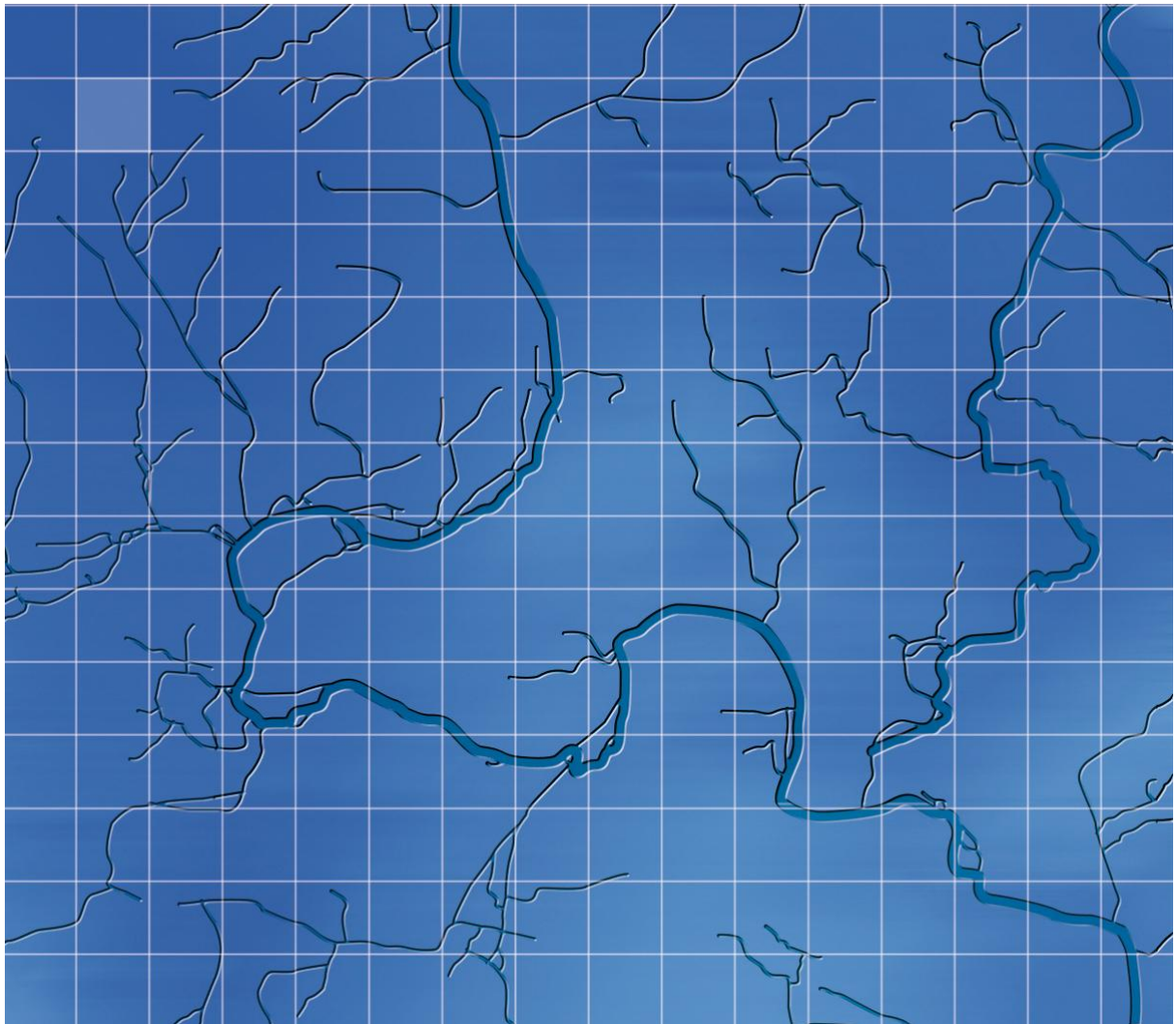


Mansfield District Council

July 2026

Mansfield District Water Cycle Study Scoping Report



WHS

Mansfield District Council

Mansfield District Council Water Cycle Study Scoping Report

Document issue details

WHS10265

Version	Issue date	Issue status	Prepared By	Approved By
3.1	07/07/2026	Final	Dominic Coy (<i>Graduate Consultant</i>)	Daniel Hamilton (<i>Principal Consultant</i>)

For and on behalf of Wallingford HydroSolutions Ltd.

This report has been prepared by WHS with all reasonable skill, care and diligence within the terms of the Contract with the client and taking account of both the resources allocated to it by agreement with the client and the data that was available to us. We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above. This report is confidential to the client and we accept no responsibility of any nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.



The WHS Quality & Environmental Management system is certified as meeting the requirements of ISO 9001:2015 and ISO 14001:2015 providing environmental consultancy (including monitoring and surveying), the development of hydrological software and associated training.



Registered Office Stables 4, Howbery Business Park, Wallingford, OX10 8BA
www.hydrosolutions.co.uk

Contents

1	Introduction	1
1.1	Scope of Assessment	1
1.2	Water Cycle Study Scoping Report Objectives	1
2	Method Statement	2
2.1	Initial Liaison and Data Collation	2
2.2	Data Sources	2
2.3	Summary of Relevant National Policy and Guidance	3
2.4	Structure of Scoping Study	4
2.5	Water Resources and Supply	5
2.6	Wastewater Infrastructure, Water Quality and Environmental Capacity	6
2.7	Flood Risk	6
2.8	Other Environmental Constraints	6
3	Baseline Assessment	8
4	Water Resources and Supply	10
4.1	Introduction	10
4.2	Water Company Planning	10
4.3	Water Resource Zone	10
4.4	Population and Dwelling Forecast	12
4.5	Supply and Demand	14
4.6	Abstraction Licenses	25
4.7	Summary	27
5	Wastewater, Water Quality and Environmental Capacity	29
5.1	Introduction	29
5.2	Infrastructural Capacity	29
5.3	Environmental Capacity	38
5.4	Summary	44
6	Flood Risk	46
6.1	Introduction	46
6.2	Overview of Flood Risk relevant to WCS	46
6.3	Impacts of Development on Flood Risk	46
6.4	Mitigation Options	47
6.5	Summary	49
7	Other Environmental Constraints	50
7.1	Protected Sites	50
7.2	Odour Risk	52
7.3	Summary	53
8	Conclusions & Recommendations	55

Glossary

Abstraction licence- Authorisation granted by the Environment Agency to allow the removal of water from a source.

Assessment Point (AP)- A significant point on a river, often where two major rivers join or at a gauging station.

Asset Management Period (AMP)- The AMP sets the framework for how water companies manage their assets, deliver services to customers, and invest in infrastructure over a five-year period. The AMP is regulated by Ofwat, the Water Services Regulation Authority in England and Wales. AMP 7 runs from 2020-2025, AMP8 will run from 2025-2030.

Combined Sewer Overflows (CSOs)- Many parts of England have a combined sewage system, with clean rainwater and wastewater conveyed in the same pipe. During heavy rainfall the capacity of these pipes can be exceeded, which means possible backing up of the system and inundation of WwTWs downstream. CSOs were developed as overflow valves to reduce the risk of sewage backing up during heavy rainfall. They are a necessary part of the sewer system but where they regularly spill it can indicate underlying issues with the sewer system's condition and capacity.

Compliance Assessment Report (CAR)- A written report compiled by Environment Agency officers when assessing compliance with an environmental permit. The CAR is used to record the findings of EA's site inspections, audits and monitoring activities. It also includes reviews of monitoring and other data/reports.

Deployable Output (DO)- The reliable output of an active source, or group of sources, or of a bulk supply of water, which is constrained by: environment; licence, if applicable; pumping plant and/or well/aquifer properties; raw water mains and/or aquifers; transfer and/or output main; treatment; water quality.

Discharge Permit- An environmental permit granted by the EA to discharge liquid effluent or wastewater to a surface water or the groundwater body.

District Metering Area (DMA)- A DMA is a discrete area of the water distribution network that can be isolated by closing valves so that the quantities of water entering and leaving the area can be metered. The volume of water into and out of the DMA is measured by a district meter. The purpose of a DMA is to divide each WRZ into manageable sections to detect and determine the location of burst mains, calculate the level of leakage in each DMA and compare DMAs so that activities can be targeted to where they will have the greatest impact in reducing leakage.

Drainage and Wastewater Plan (DWMP)- Strategic plans where wastewater companies take a company-wide approach to managing their wastewater and drainage assets. DWMP look at current and future capacity, pressures, and risks to their networks such as climate change and population growth over a 25-year period.

Drought Permit- An authorisation granted by the Environment Agency under drought conditions, which that enable water companies to abstract more water than permitted by their abstraction licenses or abstract during dry periods when abstraction would normally be restricted.

Dry Weather Flow (DWF)- Dry weather flow (DWF) is the average daily flow to a WwTW during a period without rain. The EA sets limits on the quality and quantity of treated effluent from WwTW so that WwTW do not cause an unacceptable impact on the environment. The flow that may be discharged in dry weather is one of these limits.

Dry Year Annual Average (DYAA)- The annual average value of water demand, deployable output or some other quantity over the course of a dry year.

Dry Year Critical Period (DYCP)- The water demand, deployable output or some other quantity during the time in a dry year when demand is greatest, often termed the peak week. Also commonly known as the summer peak period.

Environmental Impact Assessment (EIA)- Environmental Impact Assessment (EIA) is a tool used to assess the significant effects of a project or development proposal on the environment.

Flood Zone 2- Areas situated in Flood Zone 2 have a medium probability of flooding and have an annual probability of river flooding between 1.0% and 0.1% and annual probability of sea flooding between 0.5% and 0.1%.

Flood Zone 3- Flood zone 3 is distinguished as land which has a 1% or greater annual probability of river flooding or a 0.5% or greater annual probability of sea flooding.

Flow to Full Treatment (FFT)- A measure of how much wastewater a treatment works must be able to treat at any time. All WwTWs are built to be able to deal with a certain amount of wastewater, calculated depending on the area they serve, and many have a requirement in their environmental permit about the FFT level they must work to.

Good Ecological Potential (GES)- GES is the ecological quality that can be achieved in the affected water bodies without a significant adverse impact on the benefits provided by the uses or a significant adverse impact on the wider environment.

Groundwater Infiltration- Groundwater infiltration occurs when groundwater finds its way into the underground water and sewerage system. Small leaks, openings, defective joints and cracks are the main causes for infiltration.

Habitat Regulations Assessment (HRA)- A HRA is a process that determines whether or not development plans could negatively impact local plans on a recognised protected European site.

Hands off flow (HoF)- A condition attached to an abstraction license which states that if flow (in the river) falls below the level specified on the license, the abstractor will be required to reduce or stop the abstraction.

Headroom- The difference between the measured DWF and the consented DWF is termed headroom.

Home water efficiency audits (HWEA)- targeted checks of properties with high water meter readings to fix any leaks present and encourage improved water efficiency by supplying advice or water saving devices where appropriate.

Household (HH) Consumption- Water consumed by household customers

Leakage- Water that leaks from surface water sewers, combined sewers, foul sewers, water mains and customer supplies pipes.

Non-Household (NHH) Consumption- Water consumed by businesses

Natural Flood Risk Management (NFM)- NFM involves working with nature to reduce the risk of flooding for communities. It uses various techniques to restore or mimic the natural functions of rivers, floodplains and the wider catchment.

Olfactometry- Olfactometry is the process of measuring the concentration and intensity of odour. Olfactometry is often used for monitoring wastewater infrastructure, where controlling odorous emissions is important for environmental and health reasons.

Price Review (PR)- The price determination process undertaken by Ofwat every five years. Each water and sewerage undertaker submits a business plan covering the five-year period for which Ofwat will determine cost and revenue allowances.

Sewage Pumping Stations (SPS) - SPS typically move sewage from lower to higher elevations. The stations pump raw sewage and wastewater into pipes transporting the waste to a WwTW or other disposal site.

Sanitary Sewer Overflow (SSO) - An discharge or leak of raw, untreated sewage from a wastewater system into the environment before the sewage reaches a wastewater treatment facility

Site of Specific Scientific Interest (SSSI)- A SSSI is a formal conservation designation. Usually, it describes an area that's of particular interest to science due to the rare species of fauna or flora it contains (Biological SSSI) - or important geological or physiological features that may lie in its boundaries (Geological SSSI).

Smarter Business Visit (SBV)- A location-based business programme that helps customers to fit water-saving devices, identify and potentially fix leaking toilets and fit free urinal controls if practical.

Source Protection Zones (SPZs)- SPZs are defined around large and public potable groundwater abstraction sites. The purpose of SPZs is to provide additional protection to safeguard drinking water quality through constraining the proximity of an activity that may impact upon a drinking water abstraction.

Special Area of Conservation (SAC)- A site designated as being of special conservation value under the European Habitats Directive. It protects one or more special habitats and/or species – terrestrial or marine.

Storm Overflow Assessment Framework (SOAF)- The SOAF written by the EA sets out how sewer systems comply with current statutory requirements. The framework shows that any overflow reported to exceed the spill frequency thresholds set out in this document should be investigated.

Sustainable Drainage Systems (SuDS)- SuDS mimic nature and typically manage rainfall close to where it falls. SuDS can be designed to transport (convey) surface water, slow runoff down (attenuate) before it enters watercourses, they provide areas to store water in natural contours and can be used to allow water to soak (infiltrate) into the ground or evaporated from surface water and lost or transpired from vegetation (known as evapotranspiration).

Urban Creep- Urban creep is the increasing density of development, due to extension, paving over of gardens and other permeable areas, which increases the impermeability of developed areas and causes rates and volumes of runoff to rise.

Water Available for Use (WAFU)- The overall amount of water that is available to use. This takes account of the total deployable output minus water lost through planned and unplanned events, sustainability reductions, climate change, water transferred out of a water company's supply area to other companies (exports) and water received from other companies (imports).

Water Framework Directive (WFD)- The Water Framework Directive (WFD) 2000/60/EC is an EU directive to establish a framework for the protection of all water bodies. The WFD set a programme and timetable for Member States to set up River Basin Management Plans by 2009, which are then periodically updated every 6-years.

Water Resource Management Plan (WRMP)- WRMP sets out how water companies intend to achieve a secure supply of water for your customers and a protected and enhanced environment.

Water companies in England or Wales, must prepare and maintain a water resources management plan (WRMP) every 5-years to align with the AMP.

Water Resource Zone (WRZ)- The largest possible zone in which all resources, including external transfers, can be shared and hence, the zone in which all customers will experience the same risk of supply failure from a resource shortfall.

Water Services Regulation Authority (Ofwat)- The Water Services Regulation Authority, or Ofwat, is the body responsible for economic regulation of the privatised water and sewerage industry in England.

Water Trading- An agreement with an existing licence holder to give part or all of their water abstraction right permanently or temporarily.

Waste Water Treatment Works (WwTW)- Wastewater/Sewage treatment works are plants designed to treat and clean sewage and waste water before they are released into the environment. Treatment typically consists of three phases termed primary, secondary and tertiary water treatment.

Windfall Development- Development not specifically allocated in a development plan but unexpectedly becomes available during the lifetime of a plan.

1 Introduction

1.1 Scope of Assessment

Wallingford HydroSolutions (WHS) has been commissioned by Mansfield District Council (MDC) to undertake a water cycle study (WCS) scoping report.

It reviews the infrastructural capacity of water resource and wastewater infrastructure within the district, before assessing the environmental capacity of the receiving water environment. This review will be placed in the context of future development and climate change. The study will be used to inform policies and site selection processes for MDC's Local Plan Review 2023-2043.

This scoping report details infrastructural and environmental constraints in the study area in addition to any evidence gaps identified as a result of the study. Based on this assessment recommendations for a further detailed WCS are made.

1.2 Water Cycle Study Scoping Report Objectives

Water cycle studies are voluntary studies that consider how strategic plans and development proposals will affect the water environment. The study's objectives include the following:

- Review the Mansfield District Council (MDC) extents and amount of proposed development.
- Communicate with key stakeholders including MDC, the Environment Agency (EA) and Severn Trent Water.
- Identify existing evidence on water resources, wastewater infrastructure water quality and flood risk.
- Identify environmental issues and constraints on development.
- Identify potential solutions.
- Identify evidence gaps where further assessment may be required through a further detailed report.
- Inform wider planning policy requirements.

2 Method Statement

The water cycle study has been completed using national Environment Agency (EA) guidance on water cycle studies¹. It has also been guided by the specification provided by and further consultation with the council.

2.1 Initial Liaison and Data Collation

Development of the water cycle study scoping report has been underpinned by early stakeholder liaison and collaboration. The primary stakeholders identified to inform the study include MDC, the EA, Nottinghamshire County Council and Severn Trent Water who supply clean water and manage wastewater in the district. They have been engaged with in order to obtain the datasets required to progress the study and to gain a clear understanding of the water environment and water infrastructure for the district, in addition to the development pressures in neighbouring authorities.

2.2 Data Sources

Following the initial liaison stage the following data sources were used to inform the water cycle study scoping report.

- Severn Trent Water Water Resource Management Plan (WRMP) 2024² and supporting technical reports - To determine future water demand and water resource options across the district.
- Severn Trent Water Drainage and Wastewater Management Plan (DWMP)³- To determine Severn Trent Water's future goals with regard to drainage and wastewater infrastructure across its supply area.
- Severn Trent DWMP Level 2 Strategic Planning Area Overview: North Notts SPA⁴- To determine Severn Trent Water's future plans with regard to drainage and wastewater infrastructure in North Notts and Mansfield specifically.
- Severn Trent DWMP Level 3 Tactical Planning Unit Summary: North Notts SPA⁵ – To help identify existing and historical issues at Wastewater Treatment Works (WwTW) within North Notts.
- Severn Trent Water DG5 sewer flooding data⁶– to determine areas at risk of sewer flooding and where capacity issues may exist.
- EA Catchment Data Explorer⁷ - To review Water Framework Directive (WFD) classifications and objectives for waterbodies falling within the district.
- EA Humber River Basin Management Plan⁸- To help understand current and existing pressures on the water environment and mitigation measures.

¹ Environment Agency (2021) *Guidance- Water Cycle Studies* <https://www.gov.uk/guidance/water-cycle-studies>

² Severn Trent Water (2024) *Water Resources Management Plan 2024 Final Documents* <https://www.severntrent.com/about-us/our-plans/water-resources-management-plan/wrmp24-final-documents/>

³ Severn Trent Water (2023) *Drainage and Wastewater Management Plan (DWMP)* <https://www.severntrent.com/about-us/our-plans/drainage-wastewater-management-plan/>

⁴ Severn Trent Water (2023) *Level 2 Strategic Planning Area Overview: North Notts SPA* <https://www.severntrent.com/content/dam/stw-plc/about-us/drainage-and-wastewater-management-plan/2023/SVE-fDWMP23-L2-SPA-Overview-North-Notts.pdf>

⁵ Severn Trent Water (2023) *Level 3 Tactical Planning Unit Summary: North Notts SPA* <https://www.severntrent.com/content/dam/stw-plc/about-us/drainage-and-wastewater-management-plan/2023/SVE-fDWMP23-L3-TPU-Summary-North-Notts.pdf>

⁶ Severn Trent Water (2025) *DG5 Sewer Flooding Data HFRR_Extract_MDC_28_10_2025.xlsx*

⁷ EA (2026) *Catchment Data Explorer* <https://environment.data.gov.uk/catchment-planning/>

⁸ EA (2022) *Humber River basin district river basin management plan: updated 2022* <https://www.gov.uk/guidance/humber-river-basin-district-river-management-plan-updated-2022>

- EA Discharge Consents and Abstraction License Locations⁹- To gain spatial understanding of current discharges and abstractions to determine future management.
- Idle and Torne Abstraction Licensing Strategy¹⁰- To gain understanding of how abstractions are managed in the district and wider Idle and Torne catchment.
- EA Fluvial Flood Maps¹¹- to quantify fluvial flood risk across the study area.
- EA Surface Water Flood Maps¹² – to quantify the pluvial flood risk across the study area.
- PR24 Water Industry National Environmental Programme (WINEP) Data¹³
- National Data Library: Event Duration Monitoring – Storm Overflows¹⁴
- Mansfield District Council SuDS Supplementary Planning Document (2023)¹⁵

2.3 Summary of Relevant National Policy and Guidance

2.3.1 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF)¹⁶ sets out Government planning policies in England and how these should be implemented. The latest NPPF was published in December 2024.

The document sets out key information with a bearing upon this water cycle study, including that:

- Local plans should make sufficient provision for water supply and wastewater infrastructure, also considering the effects of climate change and working collaboratively across boundaries to improve environmental resilience
- Major developments are expected to incorporate sustainable drainage systems (SuDS), helping to reduce pollution in runoff alongside managing water storage, with all developments needing to take account of potential pollution risks
- Development should, wherever possible, help to improve local environmental conditions such as water quality taking account relevant information such as river basin management plans.
- The scale and extent of development within all these designated areas should be limited, while development within their setting should be sensitively located and designed to avoid or minimise adverse impacts on the designated areas.

2.3.2 Planning Practice Guidance (PPG)

The Planning Practice Guidance for Water supply, wastewater and water quality¹⁷ supports the NPPF. It was last updated in 2019 and explains how the planning system in England should manage water

⁹ EA (2025) *Discharge consents and Abstractions licenses* EIR2025_45118.xlsx

¹⁰ EA (2020) *Idle and Torn Abstraction Licensing Strategy* (2020)
<https://www.gov.uk/government/publications/idle-and-torne-abstraction-licensing-strategy/idle-and-torne-abstraction-licensing-strategy>

¹¹ EA (2026) *Flood Map for Planning (Rivers and Sea)* <https://flood-map-for-planning.service.gov.uk/>

¹² EA (2026) *Risk of surface water flooding* <https://check-long-term-flood-risk.service.gov.uk/map>

¹³ EA (2025) PR24 Water Industry National Environmental Programme:
<https://environment.data.gov.uk/dataset/39b11ea0-3cfa-4cbb-b3a1-b5950019f169>

¹⁴ EA (2026) Event Duration Monitoring – Storm Overflows – Annual Returns
<https://www.data.gov.uk/dataset/19f6064d-7356-466f-844e-d20ea10ae9fd/event-duration-monitoring-storm-overflows-annual-returns>

¹⁵ Mansfield District Council (2023) Sustainable Drainage Systems Supplementary Planning Document
<https://www.mansfield.gov.uk/downloads/file/6635/sustainable-drainage-systems-spd-final-version-for-adoption>

¹⁶ Ministry of Housing, Communities & Local Government (2024) *National Planning Policy Framework*,
<https://www.gov.uk/government/publications/national-planning-policy-framework--2>

¹⁷ Ministry of Housing, Communities & Local Government (2025) *Guidance Water supply, wastewater and water quality* <https://www.gov.uk/guidance/water-supply-wastewater-and-water-quality>

resources, wastewater infrastructure, and water quality when preparing local plans and deciding planning applications.

Key points with a bearing upon this water cycle study include:

- Planning authorities must consider the requirements of the Water Environment Regulations 2017 and River Basin Management Plans when making decisions. The aim is to prevent deterioration of water bodies and improve them to “good status”.
- Good planning and design can improve flood resilience, biodiversity, and water quality through measures such as sustainable drainage systems (SuDS), permeable surfaces, and green infrastructure. Authorities can use planning conditions and obligations to secure mitigation measures and infrastructure delivery.
- Local plans should address water supply and wastewater infrastructure capacity, water quality protection, cross-boundary water issues, environmental assessments, and impacts on protected habitats.
- Early collaboration between councils, the Environment Agency, and water/sewerage companies is strongly encouraged.
- Water issues are often best managed on a catchment basis because rivers and groundwater cross local authority boundaries. Authorities are expected to cooperate and produce evidence such as Statements of Common Ground.
- The guidance highlights several important information sources, including River Basin Management Plans, drainage strategies, EA data, water company resource plans and water cycle studies themselves.

2.3.3 Water Cycle Studies Guidance

The EA have published guidance on water cycle studies¹. This outlines how local planning authorities, developers, and environmental bodies can use water cycle studies (WCS) to support sustainable development and infrastructure planning in England. It also advises on how they should be prepared.

The EA define a water cycle study as a voluntary evidence-based assessment used to understand whether planned growth can be supported by adequate:

- Water supply
- Wastewater treatment
- Drainage systems
- Flood management
- Environmental protection measures

The studies are intended to help ensure development is sustainable and resilient to climate change. The EA outline that the process typically has two main stages:

- Scoping study– identifies growth areas, existing evidence, infrastructure constraints, partners, and evidence gaps.
- Detailed study– investigates specific risks, infrastructure requirements, mitigation measures, and opportunities for integrated water management.

2.4 Structure of Scoping Study

The first stage of the scoping study has sought to identify the baseline conditions of the current water environment. Information has been gathered on precipitation, surface water, groundwater, water quality, land use and other relevant factors across the study area.

After establishing the baseline conditions, the following four elements have been assessed, forming the basis of the scoping assessment.

- Water resources and supply
- Wastewater infrastructure, water quality and environmental capacity
- Flood risk
- Other environmental issues

The scoping study has reviewed these four elements in the context of planned and proposed development across the district and climate change. Opportunities to manage future development and protect and enhance the water environment have been identified, alongside any evidence gaps and constraints on development.

In order to gain a deeper understanding of these four elements, as part of liaison with stakeholders, key documents have been identified to supplement this water cycle study. These include water company resource management plans, drainage and wastewater management plans, river basin management plans and abstraction licensing strategies.

The scale and distribution of development already planned in the district through the adopted local plan, in addition to development being put forward in the emerging local plan has all been determined through consultation with Mansfield District Council. This has been used to assess future pressures on wastewater infrastructure and gain an idea of the amount of additional water demand.

2.5 Water Resources and Supply

Future water demand has been assessed against Severn Trent Water's latest WRMP published in 2024. It sets out how they plan to provide a secure and sustainable supply of water for customers over the next 25 years to 2050 and looks ahead to 2085 to help prepare for the future. The WRMP thereby incorporates the majority of the period being assessed in this study (2023-2043). The Mansfield District Council administrative boundary is entirely located within the Nottinghamshire Water Resource Zone (WRZ). The plan also considers the whole Severn Trent Water network, which is vital for putting development in the district in the context of cumulative development across other functional catchment areas. Also considered are the impacts of climate change, the supply and demand position both now and in the future, and potential resource options arising from this.

Severn Trent Water has been closely consulted throughout the development of this part of the study to confirm their understanding of the resource plan and identify any specific pressures in the study area.

In the context of the assessment and liaison with Severn Trent Water, the potential for higher water efficiency standards have been considered for the district. The study seeks to provide comment on the tighter standards being put forward in the government's Environmental Improvement Plan, identify exemplar standards that developers could aim for and consider standards for non-residential development.

Abstraction licences from the EA have been obtained and analysed for the district. Subsequently, a high-level review has been undertaken, looking at the current abstraction strategy in the district and likely changes going forward. This analysis was used to determine how current and future water abstractions within the district, from both rivers and groundwater sources, may affect future water availability.

Based on the findings of the above, the water cycle study scoping report advises on future demand and resource management in the study area. It also confirms if there are any evidence gaps that may warrant further review as part of a detailed report.

2.6 Wastewater Infrastructure, Water Quality and Environmental Capacity

The water cycle study scoping report reviews the infrastructural capacity of the wastewater system and environmental capacity of the receiving water environment. This assessment has been undertaken in the context of the level of development identified and climate change.

In terms of infrastructural capacity, relevant information from Severn Trent Water, the wastewater undertaker in the area has been obtained. This has included information on major WwTW's and data on combined sewer overflows. This has supported a high-level summary of locations which are close to or at capacity and where upgrades to manage future development may be necessary.

Environmental capacity in the context of wastewater considers a water bodies capacity to receive damage from release of wastewater. Lower environmental capacity indicates high vulnerability to wastewater, or that significant damage has already taken place. To assess environmental capacity, the EA's catchment data explorer has been used to find the current trends in ecological and chemical status for a number of watercourses in the study area. The Humber River Basin Management Plan has been reviewed to identify the current measures in place to maintain water quality across the district.

In the context of these findings and the future development proposals put forward, risk areas have been identified and high-level recommendations on potential measures to protect and where possible enhance water quality identified.

Through a review of infrastructural and environmental capacity, any evidence gaps and constraints which may need further assessment as part of a detailed report have been identified. It is understood that the information provided as part of this chapter will be used to inform future infrastructure requirements (including timescales and funding arrangements). Therefore, where it is considered that there are insufficient data to confidently advise on suitable mitigation, this is flagged.

2.7 Flood Risk

A high-level review of flood risk in Mansfield District has been carried out. The review of flood risk has focused on the potential impacts of future development and has been informed by the Mansfield District SFRA¹⁸ completed by WHS in February 2026. The SFRA supports the Local Plan by assessing flood risk from all sources to guide development allocations and inform the future management of flood risk across the district.

An evaluation of the areas most sensitive to flood risk has been extrapolated to 2043 to consider the overall impact of the development proposed. This has used the EA national flood maps and DG5 records of sewer flooding. As well as accounting for the scale of development, climate change and local SuDS policy have also been considered.

2.8 Other Environmental Constraints

Any other relevant environmental constraints have been identified through consultation with the councils and the EA in the early stages of the project. This section principally covers protected sites and odour.

There are a number of sites designated for their biodiversity importance within and surrounding Mansfield district, including seven Sites of Special Scientific Interest (SSSIs) and a Special Area of Conservation (SACs) just outside of the district. It should also be noted that the Sherwood Forest

¹⁸ Wallingford HydroSolutions Ltd (2026) *Mansfield District Level 1 Strategic Flood Risk Assessment* Mansfield Level 1 SFRA v4.0.pdf

area which falls partially within the district is currently being considered as a possible potential Special Protection Area (ppSPA).

The location of WwTWs in relation to developments is also discussed in the context of odour risk. Detail is provided on the steps required if sites are at reasonable risk of odour from treatment works, presently or in the future.

The findings of this chapter are likely to inform nature recovery and potential environmental improvements within the district.

3 Baseline Assessment

The study area and main watercourses across it are shown in Figure 3-1. The study area comprises the administrative area of MDC.

The EA has classified the area served by Severn Trent Water (which includes Mansfield) as being in “serious water stress”¹⁹. Serious water stress is defined in the Water Industry (Prescribed Conditions) Regulations 1999²⁰ as where *‘the current household demand for water is a high proportion of the current effective rainfall which is available to meet that demand’*.

In terms of watercourses, the district has two main watercourses. The River Maun runs through the centre of Mansfield in the southern area of the district, flowing in a northeasterly direction. Running almost parallel to the Maun but to the north is the River Meden, which forms part of the boundary between Mansfield district and Bolsover district in Derbyshire, before flowing through the northern portion of the district near the towns of Market Warsop and Meden Vale.

The main tributaries within the district include Cauldwell Brook, which joins the Maun near the centre of Mansfield, Leas Brook/The Bottoms which starts in the town of Mansfield Woodhouse and joins the Meden around 1km southwest of Market Warsop, and Sookholme brook which joins the Meden slightly further downstream near Warsop Vale.

In terms of the water quality and the condition of watercourses, the EA catchment data explorer shows of the 8 measured Water Framework Directive (WFD) catchments falling within the district, 3 of the catchments have an ecological status of Poor, 4 are classed as Moderate and 1 catchment is classed as Good. All catchments were measured to have a Fail chemical status in 2019. This shows the water environment to be vulnerable at present. The condition of the water environment is assessed in more detail in section 5.3.2.

According to the Met Office²¹ average annual rainfall is measured to be between 716-909 mm (1991-2020) based on data from the Nottingham and Ashover weather stations, the two nearest long-term average climate stations to Mansfield. The average annual rainfall for the wider Midlands region is 810mm. Rainfall is delivered relatively uniformly across the year with moderate increases in the winter months.

In terms of groundwater, British Geological Society (BGS) mapping shows that there is a range of geology in the area, but the district is mostly underlain by sandstone, mudstone and dolostone. For the areas with mudstone geology, drainage into the subsurface will be more impeded and the strata are generally likely to be unproductive, whilst sandstone and dolostone areas are more permeable, providing groundwater reserves. The district is underlain by two recognised groundwater bodies, the most significant of which is the Sherwood Sandstone aquifer that underlays the whole of the eastern half of the district. Sherwood Sandstone in the area is classified as a principal aquifer, important for strategic water supplies and baseflow to rivers.

¹⁹ Environment Agency (July 2021) Water Stressed Areas - Final Classification 2021. Version 1.0: www.gov.uk/government/publications/water-stressed-areas-2021-classification

²⁰ UK Statutory Instruments (1999) *The Water Industry (Prescribed Conditions) Regulations 1999* <https://www.legislation.gov.uk/uksi/1999/3442/contents/made>

²¹ Met Office (2024) UK Climate Averages Nottingham, Watnall <https://www.metoffice.gov.uk/research/climate/maps-and-data/location-specific-long-term-averages/gcrje93b8>

Based on Soilsmap mapping, the majority of the district is sited on freely draining slightly acid sandy soils or freely draining lime-rich loamy soils, with some areas of clayey soils with impeded drainage near Market Warsop.

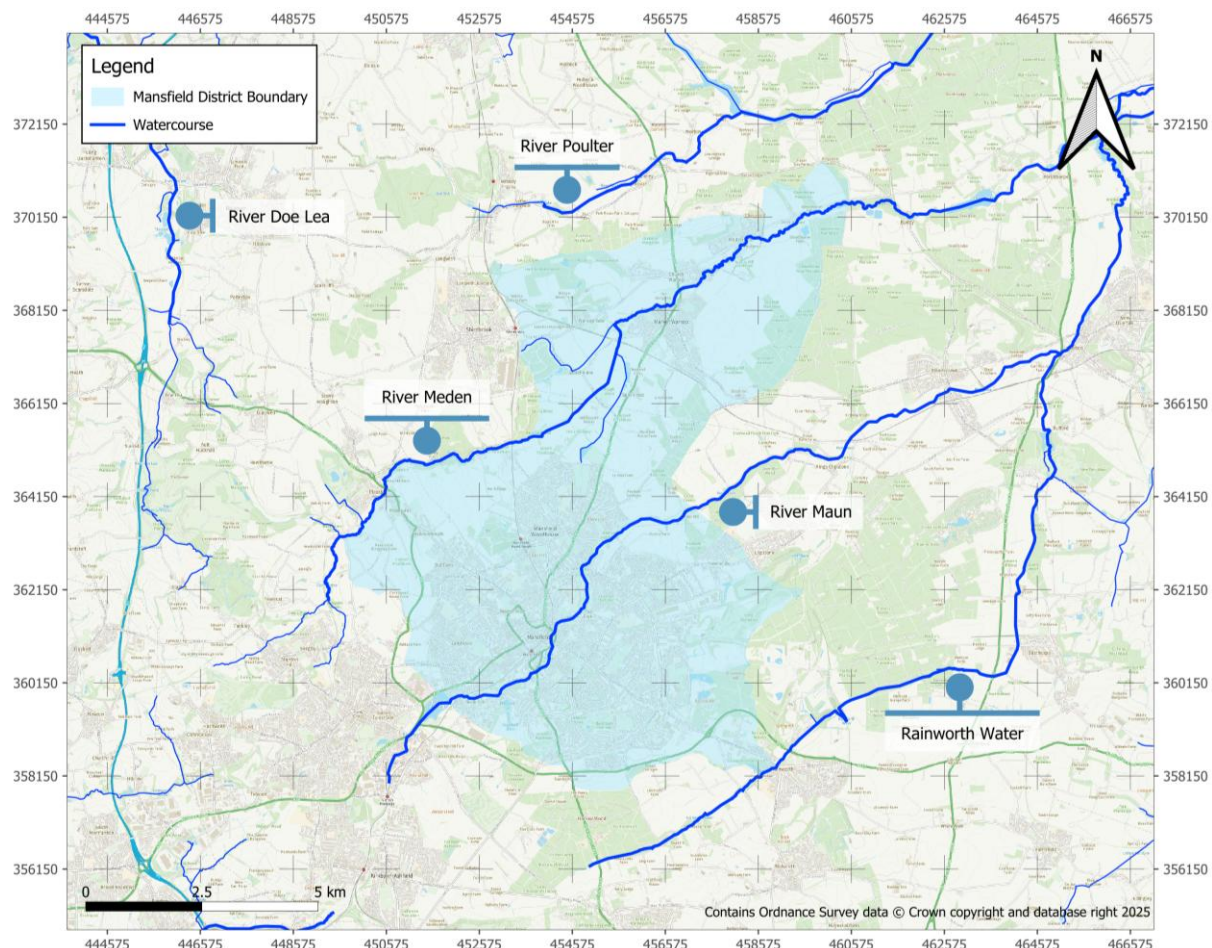


Figure 3-1- Mansfield District Council Boundary and Watercourses

4 Water Resources and Supply

4.1 Introduction

This section first assesses the current water resources supplying the Mansfield District administrative area. Subsequently, the supply-demand position moving forward is reviewed against future development at the strategic level. This includes all development earmarked up to 2043. The assessment seeks to determine whether there will be enough water resources available to sustainably manage the projected development levels in the study area.

The existing abstraction licenses and license strategies across the study area are also reviewed. Recommendations are then made on future demand and resource management in the study area. Any requirements for further work as part of a detailed report are also provided.

4.2 Water Company Planning

Severn Trent Water is responsible for water supply, and wastewater collection and treatment across the Mansfield district area. Water companies within England responsible for providing water supply and wastewater collection and treatment are funded in 5-year planning periods, termed Asset Management Periods (AMPs). The budget they have available to spend is determined by the Water Services Regulation Authority (OFWAT) in consultation with the government, the EA and consumer organisations amongst others. The consultation process is known as the Price Review (PR). The most recent Price Review was in 2024 (PR24) and determined how much money water companies have available to spend between 2025 and 2030 during AMP 8. Once funding has been obtained for upgrading and/or building new infrastructure, there remain significant lead times for planning and construction before infrastructure can be considered functional. In this respect the water companies require detailed information on likely housing development well in advance.

4.3 Water Resource Zone

The entire area of Mansfield District falls within the Nottinghamshire WRZ. Figure 4-1 shows the WRZ relative to the MDC administrative boundary. The zone covers over 1600 km², covering most of Nottinghamshire, as well as a small part of South Yorkshire near Doncaster. The largest settlements include Nottingham, Mansfield, Ashfield and Worksop.

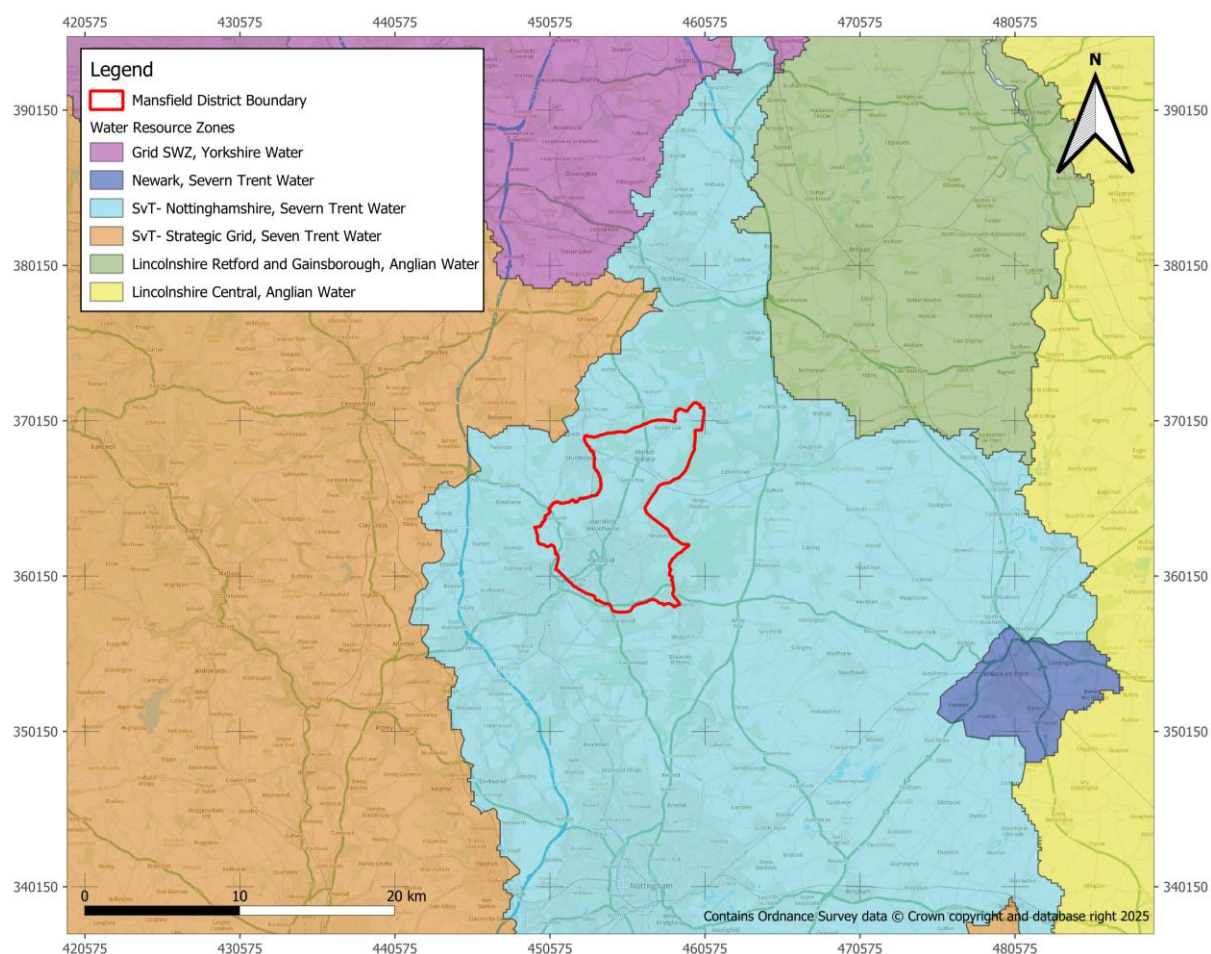


Figure 4-1- Mansfield District Council Boundary relative to Nottinghamshire WRZ and surrounding WRZs

The Nottinghamshire WRZ is regarded as a conjunctive use zone, deriving its water from a combination of groundwater sources and surface water imports from the neighbouring Strategic Grid Zone. The zone also exports water back to the Strategic Grid in Mansfield and the neighbouring Newark WRZ.

The water resources which supply the zone are summarised in Table 4.1. As can be seen, the WRZ relies on both local and external transfers. In dry years more than 45% of water comes from outside of the WRZ, making it highly reliant on inter-basin transfers for drought resilience and demand reliability. Mansfield has historically been primarily supplied by groundwater derived from the Sherwood Sandstone aquifer. However, the EA have set out a goal to gradually reduce abstraction from aquifers to meet WFD requirements, this means that there will be a growing dependence on water transfers into the area over the next 20 years.

Table 4.1- Water sources and transfers within and outside the Nottinghamshire WRZ

Category	Source / Scheme	Description	Typical Contribution / Notes
Internal (within Nottinghamshire WRZ)	Groundwater	Abstracted for supply – from Sherwood Sandstone and Magnesian Limestone aquifers	Major internal source of water for the WRZ (99%), but supplemented by transfers in dry years where imports account for up to 45%
	Reservoirs	Pumped-storage reservoirs supplied by local rivers	~1% of internal supply
Imports into Nottinghamshire WRZ (external)	Derwent Valley Aqueduct (DVA) to Notts (from Strategic Grid)	Transfers water from a system of reservoirs in the Peak District via pipelines and pumping	Derwent valley reservoirs (Howden, Derwent, Ladybower) transferred by gravity fed pipe to Ambergate reservoir and into Nottinghamshire
	Church Wilne to Notts (from Strategic Grid)	Transfer from a large WwTW located on the border of Derbyshire and Nottinghamshire	Serves around 600,000 customers mostly in Nottingham and Derby, and is currently the largest import to the Nottinghamshire WRZ, with a dry year transfer of over 70MI/day
	Higham to North Notts (from Strategic Grid)	Transfer from service reservoir, mostly supplying Nottingham	Relatively small dry year transfer of 8.7MI/day.
Exports out of Nottinghamshire WRZ (external)	Notts to Chesterfield (to Strategic Grid)	Transfer to supply the town of Chesterfield, mostly from sources originating in the strategic grid	Dry year transfer of around 5MI/day.
	Caunton and Ompton to Newark (to Newark)	Transfer to Newark. Historically like Mansfield has relied upon local groundwater sources- connects the town to strategic grid indirectly.	Dry year transfer of around 10MI/day from the Nottinghamshire WRZ to Newark, accounting for over 75% of Newark's supply
	Oxton CG transfer to Newark CG (to Newark)		

4.4 Population and Dwelling Forecast

Severn Trent Water has assessed the impact of forecast population, household growth and non-household growth on water resources as part of its WRMP 2024. It sets out how they plan to provide a secure and sustainable supply of water for customers over the next 25 years to 2050 and looks ahead to 2085 to help prepare for the future. This scoping study has used the information from this latest WRMP to determine demand and delineate the potential impact of future development in the district.

Population and dwelling forecasts are paramount in estimating future demand. Severn Trent Water's forecasts were developed considering local plans and Office of National Statistics (ONS) trend-based projections made in 2018, which factor in housing development, ageing population profiles and migration.

Population and dwelling forecasts are generated for each WRZ based on an aggregate of the findings for each local authority area. The values derived by Severn Trent Water are used to inform future demand, which is subsequently used in the determination of suitable resource options. The figures

derived have been compared against the development proposed in the local plan to determine if the levels of growth are potentially in excess of or below Severn Trent Water's anticipated values.

According to Severn Trent Water, the base population (2021/22) in the Nottinghamshire WRZ is 1,112,660, residing in 498,600 dwellings. Based on census data²², the Mansfield District population in 2021 was 110,500, equating to 9.93% of the total Nottinghamshire WRZ population.

The central housing plan population forecasts for the Nottinghamshire WRZ area in the WRMP show an average population growth of 13.56%, equating to an increase in population of 150,910 from the base year to 2049/50. In the absence of a breakdown for each local authority area, population growth is assumed to be uniform across the Nottinghamshire WRZ area. The population growth in Mansfield District is therefore also assumed to be 13.56% translating to an increase in population of 14,987.

Severn Trent Water has also estimated dwelling numbers. The base year shows 495,430 dwellings in the Nottinghamshire WRZ. The projected increase in dwelling numbers across the WRZ by 2049/50 is 121,240 (24.47%).

Severn Trent Water have not provided a base year number of dwellings for Mansfield district specifically; however, they have provided the number of new dwellings expected from the base year. For 2049/50 this is 9,237 dwellings. Using the population proportion above (9.93%), 49,202 dwellings have been assumed for Mansfield District in the base year (9.93% of 495,430). Therefore, this translates to a 18.77% increase in dwellings within the district. Table 4.2 summarises the values estimated in terms of population and dwelling growth.

Table 4.2- Base and Projected (2049/50) Population & Dwelling Estimates based on Severn Trent Water's WRMP

	Nottinghamshire WRZ	Mansfield District
Base Population (2021/2022)	1,112,660	110,500
Projected Population (2049/50)	1,263,570	125,487
Base Dwelling (2021/2022)	495,430	49,202
Projected Dwellings (2049/50)	616,670	58,439

To allow a comparison with the development proposed in the local plan, it is necessary to consider the total number of dwellings forecast by Severn Trent Water across the plan period (2023-2043). The WRMP does not provide a breakdown for each year, therefore, to estimate this number, the dwelling per annum between the base year (2021/2022) and 2049/2050 has been estimated. This number has subsequently been multiplied by the number of years in the plan period (20-years).

Table 4.3 shows the results of this analysis and compares these with the number of dwellings expected in Mansfield district council's local plan. At the time of writing, Mansfield District Council has provided the number of dwellings expected to be delivered in the district up to 2043. This value totals 10,395 dwellings, it includes the latest local plan allocations, existing planning commitments, completions, and adopted local plan allocations. Of this total figure, circa 3000 dwellings are proposed in the latest local plan allocations, the remainder is already committed through existing planning commitments, completions and the adopted Local Plan allocations.

²² ONS (2022) *How the population changed in Mansfield: Census 2021*
<https://www.ons.gov.uk/visualisations/censuspopulationchange/E07000174/>

Table 4.3- Comparison in estimated Dwelling Per Annum and across the plan period

	Severn Trent Water	Mansfield District Council
Dwellings Per Annum	330	520
Dwellings Across Plan Period	6,598	10,395

Comparing these figures with the development and population estimated by Mansfield District Council, shows Severn Trent Water's projections to be significantly lower than the councils' projections. The margin of difference is roughly equivalent to the 3000 dwellings coming forward in the latest local plan allocations.

It is important to note that assessing the district in isolation may not be reflective of future water availability, given that the availability of water in Mansfield will also be shaped by pressures in the Nottinghamshire WRZ and wider Severn Trent Water supply area due to water transfers. Surpluses in one location could be used to address shortages elsewhere. Furthermore, it should be noted that the council's value is subject to change, a more conservative number has been utilised to inform scoping and help accommodate any shift in exact capacity as work on the Local Plan continues.

Despite this, the differences to the local plan are noteworthy with the Severn Trent Water forecast 37% lower in terms of dwelling numbers, suggesting that the development earmarked in the local plan could bring unforeseen pressures to water resources if not taken into account.

It should be noted that the WRMP2024 predates the government's latest housing targets meaning that in many areas the estimated number of future dwellings has increased. As part of their WRMP2029, Severn Trent Water will need to assess future development earmarked in the local plan when developing their upcoming WRMP2029. Furthermore, Severn Trent Water were provided with a draft copy of this report and raised no concerns in relation to the exceedance above.

4.5 Supply and Demand

4.5.1 Forecasting Methods

Demand includes household use, non-household use, operational use (water used maintaining the network), water taken unbilled and leakage. The main driver on demand is population; however, several other factors also play a role, including the effects of climate change, improvements in efficiency, and changes in household/non-household consumption. Severn Trent Water's WRMP 24 prioritises demand management as the first line of action to ensure long-term water resilience across its service area. This strategy follows the national twin-track approach, emphasising demand reduction before new supply development.

To calculate household water demand, the sums of volumes of water used from various appliances are modelled and summed for individual activities, such as from toilet flushing, personal washing and clothes washing. For non-household demand, data is collected from a variety of sources including survey questions to understand potential changes in the water consumption from non-household uses. Forecasting uses models which predict future changes based on economic indicators (e.g. employment rates). The forecast models for household and non-household consumption are calibrated against annual return data.

Severn Trent Water has estimated a baseline and final plan demand forecast. The baseline plan assumes new demand management activity ceases at the end of AMP7 (2025) as per EA guidelines. The measures introduced under AMP7 include the installation of meters, leakage reductions and household use reductions (due to public awareness and water efficiency savings). The MI/d savings

earmarked for these measures introduced under AMP7 will still have a continued effect, however additional measures introduced as part of AMP8 and beyond are not accounted for.

In the final plan, the costs and benefits of additional leakage reduction and demand management measures (including AMP8 and beyond) are tested to produce the final planning forecast.

The WRMP has assessed demand using the Dry Year Annual Average (DYAA) forecast. The DYAA is the annual average value of water demand over the course of a dry year. A Dry Year Critical Period (DYCP) forecast was not developed for the WRMP but would describe the average daily demand during the peak week for water demand, rather than an annual average across the year. A shortfall in DYAA would suggest a longer-term water shortage across the year, whereas a shortfall in DYCP would suggest a water shortage when demand is high.

As part of the WRMP, Severn Trent Water has also determined the amount of water that is available for water supply, termed the Deployable Output (DO). It has also estimated and forecast the Water Available for Use (WAFU). The WAFU is the amount of water that water companies expect to be able to supply under the demand conditions set out in the levels of service. The key components of WAFU are the DO and water from neighbouring water companies' resources zones. It also takes into account climate change, the water lost through process, planned and unplanned events (outages) sustainability reductions and water transfers to other companies. Note, in their WRMP, when estimating WAFU, the DO values are estimated for a dry year.

Severn Trent Water have broken down forecasts into baseline and final plan scenarios, both of which are described in the following sections.

4.5.2 Baseline Demand and Supply

For the DYAA baseline forecast, demand increases from 236 MI/d in 2025/26 to 243 MI/d by 2043, where the increases in demand are largely driven by population growth increasing household demand. Non-household consumption is forecast to remain steady, with some decreases expected in leakage too mostly occurring over the next 5 years.

In terms of supply, for 2025/2026 the WAFU in the Nottinghamshire WRZ is estimated to be 241.9 MI/d under DYAA conditions, meaning supply and demand are currently approximately balanced with a headroom of 6.31MI/day.

Looking to the future, water supplies are forecast to fall, the main cause being a reduction in raw water abstraction (taking water directly out of rivers or aquifers) within the WRZ, which accounts for a reduction in DO of 56.8MI/day by 2043. Current levels of abstraction of raw water are unsustainable, meaning more water is removed than can be naturally replenished by rainfall. This reduction in water abstraction is therefore planned to restore sustainable abstraction, working towards environmental targets such the Water Framework Directive (WFD).

Ultimately, this reduction in abstraction means by the end of the plan period, the WAFU is significantly reduced to 185.0MI/day resulting in a significant loss of headroom and imbalance in supply and demand of -57.94MI/day by 2043, that would put the region under severe water stress. Figure 4-2 illustrates the sum of components of demand and supply and hence available headroom up to the year 2085, where the end of the plan period in 2043 is marked by the dashed red line.

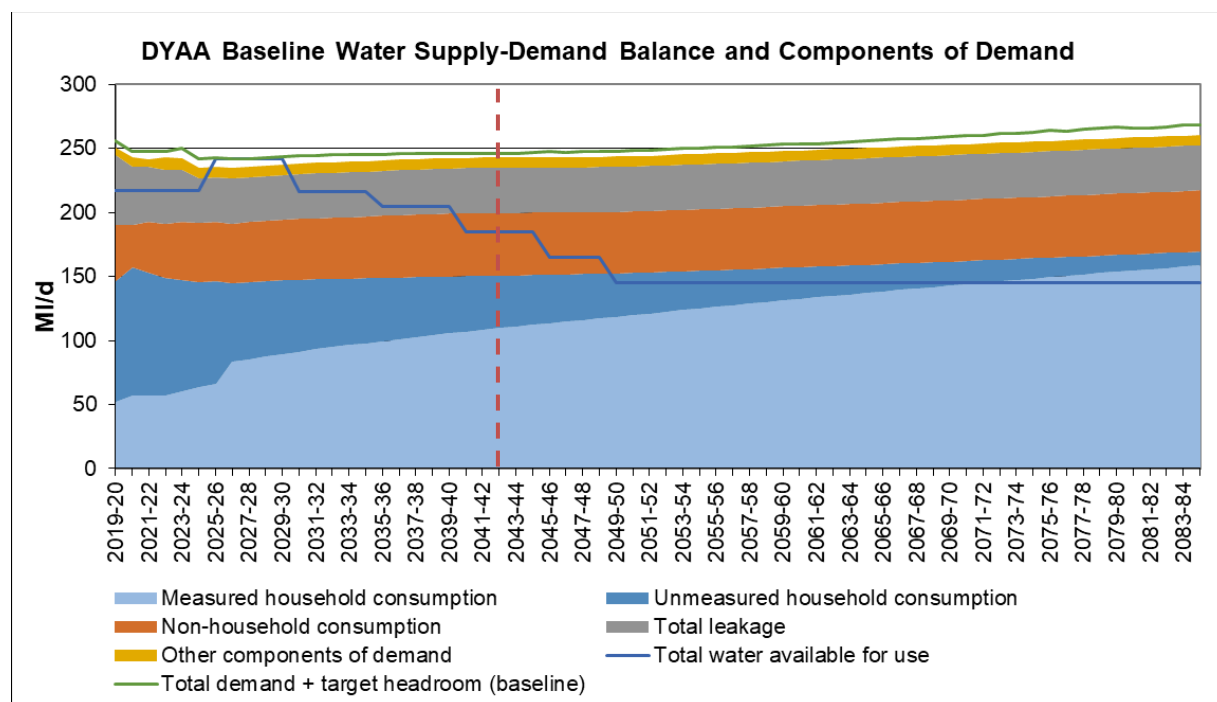


Figure 4-2- Plot showing DYAA forecast for Nottinghamshire WRZ (Source: Severn Trent Water)

4.5.3 Final Plan Demand and Supply

The final demand forecast incorporates AMP8 measures and measures beyond 2030. It includes the following conditions:

- Universal household metering and smart meter rollout, aiming for complete coverage by 2035
- Reduction in leakages by 50% by 2050 supported by proactive maintenance and smart data analytics
- Enhanced water efficiency through schemes such as product subsidies and home water checks
- Government led interventions applied to household consumption.

The final plan DYAA forecast predicts that total demand will decrease from 233 MI/day in 2025/26 to 210 MI/day by 2043, a decrease of 23MI/day, achieved thanks to the above measures compared to the baseline scenario where demand increased by 7MI/day.

Compared to the baseline scenario, DO and WAFU are both also increased, due to new resource options discussed in section 4.5.5- Resource Supply Options. Current WAFU is 259.1MI/day, with this figure still expected to reduce up to 2043 due to abstraction reductions, like in the baseline scenario. However, increases in raw water imported from neighbouring water resource zones gives a higher predicted 2043 WAFU of 214.1MI/day. Along with forecasted reductions in demand, this ensures that supply exceeds demand throughout the plan period and beyond. Figure 4-3 is also extracted from the WRMP, showing water supply/demand balance according to the final plan, with the end of the plan period marked. Note, the stepped increases in WAFU between 2025-2030 and 2055-2060 are related to the introduction and cessation of a bulk import from the strategic WRZ, in addition to changing abstraction practices.

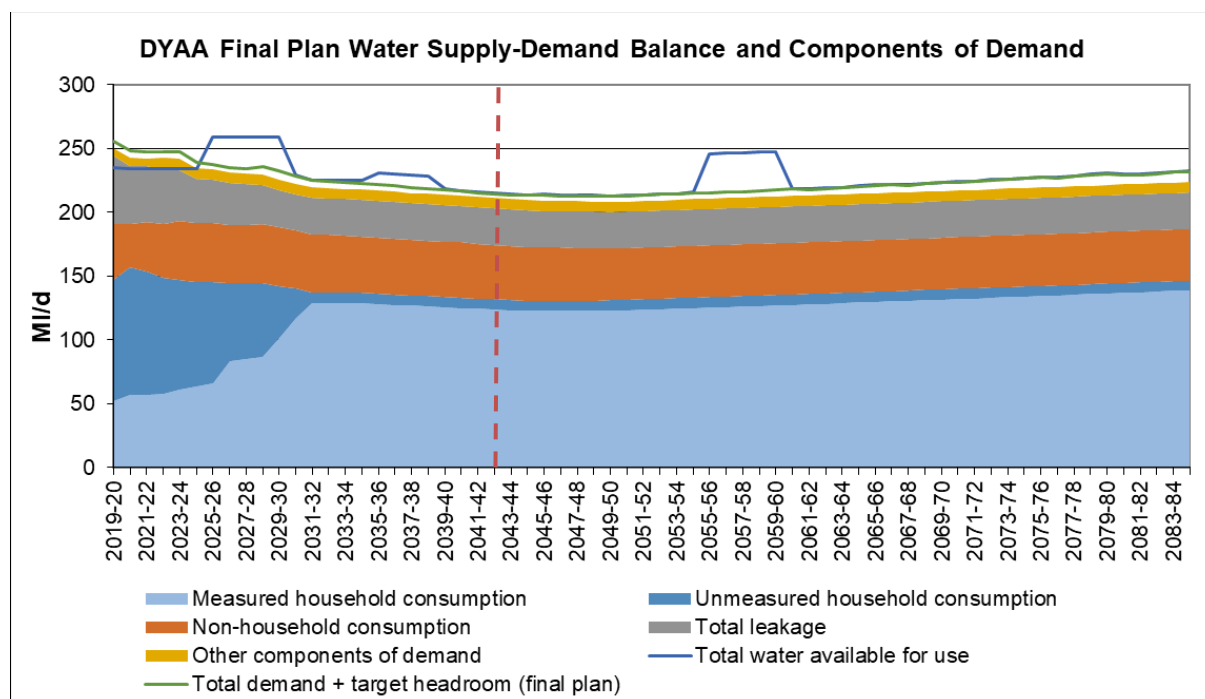


Figure 4-3- Plot showing Final Plan DYAA forecast for Nottinghamshire WRZ (Source: Severn Trent Water)

The final plan indicates a reduction in demand and subsequent maintenance of positive headroom up to 2043; however, it relies on several assumptions related to behavioural change, leakage, economic growth and government-led interventions. It should also be noted that the level of development proposed in the local plan appears to exceed the household growth anticipated by Severn Trent Water so in Mansfield specifically the fall in household consumption may be reduced.

Non-Household Consumption

Household consumption represents the largest component of water demand. Moreover, household consumption forecasts are based on dwelling projections, allowing for a like-for-like comparison with the development allocations identified in the Local Plan (see section 4.4). Accordingly, the primary focus of this study has been on household consumption.

Nevertheless, non-household consumption and the uncertainties associated with future demand should also be recognised. Non-household demand can still comprise a significant proportion of overall water use, particularly in areas with high-consumption industries such as data centres and energy infrastructure.

As part of the WRMP process, Severn Trent, alongside Hafren Dyfrdwy, United Utilities, and Artesia, developed non-household water demand forecasts for all water resource zones through to 2085. The forecasts cover both metered and unmetered properties and are disaggregated by company, water resource zone, and industrial sector.

The forecasting methodology follows industry best practice and uses multiple linear regression models based on variables including population growth, economic output, employment rates, and sector-specific factors. In addition, non-household customers were consulted regarding anticipated changes in demand over the short and medium term.

Non-household water demand within the Nottinghamshire WRZ is characterised by substantial industrial consumption, particularly from the food, drink, and mineral products sectors. Agricultural demand is also significant. Historically, power generation along the Trent Valley has accounted for a

considerable proportion of water consumption; this demand has currently declined in line with the transition away from coal and gas generation towards lower-carbon options. However, there is potential for power sector water consumption to again increase with future development in the WRZ

In terms of future non-household consumption within the Nottinghamshire WRZ, Severn Trent Water's Final Plan commits to a 9% reduction in non-household demand by 2038, relative to the 2019–20 baseline, and a 15% reduction by 2050. To achieve these targets, Severn Trent Water proposes a universal rollout of smart metering, increased collaboration with commercial water retailers, and targeted workshops to support coordinated water efficiency initiatives.

It should also be noted that the EA is expected to introduce stricter limits on private groundwater abstraction licences. As these licences currently support a substantial proportion of industrial activity within the region, major water users may increasingly need to adopt industrial water recycling, efficiency auditing, and multi-sector licence trading arrangements, reducing water consumptions. In contrast to improved efficiency, where license reductions may occur due to unsustainable abstraction, current users of private supplies may become reliant on STW's water supplies. This could increase the use of public water supplies, bringing more uncertainty over future supply and demand.

Despite mandatory efficiency targets and tighter abstraction controls, future economic growth in high water-use sectors, including energy infrastructure and data centres presents a potentially conflicting trajectory that could place unforeseen pressure on water resources if not carefully managed. Significantly, none of the employment allocations proposed within the Local Plan relate to data centres or energy infrastructure. It is expected that the majority of employment uses will be for offices and warehousing.

Climate Change

The projected demand reductions and future supply will also be influenced by the impacts of climate change which themselves are uncertain. Figure 4-4 extracted from the WRMP, presents the findings of Severn Trent Water's climate change vulnerability assessment, conducted as part of the WRMP. The horizontal axis illustrates uncertainty in future projections of water availability based on climate models, with a higher range (Wet-Dry Scenario) expressed as a percentage corresponding to greater uncertainty in the impact of climate change on water supplies in the future, making planning more difficult. The vertical axis represents the expected change in DO expressed as a percentage for each WRZ for a median estimate of climate change impact, with lower values indicating a more significant drop in available water supplies due to climate change. These two factors together determine climate change vulnerability.

Nottinghamshire WRZ is shown to be classed as high risk, due to links with Strategic Grid WRZ which has been classified as highly vulnerable to climate change. However, Severn Trent Water state that as groundwater sources make up most of the deployable output in Nottinghamshire WRZ, which are mainly constrained by infrastructure/licences rather than climate change, it should be classed as low vulnerability. In view of this they decided to not include climate change impact in the DO forecast for Nottinghamshire. Ultimately, this presents a mixed picture but it appears that vulnerability to climate change will be closely tied to how much the Nottinghamshire WRZ relies on the strategic grid WRZ in the future. Currently the Nottinghamshire WRZ is still heavily reliant on water transfer from the Strategic Grid WRZ, particularly during dry periods. This flags that the supply-demand balance in external areas could significantly affect water available locally in Mansfield.

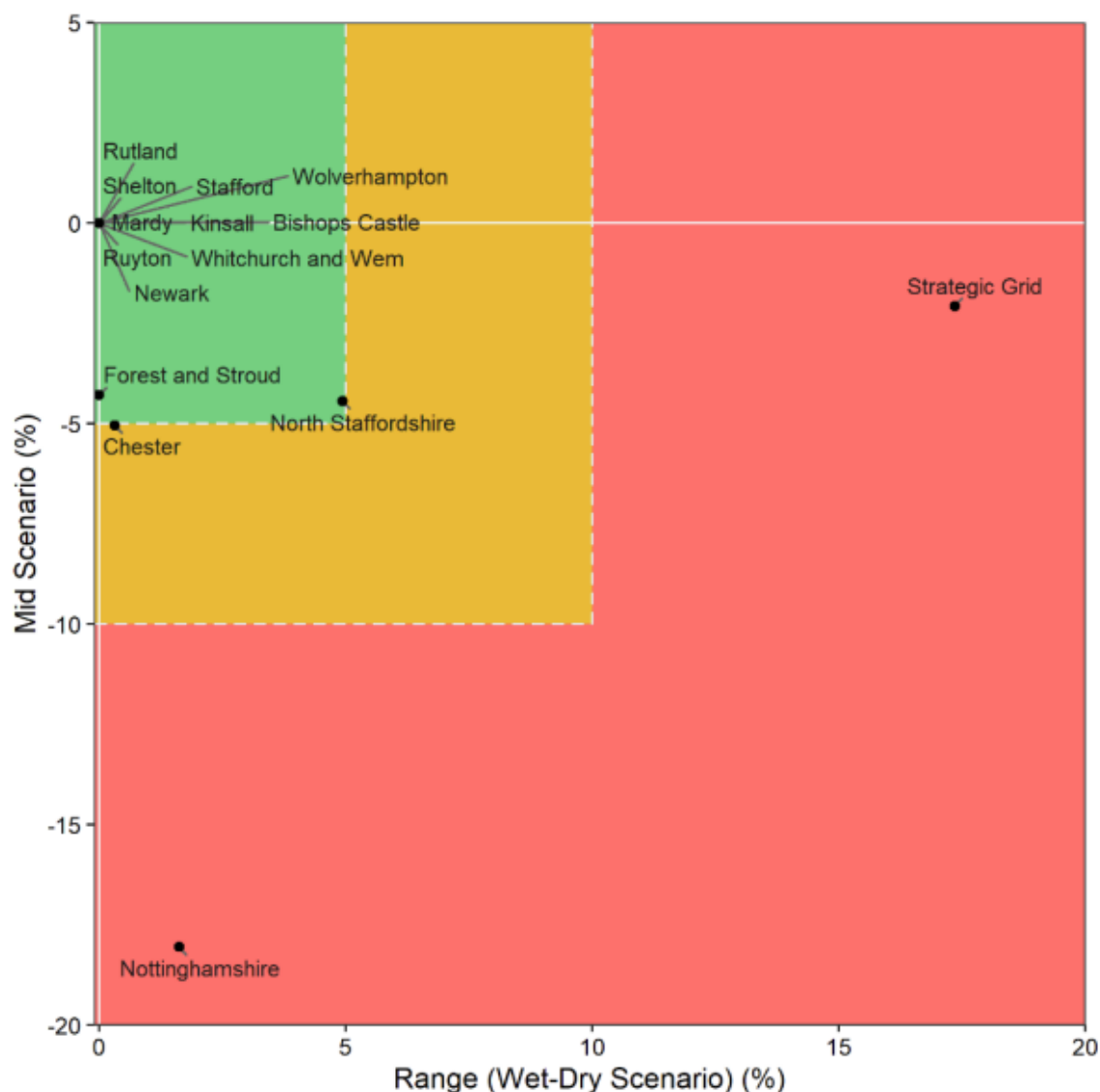


Figure 4-4- Severn Trent Water Vulnerability Assessment- Climate Change (Source: Severn Trent Water)

Altogether, factors including climate change, future economic growth, reliance on external areas and the need to reduce abstraction in the Nottinghamshire WRZ creates an uncertain future for water security. In general, it can be concluded that without corrective action, the supply for the Nottinghamshire WRZ and for Mansfield District may become less secure over time. This implies a need for resource options to increase water security going forward.

Note, as the planning period begins, the forecasts set out in the WRMP will be reviewed annually through the annual water balance. This review highlights any differences between the forecast and actual observations. Where significant differences are identified, further investigation and analysis are carried out to determine the causes and assess their implications for future forecasts. Any such changes are then documented in the annual review documents as part of the regulatory reporting requirements. Severn Trent Water is also developing its WRMP 2029, which will incorporate the latest available data on housing growth, water consumption, economic trends, and climate change to help inform future water resource planning and investment decisions.

The following sections expand on certain aspects of Severn Trent Water’s final plan, detailing the measures involved in ensuring sufficient headroom and balance of water supply and demand in the area including the topic of water efficiency and the development of resource options.

4.5.4 Water Efficiency

Water efficiency is a key measure to reduce water demand going forward and is heavily tied to local plan policy. The findings of the WRMP and future water efficiency standards are explored in more detail in this section.

Severn Trent Water’s WRMP has projected future changes to household and non-household water efficiency. Table 4.4 summarises the projected impact on average household per capita consumption (PCC) in litres/head/day by the end of each of the four AMP phases corresponding with the local plan period, showing efficiency-based activities outlined as part of the final plan to have a significant impact on PCC.

Table 4.4- Final Plan PCC Impact projections from SVT WRMP

Year (end of AMP)	2025 (AMP7)	2030 (AMP8)	2035 (AMP9)	2040 (AMP10)	2045 (AMP11)
Average Household-PCC (l/head/d)	129.4	122.3	116.5	111.0	106.4
Change from baseline scenario (l/head/d)	0	-3.7	-7.9	-12.2	-15.4

The water efficiency activities outlined by the WRMP include the provision and promotion of free and subsidised products to household customers, rollout of universal metering and leak alarms to identify opportunities for proactive leak repairs. In addition to technology, they also highlight providing advice to customers and the extension of home water efficiency audits (HWEA). These audits serve as targeted checks of properties with high water meter readings to fix any leaks present and encourage improved water efficiency by supplying advice or water saving devices where appropriate. Severn Trent Water suggests these measures will reduce average consumption down to around 118 l/head/day by 2050 alone. Government initiatives and new technologies are cited to help drive average consumption (across existing and new development) down further to meet the government target of 110 l/head/day.

In terms of future standards, currently for new build dwellings, a water efficiency calculation is a legal requirement set out in Part G of the Building Regulations. These calculations are required for all new build dwellings, as well as conversions. Part G requires that a dwelling must not use more than 125 l/head/day. However, the Planning Practice Guidance (PPG)²³ states that 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 l/head/day.

Presently, as mentioned the national government’s PCC target is 110 l/head/day, however tighter standards may be sought going forward. In September 2025, the UK government consulted on lowering the baseline mandatory efficiency standard to all new homes from 125 l/p/d to 105 l/p/d and lowering the optional standard from 110 l/p/d to 100 l/p/d. While not yet implemented, these changes could take effect in 2026.

²³ Department for Levelling Up, Housing and Communities (2015) *Housing: optional technical standards*
<https://www.gov.uk/guidance/housing-optional-technical-standards>

In addition to the currently proposed reform package the Government is considering further phases of amendments to the Building Regulations Part G. The consultation included a call for evidence, whereby the government is seeking information and evidence on whether the government should pursue tightening mandatory standards to 95 or 100 l/p/d and optional standards to 80-90 l/p/d. A significant portion of the evidence gathering focuses on the feasibility of mandating reuse systems through the Building Regulations, including rainwater harvesting, greywater harvesting, and black water harvesting systems.

Aligning with this, the Environmental Improvement Plan 2025 states that water efficiency, water recycling, and drainage standards should be reviewed regularly to determine whether they need strengthening, including exploring opportunities to meet the standard such as technological innovation to increase water-efficient housing.

Given the issues of water stress a number of public and private bodies have investigated the potential for tighter standards. In response to the EA's publication, *Meeting our Future Water Needs: a National Framework for Water Resources*²⁴ a roadmap is being developed by national government towards greater water efficiency in new developments and retrofits. The Future Homes Hub is providing input to the roadmap by bringing together industry stakeholders. It has published a report²⁵ which highlights the need for changes in future PCC standards, fittings, labelling, water reuse and water positivity to enable sustainable growth. In terms of PCC specifically, it has reviewed foreseeable changes in fittings and technology to set out a roadmap for future standards between 2025-2035. These are shown in Table 4.5, with different standards set depending on levels of water stress.

Table 4.5- Future Homes Hub Litres per person per day framework

Demand Programme	2025	2030	2035
Achieved through fittings approach	105 l/head/day	100 l/head/day	90 l/head/day
In water stressed areas	100 l/head/day	90 l/head/day	80 l/head/day
In seriously water stressed areas	90 l/head/day	To be determined	To be determined

Royal Institute of British Architects (RIBA) has also developed in consultation with other professional UK construction bodies voluntary performance targets for water use²⁶ with regard to construction. The performance targets align with the future legislative horizon and set out challenging but achievable targets in order to have a realistic prospect of achieving net zero carbon for the whole UK building stock by 2050. In terms of water use it sets a standard of 95 l/head/day by 2025 and 75 l/head/day by 2030.

The Building Research Establishment Environmental Assessment Method (BREEAM)²⁷ does not set specific standards for PCC, however, does set graded standards for individual water fittings which developers can use to reduce water consumption. Furthermore, they provide certification for non-

²⁴ EA (2020) *Meeting our future water needs: a national framework for water resources* <https://www.gov.uk/government/publications/meeting-our-future-water-needs-a-national-framework-for-water-resources>

²⁵ Future Homes Hub (2024) *Water Ready- A report to inform HM Government's roadmap for water efficient new homes* https://irp.cdnwebsite.com/bdbb2d99/files/uploaded/Water%20Ready_A%20report%20to%20inform%20HM%20Government-s%20roadmap%20for%20water%20efficient%20new%20homes.pdf

²⁶ RIBA (2021) *RIBA 2030 Climate Challenge* <https://www.architecture.com/-/media/files/Climate-action/RIBA-2030-Climate-Challenge.pdf?srsltid=AfmBOOpW1CKKCWUCJ76wMu2194M2EVKmfT9sCZT-NoSvN8rClGvzGv1>

²⁷ BREEAM (2024) *BREEAM Standards* <https://breeam.com/standards>

household buildings. This involves an assessment of the efficiency of the buildings water consumption compared to a baseline performance standard²⁸.

The Future Homes Hub, RIBA and BREEAM standards are all voluntary standards at this stage that developers could choose to align with.

Being an area under serious water stress, Mansfield District could face challenges with respect to its supply and demand balance. It is recommended that the emerging local plan adopt and promote the requirement of 110 l/head/day for new developments as a minimum, and that MDC considers further policies on water efficient design to reduce consumption to below 100 l/head/day wherever possible. This will help mitigate water resource challenges and give time for new supply sources to come online, safeguarding against additional pressures in the future. This is also particularly relevant given that the Nottinghamshire WRZ is becoming more dependent upon transfers from the Strategic Grid WRZ, a water resource zone deemed highly vulnerable to climate change.

For non-household development, it is recommended that local plan policy requires a minimum of 3 credits under the BREEAM New Construction Standard measure "Wat01".

Reducing PCC to tighter standards across the district will likely require the demand reduction actions outlined by Severn Trent Water in combination with government led policy changes. This in turn should help make water efficiency savings more financially viable for developers.

4.5.5 Resource Supply Options

While demand reduction is the priority, Severn Trent Water recognises that population growth, climate change, and environmental constraints will require additional water sources to maintain long-term supply resilience. Without any upgrades to existing infrastructure and new transfers, it is expected that Severn Trent Water will have insufficient water resources over the next 25 years and will rely heavily on water transfers from elsewhere.

In terms of resource options to increase available supply Severn Trent Water WRMP24 identifies several potential resource options following a multi-stage screening process based on environmental constraints, alongside economic and technical feasibility. They identify very few options to increase groundwater abstraction across their supply area, meaning a focus on existing reservoir and water treatment networks, as well as new infrastructure to distribute to areas in need.

Various resource supply options were investigated across the Severn Trent supply area, from desalination plants to new water treatment works and water transfer schemes. Table 4.6 details the supply options taken forward in the final preferred plan in the WRMP24 for the Nottinghamshire WRZ. It also includes other potential resource options that were cited but ultimately excluded from the final plan following detailed appraisals. For pipelines, the output stated is the maximum expected utilisation in the planning period.

²⁸ Designing Building The Construction Wiki (2020) *BREEAM Water Consumption*
https://www.designingbuildings.co.uk/wiki/BREEAM_Water_consumption

Table 4.6- Feasible Resource Options for Nottinghamshire WRZ

Option Type	Name	Output (MI/d)	Commentary	Within Plan Period
Pipeline	North Notts Transfer	30	New 16km long pipeline linking the Derwent Valley to North Nottinghamshire (near Worksop).	AMP8- due to be completed by 2030.
Third Party licence termination	Terminate Derwent Valley export to Yorkshire Water	35	End export agreement which will provide additional raw water in the Derwent Reservoirs to be stored and utilised during dry seasons	AMP9
Pipeline	Mid Notts Transfer	30	Transfer of surplus treated water in the Strategic Grid WRZ to Nottinghamshire WRZ via a new pipeline and pumping station.	AMP11- partially within plan period
Desalination	Desalination- Notts Notional Scheme	N/A	Potential desalination plant to be constructed to utilise saline estuary water, but deemed too expensive and inefficient to be included in the final plan	Not included in final plan
Water Treatment	New abstraction and WTW on the River Trent	N/A	Potential new water treatment works on the Trent. Excluded from core plan but included as option in the 'Environmental Stretch' and 'Demand Difference' alternative pathways	AMP11/12, but not included in final plan

In addition to the measures outlined in the table above, the continued abstraction of groundwater in aquifers such as those from Sherwood Sandstone and Magnesian Limestone, is central to the future of Nottinghamshire's water supply, although face sustainability reductions. Therefore, external transfers in the form of strategic pipelines connecting Nottinghamshire to neighbouring WRZs are most vital in delivering additional capacity via shared infrastructure.

4.5.6 Strategic Resource Options

Strategic Resource Options (SROs) are ambitious, large-scale projects which have the potential to benefit national and regional long-term water security, overseen by three water regulators: Ofwat, the EA and the Drinking Water Inspectorate (DWI). The size and location of the Severn Trent Water supply area means that Severn Trent Water play an important role in the development of several SROs. Included in the PR24 Final Determination²⁹ were three new SROs to investigate, one particularly relevant to the Nottinghamshire WRZ being the Nottinghamshire Mine Water SRO.

²⁹ PR24 Final Determination- Overview of Severn Trent Water (2024) <https://www.ofwat.gov.uk/wp-content/uploads/2024/12/Overview-of-Severn-Trent-Waters-PR24-final-determination.pdf>

The Nottinghamshire Mine Water (NWM) SRO aims to provide new water supply for the East Midlands and South Yorkshire, derived from water from the Hartington-Creswell-Langwith (HCL) Mine Water Block and other deep legacy coal mine workings in the region. The project involves multiple phases, with the end goal involving the abstraction and treatment of saline mine water, to be transferred through pipelines to the Severn Trent and Yorkshire Water distribution networks.

This project is at the very early stages, with feasibility studies currently being undertaken, but it may be another option for water supply to Nottinghamshire and Mansfield District in the future.

4.5.7 Drought Permits

In addition to the supply options outlined above, the WRMP states that a number of drought permit options are available to Severn Trent Water. Drought permits are options that enable water companies to abstract more water than permitted by their abstraction licenses or abstract during dry periods when abstraction would normally be restricted. Hence these options usually only available in drought situations and require the water company to demonstrate that there has been an exceptional shortage of rainfall. During the 2022 drought, in which record 6-month dry spells were experienced, Severn Trent Water applied for three drought permits: the River Derwent at Derwent Valley Reservoirs, River Churnet at Tittesworth Reservoir, and at the Dove Reservoirs. The Derwent and Churnet permits had been in the Severn Trent drought plan for many years, with the Dove drought permit licence a newer addition, which is being considered as a permanent scheme option for future supply. This illustrates the potential use of drought permits to ensure sufficient water supply into the future, especially during extreme drought events.

4.5.8 Summary of Demand and Supply Options

Unlike supply options, demand options are able to deliver from the first year of implementation due to shorter lead times. Whilst the yield from such measures is typically less than those found for the supply options, they still offer significant savings. Based on a review of the figures estimated in the WRMP, efficiency measures could yield up to 15l/head/day by 2043/44, with leakage reductions also helping reduce demand by 23Ml/day by 2043.

This should be sufficient to significantly offset some of the deficits measured in the baseline scenario tested by Severn Trent Water. However, it should be noted that there remains an element of risk around the expectation on the public and on the government to assist in the demand reductions. It is also noted that the current dwellings expected in the local plan may exceed those forecast in Severn Trent Water's WRMP.

In the short to medium term, supply options brought forward in the WRMP24 could yield up to 65Ml/d by the end of AMP9, but uncertainty persists regarding the exact timings these supplies would be available. These options include a new water transfer and eliminating exports. In the longer-term, increased supply options are likely to be necessary. In this regard, Severn Trent Water is exploring several options for its supply area including further water transfer schemes, using mine water and developing new water treatment works. These have the potential to offset any deficits but will require significant lead in times and are often proposed to serve the Severn Trent Water supply area as a whole, rather than Mansfield District or even Nottinghamshire WRZ in isolation.

Table 4.7 summarises supply and demand in the baseline and final plan WRMP24 scenarios taken from the year 2043. The final plan scenario includes the core programme of resource options including the termination of water export to Yorkshire Water and the North Notts water transfer, with the final plan strategy resulting in a predicted net benefit of around 60Ml/day by 2043.

Table 4.7- Supply and Demand summary in 2043

Scenario	Demand (2043)	Supply (2043)	Balance (2043)
Baseline	242.92Ml/day	184.98Ml/day	-57.94Ml/day
Final Plan	210.24Ml/day	214.14Ml/day	+3.9Ml/day

4.6 Abstraction Licenses

A data request was sent to the EA to establish the existing water abstraction licenses currently in use in Mansfield District. Currently there are a total of 28 point and 3 reach abstraction licenses, from a combination of groundwater and surface water sources. Table 4.8 provides more information about the abstractions including the license holder and their uses. Figure 4-5 maps the location of the abstractions.

Table 4.8- Abstraction License Details

Licence Holder	Use	Eastings	Northings	Source of Supply
Point				
SHERWOOD FOREST GOLF CLUB LTD	Sports/Leisure	457690	361290	Groundwater- Sherwood Forest Golf Course Borehole
MANSFIELD TOWN FOOTBALL CLUB LTD	Irrigation	453700	360300	Surface Water- Field Mill Ground, River Maun
J A & A CLARK	Agricultural	458140	362370	Surface Water- Newlands Farm, Forest Town, Vicar Water
		458270	362430	
		458600	362550	
		457970	362260	Surface Water- Newlands Farm, Forest Town, Reservoir
		457950	362220	
Severn Trent Water Ltd	Public Water Supply			Groundwater
				Groundwater
				Groundwater
				Groundwater
Harworth Estates Investments Limited	Irrigation	458315	369725	Surface Water- Welbeck Colliery, spring adjoining the River Meden
A E Bowring and Sons Ltd	Agricultural	458305	369595	Surface Water- Assarts Farm near Welbeck, River Meden
		456050	368120	Surface Water- Burns Farm, River Meden
		457400	368840	
J R TOWNROE	Agricultural	456490	365370	Groundwater- Borehole at Westfield House Farm, Warsop
A E Bowring and Sons Ltd	Agricultural	458360	369560	Groundwater- Borehole at Assarts Farm, Warsop
G Bacon and Sons	Agricultural	459300	369990	Surface Water- Gleadthorpe Grange, Meden Vale, River Meden
TORAY TEXTILES EUROPE LTD	Textile Finishing	456380	361690	Groundwater- Forest Town Site, Mansfield Boreholes
		456460	362030	
		456670	361800	
	Private Water Supply	456320	361520	
		456870	361670	
		456530	361750	
FRW Taylor	Agricultural	453188	359203	Surface Water- Cauldwell Brook at Low Oakham and Stonehill
		453064	358042	
Dawn Bowring	Agricultural	457640	366760	Groundwater- Borehole at Meden Farm, Warsop
Midland Landfill Limited	Waste	453100	364900	Groundwater- Sump at Mansfield Woodhouse Landfill Site
Reach				
J H JOULE & PARTNERS	Agricultural	454720	366030	Sookholme Hall Farm, Mansfield Woodhouse, River Meden
FRW Taylor	Agricultural	453064	358042	Cauldwell Brook at Low Oakham and Stonehill
FRW Taylor	Agricultural	456395	363635	Near Peafield Lane, Mansfield- River Maun

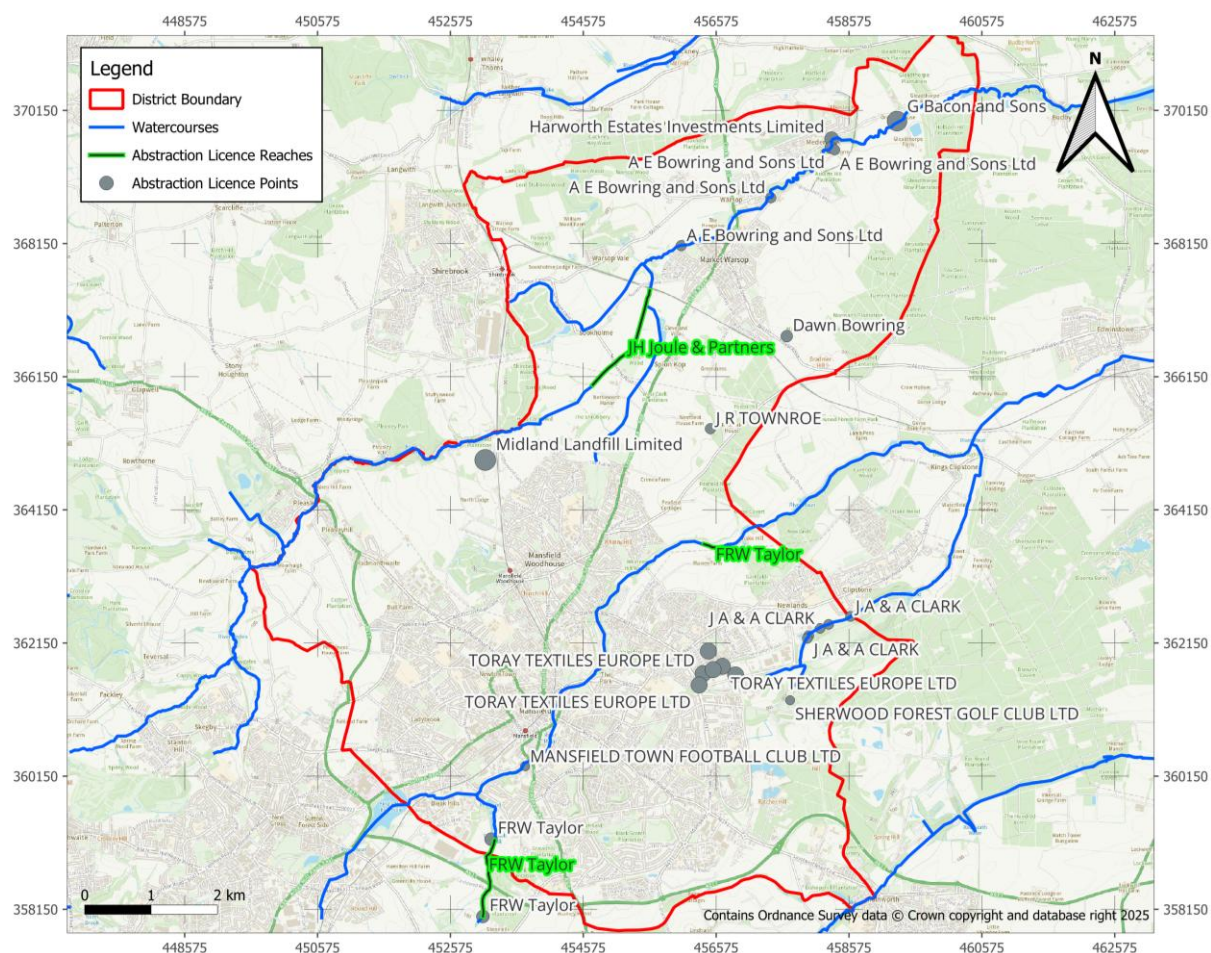


Figure 4-5- Location of abstraction licenses in Mansfield District, scaled to max daily abstraction volume

Mansfield District falls within the Idle and Torne catchment, in which the Idle and Torne Abstraction License Strategy outlines the approach to abstraction licensing into the future. The catchment is closed to further consumptive abstraction due to previous over-abstraction to ensure further deterioration is avoided, in line with the WFD. This is in place at all assessed flows and means no new licences will be granted.

In terms of groundwater, the confined Sherwood Sandstone and Lower Magnesian Limestone aquifers across the Idle and Torne catchment are also deemed by the EA to be fully committed and no abstraction can take place. These aquifers are currently of poor WFD status. The strategy mentions the potential need to add constraints to existing licences, for example 'Hands off Level' or 'Hands off Flow' conditions which restrict the abstractor to ensure a minimum flow or groundwater level is maintained during periods of low water availability. The single exception for a licence being granted is to create environmental gains, such as for wetland recreation.

The majority of the quantity of water abstracted currently across the catchment is for the purpose of water supply, with other main uses being for agriculture and industry. Following investigations by Severn Trent Water between 2010 and 2020 into the impact of abstraction on the Sherwood sandstone aquifer and various watercourses in the Idle catchment, abstractions from Severn Trent Water boreholes are due to reduce, with reductions in licences coming into effect by 2030. Other key measures planned to help manage water abstraction in the Idle and Torne catchment include:

- Ensuring current abstraction licences are used efficiently and all abstraction is fully justified, with licenses reduced or revoked where this is not the case.
- Facilitating increased water rights trading, where a person sells all or part of their water right to another person on a temporary or permanent basis.
- Working with Nottinghamshire Wildlife Trust, the Rivers Trust and the RSPB to engage the agricultural sector and local communities and explore sustainable land management techniques.

4.7 Summary

Based on the demand and supply forecasts in Severn Trent Water's latest WRMP without corrective action there could be shortfalls in water up to 2043 and beyond. This suggests that water shortage for the district could be a concern moving forward.

The WRMP has identified demand management through a combination of leakage reduction, smart metering and the promotion of water efficiency as the best means to negate a water deficit in the short to medium term. This should be sufficient to offset some of the deficits estimated, however supply options are likely to be necessary, especially in the longer term. These have the potential to offset the deficits estimated, however will require significant lead in times and are often proposed to serve the Severn Trent supply area rather than Mansfield District in isolation.

Abstractions across the district come from a combination of water supply uses and agriculture. Overall, the impact of these groundwater abstractions on water resources is significant, preventing increased abstraction for water supply going forward. Water availability in Mansfield will depend on development and climate pressures not only in the district but across the wider Severn Trent Water supply area. It will also be influenced by the implementation of the WRMP.

The assessment undertaken provides an understanding of water resource pressures in the district in the context of future development and climate change. However, it is important to note that the findings are caveated on the basis of several assumptions. The main evidence gaps are identified as:

- Whether the demand and supply changes forecasted for the Nottinghamshire WRZ based on population and dwellings fully translate to Mansfield District.
- The effects on water resources of the development (above Severn Trent's current projections) proposed in the local plan on water demand.

To provide more confidence in the assessment and fill the evidence gaps identified, further technical work would be required in order to refine population estimates and derive specific deficits for Mansfield district, considering the quantum of development proposed in the upcoming local plan. Population projections could be refined looking at past growth trends and the level of development planned. Severn Trent Water are best placed to assess the impact of these population changes on supply and demand, which will require an in-depth understanding of how Nottinghamshire WRZ operates and access to the models used in development of the WRMP. The deliverability of upgrades to the water network would also require further technical input from Severn Trent Water as sites are brought forward through the planning process.

In view of the above, a water cycle study detailed report is not required to assess water resource and supply, however following adoption of the local plan, further technical work by Severn Trent Water could be useful in better understanding current and future pressures across the district. This should be partly captured in future updates to Severn Trent Water's WRMP which will make use of more recent local plan data.

To further strengthen the long-term management of water resources throughout the plan period, the following stakeholder actions and recommendations have been identified:

- Severn Trent Water will continue its responsibilities in upgrading and providing water supply for new developments without presenting a risk to the environment.
- Severn Trent Water will need to assess future development earmarked in the local plan when developing their upcoming WRMP2029.
- The EA will need to review and provides feedback on Severn Trent Water's WRMP2029, ensuring that Severn Trent Water address future water needs and provide a secure and sustainable water supply to the districts.
- The EA will continue to regulate the abstraction of water from rivers and other sources in the borough, ensuring it is sustainable and within legal limits.
- It is recommended that developers engage with Severn Trent Water as early as possible so they can undertake modelled impact assessments to confirm if specific water supply upgrades are required and when.
- Should strategic infrastructure upgrades be required to supply new development, the option to phase some of the dwellings to later in the plan period should be considered, especially for larger scale residential developments (>1000 dwellings).
- It is recommended that the emerging local plan adopt and promote the optional requirement of 110 l/head/day for new developments as a minimum, with the potential to explore higher levels of water efficiency as new building regulations are implemented and the plan period progresses.
- For non-household development, it is recommended that local plan policy requires a minimum of 3 credits under the BREEAM New Construction Standard measure "Wat01".
- The council will provide Severn Trent water with their Annual Monitoring Reports and Housing Land Supply Statements, which outline projected housing development within their administrative areas.

5 Wastewater, Water Quality and Environmental Capacity

5.1 Introduction

This section assesses the infrastructural capacity of the wastewater system and environmental capacity of the receiving water environment. The infrastructural capacity is defined as the ability of the wastewater system to collect, transfer and treat wastewater from homes and businesses. The environmental capacity is defined as the water quality needed to protect aquatic wildlife and the environment. This is associated with the water quality targets set out by the WFD, required to protect waterbodies and the associated WwTW and storm discharge environmental permits in place to achieve this. Both are assessed against the proposed development in Mansfield District to determine whether there will be a detrimental impact on water quality, and whether new wastewater infrastructure is required.

5.2 Infrastructural Capacity

5.2.1 Drainage and Wastewater Management Plan & Catchment Strategic Plan

Water and sewerage companies must produce Drainage and Wastewater Management Plans (DWMPs) looking at current and future capacity covering a minimum of 25 years. Pressures and risks to their networks such as climate change and population growth need to be considered. DWMPs must detail how companies will manage these pressures and risks through their business plans and how they will work with other risk management authorities and/or drainage asset owners.

Severn Trent Water published their latest DWMP in 2023³⁰. The DWMP process is iterative and will be repeated every 5 years, with the next version due in 2028. Some of the goals in the current DWMP are:

- Network flood resilience– Reduce risk of sewer flooding up to a 1 in 50-year storm event. Reduce number of sewer collapses.
- Storm Overflow Performance – Reduce the number of spills, including ensuring no storm overflow operates more than 10 times per year by 2050.
- Pollution Risks – Reduce number of pollution incidents classed by the EA as category 1 (serious), category 2 (significant) and category 3 (minor) incidents. Ensure compliance of WwTW discharge permits.
- River Health- Ensure Severn Trent operations do not negatively impact river health by 2050 and increase the extent of bathing-quality rivers
- Enable sustainable economic and housing growth.

The area covered by the DWMP includes the whole Severn Trent supply area, a large area covering the majority of the Midlands, from parts of South Yorkshire and the Peak District National Park to the Severn Estuary. The network largely is composed of a combination of combined and separate sewer systems, with over 93,000km of pipelines and over 1000 wastewater treatment works in total. Combined sewers still make up a significant proportion of the sewer network and many of the separate systems ultimately drain into combined sewers. Surface water sewers and highway drainage discharge directly into nearby watercourses. The river water quality status in this region and within

³⁰ Severn Trent Water (2023) *Drainage and Wastewater Management Plan (DWMP)*
<https://www.severntrent.com/about-us/our-plans/drainage-wastewater-management-plan/>

the district specifically is generally moderate to poor (see section 5.3.2 for more detail on watercourse classifications).

The DWMP's initial risk-based screening of the North Notts Strategic Planning Area (SPA) found that 43 of the 52 WwTW catchments in this area were vulnerable to the risks associated with development and climate change and warranted long-term planning.

The level of priority to improve wastewater treatment performance was assessed for the whole SPA and each wastewater catchment individually, against six common planning objectives:

- Internal Sewer Flooding Risk
- Pollution Risk
- Sewer Collapse Risk
- Risk of Internal Sewer Flooding in 1 in 50-year storm
- Storm Overflow Performance
- Risk of WwTW quality compliance failure

Storm overflow performance was identified as the most critical issue across Mansfield District, with the WwTW site at Mansfield (Bath Ln) having the highest priority scores in total over all six objectives.

5.2.2 Wastewater Treatment Works

Background

Discharges from WwTWs are controlled by discharge consents set by the EA, which detail the flow rate and effluent quality that the WwTW must meet to achieve water quality targets. The Dry Weather Flow (DWF) is a key parameter in this regard, it is the flow that may be discharged in dry weather (i.e. flow which occurs in the absence of any runoff from rainfall, snow melt or other sources). The DWF permit specifies the allowable discharge flow rate and required effluent quality of the flow.

The flow to full treatment (FFT) is also important. It measures how much wastewater a treatment works is able to treat at any time. Where the FFT level is exceeded, water may need to be diverted to storm tanks (if available). Water will typically be held in these tanks until the storm passes. The contents of these storm tanks can then be returned to be treated by the works. Where a storm is prolonged or sustained, then often the environmental permit will allow the water company to release the extra incoming rainwater and diluted wastewater into the environment, normally after partial treatment. If a water company is diverting this rain and wastewater to storm tanks or the environment before reaching the works' FFT level, they could be breaking the conditions of their environmental permit.

Population growth is also expected in the district as outlined in section 4.4, which could increase the amount of treated sewage being discharged to the receiving water environment. If population increase causes effluent flows to increase above the consented flow, then there will be a risk of failing to meet water quality objectives. To mitigate against this, the treatment capacity at WwTWs may need to be increased and/or the treatment technologies may need to be improved. Current DWF permits may also need to be renegotiated.

Mansfield District is served by 7 WwTW catchments, these catchments and the location of their WwTWs as well as other surrounding WwTW catchments not located within the boundary of Mansfield District are shown below in Figure 5-1. The seven sewage treatment works serving Mansfield vary in size, from Budby which in 2023 was estimated to serve only 59 people, to Mansfield (Bath Ln) which is the largest in the district by a significant margin and served 93,099 people at this time.

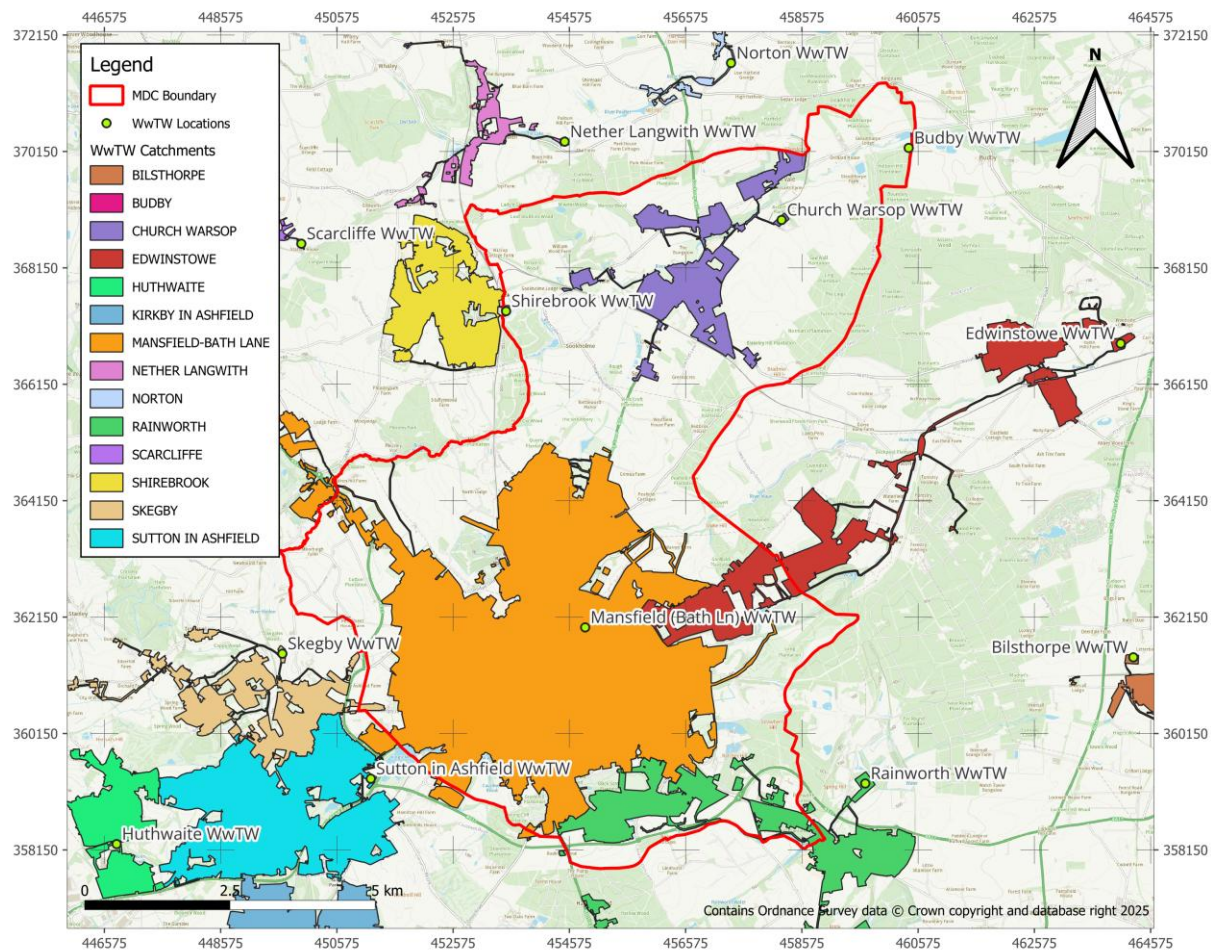


Figure 5-1- WwTW Catchments in Mansfield District

Three of the sites discharge within the Mansfield District and also primarily serve populations within the district, namely Mansfield (Bath Ln) WwTW which discharges into the Maun, and Church Warsop and Budby WwTWs which discharge into the Meden.

Shirebrook WwTW primarily serves the population within the neighbouring Bolsover District, however it discharges within Mansfield District into Sookholme Brook, a tributary of the River Meden. The new local Plan for Bolsover is currently in development. However, the Shirebrook Growth Plan developed in 2024, details a preferred option for growth in the town of Shirebrook consisting of 3,000 new homes and 50ha of employment land. As part of their new local plan Bolsover District Council will need to ensure that development does not impact the water environment. Mansfield District Council will engage with Bolsover District Council throughout the process to understand the existing pressures on Sookholme Brook and to assess the cumulative impacts of development across both authority areas.

The other three sites discharge into neighbouring local authority areas and the majority of population they serve lies outside of Mansfield district.

Strategic Mitigation Options

As previously mentioned, in Severn Trent Water's DWMP, 6 key planning objectives were set out with regards to improving the capacity and reliability of wastewater treatment infrastructure. To

achieve these outcomes, Severn Trent have identified the following potential options as part of their long-term strategy, as presented in Table 5.1.

Table 5.1- Summary of relevant mitigation options from Severn Trent Water's DWMP Technical Report.

Group	Option	Details
'Reduce'	Domestic Water Consumption Management	Reducing water consumptions of domestic properties though working with customers and efficiency savings to reduce Dry Weather Flows (DWFs)/baseflows.
	Trade Flow Demand Management	Working with non-household traders to identify opportunities to pre-treat flows on site to offset issues at WwTW.
	Surface Water Inflow Management	Manage surface water entering the sewer network through surface water separation and SuDS strategies.
	Infiltration Management	Managing groundwater ingress into the sewer network during wet weather in areas with high water tables through activities such as sewer lining and replacement.
Optimise sewerage network and wastewater treatment	Sewer Flow Management to Optimise Headroom	Identify opportunities within the sewer network where alterations can be made to make better use of existing spare capacity.
	Storm Overflow Rationalisation	Identify opportunities to combine multiple Storm Overflows into a single asset designed to improved modern design standards.
	Active System Control	Using smart technology such as active system control or real time control to dynamically hold flows back in areas where capacity is greater.
	River Catchment Flexible Permitting	Use River reach analysis of permits to ensure impacts from WwTW are cumulatively considered and balanced to meet needs of the WwTW and environmental objectives.
	WwTW Treatment Optimisation/Decentralisation	Optimise existing treatment capacity by transferring flows to alternative WwTW with spare capacity.
	Storm Overflow Effluent Treatment	Treatment of storm overflow effluent to improve water quality before released into sensitive environments e.g. using reed beds and UV filters.
Build new infrastructure	Sewer Capacity Upgrades	Traditional capacity upgrades including new sewers and attenuation tanks
	WwTW Capacity Upgrades	Traditional capacity upgrades including new treatment capacity considering land availability and the environmental capacity of the receiving watercourse.
Environmental Measures	SuDS for Groundwater Recharge	SuDS strategies to support groundwater recharge and meet water availability objectives.
	Natural Flood Management	Use of NFM to manage flood levels where they interact with and can inundate the wastewater system

Based on the six specific level 3 Baseline Risk and Vulnerability (BRAVA) reports completed for water treatment catchments wholly or partially within Mansfield district, three key interventions were deemed to be most viable on average:

- Surface water inflow management
- Sewer capacity upgrades
- WwTW capacity upgrades

Two of these interventions involve the development of new 'grey' (human-engineered) infrastructure, instead of nature-based solutions, highlighting the potential need for significant investment into upgrading existing wastewater infrastructure within Mansfield. However, surface water inflow management is more tied to the use of nature-based interventions. For example, a major surface water inflow management scheme is already ongoing in the district, with Severn Trent Water working with Mansfield District Council and Nottinghamshire County Council to implement the Mansfield Green Recovery programme. The programme aims to protect around 90,000 homes from surface water and sewer flooding, focussing on creating the first catchment-scale flood resilient community, using a nature-based approach by storing around 58,000m³ of surface water across the catchment within rain gardens, drainage ponds, new grassed areas and permeable hard paving. The widespread implementation of these measures could be vital in ensuring sufficient infrastructural and environmental capacity going forward.

Site-Specific Mitigations

WwTW site specific measures and strategies are also outlined by Severn Trent Water in the DWMP report, based on risk of sewer flooding, risk of storm overflow and site specific WwTW assessments, considering headroom, capacity and environmental constraints. Table 5.2 identifies where wastewater treatment improvement works serving Mansfield District are recently completed (AMP7) or planned to commence during AMP8, before 2030.

Table 5.2- WwTW and CSOs strategic improvement works and investigations within Mansfield District

Scheme	AMP	Details of Investment
Mansfield (Bath Ln) WwTW improvements	AMP7 TBC	Green recovery SuDS project and phosphorus removal using chemical dosing, TSR and new primary settlement tank. Severn Trent Water currently monitoring performance of the works- Further investment potentially required in future AMPs
Skegby WwTW improvements	AMP7/8	Investigations and subsequent capacity improvements to prevent sewer overflow discharges and phosphorus removal
Edwinstowe WwTW	AMP8	Addressing harm caused by sewer overflows. Severn Trent Water comment that current capacity will likely accommodate known future population.
Church Warsop WwTW	AMP8	Phosphate removal at WwTW alongside catchment-wide nutrient balancing to improve condition of Thoresby Lake SSSI, and scheme to increase DWF capacity.
Rainworth WwTW	AMP8 AMP9	Ammonia removal to prevent deterioration from current status. STW comment that capacity at Rainworth is currently uncertain following storm damage to tanks, with plans to resolve in 2026. STW expect capacity to fall short of level required to accommodate housing planned, with the WwTW identified for investment to increase capacity during AMP9

Forest Town – Main Avenue CSO	AMP8	Investigate and address harm caused by sewer overflows discharging into Vicar Water
Other CSO/SSO Improvements	AMP8	Plans to reduce spill frequency at CSOs utilising non-traditional solutions where feasible, including at Sutton in Ashfield WwTW (SSO), Shirebrook 3DWF CSO, and Meden Vale – Welbeck Colliery (SSO)
Maun catchment-wide investigation	AMP8	Investigation to assess the impact of intermittent discharges on water quality in waterbodies with Reasons for Not Achieving Good Status (RNAGS)

5.2.3 Combined Sewer Overflows (CSOs)

Many parts of England have a combined sewerage system which transports both clean rainwater and wastewater. During heavy rainfall the capacity of these pipes can be exceeded, which means possible inundation of WwTWs and backing up of network infrastructure. Combined sewer overflows (CSOs) were developed as overflow valves to reduce the risk of sewage backing up during heavy rainfall. These overflows discharge diluted untreated sewage during heavy rainfall. CSOs discharge to watercourses in the district. The EA works closely with water companies to ensure CSOs are closely monitored to identify where the system is not operating as it should. The Environment Act 2021³¹ introduced new requirements, stipulating that storm overflow discharges in England must be reported, including their location and the duration of any spill.

The national government's Storm Overflows Discharge Reduction Plan³² sets targets for regulators and water companies to prioritise improving the water environment. This ties into some of the aims set out in Severn Trent Water's DWMP (see section 5.2.1). The reduction plan states that by 2040, water companies should have improved 87% of overflows discharging into high-priority sites and 60% of all overflows. By 2050 all overflows should be improved. Note, for a CSO (including both CSOs at WwTWs and network CSOs) to be considered as improved, it must meet the following criteria:

- It must be demonstrated that discharges from the CSOs have no local adverse ecological impact.
- The CSO will not be permitted to discharge above an average of 10 rainfall events per year.
- The CSO has screening controls that avoid pollution by limiting discharge of persistent inorganic material. Disinfection may be required in some cases to reduce harmful pathogens.
- The CSO spills no more than 1 times per season when upstream of a designated bathing water. (However there are no designated bathing waters within Mansfield District)

Severn Trent Water publish CSO overspill data annually³³. The CSOs monitored across the district are shown in Figure 5.2. Further development has the potential to increase risks unless infrastructural capacity is in place. It is also Severn Trent Water's responsibility to continue to monitor CSOs and take appropriate action. This list does not represent sewer overflows upstream of the district which

³¹ Parliament of the United Kingdom (2021) *The Environment Act 2021*

<https://www.legislation.gov.uk/ukpga/2021/30/contents>

³² UK Government (2023) *Storm overflows discharge reduction plan*

<https://www.gov.uk/government/publications/storm-overflows-discharge-reduction-plan>

³³ Severn Trent Water, DEFRA (2025). Event Duration Monitoring - Storm Overflows - Annual Returns. <https://environment.data.gov.uk/dataset/21e15f12-0df8-4bfc-b763-45226c16a8ac>

may also impact water quality, as only CSO's within the administrative boundary were selected. Table 5.3 provides the full dataset, which includes further information on each CSO.

The sites with the highest average yearly spill count include the Mansfield Bath Ln WwTW and associated sewage pumping station, Church Warsop WwTW and the Mansfield Woodhouse Old Mill Ln CSO. Mansfield and Church Warsop WwTW are two of the largest treatment works within Mansfield district, potentially suggesting significant capacity issues at these locations.

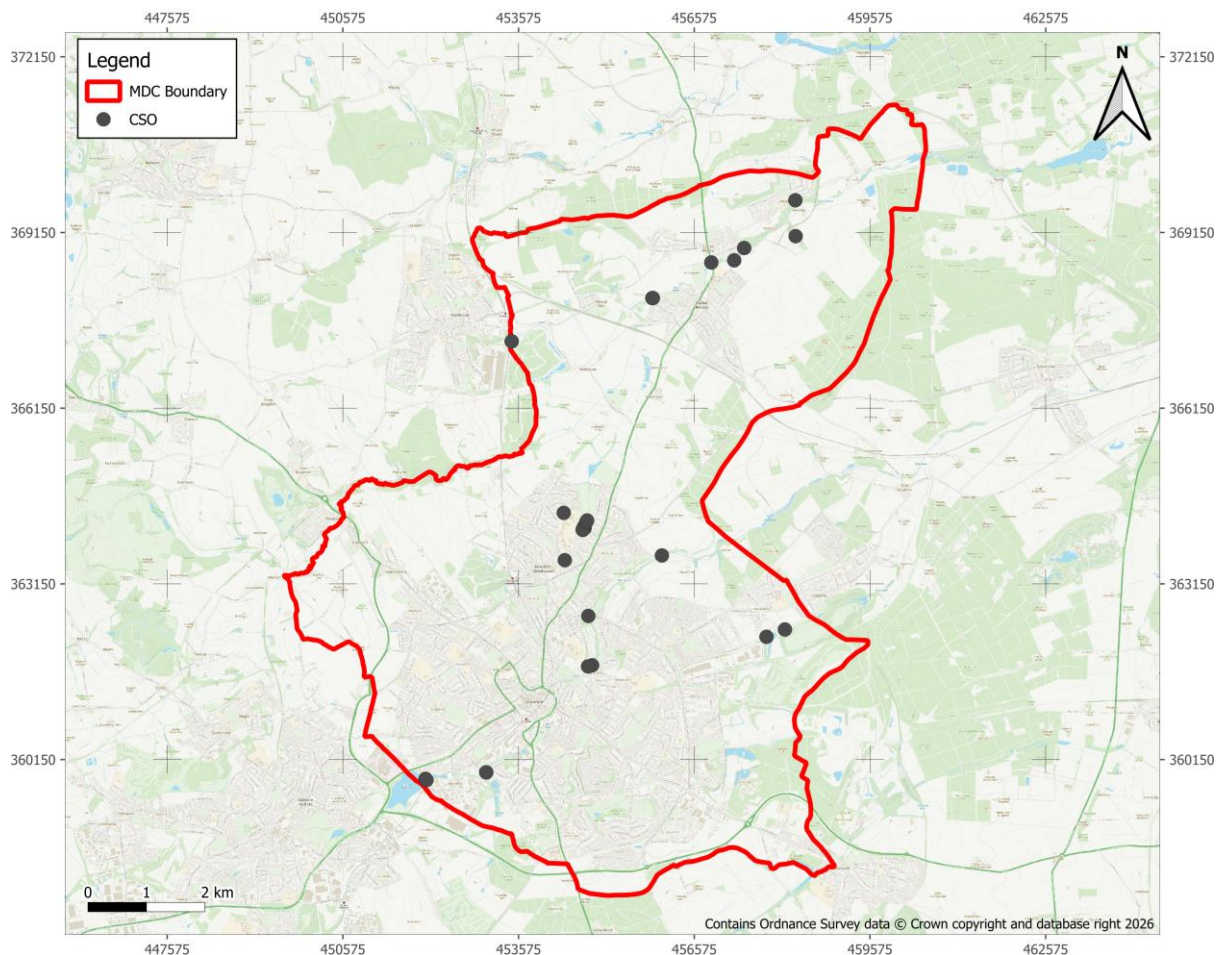


Figure 5-2- Location of CSOs in Mansfield District

Mansfield District Water Cycle Study Scoping Report

Table 5.3- CSOs monitored in study area^

Name	NGR	Counted Spills (2025)	Counted Spills (2024)	Counted Spills (2023)	Counted Spills (2022)	Counted Spills (2021)	Counted Spills (2020)	Average Spills (2020-2025)	Counted Spills (2020-2025)
86 Park Hall Road CSO	SK5434664362	0	0	0	0	0	22	3.66	22
Albert Square CSO	SK5468964117	10	26	34	32	2	21	20.83	125
Mansfield Woodhouse - Leeming Lane (CSO)	SK5470064100	12	13	5	37	10	22	16.50	99
Warsop - Burns Lane CSO	SK5725668674	6	9	28	20	19	9	15.17	91
Church Rd/Eastlands Lane Jcn CSO	SK5686568638	4	7	11	8	6	8	7.33	44
Church Warsop WwTW	SK5830569087	30	44	43	30	45	33	37.50	225
Forest Town - Main Avenue CSO+	SK5780762246	21	13	23	29	26	23	22.50	135
Forest Town - Newlands Farm CSO	SK5812262371	23	19	20	19	20	20	20.17	121
Leeming Lane CSO	SK5467164074	0	3	0	0	0	0	0.50	3
Manor Road Combined Sewer Overflow	SK5742668885	1	2	3	4	2	0	2.00	12
Mansf. Woodhouse - Old Mill Ln (CSO)	SK5742668885	32	33	42	42	38	19	34.33	206
Mansf. Woodhouse - Church/High St (CSO)	SK5436463554	0	0	0	0	0	0	0.00	0
Mansfield - 10 Randol Close CSO	SK5198659820	16	20	30	21	18	11	19.33	116
Mansfield - Bath Lane WwTW	SK5198659820	31	37	41	7	83	63	43.67	262
Mansfield - Sheepbridge Lane 2 CSO	SK5302259932	1	4	8	3	N/A*	0	3.20	16
Mansfield - Sheepbridge Lane 2 CSO	SK5302259932	17	24	12	8	N/A*	3	12.80	64
Mansfield Woodhouse - Kingsley Ave (CSO)	SK5474564232	15	12	N/A	N/A	N/A	N/A	13.50	27

Mansfield District Water Cycle Study Scoping Report

Mansfield Woodhouse - Swan Lane CSO	SK5468964117	0	3	2	2	3	2	2.00	12
Mansfield Woodhouse - Warsop Rd CSO	SK5467064072	9	10	10	6	13	11	9.83	59
Mansfield Woodhouse-12 Wells CL CSO	SK5467064072	14	20	21	22	18	11	17.67	106
Mansfield Woodhouse-Kingsley Av SPS	SK5473264207	4	2	7	18	11	227	44.83	269
Market Warsop - Stonebridge Ln (CSO)	SK5586068030	0	1	N/A	N/A	N/A	N/A	0.50	1
Market Warsop - The Hawthorns (CSO)	SK5586068030	0	0	1	0	0	1	0.33	2
Maun Valley Sewage Pumping Station	SK5602263635	7	5	3	2	N/A	N/A	4.25	17
Netherfield Ln Storm Sewage Overflow	SK5830069700	37	42	31	27	13	8	26.33	158
Sewage Pumping Station	SK5476061740	24	53	74	42	56	17	44.33	266
Shirebrook Sewage Treatment Works	SK5345667291	13	19	1	5	26	14	13.00	78
Shirebrook Sewage Treatment Works ⁺	SK5345667291	8	16	11	14	12	1	10.33	62
Sutton-In-Ashfield WwTW ⁺	SK5200359800	2	14	112	40	0**	0	28.00	168
Warsop - Stonebridge Lane (SSO)	SK5586068030	0	0	3	0	0	1	0.67	4
Warsop - Stonebridge Lane/Vale Av SPS (CSO)	SK5586068030	12	14	14	13	17	6	12.67	76

*It is not possible to discern spills from Sheepbridge Lane 2 Records from 2021.

**In the 2021 dataset there is a duplicate entry, which is not present in any other annual report. The duplicate entry was not included in this table. The duplicate entry was discharge from a storm discharge from a pumping station.

⁺CSO is being investigated during AMP8, meaning potential improvements over the next few years

^N/A marks where data is unavailable. N/A years are not included in the average number of spills calculation

5.3 Environmental Capacity

5.3.1 Humber River Basin management plan

The Humber Rivers Basin Management Plan³⁴ (RBMP) was initially published by DEFRA and the EA in 2015 and updated in 2022. The purpose of the RBMP is to provide a framework for protecting and enhancing the water environment. To achieve this, and because water and land resources are closely linked, it also informs decisions on land use planning.

The RBMP covers the following areas which relate to management of land and water:

- Baseline classification of water bodies
- Statutory objectives for protected areas
- Statutory objectives for water bodies
- Challenges for the water environment
- Summary programme of measures to achieve statutory objectives

The Water Framework Directive (WFD)³⁵ transposed into law by the Water Environment Regulations 2017 in England and Wales³⁶ provides most of the legislative basis for the RBMP. Water bodies are assessed based on the WFD indicator, which measures the health of the water environment and assigns them a status. The assessment is based on a range of quality elements relating to the biology and chemical quality of surface waters. Table 5.4 gives a description of each of the status classes.

Table 5.4- Definition of ecological status in Water Framework Directive

Status	Definition
High	Near natural conditions. No restriction on the beneficial uses of the water body. No impacts on amenity, wildlife, or fisheries.
Good	Slight change from natural conditions because of human activity. No restriction on the beneficial uses of the water body. No impact on amenity or fisheries. Protects all but the most sensitive wildlife
Moderate	Moderate change from natural conditions because of human activity. Some restriction on the beneficial uses of the water body. No impact on amenity. Some impact on wildlife and fisheries.
Poor	Major change from natural conditions because of human activity. Some restrictions on the beneficial uses of the water body. Some impact on amenity. Moderate impact on wildlife and fisheries.
Bad	Severe change from natural conditions because of human activity. Significant restriction on the beneficial uses of the water body. Major impact on amenity. Major impact on wildlife and fisheries with many species not present.

These status classes feed into the overall environmental objectives of the WFD and the associated RBMP. The environmental objectives are

- To prevent deterioration of the status of surface waters and groundwater
- To achieve objectives and standards for protected areas
- To aim to achieve good status for all water bodies

³⁴ EA (2022). River basin management plan for the Humber River Basin District. https://assets.publishing.service.gov.uk/media/63524462d3bf7f193d35a0f7/Humber_river_basin_management_plan_2022_HRA.pdf

³⁵ European Commission, *Water Framework Directive (2000)*, http://ec.europa.eu/environment/water/water-framework/index_en.html

³⁶ Parliament of the United Kingdom (2017) *The Water Environment (Water Framework Directive) (England & Wales) Regulations (2017)* <https://www.legislation.gov.uk/uksi/2017/407/contents>

- To reverse any significant and sustained upward trends in pollutant concentrations in groundwater
- The cessation of discharges, emissions and priority hazardous substances into surface waters
- Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants

The RBMP outlines the measures potentially needed to achieve these statutory objectives and the regulators/operators responsible. These measures are/will be essential in maintaining environmental capacity in response to increased housing and population growth. Table 5.5 summarises some of the key measures relevant to the study area³⁷.

Table 5.5- Key measures summarised from Humber Rivers RBMP

Category	Description	Key Stakeholders
Advice Schemes	Advice to farmers on environmental improvements and nutrient management	NFU
Education, targeted information	Aquatic Biosecurity Campaigns- Slowing spread of invasive species via public awareness	GB Non Native Species Secretariat
	Behaviour campaigns on water use	EA, Severn Trent Water (STW), Yorkshire Water (YW)
Financial incentives	Environment Management capital programme including diffuse pollution control initiatives	EA
	EA Flood and Coastal Risk Management capital programme- includes river restoration	EA
	England Woodland Creation Offer- Tree planting to improve water quality	Forestry Commission
	Green recovery challenge fund- various environmental improvement projects	Defra
	Environment Land Management Schemes- Various environmental improvements by land managers	Defra
	Water Environment Improvement Fund- Local habitat improvement schemes and pollution control initiatives	EA
Guidance/Process	Water Leaders Group to act as advocates for restoration of natural processes within freshwater catchments	EA
	Water Environment Transformation (WET) Programme - to support wider implementation of nature-based solutions through PR24 process and the agriculture sector	EA
	Drainage Wastewater Management Plans to inform measures identified by Water Industry in Price Review ²⁴	EA, YW, STW
Non-regulatory	Nature Recovery Network- Various actions to protect, improve, expand, and connect habitats including water and water-dependent environments	Natural England
Partnerships	Catchment partnership led projects and measures related to multiple funding streams and outcomes for water quality, quantity, habitat and flood risk reduction	EA, YW, STW
Regulatory	Water Industry National Environment Programme schemes - Habitat improvements and farm nutrient management plans	EA, YW, STW, NFU
	Sustainable abstraction improvements through changes to abstraction licences, licence conditions and non-licence changes at specific sites	EA, YW, STW
	Sewage treatment improvements by changes to licence conditions at specific sites	EA, YW, STW
Research	Water Leaders Group developing shared guidance and case studies for integrating investment in and across catchments	EA

³⁷ Environment Agency (2022). Summary of RBMP Measures. Summary of the measures planned for each river basin district.xlsx.

5.3.2 Surface Water

The EA's catchment data explorer was used to extract information about the water environment for the WFD catchments falling within the Mansfield District area. The catchment data explorer provides information on the ecological and chemical status of WFD catchments throughout the UK.

The ecological status of WFD catchments can be classified as *Bad*, *Poor*, *Moderate*, *Good* and *High*. For the chemical status, WFD catchments are classed as either as a *Fail* or *Good*. For this study the classifications are used to assess the existing pressures on specific catchments in the study area and understand their environmental capacity. Figure 5-3 shows the WFD catchments within the district.

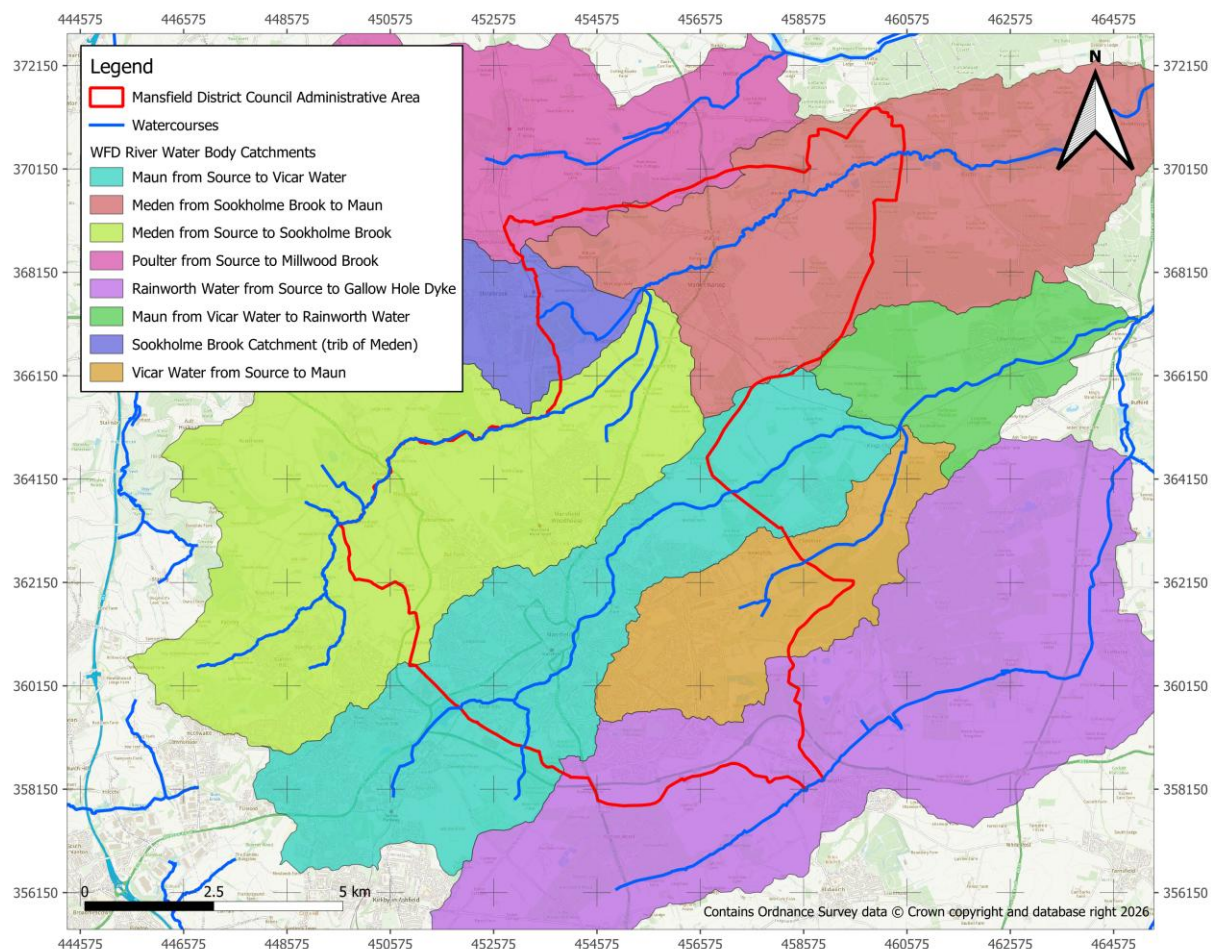


Figure 5-3- WFD Cycle 3 River Waterbody Catchments

Table 5.6 shows the ecological and chemical status of the eight WFD catchments which fall within the district. The ecological status is also mapped in Figure 5-4. In total, 3 catchments are classed as *Poor*, and 4 are classed as *Moderate*. All catchments were measured to have a *Fail* chemical status in 2019. For the 2019 assessment of chemical status, the EA changed some methods and increased their evidence base. Due to these changes, all water bodies now fail chemical status. This is largely due to the introduction of thresholds for newly introduced substances. The assessment is not comparable to the assessments undertaken for previous WFD cycles. The table also lists where the water industry has been identified as a reason for the watercourse not achieving good status, based on its effect on a specific metric used to determine ecological and chemical classifications. In many of these cases the water industry is not the only reason listed with agriculture, transport and land

management practices often also being cited as reasons for not achieving good status. Those being impacted by the water industry could be more sensitive to future development given its potential impact on increasing pollutant loads.

Table 5.6- Ecological and Chemical Status of Surface Waterbodies in the study area

Waterbody Name	Ecological	Chemical	Reasons for not achieving good status (RNAG)
Maun from Source to Vicar Water	Moderate	Fail*	Sewage discharge , physical modification, transport drainage runoff, poor soil management.
Meden from Sookholme Brook to Maun	Good	Fail*	Surface water abstraction and sewage discharge
Meden from Source to Sookholme Brook	Poor	Fail*	Poor livestock management, transport drainage runoff, poor soil management, sewage discharge , and physical modifications causing ecological discontinuity.
Poulter from Source to Millwood Brook	Moderate	Fail*	Presence of Mercury and its compounds, PBDE and benzo(g-h-i)perylene (under investigation)
Rainworth Water from Source to Gallow Dyke Hole	Moderate	Fail*	Poor livestock management, transport drainage runoff, poor nutrient management, sewage discharge , groundwater abstraction, land drainage, and physical modifications causing ecological discontinuity
Maun from Vicar Water to Rainworth Water	Moderate	Fail*	Transport drainage runoff, poor nutrient management, sewage discharge , and physical modifications causing ecological discontinuity
Sookholme Brook Catchment (Trib of Meden)	Poor	Fail*	Transport drainage runoff and presence of mercury and its compounds, PBDE and benzo(g-h-i)perylene (under investigation)
Vicar Water from Source to Maun	Poor	Fail*	Sewage discharge , groundwater over-abstraction, physical modification, groundwater resource impacts from mining and quarrying.

*Classification from 2019, no classification available for 2022

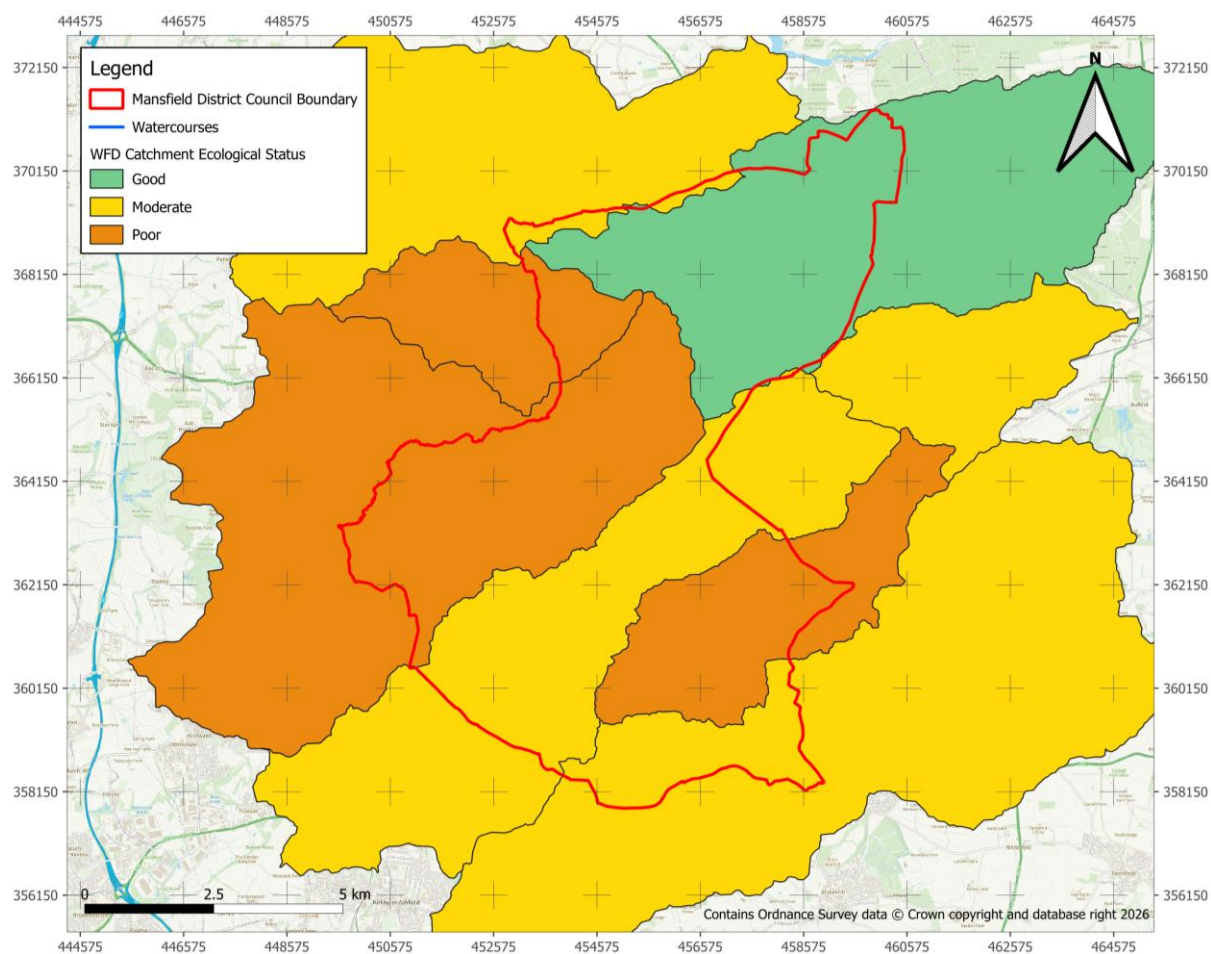


Figure 5-4- WFD Catchments Ecological Status

The current status of watercourses within the district shows them to be vulnerable, with limited environmental capacity especially likely in catchments with failures in nutrient status (Phosphate levels being a pertinent issue across Mansfield District, due to a variety of sources including sewage discharge, runoff from transport drainage and poor livestock management). Environmental capacity is also significantly limited by over abstraction in the area, which affects fish and invertebrates.

The findings do highlight the need for the WwTW upgrades earmarked in Table 5.2 to be implemented in a timely manner. When completed, these have the potential to improve the effluent quality at WwTWs. In addition to improvements in effluent quality, the capacity of WwTW may need to be increased so that flows discharged do not increase significantly. Increased WwTW capacity and improved effluent controls through the tightening of environmental permits should create more headroom for growth, ensuring 'no deterioration' in the downstream water environment.

As well as creating additional wastewater that WwTWs must manage, development can also affect surface water flow routes and water quality through direct runoff to waterbodies. This has the potential to impact upon the ecology of the watercourses running through the district. In this regard, the use of SuDS and associated flow control should be encouraged to ensure development does not affect or has minimal impact on water quality or flow regimes (more detail on SuDS is provided in section 6.4).

5.3.3 Groundwater

The EA catchment data explorer was also used to assess the status of groundwater bodies. As shown in Figure 5-5, Mansfield district is underlain by 3 different groundwater bodies. The two main groundwater bodies are comprised of Magnesian Limestone in the west of the district, with the Sherwood sandstone aquifer in the east. A tiny portion of the district near Pleasley is also underlain by Millstone grit and coal measures.

Groundwater bodies are measured against a quantitative status and a chemical status. Good quantitative status can be achieved by ensuring that the available groundwater resource is not reduced by the long-term annual average rate of abstraction. In addition, impacts on surface water linked with groundwater or groundwater-dependent terrestrial ecosystems should be avoided, as should saline intrusions.

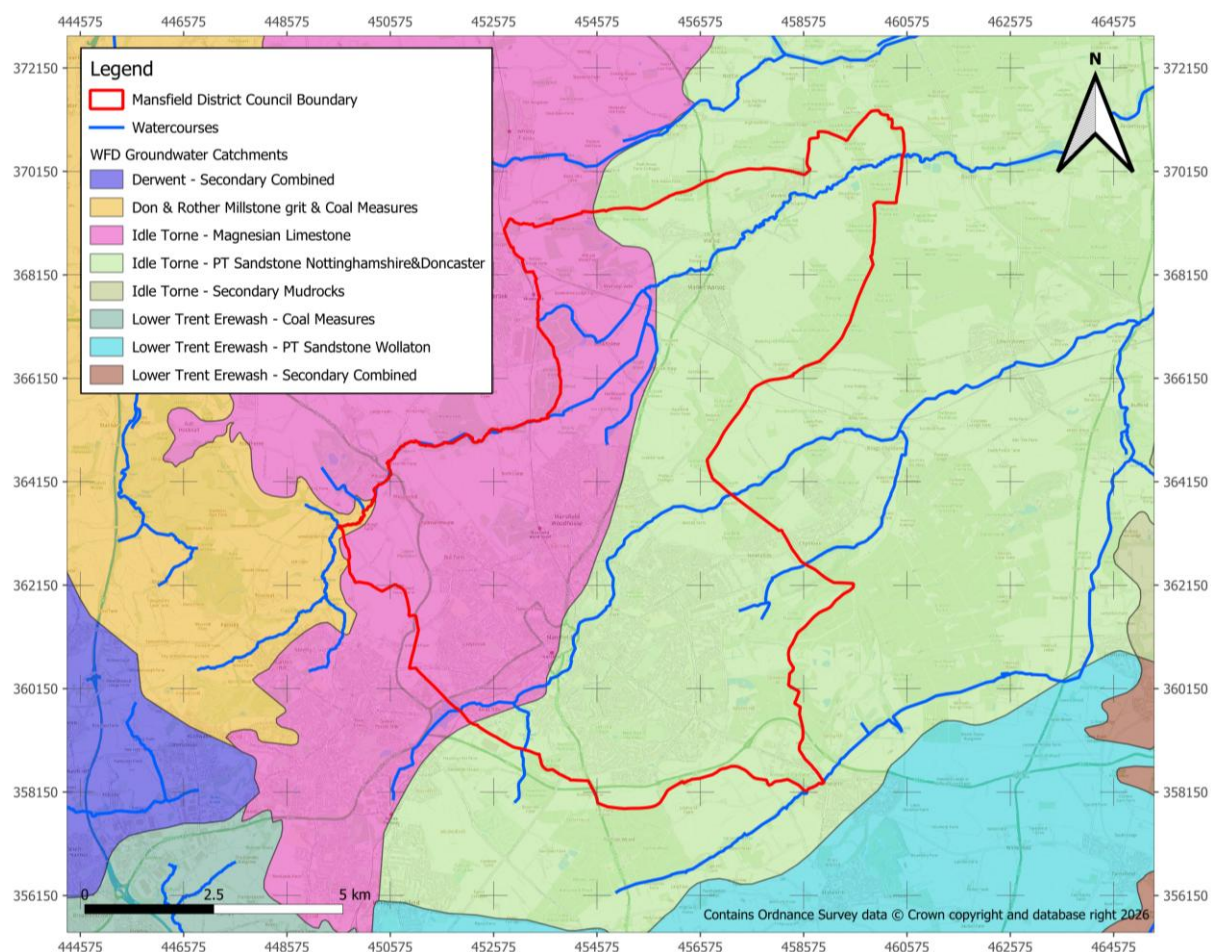


Figure 5-5- WFD Groundwater Catchments intersecting the district

As shown in Figure 5-6, the WFD groundwater classification for all groundwater catchments intersecting the district is *Poor*. For the Sherwood sandstone aquifer, the groundwater status is poor due to both its chemical and quantitative status, whilst for the magnesian limestone aquifer, this is due to its chemical status, as its quantitative status is *Good*. The reasons for not achieving good chemical status are likely diffuse pollution from poor nutrient/livestock management practices associated with agriculture and land management, as well as from industrial plants operating in the areas.

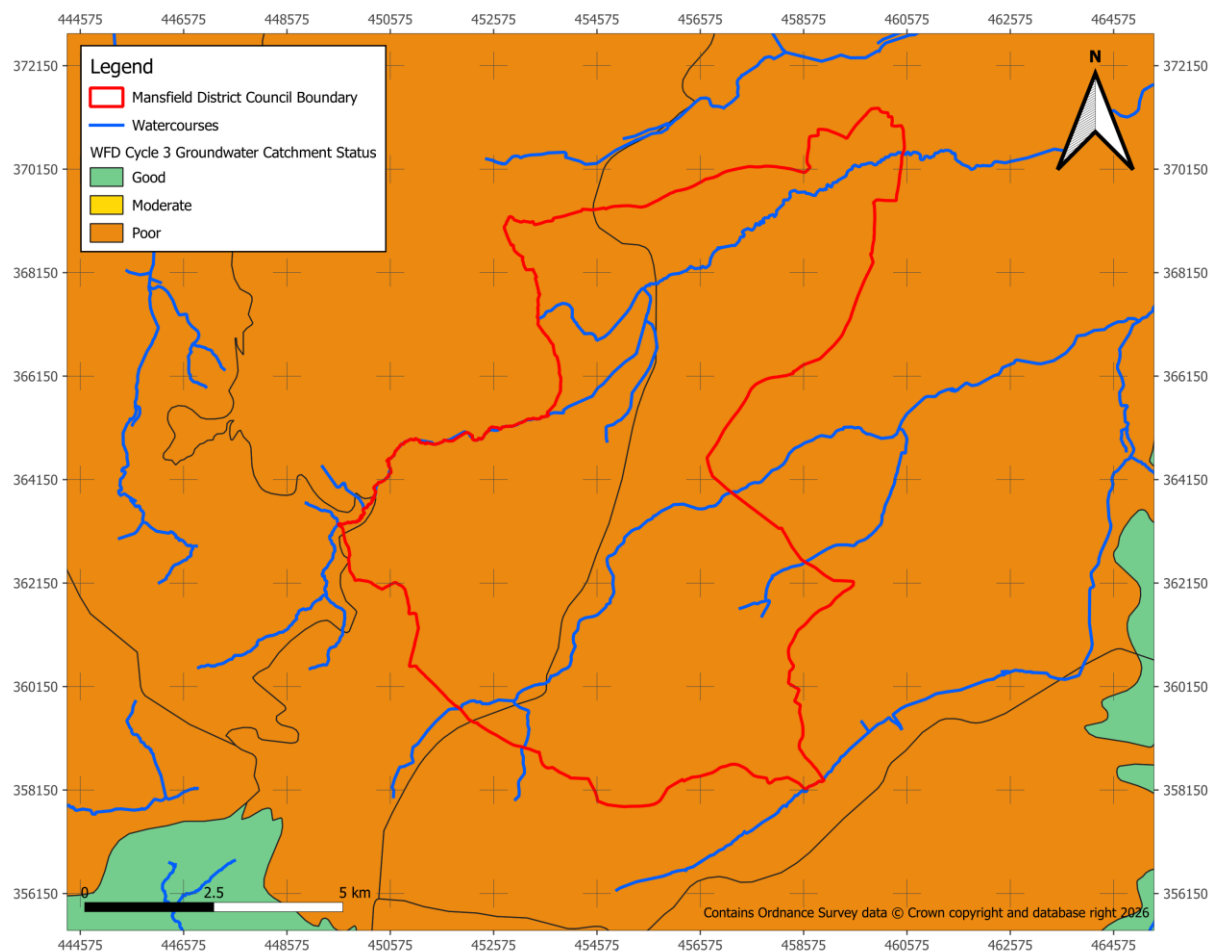


Figure 5-6- WFD Groundwater Catchment Classifications intersecting the district

5.4 Summary

The sewer network in Mansfield District and surrounding areas currently manages the demand of over 169,000 people. This is set to increase with population growth, and it is essential that there is sufficient infrastructural and environmental capacity to safeguard against issues such as ecological damage and sewer flooding. The WwTWs serving the districts are the most important infrastructural asset with respect to future development in the districts.

In terms of environmental capacity, the EA's catchment data explorer suggests that most of the watercourses in the study area have *Moderate* or *Poor* ecological status and *Fail* with regard to chemical status. This suggests that overall, they are vulnerable at present. Further assessment is needed however to understand which watercourses are being impacted most by the water industry and which will be most vulnerable to future growth.

Future upgrades to the sewer network alongside measures identified in the Humber River Basin Management Plan and Severn Trent Water's DWMP could help in reducing impacts but will take time to take effect. It is vital that the correct measures are followed by several stakeholders, including developers, the EA, local authorities and STW, to ensure that the current statuses of the watercourses improve.

The assessment undertaken in this scoping study presents an overview of environmental capacity and infrastructural capacity for the study area. However, there remains some uncertainty over the impacts of development. This includes uncertainty on the following issues:

- Infrastructural capacity within some of the WwTW catchments
- The potential for development to cause further deterioration in some of WFD catchments identified.
- Appropriate mitigation measures to safeguard environmental and infrastructural capacity.

To address uncertainties over infrastructural capacity, headroom assessments could be undertaken at all WwTWs that may be impacted by growth. These assessments will determine whether the sites have sufficient infrastructural capacity to manage the future growth proposed over the lifespan of the local plan.

An assessment of water quality impacts could also be undertaken using the latest version of the EA's SIMCAT model for watercourses in the district. This will include an assessment of growth against the WFD status for watercourses discharged to. All WwTWs that may be impacted by growth would be considered, with particular attention paid to the Mansfield Bath Ln WwTW.

Headroom assessments and water quality modelling will help better understand which watercourses are being impacted most by the water industry and which will be most vulnerable to future growth. It should also be possible to identify whether Severn Trent Water need to apply to the EA to amend existing environmental permits to allow for future development. However, they will require significant time inputs and further technical work would still be required by Severn Trent Water in consultation with the EA to fully determine the design of any required upgrades and the full conditions within any future permit applications.

Following receipt of a draft version of this report, the EA have confirmed that they would not expect to see these calculations to be undertaken within the WCS. Confirming that they will be undertaken as required through the normal consultation process between the EA and STW. In this regard a detailed water cycle study is not required with respect to wastewater and water quality.

6 Flood Risk

6.1 Introduction

This section includes a high-level review of the flood risk relevant to this study across Mansfield District, and its relationship with the development proposed. How flood risk might be managed moving forward is also addressed. Information in this section is partly based off the Mansfield District SFRA¹⁵. This was completed by WHS in February 2026. The SFRA supports the Local Plan by assessing flood risk from all sources to guide development allocations and inform the future management of flood risk across the district.

6.2 Overview of Flood Risk relevant to WCS

The River Maun and River Meden and their tributaries including Cauldwell Brook, Leas Brook and Sookholme Brook are the main watercourses affecting fluvial flood risk within Mansfield District. Fluvial flood risk is present along main rivers (which are the responsibility of the EA) and ordinary watercourses (which are the responsibility of the Nottinghamshire County Council acting as the Lead Local Flood Authority (LLFA) and riparian owners.

Surface water flood risk also affects many locations across the district. In Mansfield district, this includes much of Mansfield Town centre, Mansfield Woodhouse and Market Warsop. Flooding of land from surface water runoff is usually caused by intense rainfall and usually occurs in lower lying areas often where the drainage system is unable to cope with the volume of water. Surface water flooding problems are inextricably linked to issues of poor drainage and sewer flooding.

Sewer flooding often occurs when intense rainfall overloads the sewer system capacity (surface water, foul or combined), and/or when sewers cannot discharge properly to watercourses due to high water levels. Groundwater flooding, which is possible due to the hard rock aquifers in the district, can also contribute to sewer flooding through groundwater infiltration, where groundwater finds its way into the sewer system. Sewer flooding can also be caused when problems such as blockages, collapses or equipment failure occur in the sewerage system.

The Severn Trent Water DG5 sewer flooding register is available at the property level and has been obtained to further assess the spatial distribution of sewer flooding. The DG5 register, or flood risk register provided, is a record of properties that are deemed to be at risk of flooding due to hydraulic incapacity (i.e. not due to blockages, collapses or pump failure) during a storm event with a return period of 20 years or lower. In total there are 225 locations on the register within the Mansfield District administrative area. Of these properties, 92 have recorded events between 2013-2024. The remaining properties are considered to be at risk; however, no events have been recorded between 2013-2024.

The specific location of the properties within the register cannot be shared, however generally, properties at risk are present throughout the built up area of Mansfield, in areas that are understood to drain into Mansfield (Bath Ln) Water Treatment Works. In the north of the district, Market Warsop, Church Warsop and Meden Vale together have 19 properties at risk too.

6.3 Impacts of Development on Flood Risk

Development, if not properly managed, has the potential to impact a wide range of flood mechanisms, including those identified in section 6.2. Land use change influences the characteristics of how rainwater runs off land into local water networks such as drains, streams and rivers. Localised changes in land use can alter the pre-existing baseline behaviour of an individual area, and when this occurs collectively over multiple areas within a catchment, it can cause a change in flooding

characteristics for the area. As such, this may incur detrimental impacts downstream on a catchment-wide scale.

Specifically, the replacement of rural land use with impermeable surfaces will increase the volume and rates of surface water runoff following rainfall. When instances of this happen repeatedly across a catchment, this can result in a catchment experiencing shorter amounts of time between rainfall events and peak flood levels, resulting in greater magnitude floods and making effective flood response more difficult. This can impact both fluvial flood risk and surface water flood risk. Windfall sites and urban creep could also contribute to these forms of flood risk by the same mechanism.

In addition, development may result in the loss of floodplain area causing reduced floodplain storage capacity which could have a detrimental impact on fluvial flood risk on immediately neighbouring land, as well as downstream. Instances of practices that may cause this, include changes in a buildings footprint which could reduce flood storage area, whilst the raising of land levels above the existing floodplain may interfere with storage and floodwater conveyance.

An indirect impact of development on fluvial flood risk which is relevant to this study, is increasing discharges from WwTWs as a result of changes to current discharge permits. Generally, this is not considered to be a significant contributor to flood risk given that the flows discharged from WwTWs tend to be many orders of magnitude smaller than the flood flows in the watercourses they discharge to. However, it may be a concern where WwTWs drain to small streams.

Development across the district could also contribute to sewer flooding. As more land drains to the sewer network, its capacity will need to increase to ensure that it is not overloaded and surcharges.

6.4 Mitigation Options

Flood risk is a key factor in spatial planning. Government policy seeks to ensure that all developments are safe with respect to flooding, and that floodplains are used for their natural purposes. As mentioned, development on a floodplain is both at risk from flooding and also has the potential to reduce the ability of the river corridor to convey and store flood waters without suitable mitigation measures. This means that if development is not adequately controlled, there will be a detrimental effect on third party flood risk, with the floodplain's capacity reduced and water displaced elsewhere.

Through application of the National Planning Policy Framework (NPPF)³⁸ a sequential approach will be taken in the Local Plan to steer new development to areas with the lowest probability of flooding. Development should not be allocated or permitted if there are reasonably available sites in areas with a lower probability of flooding. If following this exercise, sites still need to be allocated in at risk areas, an Exception Test is typically required, which requires that the development is safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

In terms of the Local Plan, whilst development will be sited outside of floodplain areas where possible and often upon previously developed land, it still has the potential to exacerbate flood risk due to increased runoff from hard impermeable surfaces. There will be a change in land use in some areas as a result of the Local Plan. To accommodate such a change, it is likely that mitigation options will need to be implemented at a number of sites in order to facilitate development, ensuring

³⁸ Ministry of Housing, Communities and Local Government (2024) *National Planning Policy Framework* <https://www.gov.uk/government/publications/national-planning-policy-framework--2>

development is both safe and does not increase third party flood risk elsewhere. Options to be considered include:

- Increase floodplain storage/provide compensatory storage should the development require any ground raising above measured/modelled flood levels.
- Sustainable Drainage Systems (SuDS) guidelines to achieve no net increase in runoff as a result of the development proposals (obligatory for most development sites).
- Possibility of developer contributions to fund local improvement schemes elsewhere.
- Flood resilient and resistant building design.
- Flood incident management (flood warning) and emergency planning.
- Opportunities for SuDS at locations where there is mutual benefit in relation to reducing overall flood risk to new and existing developments.

SuDS in particular are seen as key in ensuring development does not lead to increased runoff rates and volumes. SuDS are designed to manage stormwater locally (as close to its source as possible), to mimic natural drainage and encourage its infiltration, attenuation and passive treatment. They also help maintain and improve water quality. The national standards for SuDS³⁹ published by DEFRA (2025), sets out the standards for SuDS systems in England and provide key information for designers, property developers, local authorities and other interested parties, such as sewerage undertakers and the EA.

In managing stormwater locally through infiltration and attenuation, SuDS also has the potential to reduce the amount of surface water runoff entering sewer systems and thereby sewer flood risk overall. SuDS also has the potential to treat and enhance water quality. Both of these facets will be key in managing the infrastructural and environmental capacity available in the district, in addition to limiting significant increases in discharges from the WwTWs serving the district. In terms of the latter, upgrades to WwTWs including the provision of new storm tanks could allow for more water to be stored at WwTWs for subsequent treatment and discharge when water levels are within normal range.

Mansfield District Council are committed to SuDS and their SuDS Supplementary Planning Document⁴⁰ states that '*Mansfield District Council are committed to achieving SuDS in new developments in order to reduce the potential for flooding, deliver environmental enhancements, making places more resilient and adaptive to climate change and adding value in terms of Green Infrastructure and biodiversity*'. The document also sets out key principles in applying SuDS, for example:

- SuDS should be considered at the earliest stages of scheme development and not an afterthought.
- They should seek to mimic natural drainage in the way that surface water infiltrates the ground.
- They should be encouraged at both a small scale (domestic) and larger scale (systems) and incorporated in all types of development.
- They should follow the drainage hierarchy, encouraging water infiltration where possible or using surface water features where infiltration is not possible.

³⁹ DEFRA (2025) *National standards for sustainable drainage systems (SuDS)*

<https://www.gov.uk/government/publications/national-standards-for-sustainable-drainage-systems/national-standards-for-sustainable-drainage-systems-suds>

⁴⁰ Mansfield District Council (2023) *Sustainable Drainage Systems Supplementary Planning Document*
<https://www.mansfield.gov.uk/downloads/file/6635/sustainable-drainage-systems-spd-final-version-for-adoption>

- They should contribute to place-making and urban design and be sympathetic to landscape, habitats, flora and fauna, history and archaeology.
- They should seek solutions that embed carbon, enhance biodiversity and can be easily accessed and maintained.
- They should be well-designed and not detract from open space, play or leisure experience where they are accommodated within open spaces, and be incorporated within streets where possible.

In addition to the guidance above, there has also been a recently successful example of SuDS implementation in Mansfield District- the Mansfield Green Recovery Project, referenced in section 5.2.2. The learnings from this project should be taken forward and incorporated into future planning and development.

Severn Trent Water also promotes SuDS as an alternative to conventional piped drainage for managing surface water. When considering sites in the Local Plan and windfall sites, any developer is encouraged to work with the water company early in the planning process to understand what infrastructure is required, in addition to where, when and how it will be delivered. Urban creep and the potential impacts of climate change will also need to be considered in any liaison to ensure the infrastructure upgrades implemented are resilient going forward. In terms of climate change the EA's guidance on climate change for flood risk assessments⁴¹ should be considered.

During the plan period, mitigation may also be implemented at the catchment wide scale (typically by the EA, LLFA or local authorities), encompassing natural flood risk management (NFM), river engineering, wide scale sewer network upgrades, rural land management, urban design and defence infrastructure. These measures have the potential to reduce flood risk for new and existing development.

6.5 Summary

Both the impact of development on flood risk, and the impact of flood risk on development can be reduced by following the Sequential and Exception Tests outlined in the NPPF and ensuring that development in the study area follows SuDS guidelines. At a development specific level, SuDS should be implemented at all sites, and ground raising and compensatory storage may also be required where sites are at increased risk. Furthermore, ensuring local sewer upgrades are in place prior to development will safeguard against increased surface water and sewer flood risk. In line with NPPF, it is also recommended that where possible development should seek to reduce flood risk overall. Methods to reduce flood risk at sites and downstream may include creating flood storage areas, establishing wetland features, promoting vegetation growth and the use of NFM practices. Alongside these site scale measures; catchment scale measures may help reduce flood risk in the district, such as those already seen in the Mansfield Green recovery project. A reduction in flood risk could also be supported by a direct financial contribution from developers to wider flood risk management infrastructure through section 106 agreements or a community infrastructure levy.

The assessment of flood risk undertaken to date is high level and specific upgrades required to the sewer network in response to development are likely to require further technical work by Severn Trent Water in collaboration with developers.

⁴¹ EA (2025) *Flood risk assessments: climate change allowances* <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

7 Other Environmental Constraints

7.1 Protected Sites

Further environmental constraints arise mainly from the designated status of sites across the district. Designated sites are legally protected areas of land or sea recognised for their, high-quality wildlife, geological features, or landscape value. Protection includes safeguarding the environment and water quality specifically.

There is one large Special Area of Conservation (SAC) located approximately 4km east of Market Warsop and 1km to the east of the Mansfield District boundary. The Birklands and Bilhaugh SAC covers an area of approximately 2.8km² near the village of Edwinstowe containing much of Sherwood Forest National Nature Reserve. Sherwood Forest itself is also currently being considered as a future Special Protection Area (SPA). SACs are strictly protected sites designated under the European Union's Habitats Directive. Any developments that are close to or within the boundary of a SAC, may require a Habitat Regulations Assessment (HRA) if they could have an adverse effect on the site. An initial screening stage would be required, followed by an appropriate assessment if needed. The HRA process is focused on protecting the qualifying features of designated sites.

Where it is considered that an adverse effect on the integrity of the SAC is likely, and no alternatives are available, the project can only go ahead if there are imperative reasons of over-riding public interest and if the appropriate compensatory measures can be secured. Planning authorities can also insist that developments carried out without necessary planning permission are removed. shows the location of the Birklands and Bilhaugh SAC in relation to Mansfield district.

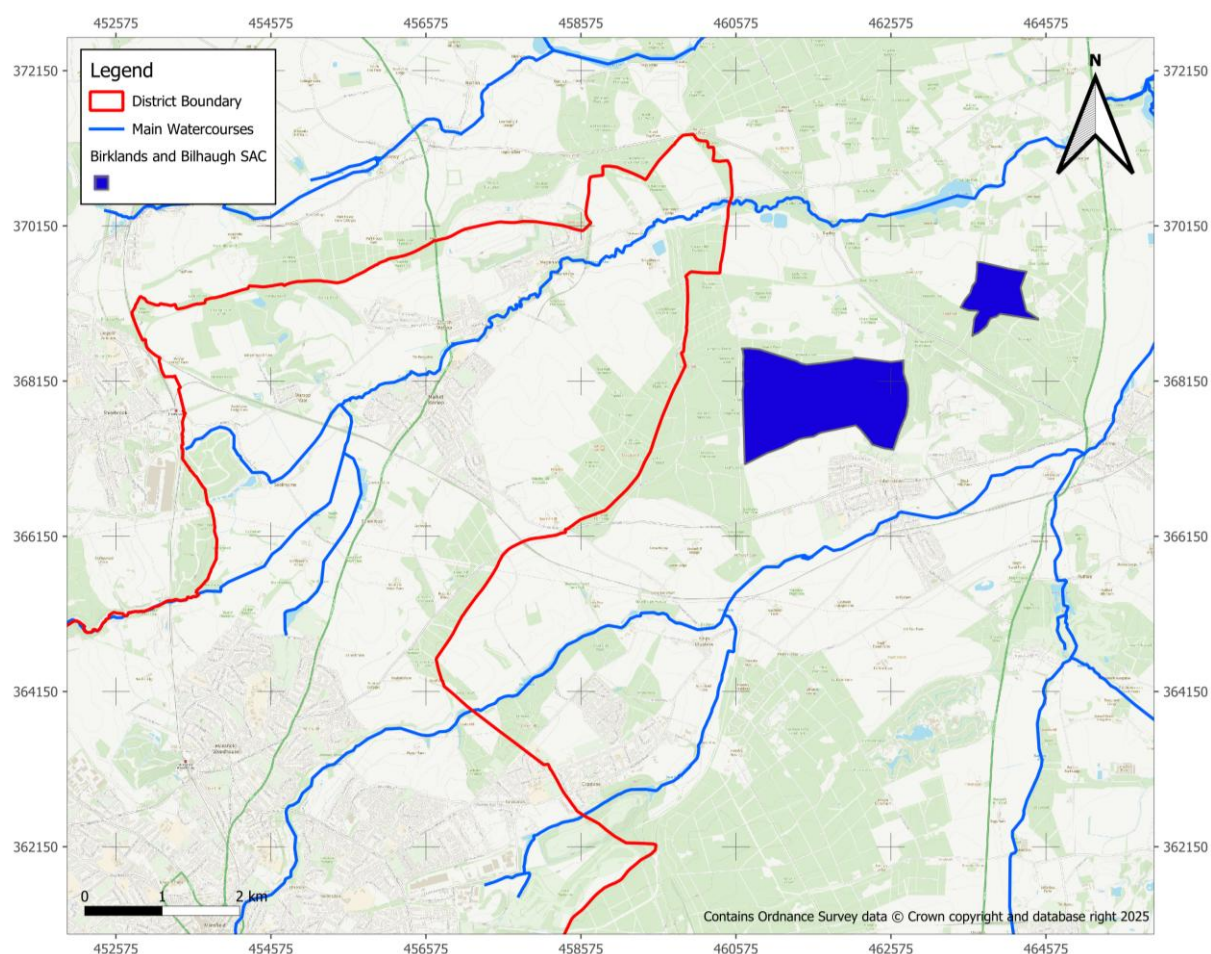


Figure 7-1- SACs across the district and in the surrounding area

There are 7 Sites of Special Scientific Interest (SSSI) within the district's administrative area, these are summarised in Table 7.1. Many SSSIs are also located in the surrounding area. A SSSI is a formal conservation designation. Usually, it describes an area that is of particular interest to science due to the rare species of fauna or flora it contains (Biological SSSI) or important geological or physiological features that may lie in its boundaries (Geological SSSI).

Table 7.1- SSSI across Mansfield District

Name	Area (ha)	Interest
Birklands West and Ollerton Comer	414.0	Biological
Lord Stubbins Wood	24.8	Biological
Hills and Holes and Sookholme Brook, Warsop	30.2	Biological
Pleasley Valley Railway	3.5	Biological
Strawberry Hill Heaths	31.5	Biological
Sherwood Forest Golf Course	62.6	Biological
Rainworth Lakes	14.2	Biological

It should be noted that Thoresby Lake SSSI is located outside of the Mansfield District boundary but is directly at risk from water activities within the district given it is downstream of the district on the River Meden.

Local planning authorities are required to have policies in their development plans that protect SSSIs. They are also required to consult the appropriate conservation body over planning applications which might affect the special interest of a SSSI. The landowners of SSSIs are also required to obtain

consent from the relevant nature conservation body if they want to permit potentially damaging activities. Figure 7-2 shows the location of SSSIs in relation to the Mansfield District.

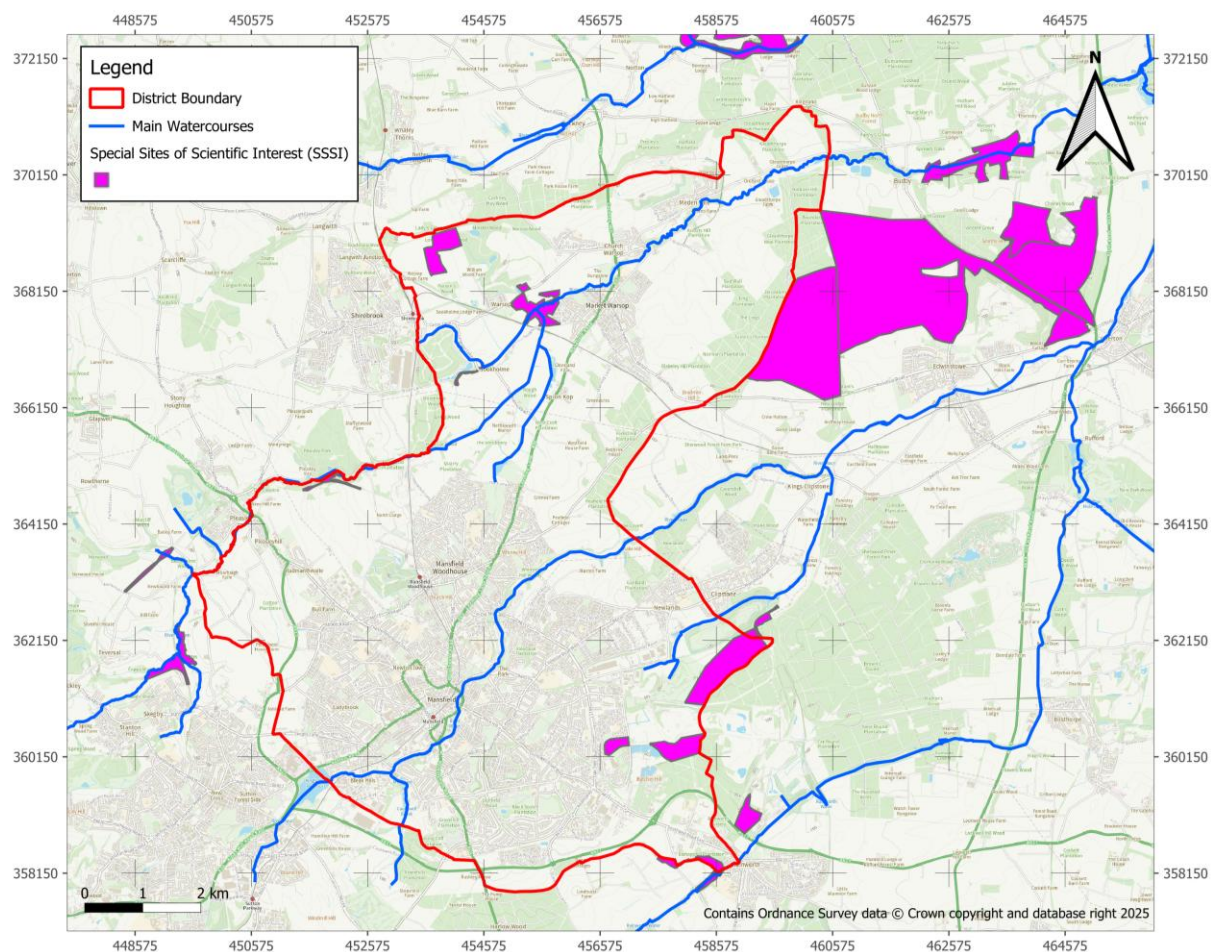


Figure 7-2- SSSIs across the district and surrounding area

Often protected sites play a key function in terms of water quality which is vital for maintaining the environmental capacity across the district. If development is not properly managed, it could lead to a deterioration in water quality or changes in the flow regime at protected sites. Care needs to be taken both during and after construction to ensure that runoff from development sites is adequately treated before entering the local drainage network. This will in turn safeguard environmental capacity and allow for further development to be delivered sustainably.

7.2 Odour Risk

WWTWs and other wastewater sites, like pumping stations and storm tanks, can sometimes be odour sources. They were originally built a significant distance away from urbanised areas; however, population growth means these once remote sites are now potential locations for development.

Developers should contact Severn Trent Water to discuss any encroachment close to WWTWs prior to submitting a planning application. A risk assessment process is typically followed to consider any planning applications within 400-800m of a major WWTW. The assessment does not seek to decide the outcome of a planning application but rather aims to inform the decisions of potential developers, planning officers and elected councillors.

Figure 7-3 shows the locations of WwTWs in and around the Mansfield District Council Administrative area, with a 400m buffer shown. A larger buffer zone may be specified at Severn Trent Water's discretion especially should the WwTW serve a large population.

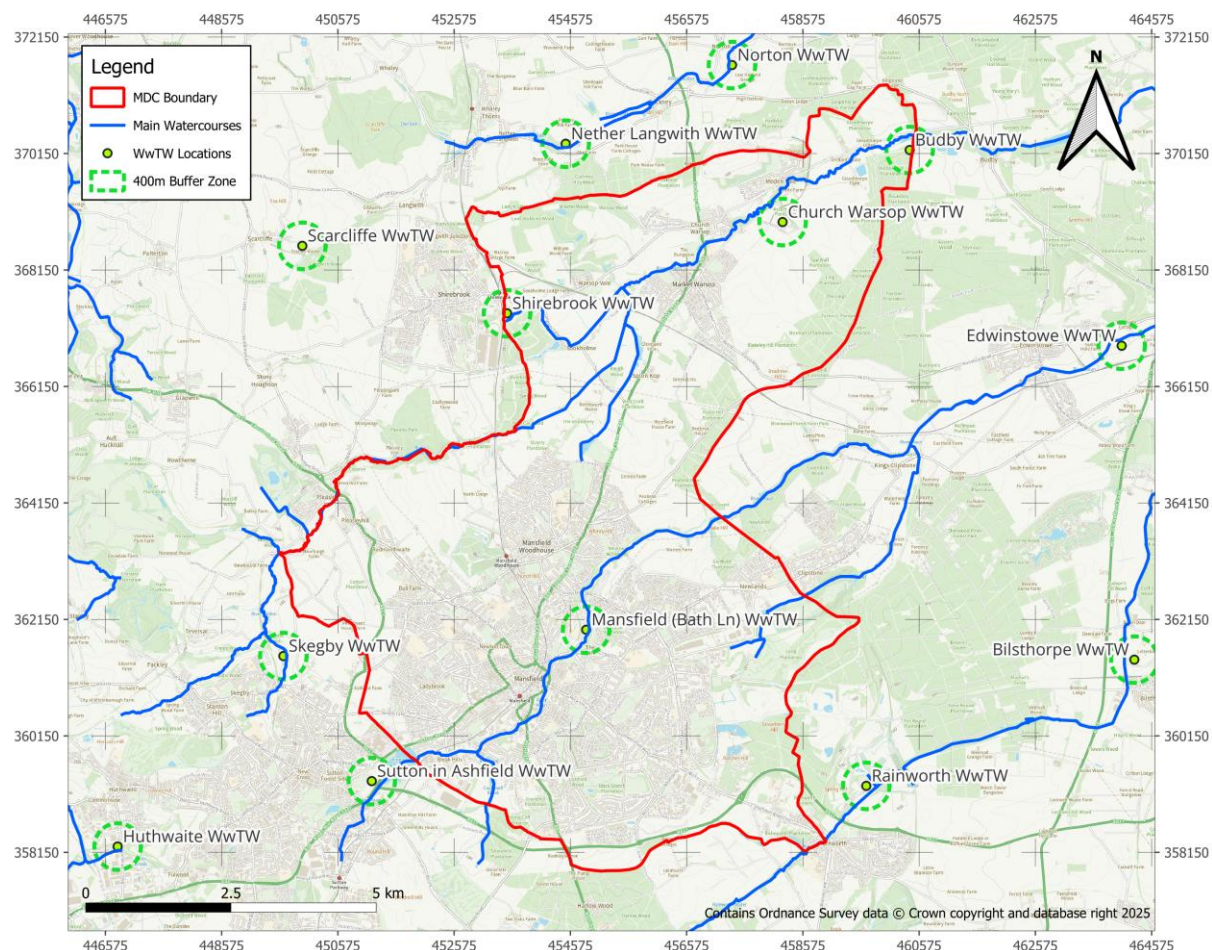


Figure 7-3- WwTWs with 400m buffer

At potential development sites close to WwTWs odour risk could be a concern and should be assessed before the planning application stage. This will enable issues to be identified and resolved where possible, meaning fewer delays at the planning and construction stages. Where odour risk is a concern, developers may be required to submit an odour modelling assessment, in consultation with Severn Trent Water. Where mitigation is required, the developer must fund this. It can be costly to reduce and treat odour. Measures include increased maintenance of plant and equipment, covers for tanks, the use of enclosure and venting and end of pipe treatments (i.e. dilute, disperse or abatement).

7.3 Summary

The district includes a number of protected sites and designated habitats which may present constraints to development in certain areas. Ensuring these areas continue to serve their function will help maintain environmental capacity which is vital for allowing development to continue sustainably into the future.

At this stage, this scoping study has identified the main environmental constraints with respect to protected sites. Further work at the planning application stage including Environmental Impact

Assessments (EIAs) and HRAs may be required to determine impacts on specific SACs and SSSIs and any required mitigation.

In terms of odour risk, for any sites close to WwTW (typically 400-800m), developers should contact Severn Trent Water prior to submitting a planning application. This will enable issues to be identified and resolved at an early stage where possible, meaning fewer delays at the planning and construction stages.

The assessments outlined above should be sufficient to address the evidence gaps identified in this scoping study without the need for further assessment.

8 Conclusions & Recommendations

The conclusions and recommendations from this study are as follows:

Water Resources and Supply

- Based on the forecasts in Severn Trent Water's latest WRMP there could be shortfalls in water supply up to 2043 and beyond. Without corrective action, the supply for Mansfield District could be less secure which will mean a greater probability that demand restrictions will be required in dry years.
- Severn Trent Water's WRMP has identified and forecasted the effects of several demand management options on household consumption, non-household consumption and leakage. The options should be sufficient to offset some of the deficits in the development scenarios tested.
- Severn Trent Water has also identified several short to medium-term resource options including the development of new water transfer schemes. These supply options offer increases in yield, however, are subject to uncertain lead times.
- It is noted that development earmarked in the local plan exceeds Severn Trent Water's current development projections for Mansfield District.
- The demand options are able to deliver from the first year of implementation due to shorter lead times and will be important early in the plan period, before additional supply options come forward.
- New interventions from the district council such as stricter water use standards, particularly for new build houses, may be required during the plan period. It is recommended that the emerging local plan adopt and promote the optional requirement of 110 l/head/day for new developments as a minimum, with the potential to explore higher levels of water efficiency as new building regulations are implemented and the plan period progresses.
- For non-household development, it is recommended that local plan policy requires a minimum of 3 credits under the BREEAM New Construction Standard measure "Wat01".
- The majority of groundwater abstraction across the district is for water supply, with other abstraction licenses for industrial, commercial and agricultural purposes.
- The impact of these abstractions on water resources is high, with no further abstraction permitted for the foreseeable future, and effort being made to limit groundwater abstraction which has historically been the main source of water in Mansfield District.
- The scoping assessment undertaken highlights future water-resource pressures in the district but is limited by several assumptions.
- Key evidence gaps include whether Nottinghamshire WRZ demand/supply forecasts accurately reflect Mansfield District, and how local-plan development above current projections will affect water demand.
- A water cycle study detailed report is not required to assess water resource and supply, however following adoption of the local plan further technical work Severn Trent Water could be helpful in deriving specific deficits for both districts considering the latest development allocations. This in part may be captured in the next iteration of the WRMP which should include the quantum of development earmarked in the local plan.
- The deliverability of upgrades to the water network would also require further technical input from Severn Trent Water as sites are brought forward through the planning process.

Wastewater Infrastructure, Water Quality and Environmental Capacity

- The WwTWs serving the districts are the most important infrastructural asset with respect to future development in the districts. Some of these are thought to be close to capacity requiring future upgrades.
- Development within WwTW's catchments may need to be phased to enable upgrades to infrastructure first and increases to DWF consents.
- In terms of environmental capacity, the EA's catchment data explorer suggests that most of the watercourses in the study area have *Moderate* ecological status and *Fail* with regard to chemical status. This suggests that overall they are potentially vulnerable to future growth.
- Future upgrades to the sewer network alongside measures identified in the Humber Rivers Basin Management Plan and Severn Trent Water's DWMP could help in this regard but will take time.
- The scoping assessment undertaken highlights uncertainties around WwTW capacity, WFD catchment deterioration risks, and suitable mitigation measures.
- Further work could be undertaken as part of a water cycle study detailed report to understand the infrastructural and environmental capacity within some parts of the district. This will include headroom assessments and water quality modelling. This work will require significant time inputs and further technical work would still be required by Severn Trent Water and the EA.
- Following receipt of a draft version of this report, the EA have confirmed that they would not expect to see these calculations to be undertaken within the WCS. Confirming that they will be undertaken as required through the normal consultation process between the EA and STW.

Flood Risk

- Development has the potential to impact on a wide range of flood mechanisms including fluvial, surface water and sewer flooding.
- Both the impact of development on flood risk and the impact of flood risk on development can be reduced by following the Sequential and Exception Tests outlined in the NPPF and ensuring that development in the study area follows SuDS guidelines.
- At the site-specific level, SuDS should be implemented at all of the sites. Ground raising, and compensatory storage may also be required where sites are at flood risk.
- Ensuring local sewer upgrades are in place prior to the occupation of development will safeguard against pronounced surface water and sewer flood risk.
- The assessment of flood risk undertaken to date is high level. The specific upgrades required to the sewer network in response to development are likely to require further technical work by Severn Trent Water in collaboration with developers at the planning stage.

Other Environmental Constraints

- The district includes a number of protected sites and designated habitats which present constraints to development in certain areas.
- At this stage, this study has identified the main environmental constraints with respect to protected sites.
- Further work at the planning application stage including Environmental Impact Assessments (EIAs) and HRAs may be required to determine impacts on specific SACs and SSSIs and any required mitigation.

- The assessments outlined above for other environmental constraints should be sufficient to address the evidence gaps identified in this study without the need for further assessment as part of a water cycle study detailed report.

Appendix 1 – EA Abstraction Licenses

Appendix 2 – Severn Trent Water DG5 Flood Risk Register