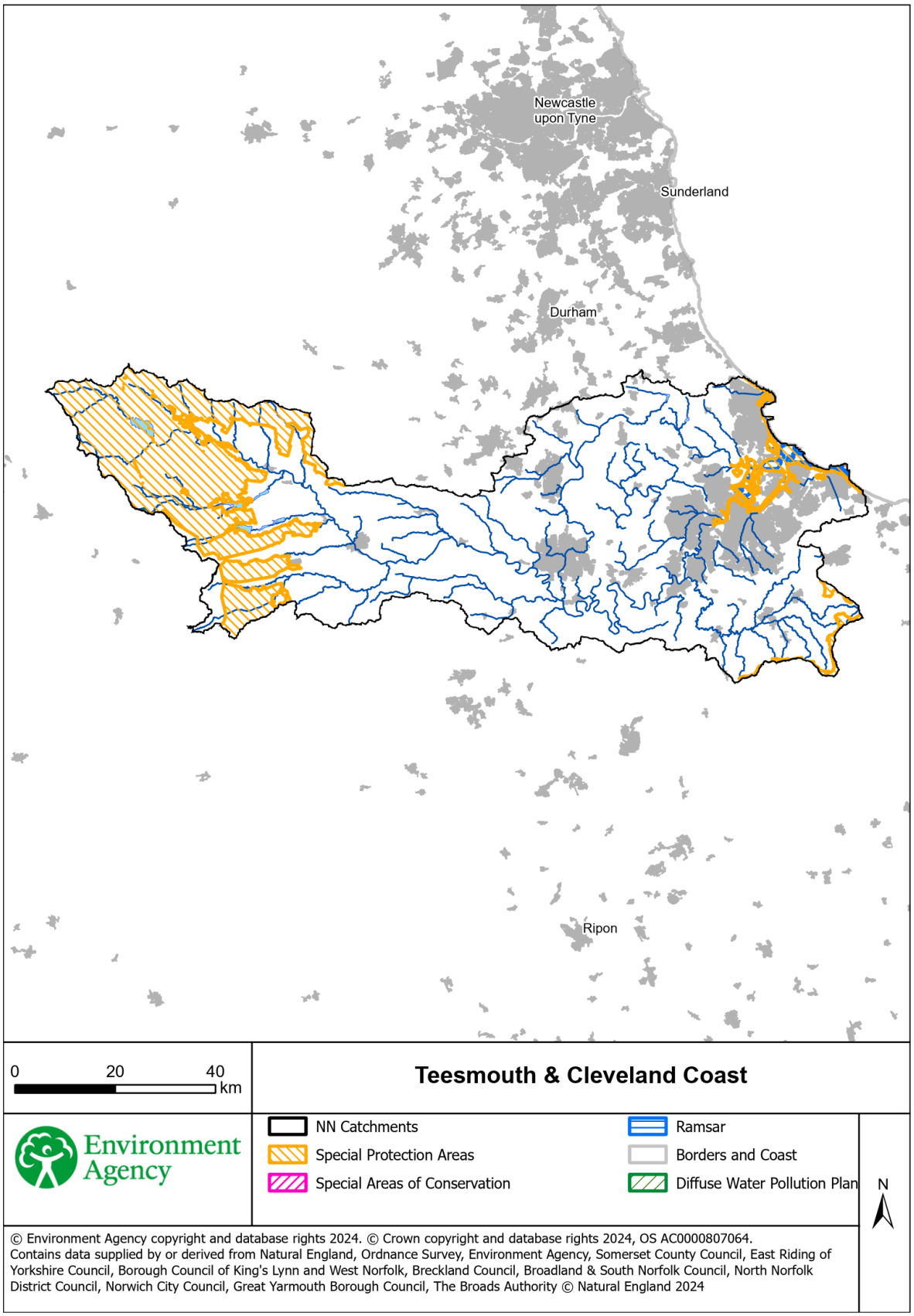

Figure 38: Tees Catchment

No further modelling of the Teesmouth is proposed for 2024, the site does not fall within the DWPP Programme.

Table 73: Indicative input load source apportionment for Teesmouth (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Total Nitrogen	61%	33%	1%	0%	5%

Table 74: Indicative total nitrogen catchment average statistics and sector reductions for Teesmouth nutrient neutrality catchment. Awaiting target confirmation to provide diffuse sector reductions required.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	TBC		
Sector Share of Mean Target (mg/l)	TBC		
Modelled Recent Sector Mean Concentration (mg/l)			
Sector Reduction Required			
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	5%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	7%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	11%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	18%	n/a	
Residual % Diffuse Sector Reduction	TBC		

Waveney Catchment – (Geldeston Meadows SSSI, Stanley and Alder Carrs SSSI and Sprats Water and Marshes SSSI.)

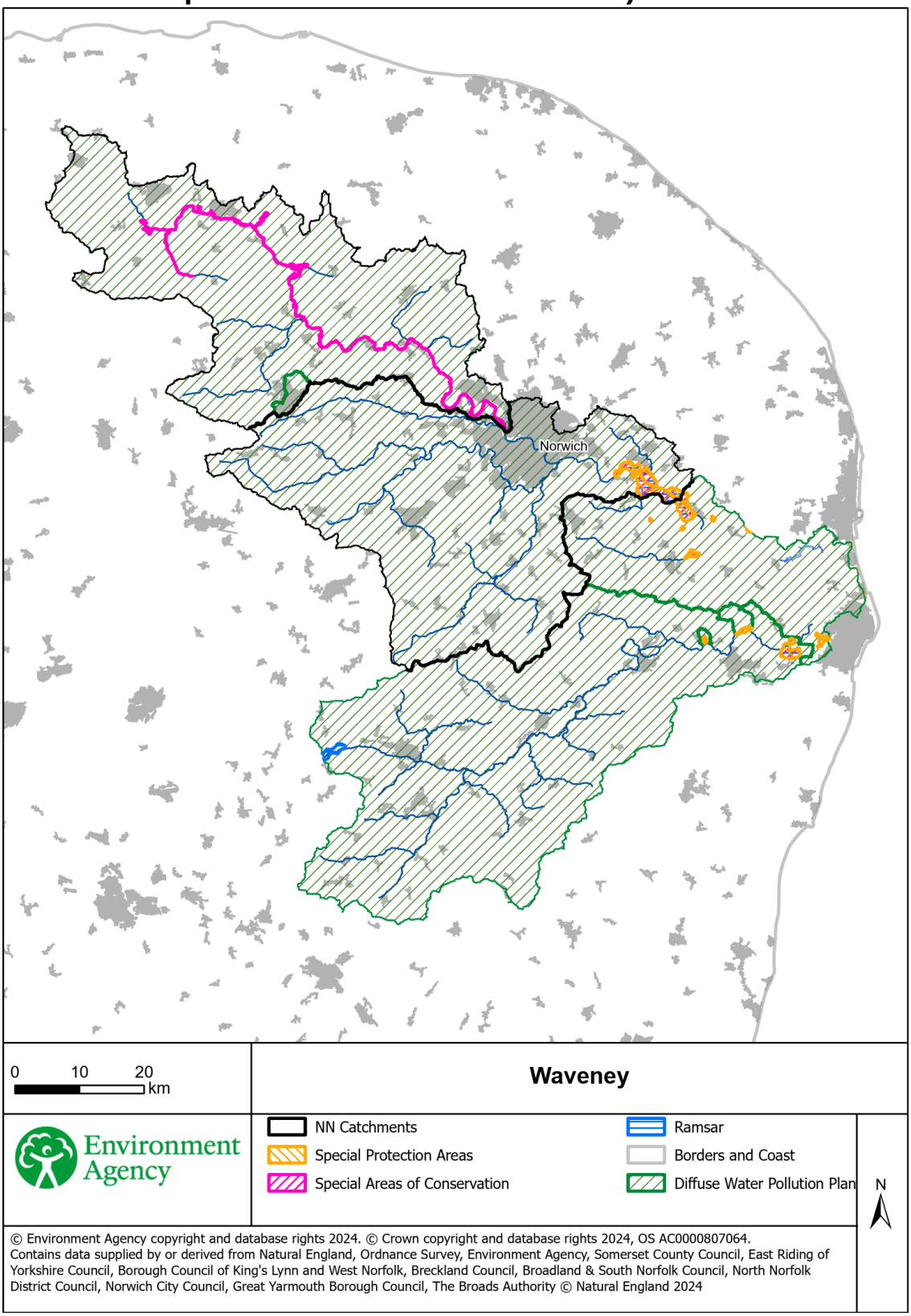

Figure 39: Waveney Catchment

Table 75:Indicative input load source apportionment for the Waveney sites at Geldeston Meadows SSSI (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	29%	64%	4%	2%	0%

Table 76: Indicative phosphate catchment average statistics and sector reductions for the Waveney catchment at Geldeston Meadows SSSI.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	41%	59%	
Sector Share of Mean Target (mg/l)	0.041	0.059	0.1
Modelled Recent Sector Mean Concentration (mg/l)	0.063	0.04	
Sector Reduction Required	35%	0%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	8%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	10%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	18%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	29%	n/a	
Residual % Diffuse Sector Reduction	6-27%	n/a	

Yare Broads and Marshes SSSI

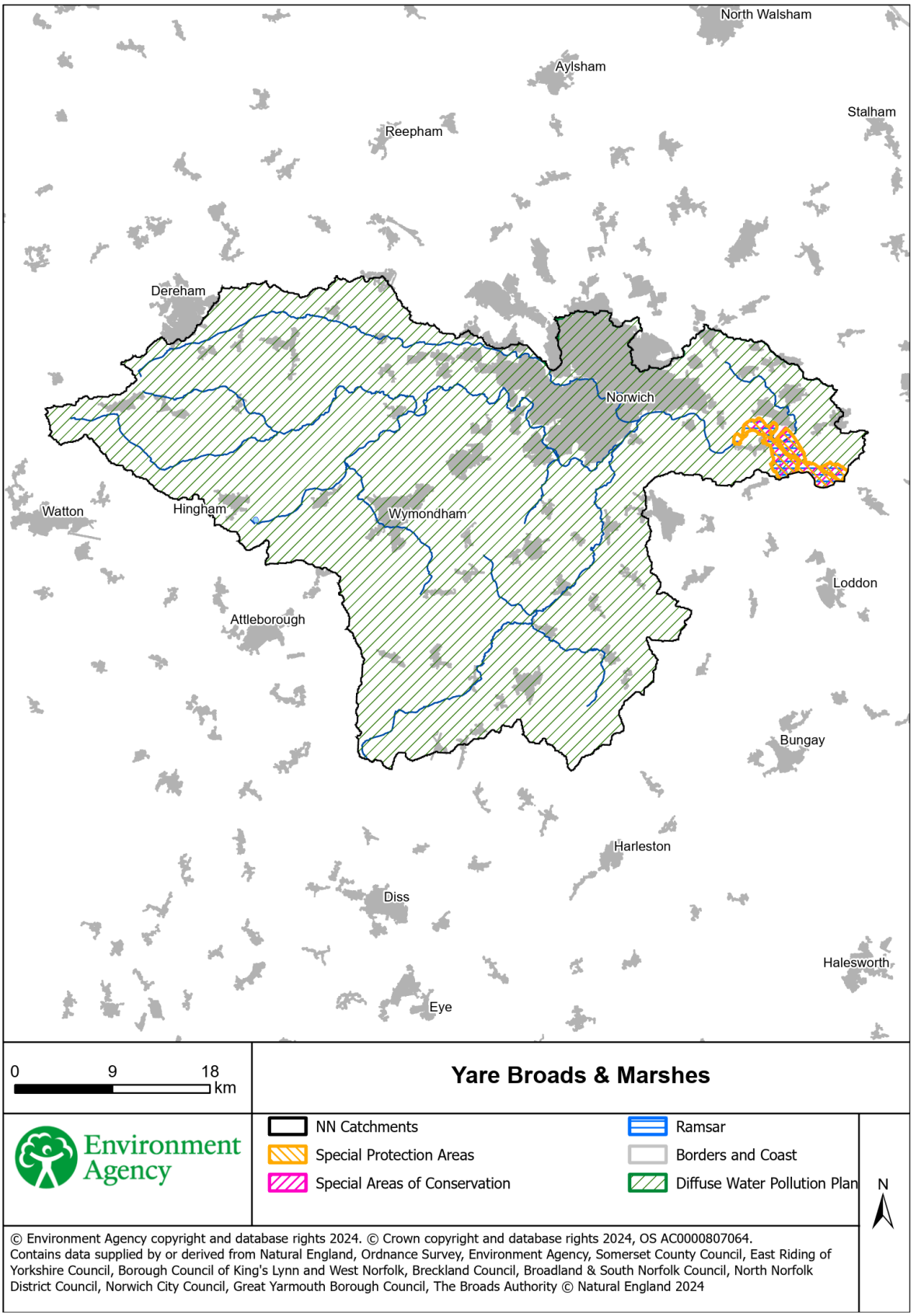

Figure 40: Yare Broads and Marshes Catchment

No further modelling of the Yare Broads and Marshes catchment is proposed for 2024.

Table 77:Indicative input load source apportionment for the Yare Broads and Marshes SSSI (recent scenario, PR24 calibration models).

	Point Sources	Rural Land Use	Urban	Septic Tanks	Other
Phosphate	46%	41%	13%	1%	0%

Table 78: Indicative phosphate catchment average statistics and sector reductions for the Yare Broads and Marshes SSSI.

	Diffuse	Point	Total
Baseline (2009) Sector Share of the Target	50%	50%	
Sector Share of Mean Target (mg/l)	0.01	0.01	0.02
Modelled Recent Sector Mean Concentration (mg/l)	0.051	0.086	
Sector Reduction Required	80%	88%	
High Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 3)	9%	n/a	
Full Regulatory Compliance Reduction in losses (Farmscoper V5, Scenario 4)	11%	n/a	
Optimistic Uptake of Measures (Farmscoper V5, Scenario 8).	20%	n/a	
Theoretical Maximum Reduction in Losses (Farmscoper V5, Scenario 10).	34%	n/a	
Residual % Diffuse Sector Reduction	46-71%	n/a	

Input load figures used to calculate source apportionment

Table 79: Riverine site input loads (kg/d) and input load source apportionment after calibration, before in-river processes (recent scenario, PR24 calibration models).

River Catchment	Determinand	STW (kg/d)	Intermittents (kg/d)	Industrial (kg/d)	Rural Land Use (kg/d)	Highways (kg/d)	Urban (kg/d)	Atmospheric Deposition (kg/d)	Septic Tanks (kg/d)	Background (arising from cress/ fish farms abstractions) (kg/d)	Point (%)	Rural Land Use (%)	Urban (%)	Septic Tanks (%)	Other (%)
River Avon (Hampshire)	PO4	37.010	0.783	7.663	104.520	0.195	63.120		7.356	5.598	20%	46%	28%	3%	3%
River Axe	PO4	9.899	0.918	0.860	68.289	0.038	1.073		0.773		14%	83%	1%	1%	0%
River Camel	PO4	29.068	1.962	0.000	9.069	0.033	1.793		0.575		73%	21%	4%	1%	0%
River Clun	PO4	2.066	0.005	0.000	13.720	0.000	1.046		0.328		12%	80%	6%	2%	0%
River Dee	PO4	50.830	2.486	0.699	286.800	0.022	1.060		3.279		16%	83%	0%	1%	0%
River Derwent (Yorkshire)	PO4	53.760	0.699	3.624	69.310	0.102	2.843		1.289		44%	53%	2%	1%	0%
River Derwent & Bassenthwaite Lake (DWPP catchment)	PO4	11.360	3.948	0.404	12.227	0.054	0.076		0.055		56%	43%	0%	0%	0%
River Derwent & Bassenthwaite Lake (NN catchment)	PO4	7.768	1.818	0.715	10.726	0.063	0.089		0.066		48%	50%	0%	0%	0%
River Eden	PO4	80.820	31.130	1.947	145.310	0.282	4.549		1.382		43%	55%	2%	1%	0%
River Ehen	PO4	0.225	0.400	0.024	1.917	0.000	0.026		0.018		25%	73%	1%	1%	0%
River Itchen	PO4	17.390	1.499	0.000	15.914	0.052	10.530		1.980	5.612	36%	30%	20%	4%	11%
River Kent (DWPP catchment)	PO4	10.140	9.673	0.111	8.656	0.009	0.072		0.201		69%	30%	0%	1%	0%
River Kent (NN catchment)	PO4	0.204	0.010	0.000	1.204	0.001	0.000		0.036		15%	83%	0%	2%	0%
River Lambourn	PO4	1.614	0.152	0.020	8.812	0.057	1.752		0.251		14%	70%	14%	2%	0%
River Mease	PO4	3.695	0.321	0.000	7.669	0.036	5.419		0.904		22%	43%	30%	5%	0%
River Tweed (England) - Till sub-catchment only	PO4	2.875	1.800	0.000	27.054	0.000	0.427		0.635		14%	83%	1%	2%	0%
River Wensum	PO4	6.668	0.157	1.362	30.085	0.031	5.561		0.588		18%	68%	13%	1%	0%
Whole Wye/ Lugg (DWPP catchment)	PO4	128.300	2.797	0.909	471.300	0.144	14.040		10.890		21%	75%	2%	2%	0%
Whole Wye/ Lugg (Lugg NN catchment only)	PO4	29.760	0.441	0.000	171.730	0.402	5.030		4.485		14%	81%	2%	2%	0%
Wye Valley (Peaks)	PO4	4.189	0.202	0.000	5.946	0.000	2.033		0.114		35%	48%	16%	1%	0%
River Clun	Nitrate	24.950	0.021	0.000	596.657	0.000	1.497		2.391		2%	98%	0%	0%	0%

Table 80: Estuarine, wetlands and lakes site input loads (kg/d) and input load source apportionment (recent scenario, PR24 calibration models).

Estuaries, Wetlands and Lakes	Determinand	STW (kg/d)	Intermittents (kg/d)	Industrial (kg/d)	Rural Land Use (kg/d)	Highways (kg/d)	Urban (kg/d)	Atmospheric Deposition (kg/d)	Septic Tanks (kg/d)	Point (%)	Rural Land Use (%)	Urban (%)	Septic Tanks (%)	Other (%)
Ant Broads & Marshes SSSI	PO4	1.860	0.051	0.000	0.250	0.000	0.678	0.000	0.126	64%	8%	23%	4%	0%
Yare Broads & Marshes SSSI	PO4	66.530	0.902	1.398	61.250	0.145	19.200	0.000	1.752	46%	41%	13%	1%	0%
Bure Broads & Marshes SSSI	PO4	4.685	0.119	0.000	9.097	0.003	3.655	0.000	0.817	26%	50%	20%	4%	0%
Broads	PO4	73.456	1.145	1.398	71.479	0.148	23.945		2.812	44%	41%	14%	2%	0%
Esthwaite	TP	1.041	1.033	0.000	0.508	0.341	0.000	0.000	0.045	70%	29%	0%	2%	0%
Waveney Sites (Various SSSI)	PO4	25.700	0.313	0.281	57.530	0.000	3.357	0.000	2.039	29%	64%	4%	2%	0%
Ouse Washes	PO4	404.100	11.950	8.781	198.750	0.543	105.500	0.000	11.560	57%	27%	14%	2%	0%
Poole Harbour	PO4	119.579	2.294	111.344	72.948	0.055	4.386		1.501	75%	23%	1%	0%	0%
Somerset Levels & Moors	PO4	254.820	4.281	0.493	431.087	0.135	84.755	0.000	16.146	33%	54%	11%	2%	0%
Stodmarsh (At WQ E0001255) plus direct discharge from Westbere STW	PO4	58.440	1.220	0.000	25.680	0.100	18.780		3.180	56%	24%	17%	3%	0%
Broads	TN	2411.065	4.562	8.088	8406.959	110.008	464.886	98.004	9.237	21%	73%	4%	0%	2%
Esthwaite	TN	16.521	2.625	0.000	11.055	0.000	0.000	0.107	0.039	63%	36%	0%	0%	0%
Lindisfarne	TN	99.158	1.416		762.275	0.107	1.277	28.377	1.138	11%	85%	0%	0%	3%
Poole Harbour	TN	2009.976	11.634	248.463	8276.420	0.139	47.979	333.478	8.750	21%	76%	0%	0%	3%
Solent	TN	8065.804	48.093	1475.200	49270.558	1.994	1213.506	3648.134	96.576	15%	77%	2%	0%	8%
Stodmarsh (At WQ E0001255) plus direct discharge from Westbere STW	TN	1736.475	4.295	0.000	2435.520	0.269	83.295	197.400	8.454	39%	55%	2%	0%	4%
Teesmouth and Cleveland Coast (inc. Direct discharges)	TN	11604.042	370.255	605.999	6904.118	0.583	279.719	850.381	16.015	61%	33%	1%	0%	4%

References

Gooday, R. D., Anthony S.G., Chadwick, D.R., Newell-Price P., Harris D., Duethmann D., Fish R., Collins A.L., Winter M. (2014). Modelling the cost-effectiveness of mitigation methods for multiple pollutants at farm scale. Science of the Total Environment, 468-469, 1198-1209.

List of abbreviations

ADAS

UK-based independent agricultural and environmental consultancy, previously National Agricultural Advisory Service (NAAS).

AMP6/ AMP7

Asset Management Plan 6 and 7. Water Company investment in assets, including for environmental requirements over the periods 2015-2020 and 2020-2025 respectively. AMP6 was set by Price Review 2014 (PR14), AMP7 was set by Price Review 2019 (PR19).

DWPP

Diffuse Water Pollution Plan

NEAP-N

ADAS model providing annual 1 km grid loadings of nitrate.

PR14/ PR19/ PR24

Price Review 2014, 2019 and 2024. Five yearly Price Reviews are led by Ofwat to set the price, investment, and services from Water Companies in relation to their customers. Investment for environmental requirements goes through this regulation process. Price reviews - Ofwat

PSYCHIC

ADAS model providing annual 1 km grid loadings of phosphate.

SAGIS

Source Apportionment Geographical Information System

SAC

Special Area of Conservation

SPA

Special Protection Area

SSSI

Site of Special Scientific Interest

STW/ WWTW

Sewage Treatment Works/ Wastewater Treatment Works

UKWIR

United Kingdom Water Industry Research

Would you like to find out more about us or your environment?

Then call us on

03708 506 506 (Monday to Friday, 8am to 6pm)

Email: enquiries@environment-agency.gov.uk

Or visit our website

www.gov.uk/environment-agency

incident hotline

0800 807060 **(24 hours)**

floodline

0345 988 1188 **(24 hours)**

Find out about call charges (https://www.gov.uk/call-charges)

Environment first

Are you viewing this onscreen? Please consider the environment and only print if absolutely necessary. If you are reading a paper copy, please don’t forget to reuse and recycle.