Stage 2 Water Cycle Study, Newcastle-under-Lyme

Draft Report

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Contract

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This report describes work commissioned by Newcastle-under-Lyme Borough Council by an instruction in January 2024. The Client's representative for the contract was Allan Clarke of Newcastle-under-Lyme Borough Council. Bethan Griffiths, Alex Garratt and Richard Pardoe of JBA Consulting carried out this work.

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Acknowledgements

JBA Consulting would like to thank Newcastle-under-Lyme Borough Council, the Environment Agency, Severn Trent Water and United Utilities for their assistance in preparing this report.

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Abbreviations

1D	One Dimensional (modelling)
ALS	Abstraction Licencing Strategy
AMP	Asset Management Plan
AONB	Area of Outstanding Natural Beauty
BNG	Biodiversity Net Gain
BOD	Biological Oxygen Demand
CAMS	Catchment Abstraction Management Strategy
CIRIA	Company providing research and training in the construction industry
CSO	Combined Sewer Overflow
DWMP	Drainage and Wastewater Management Plan
EA	Environment Agency
EC	European Community
EN	English Nature
FEH	Flood Estimation Handbook
GIS	Geographical Information System
GS	Gauging Station
HM	High Mileage
HOF	Hands-off flow
JNCC	Joint Nature Conservation Committee
LFRMS	Local Flood Risk Management Strategy
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
NFM	Natural Flood Management
NPPF	National Planning Policy Framework
NuL	Newcastle-under-Lyme
PPG	Planning Policy Guidance
Q30	Flow at the 30-year return period
Q100	Flow at the 100-year return period
QA	Quality Assurance

Ramsar	The intergovernmental Convention on Wetlands, signed in Ramsar, Iran, in 1971
RBMP	River Basin Management Plan
SAC	Special Area of Conservation, protected under the EU Habitats Directive
SFRA	Strategic Flood Risk Assessment
SPA	Special Protection Area for birds, protected under the EU Habitats Directive
SuDS	Sustainable Drainage System
SSSI	Site of Special Scientific Interest
STW	Severn Trent Water
UKWIR	UK Water Industry Research Ltd
UU	United Utilities
WFD	Water Framework Directive
WRMP	Water Resource Management Plan
WRZ	Water Resource Zone

Definitions

Hands off Flow: The flow rate below which abstractions cannot occur.

Net zero: The balance between the amount of greenhouse gas produced and the amount removed from the atmosphere.

Executive Summary

JBA Consulting was commissioned by Newcastle-under-Lyme Borough Council (NULBC) to undertake a Phase 2 Outline Water Cycle Study (WCS). This builds on the Phase 1 Scoping Study completed in 2019 as a joint study for Stoke-on-Trent City Council and NULBC, which informed the joint Local Plan. Since the Scoping Study was completed, the decision has been made to produce a separate local plan for each administrative area.

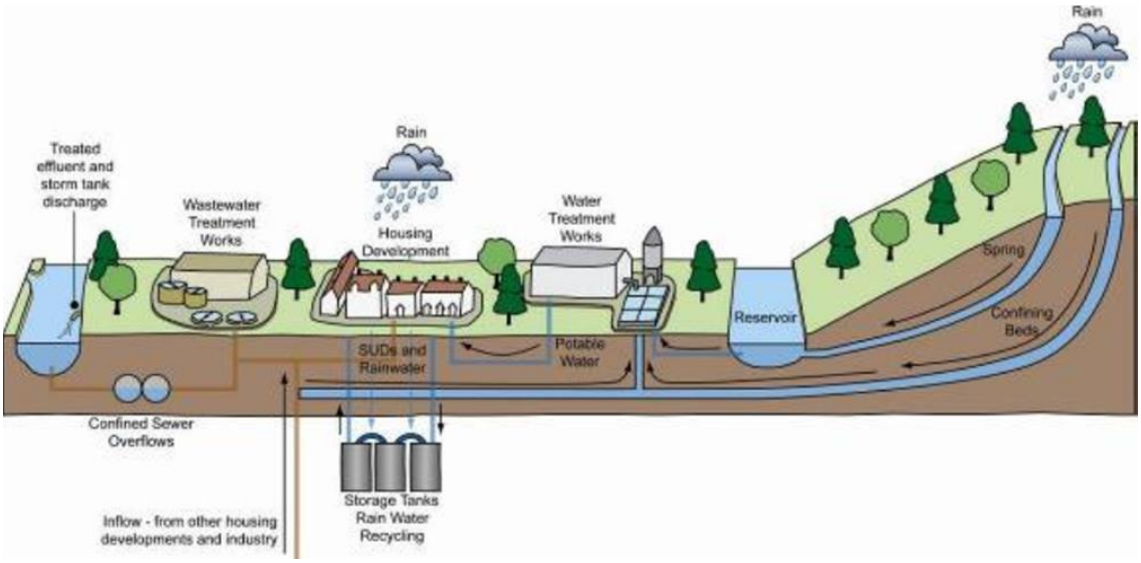
This Phase 2 study is specific to NULBC and will update the evidence provided in Phase 1 and consider the new plan period of the Newcastle-under-Lyme Draft Local Plan (2020 - 2040). This WCS aims to support the emergence of the updated Local Plan for Newcastle-under-Lyme.

Unmitigated future development and climate change can adversely affect the environment and water infrastructure capability. A WCS will provide the required evidence, together with an agreed strategy to ensure that planned growth occurs within environmental constraints, with the appropriate infrastructure in place in a timely manner so that planned allocations are deliverable.

New homes and employment land require the provision of clean water, safe disposal of wastewater and protection from flooding. The allocation of development in certain locations may result in the capacity of existing available infrastructure being exceeded, a situation that could potentially cause service failures to water and wastewater customers, adverse impacts to the environment, or high costs for the upgrade of water and wastewater assets being passed on to the bill payers.

In addition to increased demands from housing and employment development, future climate change presents further challenges to the existing water infrastructure network, including increased intensive rainfall events and a higher frequency of drought events. Sustainable planning for water must now take this into account. The water cycle can be seen in the figure below and shows how the natural and man-made processes and systems interact to collect, store or transport water in the environment.

The Water Cycle



Source of diagram: Environment Agency – Water Cycle Study Guidance

The Water Cycle Study has been carried out in co-operation with Severn Trent Water (STW), United Utilities (UU), the Environment Agency and the neighbouring Local Planning Authorities (LPAs).

Potential development sites were provided by the council and Wastewater Treatment Works (WwTW) likely to serve growth in the area were identified using the Environment Agency Consents database. Each development site was then allocated to a WwTW in order to understand the additional wastewater flow resulting from the planned growth. Available information was collated on water policy and legislation, water resources, water quality and environmental designations within the study area.

Red / Amber /Green (RAG) assessments have been prepared at the site scale for the different aspects of the water cycle. It should be remembered that where a development is scored amber or red in a water supply or wastewater infrastructure assessment, it does not mean that development cannot or should not take place in that location, merely that significant infrastructure may be required to accommodate it. The decision on the suitability of sites is made up of a number of assessments outside the scope of this report.

Water resources - Section 4

Severn Trent Water is responsible for supply Newcastle-under-Lyme with water. For the purposes of water resource planning, the STW supply area is divided into 15 Water Resource Zones (WRZs) which vary greatly in scale and have unique water resource concerns. Newcastle-under-Lyme is covered principally by the North Staffordshire WRZ.

A Draft Water Resources Management Plan (dWRMP) was published in 2024 by Severn Trent, to provide an update to WRMP 2019. The dWRMP emphasizes the company's likely future supply and demand challenges in the future, highlighting a deficit, across the STW WRZs, of 244Ml/d by plan year 2040/41, growing to 540Ml/d by 2050/51, if no action is taken. The plan sets out a long-term strategy, looking forward to the year 2085.

To meet the demand, Severn Trent Water have outlined the following measures, to be implemented over the next 25 years:

- Roll out universal metering by 2035 (save up to 52million litres / day)
- Reduce leakage by 50% by 2045 (save up to 135million litres / day)
- Deliver the Severn Trent Efficiency Plan by 2050 (37 million litres)

In Phase 1 STW commented that they had adequate water resources for all proposed development sites.

There is sufficient evidence to support the adoption of the tighter water efficiency target of 110l/p/d allowed for in building regulations. Policies to reduce water demand from new developments, or to go further and achieve water neutrality in certain areas, could be defined to reduce the potential environmental impact of additional water abstractions in Newcastle-under-Lyme, and also help to achieve reductions in carbon emissions.

Water Supply Infrastructure - Section 5

No further assessment of water supply infrastructure was undertaken in Phase 2. STW and UU are commenting on the Local Plan sites directly, instead of through this WCS.

Wastewater collection infrastructure - Section 6

Severn Trent Water and United Utilities provide wastewater services to Newcastle-under-Lyme. Sewerage Undertakers have a duty under Section 94 of the Water Industry Act 1991 to provide sewerage services and treat wastewater arising from new domestic development. Except where strategic upgrades are required to serve very large or multiple developments, infrastructure upgrades are usually only implemented following an application for a connection, adoption, or requisition from a developer.

Development in areas where there is limited wastewater network capacity will increase pressure on the network, increasing the risk of a detrimental impact on existing customer, and increasing the likelihood of storm overflow operation (where present). Newcastle-under-Lyme contains storm overflows which are currently above the threshold for investigation due to high spill counts. There are potential allocation sites which could cause increased spills at these overflows.

In areas where the current network is combined sewer system, further separation of foul and surface water may be required as well as suitable designed SuDS. Early engagement between NULBC, developers and STW and UU is required to ensure that development sites are aligned with provisions of upgrades to the wastewater network, and further modelling may be required as part of the planning process.

Wastewater treatment capacity - Section 8

Severn Trent Water and United Utilities are the operators of the WwTWs serving the growth within Newcastle-under-Lyme. JBA carried out an independent assessment of WwTW

capacity based on a comparison of available headroom versus potential growth for each WwTW serving growth in the study area. This assessment identified WwTWs which have limited treatment capacity during the plan period. However, the STW and UU DWMP outlined upgrades to these works are planned in the short term to increase capacity. As such, treatment headroom should not be a constraint to growth in NuL.

Water Quality - Section 9

An increase in the discharge of effluent from Wastewater Treatment Works (WwTW) as a result of development and growth in the area in which they serve can lead to a negative impact on the quality of the receiving watercourse. Under the Water Framework Directive (WFD), a watercourse is not allowed to deteriorate from its current WFD classification (either as an overall watercourse or for individual elements assessed). It is Environment Agency (EA) policy to model the impact of increasing effluent volumes on the receiving watercourses.

Water quality modelling was undertaken using the Environment Agency's SIMCAT water quality modelling tool. The results were applied to three assessments, including WFD assessment of deterioration of quality at the WwTW, whether the planned growth could prevent good ecological status in future and deterioration of water quality at protected environmental sites downstream of the WwTWs serving NuL.

The modelling showed that growth could cause deterioration in quality, but this can be prevented by enhancing the treatment level at certain WwTWs. Growth alone would not prevent good ecological status being reached in future. A significant deterioration in water quality at protected sites would not occur as a result of growth during the plan period.

Flood risk from additional foul flow - Section 10

In catchment with a large, planned growth in population and which discharge effluent to a small watercourse, the increase in the discharged effluent might have a negative effect on the risk of flooding. An assessment has been carried out to quantify such an effect. The impact of increased effluent flows is predicted to not impact flood risk in any of the receiving watercourses.

Environmental Constraints - Section 11

Development has the potential to cause an adverse impact on the environment through a number of routes such as worsening of air quality, pollution to the aquatic environment, or disturbance to wildlife. Of relevance in the context of a Water Cycle Study is the impact of development on the aquatic environment.

Increased abstraction can lead to a reduction of water resources. Our assessment identified 14 Groundwater Dependent Terrestrial Ecosystems (GWDTEs) and six SSSIs that could be susceptible to increased abstraction within waterbodies connected to North Staffordshire

WRZ, as a result of growth in the Local Plan period. The water quality assessment identified one protected site which fails the Common Standard Monitoring (2015) standards in the baseline and future (with growth) scenario. However, this failure cannot be attributed to local plan growth as it failed in the baseline.

NuL contains several Groundwater Source Protection Zones. Development within these zones must be heavily monitored, due to the risk of groundwater pollution. Two site allocations within the study area are planned within lower risk Groundwater Source Protection Zones. Runoff from these sites should be managed through implementation of a SuDS schemes.

Summary of key Water Cycle Study recommendations

Newcastle-under-Lyme Borough Council (NULBC)

- Local Plan to adopt enhanced water efficiency standards (110l/p/d) permitted by National Planning Practise Guidance.
- The concept of water neutrality potentially has a lot of benefit in terms of resilience to climate change and enabling waterbodies to achieve good ecological status under the water framework directive.
- Provide a yearly profile of projected housing growth for Severn Trent Water and United Utilities for water company planning.
- Early and continued engagement with Severn Trent Water and United Utilities is required in order to understand where upgrades to water supply or wastewater infrastructure is required, it can be planned in to ensure that it is in place prior to occupation of development sites.
- Incorporate water quality criterion into SuDS policy
- Work with developers to discourage connection of new developments into existing surface water and combined sewer networks.
- Opportunities for Natural Flood Management that includes schemes aimed at reducing / managing runoff should be considered to reduce nutrient and sediment pollution alongside reducing flood risk within Newcastle-under-Lyme.

Severn Trent Water

- Continue to regularly review housing growth across supply region through WRMP Annual Update Reports, and where significant change is predicted, engage with local planning authorities.
- Take into account the full volume of growth (from NULBC and neighbouring authorities) within the catchment when considering WINEP schemes or upgrades at WwTWs.
- Advise NULBC of any strategic water resource infrastructure developments within the authority where safeguarding of land is required.
- Where appropriate, undertake network modelling to ensure adequate provision of water supply and wastewater services.
- Proposals to increase discharges to watercourse may require a flood risk activities environmental permit.

Developers

- Engage with NULBC, Severn Trent Water and United Utilities early as part of pre-app and app consultations
- Work with STW, UU and the Lead Local Flood Authority closely and early to develop an outline drainage strategy for sites
- Demonstrate to Lead Local Flood Authority, STW and UU that surface water will be disposed of using a sustainable drainage system, with connection to foul water sewers seen as a last option.
- Include the design of SuDS at an early stage to maximise the benefits of the scheme, including water quality, biodiversity and amenity benefits where appropriate
- Take "no regrets" decisions in the design of developments which will contribute to mitigation and adaptation to climate change impacts. For example, consider surface water exceedance pathways when designing the layout of developments

1 Introduction

1.1 Terms of reference

JBA Consulting was commissioned by Newcastle-under-Lyme Borough Council (NULBC) to undertake a Phase 2 Water Cycle Study (WCS) to support their emerging Local Plan (Regulation 18). This will provide an assessment of the impact of the growth options on water infrastructure and the water environment.

This study builds on the Phase 1 Scoping Study completed in 2019 as a joint study for NULBC and Stoke-on-Trent City Council (SOTCC). This Phase 2 study is specific to NULBC and will update the evidence provided in Phase 1 for NULBC. The Phase 2 study assesses additional sites not included in Phase 1 and updates each assessment where appropriate. Phase 2 also addresses water quality and environmental impact.

Unmitigated future development and climate change can adversely affect the environment and water infrastructure capability. A WCS will provide the required evidence, together with a strategy to ensure that planned growth occurs within environmental constraints, with the appropriate infrastructure in place in a timely manner so that planned allocations are deliverable.

1.2 Structure of report

The requirements and objectives of the WCS are set out in the section below. Planned growth in and around Newcastle-under-Lyme (NuL) is characterised in Section 2 of the report, before relevant environmental and water industry policy and legislation is presented in Section 3 to provide context for the following assessment. The report is then divided into sections assessing the impact of growth on each topic in the water cycle study.

1.3 The Water Cycle

Planning Practice Guidance on Water Supply, Wastewater and Water Quality[1] describes a water cycle study as:

"a voluntary study that helps organisations work together to plan for sustainable growth. It uses water and planning evidence and the expertise of partners to understand environmental and infrastructure capacity. It can identify joined up and cost-effective solutions, that are resilient to climate change for the lifetime of the development.

The study provides evidence for Local Plans and sustainability appraisals and is ideally done at an early stage of plan-making. Local authorities (or groups of local authorities)

1 Planning Practice Guidance: Water supply, wastewater and water quality, Department for Communities and Local Government (2014). Accessed online at: https://www.gov.uk/guidance/water-supply-wastewater-and-water-quality

usually lead water cycle studies, as a chief aim is to provide evidence for sound Local Plans, but other partners often include the Environment Agency and water companies."

The Environment Agency's guidance on WCS[2] recommends a phased approach, which is being followed:

- Stage 2: Detailed study, to provide the evidence to inform an integrated water management strategy. It will identify the water and flood management infrastructure that will mitigate the risks from too little or too much water. It will also identify what you need to do to protect and enhance the water environment.
- As a WCS is not a mandatory document, Local Planning Authorities are advised to prioritise the stages of the WCS to integrate with their Local Plan programme. Figure 1-1 below shows the main elements that compromise the Water Cycle.

The natural water cycle describes the continuous transfers of water around the planet, from atmosphere to surface and back via evaporation, transpiration and precipitation, and the various flows and storage processes that occur. The artificial water cycle looks at the availability of water resources for human consumption, its treatment and supply to homes and business, its use and consequently the generation of wastewater. It then looks at how wastewater is taken away, treated, and finally what happens when it is returned to the environment.

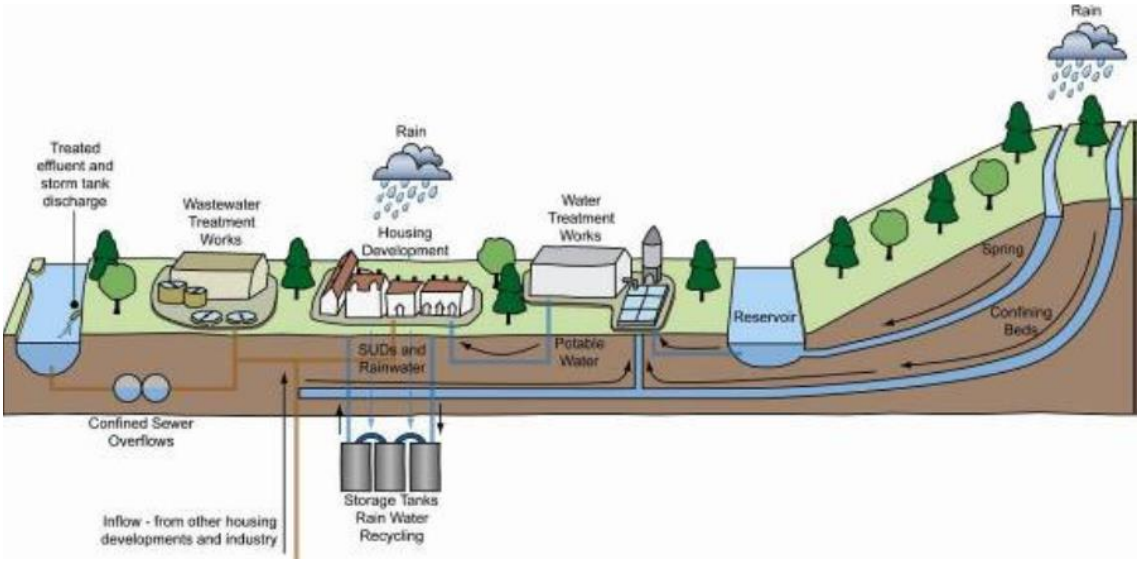


Figure 1-1 The Water Cycle

1.4 Impacts of Development on the Water Cycle

New homes require the provision of clean water, safe disposal of wastewater and limitation of flood risk. It is possible that allocating large numbers of new homes at some locations may result in the capacity of the existing available infrastructure being exceeded. This situation could potentially lead to service failures to water and wastewater customers, have

2 Water Cycle Study Guidance, Environment Agency (2021). Accessed online at: https://www.gov.uk/guidance/water-cycle-studies

adverse impacts on the environment or cause the high cost of upgrading water and wastewater assets being passed on to bill payers. Climate change presents further challenges such as increased intensity and frequency of rainfall that can be expected to put greater pressure on the existing infrastructure.

1.5 Study Area

The Local Planning Authority (LPA) area of Newcastle-under-Lyme Borough Council is shown in Figure 1-2. The study area covers 211km^2 in the West Midlands, encompassing Newcastle-under-Lyme, Kidsgrove and other large villages.

The study area has a population of 123,025 (based on the 2021 census data).

Several Environment Agency (EA) designated main rivers flow through the study area, including the Lyme Brook (tributary of the River Trent) which flows through Newcastle-under-Lyme, The River Lea which is located west of Newcastle-under-Lyme and the Loggerheads Brook (confluence of River Tern) which is found in the south of the Borough.

Water supply services are provided by Severn Trent Water (STW) and wastewater services are provided by both Severn Trent and United Utilities (UU).

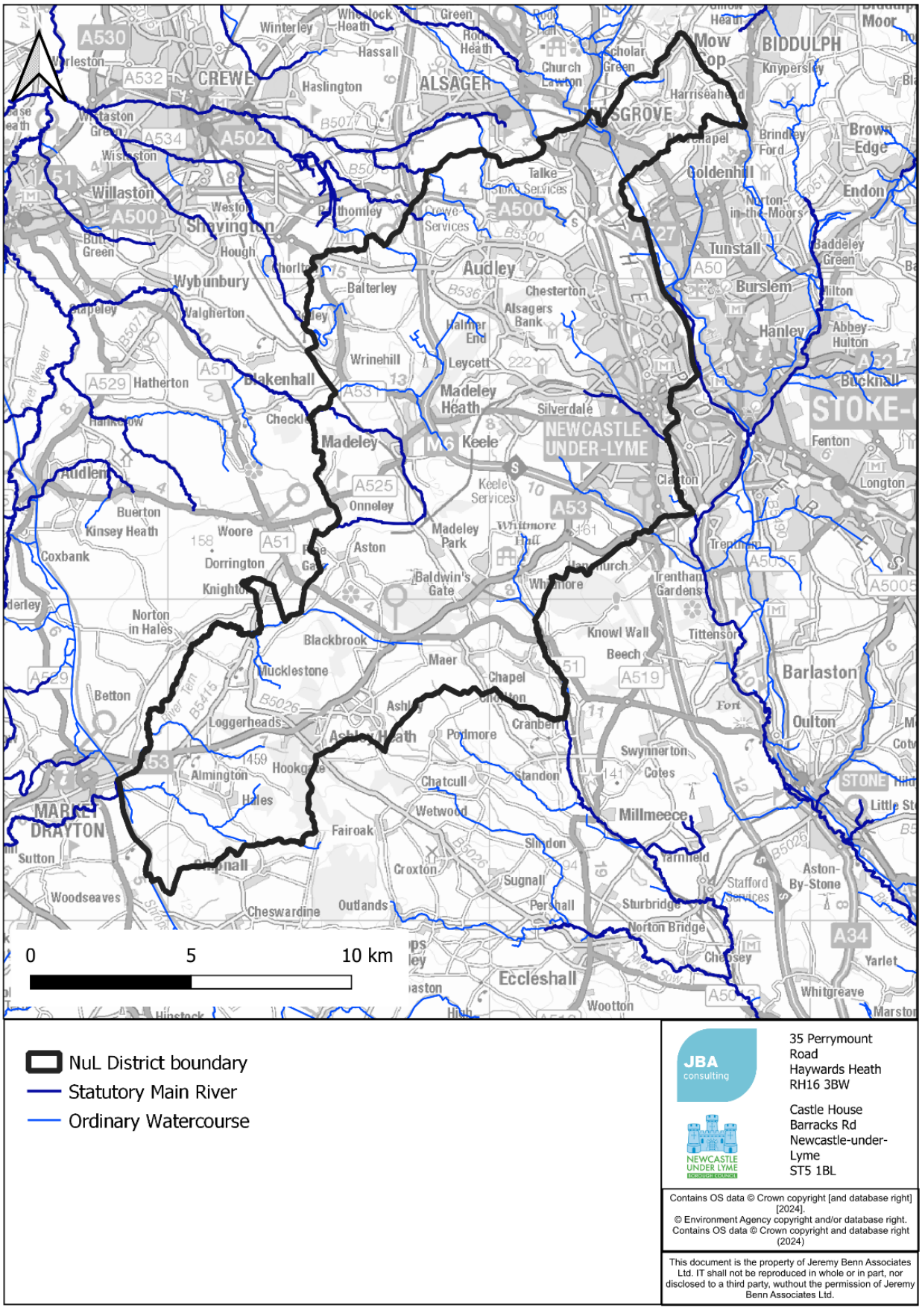


Figure 1-2 Newcastle-under-Lyme study area, including watercourses

Within Newcastle-under-Lyme there are a number of authorities and regulators responsible or involved in supplying, managing, and overseeing water supply, wastewater and the environment. Table 1-1 below explains the responsibilities of various bodies within the local plan area.

Table 1-1 Responsibilities of authorities within Buckinghamshire

Authority Name	Key Responsibilities of Different Authorities
Environment Agency	The EA are the environmental regulator in the UK with responsibilities for water quality, flood risk and administering licences for water abstraction. They are a statutory consultee for many development plan documents and for some planning applications. They advise on environmental and infrastructure capacity issues across the water cycle.
Natural England	Natural England are the Government's advisors on the natural environment, which they have a responsibility to protect and enhance. In a WCS they may provide information on the conservation objectives, and guidance on, the protection of designated sites.
Severn Trent Water	Severn Trent is the water supplier for Newcastle-under-Lyme area. Severn Trent Water has a statutory duty under the Water Industry Act to maintain an efficient and economical system of water supply within its area and supply households with a reliable and sufficient supply of water. Severn Trent is also one of the sewerage undertakers for the central and southern region of Newcastle-under-Lyme. Sewerage undertakers have a duty under the Water Industry Act to provide, improve and extend a system of public sewers (for both domestic and trade flows) so as to cleanse and maintain those sewers (and any lateral drain) to ensure that the area that they serve is effectually drained. There is also a duty to make provision for the emptying of those sewers, normally through sewage treatment works or where appropriate through discharges direct to watercourses. Note: The boundaries of water supply and of waste water areas served by water companies are not the same.

Authority Name	Key Responsibilities of Different Authorities
United Utilities Group	United Utilities is one of the sewerage undertakers for the northern region of Newcastle-under-Lyme. Sewerage undertakers have a duty under the Water Industry Act to provide, improve and extend a system of public sewers (for both domestic and trade flows) so as to cleanse and maintain those sewers (and any lateral drain) to ensure that the area that they serve is effectually drained. There is also a duty to make provision for the emptying of those sewers, normally through sewage treatment works or where appropriate through discharges direct to watercourses. Note: The boundaries of water supply and of waste water areas served by water companies are not the same.

1.6 Record of Engagement

1.6.1 Overview

Preparation of a WCS requires significant engagement with stakeholders, within the Local Planning Authority area, with water and wastewater utilities, with the Environment Agency, and where there may be cross-boundary issues, with neighbouring local authorities. This section forms a record of engagement for the WCS.

1.6.2 Engagement

An inception meeting was held with NULBC to discuss the scope and data collection requirements. Severn Trent Water (STW) were contacted at the start of the project to discuss the data needs, and a data request was issued. Further discussions were held with STW as the project progressed and results emerged. The Environment Agency were consulted on the methodology for assessing the impact of growth on water quality and provided information on the targets for each river reach in the study area.

Neighbouring authorities that share wastewater infrastructure with NULBC were contacted to obtain an estimate of growth in areas that would be served by those WwTWs. This allowed the full quantum of growth to be understood.

The preparation of this WCS was supported by the following engagement:

Inception meeting

Engaged Parties	Details
Newcastle-under-Lyme Council Severn Trent Water	Discussion of project scope, methodology and data collection requirements.

Engaged Parties	Details
United Utilities Environment Agency	

Neighbouring authorities

Engaged Parties	Details
All 5 neighbouring Local Planning Authorities Staffordshire Moorlands Stoke-on-Trent Cheshire East Stafford Shropshire	Request and receipt of site allocation and commitment data

Collaboration with Water Companies and Risk Management Authorities

Engaged Parties	Details
Staffordshire council (LLFA) Newcastle-under-Lyme Borough Council (LPA) Severn Trent Water United Utilities Group Environment Agency	Scope of works and data collection requirements.

2 Future Growth in Newcastle-under-Lyme

2.1 Growth in Newcastle-under-Lyme

The following section summarises how Newcastle-under-Lyme Borough is expected to grow during the plan period, this generates a forecast that can be used to estimate the volume of water and wastewater required in the future and assess the impact of the resulting pressure on water infrastructure.

This forecast consists of:

- Allocations - sites specifically defined in the Local Plan, or which are to be considered further for allocation in the Local Plan Review
- Committed sites - unallocated sites which have grant of planning permission
- Recent completions - sites completed in the last year that may now yet appear in flow data provided by water companies
- Windfall - sites that have not been specifically identified in the Local Plan, normally comprised of previously developed sites that have unexpectedly come available
- Neighbouring authority growth - growth served by infrastructure within or shared with the study area

Newcastle-under-Lyme Council's new Local Plan is expected to be published imminently. The draft plan states that a minimum of 7,160 homes will be delivered over the plan period (2020 to 2040). Newcastle-under-Lyme provided information on expected growth during the plan period which was collated into a forecast for housing and employment. The location of potential allocation sites identified in the study are shown in Figure 2-1. The plan will direct future growth and associated infrastructure across the area and will include new housing and employment requirements for North Staffordshire.

Table 2-1 Overall growth in the NuL area

Type of Growth	Number of Houses	Indicative number of employees
Potential allocation sites	4,716	4,898
Commitments and recent completions	4,225	13,002
Windfall	63	n/a

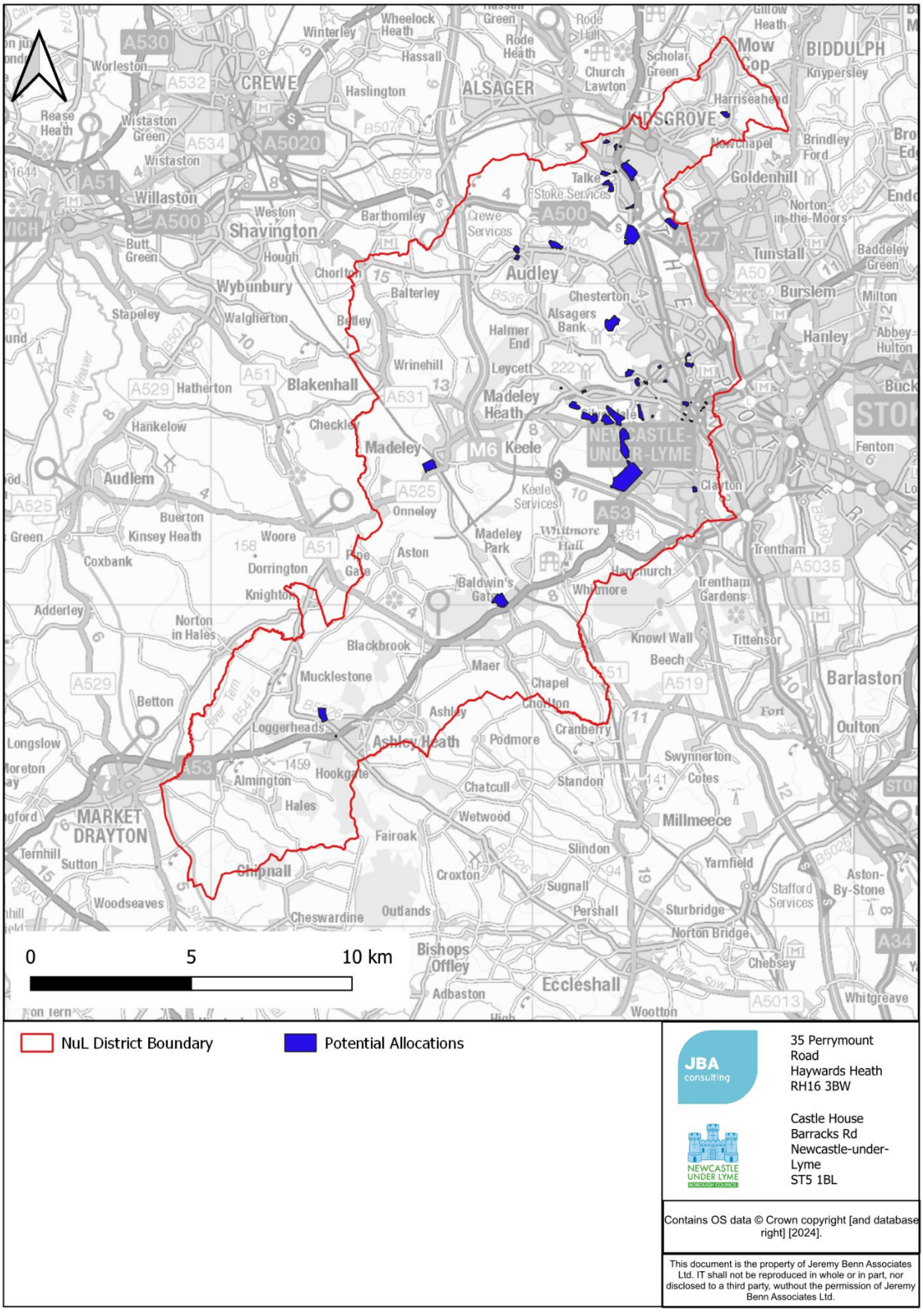


Figure 2-1 Potential allocation sites in Newcastle-under-Lyme Borough

2.2 Growth outside of Newcastle-under-Lyme

There are five LPAs adjacent to the study area. Where growth within a neighbouring area may be served by infrastructure within or shared with Newcastle-under-Lyme, it is important to take this into account when considering infrastructure capacity or environmental impact. The wastewater catchments provided by STW and UU were used to identify where infrastructure could be shared across boundaries. Each neighbouring authority was contacted in order to obtain their forecast for growth during the plan period, and a summary of this information is provided in Table 2.2.

A large area of Stoke-on-Trent is served by the Strongford WwTW. Stoke-on-Trent provided their latest housing and employment monitoring report.

Table 2-2 Housing numbers and employment floorspace in neighbouring authorities which will likely share WwTW infrastructure

Type of Growth	WwTW	Number of Houses	Indicative number of employees
City of Stoke-on-Trent	Strongford	12,481 (Including potential allocations and commitments)	1,915
Staffordshire Moorlands	Strongford	75	0
Cheshire East	n/a	0	0
Shropshire	n/a	0	0
Stafford District	n/a	0	0

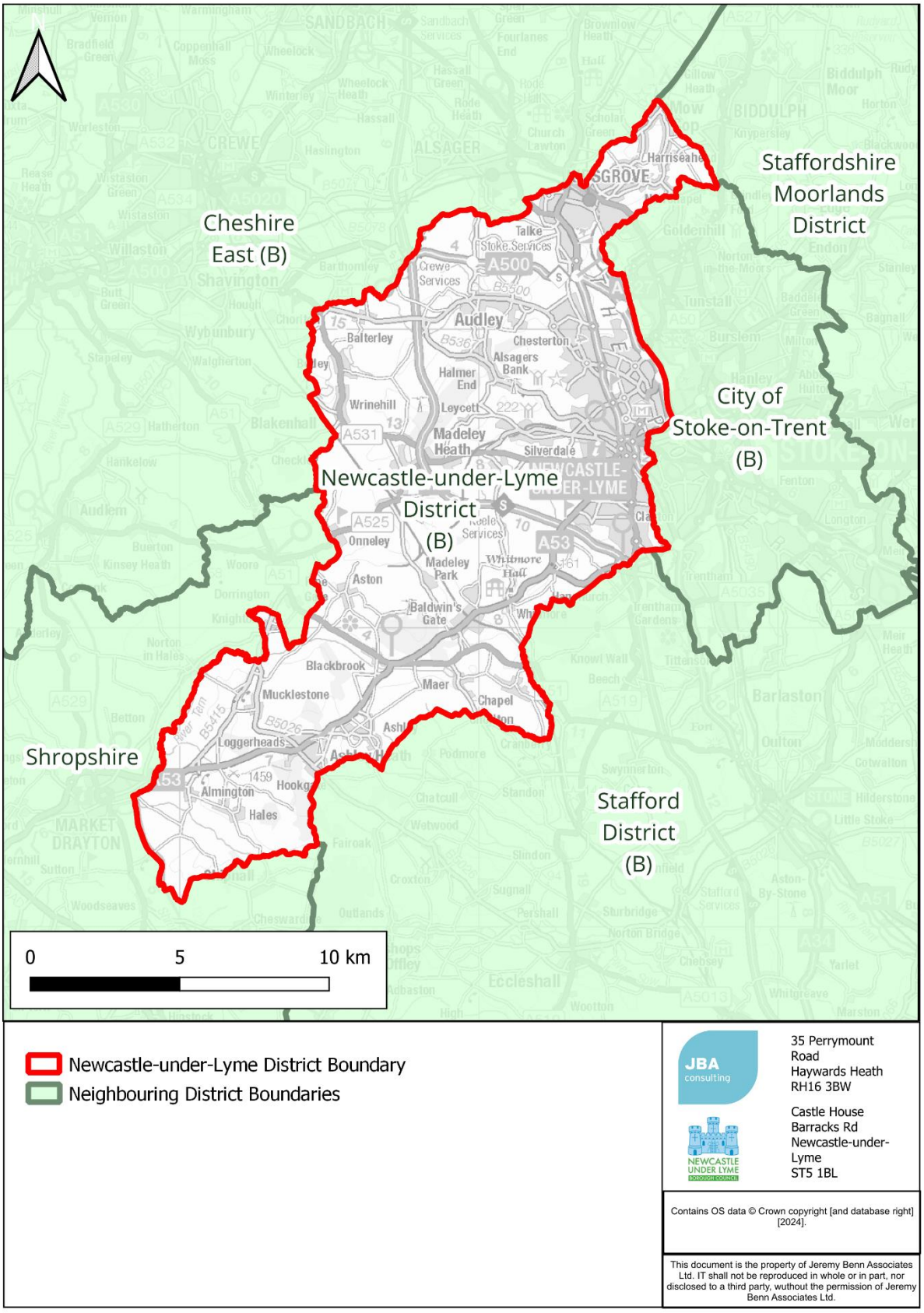


Figure 2-2 Neighbouring authorities to Newcastle-under-Lyme

2.3 Growth and Water Demand

A forecast of the impact of the planned housing and employment growth in and around NuL on water demand was prepared as follows:

2.3.1 Water Demand from housing

Data from the water supply companies draft Water Resource Management Plan (WRMP24) market information tables was used. The forecast for water demand is based on per-capita consumption for the year 2023/24, as outlined in the draft WRMP24. The forecast represents the baseline 'business-as-usual' scenario, not accounting for water efficient design and supply and demand measures from the water companies' WRMPs. Water efficient design is explored in Section 3.4 and measures from the draft WRMP are addressed in Section 4.6.

2.3.2 Water demand from employment sites

Demand from employment sites was calculated assuming a rate of 100l/d per employee. Where the forecast number of employees for a site was not specified by NuLBC, employment floorspace and assumed density based on employment use class was used to calculative an indicative number of employees for a site. Table 2-3 outlines the assumed densities of employment space derived from the Homes and Communities Agency (2015) Employment Density Guide 3rd edition. This guide pre-dates recent changes in working practices as a result of the Covid-19 pandemic, technological changes to support working from home and automation.

Table 2-3 Employment use classes and assumed densities used to calculate water demand

Use class	Description	Density (m2/employee)
B1	OFFICES	13
B1a	Offices	8
B1b	R&D space	40
B1c	Light industrial	47
B2	Industrial and manufacturing	36
B8	Storage and distribution	70
Mixed B	Mixed	28
Mixed	Mixed	40
SG	Data centres	180
A1	Retail	15
A2	Finance and professional services	16
A3	Restaurants and cafes	15
Mixed A	Mixed	15
C1	Hotels	requires bed count
C2	Residential institutions	requires bed count

Use class	Description	Density (m2/employee)
D1	Cultural Attraction	36
D2	Leisure	65

2.3.3 Business-as-usual water demand forecast

The impact of planned growth across the Newcastle-under-Lyme Local Plan period on water demand is summarised in Figure 2-3 below, displaying demand from each source of growth outlined in Figure 2-1, and from neighbouring authorities. Additional water demand from planned development is forecast to grow by 7.5 Ml/d across the five water industry Asset Management Plan (AMP) periods spanning the Local Plan period.

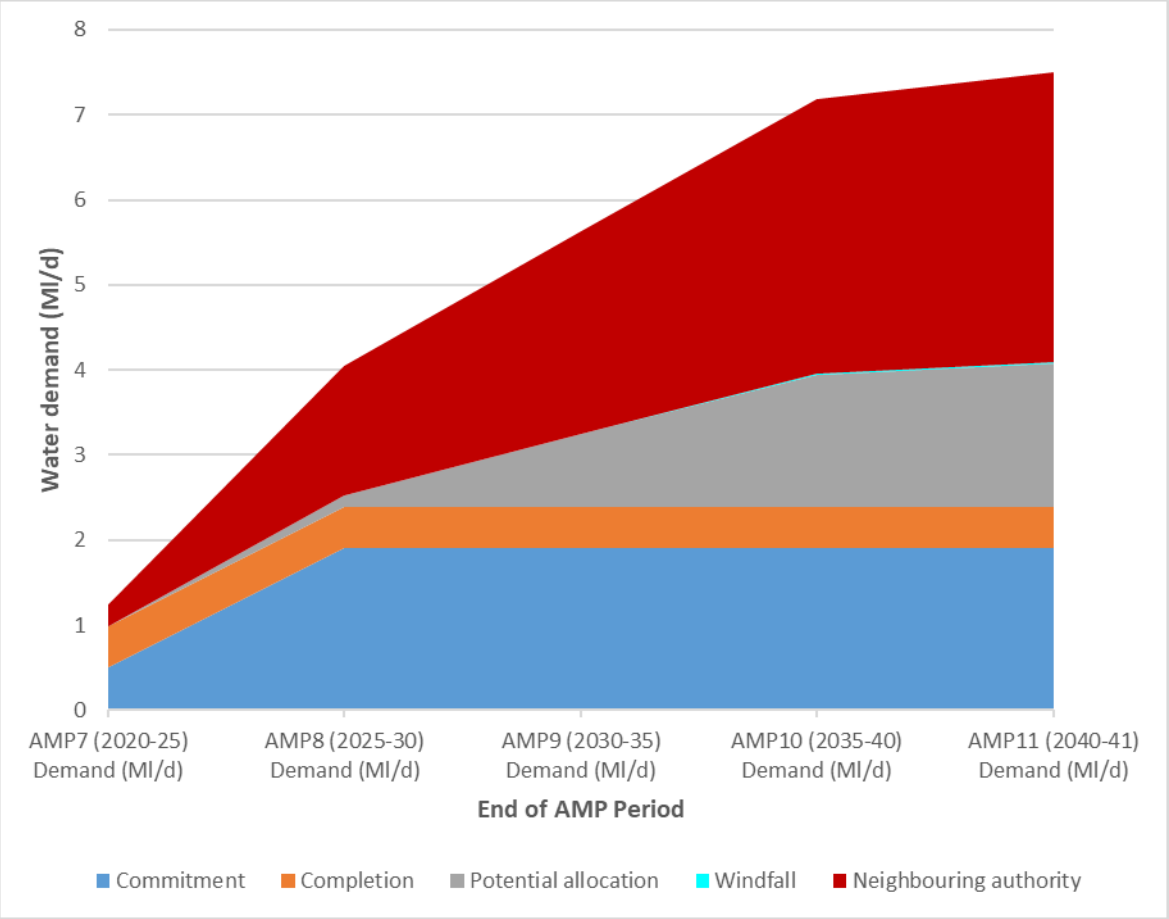


Figure 2-3 Additional water demand (Ml/d) forecast across the Local Plan review period, AMP11 here only includes the first year of that AMP period (2040-41)

3 Policy and legislation

3.1 Introduction

The following sections introduce several national, regional, and local policies that must be considered by the Local Planning Authority (LPA), water companies and developers during the planning stage. Key extracts from these policies are presented as well as links to the full text. Whilst care has been taken to ensure that the information presented in this report was up to date at the time of writing, policy and guidance can change rapidly and the reader should ensure that the most up to date information is sought.

3.2 Plan-making

The National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities, 2023) was originally published in 2012, as part of reforms to make the planning system less complex and more accessible, to protect the environment and to promote sustainable growth.

Local Plans are the primary mechanism by which plan-led spatial planning is implemented in England. Local Plans must be prepared by Local Planning Authorities (LPAs) and include:

- Strategic policies which set out the "overall strategy for the pattern, scale and design duality of places", including for the provision of infrastructure, transportation and community facilities.
- Non-strategic policies, which "set out more detailed policies for specific areas, neighbourhoods or types of development. This can include allocating sites, the provision of infrastructure and community facilities at a local level."

Under the Localism Act (HM Government, 2011) new rights were provided to allow local communities to come together and shape the development and growth of their area by preparing Neighbourhood Development Plans, or Neighbourhood Development Orders, where the ambition of the neighbourhood is aligned with strategic needs and priorities for the area. Neighbourhood Plans can make non-strategic policies, aligned to the strategic policies of the Local Plan. As neighbourhoods draw up their proposals, Local Planning Authorities are required to provide technical advice and support to communities.

3.3 Water and the Planning System

3.3.1 National Planning Policy Framework and water

The NPPF[3] provides guidance to planning authorities to take account of flood risk and water and wastewater infrastructure delivery in their Local Plans. Key paragraphs include:

3 https://assets.publishing.service.gov.uk/media/65a11af7e8f5ec000f1f8c46/NPPF_December_2023.pdf

- Paragraph 34: “Plans should set out the contributions expected from development. This should include setting out the levels and types of affordable housing provision required, along with other infrastructure (such as that needed for education, health, transport, flood and water management, green and digital infrastructure). Such policies should not undermine the deliverability of the plan.”
- Paragraph 158: “Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply...”
- Paragraph 180e: “…preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans”.

3.3.2 Planning Practice Guidance overview

Planning Practice Guidance (PPG) was originally issued in 2014 by the Department for Communities and Local Government, with the intention of providing guidance on the application of the NPPF. The individual guidance documents are updated periodically. The following guidance documents are particularly relevant to a WCS:

- Water Supply, Wastewater and Water Quality (HM Government, 2019)
- Housing - Optional Technical Standards (HM Government, 2015a)

3.3.3 PPG - Water Supply, Wastewater and Water Quality4

Two key passages from the PPG (Para 002) provide an overview of what needs to be considered by plan-making authorities, and provide a basis for the work contained in a WCS or IWMS:

"Early discussions between strategic policy-making authorities and water and sewerage companies can help to ensure that proposed growth and environmental objectives are reflected in company business plans. Growth that requires new water supply should also be reflected in companies' long-term water resources management plans. This will ensure that the necessary infrastructure is funded through the water industry's price review."

"Strategic policy-making authorities will also need to consider the objectives in the government’s 25 Year Environment Plan to reduce the damaging abstraction of water from rivers and groundwater, and to reach or exceed objectives for rivers, lakes, coastal and ground waters that are specially protected."

A summary of the advice for plan-makers and for planning applications is contained below but it is recommended that the full text is reviewed.

Plan-making considerations - Infrastructure (Para 005)

4 https://www.gov.uk/guidance/water-supply-wastewater-and-water-quality

- Identification of suitable sites for new or enhanced infrastructure, including the location of existing and proposed development.
- Consider whether new development is appropriate near to water and wastewater infrastructure (for example due to odour concerns).
- Phasing new development so that water and wastewater infrastructure will be in place when needed. Infrastructure should also be in place before any environmental effects occur on designated sites of importance for biodiversity.

Plan-making considerations - Water quality (Para 006)

- How to help protect and enhance local surface water and groundwater in ways that allow new development to proceed and avoids costly assessment at the planning application stage.
- The type or location of new development where an assessment of the potential impacts on water bodies may be required.
- Whether measures to improve water quality, (e.g., SuDS schemes) can be used to address water quality in addition to flood risk.

Plan-making considerations - Wastewater (Para 007)

- The sufficiency and capacity of wastewater infrastructure.
- The circumstances where wastewater from new development would not be expected to drain to a public sewer (such as via a package treatment sewage treatment works or septic tank).
- The capacity of the environment to receive effluent from development without preventing statutory objectives being met.

Early engagement with the LPA, the EA, and relevant water and sewerage companies can help establish whether any particular water and wastewater issues need to be considered.

Considerations for planning applications - Water supply (Para 016)

Water supply planning would normally be addressed through the LPA's strategic policies and reflected in the water companies WRMPs. Water supply is therefore unlikely to be a consideration for most planning applications. However, some exceptions might include:

- Large developments not identified in plans that are likely to require a large volume of water; and/or
- significant works required to connect the water supply; and/or
- where a plan requires enhanced water efficiency in new development as part of a strategy to manage water demand locally.

Considerations for planning applications - Water quality (Para 016)

Water quality is only likely to be a significant planning concern where a proposal would:

- Involve physical modifications to a water body such as flood storage areas, channel diversions and dredging, removing natural barriers, construction of new locks, new culverts, major bridges, new barrages or dams, new weirs, and removal of existing weirs; and/or
- indirectly affect water bodies, for example:

- As a result of new development such as the redevelopment of land that may be affected by contamination, mineral workings, water and wastewater treatment, waste management facilities and transport scheme including culverts and bridges.
- Result in runoff into surface water sewers that drain directly, or via a combined sewer, into sensitive waterbodies e.g., waterbodies with a local, national or international habitat designation.
- Through a lack of adequate infrastructure to deal with wastewater.
- Through a local of adequate infrastructure to deal with wastewater where development occurs in an area where there is strategic water quality plan e.g., a nutrient management plan, River Basin Management Plan, Water Cycle Study, Diffuse Water Pollution plan or sewerage undertakers' drainage strategy which set out strategies to manage water quality locally and help deliver new development.

3.3.4 PPG - Housing - Optional Technical Standards5

This guidance advises planning authorities on how to gather evidence to set optional requirements, including for water efficiency. It states that “all new homes already must meet the mandatory national standard set out in the Building Regulations (of 125 litres /person /day). Where there is a clear local need, local planning authorities can set out Local Plan policies requiring new dwellings to meet the tighter Building Regulations optional requirement of 110 litres/person/day. Planning authorities are advised to consult with the EA and water companies to determine where there is a clear local need, and also to consider the impact of setting this optional standard on housing viability.

3.3.5 PPG - Flood Risk and Coastal Change6

This guidance (Department for Levelling Up, Housing and Communities, 2022) sets out how spatial planners, planning authorities and developers should manage flood risk to and from proposed developments, including assessing risk, avoiding flood risk, controlling, managing and mitigating flood risk. The main updates in the 2022 version were:

- Natural Flood Management (NFM)
- Surface water flood risk
- Using multifunctional SuDS
- Application of the sequential and exceptional tests to all sources of flood risk
- Safeguarding land of future flood risk management
- Supporting transition in unsustainable locations

Full details of this PPG are set out in the SFRA.

3.3.6 PPG - Climate Change

5 https://www.gov.uk/guidance/housing-optional-technical-standards

6 https://www.gov.uk/guidance/flood-risk-and-coastal-change

This guidance (Department for Levelling Up, Housing and Communities, 2019) advises how to identify suitable mitigation and adaptation measures in the planning process to address the impacts of climate change. Planning can help increase resilience to climate change impact through the location, mix and design of development. There is a statutory duty on local planning authorities to include policies in their Local Plan to tackle climate change and its impact.

3.3.7 Levelling-up and Regeneration Act 2023

The Levelling-up and Regeneration (HM Government, 2023) aims to support the Government's commitment to reducing geographical disparities between different parts of the UK. Within the Act are several parts relating to the water environment.

Part 7 relates to nutrient pollution standards. Where the Secretary of State considers that a habitats site that is wholly or partly in England is in an unfavourable condition by virtue of pollution from nutrients in water comprising phosphorus or compounds, or nitrogen or compounds, the Secretary of State may designate the catchment area for the habitats site as a phosphorus or nitrogen sensitive area.

It requires sewerage undertakers in England to upgrade phosphorus or nitrogen significant plants in its sewerage system by 2030 in order to meet phosphorus or nitrogen pollution standards.

A phosphorus or nitrogen significant plant is defined as one that discharges treated effluent into a sensitive catchment area and is not exempt in relation to the pollution standard. Unless otherwise defined, the treatment standard for phosphorous is 0.25mg/l, and for nitrogen is 10mg/l.

3.3.8 Newcastle-under-Lyme Local Plan

The Newcastle-under-Lyme Local Plan will establish the strategic framework for development in NuL up to 2040. It will include residential and employment site allocations, reassessment of existing development management policies and guidance for developers and private sector companies.

In Policy CRE1, Newcastle-under-Lyme Borough Council mandates that new residential developments must limit water mains consumption to a maximum of 110 litres per person per day, as per Building Regulations Part G optional standards. Non-residential developments are required to achieve at least the BREEAM ‘Very Good’ standard, with an emphasis on water efficiency. Proposals should aim to achieve the BREEAM Outstanding standard where possible, with positive afforded weight be granted where this is achieved. Moreover, all new developments should integrate water-saving measures into their designs and demonstrate how water efficiency has been factored into their proposals.

Policy IN1 relates to wastewater infrastructure, NuL will support water and wastewater infrastructure investment which facilitates the delivery of wider sustainable development and the meeting of environmental objectives. Policy IN7 highlights that development should demonstrate sufficient capacity and appropriate connections for surface water disposal,

water supply and wastewater treatment, through engagement with relevant water companies.

3.4 Water and design

3.4.1 Building Regulations

The Building Regulations7 (2010) Part G was amended in early 2015 to require that all new dwellings must ensure that the potential water consumption must not exceed 125 litres/person/day, or 110 litres/person/day where required under planning conditions (HM Government, 2015b) (see section 3.3.4).

The Environmental Improvement Plan (discussed in 3.7.2) contains a commitment to consider a new standard for new homes in England of 105 litres per person per day (l/p/d) and 100 l/p/d where there is a clear local need, such as in areas of serious water stress. Whilst this new standard is only under consideration, it demonstrates the direction of travel for water efficiency standards, and it is highly likely that this or a similar standard will be adopted.

3.4.2 Building Research Establishment

The Building Research Establishment (BRE) publish an internationally recognised environmental assessment methodology for assessing, rating, and certifying the sustainability of a range of buildings.

New homes are most appropriately covered by the Home Quality Mark (BRE, BRE, 2023a), and commercial, leisure, educational facilities and mixed-use buildings by the Building Research Establishment Environmental Assessment Methodology (BREEAM) UK New Construction Standard (BRE, BREEAM, 2018b).

Using independent, licensed assessors, BREEAM/HQM assesses criteria covering a range of issues in categories that evaluate energy and water use, health and wellbeing, pollution, transport, materials, waste, ecology, and management processes.

In the Homes Quality Mark, 400 credits are available across 11 categories and lead to a star rating. 18 credits are available for water efficiency and water recycling. A greater number of credits are awarded for homes using water efficient fittings (with the highest score achieving 100l/p/d or less), and further credits are awarded for the percentage of water used in toilet flushing that is either sourced from rainwater or from grey water.

The BREEAM New Construction Standard awards credits across nine categories, four of which are related to water: water consumption, water monitoring, leak detection and water efficient equipment. This leads to a percentage score and a rating from “Pass” to “Outstanding”.

7 https://www.legislation.gov.uk/uksi/2010/2214/contents/made

Through the Local Plan, the Council has the opportunity to seek BREEAM or HQM status for all new, residential, and non-residential buildings.

3.4.3 Energy and Water

18% of the UK's domestic energy usage is for water heating (Department for Energy Security and Net Zero, 2022). If less water was being used within the home, for instance through more water efficient showers, less water would need to be heated, and overall domestic energy usage would be reduced.

The Government is currently analysing the results of a 2019 consultation on a Future Homes Standard that will involve changes to Part L (conservation of fuel and power) of the Building Regulations for new dwellings. Whilst there is no direct mention of water efficiency in this consultation, there is an important link between water use and energy use, and therefore between water use and the whole-life carbon cost of developments.

3.4.4 Viability

The evidence for the costs of meeting the optional 110l/p/d water efficiency target in new homes indicate that the costs are minimal:

- A 2014 study into the cost of implementing sustainability measures in housing found that meeting a standard of 110 litres per person per day would cost only £12 (at 2023 prices) for a four-bedroom house (EC Harris, 2014).
- The Committee on Climate Change report - UK Housing: Fit for the Future - stated that the cost of "requiring all homes in England to be built to 110 l/p/d is possible under Part G of regulations and would be no additional cost." (Committee on Climate Change, 2019)
- Heating water accounts for 18% of energy used in the home (Department for Energy Security and Net Zero, 2022) This would cost a 2-3 person, 3-bed household an average of £352 per year in energy at 2023 costs (British Gas, 2023). Water efficiency is therefore not only viable but of positive economic benefit to both private homeowners and tenants.

There is less evidence available on the costs of going below 110l/p/d. The Sussex North Water Neutrality Strategy (JBA Consulting, 2022) found that the additional cost to meet 85l/p/d using water efficient fittings would be between £349 and £431 per dwelling, or £1,049 to £1,531 where white-goods appliances would not otherwise have been installed in the dwelling (2022 prices).

3.5 The Water Industry

3.5.1 The Water Industry in England

Water and sewerage services in England and Wales are provided by eleven Water and Sewerage Companies (WaSCs) and six 'water-only' companies. The central legislation relating to the industry is the Water Industry Act 1991. The companies operate as regulated

monopolies within their supply regions, although very large water users and developments are able to obtain water and/or wastewater services from alternative suppliers - known as inset agreements.

The Water Act 20148 aims to reform the water industry to make it more innovative and to increase resilience to droughts and floods. Key measures could influence the future provision of water and wastewater services include:

- Non-domestic customers are able to switch their water supplier and/or sewerage undertaker;
- new businesses will be able to enter the market to supply these services;
- measures to promote a national water supply network; and
- enabling developers to make connections to water and sewerage systems.

The water industry is primarily regulated by three regulatory bodies:

- **Economic regulation:** Office of Water Services (Ofwat) are the economic regulator. They have a statutory duty to protect the interests of consumers, ensuring water companies carry out their functions (customer service standards, environmental rules, drinking water standards etc) and can finance them. Part of this role is setting the limits on pricing of water and sewerage services.
- **Environmental regulation:** The Environment Agency are the environmental regulator. They are responsible for monitoring the impact of the water industry (as well as others) on the environment and issuing permits for abstraction of water and discharge of wastewater.
- **Drinking water regulation:** Finally, the Drinking Water Inspectorate (DWI) implement standards for drinking water and can take enforcement measures against water companies if those standards are not met.

3.5.2 Planning and funding of the water industry

The water industry works on a five-year cycle called the Asset Management Plan period or AMP periods. Every five years a water company submits a Business Plan to Ofwat for a Price Review. These plans set out the companies' operational expenditure (OPEX) and capital expenditure (CAPEX) required to maintain service standards, enhance service (for example where sewer flooding occurs), to accommodate growth and to meet environmental objectives defined by the Environment Agency. Ofwat assesses and compares the plans with the objective of ensuring what are effectively supply monopolies are operating efficiently, and that the company is meeting its obligations. It then sets the allowable price increase for consumers based on the retail prices index, the business plan, and taking into consideration affordability for consumers. The current AMP period is AMP 7 (2020-2025), and the price of water for this period was set by Ofwat late in 2019 in a process referred to as Price Review 19 (PR19). The new price came into effect in April 2020. The next price review will be published in December 2024 (PR24) and will set prices from 2025 to 2030.

8 https://www.legislation.gov.uk/ukpga/2014/21/contents/enacted

This system gives stability in pricing. Within this price review process there may also be incentives and penalties on the water company for exceeding or failing to meet targets.

When considering investment requirements to accommodate growing demand, water companies are required to ensure a high degree of certainty that additional assets will be required before funding them. Longer term growth is, however, considered by the companies in their internal asset planning processes and in their 25-year Strategic Direction Statements and Water Resource Management Plans (WRMPs).

The Water Industry National Environment Programme (WINEP) is a set of actions that are defined by the EA and given to all water companies operating in England for completion during a particular AMP period. The aim of the programme is to support the objectives in the Environment Act, Water Framework regulations, Habitats regulations and other environmental objectives. Examples of typical actions could include investigations into the sustainability of an abstraction, a reduction in an abstraction to support river flows, or new permit limits at a wastewater treatment works.

Water and wastewater infrastructure requires significant lead-times to plan, obtain planning and other permissions, finance and construct. The time required to provide new or upgraded infrastructure to serve a development or a larger spatial plan is highly locally specific. The following is provided as an indicative guide to lead-times.

Table 3-1: Indicative lead-times (years) for new infrastructure to serve development

Scale of development	Water supply	Water resources	Wastewater network	Wastewater treatment
Minor	1	N/A	1	N/A
Major	1-3	5-10	1-5	3-5
Strategic / Plan	3-5	10-20	5-10	5-10

3.5.3 Planning for Water

Water resource management plans

Water Resource Management Plans (WRMPs) are 25-year strategies that water companies are required to prepare, with updates every five years. In reality, water companies prepare internal updates more regularly. WRMPs are required to assess:

- Future demand (due to population and economic growth).
- Future water availability (including the impact of sustainability reductions).
- Demand management and supply-side measures (e.g., water efficiency and leakage reduction, water transfers and new resource development).
- How the company will address changes to abstraction licences.
- How the impacts of climate change will be mitigated.

- Where necessary, they set out the requirements for developing additional water resources to meet growing demand and describe how the balance between water supply and demand will be balanced over the period 2015 to 2040.
- Using cost-effective demand management, transfer, trading and resource development schemes to meet growth in demand from new development and to restore abstraction to sustainable levels.
- In the medium to long term, ensuring that sufficient water continues to be available for growth and that the supply systems are flexible enough to adapt to climate change.

Severn Trent Water's draft 2024 WRMP and United Utilities revised draft 2024 WRMP are available online and we have reviewed STWs plan in detail for the study area in Section 4.6.2.

Severn Trent and United Utilities' Drought Plan

- Linked to the WRMP is a water company's drought plan. This is a requirement under the Water Industry Act 1991 (as amended by the water Act 2003). A water company must state how it will maintain a secure water supply and protect the environment during dry weather and drought. The plan will contain:
- Drought triggers - these are points where a water company will take action to manage supply and demand. They are based on monitoring of rainfall levels, river flows, groundwater levels and reservoir stocks.
- Demand management actions - how a water company will reduce demand for water during a drought. Actions that save water before taking more water from the environment must be prioritised. These could include:
    - reducing leakage;
    - carrying out water efficiency campaigns with customers;
    - reducing mains pressure; and
    - restricting water use, for example through temporary use bans which limit hosepipe and sprinkler use.
- Supply management actions - how a water company will maintain water supply during a drought. Actions that have the least effect on the environment must be prioritised. This could include:
    - carrying out engineering work to improve its supply;
    - transferring water in bulk from other water companies;
    - using drought permits and drought orders to abstract more water;
    - using desalination - permanent or temporary plants; and
    - using tankers to supply customers with water directly.
- Extreme drought management actions - the actions it could take in an extreme drought. These could delay the need to use emergency restrictions standpipes and rota cuts.

- Communicating during a drought - a water company must set out how it will communicate in a clear and timely way during a drought with customers, partners or other stakeholders.
- Environmental assessment, monitoring and mitigation. A drought plan must include:
  - an environmental assessment;
  - an environmental monitoring plan for each supply management action; and
  - details of mitigation measures the company plans to take for each supply management action.
- End of a drought - a water company must explain how it will identify when a drought is over or ending and the actions it will take during this stage, communicate this information to customers, and review its performance.

Regional water resource planning

Water resource planning is taking an increasingly regional focus, recognising the need for collaboration between water companies and sectors in order to address the challenges of climate change, increasing demand for water and protecting the water environment. Five regional groupings having been formed, including the Water Resources West (WRW) group which covers Newcastle-under-Lyme Council. An advisory group consisting of their regulators (Environment Agency and Ofwat) and Defra regularly attend meetings of WRW.

WRW are preparing a regional water resource plan for publication, which in turn will inform the next round of company WRMPs to be published in 2024. As part of this process, they have published an initial water resource position statement which sets out the water resources challenges and opportunities within the region.

3.5.4 Planning for Wastewater

21st Century Drainage

The UK Water Industry Research (UKWIR) “21st Century Drainage” programme has brought together water companies, governments, regulators, local authorities, academics, and environmental groups to consider how planning can help to address the challenges of managing drainage in the future. These challenges include climate change, population growth, urban creep and meeting the Water Framework Directive.

The group recognised that great progress has been made by the water industry in its drainage and wastewater planning over the last few decades, but that, in the future, there needs to be greater transparency and consistency of long-term planning. The Drainage and Wastewater Management Plan (DWMP) framework (Water UK, 2018) sets out how the industry intends to approach these goals. Companies were required to published finalised DWMPs in 2023 to inform their business plans for the 2024 Price Review.

Drainage and Wastewater Management Plans (DWMPs)

DWMPs are consistently structured plans delivered at three spatial scales; company-wide, regional groupings and individual wastewater catchments. The framework defines drainage

to include all organisations and all assets which have a role to play in drainage, although, as the plans will be water company led, it does not seek to address broader surface water management within catchments.

LPAs and LLFAs are recognised as key stakeholders and are invited to join, alongside other stakeholders, the Strategic Planning Groups (SPGs) organised broadly along river basin district catchments.

DWMPs aim to provide more transparent and consistent information on sewer flooding risks and the capacity of sewerage networks and treatment works, and this should be taken into account in SFRAs, Water Cycle Studies, as well as in site-specific FRAs and Drainage Strategies.

Severn Trent Water published their final DWMP in 2023 and United Utilities published their final DWMP in May 2023. These are reviewed in detail for the study area in section 6 and Section 8.

3.5.5 Developer Contributions and connection charges

A significant part of water company business is the interface with developers to facilitate connection to the public water supply and sewerage systems, through their developer services functions. Developments with planning permission have a right to connect to the public water and sewerage systems, (where this is for domestic use), however, there is no guarantee that the capacity exists to serve a development.

Developers may requisition a water supply connection or sewerage system or self-build the assets and offer these for adoption by the water company or sewerage undertaker. Self-build and adoption are usually practiced for assets within the site boundary, whereas requisitions are normally used where an extension of upgrading the infrastructure requires construction on third party land. The cost of requisitions is shared between the water company and developer as defined in the Water Industry Act 1991.

The above arrangements are third party transactions because the Town and Country Planning Act Section 106 agreements and Community Infrastructure Levy agreements may not be used to obtain funding for water or wastewater infrastructure.

Ofwat, the water industry's economic regulator, published revised rules covering how water and wastewater companies may charge customers for new connections (OfWAT, 2020). These rules have applied to all companies in England since April 2018. The key changes include:

- More charges will be fixed and published on water company websites. This will provide greater transparency to developers and will also allow alternative connection providers to offer competitive quotations more easily.
- There will be a fixed infrastructure charge for water and one for wastewater.
- The costs of network reinforcement will no longer be charged directly to the developer in their connection charges. Instead, the combined costs of all of the

works required on a company's networks, over a five-year rolling period, will be covered by the infrastructure charges paid for all new connections.

- The definition of network reinforcement has changed and will now apply only to works required as a direct consequence of the increased demand due to a development. Where the water company has not been notified of a specific development, for example when developing long-term strategic growth schemes, the expenditure cannot be recovered through infrastructure charges.

United Utilities and Severn Trent publish their charging arrangement annually, 9 & 10. These include incentives to encourage good design by developers, including:

Table 3-2 List of incentives from water companies

United Utilities	Tier 1 - Water Efficiency	Installation of a water butt or a raised rain planter with a capacity of at least 200 litres connected to the premises main roof drainage or a rain garden the size of 2% - 4% of the properties main roof that drains to the rain garden.	£20
United Utilities	Tier 2 - Water Reuse	Installation of rainwater harvesting or grey water re-use as the primary water source for all toilets, as a minimum, within the property Properties built with no surface water connection to the existing public sewer Installation of permeable surfacing at property level	£400 £288 £150
United Utilities	Tier 3 - Water Offsetting	Water offsetting charger (per qualifying premises) Water offsetting Reputational incentive	£553 plus VAT £664
Severn Trent	Sewerage Environmental Discount	Properties built with no surface water connection to the existing public sewer	Up to £124
Severn Trent	Water Environmental Discount	Properties built to 100 litres (per person per day) or less	Up to £380

9 https://www.unitedutilities.com/globalassets/documents/wholesale-charges-documents/202425-wholesale-documents/new-connection-and-developer-services-charges-scheme-2024-2025.pdf

10 https://www.stwater.co.uk/content/dam/stw/stw_buildinganddeveloping/new-connections/final-st-charging-arrangements-24-25.pdf

3.5.6 Water companies and the planning system

Water companies are currently not statutory consultees to planning applications, although they do monitor planning applications and respond to potentially significant applications, or where requested to do so by the LPA. Defra are intending to consult on making water companies statutory consultees for some applications (Department for Environment, Food & Rural Affairs, 2023).

Where a water company is concerned that a new development may impact upon their service to customers or the environment (for example by causing foul sewer flooding or pollution) they may request the LPA to impose a Grampian condition, whereby the planning permission cannot be implemented until a third-party secures the necessary upgrading or contributions.

Defra has issued National Policy Statements (NPSs) on Nationally Significant Infrastructure Projects (NSIPs) for wastewater (Department of Environment, Food & Rural Affairs, 2012) and water (Department of Environment, Food & Rural Affairs, 2023), to be used as the primary basis when considering applications for Development Consent Orders (DCOs). There are currently no NSIPs in Newcastle-under-Lyme.

3.6 Flood Risk and Surface Water

3.6.1 Flood and Water Management Act 2010

The Flood and Water Management Act (FWMA) aims to improve both flood risk management and the way water resources are managed (HM Government, 2010).

The FWMA has created clearer roles and responsibilities and helped to define a more risk-based approach to dealing with flooding. This included the creation of a lead role for LAs, as LLFAs, designed to manage local flood risk (from surface water, ground water and ordinary watercourses) and to provide a strategic overview role of all flood risk for the EA.

The content and implications of the FWMA provide considerable opportunities for improved and integrated land use planning and flood risk management by LAs and other key partners. The integration and synergy of strategies and plans at national, regional, and local scales, is increasingly important to protect vulnerable communities and deliver sustainable regeneration and growth.

Schedule 3 of the Act has not been enacted in England, but this is expected to be implemented in 2024. The enactment of schedule 3 will have the following implications for the planning process:

- Designation of local authorities as SuDS Approval Bodies (SAB) which have a duty to adopt new drainage systems.
- The cessation of the automatic right for new developments to connect to the existing sewer system.
- Developers must ensure that drainage systems are built as per the approved drainage plan that complied with mandatory national standards as outlined in the NPPF and the PPG.

3.6.2 Local Flood Risk Management Strategy (LFRMS)

Local Flood Risk Management Strategies set out how Lead Local Flood Authorities (LLFA) will manage local flood risk from surface water runoff, groundwater and ordinary watercourses, for which they have a responsibility as LLFA. They also set out the work that other Risk Management Authorities are doing to manage flood risk within the area.

Staffordshire County Council are the LLFA for NuL and hold the responsibility of producing a LFRMS. The most recent final LFRMS was published in December 2015 in collaboration with Shropshire Council. A revised LFRMS is intended to be published in 2024, in line with the announcement for Schedule 3. The 2024/25 publication will include a detailed options appraisal, information on Schedule 3 of the Flood and Water Management Act, more thorough review of documents and additional suggestions from public consultation and partner organisations. The 2015 LFRMS objectives for managing local flood risk include:

- Develop a strategic understanding of flood risk from all sources
- Promote effective management of drainage and flood defence systems
- Support communities to understand flood risk and become more resilient to flooding
- Manage local flood risk and new development in a sustainable manner
- Achieve results through partnership and collaboration
- Be better prepared for flood events

Secure and manage funding for flood risk management in a challenging financial climate

3.6.3 Strategic Flood Risk Assessment (SFRA)

All LPAs are required, under NPPF, to prepare a SFRA, which forms a key part of the evidence base for their Local Plan. The SFRA must consider flood risks from all sources, collating up-to-date flood risk data and in some cases developing new flood risk modelling. The SFRA is used to inform the Sequential Test, by which Local Plan allocations should be sequentially selected to direct development towards areas of lower flood risk, taking into consideration the vulnerability to flooding of the proposed land use. Newcastle-under-Lyme's Level 1 SFRA[11] was published in 2024.

3.6.4 Surface Water Management Plan

Surface Water Management Plans (SWMPs) outline the preferred surface water management strategy in a given location and establish a long-term action plan to manage surface water. SWMPs are undertaken, when required, by LLFAs in consultation with key local partners who are responsible for surface water management and drainage in their area. At current, there is no SWMP published for NuL. The emerging Local Plan will address some considerations of surface water management and flood risk.

11 https://www.newcastle-staffs.gov.uk/downloads/file/2342/strategic-flood-risk-assessment-june-2024-

3.6.5 Sustainable Drainage Systems

From April 2015, Local Planning Authorities (LPA) have been given the responsibility for ensuring that sustainable drainage is implemented on developments of ten or more homes or other forms of major development through the planning system. Under the new arrangements, the key policy and standards relating to the application of SuDS to new developments are:

- The National Planning Policy Framework, which requires that development in areas already at risk of flooding should give priority to sustainable drainage systems.
- The House of Commons written statement (Pickles, 2014) setting out governments intentions that LPAs should "ensure that sustainable drainage systems for the management of run-off are put in place, unless demonstrated to be inappropriate" and "clear arrangements in place for ongoing maintenance over the lifetime of the development." This requirement is also now incorporated in the 2019 update of the NPPF (paragraph 165). In practice, this has been implemented by making Lead Local Flood Authorities (LLFAs) statutory consultees on the drainage arrangements of major developments.
- The Defra non-statutory technical standards for sustainable drainage systems (HM Government, 2015c). These set out the government's high-level requirements for managing peak flows and runoff volumes, flood risk from drainage systems and the structural integrity and construction of SuDS. This very short document is not a design manual and makes no reference to the other benefits of SuDS, for example water quality, habitat, and amenity.

Staffordshire Council are the LLFA and play a key role in ensuring that the proposed drainage schemes for all new developments comply with technical standards and policies in relation to SuDS. Further information on surface water drainage can be found here.

An updated version of the CIRIA SuDS Manual was published in 2015. The guidance covers the planning, design, construction and maintenance of SuDS for effective implementation within both new and existing developments. The guidance is relevant for a range of roles with the level of technical detail increasing throughout the manual. The guidance does not include detailed information on planning requirements, SuDS approval and adoption processes and standards, as these vary by region and should be checked early in the planning process. The manual itself can be found here.

CIRIA also publish "Guidance on the Construction of SuDS" (C768), which contains detailed guidance on all aspects of SuDS construction, with specific information on each SuDS component available as a downloadable chapter. The downloadable chapter is available here.

Severn Trent Water have specific water company guidelines for 'Building sustainable, flood-resilient communities' (2021) available on their website. These guidelines set out their long term plan for drainage across their working catchment.

3.6.6 Design and Construction Guidance

The Design and Construction Guidance (DCG), part of a new Codes for Adoption covering the adoption of new water and wastewater infrastructure by water companies, contains details of the water sector's approach to the adoption of SuDS, which meet the legal definition of a sewer. This replaces the formerly voluntary Sewers for Adoption The new guidance came into force in April 2020 and compliance by water companies in England is mandatory.

The previous standards, up to and including Sewers for Adoption Version 7, included a narrow definition of sewers to mean below-ground systems comprising of gravity sewers and manholes, pumping stations and rising mains. This essentially excluded the adoption of SuDS by water companies, except for below-ground storage comprising of oversized pipes or chambers.

The new guidance provides a mechanism for water companies to secure the adoption of a wide range of SuDS components which are now compliant with the legal definition of a sewer. There are however several non- adoptable components such as green roofs, pervious pavements, and filter strips. These components may still form part of a drainage design so long as they remain upstream of the adoptable components.

The Design and Construction Guidance states that the drainage layout of a new development should be considered at the earliest stages of design. It is hoped that the new guidance will lead to better managed and more integrated surface water systems which incorporate amenity, biodiversity, and water quality benefits.

3.7 Environmental Protection and Biodiversity

3.7.1 The Environment Act 2021

The Environment Act (HM Government, 2021) came into UK law in November 2021 with the aim of protecting and enhancing the environment. The Act has objectives to improve air and water quality, biodiversity, waste reduction and resource efficiency. The implementation of the policies within the Environment Act has begun and legally binding environmental targets are being developed. This will be enforced by the newly created Office for Environmental Protection (OEP, more information available here).

The Environment Act (Part 5) contains policies concerning improvements to the water environment. These policies have the following aims:

- Effective collaboration between water companies through statutory water management plans.
- Minimise the damage that water abstraction may cause on environment.
- Modernise the process for modifying water and sewerage company licence conditions.

Further to this, there is specific legislation regarding storm overflows aiming to reduce the discharge of untreated sewage into waterways. This plan includes requirements for water companies to:

- report on the discharges from storm overflows;
- monitor the quality of water potentially affected by discharges;
- progressively reduce the harm caused by storm overflows; and
- report on elimination of discharges from storm overflows.

3.7.2 25-year Environment Plan

The Environmental Improvement Plan (EIP) is the 2nd revision of the 25-year environment plan (25YEP) published in 2023. It contains ten goals which are shown in Figure 3-1. The full text of the EIP can be found here. Government must review and revise the plan, if needed, every five years to ensure continued progress against the ten 25YEP goals.

Of particular importance to a WCS is Goal 3 - Clean and plentiful water.

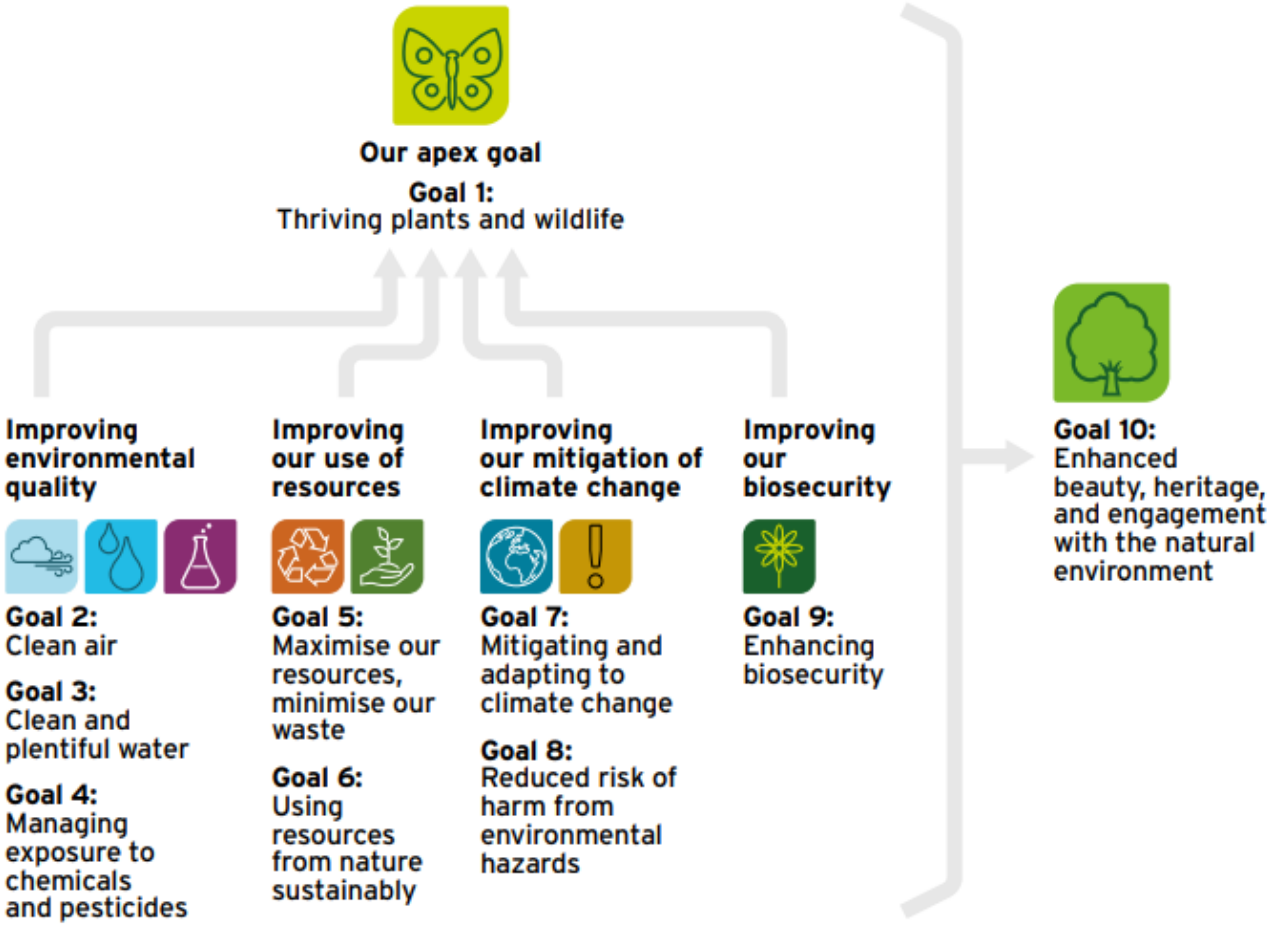


Figure 3-1 The 10 Environmental Improvement Plan goals

Under Goal 3 - Clean and plentiful water, there are eight sets of targets and commitments relating to different aspects of the water environment:

- "Reduce nitrogen, phosphorus, and sediment pollution from agriculture into the water environment by at least 40% by 2038, compared to a 2018 baseline, with an interim target of 10% by 31 January 2028, and 15% in catchment containing protected sites in unfavourable condition due to nutrient pollution by 2028.

- Reduce phosphorus loadings from treated wastewater by 50% by 2028 and 80% by 2038 against a 2020 baseline.
- Halve the length of rivers polluted by harmful metals from abandoned mines by 2038, against a baseline of around 1,500km.
- Reduce the use of public water supply in England per head of population by 20% from the 2019-20 baseline, 2038, with interim targets of 9% by 2027 and 14% by 2032, and to reduce leakage by 20% 2027 and 30% by 2032.
- Restore 75% of our water bodies to good ecological status.
- Require water companies to have eliminated all adverse ecological impact from sewage discharges at all sensitive sites by 2035, and at all overflows by 2050.
- Target a level of resilience to drought so that emergency measures are needed only once in 500-years."

To deliver these goals, the EIP outlines action across these areas:

- Improving wastewater infrastructure and water company environmental performance.
- Reducing pressures on the water environment from agriculture.
- Enabling the sustainable use of water for people, business and the environment
- Tackling pressures from chemicals and pollutants.
- Restoring natural function and iconic water landscapes.
- Joined-up management of the water system.

Progress towards delivering the EIP will be monitored annually.

3.7.3 Defra Plan for Water

Defra's Plan for Water (Department for Environment, Food & Rural Affairs, 2023) provides further detail on the actions towards achieving Goal 3 of the EIP23. It promotes an integrated approach to water management as the foundation of the plan. Whilst many of the actions contained within the Plan for Water are outside of the responsibilities of areas of influence of the LPAs, the following summarises those actions that LPAs should have regard to:

- Require standardised sustainable drainage systems (SuDS) in new housing developments in 2024, subject to final decisions on scope, threshold, and process following consultation in 2023.
- Designate all chalk catchments as water stressed and high priority under the sewer overflows reduction plan, driving action to improve water management.
- The plan reflects the predicted 4 billion litre per day (4,000 ml/d) gap between supply and demand across England and contains measures to both boost supply and reduce demand. Of interest to LPAs is the plan to reduce demand which will address half of the gap.
- A key component in reducing demand for water is improving water efficiency and there is a target under the Environment Act to reduce the use of public water supply in England per head of population by 20% by 2038.

A road map on water efficiency in new developments and retrofits has been developed with ten actions to improve water efficiency:

- **Action 1 - Implement schedule 3 to the Flood and Water Management Act 2010.** The 2024 consultation will consider rainwater harvesting in developing the statutory SuDS National Technical Standards.
- **Action 2 -** Review the Water Supply (Water Fittings) Regulations 1999, the Water Supply (Water Quality) Regulations 2016 and/or any other relevant legislation to address wasteful product issues with toilets and enable new water efficient technologies.
- **Action 3 –** Develop clear guidance on 'water positive' or 'net zero water' developments and roles for developers and water companies.
- **Action 4 –** Review water efficiency options in planning, building regulations and through voluntary schemes for non-household buildings.
- **Action 5 –** Work with Ofwat to ensure the water industry can play a central role in retrofitting water efficient products in households, businesses, charities and the public sector.
- **Action 6 –** Work across government to integrate water efficiency into energy efficiency advice and retrofit programmes.
- **Action 7 -** Review the Building Regulations 2010, and the water efficiency, water reuse and drainage standards including considering a new standard for new homes in England of 105l/p/d and 100 l/p/d where there is a clear local need.
- **Action 8 –**Mandatory water efficiency labelling scheme.
- **Action 9 –** Investigate dual pipe systems (rainwater harvesting) and water reuse options for new housing development as part of the review of the planning framework.
- **Action 10 –** Enable innovative water efficiency approaches in buildings, including technologies and approaches to funding and maintenance.

3.7.4 Biodiversity Net Gain

Biodiversity net gain (BNG) is designed to contribute to the recovery of nature while developing land. The principle is that the natural environment is in measurably better state after development than it was before. The Environment Act 2021 requires all planning permissions granted in England (except for small sites) to achieve 10% BNG since January 2024. This will be required on small sites from April 2024.

Defra publishes a biodiversity metric tool, the latest version of which must be used for calculating the BNG deriving from a proposed development.

3.7.5 Local Nature Recovery Strategy

The Environment Act (HM Government, 2021) also established a duty to prepare, by March 2025, Local Nature Recovery Strategies (LNRS), recognising that England is one of the most nature-depleted countries in the world. Staffordshire County Council are the authority

responsible for preparing the LNRS in the study area. They are tasked with working with local partners to agree priorities for nature recover and identify "practical, achievable proposals" (Department for Environment Food & Rural Affairs, 2023) to address these priorities. The LNRS should also co-ordinate with neighbouring strategies to form a national Nature Recovery Network.

There is a close linkage with BNG, as developments proposing to create, enhance or recover habitat in locations mapped by the LNRS receive a higher value in the biodiversity metric calculator than in other locations.

3.7.6 Storm Overflow Reduction Plan

The Environment Act placed a legal duty on water companies to progressively reduce the adverse impacts of discharges from storm overflows. The storm overflow reduction plan (Department for Environment, Food & Rural Affairs, 2023) sets the following targets:

- By 2035, water companies will have: improved all overflows discharging into or near every designated bating water; and improved 75% of overflows discharging to high priority sites.
- By 2050, no storm overflows will be permitted to operate outside of unusually heavy rainfall or to cause any adverse ecological harm.

There is also an expectation that water companies ensure their infrastructure keeps pace with increasing external pressures, such as urban growth and climate change, without these pressures leading to greater numbers of discharges.

3.7.7 The Water Framework Directive (WFD) and Water Environment Regulations

Introduction

The European Union Water Framework Directive (WFD) 2000 is currently transposed into English and Welsh law by the Water Environment Regulations (HM Government, 2017). They apply to all waterbodies (watercourses, canals, lakes, estuaries and coastal waters), with the objective of meeting Good Ecological Status (GES) or, where heavily modified, Good Ecological Potential (GEP) To meet GES or GEP, a water body must achieve a good or high score for all elements - in the case of surface water, these are biological, physico-chemical, specific pollutants and hydromorphology (Figure 3-2). UK policy remains to meet GES or GEP for all waterbodies by 2027.

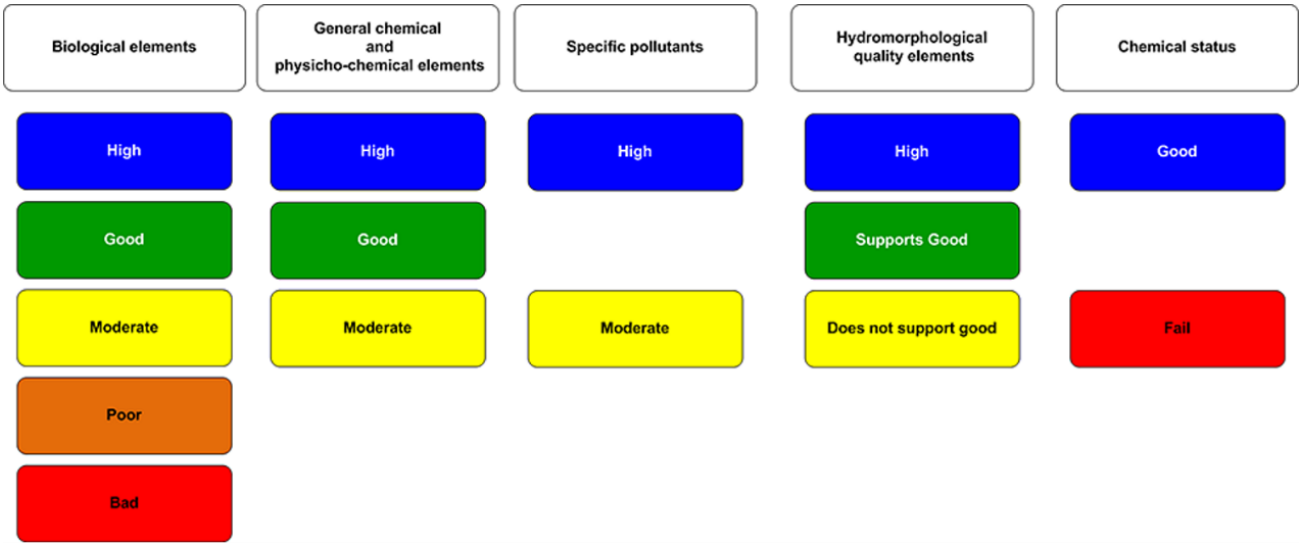


Figure 3-2: Status classification for surface water (Environment Agency, 2023a)

Chemical Status is separately assessed. The Water Framework Directive and the EA recognise a group of ubiquitous chemicals which are persistent, bioaccumulative or toxic (uPBT), and without which over 90% of England's waterbodies would achieve Good Chemical Status. Mercury, PFOS and PBDE are the most ubiquitous causes of failures. Due to the persistent nature of these chemicals, the date for getting all waterbodies to Good Chemical Status is set for 2063.

River Basin Management Plans

River Basin Management Plans (RBMP) are required under the WFD and document the baseline classification of each waterbody in the plan area, the objectives, and a programme of measures to achieve those objectives. Newcastle-under-Lyme falls within the Severn, Humber and North West RBD. The third cycle RBMPs were published in 2022. A primary WFD objective is to ensure ‘no deterioration’ in environmental status, therefore all water bodies must meet the class limits for their status class as declared in the Anglian and Thames River Basin Management Plan. Another equally important objective requires all water bodies to achieve good ecological status. Future development needs to be planned carefully so that it helps towards achieving the WFD and does not result in further pressure on the water environment and compromise WFD objectives. The WFD objectives as outlined in the updated RBMPs are summarised below:

- Preventing deterioration of the status of surface waters and groundwater.
- Achieving objectives and standards for protected areas.
- Aiming to achieve good status for all water bodies.
- Reversing any significant and sustained upward trends in pollutant concentrations in groundwater.
- Cessation of discharges, emissions and losses of priority hazardous substances into surface waters.

- Progressively reducing the pollution of groundwater and preventing or limiting the entry of pollutants.
- Local Planning Authorities (LPAs) must have regard to the Water Framework Directive as implemented in the RBMPs. It is of primary importance when assessing the impact of additional wastewater flows on local river quality.
- Alongside the RBMP documents, the data behind them can be explored further using the Catchment Data Explorer (Environment Agency, 2023a) and map viewer (Environment Agency, 2023b).

Protected Area Objectives

The Water Environment Regulations specify that areas requiring special protection under other EC Directives, and waters used for the abstraction of drinking water, are identified as protected areas. These areas have their own objectives and standards.

Some areas may require special protection under more than one piece of EU-derived legislation or may have additional (surface water and/or groundwater) objectives. In these cases, all the objectives and standards must be met.

The types of protected areas are:

- Areas designated for the abstraction of water for human consumption (Drinking Water Protected Areas);
- areas designated for the protection of economically significant aquatic species (Freshwater Fish and Shellfish);
- bodies of water designated as recreational waters, including Bathing Waters;
- nutrient-sensitive areas, including areas identified as Nitrate Vulnerable Zones under the Nitrates Directive or areas designated as sensitive under Urban Waste Water Treatment Regulations; and
- areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection including relevant Natura 2000 sites.

3.7.8 Conservation of Habitats Regulations 2017 (as amended)

The Conservation of Habitats and Species Regulations 2010 (commonly referred to as the Habitats Regulations) consolidated the Conservation (Natural Habitats, &c.) Regulations 1994, and transposed the EU Habitats Directive in England and Wales which was aimed at protecting plants, animals and habitats that make up the natural environment. The regulations were further amended in 2017.

The Habitats Regulations define the requirement for a Habitats Regulations Assessment (HRA) to be carried out. The purpose of this is to determine if a plan or project may affect the protected features of a “habitats site”. These include:

- A Special Area of Conservation (SAC) or candidate SAC.
- A Site of Community Importance (SCI).

- A site hosting a priority natural habitat type or priority species protected in accordance with Article 5(4) of the Habitats Directive.
- A Special Protection Area (SPA) or potential SPA.
- Ramsar sites.

All plans and projects (including planning applications) which are not directly connected with, or necessary for the conservation management of a habitat site require consideration of whether the plan or project is likely to have significant effects on that site.

This is referred to as the “Habitats Regulations Assessment screening” and should take into account the potential effects of both the plan/project itself and in combination with other plans or projects.

Part 6 of the conservation of Habitats and Species Regulations 2017 states that where the potential for likely significant effects cannot be excluded, a competent authority must make an appropriate assessment of the implications of the plan or project for that site, in view of the site’s conservation objectives.

The competent authority may agree to the plan or project only after having ruled out adverse effects on the integrity of the habitats site.

If adverse effects cannot be ruled out, and where there are no alternative solutions, the plan or project can only proceed if there are imperative reasons of over-riding public interest and if the necessary compensatory measures can be secured.

The “People over Wind” ECJ ruling (C-323/17) clarifies that when making screening decisions for the purposes of deciding whether an appropriate assessment is required, competent authorities cannot take into account any mitigation measures. This must be part of the appropriate assessment itself.

The implementation of the Conservation of Habitats Regulations have had particular significant implications in two areas related to water and planning:

- Nutrient Neutrality. Natural England (NE) has identified a number of catchment areas where Habitats Sites are in unfavourable condition due to eutrophication (an excess of the nutrients phosphorous and/or nitrogen in water). NE have advised that developments in these catchments must demonstrate that they do not cause harm, and that one way to do this is to introduce mitigation measures in the catchment area which offset the additional nutrients emitted as a result of the development, an approach known as nutrient neutrality. There are no parts of the study area which are currently within a nutrient neutrality catchment area, however NE may designate additional areas in the future.
- Water Neutrality. Natural England (NE) has issued a position statement that it cannot be concluded with sufficient certainty that groundwater abstractions in the Arun Valley, West Sussex are causing no adverse effect on Habitats Sites. NE have advised that developments in Sussex North Water Resource Zone must demonstrate that they do not cause harm, and that one way to do this is to introduce mitigation measures in the zone which offset the additional water consumed as a result of the development, an approach known as water

neutrality. There are no parts of the study area which are currently within a water neutrality zone, however NE may designate additional areas in the future.

Both nutrient and water neutrality designations have resulted in significant impacts on the granting of planning permission in the designated areas.

3.7.9 Wildlife and Countryside Act

Sites of Special Scientific Interest (SSSI) are designated and legally protected under the Wildlife and Countryside Act 1981, Section 28G places a duty to take reasonable steps, consistent with the proper exercise of the authority's functions, to "further to the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which the site is of special scientific interest." (HM Government, 1981).

The Government's 25-year Environment Plan has a target of "restoring 75% of our one million hectares of terrestrial and freshwater protected sites to favourable condition, securing their wildlife value for the long term." In line with this, and the Wildlife and Countryside Act 1981, Local Authorities should look put forward options that contribute to conservation or restoration of favourable condition, and at the very least must not introduce policies that hinder the restoration of favourable condition by increasing existing issues.

A site is said to be in "favourable condition" when the designated feature(s) within a unit are being adequately conserved and the results from monitoring demonstrate that the feature(s) in the unit are meeting all the mandatory site-specific monitoring targets set out in the favourable condition targets (FCT).

3.7.10 Ramsar

The Convention on Wetlands of International Importance, more commonly known as the Ramsar convention, aims to protect important wetland sites. Member counties commit to:

- Wise use of all their wetlands.
- Designating sites for the Ramsar list of "Wetlands of International Importance" (Ramsar Sites) and their conservation.
- Cooperating on transboundary wetlands and other shared interests.
- "Wise use" of wetlands is defined under the convention as "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development". (Ramsar Convention Secretariat, 2010)
- In the UK, Ramsar Sites are designated by the Joint Nature Conservation Committee (JNCC).

In general, the designation of UK Ramsar sites is underpinned through prior notification of these areas as Sites of Special Scientific Interest (SSSIs). Additionally, the NPPF states that Ramsar sites should be given the same protection in the planning process as sites designated under the EU Habitats Directive.

3.7.11 Bathing Water Regulations

The Bathing Water Directive was first published in 2006 and are currently transposed into English and Welsh law through the Bathing Water Regulations 2013. The aims of the directive are the protection of public health whilst bathing, standardisation of publicly available water quality information and to improve management practices at bathing waters.

The UK has over 600 designated bathing waters defined as areas of inshore waters designated for public swimming, these areas are typically characterised by large numbers of swimmers and visitors per year. The Environment Agency are required to monitor water quality at these sites regularly (usually weekly) throughout the Bathing Water season, between 15th May and 30th September.

Water quality standards are based on the incidence of potentially harmful bacteria, E. coli and intestinal enterococci and are categorised as ‘excellent’, ‘good’, ‘sufficient’ or ‘poor’ on the basis of bacteria levels. Sites are rated annually and on a short-term basis in response to any temporary pollution incidents.

Achieving compliance with the Bathing Water Directive has driven some £2.5bn of investment by UK water companies since the early 1990s to reduce the impact of sewerage systems and treated wastewater discharges. Measures have included storage and surface water management to reduce storm overflow spills, moving or extending effluent outfalls and improving wastewater treatment, including ultra-violet (UV) treatment of final effluent.

Ahead of the 2024 bathing water season, 27 new designations are expected, of which none are located within the NuL boundary. Defra has published guidance on applying for bathing water status, including a requirement for at least 100 bathers per day during the season (Department for the Environment, Food and Rural Affairs, 2023).

3.7.12 Environmental Permitting Regulations

Environmental permitting is a process used to manage and regulate activities which may cause harm to the environment. The Environmental Permitting Regulations (HM Government, 2016) were introduced in order to streamline a wide-ranging number of environmental permitting laws under one set of regulations. These include permits for emissions to air, water and land, and cover a range of industrial sectors and waste management streams.

Of particular relevance to this study are the regulations for permitting sewage effluent discharges to surface waters and groundwaters, known as water discharge activities (Environment Agency, 2022).

- The regulations are used to permit discharges from water company and private wastewater treatment works, and for sewer overflows.
- The Environment Agency will usually object to applications for a new private Package Treatment Plan (PTP) or septic tank where it is feasible to connect the development to a public sewerage system. A general rule of 30m per dwelling is used to define a reasonable distance from the site boundary to a public sewer.

Hence a development of 10 homes should connect to a public sewer within 300m of the boundary, unless there are significant barriers, such as a river or motorway.

- Where an existing or new development treats its own wastewater, a PTP must be installed if the discharge is directly to surface water. Where the discharge is to ground, a PTP or septic tank may be used, but must be connected to a suitably designed drainage field.

3.7.13 Groundwater protection

Under the regulations, the EA have published a set of position statements on protecting groundwater from various activities (Environment Agency, 2018). The position statements that are relevant to this study with regard to discharges to groundwaters, include surface water drainage and the use of SuDS, discharges from contaminated surfaces (e.g., lorry parks) and from treated sewage effluent.

The EA also maintain a set of maps of Source Protection Zones (SPZs) to help identify high risk areas within which pollution prevention measures should be implemented. The SPZs show the risk of contamination to public water supplies from activities that may cause pollution in the area, the closer the activity, the greater the risk:

- **Zone 1 (Inner protection zone)** This zone is designed to protect against the transmission of toxic chemicals and water-borne disease. It indicates the area in which pollution can travel to the borehole within 50 days from any point within the zone and applies at and below the water table. There is also a minimum 50 metre protection radius around the borehole.
- **Zone 2 (Outer protection zone)** This zone indicates the area in which pollution takes up to 400 days to travel to the borehole, or 25% of the total catchment area, whichever area is the largest. This is the minimum length of time the Environment Agency think pollutants need to become diluted or reduce in strength by the time they reach the borehole.
- **Zone 3 (Total catchment)** This is the total area needed to support removal of water from the borehole, and to support any discharge from the borehole.
- **Zone of special interest** This is defined on occasions, usually where local conditions mean that industrial sites and other polluters could affect the groundwater source even though they are outside the normal catchment.

3.8 Summary of key new and emerging policy and legislation

The policy and legislation covering the water environment, water and wastewater services and planning is wide and frequently changing. The new and emerging policy and legislation below have been identified as particularly important for consideration in the development of the Local Plan:

- Schedule 3 of the Flood and Water Management Act is expected to be enacted in England in 2024. This will designate Lead Local Flood Authorities as SuDS

Approval Bodies (SABs) with a duty to adopt new SuDS and removing the automatic right to connect to public sewers.

- Defra have signalled their intention, with the Plan for Water, to review the water efficiency standards for new homes, including consideration of a new national 105l/p/d standard and 100l/p/d where there is a clear local need.
- All development sites are now expected to demonstrate at least a 10% net-gain in biodiversity.
- The designation of specific catchments in England as requiring to demonstrate Nutrient Neutrality under the Conservation of Habitats Regulations has led to significant limitations to development in these areas, as well as the development of offsetting schemes to enable nutrient-neutral development. The government (Defra, 2024) has instructed competent authorities (including LPAs) undertaking HRAs for development draining via a sewer to a wastewater treatment works in nutrient sensitive areas to consider that the nutrient pollution standard will be met by 2030. At the time of writing, this notice was the subject of a legal challenge.

4 Water Resources

4.1 Introduction

4.1.1 Objectives

The aim of the water resources assessment is to ensure that sufficient water is available in the region to serve the proposed level of growth, and that it can be abstracted without a detrimental impact on the environment, both during the plan period and into the future. The report will characterise the study area, identifying the key surface water and groundwater bodies, and local geology. It will highlight the pressures on water resources in the region, and what constraints are present on abstract and provide evidence for adopting a tighter water efficiency target allowed under building regulations.

4.1.2 Conclusion from Phase 1 Scoping Study

The Phase 1 WCS concluded that the WRMP showed a supply-demand deficit from 2024 within the North Staffordshire Water Resource Zone if no action were taken but went on to define a number of actions that would address the deficit. Severn Trent Water commented that they would have adequate water resource for all proposed development sites.

On the basis that the WRMP contains an approved plan to address the supply-demand deficit, and sufficient time to adapt the long-term plan to include emerging trends in population, no further assessment was recommended as part of a Phase 2 Outline study.

4.1.3 Requirements for Phase 2 Outline Study

The scoping study assessed the impact of Newcastle-under-Lyme's housing need on water resources. Since the scoping study STW have published their Water Resource Management Plan for 2019 and have published a Draft Water Resource Management Plan for 2024, and one of the Abstraction Licencing Strategies for the study area has also been amended. The Phase 2 assessment will therefore consist of:

- Summary of the Surface water and geology of the Newcastle-under-Lyme area
- Presentation of Groundwater body status not included in Phase 1
- Update to the Abstraction Licencing Strategy
- Summary of changes to the STW WRMP
- Restatement of STW’s position

4.2 Surface Waters

Figure 4-1 shows the main watercourses within the study area. The Lyme Brook flows through Newcastle-under-Lyme to join the River Trent. The Meece Brook exists to the southeast of the Borough, passing through Whitmore. The Coal Brook and Hempmill Brook are both tributaries of The River Tern and are situated in the southwest region of the

Borough. The River Tern follows the southwest boundary of the Borough. The Checkley Brook, and River Lea are both situated in the west region.

The Newcastle-under-Lyme study area is situated across three river basin districts: Northwest, Humber and Severn.

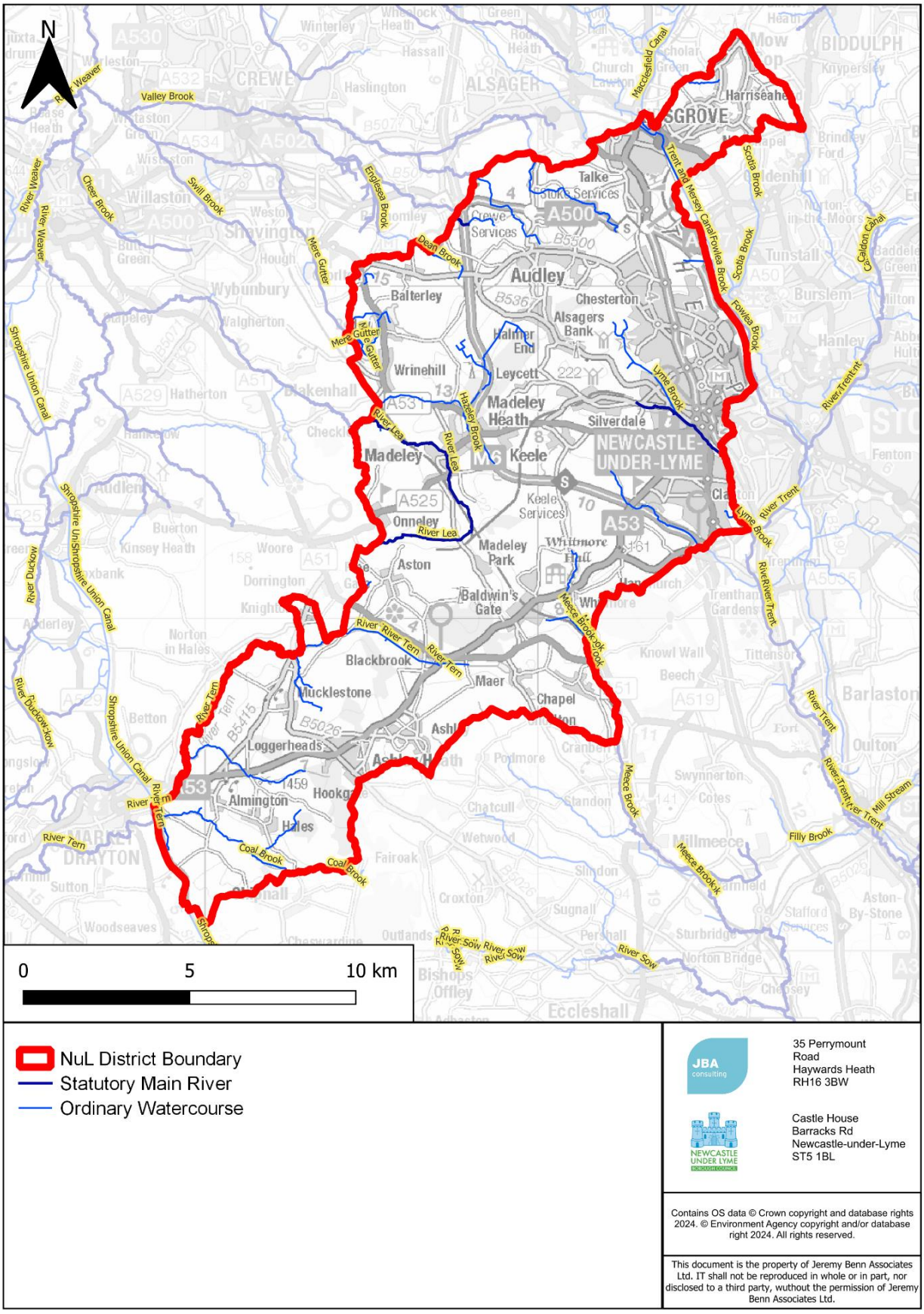


Figure 4-1 Watercourses in the NuL Borough boundary

4.3 Geology

Figure 4-2 BGS 625k bedrock geologyshows that in Newcastle-Under-Lyme, the southwest area and western boundary is underlain by undifferentiated Triassic rocks (mudstone, siltstone and sandstone). On the southwest tip, this is intersected by a small area of Warwickshire Group (siltstone and sandstone with subordinate mudstone) and undifferentiated Permian rocks (interbedding sandstone and conglomerate). Through the centre of the borough, there is another large area of Warwickshire Group geology. The northeast is underlain by Pennine Middle Coal Measures formation. Newcastle-Under-Lyme is underlain by various types of superficial deposits, shown in Figure 4-3. The northern boundary of Newcastle-Under-Lyme is underlain by glacial till. Through the centre of Stoke-on-Trent (west-east) there is a band of alluvium and small areas of undifferentiated river deposits. In the centre of Newcastle-under-Lyme, a small band of alluvium and undifferentiated river deposits exist. Throughout Newcastle-Under-Lyme, there are isolated areas of glacial sand and gravel.

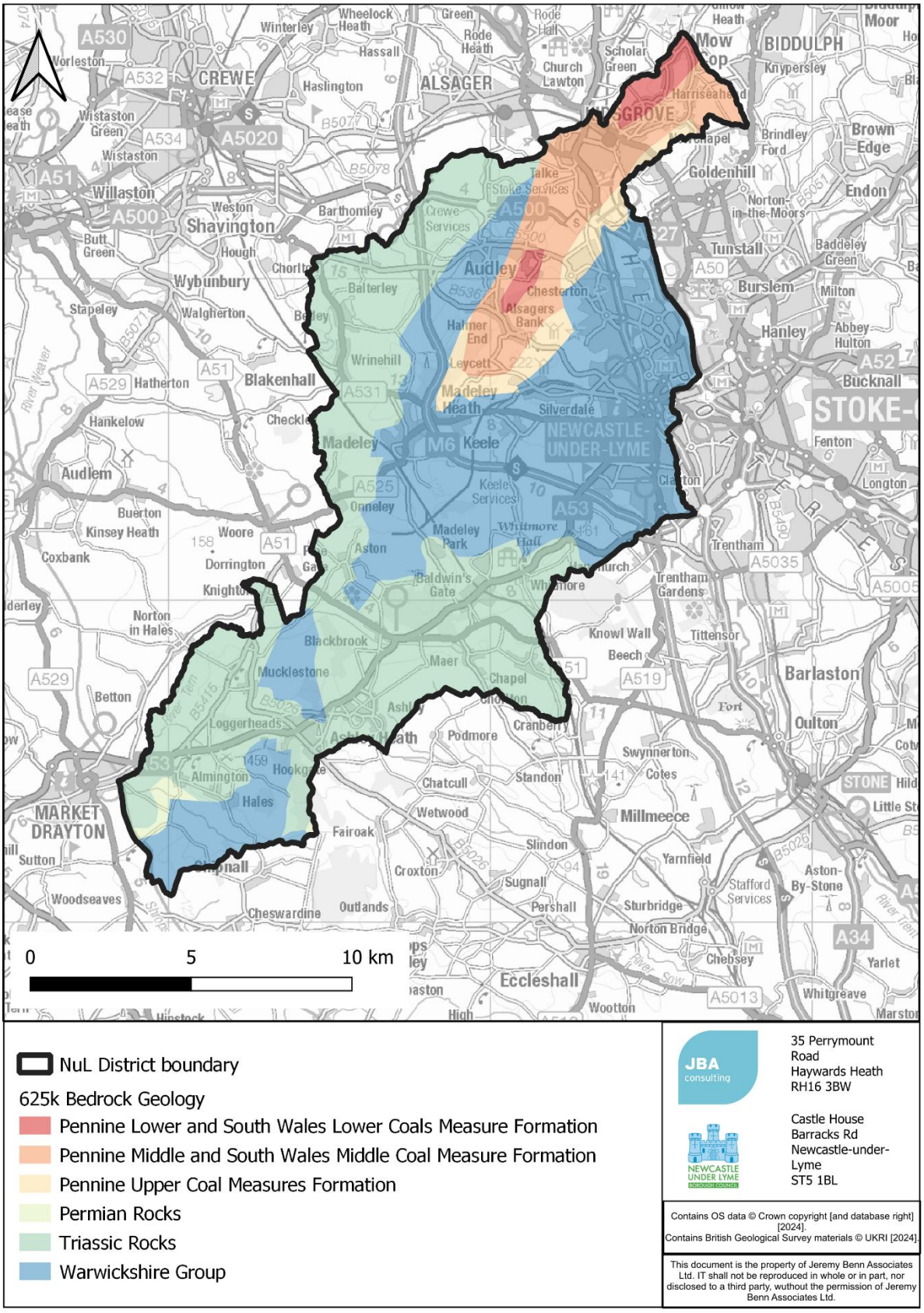


Figure 4-2 BGS 625k bedrock geology

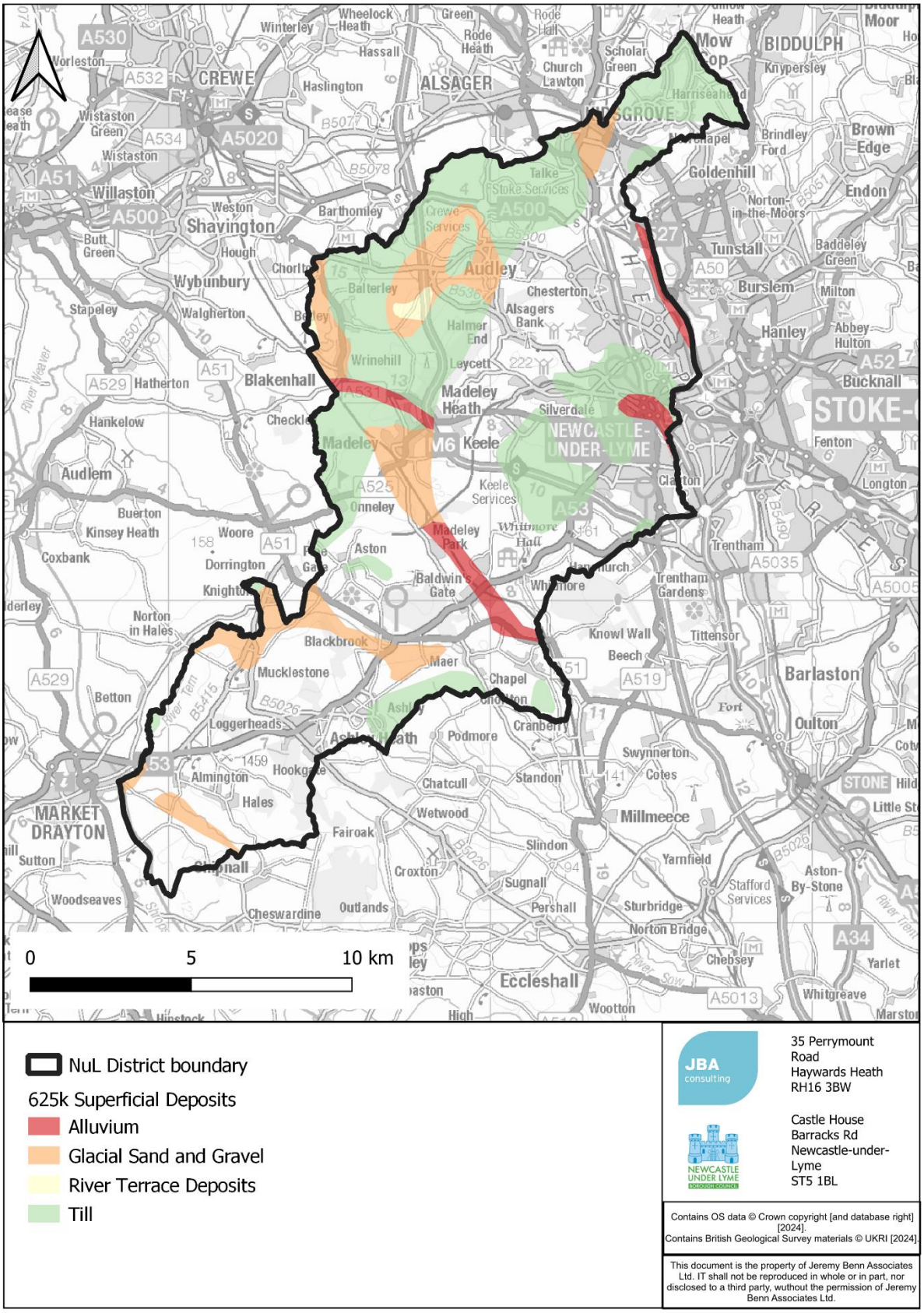


Figure 4-3 BGS 625k superficial geology

4.4 Groundwaters

Groundwater bodies within and encompassing the study area are shown in Figure 4-4 and their corresponding WFD classification is summarised in Table 4-1.

Table 4-1 WFD status of groundwater bodies

Groundwater Bodies	Quantitative Status	Chemical Status	Overall Status
Staffordshire Trent Valley - PT Sandstone Bishops Wood	Good	Good	Good
Staffordshire Trent Valley - PT Sandstone Staffordshire	Poor	Fail	Poor
Staffordshire Trent Valley - Merica Mudstone West	Good	Good	Good
Staffordshire Trent Valley - Coal Measures Stoke	Good	Fail	Poor
Shropshire Middle Severn - PT Sandstone East Shropshire	Poor	Fail	Poor
South Cheshire and North Staffordshire Permo-Triassic Sandstone Aquifers	Good	Good	Good
Manchester and East Cheshire Carboniferous Aquifers	Good	Fail	Poor
Weaver and Dane Quaternary Sand and Gravel Aquifers	Good	Fail	Poor

Poor chemical status is associated with agricultural, rural and urban land management point and diffuse sources of pollution. Quantitative status of poor means that the water bodies failed the quantitative groundwater balance test, indicating the total existing

abstraction may not be sustainable in the long term. This failure is currently associated with abstraction for agricultural and rural land management, and water industry abstraction.

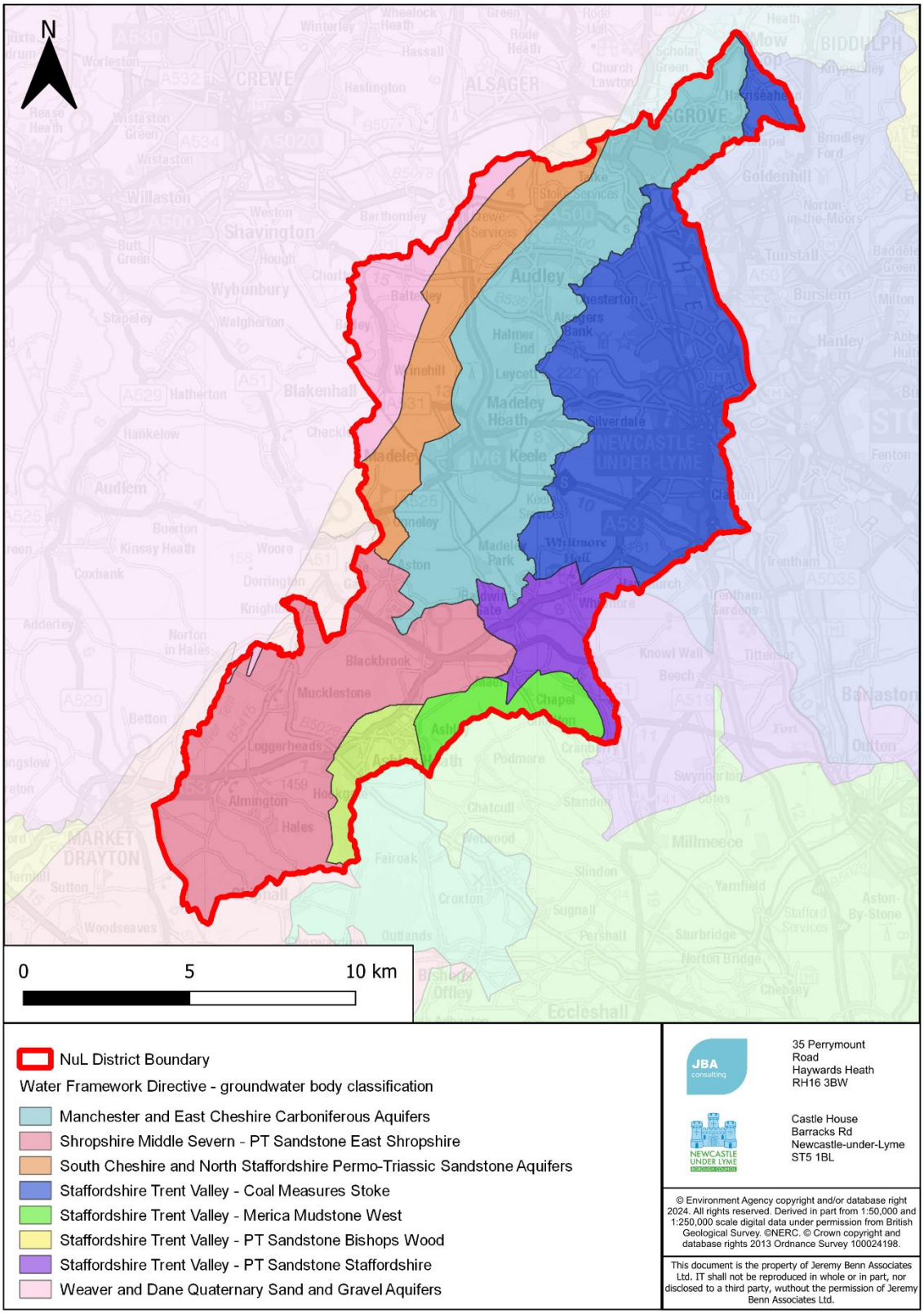


Figure 4-4 Water Framework Directive groundwater body classification in NuL Borough Boundary

4.5 Availability of Water Resources

4.5.1 Abstraction Licencing Strategy

The Environment Agency (EA), working through their Resource Assessment Methodology (which replaces the former Catchment Abstraction Management Strategy (CAMS) process), prepare an Abstraction Licensing Strategy (ALS) for each sub-catchment within a river basin. A description of documents and how they are used can be found in Section 4.1.3 of the scoping study.

Newcastle-under-Lyme is located partially within three different ALS areas: Shropshire Middle Severn, Staffordshire Trent Valley, Weaver and Dane, as shown in Figure 4-5.

4.5.2 Resource Availability Assessment

In order to abstract surface water, it is important to understand what water resources are available within a catchment and where abstraction for consumptive purposes will not pose a risk to resources or the environment. The Environment Agency has developed a classification system which shows:

- The relative balance between the environmental requirements for water and how much has been licensed for abstraction
- whether there is more water available for abstraction in the area
- areas where abstraction may need to be reduced.

The availability of water for abstraction is determined by the relationship between the fully licensed (all abstraction licences being used to full capacity) and recent actual flows (amount of water abstracted in the last six years) in relation to the Environmental Flow Indicator (EFI). Results are displayed using different water resource availability colours, further explained in Table 4-2. In some cases, water may be scarce at low flows, but available for abstraction at higher flows. Licences can be granted that protect low flows, this usually takes the form of a "Hands-off Flow" (HOF) or Hands-off Level (HOL) condition on a licence, which mean abstractions have to stop when the river flow or level falls below a particular value. This value is known as the HOF or HOL and ensures there is always a minimum flow in the river. Surface Water Flows can be assessed at Assessment Points (APs) which are significant points on the river, often where two main rivers join or at a gauging station.

Groundwater availability as a water resource is assessed similarly, unless better information on principle aquifers is available or if there are local issues that need to be taken into account.

Water resource availability is assessed under four different flow conditions:

- Q95 – very low flows which are exceeded 95% of the time
- Q70 – low flows which are exceeded 70% of the time
- Q50 – median flows which are exceeded 50% of the time
- Q30 – high flows which are exceeded 30% of the time

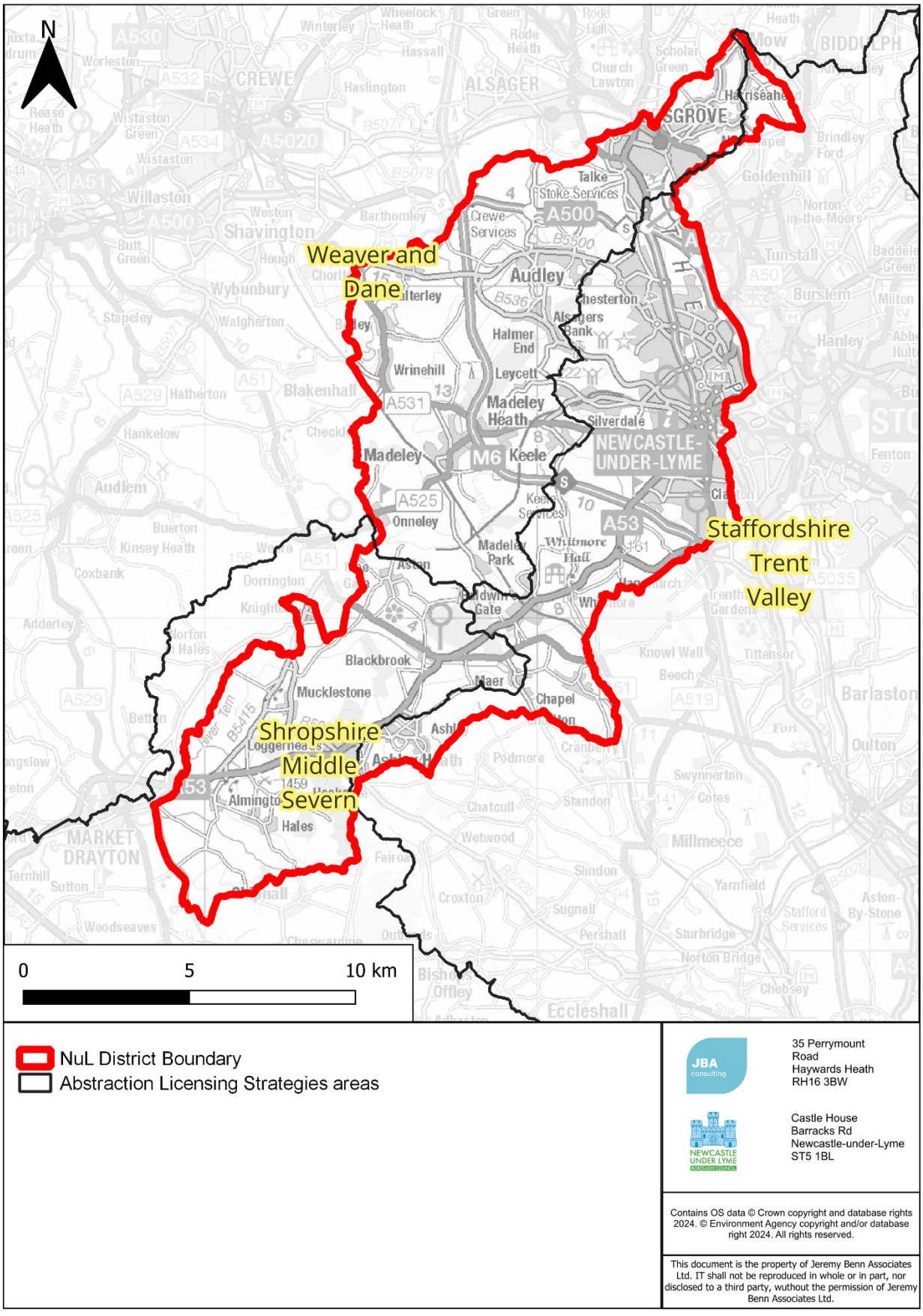


Figure 4-5 Abstraction Licensing Strategy (ALS) areas covering Newcastle-under-Lyme

Table 4-2 Implications of Surface Water Resource Availability colours

Water Resource Availability Colour	Implications for Licensing
BLUE - High hydrological regime	There is more water than required to meet the needs of the environment. Due to the need to maintain the near pristine nature of the water body, further abstraction is severely restricted.
GREEN - Water available for licensing	There is more water than required to meet the needs of the environment. Licences can be considered depending on local/downstream impacts.
YELLOW - Restricted water available for licensing	Fully Licensed flows fall below the Environmental Flow Indicator (EFI). If all licensed water is abstracted there will not be enough water left for the needs of the environment. No new consumptive licences would be granted. It may also be appropriate to investigate the possibilities for reducing fully licensed risks. Water may be available via licence trading.
RED - Water not available for licensing	Recent Actual flows are below the Environmental Flow Indicator (EFI). This scenario highlights water bodies where flows are below the indicative flow requirement to help support Good Ecological Status. No further licences will be granted. Water may be available via licence trading.
GREY - HMWBs (and /or discharge rich water bodies)	These water bodies have a modified flow that is influenced by reservoir compensation releases, or they have flows that are augmented. There may be water available for abstraction in discharge rich catchments.

The resources availability for Shropshire Middle Severn, Staffordshire Trent Valley and Weaver and Dane ALS are summarised from section 4.5.3 to 4.5.5, and for completeness, the Water Resource Availability in all the ALS catchments within the study area are presented graphically in Figure 4-6.

4.5.3 Shropshire Middle Severn Abstraction Licensing Strategy

The Shropshire Middle Severn Abstraction Licensing Strategy focuses on sustainable water management within the Shropshire Middle Severn catchment, ensuring compliance with River Basin Management Plan objectives and preventing deterioration. It applies to both new and existing water abstractions and impoundments, considering the impacts on downstream surface water bodies and adjacent groundwater levels.

In AP3, covering the River Tern from its source through Market Drayton to its confluence with the Bailey Brook, water availability is classified as "Available" at higher flows (Q30) but becomes "Restricted" as flows decrease (Q50 and Q70), and "Not Available" at the lowest flow condition assessed (Q95). This reflects a graded approach to water availability, indicating a general openness to new licensing under specific conditions but with increasing restrictions as water becomes scarcer, particularly at lower flow conditions.

4.5.4 Staffordshire Trent Valley Abstraction Licensing Strategy

The Staffordshire Trent Valley ALS focuses on managing water resources sustainably in the Humber river basin district. IT aims to meet river basin management plan objectives and prevent deterioration within the catchment. IT covers an area of approximately 1330km2, covering the River Trent and its tributaries from Biddulph Moor (north of Stoke-on-Trent) to its confluence with the Tame near Alrewas, including significant groundwater sources within the Permo-Triassic sandstone aquifers.

The strategy contains twelve assessment point relating to surface water availability. AP1 concerns the study area, covering the Upper River Trent including the Fowlea Brook, Lyme Brook and Park Brook.

Regarding water availability in AP1, it covers the upper River Trent, including Fowlea Brook, Lyme Brook, and Park Brook. Water availability is classified as "available" at higher flows (Q30 and Q50) but becomes "restricted water available" as the flow decreases (Q70 and Q95). Restrictions are added at lower flows to protect the environment. New licenses in this area may require specific conditions to protect the water body's ecological status.

4.5.5 Weaver and Dane Abstraction Licensing Strategy

The Weaver and Dane Abstraction Licensing Strategy aims to sustainably manage water resources in the River Weaver and Dane catchment area, spanning 1423 km². It prioritizes meeting River Basin Management Plan objectives and preventing environmental deterioration. The strategy applies to both surface and groundwater, considering the impact of abstractions on adjacent water bodies.

For AP 10, located at Marshfield Bridge GS (Valley Brook), water availability is classified as "Restricted Water Available for Licensing." Water can be abstracted for 329 days per annum, with an approximate volume available at restriction of 1.4 megalitres per day. This AP does have a gauging station. This indicates a limited capacity for new water abstraction licenses due to existing environmental commitments and the need to maintain water levels for ecological balance.

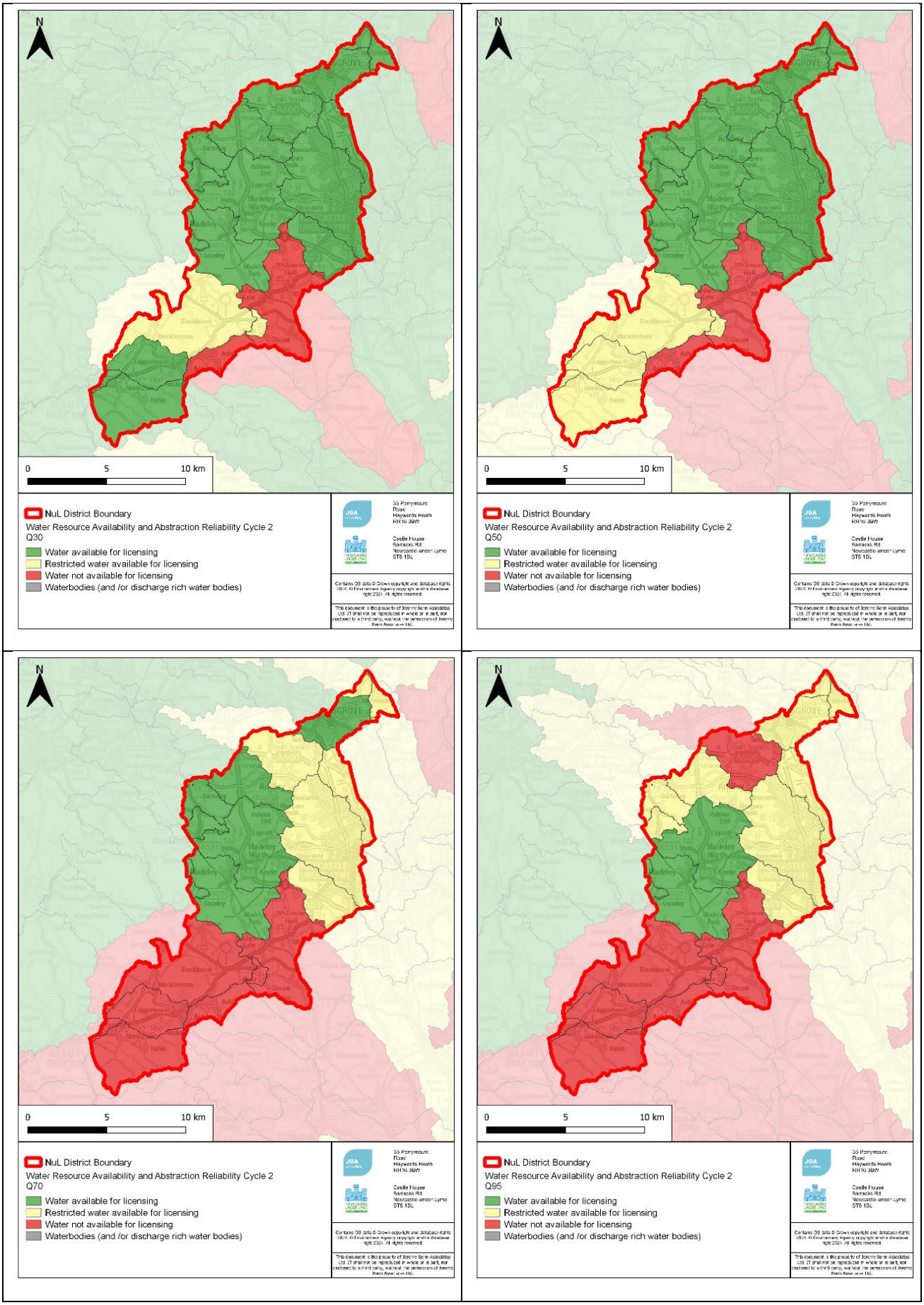

N
0
5
10 km
NuL District Boundary
Water Resource Availability and Abstraction Reliability Cycle 2
Q30
Water available for licensing
Restricted water available for licensing
Water not available for licensing
Waterbodies (and /or discharge rich water bodies)
N
0
5
10 km
NuL District Boundary
Water Resource Availability and Abstraction Reliability Cycle 2
Q50
Water available for licensing
Restricted water available for licensing
Water not available for licensing
Waterbodies (and /or discharge rich water bodies)
N
0
5
10 km
NuL District Boundary
Water Resource Availability and Abstraction Reliability Cycle 2
Q70
Water available for licensing
Restricted water available for licensing
Water not available for licensing
Waterbodies (and /or discharge rich water bodies)
N
0
5
10 km
NuL District Boundary
Water Resource Availability and Abstraction Reliability Cycle 2
Q95
Water available for licensing
Restricted water available for licensing
Water not available for licensing
Waterbodies (and /or discharge rich water bodies)

Figure 4-6 Water resource availability classification for catchments in NuL

4.6 Water Company Update

4.6.1 Water Resource Management Plan

NuL is split across two Water Resource Zones (WRZ). Primarily, NuL is covered by North Staffs, Severn Trent Water. The north of NuL is covered by United Utilities' Strategic WRZ, see Figure 4-7.

The most recent final WRMP for STW was published in August 2019. STW are currently in the process of finalising an updated 2024 WRMP, expected to be published in 2024. The draft 2024 WRMP has been examined below.

United Utilities published their Final 2019 WRMP in August 2019, they haven't published a draft 2024 plan. A very small area in the north of Newcastle-under-Lyme administrative boundary is covered by the United Utilities strategic grid WRZ. Given the absence of new development in this WRZ, the UU plan has not been evaluated as part of this water resources section.

4.6.2 Severn Trent Water

Severn Trent Water is responsible for supplying Newcastle-under-Lyme with water. For the purposes of water resources planning, the STW supply area is divided into 15 Water Resources Zones (WRZs) which vary greatly in scale and have unique water resource concerns. Newcastle-under-Lyme is covered principally by the North Staffordshire WRZ.

In Phase 1 STW commented that they had adequate water resources for all proposed development sites. As the overall growth forecast for the area has not changed, this conclusion is still generally valid. Across all STW WRZs, the Draft WRMP highlights a likely future supply/demand deficit of 244Ml/d by 2040-41, growing to 540Ml/d by 2050-52 if no action is taken. The challenges identified in the draft WRMP are:

- Climate change
- Growing population
- Leakages
- Value for customers

In STW's draft WRMP, published in 2022, there is a focus on leakage, population and climate change. STW set out key options for the region, including home efficiency audits, universal metering rollout and water transfers between WRZs. These proposed options aim to help STW meet their target of reducing leakage 50% by 2045 and a reduction of consumption to 110 l/p/d by 2050.

North Staffordshire WRZ, which covers the majority of the study area, is predicted to be in a deficit by 2030, spanning to the end of the projections in 2085. Treatment works expansions are planned from AMP8 onwards.

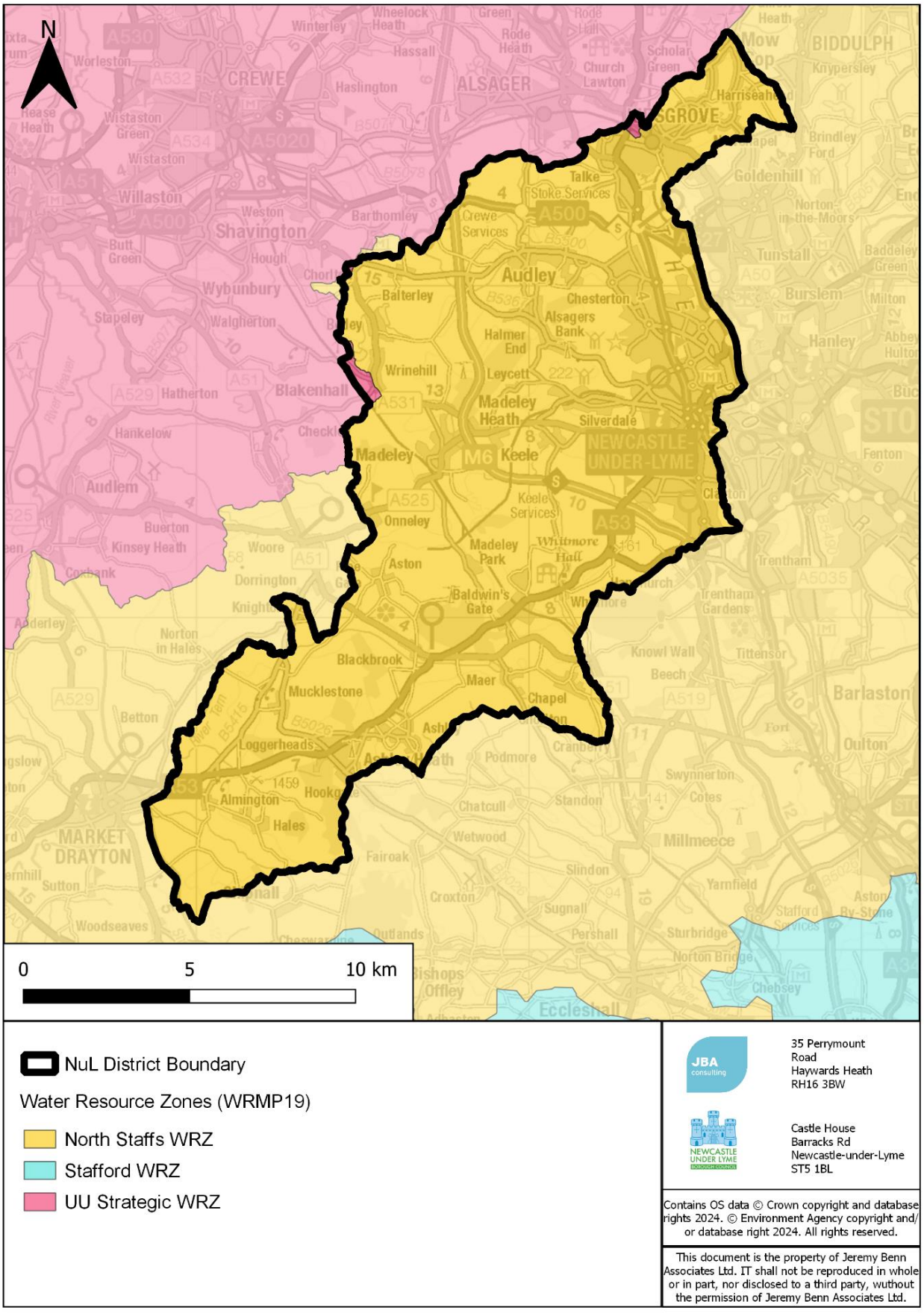


Figure 4-7 Water Resource Zones in and surrounding NuL, taken from the WRMP19

4.7 Water efficiency and water neutrality

4.7.1 Introduction

It is widely recognised that the climate is changing and in response, Newcastle-under-Lyme declared a climate emergency in 2019. Climate change is predicted to increase pressure on water resources, increasing the potential for a supply-demand deficit in the future, and making environmental damage from over abstraction of water resources more likely. Furthermore, the delivery of water and wastewater services and the heating of water in the home require high energy inputs, and therefore contribute directly to emissions of greenhouse gases. Water efficiency therefore reduces energy use and carbon emissions. It is important therefore that new development does not result in an unsustainable increase in water abstraction. This can be done in a number of ways from reducing the water demand from new houses through to achieving "water neutrality" in a region by offsetting a new developments water demand by improving efficiency in existing buildings.

Severn Trent Water STW launched a 4-month trial scheme called the Severn Trent NHH Water Efficiency Incentive in May 2021. The scheme provided incentive payment to Non-household (NHH) customers through the retailer for reduction in volume of water consumed. The scheme helped STW identify the best approach in realising better water efficiency in the area[12]. The results of this trial have not yet been published.

4.7.2 Required evidence

It is for Local Authorities to establish a clear need to adopt the tighter water efficiency target through the building regulations. This should be based on:

- Existing sources of evidence such as:
  - The Environment Agency classification of water stress
  - Water resource management plans produced by water companies
  - River Basin Management Plans which describe the river basin district and the pressure that the water environment faces. These include information on where water resources are contributing to a water body being classified as 'at risk' or 'probably at risk' of failing to achieve good ecological status, due to low flows or reduced water availability.
- Consultations with the local water and sewerage company, the Environment Agency and catchment partnerships;
- Consideration of the impact on viability and housing supply of such a requirement.

12 Severn Trent NHH Water Efficiency Incentive Scheme Trial Terms and Conditions 2021. Accessed online at: https://www.stwater.co.uk/content/dam/stw_businesses/retailers/water-efficiency-incentive-scheme-trial-terms-and-conditions.pdf on: 14/06/2021

4.7.3 Water Stress

Water stress is a measure of the level of demand for water (from domestic, business and agricultural users) compared to the available freshwater resources, whether surface or groundwater. Water stress causes deterioration of the water environment in both the quality and quantity of water, and consequently restricts the ability of a waterbody to achieve a “Good” status under the WFD.

The Environment Agency has undertaken an assessment of water stress across the UK. This defines a water stressed area as where:

- “The current household demand for water is a high proportion of the current effective rainfall which is available to meet that demand; or
- The future household demand for water is likely to be a high proportion of the effective rainfall available to meet that demand.”

In the Phase 1 study it was reported that STW’s North Staffordshire WRZ (which covers the majority of Newcastle-under-Lyme) was classified as an area of “moderate” water stress in the 2013 Environment Agency and Natural Resources Wales water stress assessment. The EA has subsequently updated its assessment and now defines the Severn Trent Water supply area as under “serious” water stress.

4.7.4 River Basin Management Plans

River Basin Management Plans (RBMP) are required under the WFD and document the bassline classification of each waterbody in the plan catchment, the objectives and a programme of measures to achieve those objectives. Newcastle-under-Lyme falls within three RBDs: the Humber, North West and Severn. The third cycle RBMPs were published in 2022.

The WFD's leading objective is for all rivers to achieve 'No Deterioration' in their environmental status, with a primary aim of ensuring all waterbodies meet class limits for their status class as outlined in the relevant RBMPs. Another key WFD objective is to ensure all waterbodies achieve good ecological status. Future development must be planned with caution, to ensure that it supports the work towards achieving the WFD and does not constitute to further pressure on the water environment. The WFD objectives as outlined in the updated RBMPs are highlighted below:

- Prevent deterioration in the status of surface waters and groundwater
- Achieve ‘Protected Area’ objectives and standards
- Aim to achieve good status for all water bodies
- Aim to achieve good ecological potential and good surface water chemical status for artificial and heavily modified water bodies
- Additional measures for protected areas

.

4.8 Conclusions

The water resource assessment for Newcastle-under-Lyme aims to ensure adequate water supply is available for future growth, whilst ensuring the environment is not negatively impacted. A supply-demand deficit of 244 Ml/d is projected by 2040-41, growing to 540 Ml/d by 2050-51 if no action is taken. Groundwater bodies, such as the Staffordshire Trent Valley - PT Sandstone Staffordshire, have poor chemical and quantitative status, with some failing tests due to unsustainable abstraction.

The Environment Agency's updated Abstraction Licensing Strategy (ALS) classifies water availability, with restrictions in place in many low flows (Q70 and Q95) to protect ecological health.

The North Staffordshire WRZ is predicted to be in deficit by 2030, spanning to the end of the projections in 2085. Treatment work expansions are planned from AMP8 onwards to address this deficit.

Recommendations for mitigating future water stress are outlined in Table 4-3. Including adopting tighter water efficiency targets, improving water management practices across all sectors, and reducing consumption.

4.9 Recommendations

Table 4-3 Recommendations for water resources

Action	Responsibility	Timescale
Continue to regularly review forecast and actual household growth across the supply region through WRMP Annual Update reports, and where significant change is predicted, engage with Local Planning Authorities.	Severn Trent Water	Ongoing
Provide yearly updates of projected housing growth to water companies to inform WRMP updates.	Newcastle-under-Lyme Borough Council	Ongoing
Use planning policy to require a water efficiency standard of 100l/p/d to be achieved using the fittings-based approach. The policy should allow for a future	Newcastle-under-Lyme Borough Council	In Local Plan

Action	Responsibility	Timescale
reduction in the water efficiency target.		
Use planning policy to require non-household development to achieve three credits in the assessment category WAT01 of the BREEAM UK New Construction Standard.	Newcastle-under-Lyme Borough Council	In Local Plan
Larger residential developments and commercial developments should consider incorporating greywater recycling and/or rainwater harvesting into development at the master planning stage in order to reduce water demand.	Newcastle-under-Lyme Borough Council	Ongoing
Water companies should advise NuL of any strategic water resource infrastructure developments within their area, where these may require safeguarding of land to prevent other type of development occurring. In addition, consideration of timescales for delivery and the provision of water should be accounted for.	Newcastle-under-Lyme Borough Council, STW and UU	In Local Plan

5 Water Supply Infrastructure

5.1.1 Introduction

An increase in water demand due to growth can exceed the hydraulic capacity of the existing supply infrastructure. This is likely to manifest itself as low pressure at time of high demand. An assessment is required to identify whether the existing infrastructure is adequate or whether updates will be required. A site-by-site assessment of the potential allocations was not undertaken by Severn Trent Water during the Phase 1 joint Water Cycle Study with Stoke-on-Trent. However, Severn Trent Water stated that they “do not envisage a problem” for any potential development sites that are within their water resource zone. As a consequence, all sites were given a “Green” red/amber/green (RAG) score.

No further assessment of water supply infrastructure was undertaken in Phase 2. STW and UU are commenting on Newcastle-under-Lymes sites directly, instead of through this WCS.

6 Wastewater Collection

6.1 Introduction

Severn Trent Water and United Utilities are the Sewerage Undertakers (SU) for Newcastle-under-Lyme. The role of the sewerage undertaker includes the collection and treatment of wastewater from domestic and commercial premises, and in some areas, it also includes the drainage of surface water from building curtilages to combined or surface water sewers. It excludes, unless adopted by the SU, systems that do not connect directly to the wastewater network, e.g., Sustainable Drainage Systems (SuDS) or highway drainage.

Increased wastewater flows into collection systems due to growth in populations or per capita consumption can lead to an overloading of the infrastructure, increasing the risk of sewer flooding and, where present, increasing the frequency of discharges from Combined Sewer Overflows (CSOs).

Likewise, headroom at Wastewater Treatment Works (WwTW) can be eroded by growth in population or per capita consumption, requiring investment in additional treatment capacity. As the volumes of treated effluent rises even if the effluent quality is maintained, the pollutant load discharged to the receiving watercourse will increase. In such circumstances, the Environment Agency as the environmental regulator, may tighten the permit limits of effluent consents to achieve a 'load standstill', i.e., ensuring that as effluent volume increases, the pollutant discharged does not increase. Again, this would require investment by the water company to improve the quality of the treated effluent.

STW are supportive of the use of SuDS and SuDS principles to manage surface water run-off. They recommend that the Drainage Hierarchy is used to direct surface water to natural outfall routes such as infiltration to the ground or into watercourses, before utilising sewers, as supported by paragraph 80 of the NPPF. Surface water should also not be permitted to connect to a foul sewer.

In combined sewerage systems, or foul systems with surface water misconnections, there is potential to create headroom in the system, thus enabling additional growth, by the removal of surface water connections. This can most readily be achieved during the redevelopment of brownfield sites which have combined sewerage systems, where there is potential to discharge surface waters via sustainable drainage systems (SuDS) to groundwater, watercourses or surface water sewers. Surface water run-off and excess discharge through drainage systems and culverts has been reported across Newcastle-under-Lyme and Kidsgrove, outlined in the 2019 Level 1 SFRA for NuL. Strategic schemes to provide improved local surface water drainage may be required in such areas, rather than solely relying upon on-site soakaways on brownfield or infill plots.

Another issue when considering sewer capacity is the volume of groundwater infiltration. This is where groundwater enters the public and private sewerage systems through cracks, holes, or faulty joints. In catchments where there is significant groundwater infiltration, capacity in the sewer is used up in the same way as the presence of a surface water

misconnection. Under storm conditions this increases the likelihood of sewer flooding or sewage overflows into watercourses.

A site-by-site assessment of the potential allocations was undertaken by Severn Trent and United Utilities and presented in Phase 1. This same approach has been completed directly between the council and water companies, therefore we cannot present the findings here.

6.2 Evaluation of STW Drainage and Wastewater Management plan

Severn Trent Water's DWMP sets out eight key priorities:

- Guarantee future water supplies.
- Ensure water is used wisely.
- Deliver a high quality, affordable service.
- Lower the risk of flooding and pollution.
- Protect and enhance our environment.
- Support a more circular economy.
- Make a positive social difference.
- Maintain a safe, inclusive, and fair workplace.

By 2030, Severn Trent Water aim to align to the Storm Overflows Discharge Reduction Plan, by addressing 39% of high priority storm overflows causing harm, and 26% of all storm overflows activating more than 10 time as year. Upgrades to the sewer network are planned to reduce storm overflow operation outside of intense rainfall events.

An assessment has been carried out using a Baseline Risk and Vulnerability Assessment (BRAVA) for a 1-in-50 year, (or 2% annual exceedance probability) storm. This assessment included varying climate change scenarios (0°, 2° and 4° temperature increase). Regarding storm overflow performance, it is expected that the average annual flood volumes will increase by 43%, with total spill counts increasing 14%. These figures reflect the anticipated impact of climate change on storm overflow events.

Within the Strongford WwTW catchment, storm overflow risk assessment result is a medium term priority for AMP7 & 8. In Ashley, storm overflow risk assessment result is a short term priority for all AMP periods between 2020 and 2040.

Table 6-1 outlines when STW have indicated the screening category is a concern for each WwTW. STW have outlined full compliance with new storm Overflow Discharge Reduction Plan targets in their 5 year action plan, this is set to be achieved by implemented blue/green and grey engineering solutions. Loggerheads Sanatorium is not included within the individual site Risk Based Catchment Screening (RBCS) results, therefore it's not included below.

Table 6-1 Results of WwTW risk based catchment screening

Assessment category	Strongford	Ashley	Baldwin's Gate	Loggerheads Village
Storm Overflow Assessment Framework (SOAF)	Yes			
Capacity Assessment Framework (CAF)	Yes	Yes		
Internal Sewer Flooding	Yes			
External Sewer Flooding	Yes			
Pollution Incidents (Category 1,2,3)	Yes			
Storm Overflows	Yes			
Risk from interdependencies between RMA systems	Yes			
Planned residential new development	Yes			Yes
WINEP	Yes			Yes
Sewer collapses				Yes
Sewer blockages	Yes	Yes	Yes	Yes
Catchment characterisation		Yes		

6.3 Evaluation of UU Drainage and Wastewater Management plan

The UU WwTW serving Newcastle-under-Lyme are Audley, Betley, Kidsgrove and Madeley. Table 6-2 outlines the results of the BRAVA assessment of flooding and environmental issues for these works.

The UU DWMP outlines regional measures, including options for the Weaver Gowy region that NuL falls within. Regional customer engagement has been shown to have a low benefit across the concerned WwTWs. Sustainable drainage solutions (SuDS) are shown to high benefit across the Audley and Kidsgrove WwTWs in particular. The BRAVA identifies a series of environmental focus areas for improvement within the catchment. In UU's 10 to 25 year action plan, they are committed to having no overflows spilling more than 10 times per average year. These solution options are outlined in full in Table 6-3.

Table 6-2 Environmental and flooding BRAVA results for UU WwTW sewer networks in Newcastle-under-Lyme

Assessment category	Audley	Madeley	Betley	Kidsgrove
Pollution assessment	No concern	Area of focus	Area of focus	No concern
Storm overflow performance at 2020	No concern	Potential area of focus	Area of focus	No concern
Storm overflow performance at 2050	No concern	No concern	Area of focus	No concern
Internal flooding risk at 2020	Potential area of focus	No concern	No concern	Potential area of focus
Internal flooding risk at 2030	Potential area of focus	No concern	No concern	Area of focus
Internal flooding risk at 2050	Potential area of focus	No concern	No concern	Area of focus
External flooding risk at 2020	No concern	No concern	No concern	No concern
External flooding risk at 2030	No concern	No concern	No concern	No concern
External flooding risk at 2050	No concern	No concern	No concern	No concern
Sewer collapse risk	No concern	No concern	No concern	No concern
Risk of flooding in a storm (1:50 yr) at 2020	Area of focus	No concern	No concern	Area of focus
Risk of flooding in a storm (1:50 yr) at 2050	Area of focus	No concern	No concern	Area of focus
Flooding of open spaces at 2020	No concern	No concern	No concern	No concern
Flooding of open spaces at 2030	No concern	No concern	No concern	No concern
Flooding of open spaces at 2050	No concern	No concern	No concern	No concern
Blockage assessment at 2020	No concern	No concern	No concern	No concern

Investment Plans

Table 6-3 Results of the BRAVA assessment indicating the timeframe of prioritisation for each environmental focus area

Measures	Audley	Kidsgrove	Madeley	Betley (assessed as Weaver Upper catchment, due to a population <2000)
Schools Education Programme		Ongoing		Ongoing
Customer Engagement				Short, Medium, Long
Surface Water Source Control Measures		Medium and Long	Long	Medium
Modification to Permits				
Intelligent Network Operation	Short, Medium, Long			Short Medium Long
WwTW Improvement	Short and Long	Short and Long	Short and Long	Short Medium Long
Construction of New Drainage Capacity		Medium and Long	Short, Medium and Long (primarily long)	Medium

United Utilities have an ongoing project called 'Better Rivers: Better North West'. This project outlines four pledges which include:

- Ensuring their operations progressively reduce impact to river health
- Being open and transparent about their performance and their plans
- Making rivers beautiful and supporting others to improve and care for them
- Creating more opportunities for everyone to enjoy river and waterways

7 Storm Overflow assessment

7.1 Storm Overflows

Storm overflows are an essential component in the sewer network – however when they operate frequently, they can cause environmental damage. They occur on combined sewer systems where the sewer takes both foul flow (sewage from homes and offices) and rainwater runoff. In normal conditions all of this flow passed through the sewer network and is treated at a wastewater treatment works.

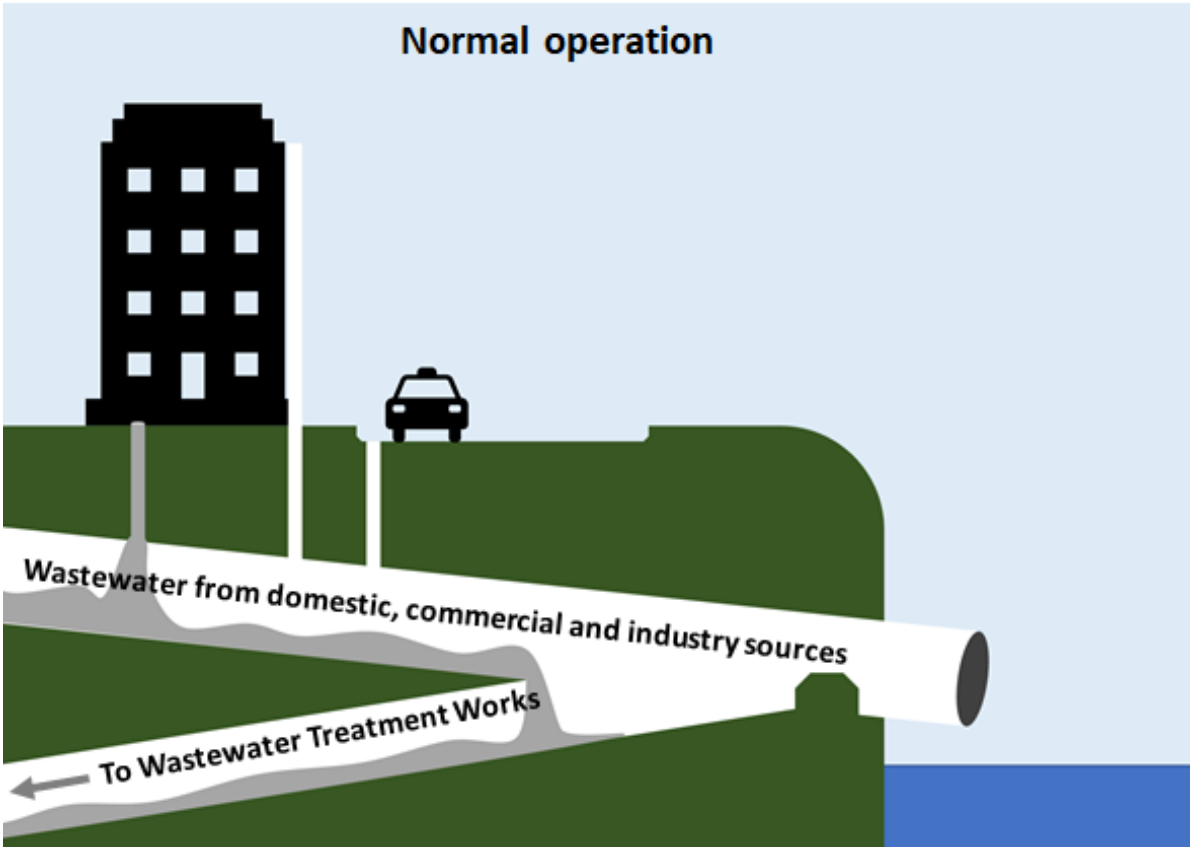


Figure 7-1 Storm overflow operation in normal conditions

In periods of exceptional rainfall, the capacity in a combined sewer may be used up by the additional flow from rooftops and storm drains. Once the capacity is exceeded, wastewater would back up into homes, businesses and on to roads. A storm overflow acts as a relief valve, preventing this from happening.

Storm overflows become problematic when they operate frequently in moderate or light rainfall, or for long periods as a result of groundwater infiltration in the sewerage system – possibly in breach of their permit. Their impacts can include aesthetic pollution, acute or chronic impacts on water quality and river ecology and impacts on humans where surface waters are used for swimming and water recreation.

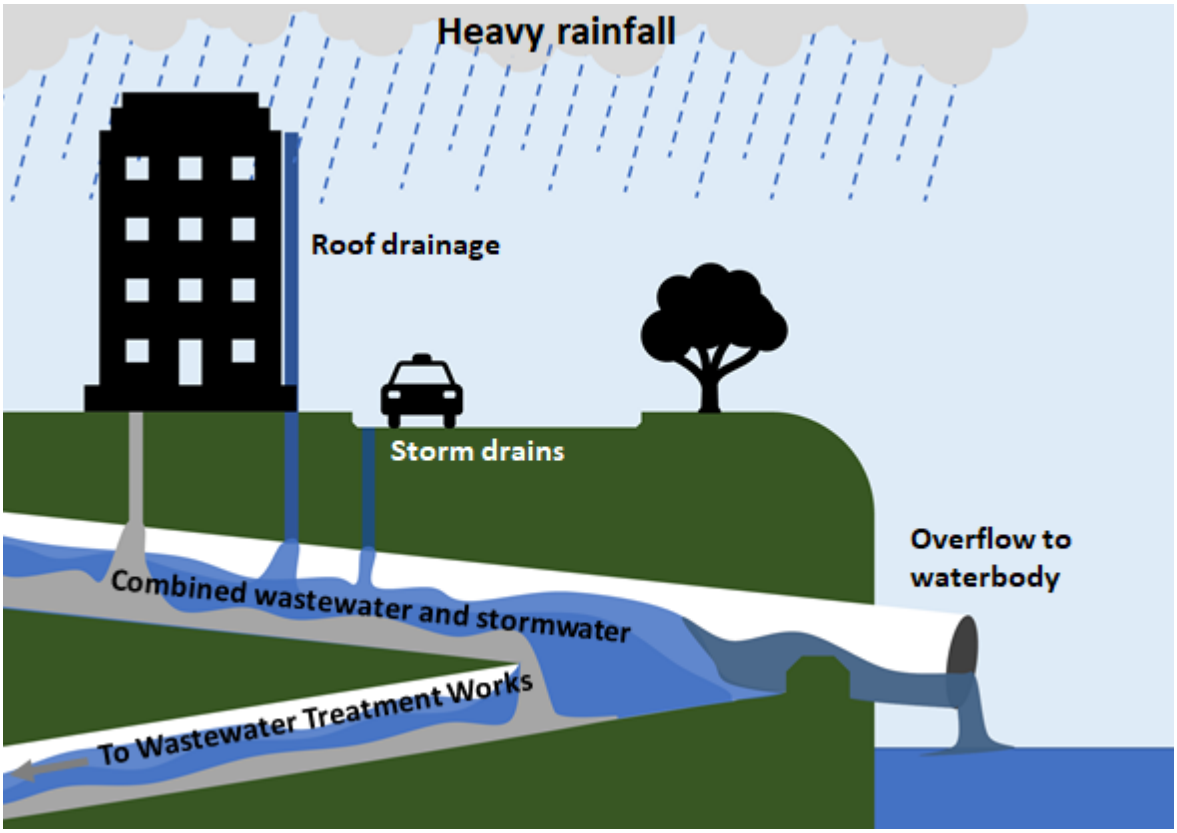


Figure 7-2 Storm overflow operation in exceptional rainfall

7.2 Methodology

7.2.1 Sewerage System Capacity Assessment

New residential developments add pressure to the existing sewerage systems. An assessment is required to identify the available capacity within the existing systems, and the potential to upgrade overloaded systems to accommodate future growth. The scale and cost of upgrading works may vary significantly depending upon the location of the development in relation to the network itself and the receiving WwTW.

It may be the case that an existing sewerage system is already working at its full capacity and further investigations have to be carried out to define which solution is necessary to implement an increase in its capacity. New infrastructure may be required if, for example, a site is not served by an existing system. Such new infrastructure will normally be secured through private third-party agreements between the developer and utility provider.

Sewerage Undertakers must consider the growth in demand for wastewater services when preparing their five-yearly Strategic Business Plans (SBPs) which set out investment for the next Asset Management Plan (AMP) period. Typically, investment is committed to provide new or upgraded sewerage capacity to support allocated growth with a high certainty of being delivered. Additional sewerage capacity to service windfall sites, smaller infill development or to connect a site to the sewerage network across third party land is

normally funded via developer contributions, as third-party arrangements between the developer and utility provider.

7.2.2 Storm overflow assessment

The Environment Act now requires water companies to report and monitor storm overflows as well as reduce the harm caused to the rivers they discharge to.

The Storm Overflow Taskforce has agreed a long-term goal to end the damaging pollution caused by the operation of storm overflows. An important component of this is the monitoring of overflows, and a target has been set to monitor the frequency and duration of operation at all storm overflows by 2023. This is called Event Duration Monitoring (EDM). The EDM dataset (which contains performance data on the circa 17K storm overflows monitored between 2021 and 2023) has been used to provide information on storm overflows in NuL. The EA have set thresholds above which a storm overflow should be investigated. Where there is one year of EDM data this should be if there are over 60 operations per year, over 50 operations for two years of data and over 40 operations for three years of data. We have included a maximum of 3 years of data in our assessment, where less years were available, we have applied the above corresponding threshold.

Table 7-1 Definition of RAG scoring applied

Sewer Overflows RAG Score	Number of operations per year (average of available data)	Commentary
Green	0-10	Overflow is currently operating within the long-term (2050) target. Need to ensure that this is maintained in the long-term considering upstream development, climate change and urban creep.
Amber	11 - threshold for individual CSO	An investigation is not required at present, but improvements will need to be made in the network and/or catchment to meet the long-term target.
Red	Above threshold	The overflow may already be operating beyond the threshold which would trigger an investigation. Upstream development could further increase the discharge frequency, so mitigation should be required prior to significant development.

An overview of the EDM network storm overflow data from 2021-2023 for NuL, including overflows in neighbouring authorities where sewer infrastructure is shared, can be found in Figure 7-3 below.

7.3 Results

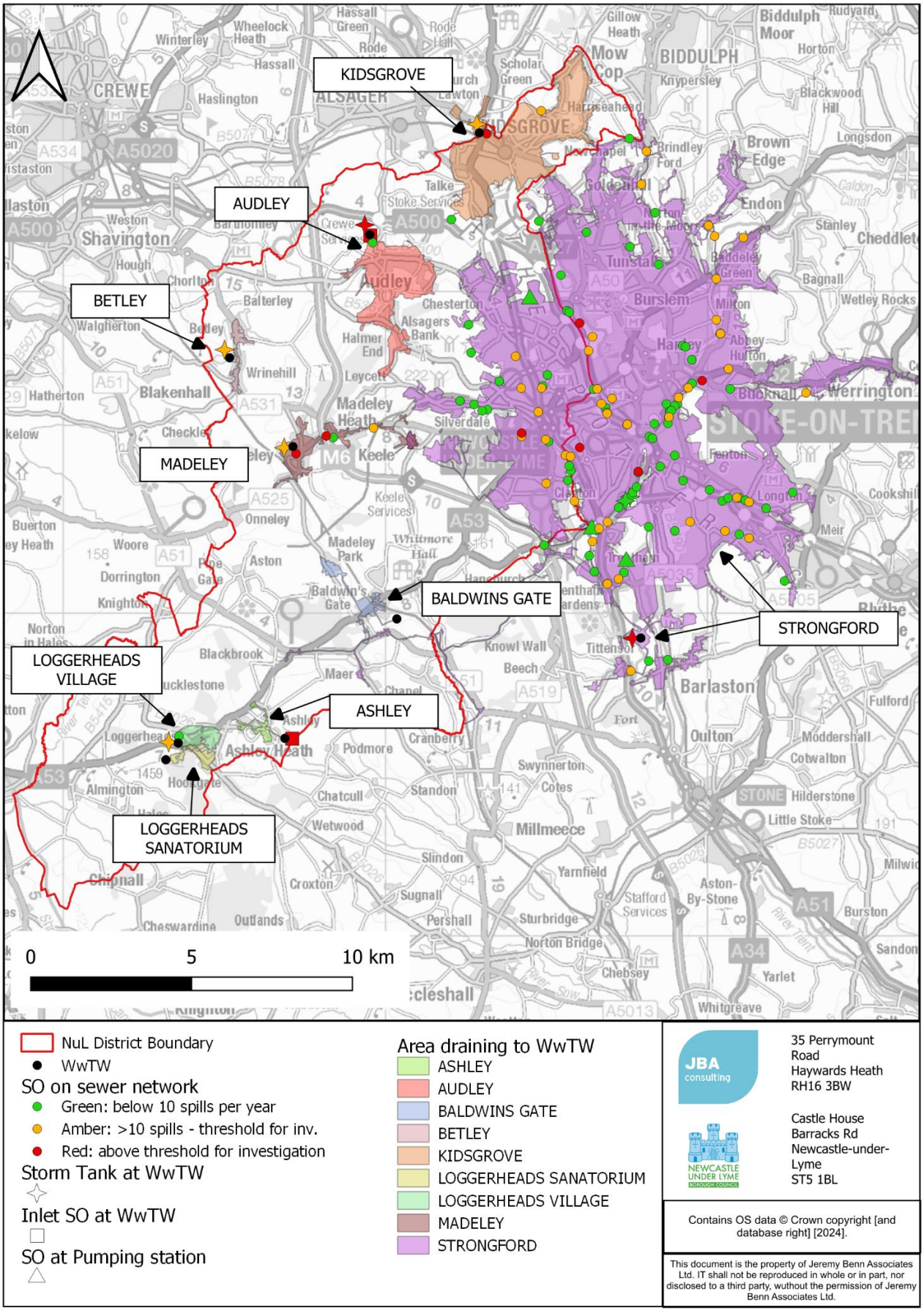


Figure 7-3 Storm overflow assessment results

There are 151 storm overflows in our assessment, made up of those on the sewer network, at pumping stations, at inlets to WwTW and storm tank overflows at WwTW. 13 of these are above the threshold for investigation, seven of which are associated with Strongford WwTW. The remaining are part of Audley, Madeley, Ashley and Kidsgrove WwTW sewer networks. A further 49 overflows are classed as amber, less than the threshold but with higher numbers of spills than the long term goal of <10 per year by 2050.

There are opportunities through the planning system to ease pressure on the wastewater network by separating foul and storm flow in existing combined systems, and not allowing new surface water connections. Surface water can also be better managed by retrofitting SuDS in existing residential areas, and in new development, ensuring SuDS are incorporated into designs at the master planning stage to maximise the potential benefits

7.4 Conclusions

Potential allocation site MD29 is likely to be served by Madeley WwTW which has two overflows over the threshold for investigation already. There is potential the allocation could increase spills further, as a result of higher wastewater flow. The sites AB33, AB15 and AB12 are located within the Audley WwTW sewer catchment. The storm tank and inlet storm overflow are both over the threshold for investigation. There is a risk that unmitigated new development could increase spills in future. There are a number of potential allocation sites within Kidsgrove sewer network. Where there is one overflow above the threshold and the storm tank is classed as amber. 33 potential allocations are likely to be served by Strongford WwTW, which shows a number of red and amber overflows across its network, including the storm tank overflow. The spatial location and temporal phasing of these allocations should be carefully considered to avoid an increase in overflow spills resulting from higher wastewater flows.

7.5 Recommendations

Table 7-2 Wastewater collection recommendations

Action	Responsibility	Timescale
Prioritise understanding risk of increased spills within sewer networks where overflows are already above the threshold for investigation.	Newcastle-under-Lyme Borough Council UU & STW	Local Plan
Consider the available sewer capacity when phasing development going to the same WwTW.	Newcastle-under-Lyme Borough Council UU & STW	Ongoing

Action	Responsibility	Timescale
Provide Annual Monitoring Reports to UU and STW detailing projected housing growth.	Newcastle-under-Lyme Borough Council	Ongoing
UU and STW to assess growth demands as part of their wastewater asset planning activities and feedback to the Council if concerns arise.	UU & STW	Ongoing
Work collaboratively to: - realise opportunities for development to reduce sewer overflows (for example by prioritising redevelopment of brownfield sites connected to combined sewers), and - leverage water company investment in SuDS and nature-based solutions to provide multiple benefits in the Borough.	Newcastle-under-Lyme Borough Council, UU & STW	Ongoing

8 Wastewater Treatment

8.1 Wastewater Treatment Works in Newcastle-under-Lyme

Headroom at Wastewater Treatment Works (WwTW) can be eroded by growth in population or per-capita consumption, requiring investment in additional treatment capacity. As the volumes of treated effluent rises, even if the effluent quality is maintained, the pollutant load discharged to the receiving watercourse will increase. In such circumstances the Environment Agency as the environmental regulator, may tighten consented effluent consents to achieve a “load standstill”, i.e., ensuring that as effluent volume increases, the pollutant discharged does not increase. Again, this would require investment by the water company to improve the quality of the treated effluent.

Severn Trent Water and United Utilities are the operators of the WwTWs serving growth across NuL. STW operate five works to the south and east, and UU operate four works to the north and west of NuL. The locations of these WwTWs are shown in Figure 8-1 below.

Each development site identified by the Council, alongside windfall and neighbouring authority growth was assigned to a WwTW using the sewerage drainage area boundaries provided by both companies. Where a development site was not within a boundary, the nearest sewer catchment was chosen.

Actual connection of a development site to a particular WwTW may be different and will depend on the nature of access routes for new pipelines, the capacity of the receiving works, and the local sewer network.

Very small developments in rural areas may be suitable for on-site treatment and discharge, however the Environment Agency will not usually permit this where there is a public sewerage system within a distance calculated as 30m per dwelling.

This Phase 2 assessment assumed that every site identified in each catchment would be developed.

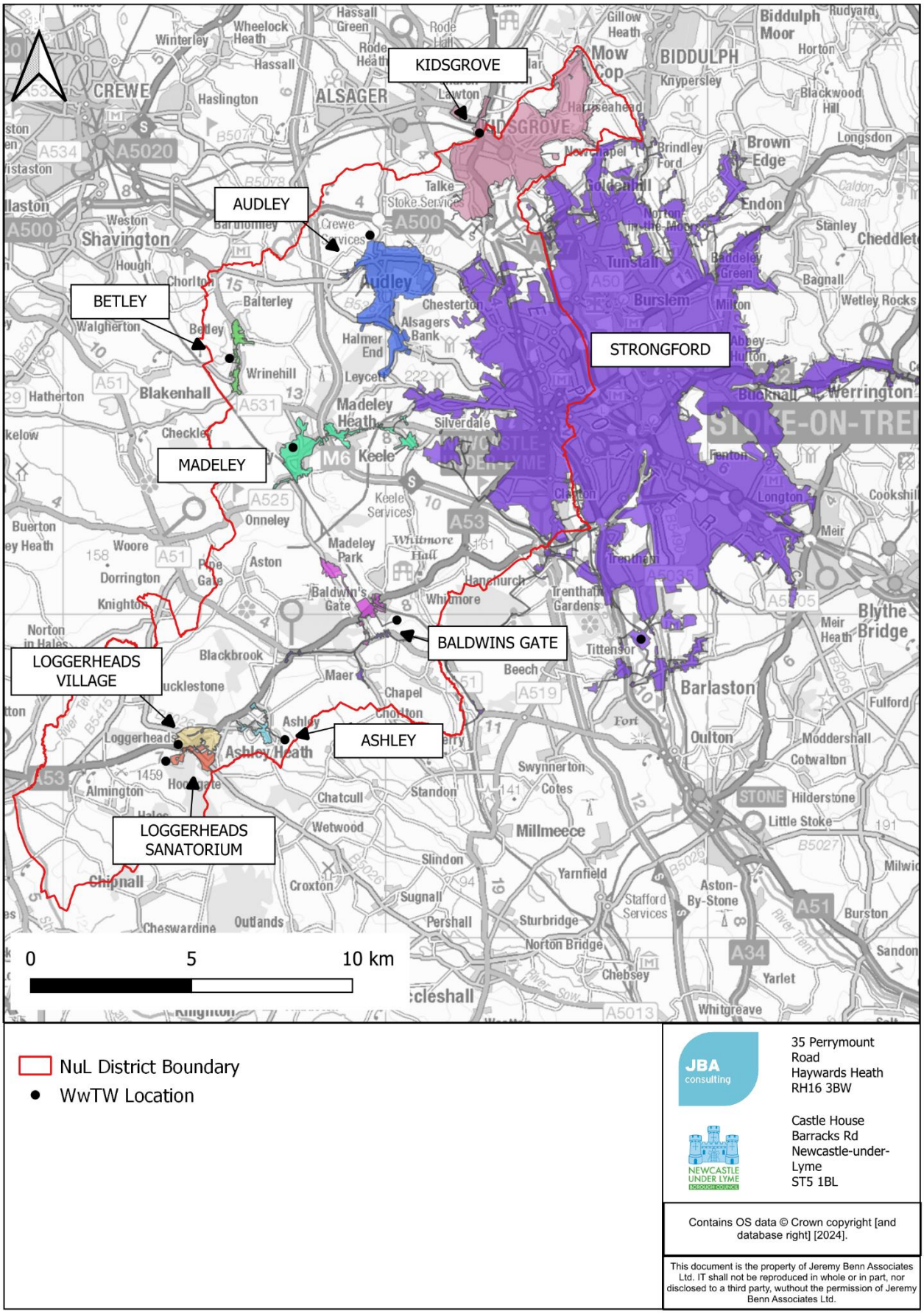


Figure 8-1 Location of WwTW and sewer network covering Newcastle-under-Lyme

8.2 Evaluation of STW Drainage and Wastewater management plan

Severn Trent Water have banded the risk level on each WwTW (Band 0/1/2). Band 0 is lowest risk and Band 2 is highest risk. Assuming no action is taken, by 2050 is it expected that 15% of STW WwTWs will be in Band 2. The total cost of maintaining the current level of flood risk within each WwTW across the STW catchment would require approximately £187.7m of investment, under a 2°C climate change scenario.

The 'risk of wastewater treatment works quality compliance failure' has been outlined as an action for Strongford (Long term), Ashley (Long term), Baldwins Gate (Short term) and Loggerheads Village (Long and Medium term).

A series of initial 5 year catchment wide actions have been outlined including:

- Continued river pledge and no cause of Reasons for Not Achieving Green (RNAGs) within the drainage area
- Implementation of appropriate screening controls to maintain aesthetics of watercourses.
- Continued investigation into river quality

STW have highlighted that WwTW improvement works are planned in AMP8 for Baldwin's Gate WwTW. Improvement Works are a long-term priority for Strongford and Ashley, spanning from 2020 to 2050. Loggerheads Sanatorium was included within the Level 2 Strategic Planning Area Assessment which identified WwTW Improvement Works as a focus between 2030 and 2050.

8.3 Evaluation of UU Drainage and Wastewater management plan

The UU DWMP includes BRAVA assessments for WwTW capacity. The results forecasted treatment work capacity issues that would be a 'potential area of focus', for Audley, Betley and Madeley at 2020, 2030 and 2050. Kidsgrove WwTW did not generate capacity concerns.

The DWMP Options Development and Appraisal set out the options considered to tackle future WwTW compliance issues (flow and load). These options include:

- Increased WwTW capacity
- SuDS
- WwTW decentralisation - The construction of new small-scale WwTWs to reduce flows/loads on existing sites and/or third-party treatment of wastewater
- WwTW rationalisation - The replacement of existing treatment works and transfer flows to a large, centralised treatment works and/or tankering to larger centralised treatment works
- Catchment management initiatives

Details of the DWMP investment plan shows that WwTW Improvement will account for approximately 5% of Kidsgrove, 5% of Madeley and 35% of Audley, out of the total investment planned for each works.

Water Friendly Farming was an initiative introduced by UU, in partnership with key stakeholders, which provides free advice to farmers, water quality management plans and small grants to implement water quality improvement measures. The project was completed in March 2022. Evidence from the initiative indicated that a combination of extensive buffer zones around cropped areas, changes in land use to reduce inputs and better management of sewage effluent in headwaters are all crucial to improving water quality. The initiative found that the creation of clean ponds, detached from streams and ditches, increased species diversity in the whole landscape by 25%. This evidence provides reasoning for the SuDS option.

8.4 JBA WwTW headroom assessment methodology

An assessment of WwTW capacity was carried out by JBA using measured flow data supplied by the water companies. The process was as follows:

- STW provided their daily effluent flow data and from this the 80% exceedance flow (or Q80) for 2021-2023 was calculated. This is an industry-standard for assessing Dry Weather Flow. The flow data was cleaned to remove zero values and low outlier values which would bring the measured DWF down.
- Flow data was also requested from UU however they did not give permission to use it. Therefore, there is greater uncertainty in the assessment for UU works.
- As a work around the UU Q80 flow was estimated by calculating the relationship between Q80 and mean flow values at the five Severn Trent works. These ratios were averaged and applied to the mean flow values found in the SIMCAT model for UUs four works. This is a lower confidence method for assessing present-day flows at the UU works, but was the only approach available in the absence of UU flow data.
- Growth was assigned to a WwTW using the sewerage drainage area boundaries as described above.

For each development site, the future DWF was calculated using the occupancy rates and per-capita consumption values obtained from the Water Resource Management Plans and the assumption that 95% of water used is returned to sewer. Permitted headroom was used as a substitute for actual designed hydraulic capacity for each WwTW being assessed. Where headroom above 10% of the permitted DWF is present during the plan period a green result was given. Between <10% and >0% headroom during the period was given an amber class, and less than 0% - a red result was given.

It should be remembered that this assessment assumes that every existing allocation which has not yet been built out or proposed allocation within each sewer catchment is allocated representing a worst-case for each WwTW. In many cases the amount of development in each catchment will be less.

If an upgrade to a WwTW is already committed to within STW or UU business plans (water companies operate on a five-year investment cycle, the current cycle being AMP7 – 2020 to 2025) delivery of an WwTW could typically take 3-5 years as a general guide, as outlined in Table 3-1. This is highly dependent on the nature and complexity of the scheme.

This has implications for phasing of development sites and early engagement with the relevant water treatment company is recommended so that infrastructure can be planned appropriately and delivered prior to occupation of development sites.

8.5 JBA WwTW Headroom assessment results

The results of our assessment are presented in Figure 8-2 below, this is in 2040, the end of the plan period.

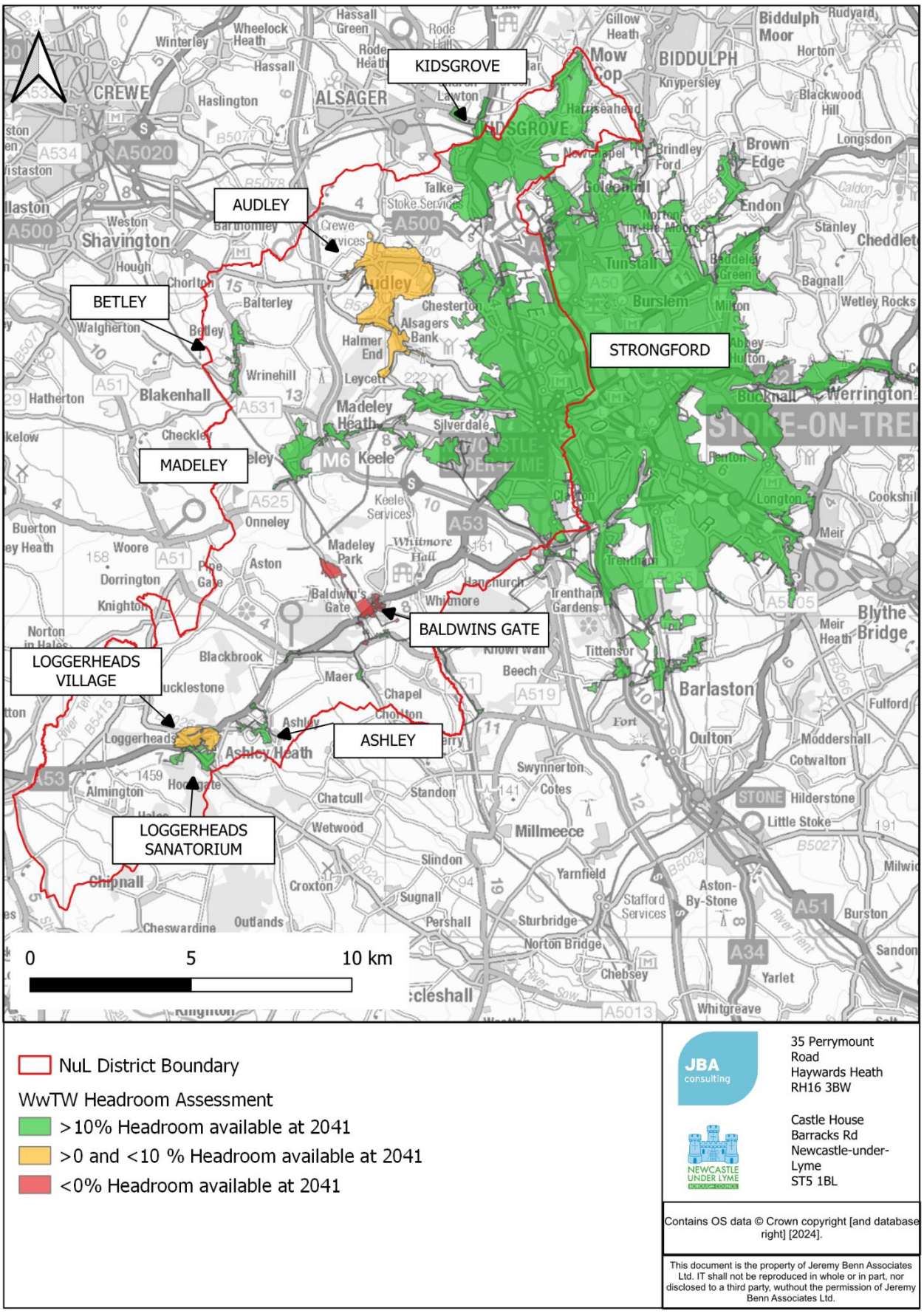


Figure 8-2 JBA WwTW headroom assessment at the end of the plan period (2040)

In Table 8-1 we present the results by AMP period up to the end of the local plan period. Baldwins Gate flow is above the permitted in the present day, indicated by negative percentage values, this worsens to a severe deficit by 2040. STW have indicated in their DWMP that an upgrade is planned during AMP8 for Baldwins Gate. This suggests the deficit is likely to be addressed and capacity should not be a constraint to development around Baldwins Gate, providing that sufficient engagement is carried out between STW and the LPA to make sufficient allowance for growth in the catchment.

Audley WwTW has less than 10% of permitted headroom available in the present, which reduces as a result of growth up to 2040. Audley has planned WwTW improvements in the short term to create additional capacity and provide environmental benefit, making up circa 25% of investment for this works. A further circa 10% capacity investment is planned in the long term, this investment indicates capacity is unlikely to be a constraint to development in Audley.

Loggerheads Village works is of very slight concern due to less than 10% headroom available by the end of AMP10 (2040). There is ample time to ensure capacity does not constrain growth in this WwTW drainage catchment.

Table 8-1 JBA WwTW headroom assessment results, the percentage of headroom remaining compared to the current permit limit

WwTW	Present day headroom % of Permitted	Headroom % of Permitted - End of AMP 7	Headroom % of Permitted - End of AMP 8	Headroom % of Permitted - End of AMP9	Headroom % of Permitted - End of AMP10	Headroom % of Permitted - At 2040
ASHLEY	48%	47%	46%	46%	46%	46%
AUDLEY WwTW	7%	7%	6%	4%	3%	3%
BALDWINS GATE	-8%	-8%	-13%	-25%	-37%	-40%
BETLEY	21%	19%	18%	18%	18%	18%
KIDSGROVE	18%	18%	17%	15%	13%	13%
LOGGER-HEADS SANATORI-UM	63%	63%	62%	62%	62%	62%
LOGGER-HEADS VILLAGE	40%	35%	15%	11%	7%	6%
MADELEY	41%	41%	40%	39%	39%	39%
STRONGFORD	21%	20%	18%	17%	16%	16%

8.6 Conclusion

The JBA headroom assessment identified WwTWs which have limited treatment capacity during the plan period. However, the STW and UU DWMP highlighted upgrades to these works are planned in the short term to increase capacity. As such, treatment capacity should not be a constraint to growth in NuL.

STW expect 15% of their WwTWs to be in Band 2 by 2050 (highest risk level), if no action is taken. This is due in part to issues with WwTWs risk of quality compliance failure. To address these issues STW have outlined a 5 year, 5 to 10 and 10 to 25 year plan.

UU have forecasted treatment work capacity issues across Audley, Betley and Madeley. Concerns surrounding internal flood risk also applied to Audley and Kidsgrove. UU include WwTW improvement and SuDS implementation as key options for the catchments.

Results for UU catchments are of lower confidence since these were calculated based on an assumed update of flow statistics from those in the SIMCAT model, rather than by direct reference to flow data as was used for the STW catchments.

8.7 Recommendations

Action	Responsibility	Timescale
Early engagement with STW and UU is required to ensure that provision of WwTW capacity is aligned with delivery of development.	Newcastle-under-Lyme Borough Council	Ongoing
Provide Annual Monitoring Reports to UU and STW detailing projected housing growth.	Newcastle-under-Lyme Borough Council	Ongoing
UU and STW to assess growth demands as part of their wastewater asset planning activities and feedback to the Council if concerns arise.	UU and STW	Ongoing

9 Water Quality

9.1 Introduction

The qualitative assessment of water quality in Phase 1 recommended that water quality modelling be undertaken in Phase 2 to assess the impact of growth on water quality.

9.2 Water quality modelling requirement

An increase in the discharge of effluent from Wastewater Treatment Works (WwTW) as a result of development and growth in the area in which they serve can lead to a negative impact on the quality of the receiving watercourse. Under the Water Framework Directive (WFD), a watercourse is not allowed to deteriorate from its current WFD classification (either as an overall watercourse or for individual elements assessed).

It is Environment Agency (EA) policy to model the impact of increasing effluent volumes on the receiving watercourses. Where the scale of development is such that a deterioration is predicted, a variation to the Environmental Permit (EP) may be required for the WwTW to improve the quality of the final effluent, so that the increased pollution load will not result in a deterioration in the water quality of the watercourse. This is known as "no deterioration" or "load standstill". The need to meet river quality targets is also taken into consideration when setting or varying a permit.

The Environment Agency operational instructions on water quality planning and no-deterioration are currently being reviewed. Previous operational instructions (withdrawn, for further information click here http://www.fwr.org/WQreg/Appendices/No_deterioration_and_the_WFD _50_12.pdf) set out a hierarchy for how the no-deterioration requirements of the WFD should be implemented on inland waters. This approach has been discussed and agreed with the EA as part of this study. The potential impact of development should be assessed in relation to the following objectives:

- Could the development cause a greater than 10% deterioration in water quality? This objective is to ensure that all the environmental capacity is not taken up by one stage of development and there is sufficient capacity for future growth.
- Could the development cause a deterioration in WFD class of any element assessed? This is a requirement of the Water Framework Directive to prevent a deterioration in class of individual contaminants. The "Weser Ruling" by the European Court of Justice in 2015 specified that individual projects should not be permitted where they may cause a deterioration of the status of a water body. If a water body is already at the lowest status ("bad"), any impairment of a quality element was considered to be a deterioration. Emerging practice is that a 3% limit of deterioration is applied.

The overall WFD classification of a water body is based on a wide range of ecological and chemical classifications. This assessment focuses on three physico-chemical quality

elements; Biochemical Oxygen Demand (BOD), Ammonia, and Phosphate as set out in the EA guidance.

For further information on the EA guidance, click here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/489146/H1_annex_D2.pdf

BOD

BOD is a measure of how much organic material – sewage, sewage effluent or industrial effluent – is present in a river. It is defined as the amount of oxygen taken up by micro-organisms (principally bacteria) in decomposing the organic material in a water sample stored in darkness for 5 days at 20°C. Water with a high BOD has a low level of dissolved oxygen. A low oxygen content can have an adverse impact on aquatic life.

Ammonia

Nitrogen is an essential nutrient required by all plants and animals for the formation of amino acids. In its molecular form nitrogen cannot be used by most aquatic plants, and so it is converted into other forms. One such form is ammonia (NH_3). This may then be oxidized by bacteria into nitrate (NO_3) or nitrite (NO_2). Ammonia may be present in water in either the unionized form NH_3 or the ionized form NH_4. Taken together these forms are called Total Ammonia Nitrogen.

Although ammonia is a nutrient, in high concentrations it can be toxic to aquatic life, in particular fish, affecting hatching and growth rates.

The main sources in rivers include agricultural sources, (fertilizer and livestock waste), residential sources (ammonia containing cleaning products and septic tank leakages), industrial processes and WwTWs.

Phosphate

Phosphorus is a plant nutrient and elevated concentrations in rivers can lead to accelerated plant growth of algae and other plants. Its impact on the composition and abundance of plant species can have adverse implications for other aspects of water quality, such as oxygen levels. These changes can cause undesirable disturbances to other aquatic life such as invertebrates and fish.

Phosphorus (P) occurs in rivers mainly as Phosphate (PO_4), which are divided into Orthophosphates (reactive phosphates), and organic Phosphates.

Orthophosphates are the main constituent in fertilizers used in agriculture and domestic gardens and provide a good estimation of the amount of phosphorus available for algae and plant growth and is the form of phosphorus that is most readily utilized by plants.

Organic phosphates are formed primarily by biological processes and enter sewage via human waste and food residues. Organic phosphates can be formed from orthophosphates in biological treatment processes or by receiving water biota.

Although it is phosphorus in the form of phosphates that is measured as a pollutant, the term phosphorus is often used in water quality work to represent the total phosphorus containing pollutants.

9.2.1 Summary of the WFD status

Figure 9-1 shows the WFD overall classification of waterbodies in the Newcastle-under-Lyme Borough, which indicate the majority of waterbodies are of 'Moderate' or 'Poor' overall status.

Figure 9-2 indicates that the ecological status is generally 'Moderate' to 'Poor', with a central region of 'Good' ecological status.

Invertebrate status, Figure 9-3, is generally 'Moderate' to 'High', with isolated 'Poor' invertebrate status in the south of the Borough and north of the Borough.

Fish status, Figure 9-4, is widely unrecorded for the Borough. Within the Borough the fish status ranges from 'Bad' to 'High'.

Table 9-1, Table 9-2 and Table 9-3 outline the Reasons for not achieving good (RNAG) across the three management catchments that affect NuL. These tables highlight the issues preventing waters from achieving good status and the sectors identified as contributing to them. The numbers included in the table are individual count of the reasons for not achieving good status, with a confidence of 'confirmed' and 'probable', where the latest status classification is lower than good. In some cases, there may be more than one reason influencing a single water body. The tables exclude reasons for deterioration (RFD).

Across the three management catchments covering the Borough, the water industry has been responsible for 10 out of the 11 'changes to the natural flow and level of water' and the water industry has been responsible for 142 of the 144 reports of 'pollution from wastewater'.

Table 9-1 Challenges for Severn Middle Shropshire Management Catchment

Significant water management issue	Changes to the natural flow and level of water	Invasive non-native species	Physical modifications	Pollution from abandoned mines	Pollution from rural areas	Pollution from towns, cities and transport	Pollution from waste water
Agriculture and rural land management	1	0	14	0	135	0	0
Domestic general public	0	0	0	0	0	2	1
Industry	0	0	0	0	0	1	0
Local & central government	0	0	0	0	0	0	0
Mining and quarrying	0	0	0	5	0	0	0
Navigation	0	0	0	0	0	0	0
No sector responsible	0	1	0	0	0	0	0
Other	0	0	1	0	0	0	0
Recreation	0	0	1	0	0	0	0
Sector under investigation	0	0	2	0	0	1	0
Urban and transport	0	0	1	0	0	7	0
Waste treatment and disposal	0	0	0	0	0	0	0
Water Industry	5	0	0	0	0	0	41
Total	6	1	19	5	135	11	42

Table 9-2 Challenges for Trent Valley Staffordshire Management Catchment

Significant water management issue	Changes to the natural flow and level of water	Invasive non-native species	Physical modifications	Pollution from abandoned mines	Pollution from rural areas	Pollution from towns, cities and transport	Pollution from waste water
Agriculture and rural land management	0	0	6	0	70	0	0
Domestic general public	0	0	0	0	0	4	1
Industry	0	0	0	0	0	1	0
Local & central government	0	0	5	0	0	0	0
Mining and quarrying	0	0	1	1	0	0	0
Navigation	0	0	0	0	0	0	0
No sector responsible	0	0	0	0	0	0	0
Other	0	0	2	0	0	0	0
Recreation	0	0	0	0	0	0	0
Sector under investigation	0	0	0	0	0	0	0
Urban and transport	0	0	11	0	0	41	0
Waste treatment and disposal	0	0	0	0	0	0	0
Water Industry	5	0	5	0	0	0	45
Total	5	0	30	1	70	46	46

Table 9-3 Challenges for Weaver Gowy Management Catchment

Significant water management issue	Changes to the natural flow and level of water	Invasive non-native species	Physical modifications	Pollution from abandoned mines	Pollution from rural areas	Pollution from towns, cities and transport	Pollution from waste water
Agriculture and rural land management	0	0	2	0	506	1	0
Domestic general public	0	0	0	0	0	0	0
Industry	0	0	2	0	0	8	0
Local & central government	0	0	3	0	0	0	0
Mining and quarrying	0	0	1	0	0	0	0
Navigation	0	0	1	0	0	0	0
No sector responsible	0	1	0	0	0	0	0
Other	0	0	1	0	0	1	0
Recreation	0	0	0	0	0	0	0
Sector under investigation	0	0	18	0	0	0	0
Urban and transport	0	0	4	0	0	10	0
Waste treatment and disposal	0	0	0	0	0	0	0
Water Industry	0	0	2	0	0	0	56
Total	0	1	34	0	506	20	56

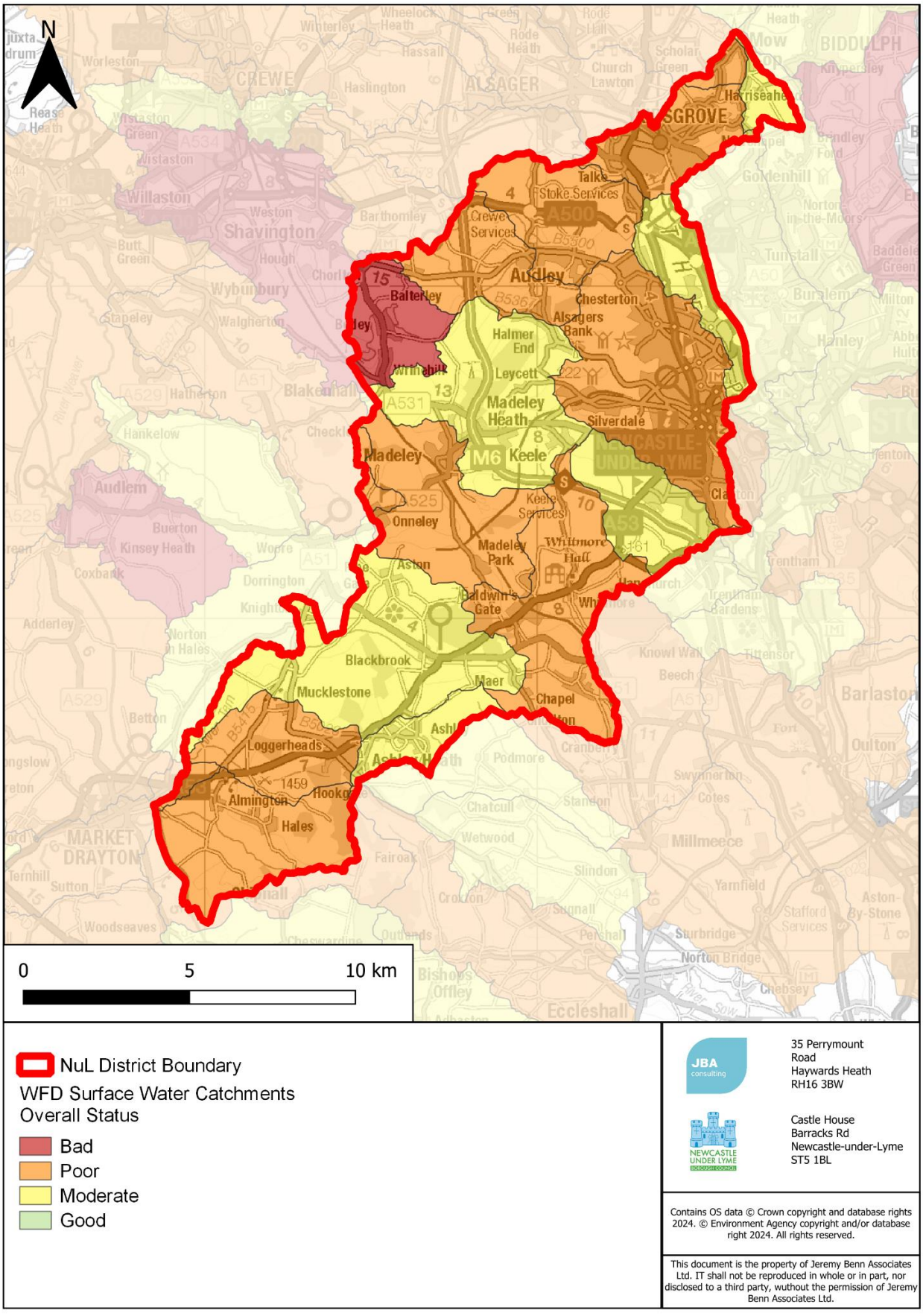


Figure 9-1 WFD waterbody overall status within NuL

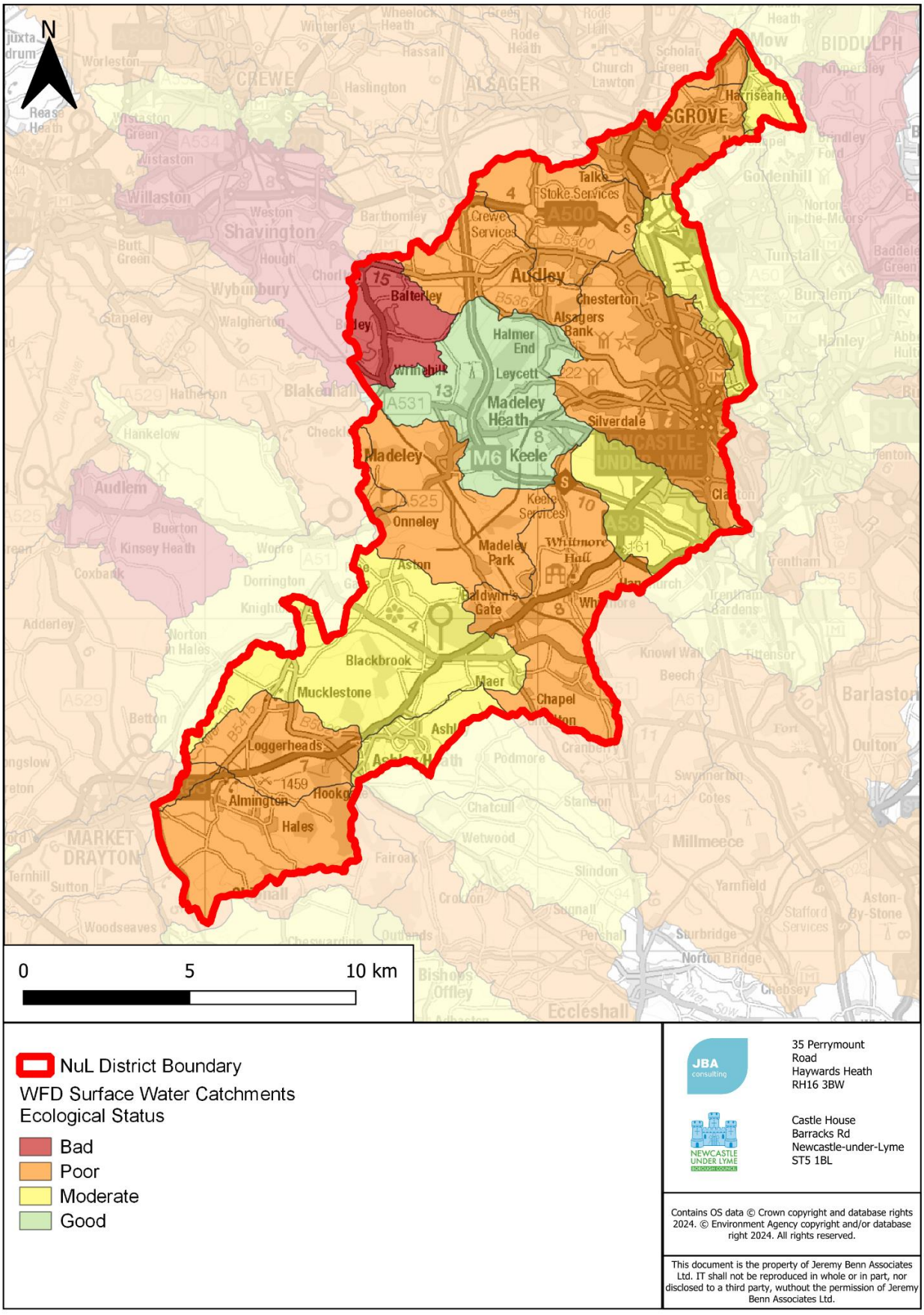


Figure 9-2 WFD waterbody ecological status within NuL

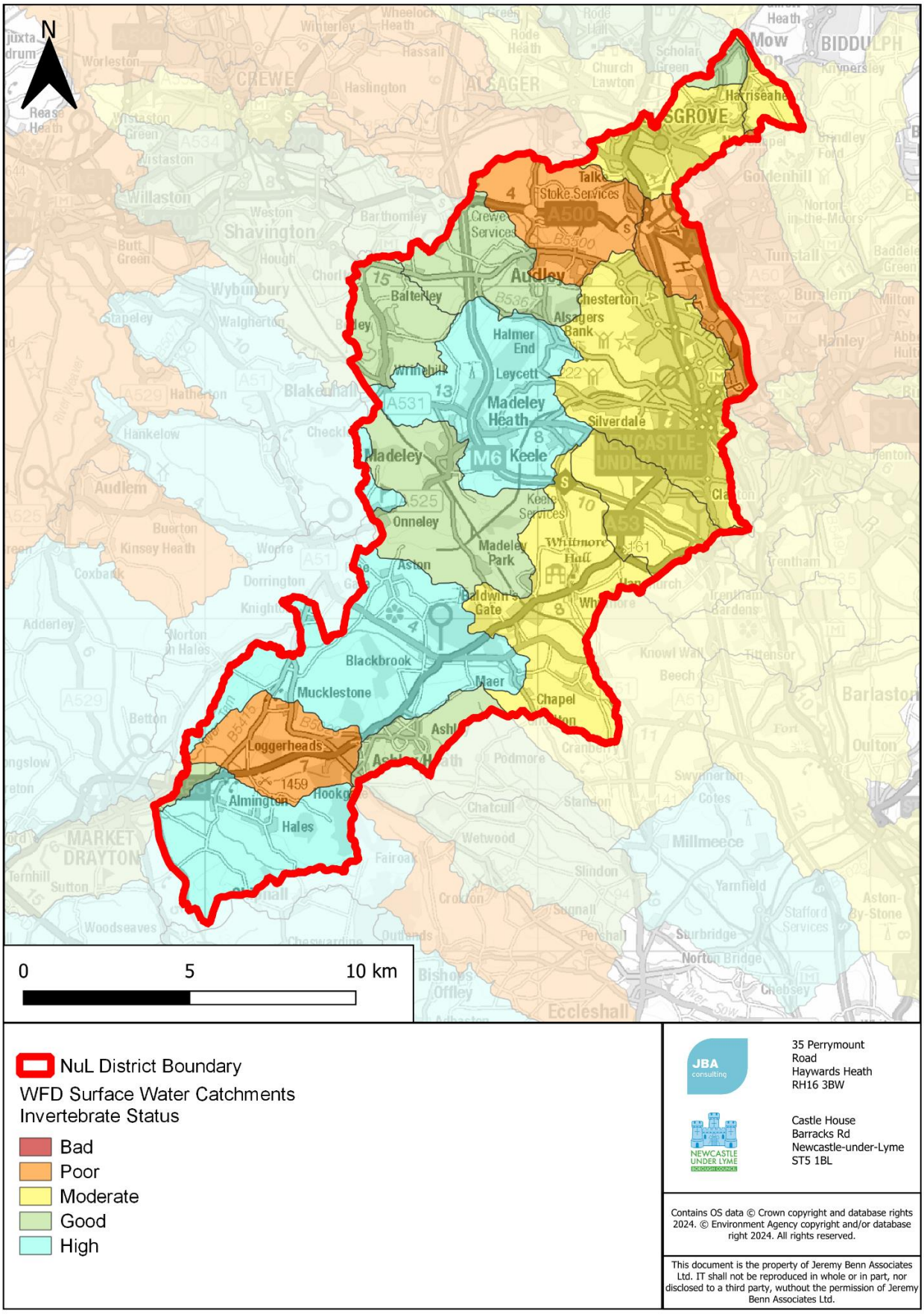


Figure 9-3 WFD waterbody invertebrate status within NuL

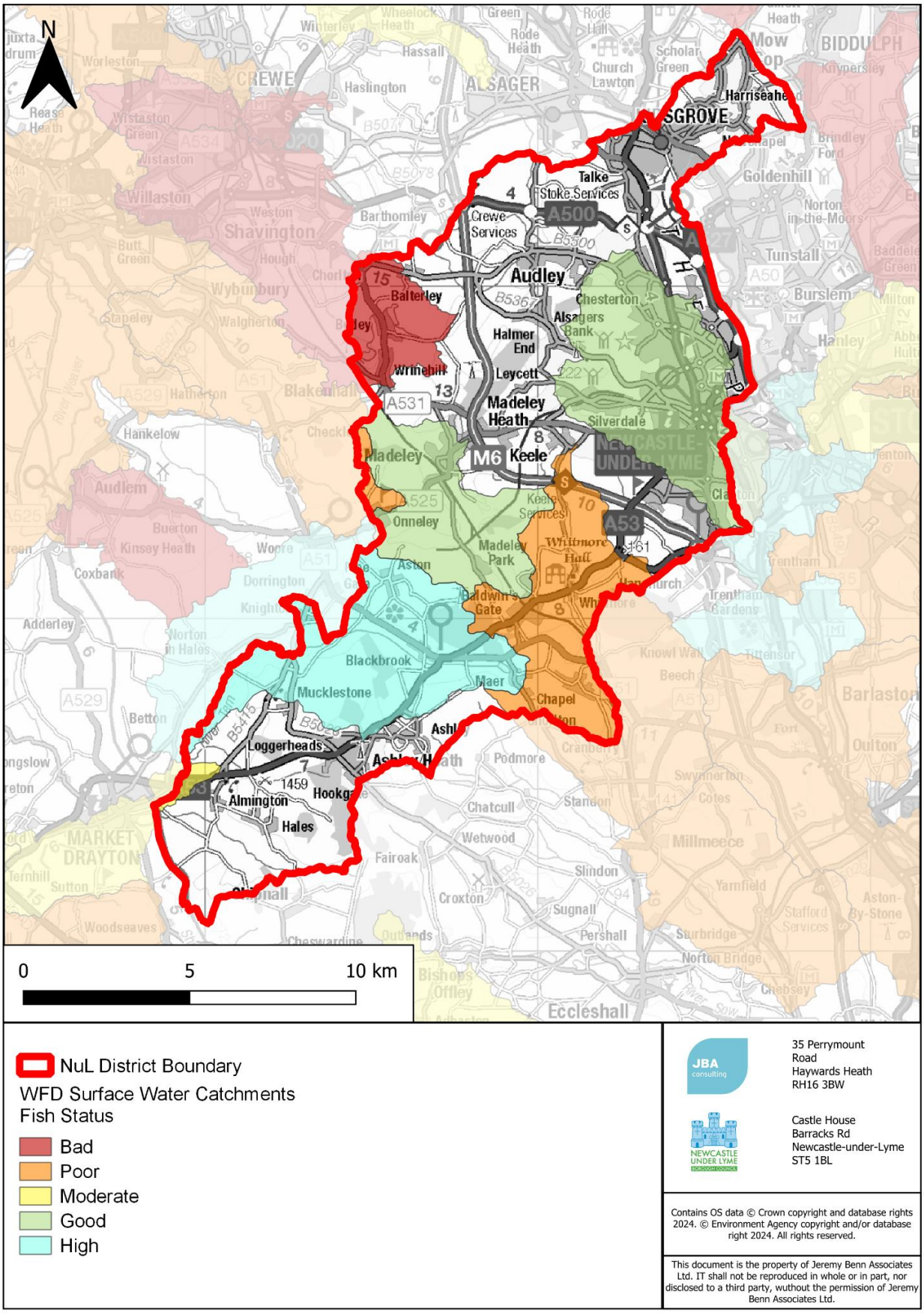


Figure 9-4 WFD waterbody status for fish within NuL

9.2.2 Priority substances

As well as the physico-chemical water quality elements (BOD, Ammonia, Phosphate etc.) addressed above, a watercourse can fail to achieve Good Ecological Status due to exceeding permissible concentrations of hazardous substances. Currently 33 substances are defined as hazardous or priority hazardous substances, with others under review. Such substances may pose risks both to humans (when contained in drinking water) and to aquatic life and animals feeding on aquatic life. These substances are managed by a range of different approaches, including EU and international bans on manufacturing and use, targeted bans, selection of safer alternatives and end-of-pipe treatment solutions. There is considerable concern within the UK water industry that regulation of these substances by setting permit values which require their removal at wastewater treatment works will place a huge cost burden upon the industry and its customers, and that this approach would be out of keeping with the "polluter pays" principle.

Consideration should be given to how the planning system might be used to manage priority substances:

- Industrial sources – whilst this report covers potential employment sites, it doesn't consider the type of industry and therefore likely sources of priority substances are unknown. It is recommended that developers should discuss potential uses which may be sources of priority substances from planned industrial facilities at an early stage with the EA and, where they are seeking a trade effluent consent, with the sewerage undertaker.
- Agricultural sources - There is limited scope for the planning system to change or regulate agricultural practices. UK water companies are involved in a range of “Catchment-based Approach” schemes aimed at reducing diffuse sources of pollutants, including agricultural pesticides.
- Surface water runoff sources - some priority substances e.g., heavy metals, are present in urban surface water runoff. It is recommended that future developments would manage these sources by using SuDS that provide water quality treatment, designed following the CIRIA SuDS Manual. This is covered in more detail in section 11.5.
- Domestic wastewater sources - some priority substances are found in domestic wastewater as a result of domestic cleaning chemicals, detergents, pharmaceuticals, pesticides or materials used within the home. Whilst an increase in the population due to housing growth could increase the total volumes of such substances being discharged to the environment, it would be more appropriate to manage these substances through regulation at source, rather than through restricting housing growth through the planning system.

No further analysis of priority substances will be undertaken as part of this study.

9.2.3 Water quality WINEP actions and schemes

Table 9-4 outlines the key WINEP actions which relate to the improvement of the quantity of surface water and groundwaters within NuL, full details can be found in Appendix C. In total, there were 80 actions identified covering adaptive management, continuous discharge, intermittent discharge, investigation and investigation and options appraisal. The majority of the core obligation are Water Framework Directive (50), and the remainder are Urban Wastewater treatment Directive (30). Included in this table are WINEP actions to address flow issues in the region.

Table 9-4 Summary of WINEP actions for waterbodies within NuL, including actions with drivers related to water quality and quantity improvements

Summary	Code and core obligations	Detailed definition
In total there were 20 long term monitoring actions.	U_MON1 (1)	Schemes requiring event duration monitoring from storm discharges identified as high significance (under the Risk Based Approach to the Monitoring of Storm Discharges), other than bathing and shellfish waters. The specification for the monitoring is that frequency and duration of a spill event is measured at the storm overflow and recorded via telemetry.
	U_MON2 (2)	Event duration monitoring of storm discharges identified (under the Risk Based Approach to the Monitoring of Storm Discharges) without EDM1, B5 or S8 drivers.
	U_MON3 (11)	Install EDM on WwTW overflows to storm tanks at those WwTW where we can`t use existing monitors to be confident that the permitted FFT setting is being complied with.
	U_MON4 (8)	Install MCERTS flow monitoring as close to the overflow as practicable to record FFT at WwTW where the existing DWF MCERTS flow monitoring, or other installed flow monitoring, cannot be readily used to confirm the permitted FFT setting is being complied with when the overflow to storm tanks operates.
In total there were 38 improvement actions.	U_IMP4 (2)	UWWTR spill frequency reduction scheme.
	WFD_IMPg (31)	Measures to reduce ammonia, phosphorus, BOD or nitrogen at STWs in order to meet WFD standards in rivers, transitional or coastal waters. g - measure to meet Good status for the element.
	WFD_IMPm (5)	Measures to reduce ammonia, phosphorus, BOD or nitrogen at STWs in order to meet WFD standards in rivers, transitional or coastal waters.

Summary	Code and core obligations	Detailed definition
		m - measure to meet Moderate status for the element.
In total there were 6 investigation actions.	U_INV (3)	UWWTR spill frequency reduction investigation and Cost Benefit appraisal.
	U_INV2 (3)	Investigation to confirm if any existing front end flow monitor or the back end MCERTS flow monitor can be used to measure PFF to full treatment at a WwTW. Existing front end monitors must be considered first and where they can be MCERTS certified to measure PFF they should be used to provide data within AMP7. Where there is no front end monitor or it cannot be MCERTS certified investigate whether the back end flow monitor can be MCERTS certified to measure PFF. If it can, then use it to provide data within AMP7. If neither can be MCERTS certified then a new inlet MCERTS flow monitor will be required under a PR24 driver
In total there were 8 actions to prevent deterioration.	WFD_ND (4)	The WFD_ND driver can be used for any of the following: schemes to meet requirements to prevent deterioration in ammonia, schemes to meet requirements to prevent deterioration in phosphorus, schemes to meet requirements to prevent deterioration of nitrates in Transitional and Coastal (TraC) water bodies. schemes to meet requirements to prevent deterioration in chemical status.
	WFD_ND_WRFlow (3)	Action to prevent deterioration of ecological status from flow pressures
	WFD_NDLS_Chem2 (1)	Measures related to load standstill requirements for chemicals (below EQS). These are set where a wastewater treatment works is discharging significant concentrations of a chemical, but the EQS is not threatened. Targets are set to ensure that current effluent quality does not deteriorate.
In total there were 6 'No Deterioration Investigations'	WFD_NDINV_WRFlow (6)	Action to Investigate & undertake Options Appraisal for preventing deterioration of ecological status from flow pressures

9.3 Modelling Methodology

9.3.1 General Approach

SIMCAT is used by the Environment Agency to model water quality in rivers and identify where permit changes are needed to prevent deterioration or improve water quality as well as supporting decision-making to guide development to locations where environmental deterioration will be reduced. SIMCAT is a 1D stochastic, steady state model which represents inputs from point-score effluent discharges and the behaviour of solutes in the river.

SIMCAT can simulate inputs of discharge and water quality data and statistically distribute them from multiple effluent sources along the river reach. It uses the Monte Carlo method for distribution that randomly models up to 2,500 boundary conditions. The simulation calculates the resultant water quality as the calculations cascade further downstream.

Once the distribution results have been produced, an assessment can be undertaken on the predicted mean and ninety percentile concentrations or loads, by comparing these to the WFD standards.

Within SIMCAT, the determinants modelled were Biochemical Oxygen Demand (BOD), Ammonia (NH_4) and Phosphorus (P). In fresh waterbodies, phosphate is usually the limiting nutrient for algal growth. However, in marine environments, nitrogen is considered to be the limiting nutrient.

The methodology followed is summarised in Figure 9-5 below. In this flow chart, all of the questions in the top row must be answered.

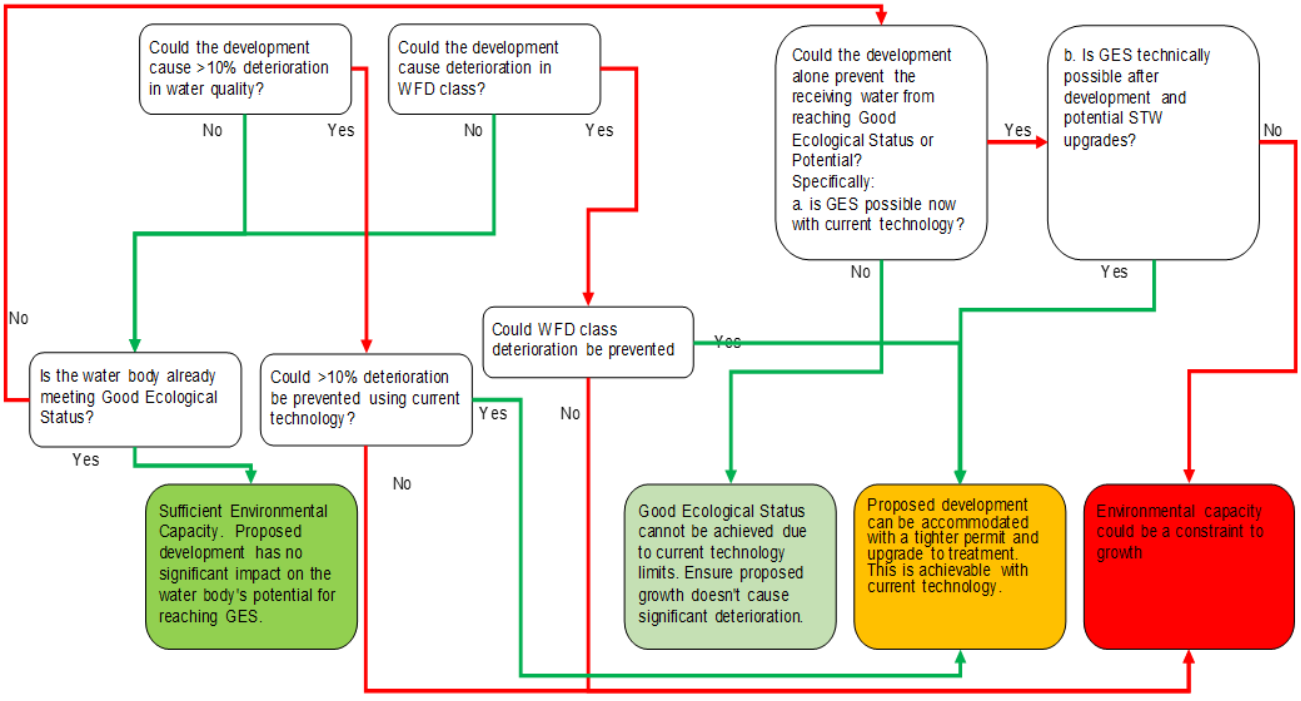


Figure 9-5 Water quality impact assessment following EA guidance

Where modelling indicated growth may lead to a deterioration in the watercourse, or where the watercourse is not currently meeting at least a 'Good' class for each determinant, the models were used to test whether this could be addressed by applying stricter discharge limits. In such cases, a Technically Achievable Limit (TAL) was considered.

The EA advised that the following permit values are achievable using treatment at TAL, and that these values should be used for modelling all WwTW potential capacity irrespective of the existing treatment technology and size of the works:

- Ammonia (90%ile): 1 mg/l
- BOD (90%ile): 5 mg/l
- Phosphorus (mean): 0.25 mg/l

This assessment did not take into consideration whether it is feasible to upgrade each existing WwTW to TAL due to constraints of costs, timing, space, carbon costs etc.

9.3.2 Data Sets

The datasets used to assess the water quality impact were as follows:

- Water quality, river and effluent flow data from within the Environment Agency SIMCAT model
- Severn Trent Water effluent flow data (UU data not available)
- Additional wastewater demand resulting from growth in Newcastle-under-Lyme
- Current technically achievable limits for WwTW
- Planned AMP7 upgrades to WwTW

The NuL Borough Boundary is covered by three SIMCAT models. These are the following:

- Ribble
- Severn
- Trent

9.3.3 Model Setup

The models have been largely based on observed flow and quality data for the period 2014-2020. A general update of the models, and the resultant recalibration were not within scope of this project. Therefore, flow data from the last three years for each WwTW in the study area was supplied by Severn Trent Water and United Utilities and used to update the model. In addition, several of the WwTWs in the study area had upgrades planned in AMP7, which would be expected to improve water quality at those locations. These were therefore factored into the model by applying the updated permit limit where it was less than the current discharge in the model. The model was then run in its updated form to set a 2024 baseline.

Additional effluent flow from growth during the Local Plan period was added to current flow at WwTWs receiving growth and the model re-run as a future scenario.

9.3.4 WFD assessment

The results from the baseline and future versions of the model were compared to assess the predicted percentage deterioration for each of the modelled determinands. WFD targets for each river reach were obtained from the SIMCAT model DAT files.

Where a deterioration of 10% or greater was predicted or a change in class (considered to be a significant deterioration under WFD) a further test was conducted to see if this deterioration could be prevented by upgrades to treatment processes. This used another version of the model with each WwTW set to operate at their Technically Achievable Limit (TAL).

9.3.5 Good Ecological Status assessment

Where treatment at TAL and reductions in diffuse sources in the present day could improve water quality to achieve Good Ecological Status (GES), it is important to understand whether this could be compromised as a result of future growth within the catchment.

Guidance from the EA suggests breaking this down in to two questions:

a) Is GES possible now with current technology?

b) Is GES technically possible after development and any potential WwTW upgrades?

If the answer to questions a) and b) are both ‘Yes’ or both ‘No’ then the development can be assessed as having no significant impact on the water bodies potential for reaching GES, i.e., the development alone is not preventing GES from being achieved.

If the answer to a) is ‘Yes’ and the answer for b) is ‘No’ then development is having a significant impact, i.e., before development GES could be achieved with upstream improvements, and after growth the additional effluent from growth prevents GES being achieved.

The possible answers are summarised in Table 9-5.

Run type 9 within SIMCAT was used which assumes that upstream flow at each treatment works is at good ecological status. This simulates improvements being made in upstream water quality. The water quality of the discharge from each WwTW in order to maintain GES is then calculated by the model.

Table 9-5 Possible GES assessment results

Predicted to achieve GES after growth	Could achieve GES today with improvements in upstream water quality? (a)	Could achieve GES in the future with improvements in upstream water quality? (b)	Assessment Result
YES	N/A	N/A	GREEN - Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.
NO	YES	YES	AMBER - Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology.
NO	NO	NO	YELLOW - Good ecological status cannot be achieved due to current technology limits. Ensure proposed growth doesn't cause significant deterioration.
NO	YES	NO	RED - Environmental capacity could be a constraint to growth.

9.4 Summary of Modelling Results

9.4.1 WFD Assessment

Our WFD assessment examines the water quality of the waterbody that receives the WwTW final effluent, results are shown in Table 9-6. The waterbody downstream of Baldwins Gate WwTW shows a 14% increase in Ammonia concentration when future growth is modelled. As this is higher than 10%, its determined to be a significant deterioration. However, this deterioration can be prevented when the treatment level is at TAL. There are no other significant deteriorations in water quality immediately downstream of the remaining works.

Table 9-6 WFD Assessment results downstream of WwTW

WwTW	Could the development cause a greater than 10% deterioration in water quality for one or more of Ammonia, BOD, or Phosphate?	Could the development cause a deterioration in WFD class of any element?	Can a deterioration of >10% or in class be prevented by treatment at TAL
ASHLEY	No	No	Yes
AUDLEY	No	No	Yes
BALDWINS GATE	Yes (Ammonia - 14%)	No	Yes
BETLEY	No	No	Yes
KIDSGROVE	No	No	Yes
LOGGERHEADS SANATORIUM	No	No	Yes
LOGGERHEADS VILLAGE	No	No	Yes
MADELEY	No	No	Yes
STRONGFORD	No	No	Yes

9.4.2 Good Ecological Status assessment

Table 9-7 summarises the results of the GES assessment outlined in section 9.3.5. Four different assessments are possible which are shown in Table 9-5 above. There are no red outcomes which indicates growth alone would not prevent achievement of good ecological status in future.

- If good ecological status is predicted to be achieved within the receiving waterbody following growth during the plan period, a **green** assessment is given. In this case, it can be said that there is environmental capacity to accommodate growth.
- Where GES is not currently being achieved but could be achieved if upstream water quality were improved, then an **amber** score is given – growth could be accommodated without preventing a waterbody achieving GES in the future.
- Where GES cannot be achieved either today or in the future, despite upgrades in treatment processes, and improvements in upstream water quality, then a **yellow** assessment is given – and it can be said that GES cannot be achieved due to the limits of current technology. Growth alone is not predicted to prevent GES being achieved in the future.
- Should GES be achievable today, but not in the future due to growth, a **red** assessment would be given, and it can be said that environmental capacity could be a constraint to growth, i.e., growth alone could prevent good ecological status being achieved in the future.

Table 9-7 GES Assessment results for WwTW receiving water

WwTW	Ammonia	Biochemical Oxygen Demand (BOD)	Phosphate
ASHLEY	GREEN	GREEN	AMBER
AUDLEY	YELLOW	GREEN	YELLOW
BALDWINS GATE	GREEN	GREEN	AMBER
BETLEY	GREEN	AMBER	AMBER
KIDSGROVE	GREEN	GREEN	YELLOW
LOGGERHEADS SANATORIUM	AMBER	GREEN	YELLOW
LOGGERHEADS VILLAGE	GREEN	GREEN	YELLOW
MADELEY	GREEN	GREEN	YELLOW
STRONGFORD	GREEN	GREEN	YELLOW

9.5 Conclusion

The WFD overall and ecological status were generally classified as moderate or poor across NuL river catchments. Invertebrate status is generally moderate to high, with some poor status in the south of the NuL Borough. Fish status is variable from Bad to High. Across the three management catchments that NuL Borough overlaps, the water industry has been responsible for 10 out of the 11 'changes to the natural flow and level of water' and been responsible for 142 of the 144 reasons for not achieving good status 'pollution from wastewater'.

WINEP actions for waterbodies within NuL included 20 monitoring actions, 38 improvement actions, 6 investigation actions, 8 actions to prevent deterioration and 6 actions for no deterioration.

SIMCAT modelling was used to simulate discharge and water quality data, to determine any potential concerns with BOD, Ammonia and Phosphate levels within the catchment. There were no significant deteriorations found in the WFD assessment which can't be prevented by improved treatment standards. There are no red GES assessment outcomes, which indicates growth alone would not prevent achievement of good ecological status in future across NuL.

9.6 Recommendations

Table 9-8 Water quality recommendations

Action	Responsibility	Timescale
Liaise with STW to determine whether Baldwins Gate WwTW upgrades planned in AMP8 will prevent >10% deterioration of river Ammonia concentration. The timing of occupation of potential allocation 'Land at Baldwins Gate Farm, Site B (LW74)' is significant here, as it has a relatively high number of dwellings proposed (200). As such, it is likely the cause of deterioration.	STW, Newcastle-under-Lyme	During local plan period
Take into account the full volume of growth from NuL and neighbouring authorities	STW and UU	Ongoing

10 Flood Risk from Effluent Discharge

10.1 Introduction

In catchments with a large, planned growth in population and which discharge effluent to a small watercourse, the increase in the discharged effluent might have a negative effect on the risk of flooding. An assessment was carried out in Phase 1 to quantify such an effect. This has been updated in Phase 2 based on the latest growth forecast.

10.2 Methodology

The following process has been used to assess the potential increased risk of flooding due to the extra flow reaching a specific WwTW:

- Calculate the increase in DWF attributable to planned growth;
- Identify the point of discharge of these WwTWs;
- At each outfall point, identify the FEH v1.0 catchment descriptors associated with the WwTW;
- Use FEH Statistical method to calculate peak 1 in 30 (Q30) and 1 in 100 (Q100) year fluvial flows;
- Calculate the additional foul flow as a percentage of the Q30 and Q100 flow.
- Note: WwTWs where the additional flow is lower than 0.432Ml have been filtered out as these flows are too small for JFES (JBA's flood estimation software) to resolve.

A red/amber/green rating was applied to score the associated risk as follows:

Additional flow ≤5% of Q30. Low risk that increased discharged will increase fluvial flood risk.	Additional Flow ≥5% of Q30. Moderate risk that increased discharges will increase fluvial flood risk.	Additional flow ≥5% of Q100. High risk that increased discharges will increase fluvial flood risk.

The hydrological assessment of river flows applied a simplified approach, appropriate to this type of screening assessment. The Q30 and Q100 flows quoted should not be used for other purposes, e.g., flood modelling or flood risk assessments.

10.3 Results

Table 10-1 Additional flow from growth at the end of the plan period as a percentage of river flow

WwTW	Q30 flow (m3/s)	Q100 flow (m3/s)	Additional flow as % of Q30 (m3/s)	Additional flow as % of Q100 (m3/s)
Ashley	1.27	1.7	0%	0%
Audley	3.63	4.94	0%	0%
Baldwins Gate	0.09	0.12	1%	1%
Betley	0.11	0.15	0%	0%
Kidsgrove	0.45	0.6	1%	1%
Loggerheads Sanatorium	0.16	0.21	0%	0%
Loggerheads Village	0.26	0.35	0%	0%
Madley	5.06	6.52	0%	0%
Strongford	85.4	113	0%	0%

10.4 Conclusions

All WwTWs are classed as low risk that increased effluent discharge will increase fluvial flood risk.

11 Environment Opportunities and Constraints

11.1 Introduction to protected sites screening

The following sites with environment designations are considered in the study:

- Special Areas of Conservation (SAC)
- Special Protection Areas (SPA)
- Sites of Special Scientific Interest (SSSI)
- Ramsar Sites (Wetlands of International Importance)

11.2 Summary of protected sites screening

In order to identify protected sites that may be at risk of deterioration in water quality, Flood Zone 2 from the Environment Agency's Flood Map for Planning, flood risk from rivers and the sea, was used to define an area that was either adjacent to a river or could be reasonably expected to receive surface water from a river. Where a WwTW was present in the catchment upstream of the protected site, it was considered that there was a risk of deterioration in water quality due to growth in the local plan period. Where there were no WwTWs serving growth upstream, risk of deterioration is considered to be low and would not be shown by water quality modelling. however, in these cases the overall catchment water quality should be considered where for example they are designated for migratory fish species that may spend part of their lifecycle elsewhere in the catchment.

11.3 Screening methodology

Where a designated site was identified for further study, the SIMCAT water quality model was investigated to provide the nearest point in the model where a prediction of water quality could be obtained in the adjacent watercourse.

Where possible this was taken as close as possible to the upstream end of the protected site, but where a tributary joined the watercourse along the length of the protected site, a further assessment point was taken to ensure this additional pathway was accounted for.

At each point, the predicted concentration of phosphate, ammonia and biochemical oxygen demand (BOD) in the adjacent waterbody was taken from the results of the water quality model. The future scenario (taking into account growth during the plan period) was compared to the baseline results to provide a predicted deterioration. A further test was then applied to ascertain whether deterioration could be prevented by improvements in upstream treatment processes. This version of the model assumes that every WwTW is treating at the technically achievable limit (TAL).

11.4 Screening results

In the future scenario the Betley Gutter within Betley Mere (SSSI and RAMSAR), exhibits a deterioration of 2% for Ammonia and 1% for Phosphate. This future deterioration in quality for both Phosphate and Ammonia can be prevented when treatment at TAL is employed.

The Wynbunbury Brook adjacent to Wynbunbury Moss (SSSI, RAMSAR and SAC), exhibits no significant deterioration in future when WFD standards are applied. However, this protected site has a Common Standards Monitoring (2015) standard of 0.01mg/l for phosphate. When this standard is compared to the river quality, the site fails for Phosphate in the baseline and the future (with growth) scenarios. This standard cannot be met using TAL treatment at WwTWs. Given the site fails significantly in the present and future scenarios, it can be considered that growth would not cause a detrimental impact to this site.

The frequency of storm overflow operation should also be taken into account, where an overflow is upstream of a protected site. Development in a catchment where storm overflow operation is already high may exacerbate existing issues and risk environmental damage (see section 7).

Full results from the environmental sites screening are provided in Appendix B.3.

11.5 Screening of protected sites within waterbodies with significant water management issues

Abstraction of water within a catchment, either from groundwater or surface water sources, is necessary to provide a public water supply, for industrial processes and for agriculture. When the volume of water being abstracted becomes too high, it can cause environmental damage by reducing river flow, or lowering the water table.

Changes in river flow can impact sensitive ecosystems, for example Trout require a clean gravel bed to lay their eggs. A reduction in river flow can cause sediment to build up, blocking the spaces the fish require to lay their eggs impacting their reproductive cycle. Changes in groundwater levels can also affect the flow regime in rivers and can cause drying of wetland sites.

The precise location of abstraction points for public water supply in England is not available for reasons of national security. Furthermore, water demand within a WRZ can be met by sources anywhere within that WRZ, or from a neighbouring WRZ if transfer between WRZs is used to provide some of the water available for use. It is therefore not possible to trace an impact of an individual development site back to a particular water abstraction and therefore to an environmental impact. The assessments in this report therefore rely on information in the public domain.

11.5.1 Surface waterbodies

Water could be abstracted from anywhere within the North Staffs WRZ. Those protected sites downstream of an abstraction could be impacted by changes in river flow resulting from the abstraction. Any protected site directly on a waterbody that flows through or is

downstream of the WRZ could be impacted by abstraction. Protected sites upstream or on tributaries that have not flowed through the WRZ are ignored.

The following method was followed:

- Define study area - based on extent of WRZ and WFD Surface water bodies that overlap with the WRZs.
- Identify protected sites within the study area.
- Filter these based on their proximity to waterbodies within the study area defined using flood zone 2 as a proxy.
- Identify the protected sites within a catchment where flow is recorded as a significant water management issue.

Table 11-1 highlights the six SSSI sites in the study area within waterbodies with significant water management issues.

Table 11-1 Protected sites within WFD waterbodies with a significant water management issue, that overlap the North Staffordshire water resource zone.

SSSI Name	SSSI Reference	Waterbody ID	Waterbody name
Blithfield Reservoir	SK058243	GB104028052290	Blithe from Source to Tad Brook
Doxey and Tillington Marshes	SJ906243	GB104028047220	Sow - Brockton Bk to Doxey Bk
Churnet Valley	SK006484	GB104028052651	Churnet from Endon Brook to Consall
Froghall Meadow and Pastures	SK025468	GB104028052652	Churnet from Consall to River Dove
Dimmings Dale & The Ranger	SK053430	GB104028052652	Churnet from Consall to River Dove
Churnet Valley	SK006484	GB104028052652	Churnet from Consall to River Dove

11.5.2 Groundwater bodies

There were three WFD Groundwater bodies in the North Staffordshire WRZ that were highlighted as having significant water management issues relating to abstraction and flow. All GWDTEs situated within these WFD groundwater bodies are identified in Table 11-2. These GWDTEs are at potential risk of lower groundwater levels, from further abstraction within the WRZ, as a result of growth in the Local Plan period.

Table 11-2 Groundwater dependent terrestrial ecosystems (GWDTE), overlying WFD groundwater bodies with a significant water management issue, that overlap the North Staffordshire water resource zone

SSSI Name	SSSI Reference	Waterbody ID	Waterbody name
Loynton Moss (SSSI)	1000230	GB40901G300100	Shropshire Middle Severn - PT Sandstone East Shropshire
Doley Common (SSSI)	1003618	GB40901G300100	Shropshire Middle Severn - PT Sandstone East Shropshire
Churnet Valley (SSSI)	1007135	GB40401G302000	Dove - PT Sandstone Leek
Maer Pool (SSSI)	1000283	GB40901G300100	Shropshire Middle Severn - PT Sandstone East Shropshire
Shrawardine Pool (SSSI)	1004361	GB40901G300100	Shropshire Middle Severn - PT Sandstone East Shropshire
Aqualate Mere (SSSI)	1003807	GB40901G300100	Shropshire Middle Severn - PT Sandstone East Shropshire
Hencott Pool (SSSI)	1000173	GB40901G300100	Shropshire Middle Severn - PT Sandstone East Shropshire
The Wrekin & The Ercall (SSSI)	1001585	GB40901G300100	Shropshire Middle Severn - PT Sandstone East Shropshire
Chasewater And The Southern Staffordshire Coalfield Heaths (SSSI)	2000693	GB40402G300300	Staffordshire Trent Valley - Mercia Mudstone East & Coal Measures
Pasturefields Salt Marsh (SSSI)	1003939	GB40402G300300	Staffordshire Trent Valley - Mercia Mudstone East & Coal Measures
Chartley Moss (SSSI)	1002337	GB40402G300300	Staffordshire Trent Valley - Mercia Mudstone East & Coal Measures
Hodnet Heath (SSSI)	1000183	GB40901G300100	Shropshire Middle Severn - PT Sandstone East Shropshire
Gentleshaw Common (SSSI)	1005764	GB40402G300300	Staffordshire Trent Valley - Mercia Mudstone East & Coal Measures
Old River Bed, Shrewsbury (SSSI)	1000328	GB40901G300100	Shropshire Middle Severn - PT Sandstone East Shropshire

11.6 Protection and Mitigation

11.6.1 Groundwater Protection

Groundwater is an important source of water in England and Wales.

The Environment Agency is responsible for the protection of “controlled waters” from pollution under the Water Resources Act 1991. These controlled waters include all watercourses and groundwater contained in underground strata.

The zones are based on an estimate of the time it would take for a pollutant which enters the saturated zone of an aquifer to reach the source of abstraction or discharge point (Zone 1 = 50 days, Zone 2 = 400 days, Zone 3 is the total catchment area). The Environment Agency will use SPZs (alongside other datasets such as the Drinking Water Protected Areas (DrWPAs) and aquifer designations as a screening tool to show:

- areas where it would object in principle to certain potentially polluting activities, or other activities that could damage groundwater,
- areas where additional controls or restrictions on activities may be needed to protect water intended for human consumption,
- how it prioritises responses to incidents.

The EA have published a position paper outlining its approach to groundwater protection which includes direct discharges to groundwater, discharges of effluents to ground and surface water runoff. This is of relevance to this water cycle study where a development may manage surface water through SuDS.

Sewage and Trade Effluent

Discharge of treated sewage of 2m^3 per day or less to ground are called small sewage discharges (SSDs). Most SSDs do not require an environmental permit if they comply with certain qualifying conditions. A permit is required for all SSDs discharging into a Source Protection Zone 1 (SPZ1). For treated sewage effluent discharges, the EA encourages the use of shallow infiltration systems, which maximise the attenuation within the drainage blanket and the underlying unsaturated zone. Whilst some sewage effluent discharges may not pose a risk to groundwater quality individually, the cumulative risk of pollution from aggregations of discharge can be significant. Improvement or pre-operational conditions may be imposed before granting an environmental permit. The EA will only agree to developments where the addition of new sewage effluent discharges to ground in an area of existing discharges is unlikely to lead to an unacceptable cumulative impacts. Generally, the Environment Agency will only agree to developments involving release of sewage effluent, trade effluent or other contaminated discharges to ground if it is satisfied that it is not reasonable to make a connection to the public foul sewer. The developer would have to provide evidence of why the proposed development cannot connect to the foul sewer in the planning application. This position will not normally apply to surface water run-off via sustainable drainage systems and discharges from sewage treatment works operated by sewerage undertakers with appropriate treatment and discharge controls. Deep infiltration systems (such as boreholes and shafts) are not generally accepted by the EA for discharge

of sewage effluent as they bypass soil layers and reduce the opportunity for natural treatment of pollutants.

Discharges of surface water run-off to ground at sites affected by land contamination, or from sites for the storage of potential pollutants are likely to require an environmental permit. This could include sites such as garage forecourts and coach and lorry parks. These sites would be subject to a risk assessment with acceptable effluent treatment provided.

Discharge of Clean Water

"Clean water" discharges such as runoff from roofs or from roads, may not require a permit. However, they are still a potential source of groundwater pollution if they are not appropriately designed and maintained.

Where infiltration SuDS schemes are proposed to manage surface runoff they should:

- be suitably designed;
- meet Government non-statutory technical standards for sustainable drainage systems (UK Government n, 2015) – these should be used in conjunction with the NPPF and PPG; and
- use a SuDS management treatment train (see section 11.6.2)

A hydrogeological risk assessment is required where infiltration SuDS is proposed for anything other than clean roof drainage in a SPZ1.

Source Protection Zones in Newcastle-under Lyme

Source Protection Zones (SPZs) form a key part of the Environment Agency's approach to controlling the risk to groundwater supplies from potentially polluting activities and accidental releases of pollutants. The Environment Agency's approach to groundwater protection, (Environment Agency, 2018), is a position statement which sets out a tiered, risk-based approach to protecting groundwater.

Proposed development locations within or close to Source Protection Zones, should be assessed in relation to the Environment Agency guidance, which identifies some forms of development that they will object to within specific SPZs. For residential development, this specifically relates to:

- Sewage effluent discharges inside SPZ1
- Infiltration SuDS in SPZ1 (except where these serve only roof water)

For employment sites the specific guidance related to proposed uses should be followed. SPZs that are present in the study area are shown in Figure 11-1 alongside potential allocation sites. None of the allocation sites are overlying SPZ 2 or 1, there are two which are within a zone 3 (sites SHLAA reference LW53 and LW74).

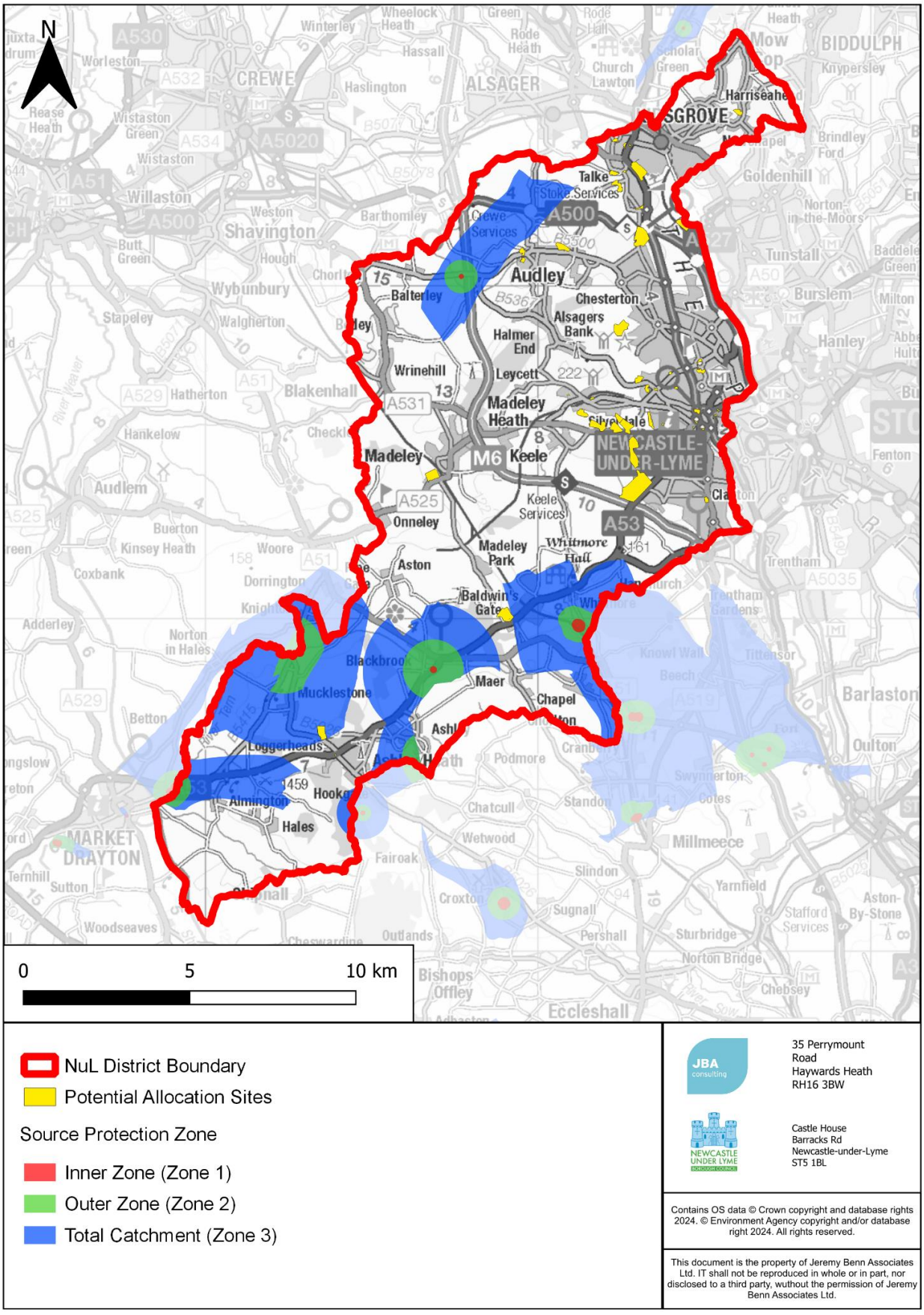


Figure 11-1 Source protection zones covering NuL and proximity of potential allocation sites

11.6.2 Use of SuDS in Water Quality Management

SuDS allow the management of diffuse pollution generated by urban areas through the sequential treatment of surface water reducing the pollutants entering lakes and rivers, resulting in lower levels of water supply and wastewater treatment being required. This treatment of diffuse pollution at source can contribute to meeting WFD water quality targets, as well as national objectives for sustainable development.

This is usually facilitated via a SuDS Management Train of several components in series that provide a range of treatment processes delivering gradual improvement in water quality and providing an environmental buffer for accidental spills or unexpected high pollutant loadings from the site. Considerations for SuDS design for water quality are summarised in Table 11-3.

Table 11-3 Considerations for SuDS design for water quality

Consideration	Details
Manage surface water close to source	Where practicable, treatment systems should be designed to be close to source of runoff It is easier to design effective treatment when the flow rate and pollutant loadings are relatively low Treatment provided can be proportionate to pollutant loadings Accidental spills or other pollution events can be isolated more easily without affecting the downstream drainage system Encourages ownership of pollution Poor treatment performance or component damage/failure can be delt with more effectively without impacting on the whole site
Treat surface water runoff on the surface	Where practicable, treatment systems should be designed to be on the surface Where sediments are exposed to UV light, photolysis and volatilisation processes can act to break down contaminants If sediment is trapped in accessible parts of the SuDS, it can be removed more easily as part of maintenance It enables use of evapotranspiration and some infiltration to the ground to reduce runoff volumes and associated total contamination loads (provided risk to groundwater is managed appropriately) It allows treatment to be delivered by vegetation Sources of pollution can be easily identified Accidental spills or misconnections are visible immediately and can be dealt with rapidly Poor treatment performance can be easily identified during routine inspections, and remedial works can be planned efficiently
Treat surface water runoff to remove a range of contaminants	SuDS design should consider the likely presence and significance of any contaminate that may pose a risk to the receiving environment, The SuDS component or combination of components selected

Consideration	Details
	should include treatment processes that, in combination, are likely to reduce this risk to acceptably low levels.
Minimise risk of sediment remobilisation	The SuDS design should consider and mitigate the risks of sediments (and other contaminants) being remobilised and washed into receiving surface waters during events greater than those which the component has been specifically designed for
Minimise impacts from accidental spills	By using a number of components in series, SuDS can help ensure that accidental spills are trapped in/on upstream component surfaces, facilitating contamination management and removal. The selected SuDS components should deliver a robust treatment design that manages risks appropriately - taking into account the uncertainty and variability of pollution ladings and treatment processes

Managing pollution close to its source can help keep pollutant levels and accumulation rates low, allowing natural processes to be more effective. Treatment can often be delivered within the same components that are delivering water quantity design criteria, requiring no additional cost or land-take.

SuDS designs should control the 'first flush' of pollutants (usually mobilised by the first 5mm of rainfall) at source, to ensure contaminants are not released from the site. Best practise is that no runoff should be discharged from the site to receiving watercourses or sewers for the majority of small (e.g., less than 5mm) rainfall events.

Infiltration techniques will need to consider Groundwater Source Protection Zones (GSPZs) and are likely to require consultation with the Environment Agency.

Early consideration of SuDS within master planning will typically allow a more effective scheme to be designed.

11.6.3 Additional benefits of SuDS

Flood Risk

The Strategic Flood Risk Assessment contains recommendations for SuDS to manage surface water on development sites, with the primary aim of reducing flood risk.

SuDS are most effective at reducing flood risk for relatively high intensity, short and medium duration events, and are particularly important in mitigating potential increases in surface water flooding, sewer flooding and flooding from small and medium sized watercourses resulting from development.

Water Resources

A central principle of SuDS is the use of surface water as a resource. Traditionally, surface water drainage involved the rapid disposal of rainwater, by conveying it directly into a sewer or wastewater treatment works.

SuDS techniques such as rainwater harvesting, allow rainwater to be collected and re-used as non-potable water supply within homes and gardens, reducing the demand on water resources and supply infrastructure.

Climate Resilience

Climate projections for the UK suggest that winters may become milder, and wetter and summers may become warmer. This would be expected to increase the volume of runoff, and therefore the risk of flooding from surface water, and diffuse pollution, and reduce water availability.

SuDS offer a more adaptable way of draining surfaces, controlling the rate and volume of runoff leaving urban areas during high intensity rainfall, and reducing flood risk to downstream communities through storage and controlled release of rainwater from development sites.

Through allowing rainwater to soak into the ground, SuDS are effective at retaining soil moisture and groundwater levels, which allows the recharge of the watercourses and underlying aquifers. This is particularly important where water resource availability is limited, and likely to become increasingly scarce under future drier climates.

Biodiversity

The water within a SuDS component is an essential resource for the growth and development of plants and animals, and biodiversity benefits can be delivered even by very small, isolated schemes. The greatest value can be achieved where SuDS are planned as part of a wider green landscape, providing important habitat, and wildlife connectivity. With careful design, SuDS can provide shelter, food, foraging and breeding opportunities for a variety of species including plants, amphibians, invertebrates, birds, bats and other animals.

Amenity

Designs using surface water management systems to help structure the urban landscape can enrich its aesthetic and recreational value, promoting health and well-being and supporting green infrastructure. Water managed on the surface rather than underground can help reduce summer temperatures, provide habitat for flora and fauna and act a resource for local environmental education programmes and working groups and directly influence the sense of community in an area.

11.6.4 Suitable SuDS techniques

The hydraulic and geological characteristics of each property development site across Herefordshire should be assessed to identify the most appropriate forms of surface water management and any constraining factors to the utilisation of SuDS. These assessments are designed to inform the early-stage site planning process and should be followed up the site-specific detailed drainage assessments.

Appropriate SuDS techniques have been categorised into five main groups, as shown in Table 11-4. Further site-specific investigation should be conducted to determine what SuDS

techniques could be used on a particular development, informed by detailed ground investigations.

Table 11-4 Summary of SuDS Categories

SuDS Type	Technique
Source Controls	Green Roof, Rainwater Harvesting, Pervious Pavements, Rain Gardens
Infiltration	Infiltration Trench, Infiltration Basin, Soakaway
Detention	Pond, Wetland, Subsurface Storage, Shallow Wetland, Extended Detention Wetland, Pocket Wetland, Submerged Gravel Wetland, Wetland Channel, Detention Basin
Filtration	Surface Sand filter, Sub-Surface Sand Filter, Perimeter Sand Filter, Bioretention, Filter Strip, Filter Trench
Conveyance	Dry Swale, Under-drained Swale, Wet Swale

11.6.5 Natural Flood Management

Natural Flood Management (NFM) is used to protect, restore, and re-naturalise the function of catchments and rivers to reduce flood risk. A wide range of techniques can be used that aim to reduce flooding by working with natural features and processes in order to store or slow down flood waters before they can damage flood risk receptors (e.g., people, property, infrastructure, etc.). NFM involves taking action to manage flood and coastal erosion risk by protecting, restoring, and emulating the natural regulating functions of catchments, rivers, floodplains, and coasts. Techniques and measures, which could be applied in Herefordshire include:

- Peatland and moorland restoration in upland catchments
- Offline storage areas
- Re-meandering streams
- Targeted woodland planting
- Reconnection and restoration of functional floodplains
- Restoration of rivers and removal of redundant structures
- Installation or retention of large woody material in river channels
- Improvements in management of soil and land use
- Creation of rural and urban SuDS

In 2017, the Environment Agency published on online evidence base (Gov.UK, 2021) to support the implementation of NFM and with JBA produced maps showing locations with the potential for NFM measures (Environment Agency j, 2020). These maps are intended to be used alongside the evidence directory to help practitioners think about the types of measure that may work in a catchment and the best places in which to locate them. There are limitations with the maps; however, it is a useful tool to help start dialogue with key partners.

11.6.6 Multiple Benefits of NFM

In addition to flood risk benefits, there are also significant benefits in other areas such as habitat provision, air quality, climate regulation and water quality.

Many NFM measures can reduce nutrient and sediment sources by reducing surface runoff flows from higher ground, reducing soil erosion, trapping sediment at the edge of agricultural land, or encouraging deposition of sediments behind natural dams upstream in watercourses.

Suitable techniques may include:

- Leaky dams
- Woodland planting
- Buffer strips
- Runoff retention ponds
- Land management techniques (soil aeration, cover crops etc.)

11.7 Conclusions

The potential impacts of development on protected sites within and downstream of Newcastle-under-Lyme should be considered in future plan making.

Several Groundwater Source Protection Zones are present in the NuL study area. Two allocation sites are situated in SPZ 3, and no allocation sites are present in SPZ 1 or 2. The EA has published management advice for development with these zones.[13]

Water quality for designated sites was assessed using SIMCAT water quality model values for BOD, Ammonia and Phosphate. Betley Mere (both SSSI and Ramsar), exhibited deterioration in Ammonia and Phosphate that TAL treatment could prevent.

The Wynbunbury Brook adjacent to Wynbunbury Moss (SSSI, RAMSAR and SAC), exhibits no significant deterioration in future when WFD standards are applied. However, this protected site has a Common Standards Monitoring (2015) standard of 0.01mg/l for phosphate. When this standard is compared to the river quality, the site fails for Phosphate in the baseline and the future (with growth) scenarios. This standard cannot be met using TAL treatment at WwTWs. Given the site fails significantly in the present and future scenarios, it can be considered that growth is not causing a detrimental impact to this site.

Abstraction assessments found 14 Groundwater Dependent Terrestrial Ecosystems (GWDTEs) and 6 surface water WFD waterbodies to be susceptible to the risks of abstraction within the catchment.

SuDS are now a requirement for all development sites. Their design should consider both water quantity and water quality and site level investigations should be undertaken to define the most appropriate SuDS types for each specific development.

13 https://assets.publishing.service.gov.uk/media/5ab38864e5274a3dc898e29b/Envirnment-Agency-approach-to-groundwater-protection.pdf

Newcastle-under-Lyme Borough Council should be consulted at an early stage of development to ensure that SuDS are implemented and designed in response to site characteristics and policy factors.

In the wider area, opportunities exist to implement natural flood management techniques to achieve multiple benefits of flood risk, water quality and habitat creation.

11.8 Recommendations

Action	Responsibility	Timescale
STW to ensure increased abstraction doesn't impact protected sites identified in section 11.5.1 and 11.5.2.	STW, NuL	On-going
NuL to work with their HRA consultant to determine the standards to be applied for Wynbunbury Moss SAC identified in section 11.4.	NuL	Preparation of local plan
Follow advice published by the EA when considering the protection of groundwater in new developments. https://assets.publishing.service.gov.uk/media/5ab38864e5274a3dc898e29b/Envirnment-Agency-approach-to-groundwater-protection.pdf	NuL	Preparation of local plan

12 Summary of conclusions and recommendations

12.1 Conclusions

Assessment	Conclusion
Water resources	• A total supply demand deficit across all STW WRZs of 244Ml/d is project by 2040/41, growing to 540 Ml/d by 2050/51 if no action is taken. • Groundwater body quantitative status in NuL is generally 'Good', chemical status is generally a 'Fail' and Overall Status is generally 'Poor'. • Groundwater bodies Staffordshire Trent Valley - PT Sandstone Staffordshire and Shropshire Middle Severn - PT Sandstone East Shropshire both received Poor (Quantitative), Fail (Chemical) and Poor (overall status), which were the lowest rankings within the NuL Borough. • Availability of water resources are generally available at higher flows (Q30) and become restricted in lower flows (Q50 and Q70). Water is deemed 'Not Available' in Shropshire Middle Severn ALS in Q95 flow conditions.
Wastewater network	• Severn Trent water's DWMP highlights that Strongford, Ashley, Baldwins Gate and Loggerheads Village all experience issues with sewer blockages. Other concerns across these treatment works catchments include internal sewer flooding, capacity issues, planned residential new development and pollution incidents. • United Utilities' DWMP highlights internal flood risk, pollution and storm overflow performance as areas of focus for some of the WwTWs in NuL. UU have outlined implementation of SuDS and regional customer engagement as high benefit options within the catchment. Surface water source control measures and intelligent network operation are amongst some of the future investment plans.
Wastewater treatment	• The JBA headroom assessment identified WwTWs which have limited treatment capacity during the plan period. However, the STW and UU DWMP highlighted upgrades to these works are planned in the short term to increase capacity. As such, treatment capacity should not be a constraint to growth in NuL.

Assessment	Conclusion
	• STW expect 15% of their WwTWs to be in Band 2 by 2050 (highest risk level), if no action is taken. Issues with WwTWs include storm overflow and risk of quality compliance failure. To address these issues STW have outlined a 5 year, 5 to 10 and 10 to 25 year plan. The actions include a continued river pledge, full compliance with new Strom Overflow Discharge Reduction Plan targets and a commitment to reduce overflows to an average of 10 times per year. • UU have forecasted treatment work capacity issues across Audley, Betley and Madeley. Concerns surrounding internal flood risk also applied to Audley and Kidsgrove. UU include WwTW improvement and SuDS implementation as key options for the catchment.
Water quality	• Across the three management catchments which NuL Borough falls within, the water industry has been responsible for 10 out of the 11 'changes to the natural flow and level of water' and the water industry has been responsible for 142 of the 144 reports of 'pollution from wastewater'. • WINEP actions for waterbodies within NuL included 20 monitoring actions, 38 improvement actions, 6 investigation actions, 8 actions to prevent deterioration and 6 actions for no deterioration. • SIMCAT modelling was used to simulate discharge and water quality data, to determine any potential concerns with BOD, Ammonia and Phosphate levels within the catchment. There were no significant deteriorations found in the WFD assessment which can't be prevented. • There were no red good ecological status assessment outcomes, which indicates growth alone would not prevent achievement of good ecological status in future across NuL.
Flood risk from effluent discharge	• All WwTWs are classed as low risk that increased discharge will increase fluvial flood risk.

Assessment	Conclusion
Environmental impact	• Two allocation sites are situated in SPZ 3, and no allocation sites are present in SPZ 1 or 2. • Water quality assessments identified Betley Mere (SSSI and Ramsar), that exhibited deterioration in Ammonia and Phosphate that TAL treatment could prevent. The Wynbunbury Brook (SSSI, RAMSAR and SAC) exhibited no significant deterioration under WFD Standards. However, under the Common Standards Monitoring (2015) standard of 0.01mg/l, it produces a failure for the site. However, a failure is also found in the baseline scenario, therefore it can be considered growth as part of the local plan would not cause a failure of the standards. • Abstraction assessments found 14 Groundwater Dependent Terrestrial Ecosystems (GWDTEs) and 6 SSSI protected sites to be susceptible to the risks of abstraction within waterbodies connected to North Staffordshire WRZ. • SuDS are now a requirement for all development sites. Their design should consider both water quantity and water quality and site level investigations should be undertaken to define the most appropriate SuDS types for each specific development. • Newcastle-under-Lyme Council should be consulted at an early stage of development to ensure that SuDS are implemented and designed in response to site characteristics and policy factors. • In the wider area, opportunities exist to implement natural flood management techniques to achieve multiple benefits of flood risk, water quality and habitat creation.

12.2 Recommendations

Table 12-1 Summary of recommendations for all chapters

Aspect	Action	Responsibility	Timescale
Water resources	Continue to regularly review forecast and actual household growth across the supply region through WRMP Annual Update reports, and where significant change is predicted, engage with Local Planning Authorities.	Severn Trent Water	Ongoing
Water resources	Provide yearly updates of projected housing growth to water companies to inform WRMP updates.	Newcastle-under-Lyme Borough Council	Ongoing
Water resources	Use planning policy to require a water efficiency standard of 100l/p/d to be achieved using the fittings-based approach. The policy should allow for a future reduction in the water efficiency target.	Newcastle-under-Lyme Borough Council	In Local Plan
Water resources	Use planning policy to require non-household development to achieve three credits in the assessment category WAT01 of the BREEAM UK New Construction Standard.	Newcastle-under-Lyme Borough Council	In Local Plan
Water resources	Larger residential developments and commercial developments should consider incorporating greywater recycling and/or rainwater harvesting into development at the master planning stage in order to reduce water demand.	Newcastle-under-Lyme Borough Council	Ongoing
Wastewater Resources	Water companies should advise NuL of any strategic water resource infrastructure developments within their area, where these may require safeguarding of land to prevent other type of development occurring. In addition, consideration of timescales for delivery and the provision of water should be accounted for.	Newcastle-under-Lyme Borough Council, STW and UU	In Local Plan
Wastewater network	Prioritise understanding risk of increased spills within sewer networks where overflows are already above the threshold for investigation.	Newcastle-under-Lyme Borough Council UU & STW	Local Plan

Aspect	Action	Responsibility	Timescale
Wastewater network	Consider the available sewer capacity when phasing development going to the same WwTW.	Newcastle-under-Lyme Borough Council UU & STW	Ongoing
Wastewater network	Provide Annual Monitoring Reports to UU and STW detailing projected housing growth.	Newcastle-under-Lyme Borough Council	Ongoing
Wastewater network	UU and STW to assess growth demands as part of their wastewater asset planning activities and feedback to the Council if concerns arise.	UU & STW	Ongoing
Wastewater treatment	Early engagement with STW and UU is required to ensure that provision of WwTW capacity is aligned with delivery of development.	Newcastle-under-Lyme Borough Council	Ongoing
Wastewater treatment	Provide Annual Monitoring Reports to UU and STW detailing projected housing growth.	Newcastle-under-Lyme Borough Council	Ongoing
Wastewater treatment	UU and STW to assess growth demands as part of their wastewater asset planning activities and feedback to the Council if concerns arise.	UU and STW	Ongoing
Water quality	Liaise with STW to determine whether Baldwins Gate WwTW upgrades planned in AMP8 will prevent >10% deterioration of river Ammonia concentration. The timing of occupation of potential allocation 'Land at Baldwins Gate Farm, Site B (LW74)' is significant here, as it has a relatively high number of dwellings proposed (200). As such, it is likely the cause of deterioration.	STW, Newcastle-under-Lyme Borough Council	During the local plan period
Water quality	Take into account the full volume of growth from NuL and neighbouring authorities.	STW and UU	Ongoing
Environmental impact	STW to ensure increased abstraction doesn't impact protected sites identified in section 11.5.1 and 11.5.2.	STW and Newcastle-under-Lyme Borough Council	Ongoing

Aspect	Action	Responsibility	Timescale
Environmental impact	NuL to work with HRA consultant to determine the standards to be applied for Wynbunbury Moss SAC identified in section 11.4.	Newcastle-under-Lyme Borough Council	Local plan preparation
Environmental impact	Follow advice published by the EA when considering the protection of groundwater in new developments. https://assets.publishing.service.gov.uk/media/5ab38864e5274a3dc898e29b/Envirnment-Agency-approach-to-groundwater-protection.pdf	Newcastle-under-Lyme Borough Council	Local plan preparation

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A Storm Overflow Assessment full results

CSO reference	2021	2022	2023	Type of storm overflow	WwTW sewer network	Average number of spills	Number of years data
STOKE - BALL GREEN (CSO)	0			SO on sewer network	STRONGFORD	0	1
T/01/02030/O	0			SO on sewer network	STRONGFORD	0	1
TRENTHAM - CONSTANCE AVE PS (CSO)	0			Storm discharge at pumping station	STRONGFORD	0	1
HANLEY - LICHFIELD ST/LEEK ROAD X (CSO)	0			SO on sewer network	STRONGFORD	0	1
T/01/00541/O	0			SO on sewer network	STRONGFORD	0	1
COLLEGE ROAD CSO	0			SO on sewer network	STRONGFORD	0	1
T/01/22289/O	0			SO on sewer network	STRONGFORD	0	1
BRADWELL - CLAYHANGER CLOSE SPS	0			Storm discharge at pumping station	STRONGFORD	0	1
SILVERDALE - CHURCH STREET (CSO) - EPRKB3192RR	0	0	2	SO on sewer network	STRONGFORD	0	3
KNUTTON - COTSWOLD AVENUE PS (CSO)	0	0		SO on sewer network	STRONGFORD	0	2

CSO reference	2021	2022	2023	Type of storm overflow	WwTW sewer network	Average number of spills	Number of years data
WESTON COYNEY - PARK AVE/HORTON DRIVE (CSO)		0	0	SO on sewer network	STRONGFORD	0	2
STOKE-ON-TRENT - CROMER ROAD (CSO)	1	0	0	SO on sewer network	STRONGFORD	1	3
T/01/30157/O	0	1	0	SO on sewer network	STRONGFORD	1	3
T/01/30152/O		1	0	SO on sewer network	STRONGFORD	1	2
T/01/21896/O	0		1	SO on sewer network	STRONGFORD	1	2
NEWCASTLE U LYME - MILEHOUSE LN (CSO)	3	4	3	SO on sewer network	STRONGFORD	3	3
ABBEY HULTON – O/S XX GREASLEY ROAD (CSO)	0	11	16	SO on sewer network	STRONGFORD	6	3
16881957	0	0	0	SO on sewer network	KIDSGROVE	0	3
S/04/20963/O	0	0	0	SO on sewer network	LOGGERHEADS VILLAGE	0	3
T/01/01887/O	0	0	0	SO on sewer network	STRONGFORD	0	3
T/01/21502/O	0	0	0	SO on sewer network	STRONGFORD	0	3
T/01/36214/O	0	0	0	SO on sewer network	STRONGFORD	0	3

CSO reference	2021	2022	2023	Type of storm overflow	WwTW sewer network	Average number of spills	Number of years data
ABBEY HULTON-GREASLEY/LEEK ROAD (CSO)	0	0	0	SO on sewer network	STRONGFORD	0	3
T/01/35711/O	0	0	0	SO on sewer network	STRONGFORD	0	3
T/01/35787/O	0	0	0	SO on sewer network	STRONGFORD	0	3
T/01/35717/O	0	0	0	SO on sewer network	STRONGFORD	0	3
T/01/35974/O	0	0	0	SO on sewer network	STRONGFORD	0	3
T/01/36022/O	0	0	0	SO on sewer network	STRONGFORD	0	3
SILVERDALE - NEWCASTLE STREET (CSO)	0	0	0	SO on sewer network	STRONGFORD	0	3
CROSS HEATH - HEMSTALLS LN (CSO)	0	0	1	SO on sewer network	STRONGFORD	0	3
T/01/22640/O	1	0	0	SO on sewer network	STRONGFORD	0	3
T/01/21669/O	0	1	0	SO on sewer network	STRONGFORD	0	3
T/01/35955/O	0	1	0	SO on sewer network	STRONGFORD	0	3
T/01/36459/O	0	1	0	SO on sewer network	STRONGFORD	0	3
T/01/07540/O	1	0	0	SO on sewer network	STRONGFORD	0	3
STOKE ON TRENT - CAMPBELL ROAD (CSO)	13	0	0	Storm tank at WwTW	STRONGFORD	4	3
STOKE-ON-TRENT - QUEENSWAY (SSO)	0	1	0	SO on sewer network	STRONGFORD	0	3

CSO reference	2021	2022	2023	Type of storm overflow	WwTW sewer network	Average number of spills	Number of years data
01NEW0008	56		32	SO on sewer network	MADELEY	44	2
T/01/30151/O	1	1	0	SO on sewer network	STRONGFORD	1	3
EPRKB3190DB			0	SO on sewer network	STRONGFORD	0	1
EPRJB3490AL			0	SO on sewer network	STRONGFORD	0	1
T/01/36216/O	0	1	1	SO on sewer network	STRONGFORD	1	3
T/01/35786/O	0	2	1	SO on sewer network	STRONGFORD	1	3
T/01/30243/O	0	1	2	SO on sewer network	STRONGFORD	1	3
T/01/36257/O	2	1	0	SO on sewer network	STRONGFORD	1	3
T/01/36215/O	3	0	0	SO on sewer network	STRONGFORD	1	3
T/01/30153/O	1	2	0	SO on sewer network	STRONGFORD	1	3
EPRKB3193EK			0	Storm tank at WwTW	STRONGFORD	0	1
T/01/22783/O	2	0	1	SO on sewer network	STRONGFORD	1	3
T/01/35713/O	2	0	1	SO on sewer network	STRONGFORD	1	3
T/01/21117/O	4	1	0	SO on sewer network	STRONGFORD	2	3
01NEW0007	1	5	0	SO on sewer network	MADELEY	2	3
T/01/35716/O	3	0	3	SO on sewer network	STRONGFORD	2	3
T/01/02020/O	2	2	2	SO on sewer network	STRONGFORD	2	3
T/01/30327/O	0	3	4	SO on sewer network	STRONGFORD	2	3
T/01/12372/O Commissioned in 2017	4	7	4	SO on sewer network	STRONGFORD	5	3
T/01/12372/O Commissioned in 2020		0	0	SO on sewer network	STRONGFORD	0	2

CSO reference	2021	2022	2023	Type of storm overflow	WwTW sewer network	Average number of spills	Number of years data
T/01/22768/O	6	1	1	SO on sewer network	STRONGFORD	3	3
T/01/35800/O	5	3	0	SO on sewer network	STRONGFORD	3	3
T/01/30156/O	4	2	3	SO on sewer network	STRONGFORD	3	3
T/01/22784/O	3	3	3	SO on sewer network	STRONGFORD	3	3
T/01/20465/O	5	3	2	SO on sewer network	STRONGFORD	3	3
T/01/21508/O	4	3	3	SO on sewer network	STRONGFORD	3	3
T/01/30158/O	8	2	1	SO on sewer network	STRONGFORD	4	3
T/01/35799/O	7	4	0	SO on sewer network	STRONGFORD	4	3
T/01/21131/O	4	4	4	SO on sewer network	STRONGFORD	4	3
T/01/21606/O	4	7	2	SO on sewer network	STRONGFORD	4	3
T/01/35830/O	4	0	9	SO on sewer network	STRONGFORD	4	3
T/01/35844/O	9	2	3	SO on sewer network	STRONGFORD	5	3
T/01/35899/O	7	4	4	SO on sewer network	STRONGFORD	5	3
T/01/35973/O	7	2	6	SO on sewer network	STRONGFORD	5	3
T/01/35062/O	8	3	4	SO on sewer network	STRONGFORD	5	3
T/01/36226/O	2	0	14	SO on sewer network	STRONGFORD	5	3
T/01/21323/O	9	4	4	SO on sewer network	STRONGFORD	6	3
T/01/36023/O	3	1	14	SO on sewer network	STRONGFORD	6	3
T/01/22804/O	7	5	7	SO on sewer network	STRONGFORD	6	3
T/01/20998/O	4	4	11	SO on sewer network	STRONGFORD	6	3
FENTON - HERON STREET (CSO)	0	18	1	SO on sewer network	STRONGFORD	6	3
T/01/03101/O	10	10	0	SO on sewer network	STRONGFORD	7	3

CSO reference	2021	2022	2023	Type of storm overflow	WwTW sewer network	Average number of spills	Number of years data
T/01/30276/O	9	7	4	SO on sewer network	STRONGFORD	7	3
T/01/35956/O	13	2	7	SO on sewer network	STRONGFORD	7	3
T/01/35689/O	0	0	22	SO on sewer network	STRONGFORD	7	3
T/01/35644/O	12	2	9	SO on sewer network	STRONGFORD	8	3
T/01/21318/O	8	7	10	SO on sewer network	STRONGFORD	8	3
T/01/35893/O	13	3	9	SO on sewer network	STRONGFORD	8	3
T/01/12326/O	6	1	19	SO on sewer network	STRONGFORD	9	3
16882294	14	4	9	SO on sewer network	AUDLEY WwTW	9	3
NPSWQD002018	13	9	6	SO on sewer network	STRONGFORD	9	3
T/01/21319/O	29	1	0	SO on sewer network	STRONGFORD	10	3
T/01/20993/O	16	9	6	SO on sewer network	STRONGFORD	10	3
T/01/22807/O	17	14	1	SO on sewer network	STRONGFORD	11	3
T/01/30092/O	17	13	4	SO on sewer network	STRONGFORD	11	3
T/01/36408/O	16	7	12	SO on sewer network	STRONGFORD	12	3
16810083	6	16	14	Storm tank at WwTW	KIDSGROVE	12	3
T/01/36478/O	13	11	12	SO on sewer network	STRONGFORD	12	3
T/01/21213/O	17	13	8	SO on sewer network	STRONGFORD	13	3
T/01/35900/O	22	10	9	SO on sewer network	STRONGFORD	14	3
T/01/35719/O	0	2	39	SO on sewer network	STRONGFORD	14	3
T/01/36473/O	16	14	11	SO on sewer network	STRONGFORD	14	3
T/01/35797/O	20	13	9	SO on sewer network	STRONGFORD	14	3
T/01/36468/O	9	13	21	SO on sewer network	STRONGFORD	14	3
T/01/01822/O	14	5	26	SO on sewer network	STRONGFORD	15	3

CSO reference	2021	2022	2023	Type of storm overflow	WwTW sewer network	Average number of spills	Number of years data
T/01/21499/O	0	0	45	SO on sewer network	STRONGFORD	15	3
STOKE-ON-TRENT - RIVERHEAD CLOSE (CSO)	58	56	30	SO on sewer network	STRONGFORD	48	3
T/01/30305/O	27	13	6	SO on sewer network	STRONGFORD	15	3
T/01/22729/O	18	16	13	SO on sewer network	STRONGFORD	16	3
STOKE-ON-TRENT - ASH GREEN CLOSE (CSO)	4	24	19	SO on sewer network	STRONGFORD	16	3
S/04/55884/R	27	15	6	Storm tank at WwTW	LOGGERHEADS VILLAGE	16	3
T/01/35968/O	1	27	20	SO on sewer network	STRONGFORD	16	3
T/01/00122/O	12	16	25	SO on sewer network	STRONGFORD	18	3
T/01/30008/O	21	0	32	SO on sewer network	STRONGFORD	18	3
T/01/21284/O	31	17	6	SO on sewer network	STRONGFORD	18	3
T/01/35967/O	0	39	15	SO on sewer network	STRONGFORD	18	3
T/01/35954/O	23	21	12	SO on sewer network	STRONGFORD	19	3
T/01/02126/O	24	11	22	SO on sewer network	STRONGFORD	19	3
STOKE-ON-TRENT - QUEEN ANNE STREET (CSO)	25	24	9	SO on sewer network	STRONGFORD	19	3
T/01/21241/O	34	19	7	SO on sewer network	STRONGFORD	20	3
T/01/30035/O	25	27	10	SO on sewer network	STRONGFORD	21	3
T/01/22805/O	30	34	0	SO on sewer network	STRONGFORD	21	3

CSO reference	2021	2022	2023	Type of storm overflow	WwTW sewer network	Average number of spills	Number of years data
T/01/36239/O	24	24	19	SO on sewer network	STRONGFORD	22	3
T/01/35892/O	31	27	15	SO on sewer network	STRONGFORD	24	3
T/01/35942/O	24	17	34	SO on sewer network	STRONGFORD	25	3
T/01/35837/O	35	36	7	SO on sewer network	STRONGFORD	26	3
T/01/36237/O	18	39	24	SO on sewer network	STRONGFORD	27	3
16810091	57	16	18	Storm tank at WwTW	MADELEY	30	3
T/01/35196/O	20	26	45	SO on sewer network	STRONGFORD	30	3
16810825	60	10	23	SO on sewer network	KIDSGROVE	31	3
T/01/22738/O	36	32	29	SO on sewer network	STRONGFORD	32	3
T/01/35798/O	40	25	35	SO on sewer network	STRONGFORD	33	3
T/01/36238/O	28	36	39	SO on sewer network	STRONGFORD	34	3
T/01/36406/O	37	32	34	SO on sewer network	STRONGFORD	34	3
T/01/35770/O	29	28	47	SO on sewer network	STRONGFORD	35	3
16810049	0	31	76	Storm tank at WwTW	BETLEY	36	3
T/01/36405/O	44	25	40	SO on sewer network	STRONGFORD	36	3
T/01/21052/O	35	33	46	SO on sewer network	STRONGFORD	38	3
T/01/30171/O	69	48	2	SO on sewer network	STRONGFORD	40	3
T/01/36007/O	40	34	46	SO on sewer network	STRONGFORD	40	3
EPRKB3192RR			2	SO on sewer network	STRONGFORD	2	1
EPRKB3099VF			3	SO on sewer network	STRONGFORD	3	1
T/01/36418/O	53	37	52	SO on sewer network	STRONGFORD	47	3
16810045 - Inlet to WwTW	62	61	64	Inlet SO at WwTW	AUDLEY WwTW	48	3

CSO reference	2021	2022	2023	Type of storm overflow	WwTW sewer network	Average number of spills	Number of years data
16810045 - ST	80	0	62	Storm tank at WwTW	AUDLEY WwTW	71	3
EPRKB3090WA			16	SO on sewer network	STRONGFORD	16	1
01NEW0006	64	35	46	SO on sewer network	MADELEY	48	3
T/01/35986/O	46	50	53	SO on sewer network	STRONGFORD	50	3
T/01/35715/O	74	49	45	SO on sewer network	STRONGFORD	56	3
01NEW0005	112	15	42	SO on sewer network	MADELEY	56	3
T/02/36078/R	79		78	Inlet SO at WwTW	ASHLEY	79	2
EPRJB3494NP			30	SO on sewer network	STRONGFORD	30	1
T/01/21605/O	65	53	54	SO on sewer network	STRONGFORD	57	3
T/01/36052/R	79	48	79	Storm tank at WwTW	STRONGFORD	69	3
T/01/21322/O	72	70	71	SO on sewer network	STRONGFORD	71	3
HANFORD - CAMPBELL ROAD SPS	0			Storm discharge at pumping station	STRONGFORD	3	1
16881976	82	187	77	SO on sewer network	KIDSGROVE	115	3

B Water Quality modelling results

B.1 WwTW deterioration tables

B.1.1 Ammonia

WwTW	Baseline concentration (mg/l)	Future concentration (mg/l)	Percentage deterioration (%)	TAL concentration (mg/l)	TAL Percentage deterioration (%)	Baseline Class	Future Class	TAL Class
Ashley	0.289	0.289	0%	0.281	-3%	HIGH	HIGH	HIGH
Audley	1.266	1.262	0%	0.884	-30%	POOR	POOR	MODERATE
Baldwins Gate	0.326	0.370	14%	0.179	-45%	GOOD	GOOD	HIGH
Betley	0.526	0.536	2%	0.190	-64%	GOOD	GOOD	HIGH
Kidsgrove	0.190	0.192	1%	0.192	1%	HIGH	HIGH	HIGH
Loggerheads sanatorium	0.878	0.890	1%	0.383	-56%	MODERATE	MODERATE	GOOD
Loggerheads village	0.453	0.450	-1%	0.450	-1%	GOOD	GOOD	GOOD
Madeley	0.395	0.397	1%	0.397	1%	GOOD	GOOD	GOOD
Strongford	0.338	0.339	0%	0.339	0%	GOOD	GOOD	GOOD

B.1.2 BOD

WwTW	Baseline concentration (mg/l)	Future concentration (mg/l)	Percentage deterioration (%)	TAL concentration (mg/l)	TAL Percentage deterioration (%)	Baseline Class	Future Class	TAL Class
Ashley	3.620	3.620	0%	3.620	0%	HIGH	HIGH	HIGH
Audley	4.651	4.674	1%	3.821	-18%	GOOD	GOOD	HIGH
Baldwins Gate	3.300	3.290	0%	3.290	0%	HIGH	HIGH	HIGH
Betley	6.740	6.758	0%	6.281	-7%	POOR	POOR	MODERATE
Kidsgrove	4.008	3.948	-2%	3.948	-2%	GOOD	HIGH	HIGH
Loggerheads sanatorium	2.969	2.981	0%	2.577	-13%	HIGH	HIGH	HIGH
Loggerheads village	3.597	3.500	-3%	3.500	-3%	HIGH	HIGH	HIGH
Madeley	4.776	4.775	0%	4.775	0%	GOOD	GOOD	GOOD
Strongford	2.850	2.832	-1%	2.832	-1%	HIGH	HIGH	HIGH

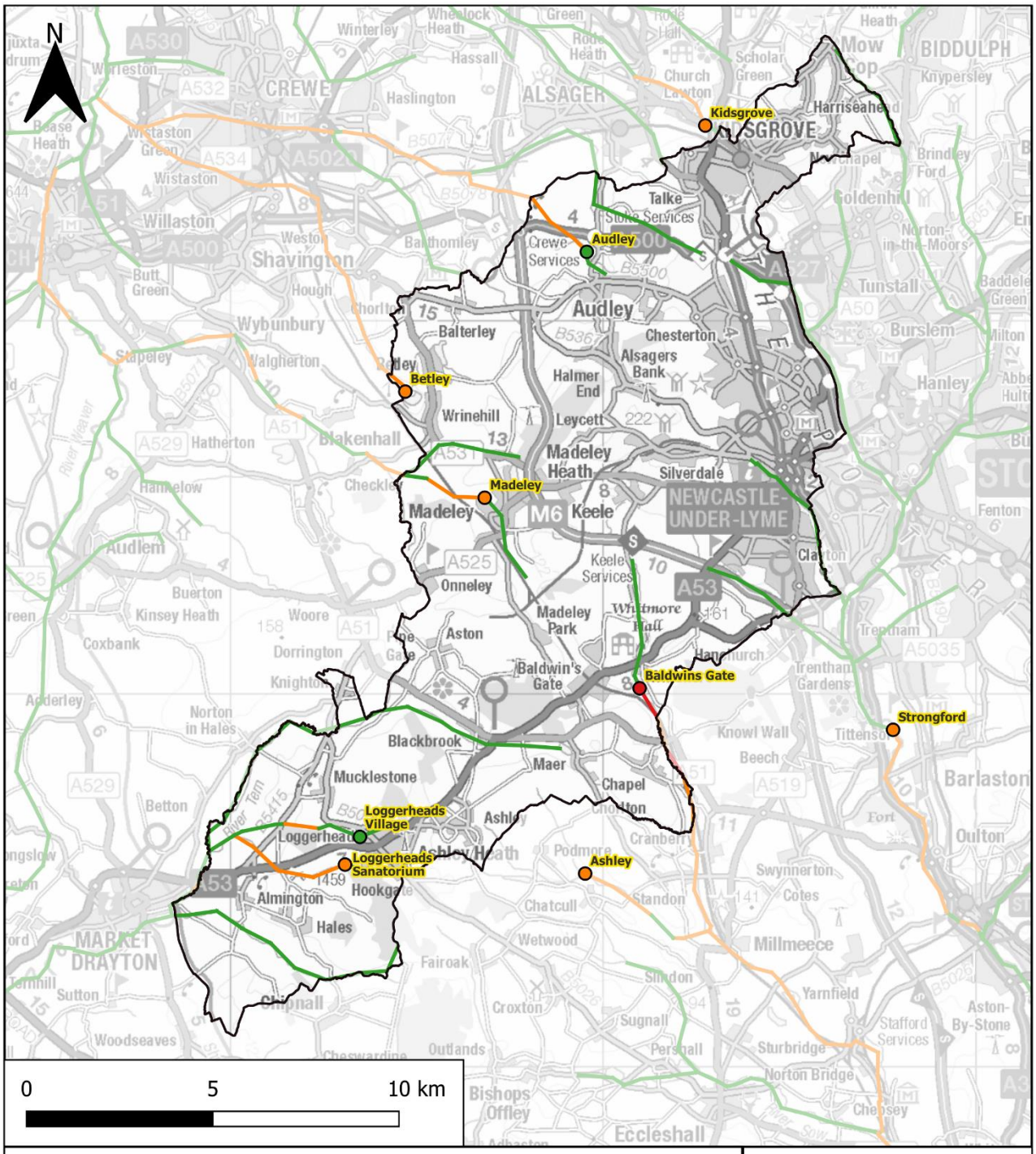
B.1.3 Phosphate

WwTW	Baseline concentration (mg/l)	Future concentration (mg/l)	Percentage deterioration (%)	TAL concentration (mg/l)	TAL Percentage deterioration (%)	Baseline Class	Future Class	TAL Class
Ashley	0.256	0.258	1%	0.152	-41%	POOR	POOR	MODERATE
Audley	1.565	1.586	1%	0.169	-89%	BAD	BAD	MODERATE
Baldwins Gate	0.405	0.441	9%	0.235	-42%	POOR	POOR	POOR
Betley	0.475	0.482	1%	0.143	-70%	POOR	POOR	MODERATE
Kidsgrove	0.128	0.130	2%	0.130	2%	MODERATE	MODERATE	MODERATE
Loggerheads sanatorium	0.348	0.353	1%	0.065	-81%	POOR	POOR	GOOD
Loggerheads village	0.639	0.579	-9%	0.558	-13%	POOR	POOR	POOR
Madeley	0.748	0.759	1%	0.180	-76%	POOR	POOR	POOR
Strongford	0.293	0.295	1%	0.214	-27%	POOR	POOR	POOR

B.2 Water quality mapping

B.2.1 Future Scenario

The following maps show the comparison of modelled results between baseline and future scenarios. The future scenario represents the predicted increase in wastewater discharges during the Local Plan period. They show a result at the point of mixing (i.e. where the WwTW discharges) and the results further downstream in the watercourse. These are classified by colours based on whether the deterioration is greater than 10% (red), less than 10% (amber) or less than or equal to 0% (green).



Ammonia Deterioration

NuL Boundary

Watercouse Deterioration at WwTW Outfall

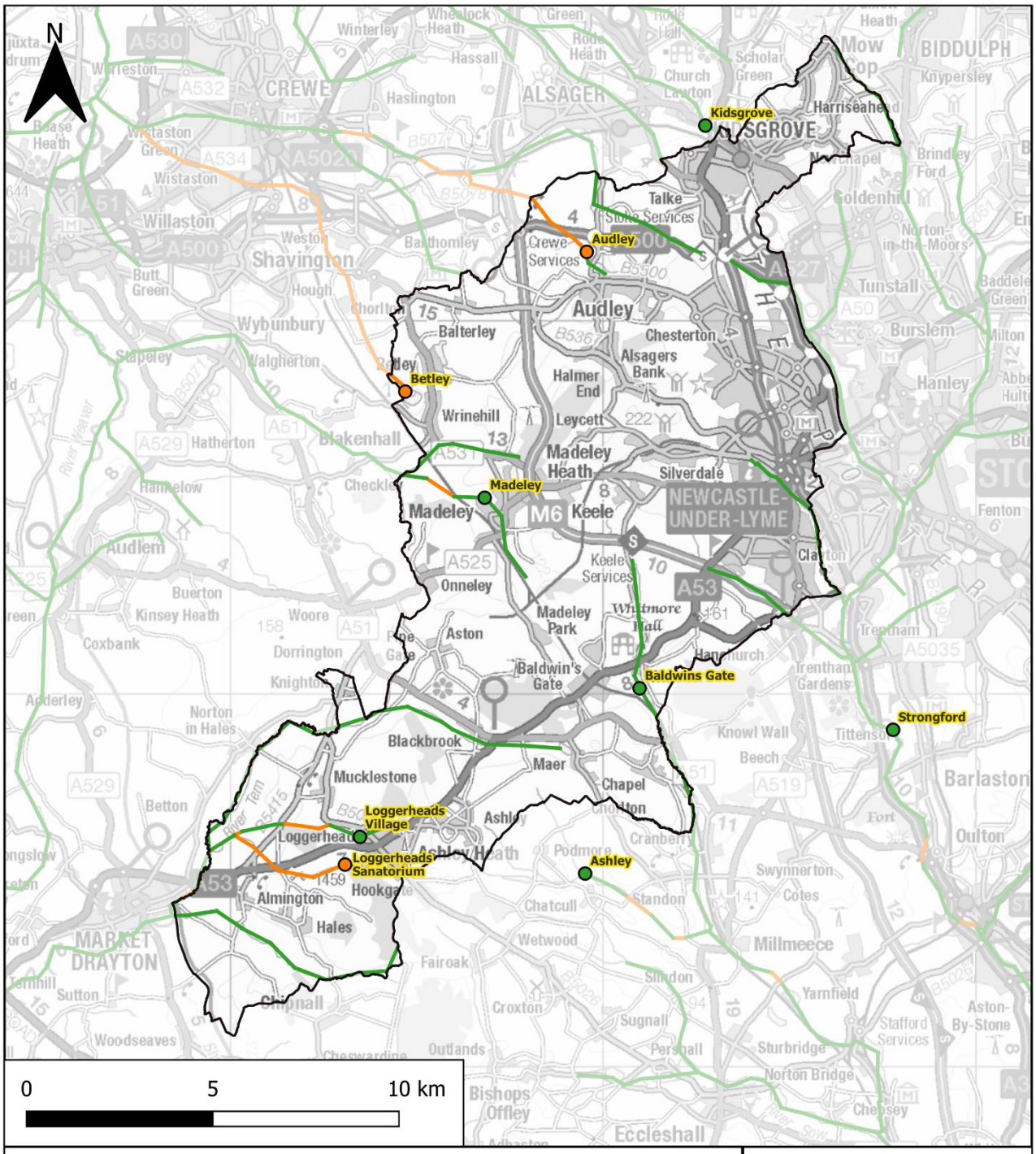
- No Deterioration
- Deterioration <10%
- Deterioration >10%

Deterioration in Watercourse

- No Data
- No Deterioration
- Deterioration <10%
- Deterioration >10%

35 Perrymount Road
Haywards Heath
RH16 3BW

Castle House
Barracks Rd
Newcastle-under-Lyme
ST5 1BL



BOD Deterioration

NuL Boundary

Watercouse Deterioration at WwTW Outfall

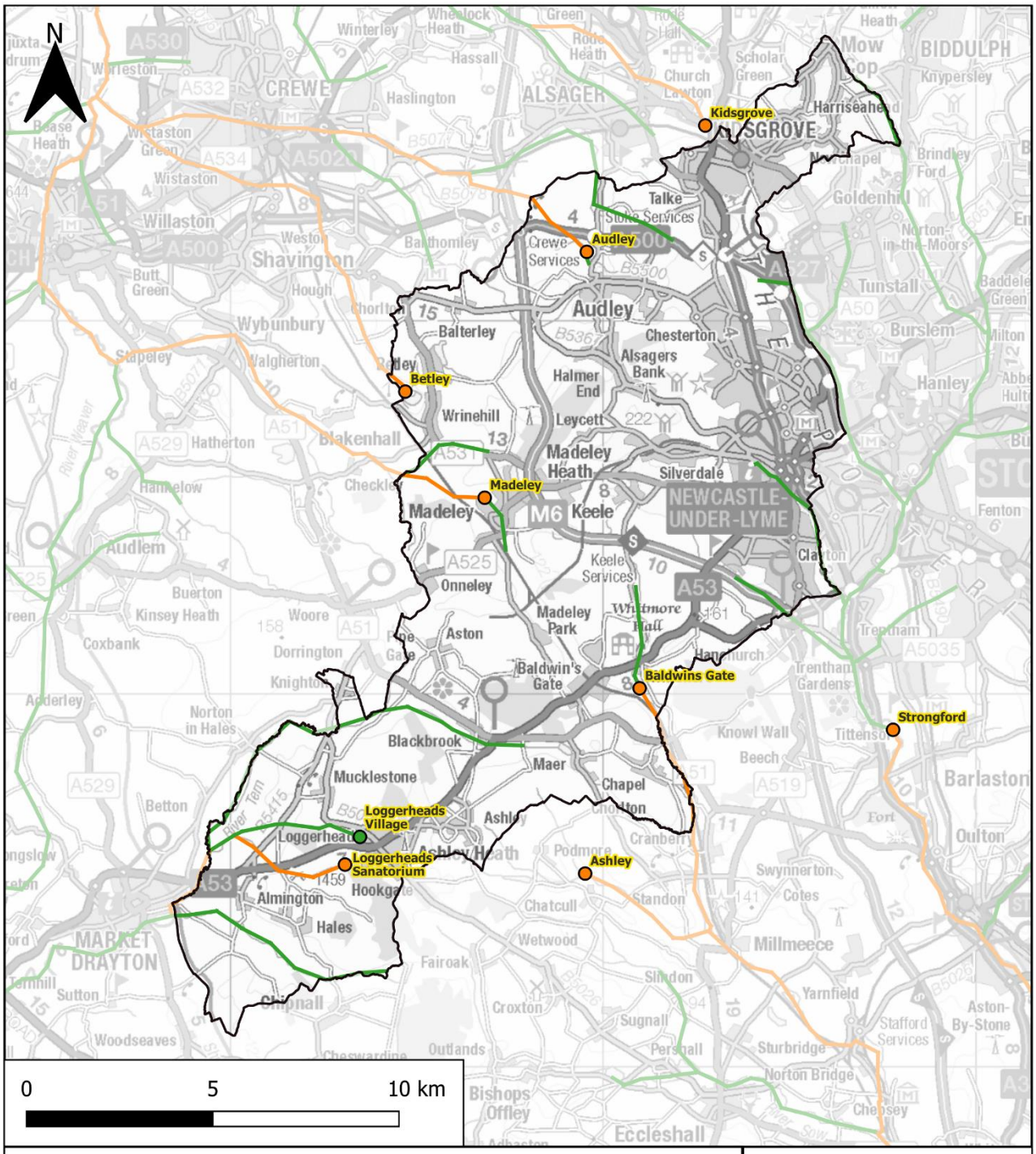
- No Deterioration
- Deterioration <10%
- Deterioration >10%

Deterioration in Watercourse

- No Data
- No Deterioration
- Deterioration <10%
- Deterioration >10%

35 Perrymount Road
Haywards Heath
RH16 3BW

Castle House
Barracks Rd
Newcastle-under-Lyme
ST5 1BL



Phosphate Deterioration

NuL Boundary

Watercouse Deterioration at WwTW Outfall

- No Deterioration
- Deterioration <10%
- Deterioration >10%

Deterioration in Watercourse

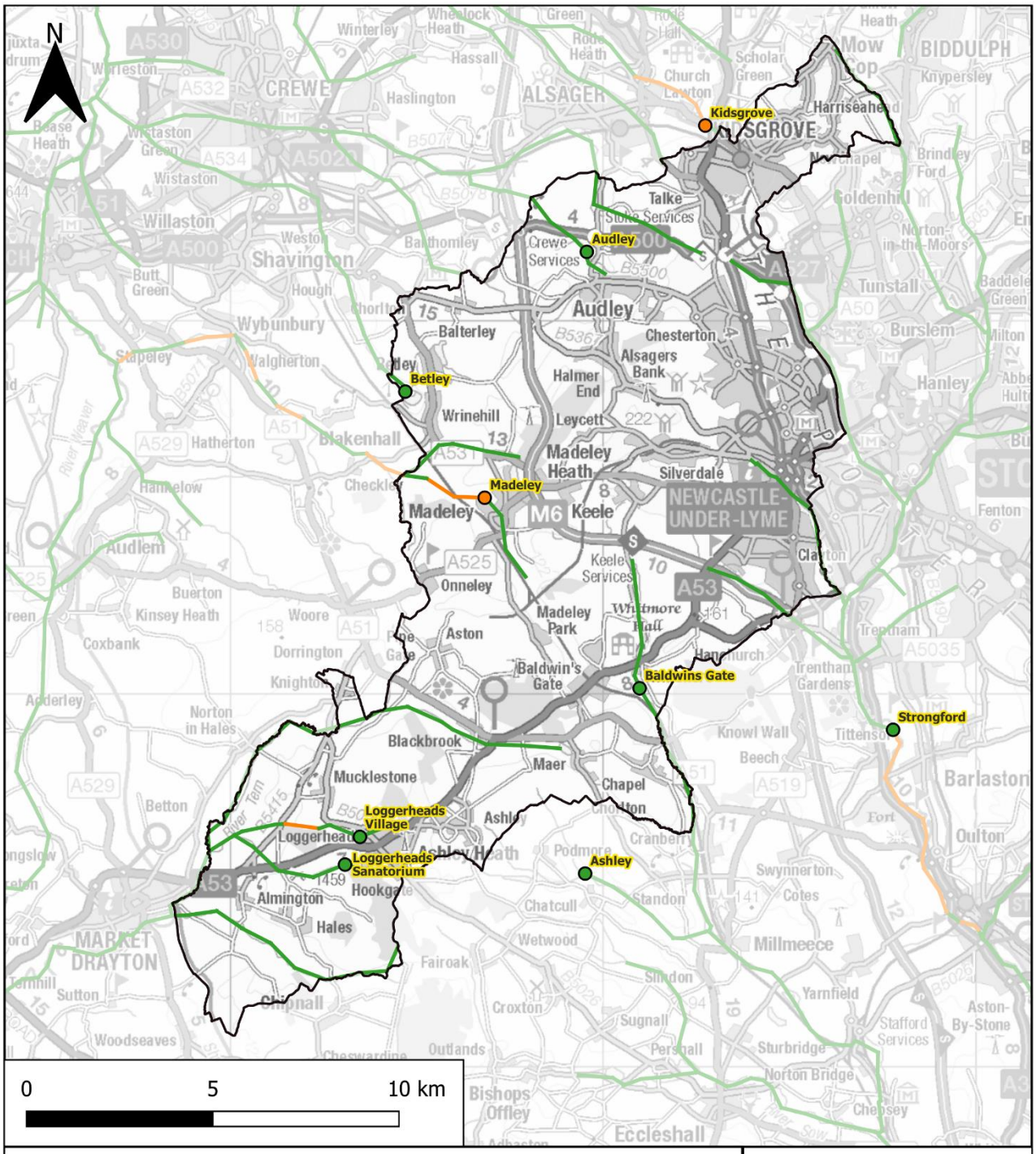
- No Data
- No Deterioration
- Deterioration <10%
- Deterioration >10%

35 Perrymount Road
Haywards Heath
RH16 3BW

Castle House
Barracks Rd
Newcastle-under-Lyme
ST5 1BL

B.2.2 Future TAL Scenario

This second set of maps shows the comparison of modelled results between baseline the future TAL scenario, where each WwTW has been upgraded to the technically achievable limit (TAL) of treatment. These are classified by colours based on whether the deterioration is greater than 10% (red), less than 10% (amber) or less than or equal to 0% (green).



Ammonia Deterioration - TAL

NuL Boundary

Watercouse Deterioration at WwTW Outfall

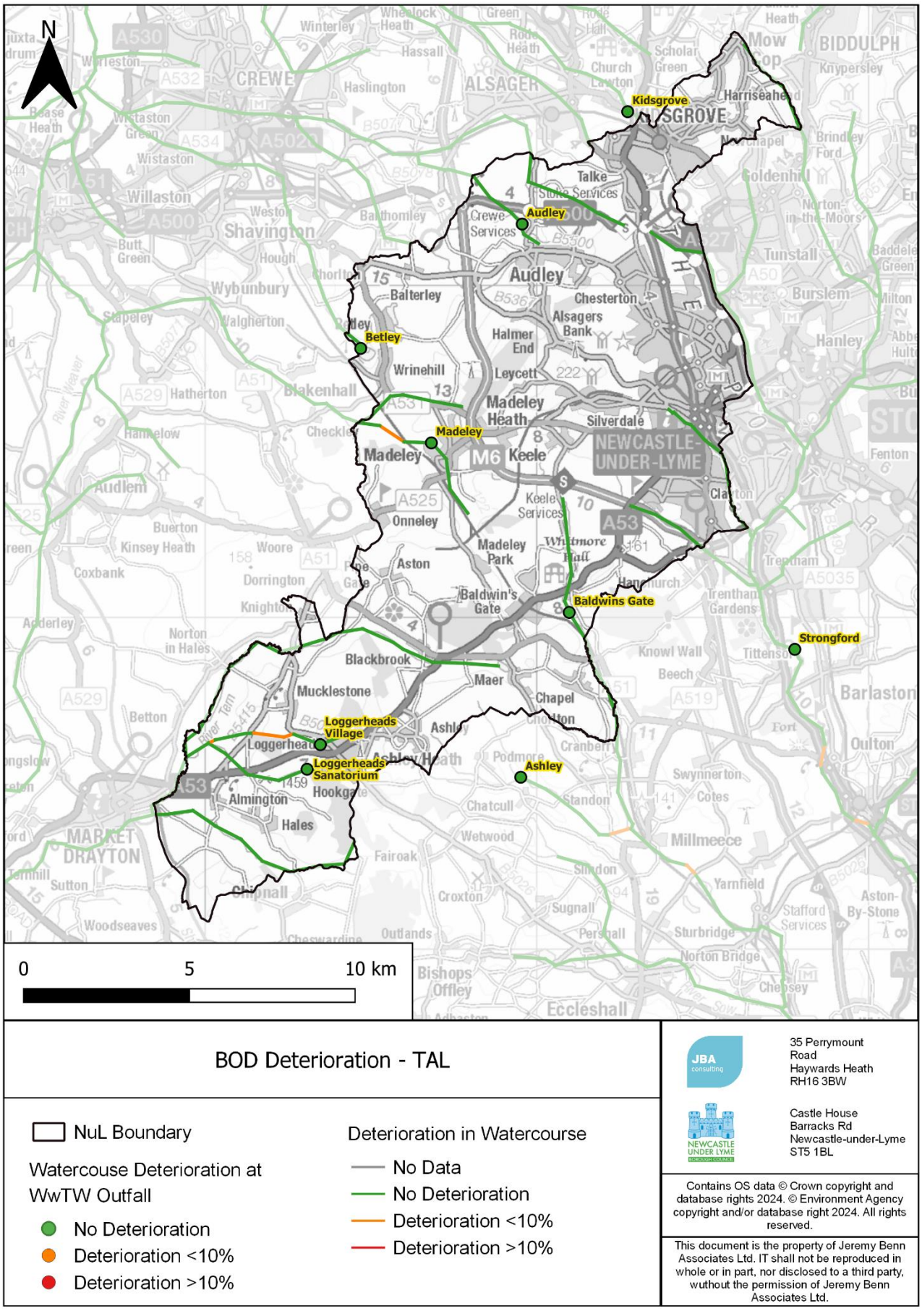
- No Deterioration
- Deterioration <10%
- Deterioration >10%

Deterioration in Watercourse

- No Data
- No Deterioration
- Deterioration <10%
- Deterioration >10%

35 Perrymount Road
Haywards Heath
RH16 3BW

Castle House
Barracks Rd
Newcastle-under-Lyme
ST5 1BL


N
Kidsgrove
Audley
Betley
Madeley
Baldwins Gate
Strongford
Loggerheads Village
Loggerheads Sanatorium
Ashley
0
5
10 km
BOD Deterioration - TAL
NuL Boundary
Watercouse Deterioration at WwTW Outfall
No Deterioration
Deterioration <10%
Deterioration >10%
Deterioration in Watercourse
No Data
No Deterioration
Deterioration <10%
Deterioration >10%
35 Perrymount Road
Haywards Heath
RH16 3BW
Castle House
Barracks Rd
Newcastle-under-Lyme
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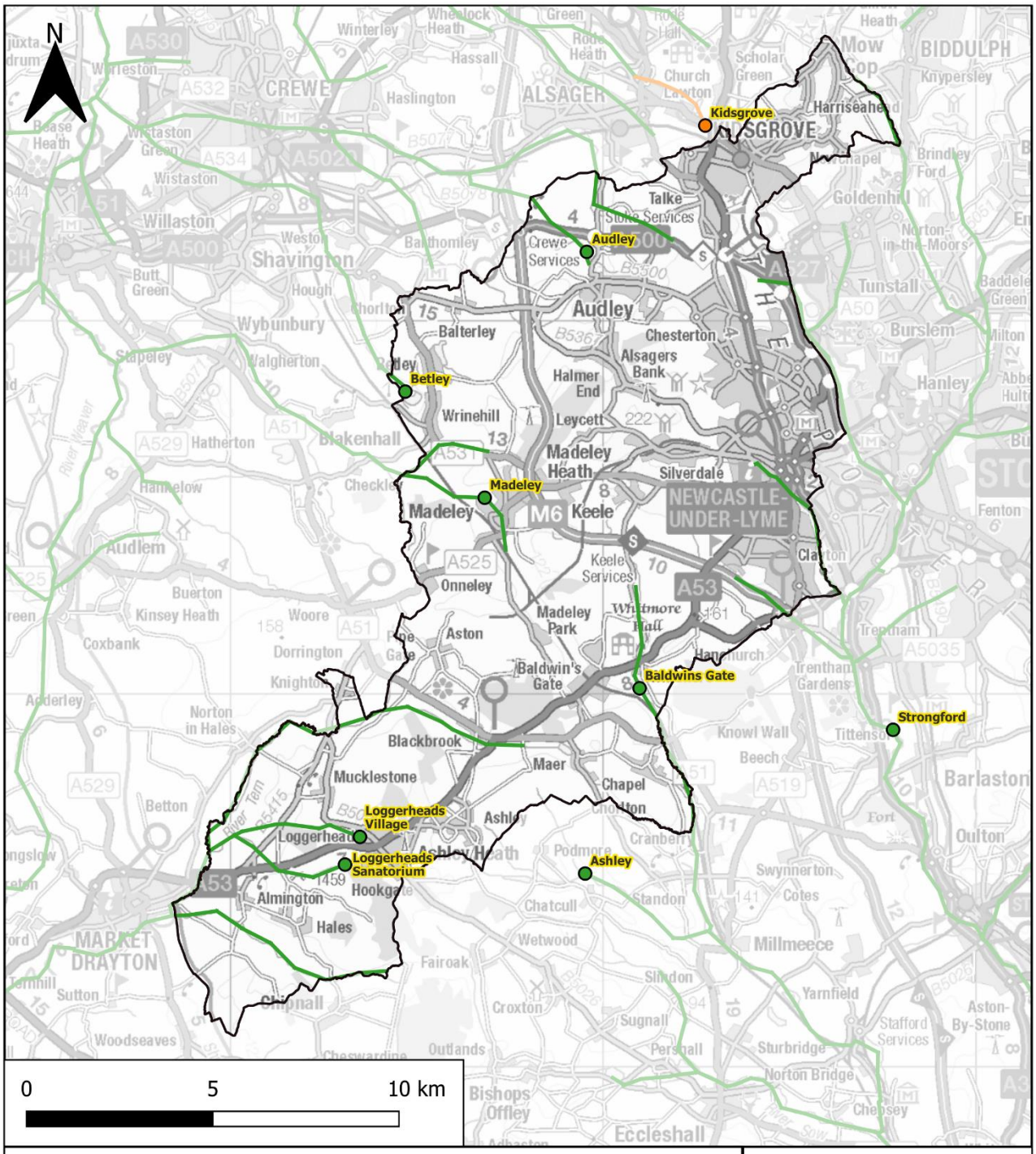

Phosphate Deterioration - TAL

NuL Boundary

Watercouse Deterioration at WwTW Outfall

- No Deterioration
- Deterioration <10%
- Deterioration >10%

Deterioration in Watercourse

- No Data
- No Deterioration
- Deterioration <10%
- Deterioration >10%

35 Perrymount Road
Haywards Heath
RH16 3BW

Castle House
Barracks Rd
Newcastle-under-Lyme
ST5 1BL

B.3 Environmental sites deterioration tables

B.3.1 Special area of conservation

SAC name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Pasturefields Salt Marsh	UK0012789	Start Of Reach 202	0%	1%	0%	-5%	-1%	-19%
River Mease	UK0030258	Start Of Reach 289	0%	0%	0%	-22%	-3%	-42%

B.3.2 Special area of conservation

RAMSAR name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Betley Mere (Midland Meres & Mosses - Phase 1)	UK11043	Betley WwTW	2%	0%	1%	-64%	-7%	-70%

RAMSAR name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Wybunbury Moss (Midland Meres & Mosses - Phase 1) also SAC	UK11043	CSO 631	0%	0%	1%	0%	0%	-54%

B.3.3 Site of special scientific interest

SSSI name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Hatton's Hey Wood, Whittle's Corner and Bank Rough	SJ566770	ExtraPlotPoint-Reach932No1	0%	0%	0%	-29%	-6%	-46%
Sandbach Flashes	SJ717628	WQ88000820	0%	0%	0%	-55%	-10%	-50%
Sandbach Flashes	SJ717628	WQ88000820	0%	0%	0%	-55%	-10%	-50%
Sandbach Flashes	SJ717628	WQ88000820	0%	0%	0%	-55%	-10%	-50%
Warburton's Wood and Well Wood	SJ555762	ExtraPlotPoint-Reach932No2	0%	0%	0%	-29%	-5%	-46%
Wimboldsley Wood	SJ671644	ExtraPlotPoint-Reach913No1	0%	0%	0%	-65%	-6%	-41%
Attenborough Gravel Pits	SK521342	ExtraPlotPoint-Reach699N	0%	0%	0%	-22%	-3%	-43%

SSSI name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
		o3						
River Mease	SK264113	StartOfReach289	0%	0%	0%	-22%	-3%	-42%
Holme Pit	SK536345	StartOfReach720	0%	0%	0%	-22%	-4%	-43%
Pasturefields Salt Marsh	SJ991248	ExtraPlotPoint-Reach202No1	-1%	0%	0%	-5%	-1%	-19%
Lockington Marshes	SK489299	ExtraPlotPoint-Reach537No1	0%	0%	0%	-23%	-3%	-43%
Doxey and Tillington Marshes	SJ906243	ExtraPlotPoint-Reach225No4	0%	0%	1%	-9%	-1%	-33%
Rawbones Meadow	SJ984225	ExtraPlotPoint-Reach243No3	0%	0%	0%	-34%	-9%	-43%
Baswich Meadows	SJ950226	WQ70257450	0%	0%	0%	-5%	-1%	-36%

SSSI name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Allscott Settling Ponds	SJ601129	ExtraPlotPoint-Reach268No1	0%	0%	0%	-1%	0%	-18%
Attingham Park	SJ551095	ExtraPlotPoint-Reach272No1	0%	0%	0%	-2%	0%	-19%
Buildwas River Section	SJ640045	StartOfReach299	0%	0%	0%	-3%	-1%	-33%
Coombe Hill Canal	SO867268	ExtraPlotPoint-Reach1034No2	0%	0%	0%	-37%	-1%	-42%
Tick Wood and Benthall Edge	SJ663033	ExtraPlotPoint-Reach301No2	0%	0%	0%	-2%	-1%	-33%
Wainlode Cliff	SO845257	StartOfReach1039	0%	0%	0%	-36%	-1%	-41%
Chaceley Meadow	SO857305	FSSevernDeerhurst	0%	0%	0%	-38%	-1%	-42%

SSSI name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Grimley Brick Pits	SO838616	StartOfReach407	0%	0%	0%	-20%	0%	-39%
Hartlebury Common and Hilldtch Coppice	SO823707	StartOfReach391	0%	0%	0%	-20%	-1%	-39%
Northwick Marsh	SO835579	ExtraPlotPoint-Reach443No1	0%	0%	0%	-18%	0%	-38%
Severn Ham, Tewkesbury	SO885325	StartOfReach1022	0%	0%	0%	-37%	-1%	-42%
Shrawley Wood	SO808659	StartOfReach400	0%	0%	0%	-20%	0%	-39%
Old River Severn, Upper Lode	SO880330	BUSHLEYCROF	0%	0%	0%	-37%	-1%	-42%
Upton Ham	SO859400	HOLLYGREENSTW	0%	0%	0%	-35%	-1%	-44%
Ashleworth Ham	SO832262	ExtraPlotPoint-Reach1039No1	0%	0%	0%	-35%	-1%	-41%

SSSI name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
River Teme	SO507745	WQ00030090	0%	0%	0%	-33%	0%	-42%
Wyre Forest	SO745766	UPPERARLEYSTW	0%	0%	0%	-10%	0%	-40%
Wyre Forest	SO745766	StartOfReach352	0%	0%	0%	-9%	0%	-40%
Wyre Forest	SO745766	ExtraPlotPoint-Reach352No1	0%	0%	0%	-9%	0%	-40%
Wyre Forest	SO745766	ExtraPlotPoint-Reach349No1	0%	0%	0%	-10%	0%	-40%

C WINEP actions by WFD waterbody within NuL

Waterbody ID	Waterbody Name	CaBA catchment name	Scheme Name/Name of Investigation/Site Name/Licence name	Core Obligation	Action Type	Driver Code (Primary)	Further Driver Code Information (related to the primary driver if applicable)	Driver Code (Secondary)
GB10402805 3050	Chatcull Brook from Source to Meece Brook	Staffordshire Trent Valley	ASHLEY (STW)	WFD	ND	WFD_ND	Biochemical Oxygen Demand / Dissolved Oxygen	
GB10402805 3050	Chatcull Brook from Source to Meece Brook	Staffordshire Trent Valley	THE WELLINGS - BOREHOLES 1&2 (WELLINGS; PWS_196)	WFD	NDINV	WFD_NDINV_WRFlow		WFDGW_NDINV_GWR
GB10402805 3080	Meece Brook from Source to Chatcull Brook	Staffordshire Trent Valley	HATTON - BOREHOLES (PWS_79)	WFD	ND	WFD_ND_WRFlow		
GB10402805 3080	Meece Brook from Source to Chatcull Brook	Staffordshire Trent Valley	MILLMEECE - WELLS & BOREHOLES (MILL MEECE; PWS_115)	WFD	ND	WFD_ND_WRFlow		
GB10402805 3080	Meece Brook from Source to Chatcull Brook	Staffordshire Trent Valley	WHITMORE, STAFFS - SUPPLY BOREHOLE (PWS_202)	WFD	ND	WFD_ND_WRFlow		
GB10402805 3271	Trent from Fowlea Brook to Tittensor	Staffordshire Trent Valley	BOOTHEN - BOOTHEN OLD ROAD 1 (CSO)	WFD	IMP	WFD_IMPg	Other	
GB10402805 3271	Trent from Fowlea Brook to Tittensor	Staffordshire Trent Valley	BOOTHEN - CHAMBERLAIN AVENUE (CSO)	WFD	IMP	WFD_IMPg	Other	
GB10402805 3271	Trent from Fowlea Brook to Tittensor	Staffordshire Trent Valley	HANFORD - STONE ROAD (SPS)	U	MON	U_MON2		

Waterbody ID	Waterbody Name	CaBA catchment name	Scheme Name/Name of Investigation/Site Name/Licence name	Core Obligation	Action Type	Driver Code (Primary)	Further Driver Code Information (related to the primary driver if applicable)	Driver Code (Secondary)
GB10402805 3271	Trent from Fowlea Brook to Tittensor	Staffordshire Trent Valley	MICHELIN A34-CRITICAL (CSO)	WFD	IMP	WFD_IMPg	Other	
GB10402805 3271	Trent from Fowlea Brook to Tittensor	Staffordshire Trent Valley	PENKHULL- PENKHULL NEW ROAD (CSO)	WFD	IMP	WFD_IMPg	Other	
GB10402805 3271	Trent from Fowlea Brook to Tittensor	Staffordshire Trent Valley	STRONGFORD (STW)	U	MON	U_MON4		
GB10402805 3271	Trent from Fowlea Brook to Tittensor	Staffordshire Trent Valley	STRONGFORD (STW)	U	MON	U_MON3		
GB10402805 3271	Trent from Fowlea Brook to Tittensor	Staffordshire Trent Valley	STRONGFORD (STW)	WFD	IMP	WFD_IMPm	Phosphorus	
GB10402805 3271	Trent from Fowlea Brook to Tittensor	Staffordshire Trent Valley	STRONGFORD (STW)	WFD	ND	WFD_ND	Biochemical Oxygen Demand / Dissolved Oxygen	
GB10402805 3271	Trent from Fowlea Brook to Tittensor	Staffordshire Trent Valley	TITTENSOR (CSO)	WFD	IMP	WFD_IMPg	Other	
GB10402805 3271	Trent from Fowlea Brook to Tittensor	Staffordshire Trent Valley	TRENT VALE PS (CSO)	U	IMP	U_IMP4		

Waterbody ID	Waterbody Name	CaBA catchment name	Scheme Name/Name of Investigation/Site Name/Licence name	Core Obligation	Action Type	Driver Code (Primary)	Further Driver Code Information (related to the primary driver if applicable)	Driver Code (Secondary)
GB10402805 3271	Trent from Fowlea Brook to Tittensor	Staffordshire Trent Valley	TRENT VALE PS (CSO)	U	INV	U_INV		
GB10402805 3271	Trent from Fowlea Brook to Tittensor	Staffordshire Trent Valley	TRENT VALE PS (CSO)	WFD	IMP	WFD_IMPg	Other	
GB10402805 3271	Trent from Fowlea Brook to Tittensor	Staffordshire Trent Valley	Whitmore Rd Trentham CSO	U	MON	U_MON1		
GB10402805 3271	Trent from Fowlea Brook to Tittensor	Staffordshire Trent Valley	WHITMORE RD TRENTHAM CSO	WFD	IMP	WFD_IMPg	Other	
GB10402805 3340	Lyme Brook Catchment (trib of Trent)	Staffordshire Trent Valley	HARTSHILL - HILTON ROAD (CSO)	U	IMP	U_IMP4		
GB10402805 3340	Lyme Brook Catchment (trib of Trent)	Staffordshire Trent Valley	HARTSHILL - HILTON ROAD (CSO)	U	INV	U_INV		
GB10402805 3340	Lyme Brook Catchment (trib of Trent)	Staffordshire Trent Valley	HARTSHILL - HILTON ROAD (CSO)	WFD	IMP	WFD_IMPg	Other	
GB10402805 3340	Lyme Brook Catchment (trib of Trent)	Staffordshire Trent Valley	NEWCASTLE - CLAYTON ROAD (CSO)	WFD	IMP	WFD_IMPg	Other	

Waterbody ID	Waterbody Name	CaBA catchment name	Scheme Name/Name of Investigation/Site Name/Licence name	Core Obligation	Action Type	Driver Code (Primary)	Further Driver Code Information (related to the primary driver if applicable)	Driver Code (Secondary)
GB10402805 3340	Lyme Brook Catchment (trib of Trent)	Staffordshire Trent Valley	NEWCASTLE - THE HIGHERLAND (SOUTH) (CSO)	WFD	IMP	WFD_IMPg	Other	
GB10402805 3340	Lyme Brook Catchment (trib of Trent)	Staffordshire Trent Valley	SILVERDALE - ELLAMS PLACE (CSO)	WFD	IMP	WFD_IMPg	Other	
GB10402805 3340	Lyme Brook Catchment (trib of Trent)	Staffordshire Trent Valley	SILVERDALE - SILVERDALE ROAD (SPS)	WFD	IMP	WFD_IMPg	Other	
GB10402805 3340	Lyme Brook Catchment (trib of Trent)	Staffordshire Trent Valley	SILVERDALE - SILVERDALE ROAD 389 (CSO)	WFD	IMP	WFD_IMPg	Other	
GB10402805 3340	Lyme Brook Catchment (trib of Trent)	Staffordshire Trent Valley	WESTLANDS - DARTMOUTH AVENUE (CSO)	WFD	IMP	WFD_IMPg	Other	
GB10402805 3360	Fowlea Brook from Source to River Trent	Staffordshire Trent Valley	ETRURIA - QUEENSWAY (CSO)	WFD	IMP	WFD_IMPg	Other	
GB10402805 3360	Fowlea Brook from Source to River Trent	Staffordshire Trent Valley	PORTHILL - ORFORD STREET (CSO)	WFD	IMP	WFD_IMPg	Other	
GB10402805 3360	Fowlea Brook from Source to River Trent	Staffordshire Trent Valley	PORTHILL - WATLANDS VIEW 4A (CSO)	WFD	IMP	WFD_IMPg	Other	

Waterbody ID	Waterbody Name	CaBA catchment name	Scheme Name/Name of Investigation/Site Name/Licence name	Core Obligation	Action Type	Driver Code (Primary)	Further Driver Code Information (related to the primary driver if applicable)	Driver Code (Secondary)
GB10402805 3360	Fowlea Brook from Source to River Trent	Staffordshire Trent Valley	STOKE-ON-TRENT - BEECHS GARAGE (CSO)	WFD	IMP	WFD_IMPg	Other	
GB10905405 0230	Ellerton Bk - source to conf R Meese	Shropshire Middle Severn	CHESWARDINE (STW)	U	INV	U_INV2		
GB10905405 0230	Ellerton Bk - source to conf R Meese	Shropshire Middle Severn	CHESWARDINE (STW)	U	MON	U_MON3		
GB10905405 0230	Ellerton Bk - source to conf R Meese	Shropshire Middle Severn	CHESWARDINE (STW)	WFD	IMP	WFD_IMPg	Phosphorus	
GB10905405 0230	Ellerton Bk - source to conf R Meese	Shropshire Middle Severn	HINSTOCK (STW)	WFD	IMP	WFD_IMPg	Phosphorus	
GB10905405 0230	Ellerton Bk - source to conf R Meese	Shropshire Middle Severn	HINSTOCK (STW)	WFD	ND	WFD_ND	Ammonia	
GB10905405 5100	Tern - conf Loggerheads Bk to conf Bailey Bk	Shropshire Middle Severn	MARKET DRAYTON - WALKMILL RD (SPS)	U	MON	U_MON2		
GB10905405 5100	Tern - conf Loggerheads Bk to conf Bailey Bk	Shropshire Middle Severn	MARKET DRAYTON (STW)	U	MON	U_MON4		

Waterbody ID	Waterbody Name	CaBA catchment name	Scheme Name/Name of Investigation/Site Name/Licence name	Core Obligation	Action Type	Driver Code (Primary)	Further Driver Code Information (related to the primary driver if applicable)	Driver Code (Secondary)
GB10905405 5100	Tern - conf Loggerheads Bk to conf Bailey Bk	Shropshire Middle Severn	MARKET DRAYTON (STW)	U	MON	U_MON3		
GB10905405 5100	Tern - conf Loggerheads Bk to conf Bailey Bk	Shropshire Middle Severn	MARKET DRAYTON (STW)	WFD	IMP	WFD_IMPg	Phosphorus	
GB10905405 5100	Tern - conf Loggerheads Bk to conf Bailey Bk	Shropshire Middle Severn	SHIFFORDS BRIDGE - BOREHOLE 1&2 (PWS_160)	WFD	NDINV	WFD_NDINV_WRFlow		WFDGW_NDINV_GWR
GB10905405 5110	Coal Bk - source to conf R Tern	Shropshire Middle Severn	SHIFFORDS BRIDGE - BOREHOLE 1&2 (PWS_160)	WFD	NDINV	WFD_NDINV_WRFlow		WFDGW_NDINV_GWR
GB10905405 5130	Loggerheads Bk - source to conf R Tern	Shropshire Middle Severn	LOGGERHEADS SANATORIUM (STW)	U	MON	U_MON3		
GB10905405 5130	Loggerheads Bk - source to conf R Tern	Shropshire Middle Severn	LOGGERHEADS SANATORIUM (STW)	U	INV	U_INV2		
GB10905405 5130	Loggerheads Bk - source to conf R Tern	Shropshire Middle Severn	LOGGERHEADS SANATORIUM (STW)	WFD	IMP	WFD_IMPg	Phosphorus	
GB10905405 5130	Loggerheads Bk - source to conf R Tern	Shropshire Middle Severn	LOGGERHEADS VILLAGE (STW)	U	INV	U_INV2		

Waterbody ID	Waterbody Name	CaBA catchment name	Scheme Name/Name of Investigation/Site Name/Licence name	Core Obligation	Action Type	Driver Code (Primary)	Further Driver Code Information (related to the primary driver if applicable)	Driver Code (Secondary)
GB10905405 5130	Loggerheads Bk - source to conf R Tern	Shropshire Middle Severn	LOGGERHEADS VILLAGE (STW)	U	MON	U_MON3		
GB10905405 5130	Loggerheads Bk - source to conf R Tern	Shropshire Middle Severn	LOGGERHEADS VILLAGE (STW)	WFD	IMP	WFD_IMPg	Phosphorus	
GB10905405 5130	Loggerheads Bk - source to conf R Tern	Shropshire Middle Severn	LOGGERHEADS VILLAGE (STW)	WFD	IMP	WFD_IMPg	Ammonia	
GB10905405 5150	Tern - source to conf Loggerheads Bk	Shropshire Middle Severn	SHIFFORDS BRIDGE - BOREHOLE 1 (PWS_160)	WFD	NDINV	WFD_NDINV_WRFlow		WFDGW_NDINV_GWR
GB10905405 5150	Tern - source to conf Loggerheads Bk	Shropshire Middle Severn	THE WELLINGS - BOREHOLES 1&2 (WELLINGS; PWS_196)	WFD	NDINV	WFD_NDINV_WRFlow		WFDGW_NDINV_GWR
GB10905405 5150	Tern - source to conf Loggerheads Bk	Shropshire Middle Severn	WOORE (STW)	WFD	IMP	WFD_IMPg	Phosphorus	
GB10905405 5150	Tern - source to conf Loggerheads Bk	Shropshire Middle Severn	BEARSTONE - BOREHOLES	WFD	NDINV	WFD_NDINV_WRFlow		WFDGW_NDINV_GWR
GB11206805 5200	Lea	Weaver Gowy	Madeley WwTW	U	MON	U_MON4		

Waterbody ID	Waterbody Name	CaBA catchment name	Scheme Name/Name of Investigation/Site Name/Licence name	Core Obligation	Action Type	Driver Code (Primary)	Further Driver Code Information (related to the primary driver if applicable)	Driver Code (Secondary)
GB11206805 5200	Lea	Weaver Gowy	Madeley WwTW	U	MON	U_MON3		
GB11206805 5200	Lea	Weaver Gowy	Madeley WwTW	WFD	IMP	WFD_IMPg	Phosphorus	
GB11206805 5230	Checkley Brook - Upper	Weaver Gowy	Newcastle Road CSO NEW0006	U	INV	U_INV	Other	
GB11206805 5280	Wistaston Brook	Weaver Gowy	Betley WwTW	U	MON	U_MON4		
GB11206805 5280	Wistaston Brook	Weaver Gowy	Betley WwTW	U	MON	U_MON3		
GB11206805 5280	Wistaston Brook	Weaver Gowy	Betley WwTW	WFD	IMP	WFD_IMPg	Phosphorus	NERC_IMP2
GB11206805 5390	Kidsgrove Stream (including Day Green Stream)	Weaver Gowy	Alsager WwTW	U	MON	U_MON4		
GB11206805 5390	Kidsgrove Stream (including Day Green Stream)	Weaver Gowy	Alsager WwTW	WFD	IMP	WFD_IMPg	Ammonia	WFD_IMPg

Waterbody ID	Waterbody Name	CaBA catchment name	Scheme Name/Name of Investigation/Site Name/Licence name	Core Obligation	Action Type	Driver Code (Primary)	Further Driver Code Information (related to the primary driver if applicable)	Driver Code (Secondary)
GB11206805 5390	Kidsgrove Stream (including Day Green Stream)	Weaver Gowy	Alsager WwTW	WFD	IMP	WFD_IMPg	Biochemical Oxygen Demand / Dissolved Oxygen	WFD_IMPg
GB11206805 5390	Kidsgrove Stream (including Day Green Stream)	Weaver Gowy	Alsager WwTW	U	MON	U_MON3		
GB11206805 5390	Kidsgrove Stream (including Day Green Stream)	Weaver Gowy	Alsager WwTW	WFD	IMP	WFD_IMPm	Phosphorus	
GB11206805 5390	Kidsgrove Stream (including Day Green Stream)	Weaver Gowy	Kidsgrove WwTW	WFD	IMP	WFD_IMPm	Phosphorus	
GB11206805 5390	Kidsgrove Stream (including Day Green Stream)	Weaver Gowy	Kidsgrove WwTW (CIP1)	WFD	ND	WFD_NDLS_Chem2	Chemicals	
GB11206805 5390	Kidsgrove Stream (including Day Green Stream)	Weaver Gowy	Lawton Gate WwTW	U	MON	U_MON4		
GB11206805 5390	Kidsgrove Stream (including Day Green Stream)	Weaver Gowy	Lawton Gate WwTW	U	MON	U_MON3		
GB11206805 5390	Kidsgrove Stream (including Day Green Stream)	Weaver Gowy	Lawton Gate WwTW	WFD	IMP	WFD_IMPm	Phosphorus	

Waterbody ID	Waterbody Name	CaBA catchment name	Scheme Name/Name of Investigation/Site Name/Licence name	Core Obligation	Action Type	Driver Code (Primary)	Further Driver Code Information (related to the primary driver if applicable)	Driver Code (Secondary)
GB11206805 5410	Wheelock (Source to Kidsgrove Stream)	Weaver Gowy	Kidsgrove WwTW	U	MON	U_MON 4		
GB11206805 5410	Wheelock (Source to Kidsgrove Stream)	Weaver Gowy	Kidsgrove WwTW	U	MON	U_MON 3		
GB11206807 4630	Valley Brook (Source to Englesea Brook)	Weaver Gowy	Audley WwTW	U	MON	U_MON 4		
GB11206807 4630	Valley Brook (Source to Englesea Brook)	Weaver Gowy	Audley WwTW	WFD	IMP	WFD_IMPg	Ammonia	
GB11206807 4630	Valley Brook (Source to Englesea Brook)	Weaver Gowy	Audley WwTW	WFD	IMP	WFD_IMPg	Biochemical Oxygen Demand / Dissolved Oxygen	
GB11206807 4630	Valley Brook (Source to Englesea Brook)	Weaver Gowy	Audley WwTW	U	MON	U_MON 3		
GB11206807 4630	Valley Brook (Source to Englesea Brook)	Weaver Gowy	Audley WwTW	WFD	IMP	WFD_IMPm	Phosphorus	
GB11206807 4630	Valley Brook (Source to Englesea Brook)	Weaver Gowy	Audley WwTW	WFD	ND	WFD_ND	Phosphorus	

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