Coventry and Warwickshire Sub-regional Water Cycle Study - Stage 1

Final Report

August 2024

Prepared for:

Coventry City Council, North Warwickshire Borough Council, Nuneaton and Bedworth Borough Council, Rugby Borough Council, Stratford-on-Avon District Council, Warwick District Council

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Abbreviations

ALS	Abstraction Licensing Strategy
AMP	Asset Management Plan
AP	Assessment Point
AW	Anglian Water
BNG	Biodiversity Net Gain
BOD	Biological Oxygen Demand
BRAVA	Baseline Risk and Vulnerability Assessment
BRE	Building Research Establishment
CAMS	Catchment Abstraction Management Strategy
CAPEX	Capital Expenditure
CEH	Centre for Ecology and Hydrology
CIRIA	Company providing research and training in the construction industry
CSO	Combined Sewer Overflow
DCG	Design and Construction Guidance
DEFRA	Department of the Environment, Food and Rural Affairs (formerly MAFF)
DWF	Dry Weather Flow
DWI	Drinking Water Inspectorate
DWMP	Drainage and Wastewater Management Plan
EA	Environment Agency
EC	European Community
ECJ	European Court of Justice
EDM	Event Duration Management
EFI	Environmental Flow Indicator
EIP	Environmental Improvement Plan
EP	Environmental Permit
EPA	Environmental Protection Agency
EU	European Union
FFT	Flow to Full Treatment
FWMA	Flood and Water Management Act
GEP	Good Ecological Potential
GES	Good Ecological Status
GWMU	Groundwater management unit
GwR	Greywater Recycling

HOF	Hands-off flow: river flow below which an abstractor may be required to stop or reduce abstraction.
HOL	Hands Off Level: groundwater level below which an abstractor is required to reduce or stop abstraction.
HQM	Homes Quality Mark
HRA	Habitats Regulation Assessment
ID	Identifier
IWMS	Integrated Water Management Study
JNCC	Joint Nature Conservation Committee
LDP	Local Development Plan
LLFA	Lead Local Flood Authority
LP	Local Plan
LPA	Local Planning Authority
NDO	Neighbourhood Development Order
NDP	Neighbourhood Development Plan
NE	Natural England
NFM	Natural Flood Management
NGO	Non-governmental Organisation
NPPF	National Planning Policy Framework
NRW	Natural Resources for Wales
OEP	Office of Environmental Protection
OFWAT	The water Services Regulation Authority
OPEX	Operational Expenditure
P	Phosphorus
PBDE	Polybrominated diphenyl ethers
PE	Potential Evaporation
PFOS	Perfluorooctane sulphonate
PMP	Probable Maximum Precipitation
PPG	Planning Policy Guidance
PR	Price Review
PTP	Package Treatment Plant
Ramsar	The intergovernmental Convention on Wetlands, signed in Ramsar, Iran, in 1971
RBD	River Basin District
RBMP	River Basin Management Plan

RNAG	Reasons for not Achieving Good
RwH	Rainwater Harvesting
SAB	SuDS Approval Body
SAC	Special Area of Conservation, protected under the EU Habitats Directive
SFRA	Strategic Flood Risk Assessment
SIMCAT	SIMulation of CATchments
SOAF	Storm Overflow Assessment Framework
SODRP	Storm Overflow Discharge Reduction Plan
SPA	Special Protection Area for birds, protected under the EU Habitats Directive
SPZ	Source Protection Zones
SRO	Strategic Resource Options
SSSI	Site of Special Scientific Interest
STW	Sewage Treatment Works
SU	Sewerage Undertaker
SUDS	Sustainable Urban Drainage Systems
TAL	Technically Achievable Limit
TBC	To be confirmed
TW	Thames Water
UK	United Kingdom
UKWIR	UK Water Industry Research Ltd
WaSCs	Water and Sewage Companies
WCS	Water Cycle Study
WFD	Water Framework Directive
WINEP	Water Industry National Environment Programme
WMS	Water Management System
WRMP	Water Resource Management Plan
WRW	Water Resources West
WTW	Water Treatment Works
WWTW	Waste Water Treatment Works

Glossary

Term	Description
Abstraction Point	The location where water is either taken or extracted from

Term	Description
	either a surface or groundwater waterbody.
Agricultural Management	The farming techniques and practices used to produce food and manage livestock.
Abstraction Licencing Strategy	The Abstraction Licencing Strategy sets out the Environment Agency's approach to managing new and existing abstraction and impoundments within their river management catchments.
Asset Management Plan (AMP) Period	Price limit periods in the water sector are sometimes known as Asset Management Plan (AMP) periods. The current period (2020-25) is commonly known as AMP 7 because it is the seventh price review period since privatisation of the water industry in 1989. AMP periods are five years in duration and begin on 1 April in the years ending in 0 or 5. Every five years the industry submits a Business Plan to OfWAT for a Price Review (PR). These plans set out the companies' operational expenditure (OPEX) and capital expenditure (CAPEX) required to maintain service standards, enhance service (for example where sewer flooding occurs), to accommodate growth and to meet environmental objectives defined by the Environment Agency. OfWAT assesses and compares the plans with the objective of ensuring what are effectively supply monopolies and operating efficiently.
Aquifer	An aquifer is a rock and/or sediment body that holds groundwater.
Dry Weather Flow	Dry weather flow is the average daily flow of wastewater to a wastewater treatment works during a period without rain.
Effluent	Effluent discharge is the liquid waste produced from residential, commercial and industrial processes.
Environmental Flow Indicator	The Environmental Flow Indicator is the proportion of natural flows that are required to support the environment of a waterbody.
Groundwater Body	A Groundwater Body is the management unit under the Water Framework Directive which represents a distinct body of groundwater with its own hydrogeological characteristics.
Hands-off Flow	A condition attached to an abstraction licence which states that if a river flow falls below the level specified on the licence, the abstractor will be required to reduce or stop the abstraction.
Lead Local Flood Authority	A county council or unitary authority which leads in managing local flood risks (i.e., risks of flooding from surface water, ground water and ordinary (smaller) watercourses).

Term	Description
	Their duties are outlined in the Flood and Water Management Act.
Natural Flood Management	Natural flood management is the use of natural processes to reduce the risk of flooding and coastal erosion.
Per Capita Consumption	The per capita consumption is the average volume of water used by one person in a day. It is defined as the sum of the measured household consumption of clean water and unmeasured household consumption of clean water divided by the total household population. This is often expressed in litres per person per day (l/p/d)
Permitted Headroom	The difference between the volume of treated wastewater a treatment works is allowed to discharge under its environmental permit, and volume it currently discharges. It can be used to estimate the number of properties that could be connected to a WwTW catchment before a flow permit is exceeded.
Storm Overflow Assessment Framework (SOAF)	A framework defined by the EA in collaboration with the water industry to monitor and assess discharges from storm overflows, and identify and plan solutions.
Sustainable Urban Drainage Systems	Sustainable drainage systems are drainage solutions that provide a natural alternative to the direct channelling of surface water through an artificial network of pipes and sewers to nearby watercourses.
Waterbodies	Water bodies constitute areas of water – both salt and fresh, large and small – which are distinct from one another in various ways. All surface waters (including rivers, lakes, estuaries and stretches of coastal water) and groundwaters have been divided up into discrete units called water bodies. Water bodies are the basic unit that are used to assess the quality of the water environment and to set targets for environmental improvements.
Water Framework Directive (WFD)	The Water Framework Directive is a river basin management planning system which was implemented to help protect and improve the ecological health of the UK's rivers, lakes, estuaries and coastal and groundwaters.
Water Framework Directive Classification Status	Rivers, lakes, estuaries and coastal waters can be awarded one of five WFD statuses: High Good Moderate Poor Bad

Term	Description
	Groundwater can be awarded one of two statuses: Good Poor
Water Framework Directive – Reasons for not achieving good (RNAG)	Where a WFD element is classified as being at less than good status, a reason for the failure to meet the good status is attributed, including the sector deemed responsible or a pressure affecting a biological element.
Water Framework Directive objectives	The Water Framework Directive objectives are set out in Regulation 12 and Regulation 8 of the Water Environment Regulations 2017.
Water Industry National Environment Programme	The Water Industry National Environment Programme is the programme of work in which water companies in England must meet their obligations from environmental legislation and UK government policy.
Water Resource Management Plan (WRMP)	Water Resource Management Plans are statutory documents that all water companies must produce at least every five years. They set out how the water company intends to achieve a secure water supply for their customers while protecting and enhancing the environment.
Water Resource Zone (WRZ)	A Water Resource Zone is an area in which the abstraction and distribution of water is self-contained and is used to meet demand within that area.
Wastewater Treatment Works (WwTW)	A wastewater treatment works receive flows from the sewerage system and treats it so it can be discharged back into a river. They may also be called Sewage Treatment Works (STWs) or Water Recycling Centres (WRCs).

Executive Summary

In April 2023, JBA Consulting was commissioned by Nuneaton and Bedworth Borough Council to undertake a Water Cycle Study (WCS) to inform the Local Plans of six Local Planning Authorities (LPAs) referred to in this report as the "sub-region" and including:

- Nuneaton and Bedworth Borough Council (NBBC)
- Coventry City Council (CCC)
- Rugby Borough Council (RBC)
- Warwick District Council (WDC)
- North Warwickshire Borough Council (NWBC)
- Stratford-on-Avon District Council (SADC)

This study assesses the potential issues relating to future development within the whole of the sub-region and the impacts on water supply, wastewater collection and treatment and water quality. The Water Cycle Study is required to assess the constraints and requirements that will arise from potential growth on the water infrastructure.

The majority of the work in this study was undertaken in 2023 based on the information available at the time. Stage 2 will build on the evidence presented in the Stage 1 report and update it where necessary.

New homes require the provision of clean water, safe disposal of wastewater and protection from flooding. The allocation of large numbers of new homes requires careful planning to ensure there are sufficient water resources, and available capacity in the water supply and wastewater network, protecting existing customers and the environment.

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

The Water Cycle

Source: Environment Agency – Water Cycle Study Guidance

This study will assist LPAs within the sub-region to select and develop sustainable development allocations where there is minimal impact on the environment, water quality, water resources, infrastructure and flood risk. This has been achieved by identifying areas where there may be conflict between any proposed development, the requirements of the environment and by recommending potential solutions to these conflicts.

All six LPAs provided information about planned growth in their areas. Potential Local Plan allocations have not been decided at the time of writing and will be assessed in a Stage 2 WCS. Available information was collated on water policy and legislation, water resources, water quality, and environmental designations within the study area. Growth already planned in the study area, and data provided by Severn Trent Water was used to indicate the current capacity in wastewater treatment infrastructure.

The objective of the study is to provide evidence to guide development towards the most sustainable locations.

Water Resources

Severn Trent Water (STW) is responsible for supplying most of the sub-region with water from the Strategic Grid Water Resource Zone (WRZ). A small part of the study area to the north is covered by South Staffordshire Water's Company Wide Zone.

Water resources are under significant pressure in the UK, and the direction of travel in water resources planning is to reduce per capita consumption in new build development below the optional building regulations standard of 110 l/p/d. Given the evidence of pressures on the environment, and on public water supply, it is recommended that the

Councils consider a domestic water efficiency target of 100l/p/pd for all new homes, in line with proposals in the Defra Plan for Water, and work with the water suppliers to incentivise even lower consumption. There would also be a positive economic impact for residents in terms of reduced energy and water bills.

The Environment Agency have stated that they support going further than the optional target in Building Regulations.

This should be supported by the use of the BREEAM New Construction standard for non-residential development and it is recommended that non-residential development over 1000sqm achieve the BREEAM "excellent" standard for water consumption.

Water supply infrastructure

Early developer engagement is required to ensure that, as development occurs within the study area, detailed modelling of water supply infrastructure will allow any upgrades to be completed without restricting the timing, location or scale of the planned development.

Wastewater collection infrastructure

STW provide wastewater services to the sub-region. Sewerage Undertakers have a duty under Section 94 of the Water Industry Act 1991 to provide sewerage and treat wastewater arising from new domestic development. Except where strategic upgrades are required to serve very large or multiple developments, infrastructure upgrades are usually only implemented following an application for a connection, adoption, or requisition from a developer. Early developer engagement with STW is therefore essential to ensure that sewerage capacity can be provided without delaying development.

Early engagement with STW is required, and further modelling of the network may be required at the planning application stage. Three storm overflows on the network exceeded the threshold for investigation by the EA.

Wastewater treatment capacity

STW provided assessments of the Wastewater Treatment Works (WwTW) serving growth in each scenario based on hydraulic capacity and headroom in the environmental permit. JBA performed a flow permit assessment in parallel to this.

While the proposed growth in the sub-region can be accommodated at a number of WwTW, some treatment works could require upgrades to ensure growth can occur without causing the flow permits being exceeded.

Early engagement with STW would be required at the planning application stage to ensure that growth is aligned with provision of capacity at WwTW.

Water quality

An increase in the discharge of effluent from WwTW as a result of development and growth in the area which they serve can lead to a negative impact on the quality of the receiving watercourse. Under the Water Framework Directive (WFD), a watercourse is not allowed to

deteriorate from its current WFD classification (either the overall watercourse classification or for individual elements assessed).

This Stage 1 Scoping Study presents the current status of waterbodies within the study area and gathers the data required to model the impact of growth during the plan period on water quality. It is recommended that the modelling of water quality is carried out in a Stage 2 Outline Study.

Environmental constraints

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

A source-pathway-receptor approach can be taken to investigate the risk of an adverse impact on protected sites and identify where further assessment or action is required. The potential impacts of development on a number of protected sites such as Special Area of Conservation (SAC), Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSIs) and Ramsar sites within, or downstream of the study area should be carefully considered in future plan making, as well as the large number of Priority Habitats and Priority Rivers. This Scoping Study identifies the protected sites that are downstream of a WwTW and may experience a deterioration in water quality during the plan period. It is recommended that modelling of this impact is carried out within a Stage 2 WCS.

Runoff from development sites is a potential source of diffuse pollution and could be managed through implementation of Sustainable Drainage Systems (SuDS) with a focus on treating the water quality of surface runoff from roads and development sites. Opportunities exist for these SuDS schemes to offer multiple benefits of flood risk reduction, amenity value and biodiversity. In the wider area, opportunities exist to implement natural flood management techniques to achieve multiple benefits of flood risk management, water quality improvement and habitat creation.

1 Introduction

1.1 Terms of Reference

1. JBA Consulting was commissioned by Nuneaton and Bedworth Borough Council to undertake a Water Cycle Study (WCS) to inform the Local Plan of six Local Planning Authorities (LPAs) referred to in this report as the "sub-region" and including:

   - Nuneaton and Bedworth Borough Council (NBBC)
   - Coventry City Council (CCC)
   - Rugby Borough Council (RBC)
   - Warwick District Council (WDC)
   - North Warwickshire Borough Council (NWBC)
   - Stratford-on-Avon District Council (SADC)

2. The purpose of the WCS is to form part of a comprehensive and robust evidence base for their Local Plan which will set out a vision and framework for development in the area and will be used to inform decisions on the location of future development.

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

1.2 Structure of the report

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

1.3 The Water Cycle

5. Planning Practice Guidance on Water Supply, Wastewater and Water Quality (Gov.UK a, 2019) describes a water cycle study as:

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

"The study provides evidence for Local Plans and Sustainability Appraisals and is ideally done at an early stage of plan-making. Local Authorities (or groups of Local Authorities) usually lead water cycle studies, as a chief aim is to provide evidence for sound Local Plans, but other partners often include the Environment Agency and water companies.”

6. The Environment Agency's guidance on WCS recommends a phased approach:

7. **Stage 1**: Scoping Study identifies if the water infrastructure capacity could constrain growth and if there are any gaps in the evidence you need to make this assessment. The Scoping Study will identify:
   - the area and amount of proposed development;
   - the existing evidence;
   - main partners to work with; and
   - evidence gaps and constraints on growth.

8. **Stage 2**: Detailed study, to provide the evidence to inform an integrated water management strategy. It will identify the water and flood management infrastructure that will mitigate the risks from too little or too much water. It will also identify what you need to do to protect and enhance the water environment.

9. As a WCS is not a mandatory document, Local Planning Authorities are advised to prioritise the stages of the WCS to integrate with their Local Plan programme. Figure 1-1 below shows the main elements that compromise the Water Cycle.

10. The natural water cycle describes the continuous transfers of water around the planet, from atmosphere to surface and back via evaporation, transpiration and precipitation, and the various flows and storage processes

that occur. The artificial water cycle looks at the availability of water resources for human consumption, its treatment and supply to homes and business, its use and consequently the generation of wastewater. It then looks at how wastewater is taken away, treated, and finally what happens when it is returned to the environment.

11. Further information can be found here.

12. Figure 1-1 below shows the main elements that compromise the Water Cycle and shows how the natural and man-made processes and systems interact to collect, store or transport water in the environment.

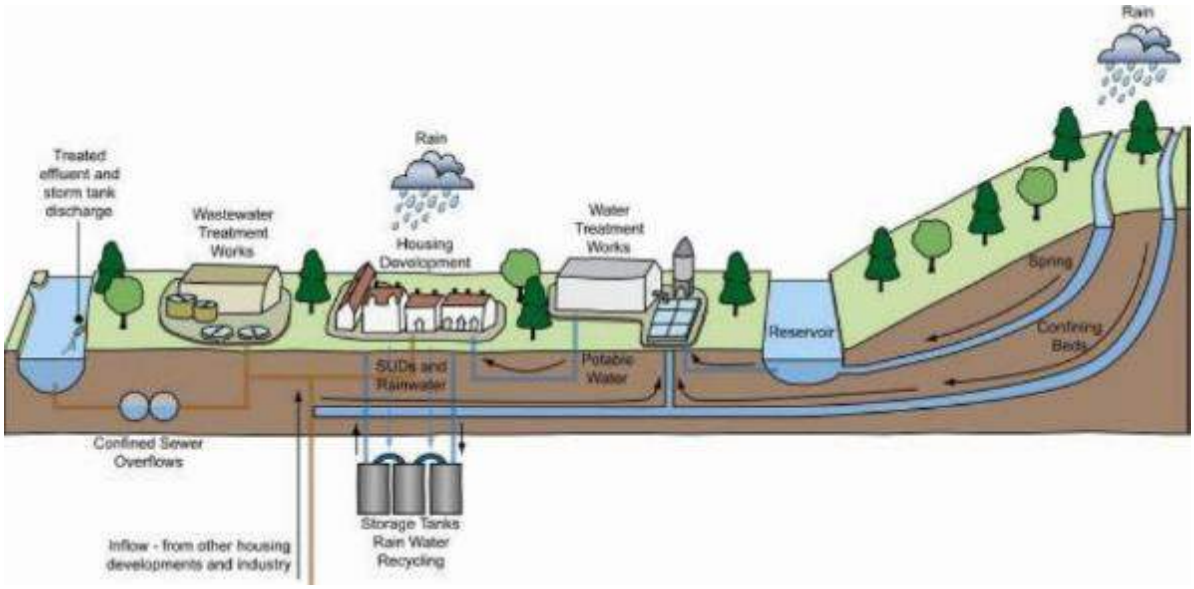

Figure 1-1 The Water Cycle

1.4 Impacts of Development on the Water Cycle

13. New homes require the provision of clean water, safe disposal of wastewater and protection from flooding. It is possible that allocating large numbers of new homes at some locations may result in the capacity of the existing available infrastructure being exceeded. This situation could potentially lead to service failures to water and wastewater customers, have adverse impacts on the environment or cause the high cost of upgrading water and wastewater assets being passed on to bill payers. Climate change presents further challenges such as increased intensity and frequency of rainfall and a higher frequency of drought events that can be expected to put greater pressure on the existing infrastructure.

Objectives

14. This Stage 1 Scoping Report is written to support the Local Planning Authorities in their Local Plan Reviews. The overall objective of the WCS is to understand the environmental and physical constraints of development and identify opportunities for more sustainable planning and improvements that may be required to achieve the required level of development.

15. This WCS will consider the following issues:

    - Water resources, demand, and supply
    - Wastewater infrastructure and treatment
    - Water quality and environmental impact
    - Flood risk and drainage

1.5 Study area

16. The study area is shown in Figure 1-2 and extends from Newton Regis in the north, to Newbold Pacey in the south across six LPAs that are referred to in this report as the sub-region:

    - Coventry City Council
    - North Warwickshire Borough Council
    - Nuneaton and Bedworth Borough Council
    - Rugby Borough Council
    - Stratford-on-Avon District Council
    - Warwick District Council.

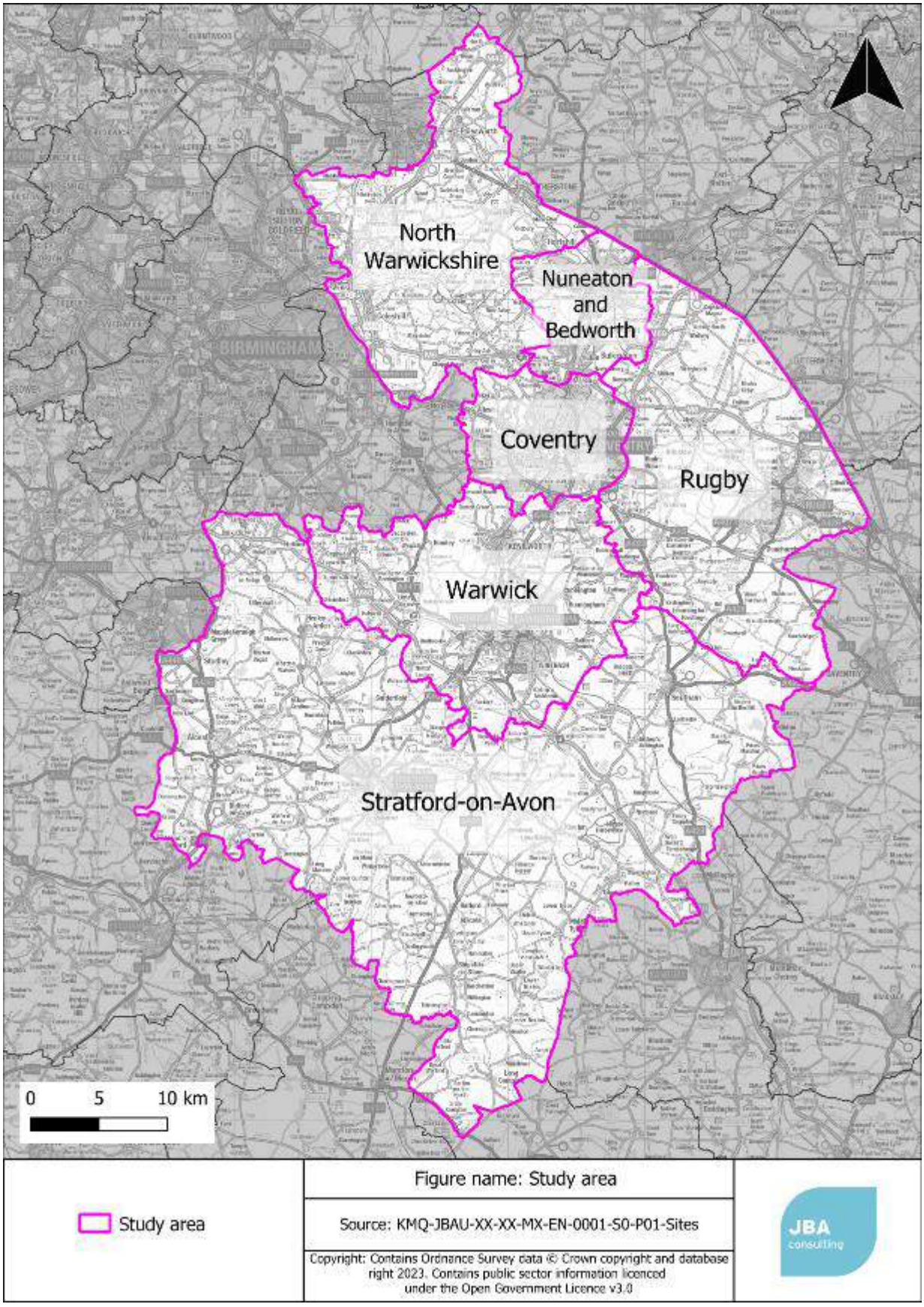

Figure 1-2 Sub-region Study area.

1.6 Authorities responsible for Water Resource and Wastewater Management in the sub-region

17. Within the sub-region there are several authorities and regulators responsible or involved in supplying, managing, and overseeing water supply, wastewater, and the environment. The table below explains the responsibilities of various bodies within the district.

Table 1-1 Responsibilities of authorities within the sub-region

Authority Name	Key Responsibilities of Different Authorities
Environment Agency	The EA are the environmental regulator in the UK with responsibilities for water quality, flood risk and administering licences for water abstraction. They are a statutory consultee for many development plan documents and for some planning applications. They advise on environmental and infrastructure capacity issues across the water cycle.
Natural England	Natural England are the Government's advisors on the natural environment, which they have a responsibility to protect and enhance. In a WCS they may provide information on the conservation objectives, and guidance on, the protection of designated sites.
Severn Trent Water	Severn Trent Water is the sewerage undertaker for the whole of the study area, and the water supplier for the majority of the study area apart from a small section to the north that is covered by South Staffordshire Water (SSW). Sewerage undertakers have a duty under the Water Industry Act to provide, improve and extend a system of public sewers (for both domestic and trade flows) so as to cleanse and maintain those sewers (and any lateral drain) to ensure that the area that they serve is effectually drained. There is also a duty to make provision for the emptying of those sewers, normally through sewage treatment works or where appropriate through discharges direct to watercourses. It is worth noting that although STW is the sewerage undertaker there may be some private Wastewater Treatment Works (WwTW) in the area as well as septic tanks and Package Treatment Plants (PTPs). As the water supplier for most of the district, they have a statutory duty under the Water Industry Act to maintain an efficient and economical system of water supply within its area and supply households with a reliable and sufficient supply of water.
South Staffordshire Water	South Staffordshire Water (SSW) are the water supplier for a small section of the north of the study area. They have a statutory duty under the Water Industry Act to maintain an efficient and economical system of water supply within its area and supply households with a reliable and sufficient supply of water.

1.7 Record of Engagement

18. Preparation of a WCS requires significant engagement with stakeholders, within the Local Planning Authority area, with water and wastewater utilities, with the Environment Agency, and where there may be cross-boundary issues, with neighbouring Local Planning Authorities. This section forms a record of engagement for the WCS. Further engagement will take place, if necessary, as the Local Plans progress.

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

Inception meeting

Engaged Parties	Details
Coventry City Council North Warwickshire Borough Council Nuneaton and Bedworth Borough Council Rugby Borough Council Stratford-on-Avon District Council Warwick District Council	Scope of works and data collection requirements.

Collaboration with Water Companies

Engaged Parties	Details
Severn Trent Water	Wastewater treatment works flow data. Water company assessments of water and wastewater infrastructure and capacity constraints.

2 Future Growth in the sub-region

2.1 Growth in the sub-region

2.1.1 Overview

20. The six LPAs within the study area are currently undertaking a review of their adopted Local Plans which cover the following periods:

- Coventry City Council: 2011- 2031
- North Warwickshire Borough Council: 2019-2033
- Nuneaton and Bedworth Borough Council: 2011-2039
- Rugby Borough Council: 2011-2031
- Stratford-on-Avon District Council: 2011-2031
- Warwick District Council: 2011-2029

21. In order to assess the impact of the future growth on water infrastructure and the environment, existing growth commitments and allocations from the adopted Local Plans need to be understood. Each LPA provided the following information:

- Allocations from adopted Local Plans
- Residential and employment commitments
- Recent completions
- Windfall allowance

22. Table 2-1 below show the Local Plans housing requirement at the time of writing.

Table 2-1 LPA housing requirements (adopted plans)

Local Planning Authority	Housing requirement
Coventry City Council	24,600 (2011 to 2031)
North Warwickshire Borough Council	9,598 (2019 to 2033)
Nuneaton and Bedworth Borough Council	9,810 (2021 to 2039)
Rugby Borough Council	12,400 (2011-2031)
Stratford-on-Avon District Council	14,600 (2011 to 2031)
Warwick District Council	16,776 (2011 to 2029)

2.1.2 LPA growth

23. LPA in the sub-region provided details of growth already planned within the LPA area (consisting of adopted allocations and planning commitments). This is summarised in Table 2-2. This will be used in section 7 to assess remaining capacity at WwTW once all planned growth is built.

Table 2-2 Summary of growth from LPAs

LPA	Proposed number of dwellings	Potential employment space (m^2)	Period
Coventry City Council	10,670	352,000	2011 - 2031
North Warwickshire Borough Council	7,083	241,400	2021 - 2033
Nuneaton & Bedworth Borough Council	20,264	938,233	2011 - 2039
Rugby Borough Council	12,815	598,880	2011 - 2031
Stratford-on-Avon District Council	7,608	N/A	2011 - 2031
Warwick District Council	9,122	2,004	2011 - 2029
Total	67,562	2,126,517	N/A

2.1.3 Windfall

24. Windfall sites are sites that have not been specifically identified in the Local Plan. They normally comprise previously developed sites that have unexpectedly become available. A windfall allowance was provided by each LPA.

2.2 Growth from outside sub-region

2.2.1 General approach

25. Water infrastructure is often shared across LPA boundaries so in order to understand the capacity of that infrastructure it is important to take account of growth that is planned in the neighbouring authority areas. Published information in the form of adopted Local Plans and Water Cycle Studies was used to identify growth within wastewater catchments serving the sub-region. This will be updated in the stage 2 study by contacting each LPA to obtain their latest growth forecasts.

26. Authorities listed below do not all share boundaries with the study area, but share wastewater catchments.

2.2.2 Neighbouring authority: Solihull

27. Site information has been taken from Solihull Water Cycle Study (Solihull Metropolitan Borough Council, 2017). These sites would be served by Norton Green, Meriden, Coleshill and Minworth WwTWs which is shared with the sub-region.

Table 2-3 Summary of growth in the Solihull served by infrastructure shared with the sub-region.

WwTW	Proposed number of dwellings	Estimated number of employees
Norton Green	750	N/a
Meriden	50	N/a
Coleshill	1,242	33,586
Minworth	650	N/a
Total	2,692	33,586

2.2.3 Neighbouring authority: Cotswold

28. Site information has been taken from Cotswold District Council WCS which is currently being developed. These sites would be served by the Nethercote WwTW which is shared with the sub-region.

Table 2-4 Summary of growth in Cotswold District served by infrastructure shared with the sub-region

WwTW	Proposed number of dwellings	Estimated number of employees
Nethercote	6	N/a

2.2.4 Neighbouring authority: Wychavon

29. Site information has been taken from Wychavon District Council WCS. These sites would be served by Stratford-Milcote, Bidford-On-Avon and Ridgeway WwTW which is shared with the sub-region.

Table 2-5 Summary of growth in Wychavon served by infrastructure shared with the sub-region

WwTW	Proposed number of dwellings	Estimated number of employees
Stratford-Milcote	1	N/a
Bidford-On- Avon	61	N/a
Ridgeway	9	N/a
Total	71	N/a

2.2.5 Neighbouring authority: Birmingham

30. Site information has been taken from Birmingham Water Cycle Study. These sites would be served by Coleshill and Minworth WwTWs which is shared with the sub-region.

Table 2-6 Summary of growth in Birmingham served by infrastructure shared with sub-region

WwTW	Proposed number of dwellings	Estimated number of employees
Coleshill	1,824	604
Minworth	71,672	93,044

WwTW	Proposed number of dwellings	Estimated number of employees
Total	73,496	93,648

2.2.6 Neighbouring authority: Lichfield

31. Site information has been taken from the South Staffordshire Councils WCS. These sites would be served by the Tamworth WwTW which is shared with the sub-region.

Table 2-7 Summary of growth in Lichfield served by infrastructure shared with the sub-region.

WwTW	Proposed number of dwellings	Estimated number of employees
Tamworth	1,480	35

2.2.7 Neighbouring authority: Tamworth

32. Site information has been taken from the South Staffordshire Councils WCS. These sites would be served by Tamworth WwTW which is shared with the sub-region.

Table 2-8 Summary of growth in Tamworth served by infrastructure shared with the sub-region.

WwTW	Proposed number of dwellings	Estimated number of employees
Tamworth	4,153	1,731

2.2.8 Neighbouring authority: Bromsgrove

33. Site information has been taken from the Redditch Local Plan which contains a cross-boundary site from Bromsgrove, and the Birmingham WCS which contains a forecast of growth in Bromsgrove. These sites would be served by the Redditch (Spernal) and Minworth WwTW which is shared with the sub-region.

Table 2-9 Summary of growth in Bromsgrove served by infrastructure shared with the sub-region

WwTW	Proposed number of dwellings	Estimated number of employees
Redditch (Spernal)	2,622	N/a
Minworth	320	3,360
Total	2,942	3,360

2.2.9 Neighbouring authority: Redditch

34. Site information has been taken from Redditch Local Plan. These sites would be served by the Redditch (Spernal) WwTW which is shared with the sub-region.

Table 2-10 Summary of growth in Redditch served by infrastructure shared with the sub-region.

WwTW	Proposed number of dwellings	Estimated net number of employees
Redditch (Spernal)	913	N/a

2.2.10 Neighbouring authority: Dudley

35. Site information has been taken from information in the Birmingham WCS which contains an estimate of growth in Dudley. These sites would be served by Minworth WwTW which is shared with the sub-region.

Table 2-11 Summary of growth in Dudley served by infrastructure shared with the sub-region.

WwTW	Proposed number of dwellings	Estimated net number of employees
Minworth	124	6,120

2.2.11 Neighbouring authority: Walsall

36. Site information has been taken from information in the Birmingham WCS which contains an estimate of growth in Walsall. These sites would be served by Minworth WwTW which is shared with the sub-region.

Table 2-12 Summary of growth in Walsall served by infrastructure shared with the sub-region.

WwTW	Proposed number of dwellings	Estimated net number of employees
Minworth	2,012	60,474

2.2.12 Neighbouring authority: Wolverhampton

37. Site information has been taken from information in the Birmingham WCS which contains an estimate of growth in Wolverhampton. These sites would be served by Minworth WwTW which is shared with the sub-region.

Table 2-13 Summary of growth in Wolverhampton served by infrastructure shared with the sub-region.

WwTW	Proposed number of dwellings	Estimated net number of employees
Minworth	489	27,078

2.2.13 Neighbouring authority: Sandwell

38. Site information has been taken from information in the Birmingham WCS which contains an estimate of growth in Sandwell. These sites would be served by Minworth WwTW which is shared with the sub-region.

Table 2-14 Summary of growth in Sandwell served by infrastructure shared with the sub-region.

WwTW	Proposed number of dwellings	Estimated net number of employees
Minworth	1,149	2,018

2.2.14 Other neighbouring authorities

39. The following LPAs neighbour the sub-region but either do not share infrastructure, or there is no significant growth served by that infrastructure:

- Harborough
- West Northamptonshire
- Cherwell
- West Oxfordshire
- Hinckley and Bosworth
- Blaby

3 Legislative and Policy Framework

3.1 Introduction

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

3.2 Plan-making

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

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

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

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

3.3 Water and the Planning System

3.3.1 National Planning Policy Framework and water

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

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

3.3.2 Planning Practice Guidance overview

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

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

3.3.3 PPG - Water Supply, Wastewater and Water Quality

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

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

"Strategic policy-making authorities will also need to consider the objectives in the government's 25 Year Environment Plan to reduce the damaging abstraction of water from rivers and groundwater, and to reach or exceed objectives for rivers, lakes, coastal and ground waters that are specially protected." (UK Government o, 2019)

47. A summary of the advice for plan-makers and for planning applications is contained below but it is recommended that the full text is reviewed. This can be found in the relevant section of the Planning Practice Guidance on the GOV.UK website.

48. Plan-making considerations - Infrastructure (Para 005)

- Identification of suitable sites for new or enhanced infrastructure, including the location of existing and proposed development.
- Consider existing and proposed development in the vicinity of a location under consideration for water and wastewater infrastructure. In two-tier areas there will need to be close working between the district and county councils.
- Consider whether new development is appropriate near to water and wastewater infrastructure (for example due to odour concerns).
- Phasing new development so that water and wastewater infrastructure will be in place when needed. Infrastructure should also be in place before any environmental effects occur on designated sites of importance for biodiversity (UK Government o, 2019).

49. Plan-making considerations - Water quality (Para 006)

- How to help protect and enhance local surface water and groundwater in ways that allow new development to proceed and avoids costly assessment at the planning application stage.

- The type or location of new development where an assessment of the potential impacts on water bodies and protected areas under the Water Environment Regulations (2017) may be required.
- Whether measures to improve water quality, (e.g., SuDS schemes) can be used to address water quality in addition to flood risk.

50. Plan-making considerations - Wastewater (Para 007)

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

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

Considerations for planning applications - Water supply (Para 016)

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

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

Considerations for planning applications - Water quality (Para 016)

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

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

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

3.3.4 PPG - Housing - Optional Technical Standards

54. This guidance advises planning authorities on how to gather evidence to set optional requirements, including for water efficiency. It states that:

> “all new homes already have to meet the mandatory national standard set out in the Building Regulations (of 125 litres /person /day). Where there is a clear local need, Local Planning Authorities can set out Local Plan policies requiring new dwellings to meet the tighter Building Regulations optional requirement of 110 litres/person/day."

Planning authorities are advised to consult with the EA and water companies to determine where there is a clear local need, and also to consider the impact of setting this optional standard on housing viability.

55. The evidence for adopting the optional requirements is outlined in section 4.8, viability is reviewed in section 4.8.6.

3.3.5 PPG - Flood Risk and Coastal Change

56. The UK government has recently put in place new wording for Planning Practice Guidance (PPG) for Flood risk and coastal change (Department for Levelling Up, Housing and Communities, 2022).

57. LPAs and developers can investigate measures to control the risk of flooding affecting the sites. Discussions early in the planning process with relevant flood risk management authorities, SFRAs and any programme of flood and coastal erosion risk management schemes will aid in identifying such control measures.

58. The main updates to be noted from August 2022 are:

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

3.3.6 PPG - Climate Change

59. This guidance advises how to identify suitable mitigation and adaptation measures in the planning process to address the impacts of climate change. Planning can help increase resilience to climate change impact through the location, mix and design of development. There is a statutory duty on Local Planning Authorities to include policies in their Local Plan to tackle climate change and its impact.

3.3.7 Levelling-up and Regeneration Act 2023

60. The Levelling-up and Regeneration Act received Royal Assent in 2023 and aims to support the Government's commitment to reducing geographical disparities between different parts of the UK. Within this Act are several parts relating to the water environment.

61. Part 7 relates to nutrient pollution standards. Where the Secretary of State considers that a habitats site that is wholly or partly in England is in an unfavourable condition by virtue of pollution from nutrients in water

comprising phosphorus or compounds, or nitrogen or compounds, the Secretary of State may designate the catchment area for the habitats site as a phosphorus or nitrogen sensitive area.

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

63. A phosphorus or nitrogen significant plant is defined as one that discharges treated effluent into a sensitive catchment area and is not exempt in relation to the pollution standard.

64. The phosphorus pollution standard is 0.25mg/l unless otherwise defined. The nitrogen pollution standard is 10mg/l unless otherwise defined.

3.4 Water and design

3.4.1 Building Regulations

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

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

3.4.2 Building Research Establishment

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

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

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

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

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

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

73. More information on the BREEAM and HQM standards can be found here.

3.4.3 Energy and Water

74. 18% of the UK’s domestic energy usage is for water heating (Department for Energy Security and Net Zero, 2022). If less water was being used within the home, for instance through more water efficient showers, less water would need to be heated, and overall domestic energy usage would be reduced.

75. The Government is currently analysing the results of a 2019 consultation on a Future Homes Standard that will involve changes to Part L (conservation of fuel and power) of the Building Regulations for new dwellings. Whilst there is no direct mention of water efficiency in this consultation, there is an important link between water use and energy use, and therefore between water use and the whole-life carbon cost of developments. The new Future Homes Standard is expected in 2025.

3.4.4 Viability

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

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

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

3.5 The Water Industry

3.5.1 The Water Industry in England

78. Water and sewerage services in England and Wales are provided by eleven Water and Sewerage Companies (WaSCs) and six 'water-only' companies. The central legislation relating to the industry is the Water Industry Act 1991. The companies operate as regulated monopolies within their supply regions, although very large water users and developments are able to obtain water and/or wastewater services from alternative suppliers - known as inset agreements.

79. The Water Act 2014 aimed to reform the water industry to make it more innovative and to increase resilience to droughts and floods. Key measures that influence the future provision of water and wastewater services include:

- non-domestic customers are be able to switch their water supplier and/or sewerage undertaker (from April 2017);
- new businesses are able to enter the market to supply these services;
- measures to promote a national water supply network; and
- enabling developers to make connections to water and sewerage systems.

80. The water industry is primarily regulated by three regulatory bodies:

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

3.5.2 Funding of the water industry

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

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

83. The Water Industry National Environment Programme (WINEP) is a set of actions that are defined by the EA and given to all water companies operating in England for completion during a particular AMP period. The aim of the programme is to support the objectives in the Water Framework Directive regulations. Examples of typical actions could include investigations into the sustainability of an abstraction, a reduction in an abstraction to support river flows, or new permit limits at a wastewater treatment works. There are also actions in AMP8 (2025 - 2030) to address storm overflow discharges where they are thought to be causing harm to watercourses in line with the targets set out in the Storm Overflow Discharge Reduction Plan.

3.5.3 Planning for Water

Water Resource Management Plans

84. Water Resource Management Plans (WRMPs) are statutory 25-year strategies that water companies are required to prepare, with updates every five years. In reality, water companies prepare internal updates more regularly, and often cover a longer period, for example the STW WRMP24 covers a period out to 2080. A WRMP sets out to achieve a secure supply of water for customers and a protected and enhanced environment, by forecasting supply and demand, and then considering the implementation of demand and supply side options to help reduce any forecasted deficits.

85. WRMPs are required to assess:

- Future demand (due to population and economic growth).
- Future water availability (including the impact of sustainability reductions and climate change).
- Demand management and supply-side measures (e.g., water efficiency and leakage reduction, water transfers and new resource development).
- How the company will address changes to abstraction licences.
- How the impacts of climate change will be mitigated.
- Where necessary, they set out the requirements for developing additional water resources to meet growing demand and describe how the balance between water supply and demand will be balanced over a 25 year period.
- Using cost-effective demand management, transfer, trading and resource development schemes to meet growth in demand from new development and to restore abstraction to sustainable levels.
- In the medium to long term, ensuring that sufficient water continues to be available for growth and that the supply systems are flexible enough to adapt to climate change.
- WRMPs should use "adaptive planning" to account for uncertainties in the preferred plan.
- WRMP24 must plan for a 1 in 500-year drought - an increase on the 1 in 200-year drought in WRMP19.

86. Severn Trent Water's final WRMP has not been published at the time of writing. The draft plan covering the period 2025 to 2050 is available here. South Staffordshire Water's final WRMP has also not been published at the time of writing. The draft plan is available here. The 2023 iterations of both plans are used for this report. These are further discussed in Section 4.5.

Drought Plan

87. Linked to the WRMP is a water company's drought plan. This is a requirement under the Water Industry Act 1991 (as amended by the Water Act 2003). A water company must state how it will maintain a secure water supply and protect the environment during dry weather and drought. The plan will contain:

- Drought triggers - these are points where a water company will take action to manage supply and demand. They are based on monitoring of rainfall levels, river flows, groundwater levels and reservoir stocks.
- Demand management actions - how a water company will reduce demand for water during a drought. Actions that save water before taking more water from the environment must be prioritised. These could include:
  - reducing leakage;
  - carrying out water efficiency campaigns with customers;
  - reducing mains pressure; and
  - restricting water use, for example through temporary use bans which limit hosepipe and sprinkler use.
- Supply management actions - how a water company will maintain water supply during a drought. Actions that have the least effect on the environment must be prioritised. This could include:
  - carrying out engineering work to improve its supply;
  - transferring water in bulk from other water companies;
  - using drought permits and drought orders to abstract more water;
  - using desalination - permanent or temporary plants; and
  - using tankers to supply customers with water directly.
- Extreme drought management actions - the actions it could take in an extreme drought. These could delay the need to use emergency restrictions standpipes and rota cuts.
- Communicating during a drought - a water company must set out how it will communicate in a clear and timely way during a drought with customers, partners or other stakeholders.
- Environmental assessment, monitoring and mitigation. A drought plan must include:
  - an environmental assessment;
  - an environmental monitoring plan for each supply management action; and
  - details of mitigation measures the company plans to take for each supply management action.

- End of a drought - a water company must explain how it will identify when a drought is over or ending and the actions it will take during this stage, communicate this information to customers, and review its performance.

Regional water resource planning

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

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

3.5.4 Planning for Wastewater

21st Century Drainage

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

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

Drainage and Wastewater Management Plans (DWMPs)

92. DWMPs are consistently structured plans delivered at three spatial scales; company-wide, regional groupings and individual wastewater catchments. The framework defines drainage to include all organisations and all assets which have a role to play in drainage, although, as the plans will be water company led, it does not seek to address broader surface water management within catchments.

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

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

95. Severn Trent Water's final DWMP, including interactive mapping, is published here, and is reviewed in detail for the study area in section 6.2.1.

3.5.5 Developer Contributions and connection charges

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

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

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

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

- More charges will be fixed and published on water company websites. This will provide greater transparency to developers and will also allow alternative connection providers to offer competitive quotations more easily.
- There will be a fixed infrastructure charge for water and one for wastewater.
- The costs of network reinforcement will no longer be charged directly to the developer in their connection charges. Instead, the combined costs of all of the works required on a company's networks, over a five-year rolling period, will be covered by the infrastructure charges paid for all new connections.

100. Severn Trent Water publish their charging arrangements annually here. These include incentives to encourage good design by developers, including:

- Water Environmental Discount: To encourage developers to build new homes to a 100 l/p/d standard or less, a discount of up to £380.00 is available to the clean water infrastructure charge.
- Sewerage Environmental Discount: To encourage no surface water connection made to public sewers during the building of new homes. This can lead to a discount of £124.00.

3.5.6 Water companies and the planning system

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

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

3.6 Flood Risk and Surface Water

3.6.1 Flood and Water Management Act 2010

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

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

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

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

- Designation of Local Authorities (either Unitary Authority or County Council if there is no Unitary Authority) as SuDS Approval Bodies (SAB) which have a duty to adopt new drainage systems.
- The cessation of the automatic right for new developments to connect to the existing sewer system.
- Developers must ensure that drainage systems are built as per the approved drainage plan that complied with mandatory national standards as outlined in the NPPF and the PPG.

3.6.2 Strategic Flood Risk Assessment (SFRA)

107. All LPAs are required, under NPPF, to prepare a SFRA, which forms a key part of the evidence base for their Local Plan. The SFRA must consider flood risks from all sources, collating up-to-date flood risk data and in some cases developing new flood risk modelling. The SFRA is used to inform the Sequential Test, by which Local Plan allocations should be sequentially selected to direct development towards areas of lower flood risk, taking into consideration the vulnerability to flooding of the proposed land use. The sub-region is covered by one Level 1 SFRA which can be found here.

3.6.3 Surface Water Management Plan

108. Surface Water Management Plans (SWMPs) outline the preferred surface water management strategy in a given location and establish a long-term action plan to manage surface water. SWMPs are undertaken, when required, by LLFAs in consultation with key local partners who are responsible for surface water management and drainage in their area. In 2014 Warwickshire County Council has published a SWMP that covers (Warwickshire, 2016):

- North Warwickshire Borough Council

- Nuneaton and Bedworth Borough Council
- Rugby Borough Council
- Warwick District Council
- Stratford-on-Avon District Council.

109. Coventry City Council has its own SWMP which is accessible here.

3.6.4 Sustainable Drainage Systems

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

- The National Planning Policy Framework, which requires that development in areas already at risk of flooding should give priority to sustainable drainage systems (HM government p, 2023).
- The House of Commons written statement (Pickles, 2014) setting out governments intentions that LPAs should:
  "ensure that sustainable drainage systems for the management of run-off are put in place, unless demonstrated to be inappropriate" and "clear arrangements in place for ongoing maintenance over the lifetime of the development."
  This requirement was also incorporated in the 2019 update of the NPPF (paragraph 175 in Dec 2023 update). In practice, this has been implemented by making Lead Local Flood Authorities (LLFAs) statutory consultees on the surface water drainage arrangements of major developments.
- The Defra non-statutory technical standards for sustainable drainage systems (HM Government, 2015c). These set out the government's high-level requirements for managing peak flows and runoff volumes, flood risk from drainage systems and the structural integrity and construction of SuDS. This very short document is not a design manual and makes no reference to the other benefits of SuDS, for example water quality, habitat, and amenity.

111. Warwickshire County Council are the LLFA for five of the six LPAs in the sub-region, with Coventry City Council the LLFA for their area. The LLFAs play a key role in ensuring that the proposed surface water drainage schemes for all new developments comply with technical standards and

policies in relation to SuDS. Further information on surface water drainage can be found on the respective LLFA websites.

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

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

114. Severn Trent Water provides guidance on their website through their surface water drainage page, available here. Applications for projects should be made through their website.

3.6.5 Design and Construction Guidance

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

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

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

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

3.7 Environmental Protection and Biodiversity

3.7.1 The Environment Act 2021

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

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

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

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

- report on the discharges from storm overflows;
- monitor the quality of water potentially affected by discharges;

- progressively reduce the harm caused by storm overflows; and
- report on elimination of discharges from storm overflows.

3.7.2 25-year Environment Plan

122. The Environmental Improvement Plan (EIP) is the first revision of the 25-year Environment Plan (25YEP) published in 2018. It contains ten goals which are shown in Figure 3-1. The full text of the EIP can be found here. Government must review and revise the plan, if needed, every five years to ensure continued progress against the ten 25YEP goals.

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

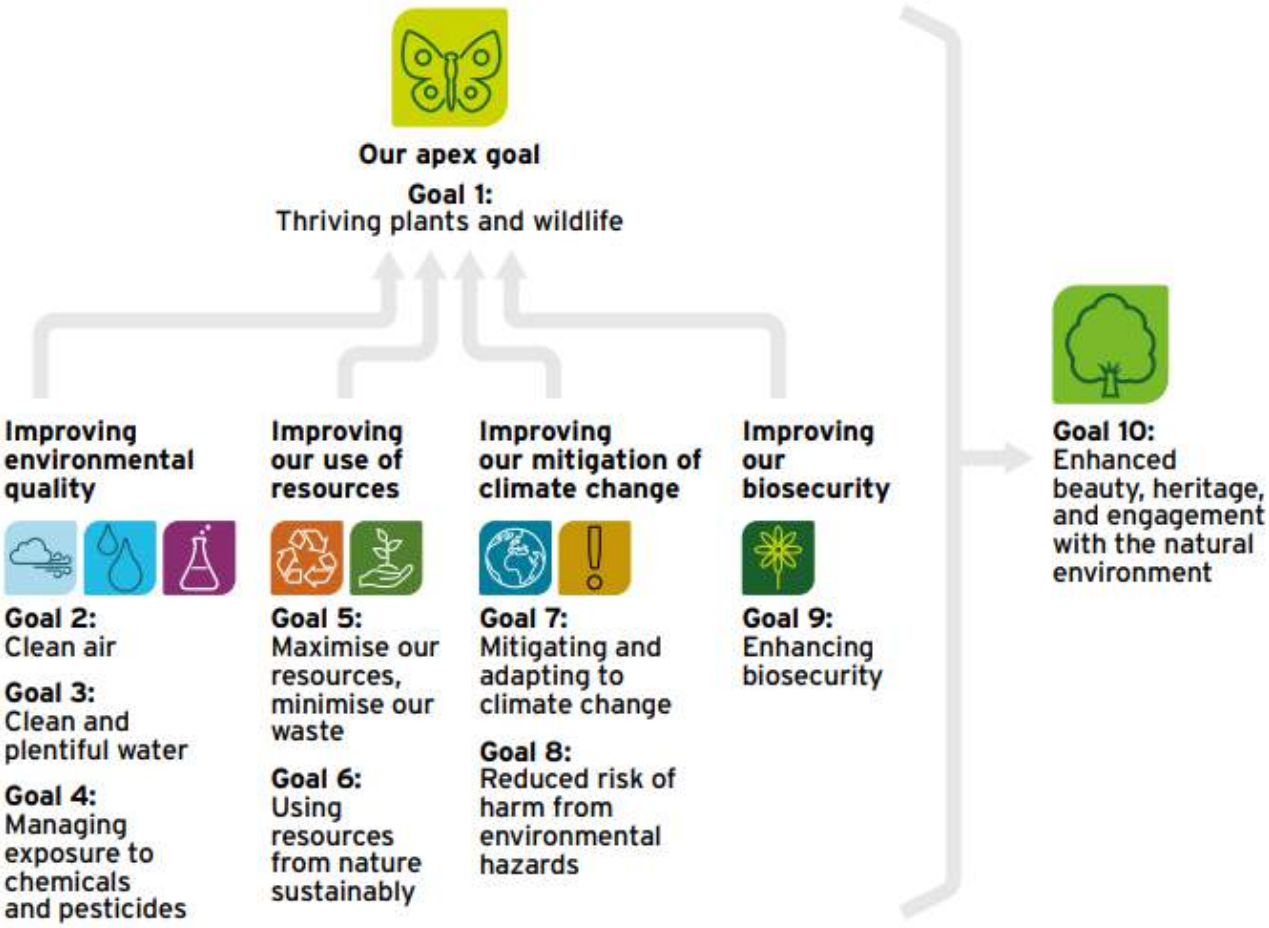

Figure 3-1 The 10 Environmental Improvement Plan goals

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

- Reduce nitrogen, phosphorus, and sediment pollution from agriculture into the water environment by at least 40% by 2038, compared to a 2018 baseline, with an interim target of 10% by 31 January 2028, and 15% in catchment containing protected sites in unfavourable condition due to nutrient pollution by 2028.
- Reduce phosphorus loadings from treated wastewater by 50% by 2028 and 80% by 2038 against a 2020 baseline.
- Halve the length of rivers polluted by harmful metals from abandoned mines by 2038, against a baseline of around 1,500km (approximately 930 miles).
- Reduce the use of public water supply in England per head of population by 20% from the 2019-20 baseline, 2038, with interim targets of 9% by 2027 and 14% by 2032, and to reduce leakage by 20% 2027 and 30% by 2032.
- Restore 75% of our water bodies to good ecological status.
- Require water companies to have eliminated all adverse ecological impact from sewage discharges at all sensitive sites by 2035, and at all overflows by 2050.
- Target a level of resilience to drought so that emergency measures are needed only once in 500-years.

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

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

126. Progress towards delivering the EIP will be monitored annually.

3.7.3 Defra Plan for Water

127. Defra's Plan for Water (Defra, 2023) provides further detail on the actions towards achieving Goal 3 of the EIP23. It promotes an integrated approach to water management as the foundation of the plan. Whilst many of the actions contained within the Plan for Water are outside of the responsibilities

of areas of influence of the LPAs, the following summarises those actions that LPAs should have regard to:

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

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

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

- **Action 10 –** Enable innovative water efficiency approaches in buildings, including technologies and approaches to funding and maintenance.

3.7.4 Biodiversity Net Gain

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

3.7.5 Storm Overflow Reduction Plan

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

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

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

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

Introduction

132. The European Union Water Framework Directive (WFD) 2000 is currently transposed into English and Welsh law by the Water Environment Regulations (HM Government, 2017). They apply to all waterbodies (watercourses, canals, lakes, estuaries and coastal waters), with the objective of meeting Good Ecological Status (GES) or, where heavily modified, Good Ecological Potential (GEP) To meet GES or GEP, a water

body must achieve a good or high score for all elements - in the case of surface water, these are biological, physico-chemical, specific pollutants and hydromorphology (meaning the physical features and content of water such as water flow and characteristics of the river bed) (Figure 3-2). UK policy remains to meet GES or GEP for all waterbodies by 2027.

133. Within the physico-chemical group, individual elements can rank below moderate (poor or bad), but the overall group can only be as low as moderate.

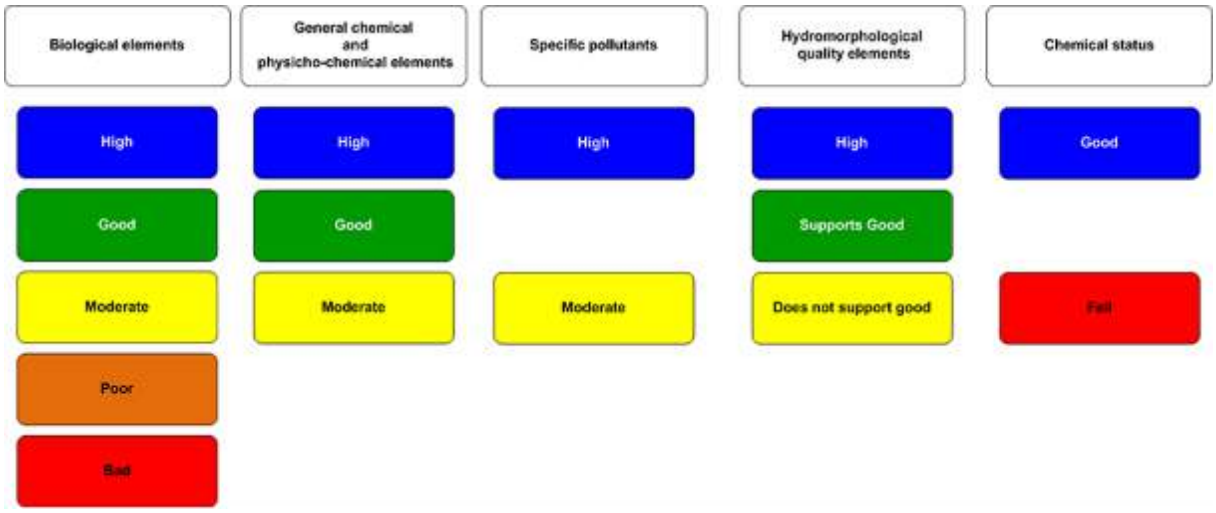

Figure 3-2: Status classification for surface water (Environment Agency, 2023a)

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

River Basin Management Plans

135. River Basin Management Plans (RBMPs) are required under the WFD and document the baseline classification of each waterbody in the plan area, the objectives, and a programme of measures to achieve those objectives. The sub-region falls within the Severn River Basin District (RBD) and the Humber RBD (DEFRA a, 2022; DEFRA b, 2022).The third cycle RBMPs were

published in 2022. A primary WFD objective is to ensure 'no deterioration' in environmental status, therefore all water bodies must meet the class limits for their status class as declared in the Severn and Humber River Basin Management Plans.

136. Another equally important objective requires all water bodies to achieve good ecological status. Future development needs to be planned carefully so that it helps towards achieving the WFD and does not result in further pressure on the water environment and compromise WFD objectives. The WFD objectives as outlined in the updated RBMPs are summarised below:

- Preventing deterioration of the status of surface waters and groundwater.
- Achieving objectives and standards for protected areas.
- Aiming to achieve good status for all water bodies.
- Reversing any significant and sustained upward trends in pollutant concentrations in groundwater.
- Cessation of discharges, emissions, and losses of priority hazardous substances into surface waters.
- Progressively reducing the pollution of groundwater and preventing or limiting the entry of pollutants.
- Local Planning Authorities (LPAs) must have regard to the Water Framework Directive as implemented in the RBMPs. It is of primary importance when assessing the impact of additional wastewater flows on local river quality.
- Alongside the RBMP documents, the data behind them can be explored further using the Catchment Data Explorer (Environment Agency, 2023a) and map viewer (Environment Agency, 2023b).

Protected Area Objectives

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

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

139. The types of protected areas are:

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

3.7.7 Conservation of Habitats and Species Regulations 2017 (as amended)

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

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

- A special area of conservation (SAC).
- A site of Community Importance.
- A site hosting a priority natural habitat type or priority species protected in accordance with Article 5(4) of the Habitats Directive.
- A Special Protection Area (SPA).
- A potential SPA.

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

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

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

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

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

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

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

- **Nutrient Neutrality** - Natural England (NE) has identified a number of catchment areas where Habitats Sites are in unfavourable condition due to eutrophication (an excess of the nutrients phosphorous and/or nitrogen in water). NE have advised that developments in these catchments must demonstrate that they do not cause harm, and that one way to do this is to introduce mitigation measures in the catchment area which offset the additional nutrients emitted as a result of the development, an approach known as nutrient neutrality. There is one nutrient neutrality area that lies partially within the study area (River Mease SAC). This issue is further considered in Section 9.
- **Water Neutrality -** Natural England (NE) has issued a position statement that it cannot be concluded with sufficient certainty that groundwater abstractions in the Arun Valley, West Sussex are causing

no adverse effect on Habitats Sites. NE have advised that developments in Sussex North Water Resource Zone must demonstrate that they do not cause harm, and that one way to do this is to introduce mitigation measures in the zone which offset the additional water consumed as a result of the development, an approach known as water neutrality. There are no parts of the Coventry and Warwickshire Subregion study area which are currently within a water neutrality zone, however NE may designate additional areas in the future, so this paragraph has been included for context.

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

3.7.8 Wildlife and Countryside Act

150. Sites of Special Scientific Interest (SSSI) are designated and legally protected under the Wildlife and Countryside Act 1981, Section 28G places a duty to take reasonable steps, consistent with the proper exercise of the authority's functions, to:

> "further to the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which the site is of special scientific interest." (HM Government, 1981).

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

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

3.7.9 Ramsar

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

- Wise use of all their wetlands.
- Designating sites for the Ramsar list of “Wetlands of International Importance” (Ramsar Sites) and their conservation.
- Cooperating on transboundary wetlands and other shared interests.

153. “Wise use” of wetlands is defined under the convention as:
“the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development”. (Ramsar Convention Secretariat, 2010)

154. In the UK, Ramsar Sites are designated by the Joint Nature Conservation Committee (JNCC).

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

3.7.10 Bathing Water Regulations

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

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

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

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

160. In contrast to some other European nations, the UK has not previously designated stretches of river as bathing waters, however five new inland bathing waters have been designated since 2021, and across England there are numerous campaigns by Non-government Organisations (NGOs) and members of the public to designate other stretches of river. Defra has published guidance on applying for bathing water status, including a requirement for at least 100 bathers per day during the season (Defra, 2023).

161. There are no official designated bathing areas within the sub-region.

3.7.11 Environmental Permitting Regulations

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

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

164. The regulations are used to permit discharges from water company and private wastewater treatment works, and for sewer overflows.

165. The Environment Agency will usually object to applications for a new private Package Treatment Plan (PTP) or septic tank where it is feasible to connect the development to a public sewerage system. A general rule of 30m per dwelling is used to define a reasonable distance from the site boundary to a public sewer. Hence a development of 10 homes should connect to a public sewer within 300m of the boundary, unless there are significant barriers, such as a river or motorway.

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

3.7.12 Groundwater protection

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

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

- **Zone 1 (Inner protection zone)** This zone is designed to protect against the transmission of toxic chemicals and water-borne disease. It indicates the area in which pollution can travel to the borehole within 50 days from any point within the zone and applies at and below the water table. There is also a minimum 50 metre protection radius around the borehole.
- **Zone 2 (Outer protection zone)** This zone indicates the area in which pollution takes up to 400 days to travel to the borehole, or 25% of the total catchment area, whichever area is the largest. This is the

minimum length of time the Environment Agency think pollutants need to become diluted or reduce in strength by the time they reach the borehole.

- **Zone 3 (Total catchment)** This is the total area needed to support removal of water from the borehole, and to support any discharge from the borehole.
- **Zone of special interest** This is defined on occasions, usually where local conditions mean that industrial sites and other polluters could affect the groundwater source even though they are outside the normal catchment.

3.8 Summary of key new and emerging policy and legislation

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

- Schedule 3 of the Flood and Water Management Act is expected to be enacted in England in 2024. This will designate Lead Local Flood Authorities as SuDS Approval Bodies (SABs) with a duty to adopt new SuDS and removing the automatic right to connect to public sewers.
- Defra have signalled their intention, with the Plan for Water, to review the water efficiency standards for new homes, including consideration of a new national 105l/p/d standard and 100l/p/d where there is a clear local need.
- All development sites will be expected to demonstrate at least a 10% net-gain in biodiversity from 2024 (From 12th of February 2024 for major developments and 2nd of April for all other developments).
- The designation of specific catchments in England as requiring to demonstrate Nutrient Neutrality under the Conservation of Habitats Regulations has led to significant limitations to development in these areas, as well as the development of offsetting schemes to enable nutrient-neutral development. In 2023 the government unsuccessfully attempted to remove development restrictions in these areas, so further developments might be expected in the near future.

170. Similarly, the availability of water resources, and the impact of new water demand on the environment, has led to restrictions on granting planning permission in Sussex North WRZ and a requirement to demonstrate water-neutral development in Cambridge Water WRZ. It is anticipated that LPAs

will be increasingly required to demonstrate that there will be sufficient water resources to supply development without causing further harm to the environment through the life of their Local Plans.

4 Water Resources and Water Supply

4.1 Introduction

171. The aim of the water resources assessment is to ensure that sufficient water is available in the region to serve the proposed level of growth, and that it can be abstracted without a detrimental impact on the environment, both during the plan period and into the future. The report characterises the study area, identifying the key surface water and groundwater bodies, and local geology. It highlights the pressures on water resources in the region, identifies existing constraints on abstraction and provides evidence for adopting tighter water efficiency targets.

4.1.1 Surface Water

172. There are several tributaries of the River Tame within the study area, including the River Blythe, Bourne and several smaller Brooks. The river Anker lies to the north of the study area, in North Warwickshire and Nuneaton and Bedworth, and is a tributary of the Trent. The River Leam runs through the south of the study area across Warwick and Rugby.

173. The main watercourse going through the sub-region is the River Avon that covers Warwick and Rugby, see Figure 4-1. The Coventry and Ashby Canal flows through the study area from the north into North Warwickshire and Nuneaton and Bedworth. The River Cole, in North Warwickshire, also feeds into the Tame, which is a main tributary of the Trent.

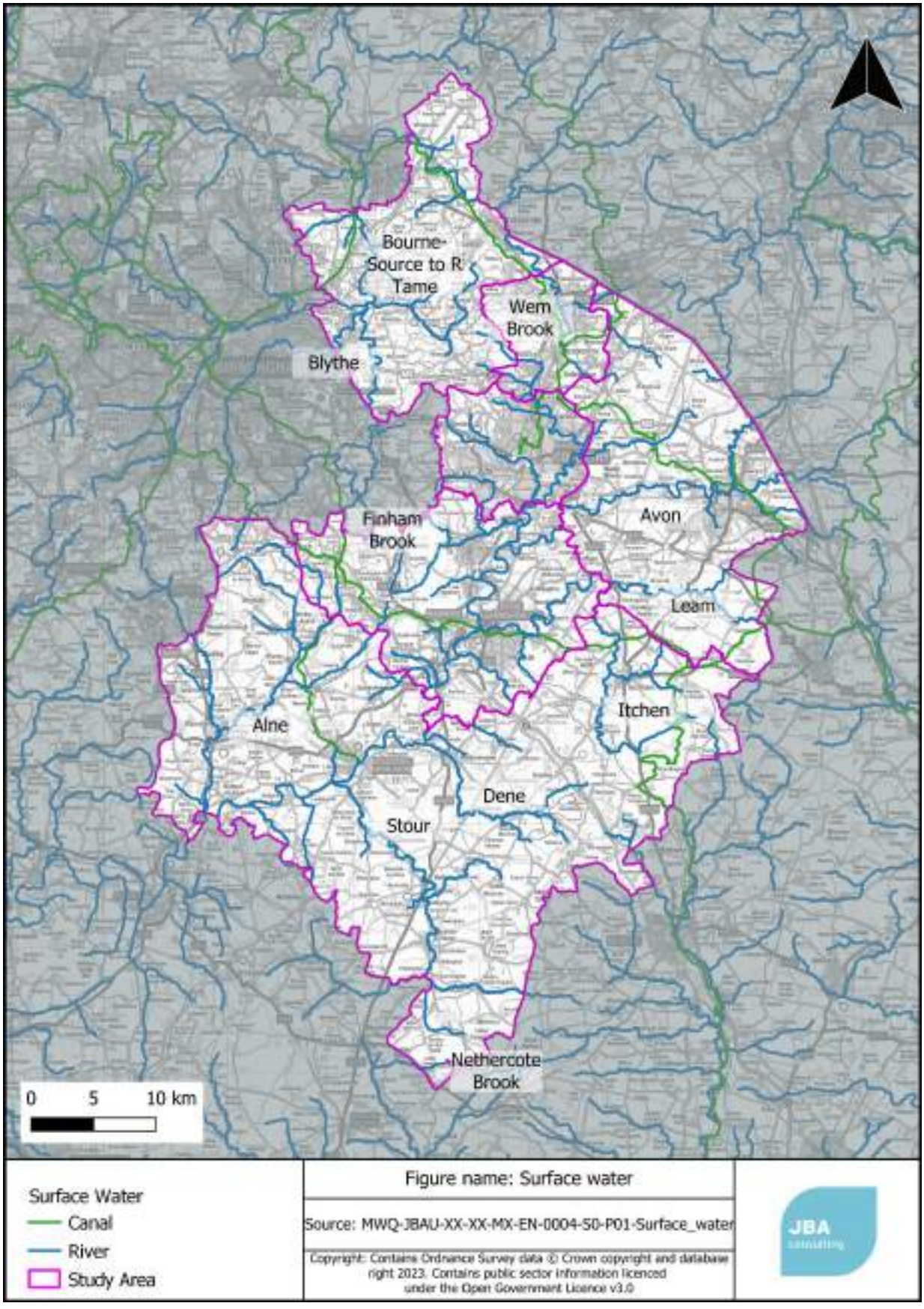

Figure 4-1 Surface water within the sub-region.

4.1.2 Geology

Superficial Geology

174. Till is predominant in the superficial geology within Coventry. Within Stratford-on-Avon, Warwick and Rugby there are river terrace deposits, till and alluvium, and there are also deposits of Lacustrine and Alluvium within Stratford-on-Avon. North Warwickshire and Nuneaton and Bedworth have deposits of till, glacial sand and gravel, and alluvium. A map of superficial geology is shown in Figure 4-2.

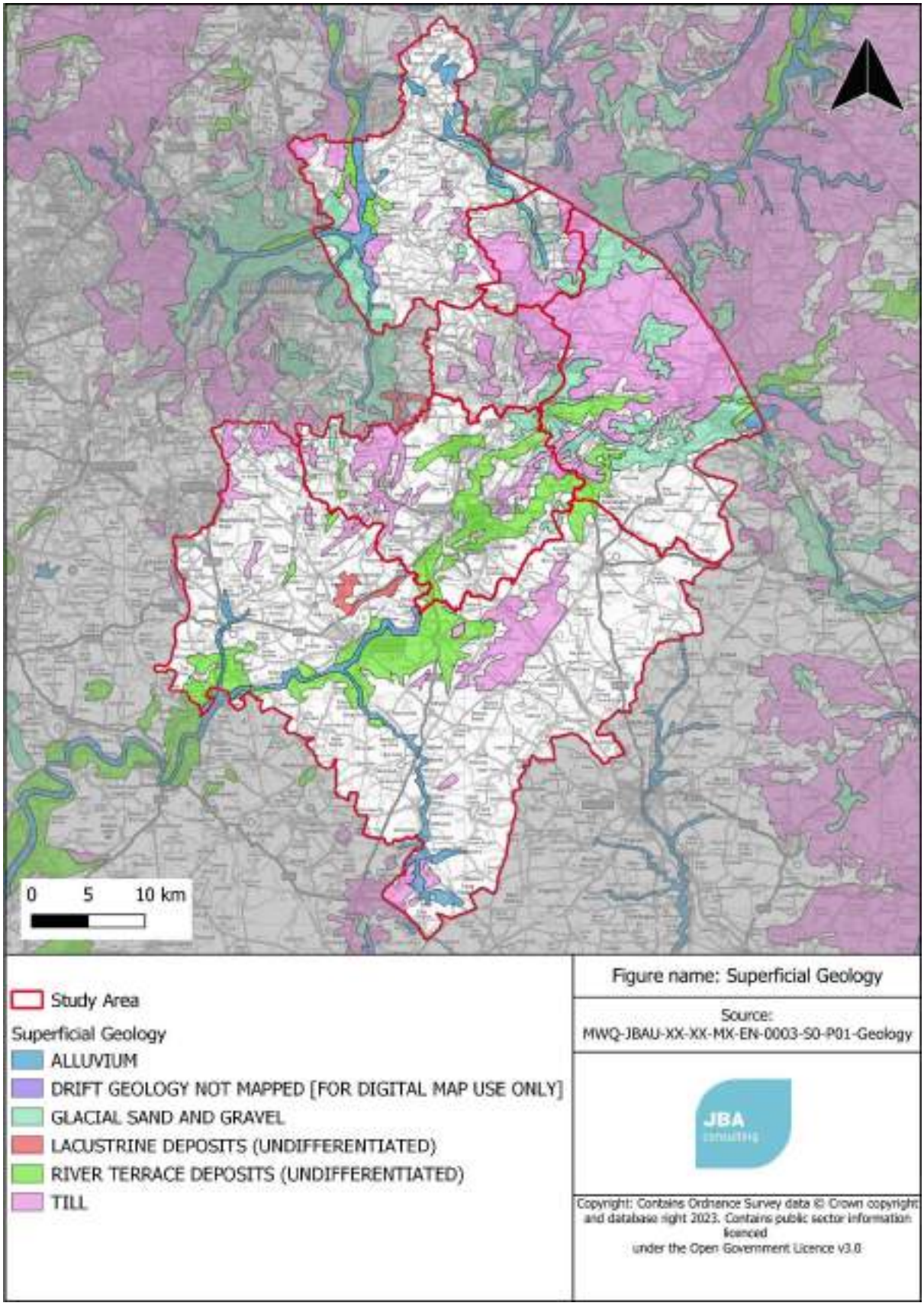

Figure 4-2 Superficial geology in the sub-region study area

Bedrock Geology

175. Bedrock geology in the study area is predominantly Triassic rock and Lias group. There is also a large deposit of Warwickshire group going through the study area.

176. Towards the north of the study area there is an amalgamation of bedrock types such as Tremadoc rock, Lower Cambrian, Pennine lower coal measures formation and South Wales lower coal measures formation (undifferentiated) and Pennine middles coast measures formation and South Wales Middle coal measures formation (undifferentiated). A map of the bedrock geology is shown in Figure 4-3.

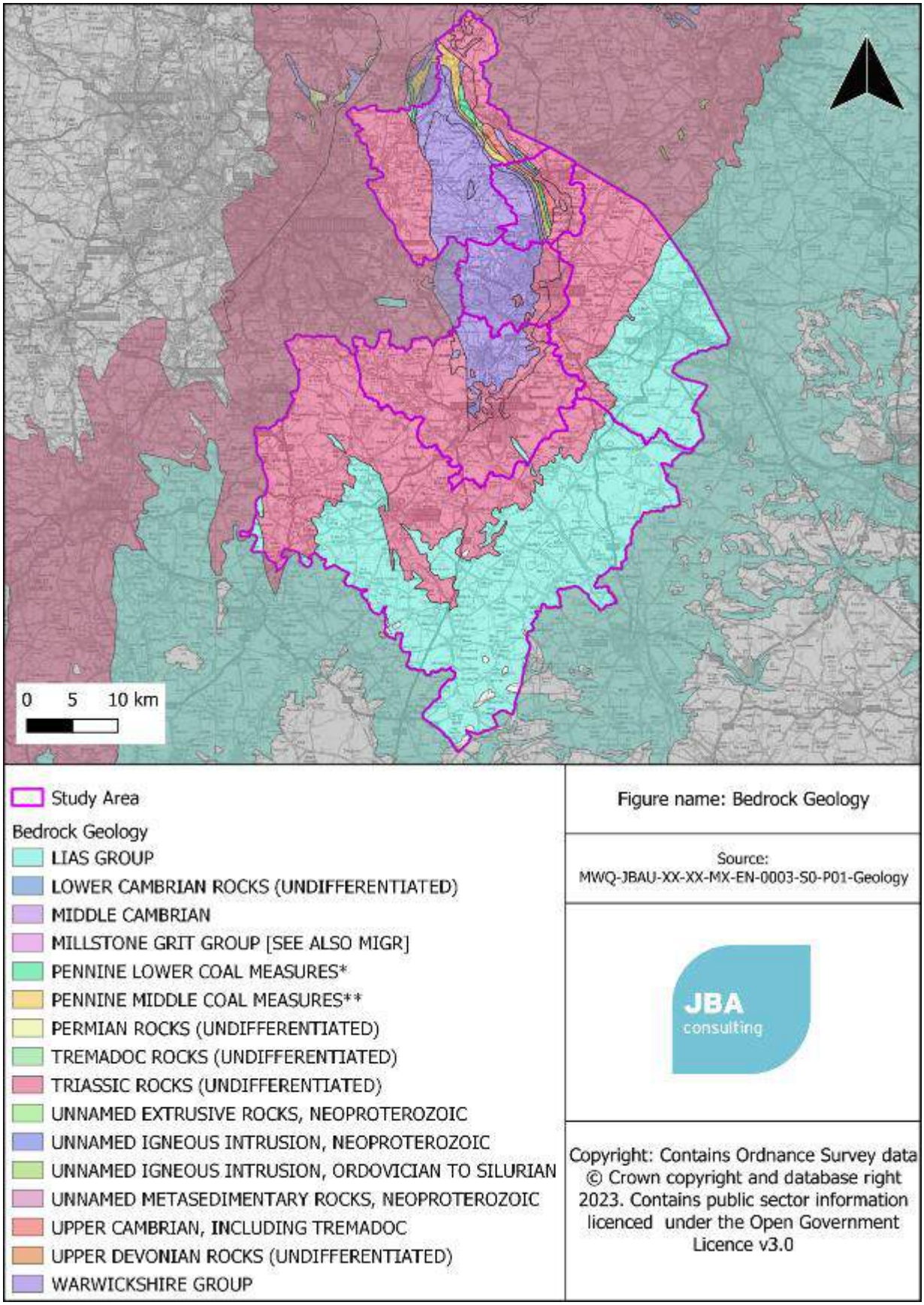

Figure 4-3 Bedrock geology in the study area.

* Pennine lower coal measures formation and South Wales lower coal measures formation (undifferentiated).

** Pennine middles coast measures formation and South Wales Middle coal measures formation (undifferentiated).

4.2 Availability of Water Resources

4.2.1 Abstraction Licencing Strategy

177. The Environment Agency (EA), working through their Catchment Abstraction Management Strategy (CAMS) process, prepare an Abstraction Licensing Strategy (ALS) for each sub-catchment within a river basin. This licensing strategy sets out how water resources are managed in different areas of England and contributes to implementing the Water Framework Directive (WFD). The ALS report provides information on the resources available and what conditions might apply to new licenses. The licences require abstractions to stop or reduce when a flow or water level falls below a specific threshold, as a restriction to protect the environment and manage the balance between supply and demand for water users. The CAMS process is published in a series of ALSs for each river basin.

178. All new licences, and some existing licenses, are time limited. This allows time for a periodic review of the specific area as circumstances may have changed since the licences were initially granted. These are generally given for a twelve-year duration, but shorter license durations may also be granted. This is usually based on the resource assessment and environmental sustainability. In some cases, future plans, or changes may mean that the EA will grant a shorter time limited licence, so it can be re-assessed following the change. If a licence is only required for a short time period, it can be granted either as a temporary licence or with a short time limit. If a licence is considered to pose a risk to the environment it may be granted with a short time limit while monitoring is carried out. The licences are then replaced with a changed licence, revoked, or renewed near to the expiry date.

179. The ALS are important in terms of the Water Resource Management Plan (WRMP) as this helps to determine the current and future pressures on water resources and how the supply and demand will be managed by the relevant water companies (UK Government l, 2014). An abstraction license is needed from Natural Resources Wales or the Environment agency if abstraction above 20m^3/ day (4,400 gallons) a day from:

- rivers or streams
- reservoirs, lake or pond
- canal
- spring or
- an underground source

180. The license is granted depending on the amount of water available.

181. The sub-region is in the Tame, Anker and Mease catchment and the Warwickshire Avon catchment. To the east of the study area there is a small part covered by the Soar and to the south a small area of the Cherwell, Thame and Wye catchment, see Figure 4-4.

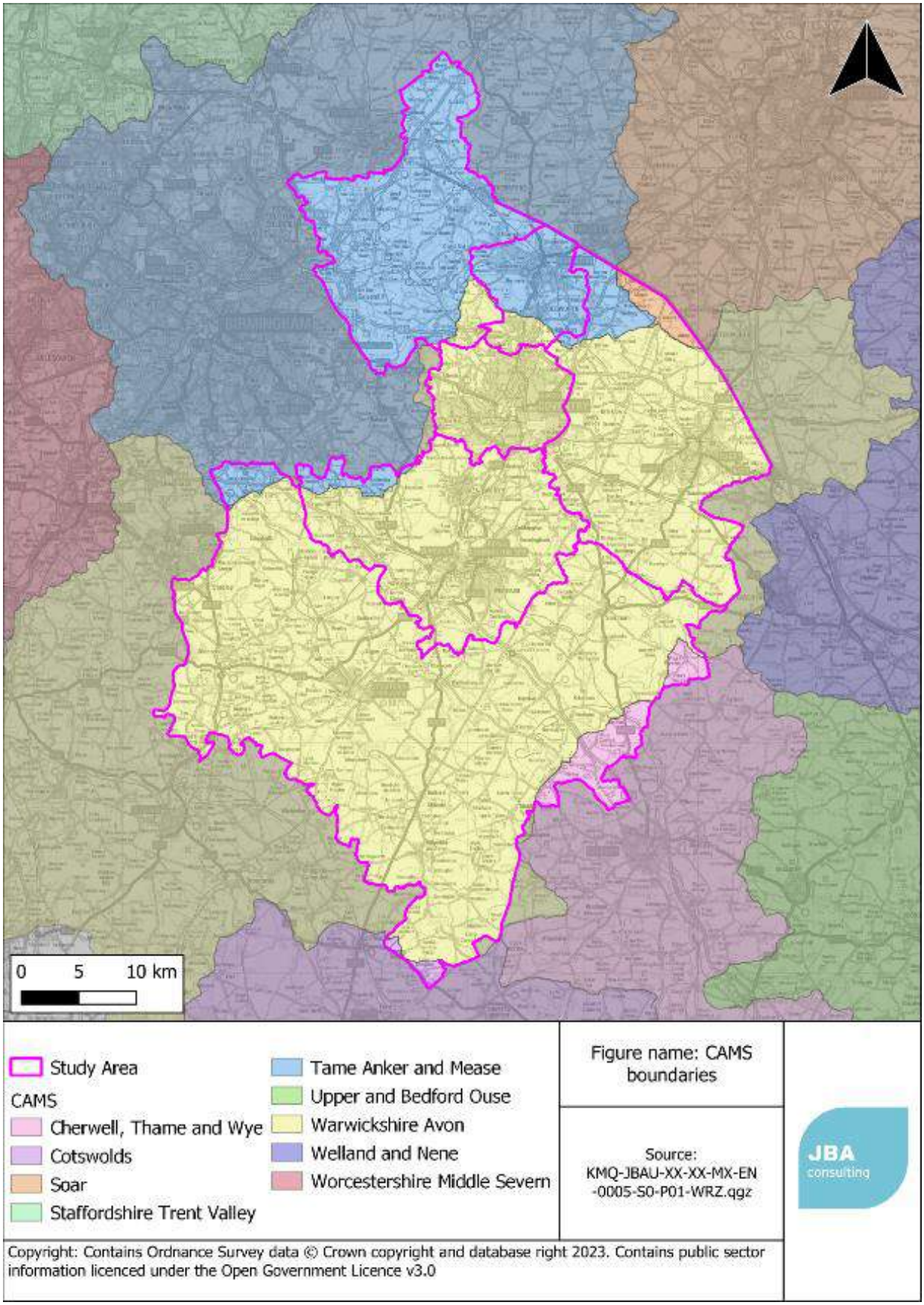

Figure 4-4 CAMS boundaries

4.3 Resource Availability Assessment

4.3.1 Overview

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

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

183. The availability of water for abstraction is determined by the relationship between the fully licensed (all abstraction licences being used to full capacity) and recent actual flows (amount of water abstracted in the last 6 years) in relation to the Environmental Flow Indicator (EFI). Results are displayed using different water resource availability colours, further explained in Table 4-1 Implications of Surface Water Resource Availability Colours. In some cases, water may be scarce at low flows, but available for abstraction at higher flows. Licences can be granted that protect low flows, this usually takes the form of a "Hands-off Flow" (HOF) licence condition, meaning that if flows in the river drops below that which is required to protect the environment, abstraction must stop. Hence the term "hands off". A Hands-off Level" (HOL) may be applied - which is a groundwater level below which an abstractor is required to reduce or stop abstraction (Environment Agency I, 2022).

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

Table 4-1 Implications of Surface Water Resource Availability Colours

Water Resource Availability Colour	Implications for Licensing
BLUE- High hydrological regime	There is more water than required to meet the needs of the environment. Due to the need to maintain the near pristine nature of the water body, further abstraction is severely restricted.

Water Resource Availability Colour	Implications for Licensing
GREEN-Water available for licensing	There is more water than required to meet the needs of the environment. Licences can be considered depending on local/downstream impacts.
YELLOW-Restricted water available for licensing	Fully Licensed flows fall below the Environmental Flow Indicator (EFI). If all licensed water is abstracted there will not be enough water left for the needs of the environment. No new consumptive licences would be granted. It may also be appropriate to investigate the possibilities for reducing fully licensed risks. Water may be available via licence trading.
RED- Water not available for licensing	Recent Actual flows are below the Environmental Flow Indicator (EFI). This scenario highlights water bodies where flows are below the indicative flow requirement to help support Good Ecological Status. No further licences will be granted. Water may be available via licence trading.

185. Water resource availability is assessed under four different flow conditions:

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

186. The resource availability for the Tame, Anker and Mease ALS and the Warwickshire Avon ALS is summarised below in Figure 4-5 Water resources available in the sub-region.

187. In some catchments this assessment may show that there is limited or no water available for abstraction at Q50 or Q70 but show that there is water available at lower flows. This is likely to be because most abstraction licences are limited using a 'Hands-off Flow' or 'Hands-off Level', therefore within the catchment less water is being abstracted at very low flows and there is water available. This may not be the case across all catchments and, particularly in heavily modified catchments, there may be other artificial influences impacting on catchment flows. For example, if there are many

discharges within the catchment or the flow is artificially augmented then this would artificially elevate flow particularly at lower flows. In some cases, the EA doesn't include this water in the amount available for licensing because it isn't guaranteed, but flow can potentially be more available.

4.3.2 Tame, Anker and Mease ALS

188. The Tame, Anker and Mease ALS spans 3,136 km^2 covering the upper River Tame, River Rea, River Blythe and the River Cole. The ALS also covers the whole of the river Tame catchment to its confluence with the river Trent, as well as the Trent catchment from the river Tame confluence to the river Dove confluence.

189. The area contains a significant amount of groundwater from aquifers and support abstraction for:

- Public supply
- Industrial
- Agricultural use

190. The climate change projections (using the 4°C increase by 2100 from the UKCP09 data) show that rainfall will decrease by 24% by 2050 in the summer but increase by 29% in the winter. Also, low flows will be 65% lower but peak river flows will be 30% higher (Environment Agency l, 2022).

191. Towards the bottom of the River Trent at North Muskham flows of 2,650 Ml/d are needed to safeguard river levels for navigation, this also aids in protecting flows further downstream into the Humber Estuary SAC.

192. There are ten Groundwater Management Units (GWMUs) within the catchment, within most of the ALS, surface water resources are available at least 70% of the time, with smaller areas having water available 30% of the time or less.

193. In Measham, Meriden, Lichfield and Shentsone GWMUs there is no water available for abstraction. Nuneaton GWMU has water available for licensing, although it is very small and has limited water resources.

194. GWMUs that have restricted water available are:

- Sutton
- Birmingham
- Burton
- Coleorton
- Warton

195. Burton, Coleorton and Warton are in a larger Groundwater Body (GWB) but are still at risk of deterioration. It is said in the report, that 'no new consumptive licenses will be granted as this would increase the risk of deterioration in the groundwater body'. Sutton and Birmingham are also in a larger GWB, which is in Poor Quantitative status and is at risk of deterioration. No new consumptive licenses are allowed here either.

196. At Q30 water is available at most Assessment Points (APs) meaning abstraction can be licensed here. AP6 has restricted water available but could still potentially be licensed with HoF condition. At Q50 AP4 and AP6 have restricted water available, whereas the other APs have water available for licencing. At Q70 there is no water available at AP6 and restricted water at AP4. The rest have water available for abstraction. Finally, at Q90 water is restricted at all APs apart from AP4 and AP6 where no water is available.

4.3.3 Warwickshire Avon ALS

197. The Warwickshire Avon ALS covers 2,900 km^2 encompassing the river Avon. Within the catchment, water is mainly abstracted from surface and groundwater, predominantly for:

- Public water supply
- Agriculture
- Industry

198. More sources are licensed for agriculture than any other purpose, making it the biggest user of water in the catchment. 24% of water licensed for consumptive abstraction is from principal aquifers and other groundwater sources (Environment Agency i, 2023).

199. Using the 4°C increase from the UKCP09 data referenced in section 4.3.2 climate change predictions present an increase in rainfall of 34% in the summer and a 29% decrease in the winter by 2050. When looking at low flows they will be 65% lower but peak river flows will be 30% higher as of 2050.

200. Within the catchment, the water resource strategy includes a Hands-off Flows (HoF) of 2,568 Ml/d set at the lower end of the River Severn at Deerhurst gauging station to safeguard lower flows.

201. There are 14 Groundwater Management Units (GWMUs) within the catchment, within most of the ALS, surface water resources are available at least 70% of the time, with smaller areas having water less than 30% of the time to the north of the ALS, or at least 50% of the time in a pocket to the southeast of the ALS.

202. GWMUs that have Restricted Water Available are:

- Coventry
- Kenilworth
- Cotswolds (North)
- Whitely

203. Coventry, Kenilworth and Whitley are part of a large GWB with Poor Quantitative Status and at Risk of Deterioration. Cotswolds (North) has

restricted water availability for licensing, this is to protect Public Water Supply abstractions to protect the downstream status of the Severn Estuary.

204. There are 14 APs in the catchment. At Q30 water is available at most APs apart from AP4 which has no water available for licencing. At Q50, only AP11 has restricted water availability, and AP4 has no water available. At Q70 flow 3/14 APs have restricted water available. At Q90 10/14 have restricted water available and 2 have no water availability. AP4 has no water available over all flow scenarios and AP13 only has no water available at Q95.

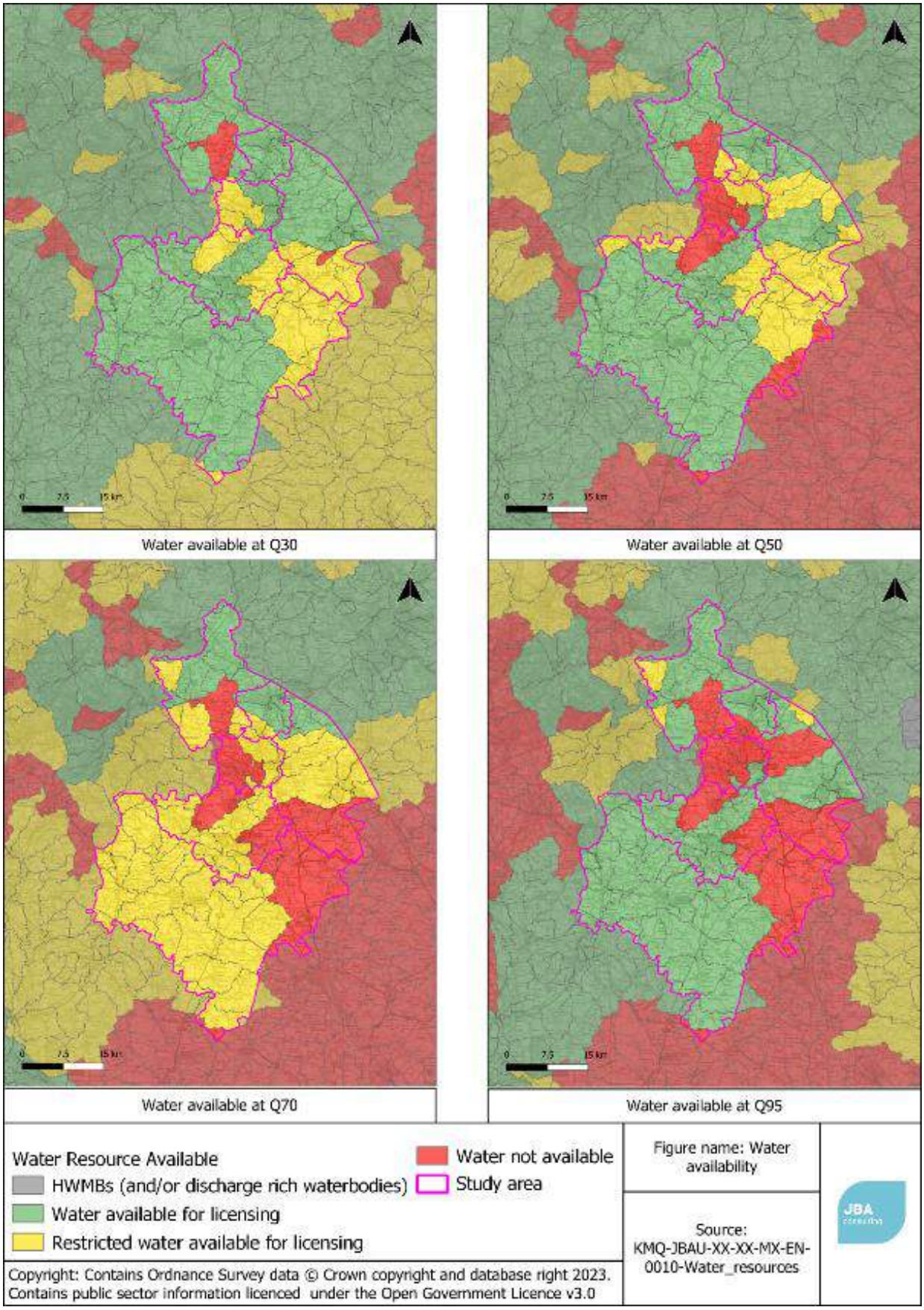

Figure 4-5 Water resources available in the sub-region.

4.4 Water Resource Assessment: Water Resource Management Plans

4.4.1 Introduction

205. When new development within an LPA is being planned, it is important to ensure that there are sufficient water resources in the area to cover the increase in demand without risk of shortages in the future or during periods of high demand.

206. The water resources assessment has been carried out utilising two approaches; initially by reviewing the Water Resource Management Plans (WRMPs) of Severn Trent Water and South Staffordshire Water (the revised draft WRMP24 was reviewed in both cases), and secondly by providing the water companies with growth scenarios for each settlement allowing them to assess each settlement and the housing yields proposed.

207. Water Resource Zones (WRZs) in the sub-region are shown in Figure 4-6. STW's Strategic Grid covers most of the study area, with a small section of the north covered by SSWs Company Wide WRZ.

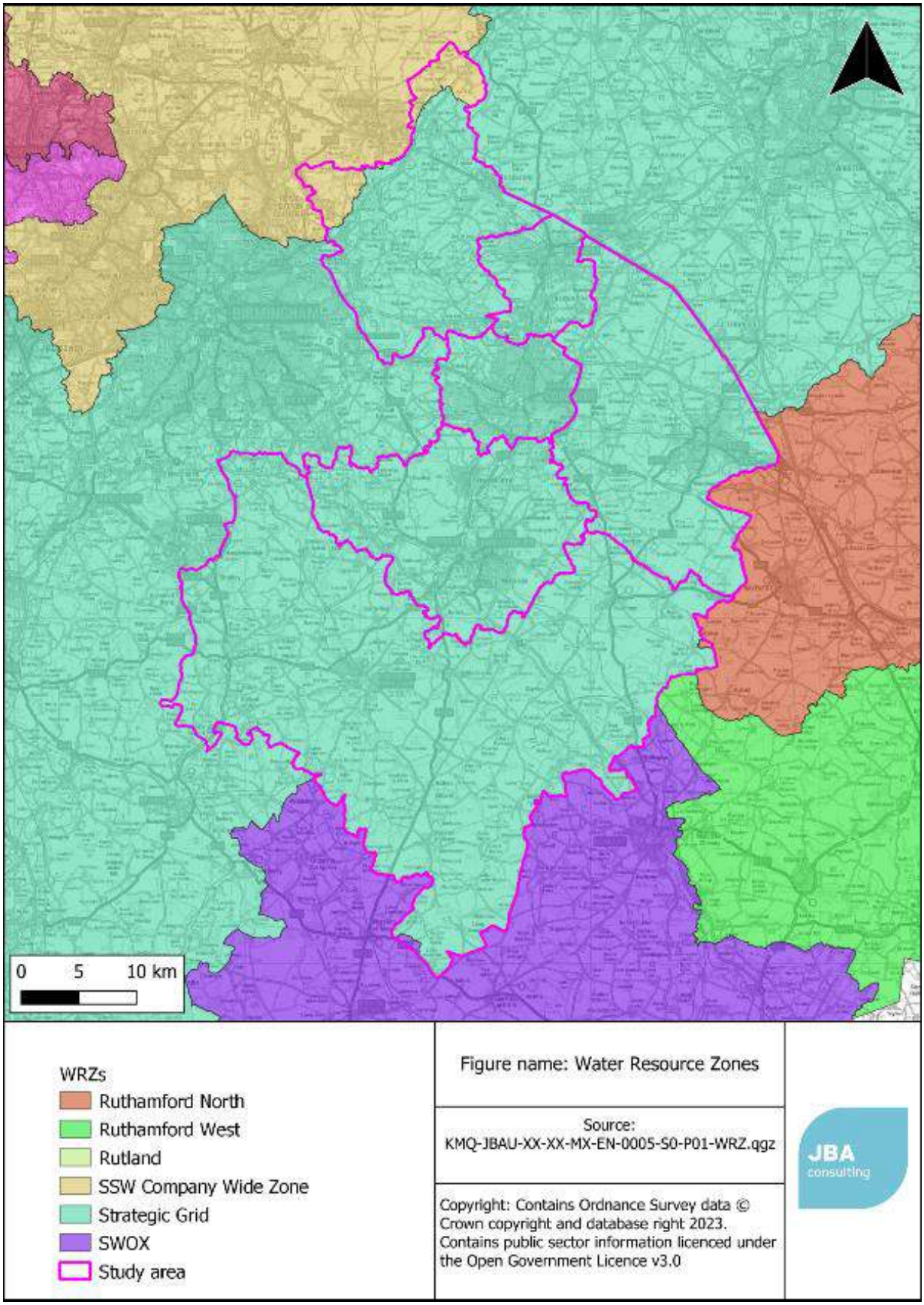

Figure 4-6 WRZs in the sub-region.

208. The sub-region is predominantly covered by the Strategic Grid WRZs which is managed by Severn Trent Water. To the north of the study area, a small area is covered by the SSW Company Wide Zone, which is managed by South Staffordshire Water. The bordering WRZ to the south is Ruthamford North managed by Anglian Water (AW), and the bordering WRZ to the southwest is Swindon and Oxfordshire (SWOX) managed by Thames Water (TW). Both AW and TW zones overlap slightly with the study area as seen in Figure 4-6. No sites in Stratford-on-Avon fall within the AW section of the study area. One site (21/02995/LDP, with just one dwelling proposed) from Stratford-on-Avon falls into the TW overlap of the study area.

4.4.2 Methodology

209. The spatial boundaries for each water company's water resource zones were used to overlay the Local Authority boundaries. Severn Trent Water and South Staffordshire Water's WRMPs were reviewed. Attention was mainly focussed upon:

- The available water resources and future pressures which may impact upon the supply element of the supply/demand balance.
- The allowance within those plans for housing and population growth and its impact upon the demand side of the supply/demand balance.

210. It should be noted that the WRMPs are still at a draft stage and water companies have not been given permission to publish a final version Defra. Any measures outlined in the WCS are therefore subject to change. The final versions will be reviewed in the Stage 2 study.

4.5 Water Resource Management Plans

4.5.1 Severn Trent Water

211. The revised draft WRMP24 was published in Autumn 2023 (Severn Trent Water, 2023), and their final WRMP24 is expected early in 2024. The stage 1 WCS has therefore reviewed the revised draft, and the final WRMP24 will be reviewed in Stage 2 and any changes reported.

212. STW's water resource for their overall area comes from a mix of reservoirs (40%), rivers (32%) and groundwater (28%). The Strategic Grid WRZ is stated as one of the WRZs which could be most affected by the changing climate with a vulnerability rating of 'high' (STW, 2024). Challenges identified in the dWRMP24 are:

- growing population (leading to an increase in water demand)
- leakages (requirement to reduce leakage by 50% by 2050)
- sustainable abstraction
- delivering the best value plan for customers and the environment

213. In STW's WRMP24 revised draft, there is a focus on demand management, leakage reduction, and achieving value for customers and climate change. Demand reduction activities include smart metering, home efficiency checks, school pop up sessions and a target to reduce per capita consumption to a mean of 110 l/p/d throughout their WRZ by 2050. Severn Trent are currently surpassing leakage targets and are predicting they will achieve a 50% reduction by 2045. There is also a focus on sustainable abstraction and ensuring the environment is protected.

214. The revised dWRMP24 contains an adaptive plan where if population is growing faster than expected an alternative pathway could be triggered and different suite of options delivered. This will explored further in the Stage 2 WCS once the final WRMP24 has been published.

215. The Strategic Grid Zone WRZ that covers part of the study area is STW's largest WRZ. The baseline supply and demand projections show the Strategic Grid Zone WRZ is predicted to be in a deficit from 2029 to the end of the projections in 2085.

216. In order to meet the deficit, supply schemes are developed as part of the WRMP process alongside demand reduction.

217. From AMP8 (2025-2030) the largest two schemes planned are transfers out of the Strategic Grid WRZ to support other WRZs (which therefore do not benefit the Strategic Grid WRZ). This is supported by an expansion of multiple Water Treatment Works (WTWs) alongside an increase in output of others. Programmes of leakage reduction and water efficiency are also planned aimed at reducing demand for future growth in STW's supply zone.

218. Details of STW's preferred water resource programme from the revised dWRMP24 for AMP8 can be seen in Table 4-2 (Severn Trent Water, 2023). These are still under review.

Table 4-2 Severn Trent Water preferred water resource programmes in AMP8.

Scheme name	Benefit (million litres per day)
Transfer from Strategic Grid to Notts	30
Carsington to Tittesworth transfer	30
United Utilities Vyrnwy release to River Severn	25
Expand Strensham Water Treatment Works	15
Expand Draycote Reservoir (Rugby)	9.5
Increase output from Little Eaton Water Treatment Works	5

Strategic Resource Options

219. STW's WRMP also presents longer term Strategic Resource Options (SROs). There are five main SROs presented by STW. Several of them are interconnected and rely on infrastructure or water resources from other water companies to be successful. The five SROs are presented in Table 4-3. The SROs are intended to help achieve a supply-demand balance alongside other actions mentioned above. These options are still under review.

Table 4-3 Strategic Resource Options for STW

Strategic Resource Option (SRO)	Details
Severn to Thames Transfer	This would mean a water transfer between Thames Water (TW) and STW. It would also include United Utilities due to the need to move water from Wales, the North West, and other areas in the Midlands into the STW region.
Minworth	Minworth is a raw water source that will support either the Severn to Thames Transfer SRO or the Grand Union Canal SRO (Severn Trent Water b, 2023).
The Grand Union Canal	STW are working with Affinity Water and the Canal and Rivers Trust to look at the possibilities of transferring water using the existing canal infrastructure to transport treated water from Minworth in the Midlands to Affinity Water in Hertfordshire and North West London (Severn Trent Water c, 2023). A significant length of the scheme runs through the study area but will not supply Warwickshire.

Strategic Resource Option (SRO)	Details
Severn Trent Sources	This option aims to increase sources of raw water and will support the Severn to Thames Transfer SRO.

4.5.2 South Staffordshire Water

220. Key objectives in the revised dWRMP24 are:

- To deliver sustainable and resilient water supply for both household and non-household customers.
- Aim to reduce the amount of water abstracted from the environment.
- Identify long term uncertainties such as climate change.
- To be affordable for customers.

221. The water industry as a whole aims to meet the public interest commitments (PICs) and Government targets relating to demand management, which are:

- 9% reduction in non-household consumption by 2038
- Reduce PCC to 110 l/h/d by 2050
- 50% leakage reduction by 2050
- 20% reduction of distribution input per capital by 2038

222. SSW preferred plan aims to achieve or exceed the above government targets.

223. SSW considered the following supply options:

- Increasing size of existing reservoirs
- New surface water sources
- Water transfers
- Licence trades
- Potable imports
- New reservoirs

224. The proposed plan only requires demand management options to address future supply deficits. This is planned to be achieved through:

- Universal smart metering & smart networks
- Water labelling - no minimum standards
- 50% Leakage reduction by 2050
- PCC to 110 l/h/d by 2050

- 9% Non-household consumption reduction by 2037

225. Key enablers for this delivery are:

- Delivery of the Government's water labelling scheme for white goods by 2025
- Universal metering installed across the region by 2035

226. SSW plan to report the progress of their demand management to the environment agency annually, to OFWAT and their internal groups regularly. If delivery is found to be off track, there is a procedure in place to identify and address the reasons to bring it back on track.

227. Their programme aims to deliver 67 Ml/d reduction in demand by 2049/50. This offsets the growth in demand associated with population increases in their region, and abstraction reform to protect the environment. Therefore, there is no need for supply options within this planning cycle. There was no need for an adaptive plan as none of the scenarios tested created a deficit in the planning period. (SSW, 2023)

4.5.3 Thames Water

228. SWOX, also known as the Swindon and Oxfordshire WRZ covers a very small part to the south of the study area. The SWOX area in the Thames Valley area is supplied by 60% groundwater and 40% surface water. The climate change vulnerability assessment carried out by TW shows London and SWOX are high risk (Thames Water g, 2023). This means that deployable output should be increased to ensure there is sufficient water for the growing population. Water efficiency should also be taken into consideration.

229. The annual leakage reduction for SWOX, the area that covers the study area was 68.75 Ml/d between 2021-22 (Thames Water f, 2023). TW hope to increase their leakage reduction by 20% by 2025 (Thames Water e, 2023).

230. There are three main options for SROs in for the SWOX region, these are:

- Raw Water Transfer (resource) (capacity of 15 Ml/d over several sites)
- Raw Water Transfer (conveyance) (capacity of 15 Ml/d over several sites)

- New Reservoir

231. More information can be found here, on page 47.

4.6 Water Industry National Environment Programme Measures

232. The Water Industry National Environment Programme (WINEP) is a set of actions that the EA have requested all 20 water companies operating in England to complete in a particular Asset Management Period (AMP) as part of their environmental commitments. Actions may include investigations or actual measures, examples could be reductions in abstraction in a particular river to maintain flow to support WFD objectives, or a reduction in phosphate pollution in a catchment through upgrades to a WwTW.

233. Appendix A.5 shows WINEP actions relating to water resources in surface waterbodies in the sub-region. Actions relating to water quality are presented in section 8 (Water Quality).

234. Development and population growth can increase abstraction, and so the LPAs within the sub-region have an opportunity to contribute to these actions indirectly by pursuing policies that promote water efficiency in new development.

4.7 Regional plan

4.7.1 Water Resource West (WRW) emerging regional plan.

235. The sub-region is within the Water Resources West (WRW) regional water resources planning group. WRW have published their Draft Regional Plan for the West of England which covers 2025-2085 (Water Resources West a, 2022). WRW relies on several major rivers such as the Severn, Dee, Trent, and Wye to supply 17 million people as well as agriculture and businesses.

236. Figure 4-7 has been taken from the WRW website to illustrate the future demand for water within the area. It shows the various challenges facing the region, including the volume of additional water required to serve growth in their region. The largest number on the diagram is the 621Ml/d that is required to meet the needs of the environment. This includes sustainability reductions where water companies are required to reduce abstraction in order to maintain river flows / groundwater levels to maintain or enhance the environment. The regional plan also contains the requirement to achieve a 50% reduction leakage (from a 2017/18 baseline) by 2050 and the ambition to achieve 110 litres per person per day across the region by 2050.

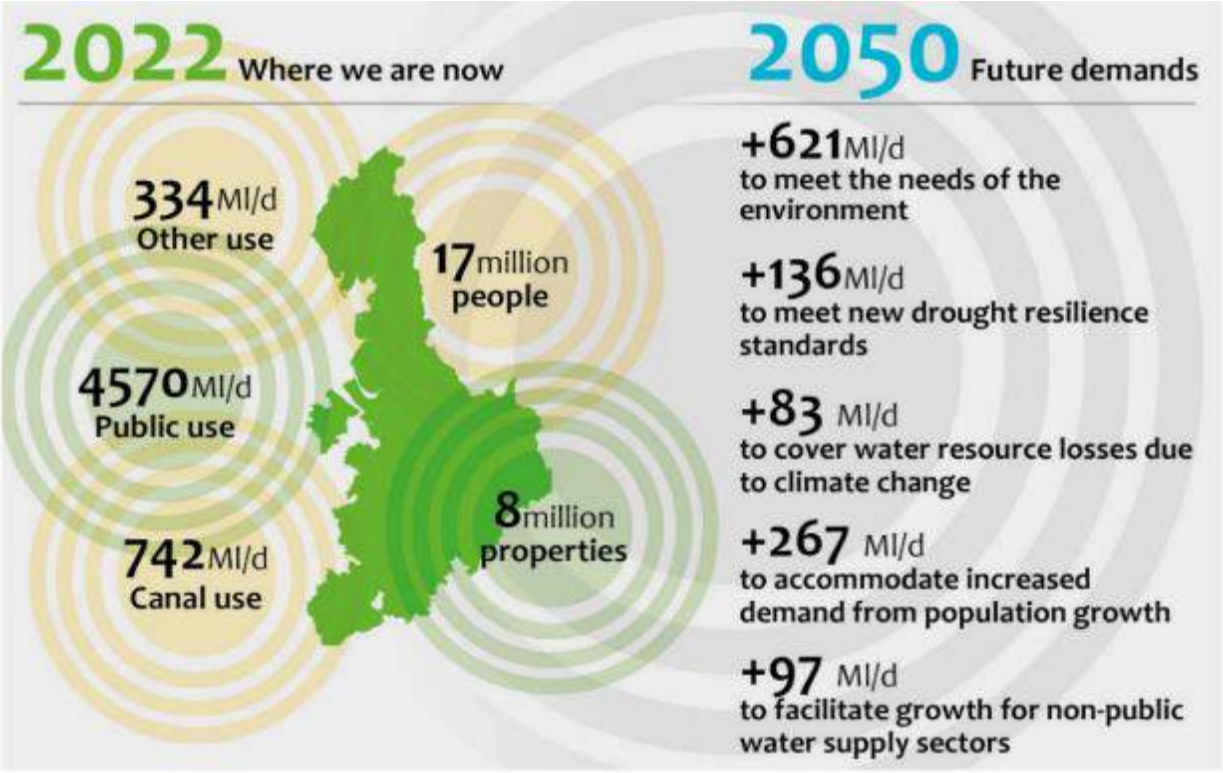

Figure 4-7 Future demands within the Water Resources West demand zone (Water Resource West b, 2022)

237. Within the draft regional plan some of the biggest non-public uses in the area are chemicals, agriculture, and power. Issues such as over abstraction, pollution, and degradation of habitats make it difficult for some watercourses in the area to achieve 'good ecological status' under the WFD. WFD status is further discussed in Section 8.3.1.

238. A further 224Ml/d is required to meet the new drought standards, with baseline forecasts for the Strategic Grid WRZ show that in a 1 in 500-year drought scenario there will be a large deficit.

239. The regional plan contains the full list of actions across the five water companies in the region, but the actions can be summarised as follows:

- Action to reduce daily water demand by over 900 million litres across the whole region. This figure includes the government introducing water labelling which is expected to save 280 million litres per day as well as home and non-household water efficiency visits, compulsory metering in certain areas, smart metering, and leakage reduction.
- Severn Trent Water are expected to deliver a large number of supply options to offset abstraction reduction including the options outlined in Table 4-2.
- United Utilities developing new water resources in the north west to support water transfers
- Welsh Water upgrading the network in South East Wales and recovering losses from water treatment works.
- A range of options to improve water quality and improve habitats such as wetland creation and engagement with farmers to offer advice and intervene to improve water quality.

4.7.2 Summary

240. The sub-region relies on several water resources from surface and groundwater. At Q30 most of the study area has water available for licensing, whereas at Q70 the majority has restricted water available for licensing. Within several GWMUs within the Tame, Anker and Mease ALS have no water available for licensing crating additional pressure on water resources from the growing population. Within the Warwickshire Avon ALS surface water resources are available at least 70% of the time yet several GWMUs have restricted water available for licensing, as well as GWBs with poor quantitative status and at risk of deterioration. Both ALSs would benefit

from an increase in water resources to manage the predicted future growth of population.

241. Most of the study area is covered by the Strategic Grid WRZ, managed by Severn Trent Water. A small section to the north is covered by SSW Company Wide Zone which is managed by South Staffordshire Water Company. Ruthamford North is a neighbouring WRZ outside of the study area managed by Anglian Water.

242. STW have several detailed SROs including new reservoirs and transfers. If carried out, this would help increase overall resources to the study area.

243. Within STW's dWRMP24, there is a focus on leakage reduction, increasing population, value for customers and climate change. Subsequently, home checks and water transfers were presented as actions to increase the visibility of leakages as well as demand reduction activities to serve the growing population.

244. Within SSWs dWRMP24, it notes two upgrades of surface water treatment works to increase water resources to customers. There is also a goal to decrease overall water consumption within their management area by 2050. This is to be done by, but not limited to, metering and home efficiency visits.

245. The WRW regional plans present the pressures of a growing population on water resources and goals to manage this such as leakage reduction and increasing resources options. Resilience to drought is also mentioned in WRWs report, with new supplies and transfers being put in place to increase resilience.

4.8 Water efficiency and water reuse

4.8.1 Introduction

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

247. It is for Local Authorities to establish a clear need to adopt the tighter water efficiency target through the building regulations. This should be based on existing sources of evidence such as:

- the Environment Agency classification of water stress;
- Water Resource Management Plans produced by water companies;
- River Basin Management Plans which describe the river basin district and the pressure that the water environment faces. These include information on where water resources are contributing to a water body being classified as ‘at risk’ or ‘probably at risk’ of failing to achieve good ecological status, due to low flows or reduced water availability;
- Defra Plan for Water;
- consultations with the local water and sewerage company, the Environment Agency and catchment partnerships; and
- consideration of the impact on viability and housing supply of such a requirement.

248. This evidence is laid out in the sections below.

249. Within Part G of the Building Regulations, the water efficiency target of 110l/p/d can be achieved either through the calculation method or the fittings approach. It is strongly recommended that the fittings-based approach is required. This approach provides clear flowrate and volume metrics for each

fitting or appliance. This provides a greater confidence that the 110l/p/d target will be met once constructed. Insight gained from a recent Thames Water study of customers with smart meters showed that where the calculation method was applied, households did not achieve the intended performance levels.

4.8.2 Water Stress

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

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

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

252. The Severn Trent Water (excluding Chester) and South Staffs region is now water stressed according to the 2021 classification of Water Stressed Areas.

4.8.3 River Basin Management Plans

253. One of the challenges identified in the River Basin Management Plan (RBMP) for the Severn Basin is alterations to “natural flow levels of water”. As for the Humber Basin, 'physical modifications' and 'pollution from rural areas' are raised as reasons for waterbodies not achieving good status.

254. The management recommendations from both RBMP’s are listed below:

- Government and agencies (Environment Agency) grant licences under the Water Resources Act 1991 to regulate how much water is taken from rivers, lakes estuaries and groundwater. The Environment Agency reviews the sustainability of time-limited abstraction licences as they expire, and the licence holders seek replacement licences.

- All sectors take up or encourage water efficiency measures, including water industry work on metering, leakage, audits, providing water efficient products, promoting water efficiency and education.
- Local Government sets out Local Plan policies requiring new homes to meet the tighter water efficiency standard of 110 litres per person per day as described in Part G of Schedule 1 to the Building Regulations 2010.
- Industry manufacturing and other business implement tighter levels of water efficiency, as proposed by changes to the Building Regulations.
- Agriculture and rural land management manage demand for water and use water more efficiently to have a sustainable water supply for the future.
- Local government commissions water cycle studies to inform spatial planning decisions around local water resources.
- The RBMP goes on to state that:
  "dealing with unsustainable abstraction and implementing water efficiency measures is essential to prepare and be able to adapt to climate change and increased water demand in the future."

4.8.4 Defra Plan for Water

255. Through their Plan for Water (Defra, 2023), Defra have signalled their intention to review the water efficiency standards for new homes, including consideration of a new national 105l/p/d standard and 100l/p/d where there is a clear local need.

4.8.5 National Water Resources Framework

256. A National Framework for Water Resources was published by the Government in March 2020. The framework can be found here. This outlines the water resources challenges facing England and sets out the strategic direction for the work being carried out by regional water resource groups.

257. A range of options were explored, and the most ambitious scenarios rely on policy change to introduce mandatory labelling of water using fittings and associated standards. The Government is currently reviewing policy on water efficiency following a recent consultation. The framework proposes that regional groups plan to help customers reduce their water use to around 110 l/p/d. This is achievable without policy interventions.

258. This aligns with the tighter standard of 110 l/p/d per day as described in building regulations. However, to achieve an average of 110 l/p/d across the UK, including existing housing, a water efficiency target for new build housing of 110 l/p/d or higher would make this harder to achieve. New build housing should therefore be lower than 110 l/p/d.

259. Some Local Authorities are now going further than building regulations, such as Crawley Borough Council which has a policy of 85l/p/d in their Local Plan as it is within a water neutrality area. Greater Cambridge is also considering a water efficiency target of 80l/p/d in their emerging Local Plan.

4.8.6 Impact on viability

260. As outlined in section 3.3.4, the cost of installing water-efficient fittings to target a per capita consumption of 110l/d has been estimated as a one-off cost of £9 for a four-bedroom house. Engagement with developers and information from Defra that emerged as part of the Sussex North Water Neutrality Strategy indicated that a target of 100l/p/d could be achieved with "minimal additional cost" (JBA Consulting, 2022). Research undertaken for the devolved Scottish and Welsh governments indicated potential annual savings on water and energy bills for householders of £24-£64 per year because of such water efficiency measures. Water efficiency is therefore not only viable but of positive economic benefit to both private homeowners and tenants. In addition, financial incentives are available from the water companies to developers to encourage water-efficient design. As outlined in 3.5.5 , STW offer an incentive of a £380 reduction in the connection charge where development achieves 100l/p/d or less.

261. Research published by BRE (BRE, 2018) on the delivery of sustainable buildings reports that the cost of achieving lower BREEAM ratings incurs little or no additional cost and targeting higher BREEAM ratings incurs a typical cost of less than 2% above the baseline. The same study reports that the cost of achieving 4 credits in WAT01 (a 50% reduction in water consumption for baseline) would be £18,244 and payback could be achieved between 1 and 3 years depending on the price of water.

4.8.7 Energy and water use

262. 18% of the UK's domestic energy usage is for water heating (Department for Energy Security and Net Zero, 2022). If less water was being used within the home, for instance through more water efficient showers, less water would need to be heated, and overall domestic energy usage would be reduced.

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

4.9 Water neutrality

4.9.1 Water neutrality concept

264. Water neutrality is a relatively new concept for managing water resources, but one that is receiving increased interest as deficits in future water supply/demand are identified. The definition adopted by the Government and the Environment Agency is:

> "For every development, total water use in the wider area after the development must be equal to or less than total water use in the wider area before development". (Environment Agency b, 2009).

265. It is useful to also refer to the refined definition developed by Ashton:

> "For every new significant development, the predicted increase in total water demand in the region due to the development should be offset by reducing demand in the existing community, where practical to do so, and these water savings must be sustained over time" (Booth and Charlesworth, 2014).

266. This definition states the need to sustain water saving measures over time, and the wording "predicted increase in total water demand" reflects the need for water neutrality to be designed in at the planning stage.

267. Both definitions refer to water use in the region or “wider area”, and the extent of this area should be appropriate to Local Authority boundaries, water resource zones, or water abstraction boundaries depending on what is appropriate for that location. For instance, if a development site is in an area of water stress relating to a particular abstraction source, offsetting water use in a neighbouring town that is served by a different water source will not help to achieve water neutrality.

268. In essence water neutrality is about accommodating growth in a region without increasing overall water demand.

269. Water neutrality can be achieved in several ways:

- Reducing leakage from the water supply networks.
- Making new developments more water-efficient.
- “Offsetting” new demand by retrofitting existing homes with water-efficient devices.
- Encouraging existing commercial premises to use less water.
- Implementing metering and tariffs to encourage the wise use of water.
- Education and awareness-raising amongst individuals.

270. The following sections outline potential measures to either achieve water neutrality, or to achieve higher levels of water efficiency.

4.9.2 Consumer water efficiency

271. Demand management is a critical part of reducing overall water use and forms a key part of STW and SSW's WRMPs. Table 4-4 lists consumer water efficiency measures that could be implemented by a variety of stakeholders such as consumers, or developers. Many interventions are designed to reduce water use if operated in a particular way, and so rely on the user being aware and engaged with their water use. The educational aspect is therefore important to ensure that homeowners are aware of their role in improving water efficiency.

Table 4-4 Consumer water-efficiency measures

Category	Water efficiency measures
Education and promotional campaigns	Encourage community establishments (e.g., schools, hospitals) to carry out self-audits on their water use. Deliver water conservation message to schools and provide visual material for schools. Building awareness with homeowners/tenants
Water-efficient measures for toilets	Cistern displacement devices to reduce volume of water in cistern. Retro-fit or replacement dual flush devices Retro-fit interruptible flush devices Replacement low-flush toilets
Water-efficient measures for taps	Tap inserts, such as aerators. Low flow restrictors Push taps Infrared taps
Water-efficient measures for showers and baths	Low-flow shower heads Aerated shower heads Low-flow restrictors Shower timers Reduced volume baths (e.g., 60 litres) Bath measures
Rainwater harvesting and water reuse	Large-scale rainwater harvesting Small-scale rainwater harvesting for example with a water butt, or rainwater tank for toilet flushing. Grey water recycling
Water-efficient measures addressing outdoor use	Hosepipe flow restrictors Hosepipe siphons Hose guns (trigger hoses) Drip irrigation systems Mulches and composting
Commercial properties	Commercial water audits Rainwater recycling Grey water recycling Optimising processes Provide water efficiency information to all newly metered businesses
Metering	Promote water companies' free meter option. Compulsory metering (in water stressed areas) Smart metering (to engage customer with their consumption) Provide interactive websites that allow customers to estimate

Category	Water efficiency measures
	the savings associated with metering (environmental and financial). Innovative tariffs (seasonal, peak, rising block). Customer supply pipe leakage - supply pipe repair and replacement
Other	Household water audits, including DIY or with help of plumber. Seek-and-fix internal leaks and/or dripping taps. Water efficient white goods included washing machines and dishwashers. Ask customers to spot and report leaks

Source: Adapted from Booth and Charleswell 2014.

4.9.3 Rainwater Harvesting and Greywater Recycling

Rainwater Harvesting

272. Rainwater recycling or rainwater harvesting (RwH) is the capture of water falling on buildings, roads or pathways that would normally be drained via a surface water sewer, infiltrate into the ground or evaporate. In the UK this water cannot currently be used as a drinking water supply as there are strict guidelines on potable water, but it can be used in other systems within domestic or commercial premises.

273. Systems for collection of rainwater can be simple water butts attached to a drainpipe on a house, or it could be a complex underground storage system, with pumps to supply water for use in toilet flushing and washing machines. By utilising rainwater in this way there is a reduced dependence on mains water supply for a large proportion of the water use in a domestic property.

Benefits of Rainwater Harvesting

274. RwH reduces the dependence on mains water supply – reducing bills for homeowners and businesses.

275. Less water needs to be abstracted from river, lakes, and groundwater.

276. Stormwater is stored in a RwH system reducing the peak runoff leaving a site providing a flood risk benefit (for smaller storms).

277. By reducing surface water flow, RwH can reduce the first flush effect whereby polluted materials adhering to pavement surfaces during dry periods are removed by the first flush of water from a storm and can cause pollution in receiving watercourses.

Challenges of RwH

278. Dependency on rainfall can limit availability of harvested rainwater during drought and hot weather events.

279. Increased capital (construction) costs to build rainwater harvesting infrastructure into new housing (£900 to £3,000 for a small scale domestic system) (Waterwise, 2020).

280. Payback periods are long as the cost of water is low so there is little incentive for homeowners to invest. Further information available here.

Greywater Recycling

281. Greywater refers to water that has been “used” in the home in appliances such as washing machines, showers, and hand basins. Greywater recycling (GwR) is the treatment and re-use of this water in other systems such as for toilet flushing. By their nature, GwR systems require more treatment and are more complex than RwH systems, and there are limited examples of their use in the UK.

282. Greywater re-use refers to systems where wastewater is taken from source and used without further treatment. An example of this would be water from a bath or shower being used on plants in the garden. This sort of system is easy to install and maintain, however as mentioned above the lack of treatment to remove organic matter means the water cannot be stored for extended periods.

283. Greywater recycling refers to systems where wastewater undergoes some treatment before it is used again. These systems are complex and require a much higher level of maintenance than RwH or greywater re-use systems.

284. Domestic water demand can be significantly reduced by using GwR, and unlike with a RwH system where the availability of water is dependent on the weather, the source of water is usually constant (for instance if it is from bathing and showering). However, the payback period for a GwR system is usually long, as the initial outlay is large, and the cost of water relatively low. Viability of greywater systems for domestic applications is therefore currently limited. Communal systems may offer more opportunities where the cost can be shared between multiple households.

4.9.4 Funding for water neutrality

285. Water neutrality is unlikely to be achieved by just one type of measure, and likewise it is unlikely to be achieved by just one funding source. Funding mechanisms that may be available could be divided into the following categories:

- Infrastructure-related funding (generally from developer payments)
- Fiscal incentives at a national or local level to influence buying decisions of households and businesses.
- Water company activities, either directly funded by the five-year price review or as a consequence of competition and individual company strategies.
- Joint funding through energy efficiency schemes (and possibly to integrate with the heat and energy saving strategy).

286. Currently in the UK, the main funding resource for the delivery of water efficiency measures is the water companies, with some discretionary spending by property owners or landlords. For water neutrality to be achieved, policy shifts may be required in order to increase investment in water efficiency. Possible measures could include:

- Further incentivisation of water companies to reduce leakage and work with customers to reduce demand.
- Require water efficient design in new development.
- Developer funding to contribute towards encouraging water efficiency measures.
- Require water efficient design in refurbishments when a planning application is made.
- Tighter standards on water using fittings and appliances, including a mandatory labelling scheme for water appliances.

4.10 Summary

287. There is sufficient evidence to recommend the optional 110 litres per person per day design standard allowed under Building Regulations. This should be supported by an equivalent non-household water efficiency target. The BREEAM New Construction Standard can be used for this. In reviewing the draft Stage 1 WCS, the Environment Agency have welcomed the use of BREEAM standards for non-residential development alongside building regulations for new homes. They recommend that non-residential development over 1000sqm achieve the BREEAM "excellent" standard for water consumption where water resources are under pressure. This represents 4 credits under the measure "Wat01" and provides a 50% improvement in water consumption compared to the baseline for that type of building.

288. Water resources are under significant pressure in the UK, and the direction of travel in water resources planning is to reduce per capita consumption in new build development below the optional building regulations standard of 110 l/p/d. Given the evidence of pressures on the environment, and on public water supply, it is recommended that the Councils consider a domestic water efficiency target of 100l/p/d for all new homes, in line with proposals in the Defra Plan for Water, and works with the water suppliers to incentivise even lower consumption.

289. The Environment Agency have stated that they support going further than the optional target in Building Regulations.

290. The water efficiency target adopted should be achieved via the fittings-based approach outlined in Part G of Building Regulations.

291. Overall, a lack of water resources is a future challenge within the study area. Actions such as water reuse, water efficiency measures and water metering can help lower water use and maximise the water resources available.

4.11 Recommendations

Table 4-5 Water resources and water supply recommendations.

Action	Responsibility	Timescale
Continue to regularly review forecast and actual household growth across the supply region through WRMP Annual Update reports, and where significant change is predicted, engage with Local Planning Authorities. This should also include non-household demand.	STW, SSW	Ongoing
Provide yearly updates of projected housing growth to water companies to inform the WRMP update.	All LPAs	Ongoing
Use planning policy to require a water efficiency target of 100l/pd to be achieved using a fittings-based approach.	All LPAs	In LPs
Use planning policy to require new build non-residential development greater than 1000sqm to achieve at least 4 credits in the Wat01 Measure for water in the BREEAM New Construction standard.	All LPAs	In LPs
The concept of water neutrality has the potential to provide a benefit in improving resilience to climate change and enabling all waterbodies to be brought up to Good status. Explore further with the water companies and the Environment Agency how the Council's planning and climate change policies can encourage this approach. This approach could have application in strategic sites.	All LPAs, EA, STW, SSW	In LPs and Climate Change Action Plan
Larger residential developments (including new settlements), and commercial developments should consider incorporating greywater recycling and/or rainwater harvesting into development at the master planning stage to reduce water demand.	All LPAs, STW, SSW	In LPs
Water companies should advise all LPAs of any strategic water resource infrastructure developments within the study, where these may require safeguarding of land to prevent other type of development occurring.	All LPAs, STW, SSW	Part of LP process

5 Water Supply Infrastructure

5.1 Introduction

292. An increase in water demand adds pressure to the existing supply infrastructure. This is likely to manifest itself as low pressure at times of high demand. An assessment is required to identify whether the existing infrastructure is adequate or whether upgrades will be required. The time required to plan, obtain funding, and construct major pipeline works can be considerable and therefore water companies and planners need to work closely together to ensure that the infrastructure is able to meet growing demand.

293. Water supply companies make a distinction between supply infrastructure, the major pipelines, reservoirs, and pumps that transfer water around a WRZ, and distribution systems, smaller scale assets which convey water around settlements to customers. This study is focused on the supply infrastructure. It is expected that developers should fund water company impact assessments and modelling of the distribution systems to determine requirements for local capacity upgrades to the distribution systems as part of the planning process.

294. In addition to the work undertaken by water companies, there are opportunities for the local authority and other stakeholders to relieve pressure on the existing water supply system by increasing water efficiency in existing properties. This can contribute to reducing water consumption targets and help to deliver wider aims of achieving water neutrality.

295. A cost-effective solution can be for Local Authorities to co-ordinate with water supply companies and “piggy back” on planned leakage or metering schemes, to survey and retrofit water efficient fittings into homes (Waterwise, 2009). This is particularly feasible within property owned or managed by the Local Authorities, such as social housing. Once potential allocations are available, they will be provided to the water companies for a site by site assessment of the impact of these sites on their water supply network. This is recommended as part of a Stage 2 WCS.

5.2 Recommendations

Table 5-1 Water supply infrastructure recommendations

Action	Responsibility	Timescale
Undertake a site-by-site assessment of the impact of potential allocations on the water supply network as part of a Stage 2 WCS.	All LPAs STW SSW	Stage 2 WCS

6 Wastewater Collection

6.1 Sewerage Undertaker for the sub-region

296. Severn Trent Water are the main Sewerage Undertaker (SU) for the sub-region, Thames Water cover a small part of Stratford-on-Avon to the south of the study area. The role of sewerage undertaker includes the collection and treatment of wastewater from domestic and commercial premises, and in some areas, it also includes the drainage of surface water from building curtilages to combined or surface water sewers. It excludes, unless adopted by the SU, systems that do not connect directly to the wastewater network, e.g., SuDS or highway drainage.

297. Increased wastewater flows into collection systems due to growth in populations or per-capita consumption can lead to an overloading of the infrastructure, increasing the risk of sewer flooding and, where present, increasing the frequency of discharges from storm overflows. Seasonal and yearly variations in weather and infiltration can reduce headroom at WwTWs.

298. Likewise, headroom at Wastewater Treatment Works (WwTW) can be eroded by growth in population or per-capita consumption, requiring investment in additional treatment capacity. As the volumes of treated effluent rises, even if the effluent quality is maintained, the pollutant load discharged to the receiving watercourse will increase. In such circumstances the Environment Agency as the environmental regulator, may tighten consented effluent consents to achieve a "load standstill", i.e., ensuring that as effluent volume increases, the pollutant discharged does not increase. Again, this would require investment by the water company to improve the quality of the treated effluent. The WwTW catchments can be seen in Appendix A.4.

299. Areas not covered by catchments shown in Appendix A.4 may not have an existing public sewer system. Where this is the case, small developments in more rural areas may be suitable for on-site treatment and discharge, however the Environment Agency will not usually permit this where there is a public sewerage system within a distance calculated as 30m per dwelling from any part of the site boundary.

300. In combined sewerage systems, or foul systems with surface water connections, there is potential to create headroom in the system, thus enabling additional growth, by the removal of surface water connections. This can most readily be achieved during the redevelopment of brownfield sites which have combined sewerage systems, where there is potential to discharge surface waters via sustainable drainage systems (SuDS) to groundwater, watercourses, or surface water sewers.

6.2 Assessment of the Drainage and Wastewater Management Plans

6.2.1 Severn Trent Water DWMP

301. Severn Trent Water's DWMP (Severn Trent Water c, 2023) lays out 10 key ambitions which are summarised below in Table 6-1 and
302. Table 6-2. The six "Common Planning Objectives" are used by all water companies. The four opportunity indicators were designed to create greater value and synergy with STW's planning. Within the table, CA indicates a Company Ambition and ST indicates a Statutory Target.

Table 6-1 Common Planning objectives from DWMP

Ref.	Measure	Units	2020	2025	2050 Best Value Plan	2050 Ambition
CP01	Internal sewer flooding risk (CA)	Total number of internal sewer flooding incidents	780	563	611	Zero
CP02	Pollution risk (CA)	Number of category 1-3 pollution incidents	190	182	157	Zero
CP03	Sewer collapses risk (CA)	Number of sewer collapses	715	740	1076	Zero
CP04	Risk of sewer flooding in a 1 in 50-year storm (CA)	Percentage of properties at risk of sewer flooding in a 1 in 50-year storm	2.58%	2.58%	2.52%	Zero
CP05	Storm overflow performance (ST)	Storm overflows - more than 10 activations per year	1624	1544	Zero	Zero

Ref.	Measure	Units	2020	2025	2050 Best Value Plan	2050 Ambition
CP06	Risk of wastewater treatment works quality compliance failure (ST)	Permit compliance at WwTW	99.04%	99.07%	99.84%	Zero

Table 6-2 Opportunity Indicators from DWMP

Ref.	Measure	Units	Description
OI1	Supporting others with reduction of surface water, fluvial and groundwater flood risk	Reduction in the number of properties at risk of surface water and fluvial flooding	Maximise number of schemes which, through the delivery of co-created schemes, will support other risk management authorities with meeting post 2027 Flood and Coastal Erosion Risk Management (FCERM) targets.
OI2	Sustainable accommodation of future growth	Number of developments not connecting to a public foul sewer	Supporting local development plans and developers to negate the need for a 'right to connect' discharge of surface water from a new development into a public foul sewer.
OI3	Ensuring our critical wastewater assets remain resilient	Number of WwTW and major pumping stations not resilient to fluvial flooding, electricity failure and/or communication outages	Alignment of DWMP delivery strategies to ensure wastewater capacity interventions consider resilience of WwTW and major pumping stations to mitigate or reduce risk of asset failure associated with inundation from rivers, interruption to electricity supplies and/or communication outages.

Ref.	Measure	Units	Description
OI4	Supporting water resource water planning	Volume of surface water removed from the public sewers to offset ground river abstractions	Maximising opportunities whereby delivery of surface water management strategies undertaken as part of DWMP also support with offsetting groundwater and river abstraction constraints within Water Resource Management Plans (WRMP). This is approach aligns to ongoing discussions with the Environment Agency regarding the Idle and Torne abstraction and flooding catchment strategy.

303. There are 2,647 storm overflows in the Severn Trent Water region, and by 2050, 1,097 of them are predicted to be classed as high priority operating more than ten times per year (should no action be taken), which is above the national annual target. By 2040 STW aim to deliver all high priority improvements, and to reduce all overflows to fewer than 10 spills per annum by 2045 (Severn Trent Water l, 2024). More information on STW's storm overflow improvement work can be found in their DWMP. Reducing storm overflow operation can be achieved by upgrading WwTWs or the sewer network ensuring that storm overflows only operate in unusually heavy rainfall.

304. An assessment has been carried out using a Baseline Risk and Vulnerability Assessment (BRAVA) for a 1 in 50-year storm with various climate change scenarios taken into consideration (no temperature change, 2°C increase and 4°C increase). The scenarios looked at how many properties would be at risk of internal sewer flooding. Currently there are 112,000 properties at risk of internal flooding which amounts to 2.58% of connected properties in the Severn Trent region. If no upgrades to the network occur, by 2050 this percentage is expected to rise to 39% (155,998 properties), assuming a 2°C increase in global temperatures.

305. Within the PR24 plan Severn Trent have identified £1.1bn of investment on storm overflows, aimed at addressing 50% of high priority storm overflows to remove harm to waterbodies, bringing spills down to 10 in a typical year of rainfall and providing screens where required.

306. Maximising blue-green nature-based solutions was focussed on to work towards a more sustainable approach to reducing the inflow of surface water in the sewer network. The main solution for this was using SuDs.

307. Overall, there is a focus on reduction of storm overflow operations, upgrading WwTW and creating more sustainable water management options, such as SuDS.

308. Several LPAs included in this WCS lie within Severn Trent Waters Avon Strategic Planning Area (SPA). Within this catchment actions have specifically been laid out for Coventry. STW are assessing the potential for SUDS retrofitting projects within Coventry, to help manage the risks of climate change and increased extreme rainfall. This is supported by STWs 'Urban Catchment of the Futures' report where the Finham (Coventry) catchment has been identified as an area of focus for nature based solutions to reduce flood risk.

309. STW are also working to support the Sherbourne Valley Project, which seeks to rejuvenate the largely culverted River Sherbourne in Coventry (Severn Trent Water k, 2023). No specific actions have been laid out in the DWMP for the other LPAs mentioned in this report.

310. Several WwTWs that serve the sub-region have a short-term priority ranking from STW for sewer flooding in a 1 in 50-year storm from present day to 2050. Short-term priority means that immediate investigation is needed and is a short-term priority to improve performance. The WwTWs include Bedworth (Marston Lane), Ilmington, and Lighthorne. For Church Lawford WwTW sewer flooding is ranked as short-term priority for 2030-2050.

311. Lighthorne and Ilmington also have a short-term priority on storm overflows performance.

312. Cherington, Itchen Bank (Southam), Long Compton and Finham (Coventry) has a short-term priority ranking for "risk of wastewater treatment works quality compliance failure", this is applied from present day until 2050.

313. Further rankings for the Avon SPA can be found here. The ranking for the Trent Confluence SPA, which covers North Warwickshire and Nuneaton and Bedworth, can be found here.

6.3 Storm Overflows

314. Storm overflows are an essential component in the sewer network – however when they operate frequently, they can cause environmental damage. They occur on combined sewer systems where the sewer takes both foul flow (sewage from homes and offices) and rainwater runoff. In normal conditions all this flow passed through the sewer network and is treated at a wastewater treatment works, see Figure 6-1.

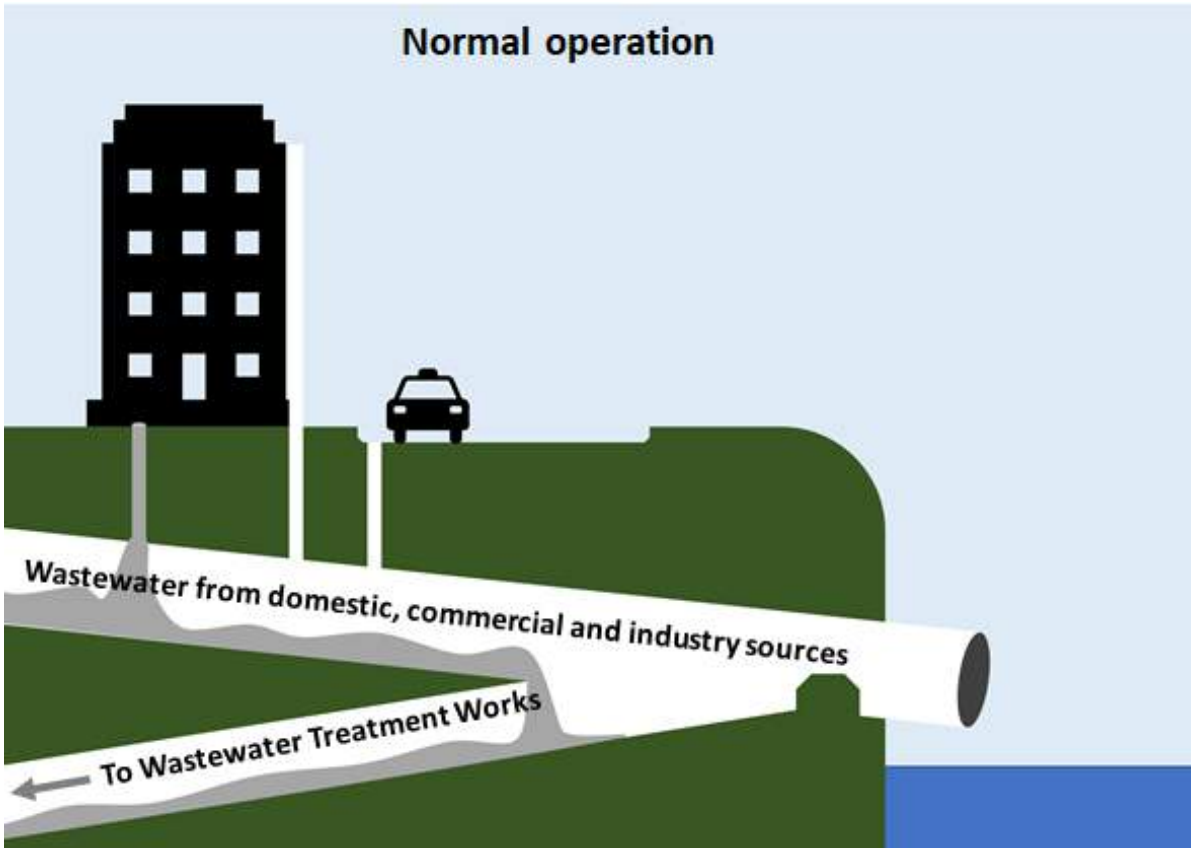

Figure 6-1 Storm overflow operation in normal conditions

315. In periods of exceptional rainfall, the capacity in a combined sewer may be used up by the additional flow from rooftops and storm drains, see Figure 6-2. Once the capacity is exceeded, wastewater would back up into homes, businesses and on to roads. A storm overflow acts as a relief valve, preventing this from happening.

316. Storm overflows can have a number of negative impacts on the environment, including aesthetic pollution, high biochemical oxygen demand (BOD) leading to oxygen depletion in the water, and high concentrations of unionised ammonia which is toxic to fish. They are also a pathway for toxic chemicals and micro-plastics present within sewage to enter waterbodies. Where water is used for swimming or watersports, they also convey bacteria and viruses.

317. Storm overflows are regulated under Environment Agency environmental permits, which typically set a minimum pass-forward flow which the sewerage system must convey before discharging to the environment, considering the domestic wastewater, trade wastewater and maximum infiltration flows present within the sewerage system. Storm overflows can become particularly problematic when they operate frequently in moderate or light rainfall, or for long periods as a result of high groundwater infiltration in the sewerage.

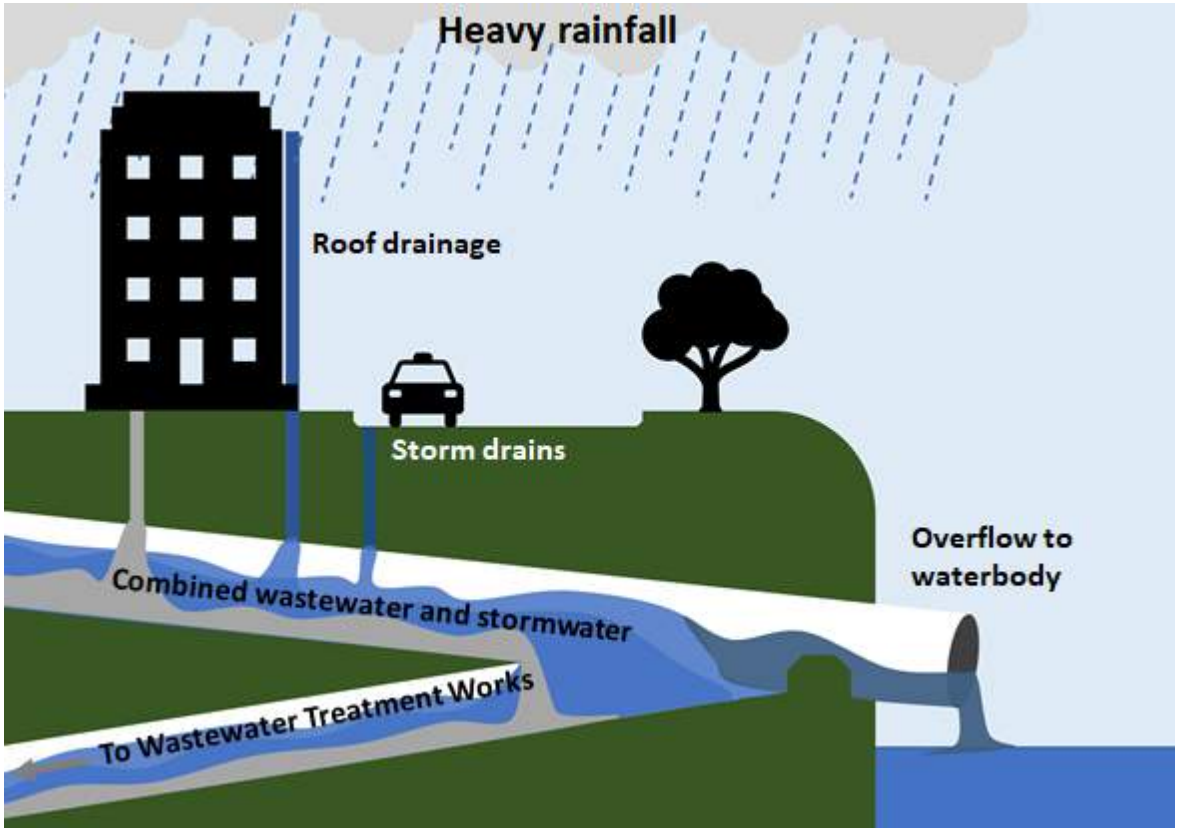

Figure 6-2 Storm overflow operation in exceptional rainfall

6.4 Methodology

6.4.1 Sewerage System Capacity Assessment

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

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

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

6.4.2 Storm overflow assessment

321. The Environment Act now requires water companies to report and monitor storm overflows as well as reduce the harm caused to the rivers they discharge to. Figure 6-3 below shows the location of storm overflows on the wastewater network.

322. The Storm Overflow Taskforce has agreed a long-term goal to end the damaging pollution caused by the operation of storm overflows. An important component of this is the monitoring of overflows, and a target has been set to monitor the frequency and duration of operation at all storm overflows by 2023. This is called Event Duration Monitoring (EDM). The EDM dataset (which contains performance data on the 16,639 storm overflows monitored in 2021) has been used to provide information on storm overflows in the sub-region. The EA have set thresholds above which a storm overflow should be investigated. Where there is one year of EDM data this should be if there are

over 60 operations per year, over 50 operations for two years of data and 40 operations for three years of data. We have included a maximum of 3 years of data in our assessment, where less years were available, we have applied the above corresponding threshold. Specifications of the RAG scores can be found in Table 6-3.

Table 6-3 Definition of RAG scoring applied.

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

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

324. The Storm Overflow Taskforce has agreed a long-term goal to end the damaging pollution caused by the operation of storm overflows (UK Government m, 2022). An important component of this is the monitoring of overflows, and a target has been set to monitor the frequency and duration of operation at all storm overflows by 2023. This is called Event Duration Monitoring (EDM). More information on EDM can be found here.

325. An overview of the network storm overflows that do not exceed the annual threshold from 2020-2022 can be found in Appendix A.6. Five of the network storm overflows exceed the annual threshold. Network storm overflows that exceeded the annual average (be it 2 or 3 year) are listed in Table 6-4.

326. Weston on Avon SPS has only one year of data with 56 spills (2021) which is close to the 60-spill annual threshold.

Table 6-4 Network storm overflows that exceed the annual threshold.

Name	Permit number	Operation durations in 2020 (hours)	Number of Operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Spill average*	RAG
ADJ. TYSOE STW - STM/EMERG O/F/	S/14/09255/O	566.14	66	477.20	60	426.79	73	66	Red
AUSTREY - WARTON LANE SPS (CSO)	EPRLB3493VK	No data	No data	2,933.2	240	1,126.0	193	216.5	Red
HASELOR - WALCOTE ROAD SPS	TSC3461	2,000.9	106	1,924.2	115	48.9	13	78	Red
OFF CHURCH HILL - STORM & EMERG	S/12/07742/O	1815.69	129	1693.37	106	1164.29	85	107	Red
WARTON - ORTON ROAD SPS	TBC/ TSC3577	132.8	38	320.2	63	No data	No data	47	Red

*With number of years available (2 or 3 years).

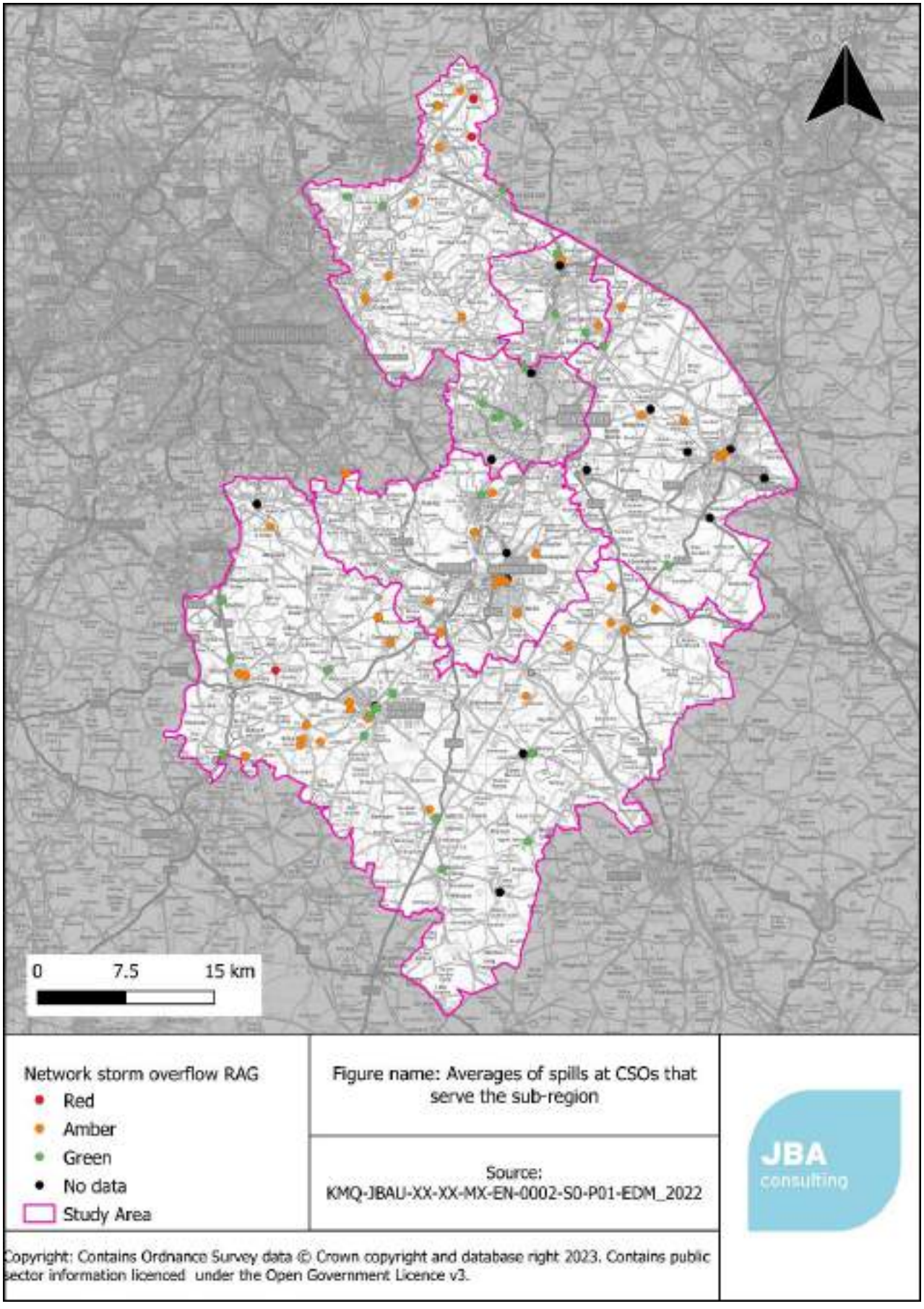

Figure 6-3 Averages of spills at storm overflows that serve sub-region.

6.5 Summary

327. Severn Trent Water are the sewage undertakers for the sub-region. A small area to the southwest of the study area is covered by Thames Water, which encompasses one site (21/02994/LDP).

328. Three storm overflows on the network exceeded the threshold for investigation by the EA (Austrey-Walcote Road SPS, Haselor - Walcote Road SPS and Warton- Orton Road SPS.

6.6 Recommendations

Table 6-5 Wastewater collection recommendations

Action	Responsibility	Timescale
Early engagement between the Councils and STW is required to ensure that where strategic infrastructure is required, it can be planned in by STW, and will not lead to any increase in discharges from sewer overflows.	All LPAs, STW, TW	Ongoing
Take into account wastewater infrastructure constraints in phasing development in partnership with the sewerage undertaker.	All LPAs, STW, TW	Ongoing
Developers will be expected to work with the sewerage undertaker closely and early in the planning promotion process to develop an Outline Drainage Strategy for sites. The Outline Drainage strategy should demonstrate the wastewater assets required, their locations including points of connection to the public foul sewerage, whether the site drainage will be adopted by the water company and if any sewer requisitions will be required.	All LPAs, STW, TW and developers	Ongoing

Action	Responsibility	Timescale
Developers will be expected to demonstrate to the Lead Local Flood Authority (LLFA) that surface water from a site will be disposed using a sustainable drainage system (SuDS) with connection to surface water sewers seen as the last option. New connections for surface water to foul sewers will be resisted by the LLFA.	LLFAs and developers	Ongoing

7 Wastewater Treatment

7.1 Wastewater Treatment Works in the sub-region

329. Severn Trent Water (STW) provide wastewater services for development in the sub-region. Sewerage undertakers may refer to their wastewater processing plants as Wastewater Treatment Works (WwTW) or Sewage Treatment Works (STW), for consistency, WwTW will be used in this report.

330. There are 102 WwTWs in the sub-region, with 66 wastewater treatment works expected to serve planned growth. They also serve parts of neighbouring authorities surrounding the sub-region. This cross over of catchments into neighbouring authorities has been accounted for by including proposed development in these WwTWs catchments within our assessment. The location of the WwTWs in the sub-region are listed in Appendix A.4.

331. The Environment Agency is responsible for regulating sewage discharge releases via a system of Environmental Permits (EPs). Monitoring for compliance with these permits is the responsibility of both the EA and the plant operators. Figure 7-1 summarises the different types of wastewater releases that might take place and present-day minimum design requirements. Precise details vary from works to works depending on the design standards adopted at the time of permitting.

332. During dry weather, the final effluent from the Wastewater Treatment Works (WwTW) should be the only discharge (labelled (1) in Figure 7-1). With rainfall, the storm tanks fill and eventually start discharging to the watercourse (labelled (2)) and Combined Sewer Overflows (CSOs) upstream of the storm tanks start to operate (labelled (3)). The discharge of storm sewage from treatment works is allowed only under conditions of heavy rain or snow melt, and therefore the flow capacity of treatment systems is required to be sufficient to treat all flows arising in dry weather and the increased flow from smaller rainfall events. After rainfall, storm tanks should be emptied back to full treatment as soon as reasonably possible, freeing their capacity for the next rainfall event.

333. Environmental permits are used alongside water quality limits as a means of controlling the pollutant load discharged from a WwTW to a receiving watercourse. Sewage flow rates must be monitored for all WwTWs where the permitted discharge rate is greater than 50 m^3/day in dry weather.

334. Permitted discharges are based on a statistic known as the Dry Weather Flow (DWF). As well as being used in the setting and enforcement of effluent discharge permits, the DWF is used for WwTW design, as a means of estimating the ‘base flow’ in sewerage modelling and for determining the Flow to Full Treatment, (FFT), the minimum flow which must undergo full treatment, and above which additional flow is permitted to pass to the storm tanks.

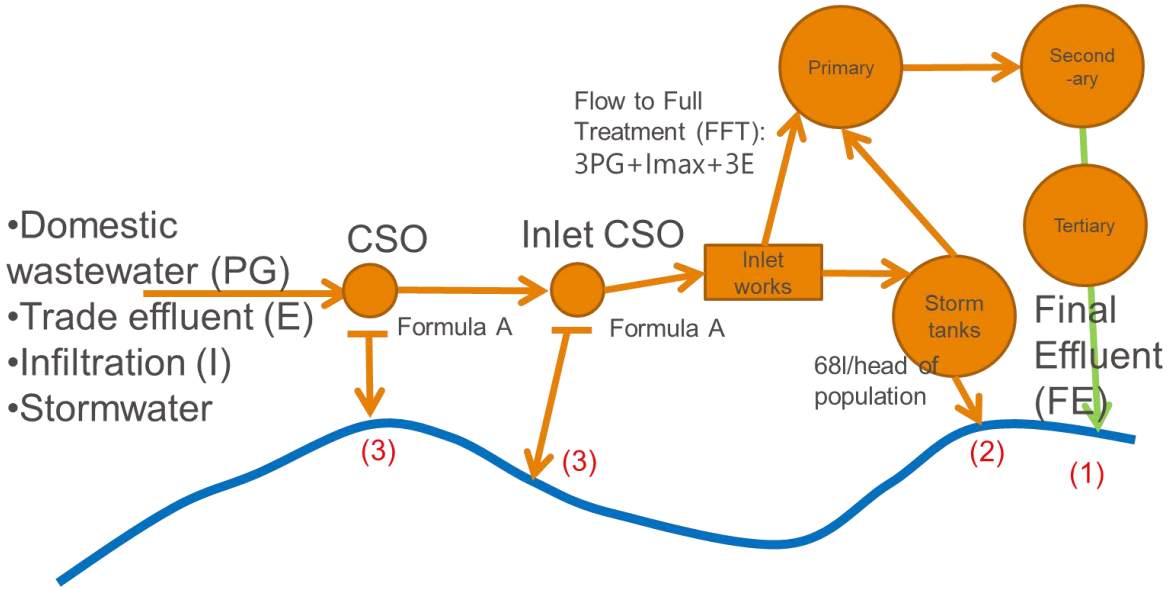

Figure 7-1 Overview of typical combined sewerage system and WwTW discharges

335. Environmental permits are used alongside water quality limits as a means of controlling the pollutant load discharged from a water recycling centre to a receiving watercourse. Sewage flow rates must be monitored for all WwTWs where the permitted discharge rate is greater than 50 m^3/day in dry weather.

336. Permitted discharges are based on a statistic known as the Dry Weather Flow (DWF). As well as being used in the setting and enforcement of effluent discharge permits, the DWF is used for WwTW design, as a means of estimating the ‘base flow’ in sewerage modelling and for determining the flow at which discharges to storm tanks will be permitted by the permit (Flow to Full Treatment, FFT).

337. WwTW Environmental Permits also consent for maximum concentrations of pollutants, in most cases Suspended Solids (SS), Biochemical Oxygen Demand (BOD) and Ammonia (NH_4). Some works (usually the larger works) also have permits for Phosphorous (P). These are determined by the Environment Agency with the objective of ensuring that the receiving

watercourse is not prevented from meeting its environmental objectives, with specific regard to the Chemical Status element of the Water Framework Directive (WFD) classification.

338. Further information on the pollutants modelled within the WCS can be found in Appendix A.1.

339. Increased domestic population and/or employment activity can lead to increased wastewater flows arriving at a WwTW. Where there is insufficient headroom at the works to treat these flows, this could lead to failures in flow consents.

7.2 Methodology

340. An assessment of WwTW capacity was carried out by JBA using measured flow data supplied by the water company. STW also provided a baseline assessment of each WwTW based on current performance.

341. The process for JBA's assessment was as follows:

- Sites already allocated in the adopted Local Plan, or already in the planning system (commitments) as well as an allowance for windfall, were assigned to a WwTW using the sewerage drainage area boundaries available on the Severn Trent Water website to set a baseline for WwTW capacity. Actual connection of a development site to a particular WwTW may be different and will depend on the capacity of the receiving works, and the local sewer network.
- STW provided their calculated 80th percentile exceedance flow statistic for each WwTW.
- For each site, the future DWF was calculated using the occupancy rates and per-capita consumption values obtained from the Water Resource Management Plans (Table 7-1), and the assumption that 95% of water used is returned to sewer. Permitted headroom was used as a substitute for actual designed hydraulic capacity for each WwTW being assessed.
- For employment sites, wastewater demand was estimated based on the predicted number of new employees. Floor space, employment use types and employment densities were used to estimate the number of employees where this was not available.

Table 7-1 Per capita consumption values used in water demand calculations.

Water Company	Water Resource Zone	Occupancy rate (persons per dwelling)	Per capita residential consumption (m^3/person/day)	Per capita employment consumption (m^3/person/day)
Severn Trent	Strategic Grid	2.2	0.120	0.1
South Staffordshire Water	Company Wide Zone	2.3	0.185	0.1

7.3 Headroom results

342. Severn Trent Water provided assessments for WwTWs that may serve growth in the sub-region, and this is presented in Appendix A.9. This assessment is prior to any increase in capacity that may be delivered as part of upgrade work at WwTWs. A map showing estimated capacity at each WwTW is shown in Figure 7-2. It should be noted that this map represents the remaining capacity (number of houses) once all committed sites are built and ignores any planned increases to treatment capacity.

343. The following definition was used by JBA to score each WwTW:

Capacity for growth during Local Plan period	Limited capacity during Local Plan period	Issues identified – WwTW capacity could be a constraint to growth

344. In general, in the case that a WwTW is likely to exceed its permit, the permit would be reviewed by the EA and if a higher flow consent was agreed, a tighter permit limit for substance concentrations is very likely to be required. In some cases, this may not be possible if that means concentrations tighter than the Technically Achievable Limit (TAL) which is 0.25 mg/l for P for example. The summary of STW's and JBA's headroom assessment results can be found in Appendix A.9. A summary of JBAs headroom results can also be found in Figure 7-2.

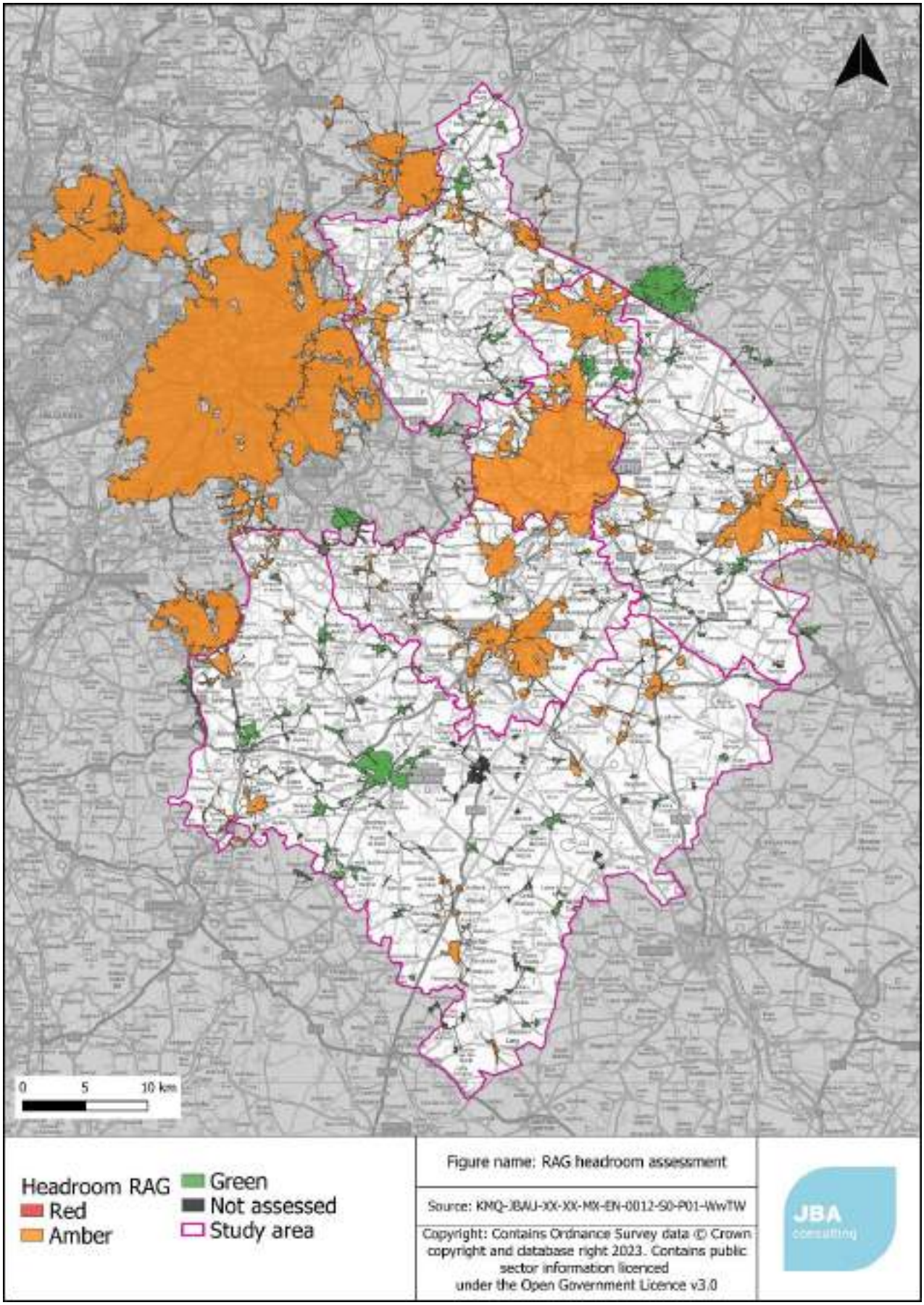

Figure 7-2 JBA WwTW Headroom capacity assessment

Table 7-2 Severn Trent Water rating criteria for headroom capacity assessment

Key	Estimated Spare Capacity scoring
Not Measured	Scale of WwTW is below that requiring flow monitoring.
Low	Not expected to be an issue.
Medium	Marginal concern subject to size of development.
High	Probable issue.
Very High	Issue currently being investigated.

345. 27 WwTWs in the study area are too small to require monitoring of flow so an assessment of headroom cannot be made. However, due to their small size, they are unlikely to be able to serve significant additional growth without a major upgrade to capacity.

346. The majority of WwTWs (54 out of 102) are operating within their permit limit based on the 80th exceedance percentile DWF. However, four of these (Coleshill, Earlswood-Springbrook, Napton, Ridgeway, Warwick-Longbridge and Rowington WwTWs) have less than 10% headroom remaining. In these cases, they have been given a score of Amber in JBA's assessment. This means that an upgrade to treatment capacity is most likely to be needed to accommodate further growth within the catchment.

347. 21 WwTWs are currently exceeding their permit limit based on the 80th percentile exceedance (which is the metric used by the Environment Agency for setting flow permit levels). Permit compliance is assessed by the EA using the 90th percentile statistic which results in a lower value than the 80th percentile. Assessing compliance against permit conditions at WwTWs is beyond the scope of a WCS and this assessment should not be used to infer non-compliance.

348. Two WwTWs (Earlswood-Springbrook and Napton) have planned schemes in AMP8 (2025-30) to increase capacity. Both WwTWs were given a rating of 'High' by STW when assessing spare headroom capacity. For Earlswood-Springbrook, STW have commented:

> "AMP8 quality scheme planned the scope of which will contribute towards environmental compliance"

and for Napton:

"AMP8 scheme planned the scope of which will contribute towards environmental compliance and make allowances for expected growth".

349. WwTWs rated 'Very High' by STW are:

- Itchen Bank
- Long Compton
- Middleton Village
- Nuneaton- Hartshill
- Stretton on Fosse
- Tysoe
- Warton
- Wellesbourne
- Each WwTW is reported to have a scheme planned or in progress within AMP7 or that will occur in the future in AMP8 by STW.

350. STW provided the following general comment on capacity:

"It is the responsibility of Severn Trent to ensure compliance against permits and to provide sufficient capacity in the network and at WwTW. Flow compliance and the potential impact of growth on permits is constantly being reviewed and assessed against the latest available information, with subsequent investment prioritised accordingly. This assessment gives an indication of the current and potential future risk which supports investment requirement identification. However, it is not necessarily restrictive to future growth as there remains a duty for Severn Trent to provide capacity for growth."

7.4 Storm Tank Overflows

351. EDM data was analysed for storm tanks at WwTWs. An average was calculated where 2 or 3 years were available. 30 of the overflows meet the EA threshold for investigation. Sites that exceed the annual average operations are shown in Table 7-3. Where a storm overflow is mentioned twice it indicates the presence of two overflows under the same permit.

Table 7-3: WwTW storm tank overflows that exceed the average annual threshold

Site name	Permit number	Duration of operation in 2020 (hours)	Number of operations in 2020	Duration of operation in 2021 (hours)	Number of operations in 2021	Duration of operation in 2022 (hours)	Number of operations in 2022	Annual Average spills*	RAG rating
ALCESTER (OVERSLEY GREEN) STW/	S/15/26 435/B-2	No data	No data	1310.73	98	547.10	50	74	Red
ATHERSTONE SEWAGE TREATMENT WORKS	T/19/35 541/R	4731.68	229.00	165.77	80	513.26	76	128	Red
ATHERSTONE SEWAGE TREATMENT WORKS	T/19/35 541/R	18.65	16.00	1373.97	112	177.84	60	63	Red
BEARLEY STW	S/15/25 830/R	31.83	51.00	69.14	46	33.89	47	48	Red
BIDFORD ON AVON STW	S/13/25 360/R	2249.01	162.00	3204.28	163	48.69	31	119	Red
BULKINGTON WWTW	T/19/35 774/R	1957.61	164.00	421.40	38	221.97	30	77	Red
CHERINGTON STW	S/14/26 294/R	1232.63	80	1929.03	119	1010.95	84	94	Red
COLESHILL WASTEWATER TREATMENT WRKS	T/12/36 068/R	3034.76	157	662.28	48	234.82	40	82	Red

Site name	Permit number	Duration of operation in 2020 (hours)	Number of operations in 2020	Duration of operation in 2021 (hours)	Number of operations in 2021	Duration of operation in 2022 (hours)	Number of operations in 2022	Annual Average spills*	RAG rating
COVENTRY-FINHAM WWTW	S/11/26637/R	No data	No data	566.51	89	No data	No data	89	Red
DORSINGTON SEWAGE TREATMENT WORKS	S/13/26040/R	243.27	53	48.97	38	320.33	77	56	Red
FARNBOROUGH (WARKS) WWTW	CSSC.1369	No data	No data	1206.11	93	235.13	26	60	Red
FENNY COMPTON STW	S/12/25307/R	82.79	9	187.07	56	1393.89	107	57	Red
FENNY COMPTON STW	S/12/25307/R	1539.95	141	1692.94	133	184.52	36	103	Red
FRANKTON SEWAGE TREATMENT WORKS	S/12/25970/R	1418.91	78	456.74	83	371.59	74	78	Red
HARBOROUGH MAGNA STW	S/10/26277/R	379.68	99	365.52	227	493.57	232	186	Red
HURLEY SEWAGE TREATMENT WORKS	T/16/35777/R	1330.94	82	379.95	56	740.35	53	64	Red
ILMINGTON STW	S/14/25976/R	967.94	74	1255.04	112	899.32	61	82	Red

Site name	Permit number	Duration of operation in 2020 (hours)	Number of operations in 2020	Duration of operation in 2021 (hours)	Number of operations in 2021	Duration of operation in 2022 (hours)	Number of operations in 2022	Annual Average spills*	RAG rating
ITCHEN BANK SEWAGE TREATMENT WORKS	S/12/26 557/R	487.23	51	593.01	45	524.04	48	48	Red
KINETON SEWAGE TREATMENT WORKS	S/13/25 745/R	731.64	172	0.00	0	179.35	42	71	Red
LITTLE COMPTON WWTW	TEMP.2 721	No data	No data	649.57	56	235.68	36	46	Red
MORETON MORRELL WWTW	S/13/26 230/R	1041.15	119	13.61	7	1.37	2	43	Red
MORETON PADDOX STW	S/13/25 818/R	203.35	63	502.53	93	166.76	60	72	Red
NAPTON SEWAGE TREATMENT WORKS	S/12/25 765/R	3958.84	175	6046.40	279	465.95	43	166	Red
NORTHEND STW	S/13/25 874/R	918.24	221	541.10	230	915.83	201	217	Red
NORTON GREEN STW	T/11/35 235/R	507.45	48	1052.59	74	466.64	45	56	Red

Site name	Permit number	Duration of operation in 2020 (hours)	Number of operations in 2020	Duration of operation in 2021 (hours)	Number of operations in 2021	Duration of operation in 2022 (hours)	Number of operations in 2022	Annual Average spills*	RAG rating
RIDGE LANE MANCETTER STW	T/15/35 759/R	0.00	0	395.45	77	665.94	99	59	Red
ROWINGTON SEWAGE TREATMENT WORKS	S/15/26 102/R	628.96	110	442.32	84	302.04	61	85	Red
STRETTON ON FOSSE STW	S/14/26 229/R	109.23	167	1.63	11	36.92	36	71	Red
WARWICK-LONGBRIDGE STW	S/13/26 328/R	559.51	51	736.72	71	444.77	50	57	Red
WESTON-UNDER-WETHERLEY STW	S/12/26 152/R	438.37	34	1142.82	80	249.02	26	47	Red

*Annual average from years available

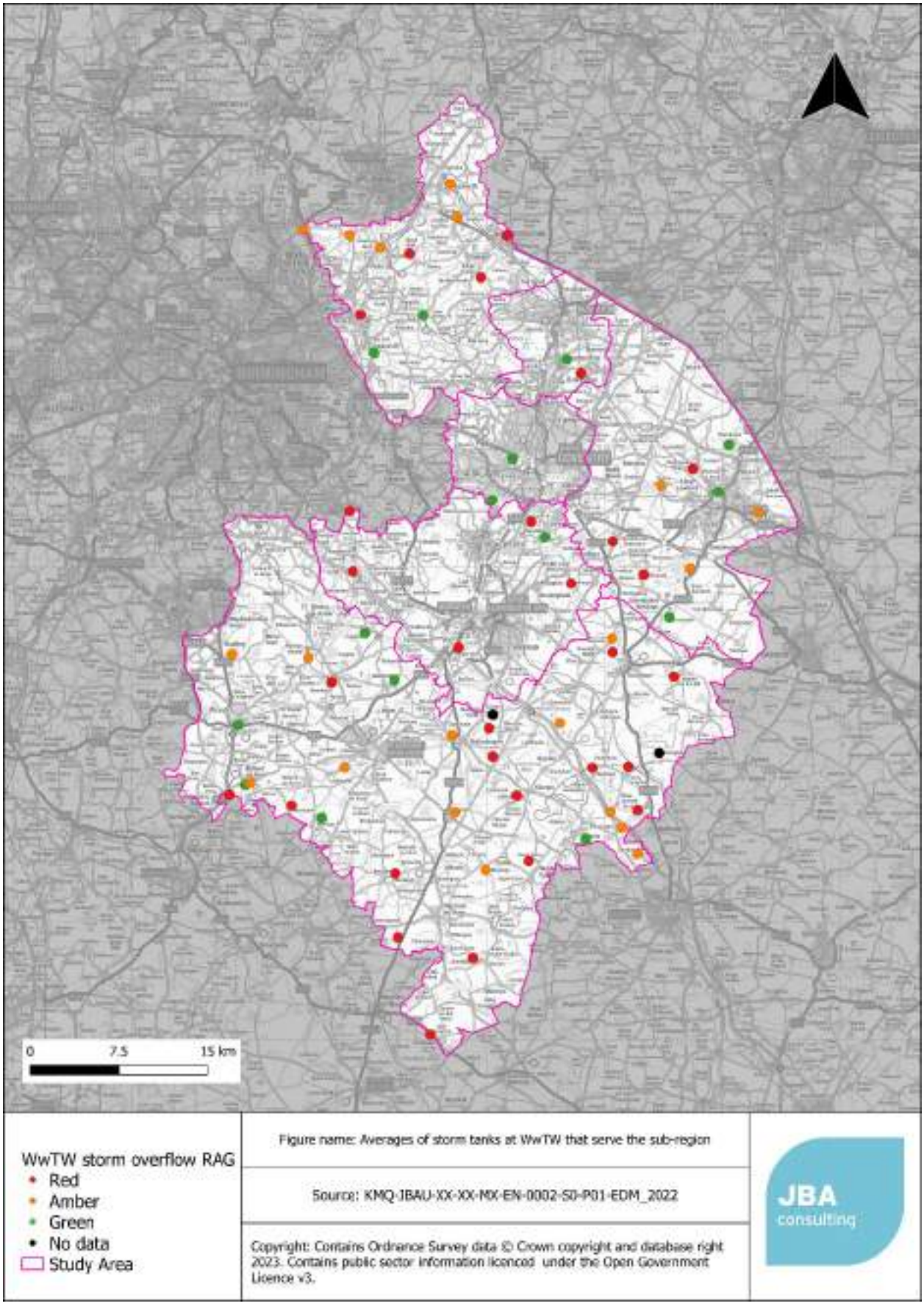

Figure 7-3 Frequency of operation storm tank overflows at WwTW that serve the sub-region.

7.5 Summary

352. 66 WwTWs are expected to serve growth in the sub-region study area.

353. 30 storm tank overflows exceed the target for the number of operations per year defined in the Storm Overflow Assessment Framework (SOAF).

354. Eight WwTWs are rated 'very high' by STW in their spare headroom capacity assessment. This indicates there is a current issue being investigated by STW.

7.6 Recommendations

Table 7-4 Wastewater treatment recommendations

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

8 Water Quality

8.1 Introduction

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

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

357. The Environment Agency operational instructions on water quality planning and no-deterioration are currently being reviewed. Previous operational instructions (now withdrawn but with no published replacement) set out a hierarchy for how the no-deterioration requirements of the WFD should be implemented on inland waters. The potential impact of development should be assessed in relation to the following objectives:

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

possible with current technology or is GES technically possible after development with any potential WwTW upgrades.

358. The overall WFD classification of a water body is based on a wide range of ecological and chemical classifications. This assessment focuses on three physico-chemical quality elements; Biochemical Oxygen Demand (BOD), Ammonia, and Phosphate which are key to Water Framework Directive compliance.

8.2 Methodology

8.2.1 General approach

359. In the Stage 1 WCS it was proposed to present the current status of waterbodies within the sub-region, and to carry out a sensitive analysis of the waterbodies to changes in the volume of treated effluent. Detailed water quality modelling is expected to form part of a Stage 2 WCS.

8.2.2 Water quality sensitivity analysis

360. SIMulation of CATchments (SIMCAT) is used by the Environment Agency to model water bodies and identify where permit changes are needed to prevent deterioration or improve water quality as well as supporting decision making to guide development to locations where environmental deterioration will be reduced. SIMCAT is a 1-Dimensional model which represents inputs from both point-source effluent discharges (i.e. the point at which the WwTW discharges into the watercourse) and diffuse sources (i.e. where pollutants enter the river along a broad length), and the behaviour of solutes in the river.

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

362. The study area is covered by the River Severn and River Trent SIMCAT models.

363. Within SIMCAT, the determinands examined in this study were Biochemical Oxygen Demand (BOD), Ammonia (NH_4) and Phosphate (P). In fresh waterbodies, Phosphorus is usually the limiting nutrient for algal growth. (See appendix A.1 fir further detail).

364. The following methodology was used:

- Run SIMCAT with current flow data and extract water quality outputs for ammonia, biochemical oxygen demand (BOD) and phosphate.
- Increase effluent flows at WwTWs by 20% to account for potential future development.
- Re-run SIMCAT with higher effluent flows and extract relevant river water quality data.
- Compare the two model runs for all three water quality indicators and categorise the percentage change.

365. Where water quality downstream of a WwTW in any given determinand deteriorates by 10% or more in response to a 20% increase in effluent flow, the sewer catchment can be said to be “more sensitive” to changes in effluent flow, and therefore growth. It should be noted that this assessment takes the existing SIMCAT model based on 2014-2020 data and increases flow by a consistent figure across the whole model. In some cases, a WwTW may be able to accommodate a higher flow, in other cases, a 20% increase may not be likely or feasible. This assessment therefore just highlights the relative risk of deterioration.

366. This analysis also does not take into account planned changes in permits at WwTWs beyond 2025 that would have the effect of improving water quality.

8.3 Results

8.3.1 Water Framework Directive Overview

367. The Water Framework Directive (WFD) aims to ensure "no deterioration" in the environmental status of rivers and sets objectives to improve rivers to meet "good" status. LPAs must have regard to the WFD and associated statutory objectives as implemented in the EA's River Basin Management Plans (RBMPs).

368. Figure 8-1 and Table 8-1 WFD overall status of watercourses in the study area shows the overall WFD classification (2022) for waterbodies in the sub-

region, the full list of watercourses is contained in Appendix A.3. This is usually assessed in WCSs for each of the waterbodies that are predicted to receive additional effluent from growth during the plan period. Several of the WwTWs discharge to small watercourses which are not within the WFD classifications. These WwTWs will still be included in the water quality modelling to be undertaken in stage 2 and the impact of additional wastewater on the resulting water quality assessed.

369. The overall WFD status is made of Ecological and Chemical status, which are further broken down into sub-elements, the measurement of which is prioritised for each waterbody based on its characteristics and risk, hence not all elements are reported for each river.

370. Of the 70 watercourses in the sub-region, no watercourses are classified as high status, only 9 are currently classified as good status. With the majority being moderate (33 watercourses) or poor (27 watercourses). One watercourse is classified as Bad status.

Table 8-1 WFD overall status of watercourses in the study area

Status	High	Good	Moderate	Poor	Bad
Overall	0	9	33	27	1

371. Within the Severn catchment there are several significant water management issues identified using the EA's Catchment Data Explorer. These issues are:

- Agriculture and rural land management
- Water industry
- Local and central government
- Urban and transport

372. The issues above can lead to pollution from both rural and urban areas, changes to the natural flow and level of water and physical modifications of watercourses (Environment Agency i, 2023).

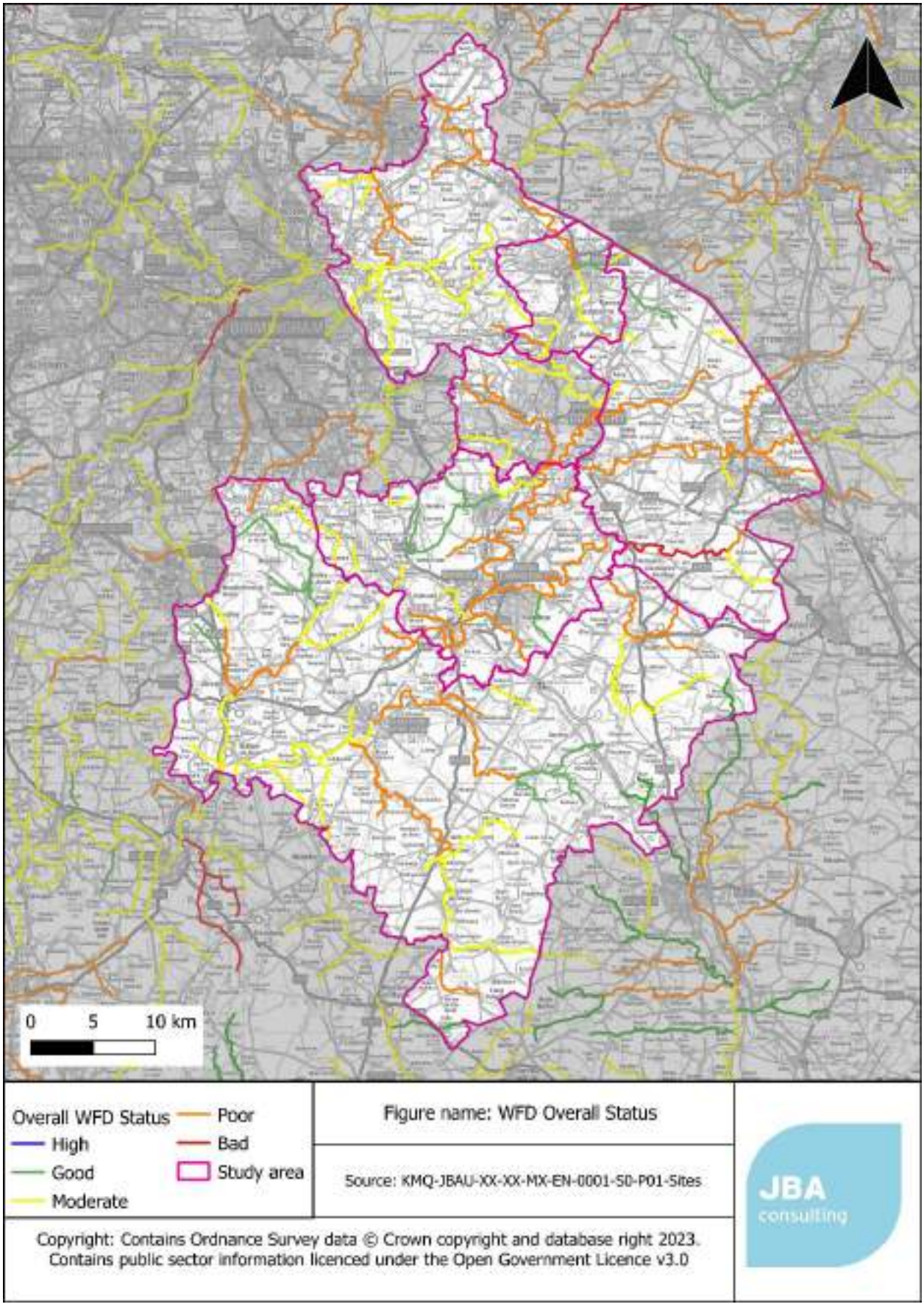

Figure 8-1 Overall WFD status of surface watercourses in and around the sub-region study area.

8.3.2 Water quality sensitivity analysis

373. The sensitivity analysis was conducted using the EA's SIMCAT models and full results are presented in Appendix A.10. The modelling results suggest changes in the volume of treated wastewater in Warwickshire cause a significant response in the concentration of Ammonia, BOD, and Phosphate in Warwickshire.

374. For ammonia, most waterbodies are highly sensitive with a greater than 10% deterioration in response to a 20% increase in the discharged volume of treated effluent, with higher sensitivity concentrated more in the south and east of Warwickshire. Generally, sensitivity of ammonia across the waterbodies in Warwickshire is greater than 10%. Sensitivity in the north and west is generally less than 10%.

375. For BOD, most waterbodies are moderately sensitive with a 0% to 10% deterioration. Generally, sensitivity of BOD across waterbodies in Warwickshire is less than 3%. Moderate deterioration is generally in the east of Warwickshire.

376. For phosphate, most waterbodies are moderately sensitive with a less than 10% predicted deterioration, with higher sensitivity concentrated more in the south and east. A deterioration of greater than 3% is observed at 2 WwTWs which are at "Bad" WFD status for Phosphate. These are Ilmington and Tamworth-in-Arden.

377. The waterbodies downstream of the following WwTWs are shown to deteriorate by greater than 10% as a result of a 20% increase in flow.

Table 8-2: WwTWs with a greater than or equal to 10% deterioration

WwTW	Ammonia	BOD	Phosphate
Alcester (Oversley STW)	14%	N/A	N/A
Ashorne	15%	N/A	13%
Bascote (WRW	11%	N/A	N/A
Bearley STW	11%	N/A	N/A
Bidford on Avon STW	13%	N/A	N/A
Cherington STW	16%	N/A	15%
Claverdon STW	11%	N/A	N/A
Dorsington	16%	N/A	N/A

WwTW	Ammonia	BOD	Phosphate
Earlswood (Spring brook)	13%	N/A	N/A
Gaydon STW	12%	N/A	N/A
Grendon STW	13%	N/A	10%
Ilmington STW	12.79%	N/A	N/A
Itchen Bank STW	12.26%	N/A	N/A
Kineton STW	10.57%	N/A	N/A
Lighthorne Heath STW	12.62%	N/A	N/A
Lighthorne STW	16.04%	N/A	N/A
Long Compton STW	16.43%	N/A	11.30%
Meriden STW	12%	N/A	N/A
Napton STW	10.45%	N/A	N/A
Nethercote STW	18.25%	N/A	N/A
Oxhill STW	16.25%	N/A	N/A
Preston Stour STW	15.17%	N/A	10.42%
Ridgeway STW	12.41%	N/A	N/A
Shipston (Fell Mill)	17.01%	N/A	13.01%
Stratford (Milcote)	11.12%	N/A	N/A
Stretton Fosse STW	16.30%	N/A	16.52%
Tysoe STW	18.58%	N/A	N/A
Ullenhall STW	N/A	N/A	10.11%
Warton STW	N/A	N/A	14%
Wellesbourne STW	10.06%	N/A	N/A
Whichford STW	18.51%	N/A	13.44%
Wolston STW	12.71%	N/A	N/A

378. It is noted that Norton Green WwTW is represented as a WwTW in the SIMCAT model, however it is located between the Trent and Severn catchments and does not discharge to a reach within the model. Severn Trent Water data indicates this treatment works serves approximately 10,000 people. This will be investigated in the Stage 2 WCS and if this WwTW is expected to serve growth, will be updated within the SIMCAT model.

379. In STW's response to the Rugby Borough Local Plan issues and options consultation in January 2024, they stated:

"We would also note that there are likely to be constraints with Rugby Newbold Wastewater Treatment Works (WwTW) due to environmental capacity of the receiving waterbody, meaning revisions to permits are increasingly tight and difficult to meet considering the best available technology".

380. A tightening of the permit at Rugby Newbold WwTW is planned in AMP 7 (2020-2025). This new permit should be included within the Stage 2 modelling, which will assess the impact of additional wastewater discharge at Rugby Newbold on water quality. A scheme is also planned in AMP8 to increase capacity to accommodate expected growth.

8.3.3 Priority Substances

381. As well as the physico-chemical water quality elements (BOD, Ammonia, Phosphate etc.) addressed above, a watercourse can fail to achieve Good Ecological Status due to exceeding permissible concentrations of hazardous substances. Currently 45 substances are defined as priority or priority hazardous substances, with others under review (Defra, 2022). The complete list of these substances can be viewed online. Such substances may pose risks both to humans (when contained in drinking water) and to aquatic life and animals feeding in aquatic life. These substances are managed by a range of different approaches, including EU and international bans on manufacturing and use, targeted bans, selection of safer alternatives and end-of-pipe treatment solutions. There is considerable concern within the UK water industry that regulation of these substances by setting permit values which require their removal at wastewater treatment works will place a huge cost burden upon the industry and its customers, and that this approach would be out of keeping with the "polluter pays" principle.

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

- Industrial sources – whilst this report covers potential employment sites, it doesn't consider the type of industry and therefore likely sources of priority substances are unknown. It is recommended that developers should discuss potential uses which may be sources of priority substances from planned industrial facilities at an early stage with the EA and, where they are seeking a trade effluent consent, with the sewerage undertaker.
- Agricultural sources - There is limited scope for the planning system to change or regulate agricultural practices. UK water companies are

involved in a range of “Catchment-based Approach” schemes aimed at reducing diffuse sources of pollutants, including agricultural pesticides.

- Surface water runoff sources - some priority substances e.g., heavy metals, are present in urban surface water runoff. It is recommended that future developments would manage these sources by using SuDS that provide water quality treatment, designed following the CIRIA SuDS Manual. This is covered in more detail in section 10.5.5.
- Domestic wastewater sources - some priority substances are found in domestic wastewater because of domestic cleaning chemicals, detergents, pharmaceuticals, pesticides or materials used within the home. Whilst an increase in the population due to housing growth could increase the total volumes of such substances being discharged to the environment, it would be more appropriate to manage these substances through regulation at source, rather than through restricting housing growth through the planning system.
- No further analysis of priority substances will be undertaken as part of this study.

8.4 Conclusions

383. The EA Reasons for Not Achieving Good status (RNAG) dataset indicates that the water industry (sewage discharges) and agriculture and rural land management (livestock and arable) are the main reasons for watercourses not achieving good status in this area. Growth during the Local Plan period will also increase the discharge of treated wastewater from WwTWs in the sub-region. There is a potential for this to cause a deterioration in water quality in the receiving watercourses and this must be carefully considered. A significant deterioration in water quality is not acceptable under the Water Framework Directive, and large-scale investment in treating effluent to higher standards may therefore be required. The sensitivity analysis suggests that watercourses within the sub-region may be sensitive to increases in the discharge of treated wastewater. Further modelling should be undertaken in the Stage 2 WCS.

8.5 Recommendations

Table 8-3 Water quality recommendations

Action	Responsibility	Timescale
Provide annual monitoring reports to STW detailing projected housing growth in the Local Authority.	Relevant LPAs	Ongoing

Action	Responsibility	Timescale
When preferred options for growth are identified, undertake water quality impact modelling as part of a Stage 2 WCS.	Relevant LPAs	Ongoing
Consider the full volume of growth (from relevant LPAs and neighbouring authorities) within the catchment when considering WINEP schemes or upgrades at WwTWs.	STW	Ongoing

9 Nutrient Management

384. In March 2022 Natural England (NE) wrote to 42 Local Planning Authorities (LPAs) advising them "as the Competent Authority under the Habitats Regulations, to carefully consider the nutrients impacts of any new plans and projects (including new development proposals) on habitats sites and whether those impacts may have an adverse effect on the integrity of a habitats site that requires mitigation, including through nutrient neutrality."

385. Catchments containing a designated site such as a Special Area of Conservation (SAC), Special Protection Area (SPA) or Ramsar site, where an adverse impact from additional nutrients (from growth) cannot be ruled out have been defined by NE. (Natural England b, 2023).

386. The guidance covers all overnight accommodation, including new homes, student accommodation, care homes, tourism attractions and tourist accommodation and permitted development which gives rise to new overnight accommodation.

387. Across England, 42 LPAs, including North Warwickshire, are required to demonstrate nutrient neutrality in at least part of their area when permitting new developments. Nutrient neutrality is a means of ensuring that a plan or project does not add to existing nutrient burdens so there is no overall increase in nutrients Nutrient neutrality needs to be demonstrated before the plan or project in question is carried out.

388. Within the sub-region study area, the catchment of a SAC and SSSI site, the River Mease, contains a small area of the north of North Warwickshire Borough, see Figure 9-1. Subsequently, mitigation of additional nutrients will need to take place if any proposed developments fall within the river catchment.

389. In January 2024, the Secretary of State for the Environment, Food and Rural Affairs designated "16 sensitive catchments, including the River Mease catchment, in which water companies are required to upgrade wastewater treatment works before April 1st 2030. Further information can be found here. None of the development sites so far assessed in this report (which in stage 1 only and includes adopted allocations and commitments) fall within

the River Mease catchment. In the stage 2 WCS, the impact on proposed allocations will be examined.

390. The River Mease is protected because it is a meandering lowland river with an array of wildlife such as Spined loach (*Cobitis taenia*) and Bullhead (*Cottus gobio*). Both species have a restricted distribution in England, which is why the River Mease has been designated a SSSI and SAC (River Mease Partnership, 2023).

391. NE and Ricardo have developed a nutrient budget calculator for the River Mease catchment to assess the relationship between new developments and additional nutrients. The Mease catchment calculator comes in the form of Excel spreadsheets and can be accessed online here. The calculator looks at the current land use, WwTW phosphate discharge and proposed land use as well as other factors that impact drainage such as soil and rainfall.

392. In the case of the River Mease, phosphate is the nutrient that is considered the greatest risk to protected site health. The total phosphate that needs to be mitigated can be found through the catchment specific calculator.

393. NE has also published standing advice for the River Mease SAC in January 2022 to help LPAs with planning applications within the Mease catchment (NWLDC, 2022). This should be consulted by LPAs and developers pre-development of sites within the River Mease catchment.

394. All development sites (that fall under the guidance) within the catchment must achieve nutrient neutrality. However, this is also a situation where a development may be outside of the catchment but be served by a wastewater treatment works (WwTW) inside the catchment. Conversely, there may also be a situation where a development site is within the catchment but served by a WwTW outside, reducing its potential impact on the River Mease SAC.

395. Advice contained in the FAQs of the Planning Advisory Service website confirms that where development is within the catchment but drains to a WwTW outside the catchment, only the surface water component should be considered. Where a development site is outside the catchment but is served by a WwTW discharging within the catchment, "…a habitats

regulations assessment will be required. This also applies to surface water drainage." We have interpreted this as meaning that the assessment must address the nutrient load from wastewater generated by the development, but that phosphates from surface water runoff from the site would not need to be offset it the assessment can demonstrate that they won't be discharged or otherwise enter the designated catchments.

396. Figure 9-2 shows the wastewater catchments within and overlapping the River Mease catchment. It can be seen that development in a small part of North Warwickshire would need to consider the nutrient impact of surface water drainage, but it is unlikely that the nutrient impact of treatment wastewater would need to be considered as there are no WwTW catchments within that area, and the nearest point of connection to the public sewer would discharge to a location outside of the River Mease catchment.

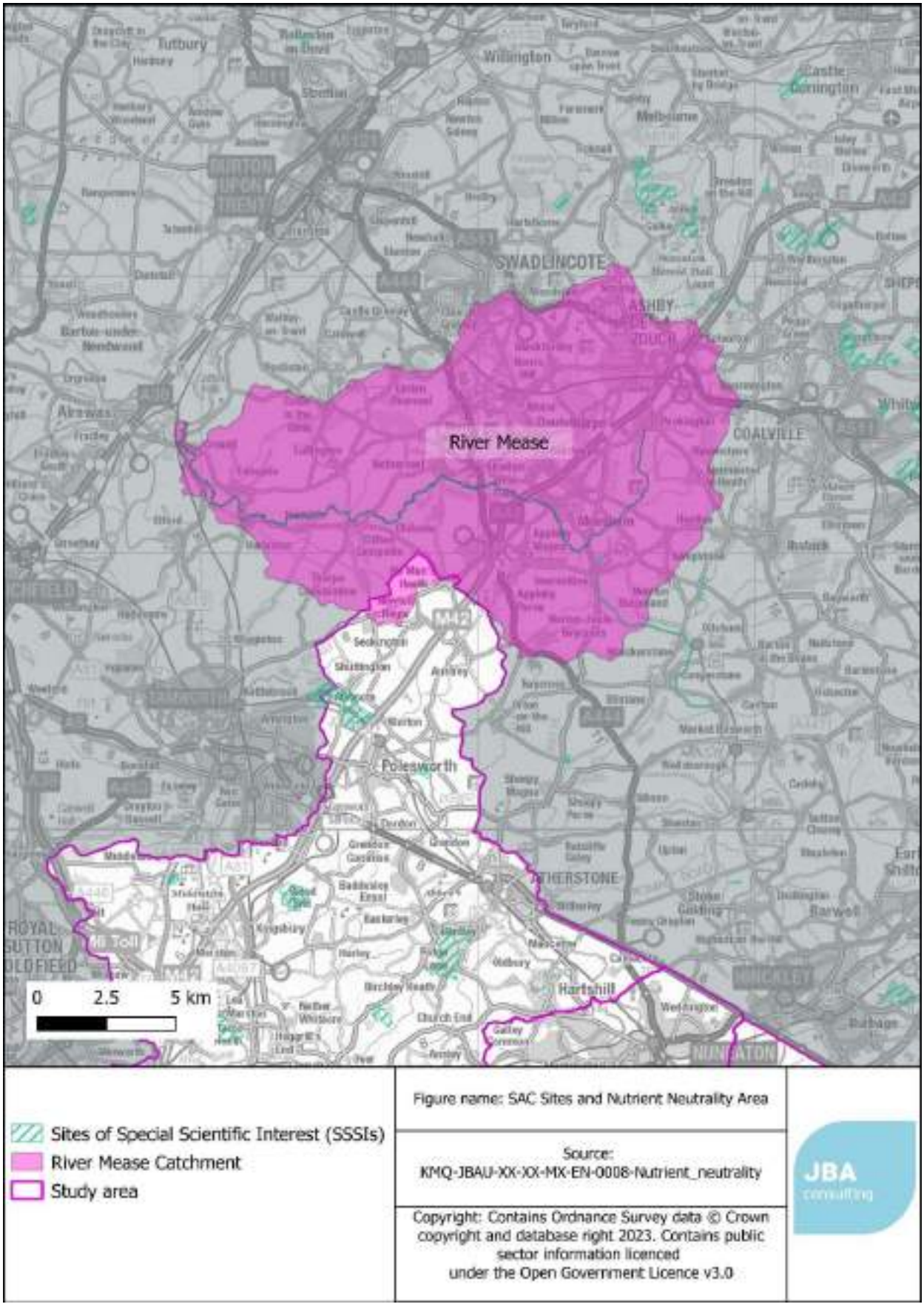

Figure 9-1 SAC sites and the River Mease catchment shown in comparison to the study area.

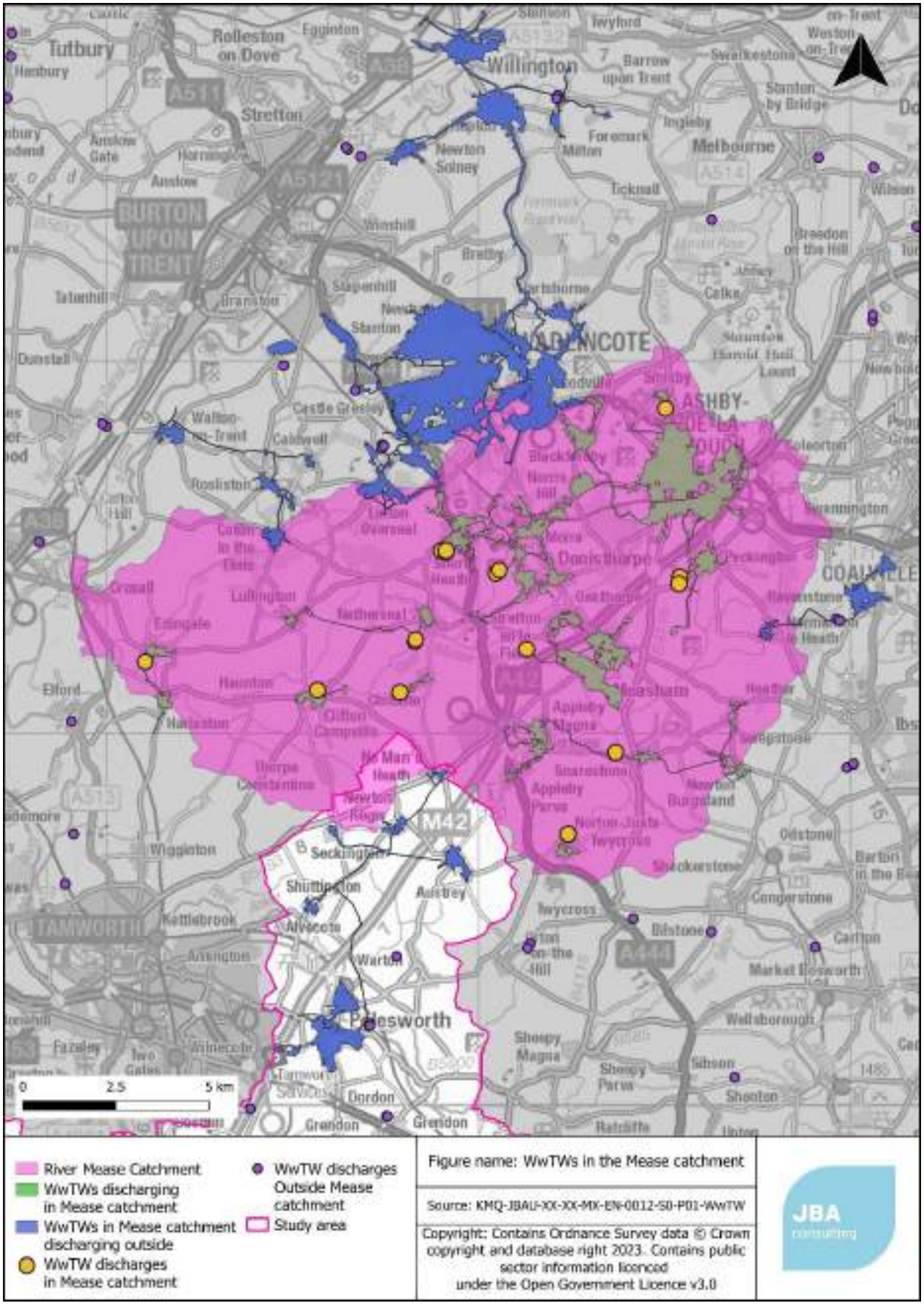

Figure 9-2 Water company WwTW catchments and discharges in the River Mease catchment

9.1 Farm nutrients management

397. The River Mease Partnership is a group of farmers, agencies and Local Authorities which are working together to conserve the River Mease which is a SSSI and a SAC. One of the actions used to help conserve the river is the reduction of nutrients.

398. Projects like Catchment Sensitive Farming, and schemes such as Rural Payment Schemes can help landowners fund and work towards managing their nutrient management. Although this is not in the power of the Local Plan, it is beneficial to be aware of to advise landowners in the sub-region.

9.2 Nutrient Trading

9.2.1 Developer Contribution Scheme (DCS)

399. The Mease Developer Contribution Scheme (DCS) is mentioned as an action to help reduce the nutrients in the catchment. DCS is where a monetary contribution is made from developers or landowners to ensure that where planning permission is granted for proposed developments, any impact on the environment is in line with appropriate regulatory obligations such as nutrient neutrality. This could include funding for land mitigation measures or phosphate credits. DCS has previously had two rounds: DCS1 and DCS2.

400. A third DCS is being developed collaboratively by the Trent Rivers Trust, South Derbyshire District Council (SDDC) and North West Leicestershire District Council (NWLDC). Until this scheme is in place, developments will only be permitted if there is an appropriate bespoke mitigation solution integrated into the application.

401. Development within this area should ensure that sufficient credits are available or alternative offsetting approaches may be required to mitigate the development.

10 Environmental opportunities and constraints

10.1 Introduction

402. Development has the potential to cause an adverse impact on the environment through several routes, such as worsening of air quality, pollution to the aquatic environment or disturbance to wildlife. In the context of a Water Cycle Study, the impact of development on the aquatic environment is under assessment.

403. A source-pathway-receptor approach can be taken to investigate the risk and identify where further assessment or action is required.

10.2 Sources of pollution

404. Water pollution is usually categorised as either diffuse or point source. Point source sources come from a single well-defined point, an example being the discharge from a WwTW.

405. Diffuse pollution is defined as:

> "unplanned and unlicensed pollution from farming, old mine workings, homes, and roads. It includes urban and rural activity and arises from industry, commerce, agriculture and civil functions and the way we live our lives."

406. Examples of diffuse sources of water pollution include:

- Contaminated runoff from roads – this can include metals and chemicals.
- Drainage from housing estates
- Misconnected sewers (foul drains to surface water drains)
- Accidental chemical/oil spills from commercial sites
- Surplus nutrients, pesticides, and eroded soils from farmland
- Septic tanks and non-mains sewer systems

407. The most likely sources of diffuse pollution from new developments include drainage from housing estates, runoff from roads and discharges from commercial and industrial premises. The pollution risk posed by a site will depend on the sensitivity of the receiving environment, the pathway between

the source of the runoff and the receiving waters, and the level of dilution available. After or during heavy rainfall, the first flush of water carrying accumulated dust and dirt is often highly polluting.

408. Whilst the threat posed by an individual site may be low, several sites together may pose a cumulative impact within the catchment.

409. Runoff from development sites should be managed by a suitably designed SuDS scheme. Potential impacts on receiving surface waters include the blanketing of riverbeds with sediment, a reduction in light penetration from suspended solids, and a reduction in natural oxygen levels, all of which can lead to a loss in biodiversity.

10.3 Pathways

410. Pollutants can take several different pathways from their source to a “receptor” – a habitat or species that can be impacted. This could be overland via surface water flow paths, via the river system, or via groundwater or a combination of all three.

10.4 Receptors

10.4.1 Environmental receptors

411. A receptor in this case is a habitat or species that is adversely impacted by a pollutant. Both the rivers and groundwater as well as being pathways, can also be considered to be receptors.

412. Within the study area and downstream are many sites with environmental designations such as:

- Special Areas of Conservation (SAC)
- Special Protection Areas (SPA)
- Sites of Special Scientific Interest (SSSI)
- Ramsar sites (Wetlands of International Importance)
- Priority Habitats and Priority Headwaters

413. A description of these, and the relevant legislation that defines and protects them, can be found in section 3.7.

414. To identify protected sites that may be at risk, Flood Zone 2 from the Risk of Flooding from Rivers and the Sea mapping was used to define an area that was either adjacent to a river or could be reasonably expected to receive surface water from a river. Where a WwTW was present in the catchment upstream of the protected site, it was considered that there was a risk of deterioration in water quality due to growth during the Local Plan period, and the first WwTW upstream of the site is reported in the table (other WwTWs must also be considered in future analysis). Where there were no WwTWs serving growth upstream, risk of deterioration is considered to be low, and would not be shown by water quality modelling. However, in these cases the overall catchment water quality should be considered where for example they are designated for migratory fish species that may spend part of their lifecycle elsewhere in the catchment.

415. Priority Habitats are available to view on the DEFRA Magic Map website, which can be accessed here.

416. The environmental designated sites which may be impacted by change in discharge from the WwTW upstream are listed below in Appendix A.8. There are 127 SSSIs in and around the study area, some of the larger sites have been labelled in Figure 10-1.

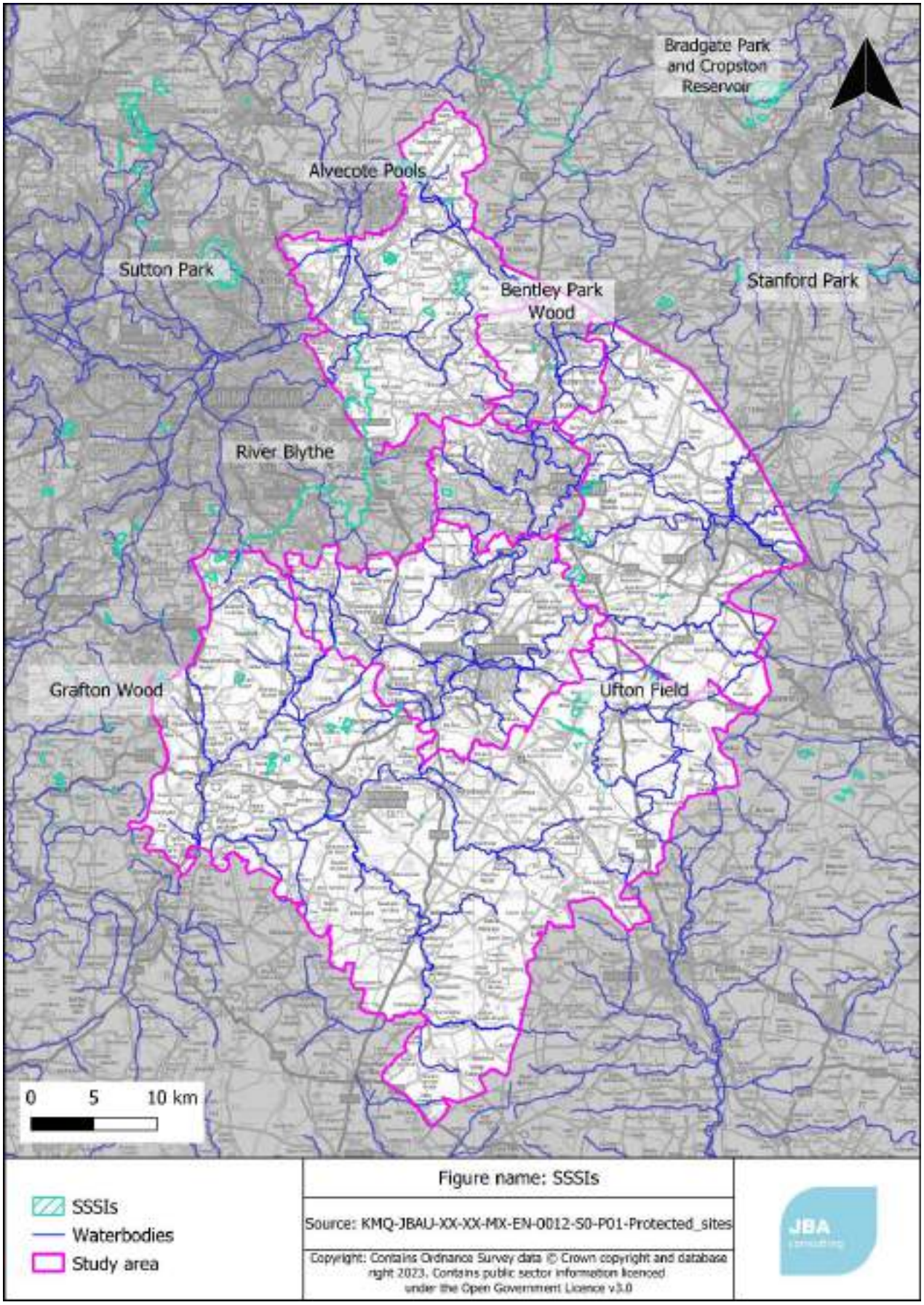

Figure 10-1 SSSIs in and around the study area.

10.4.2 Bathing waters

417. The UK has seen a significant growth in the number of people participating in open water swimming and other watersports on both inland and coastal waters. Maintaining and improving bathing water quality is an important concern to public health, as swimming at beaches or inland waters contaminated with faecal bacteria can result in illness. A major source of pollution for faecal bacteria are from insufficiently treated/untreated wastewater, overflows from WwTWs and storm overflows, misconnections in the sewage network, runoff from livestock farming and spreading of poorly treated bio-waste.

418. Weather is an important consideration in bathing water quality, heavy rainwater causes stormwater overflow and the release of diluted sewage into bathing waters or streams that discharge close to beaches. In years with below average sunshine, water quality can be affected as the sun's UV rays kill faecal bacteria in water.

419. There are no designated bathing waters within the study area, but there is one undesignated recreational bathing water area found within the sub-region study area. The Midlands Open Water activity centre is located on a private lake adjacent to the River Tame near to Kingsbury, within North Warwickshire Borough.

10.5 Protection and mitigation

10.5.1 Agricultural Management

420. The Environment Agency's 'Reason for Not Achieving Good' database indicates that one of the reasons for some of the watercourses in the district are not meeting 'Good' WFD standards can be related to agriculture and rural land use. The cause of this includes pollution from fertilisers, manures, pesticides, and soils washing into streams when it rains or percolating into the groundwater. Other pressures from agriculture include deepening, widening or re-routing of streams for land drainage, gravel removal and bankside erosion.

421. There is a big potential to improve water quality by interventions aimed at agricultural sources, especially considering the measures already taken by the water companies to reduce their contribution to phosphate load.

422. Potential schemes could include:

- Buffer strips
- Cross slope tree planting
- Runoff retention basins
- Contour ploughing
- Cover crops

423. There is considerable overlap with NFM measures, and the challenges are also very similar. Exact impacts are difficult to measure, although modelling tools such as Farmscoper exist to help with this (ADAS, 2023). Once a scheme is implemented it relies on the landowner to continue to maintain it in order to maintain the mitigation benefit.

424. Funding for agricultural interventions could come from Catchment Sensitive Farming or a Payment for Ecosystem Services approach.

Case Study – Wessex Water - EnTrade

425. Wessex Water catchment team used EnTrade to invite farmers to bid to grow cover crops over winter to reduce the nitrogen leaching into the watercourse.

426. This avoided the need to upgrade Dorchester WwTW to provide the same nitrogen removal capacity.

427. A trial auction was held in 2015, and two further auctions have since taken place attracting 557 bids from 63 farmers to save 153 tonnes of nitrogen.

428. “Using EnTrade to create a market in measures to deliver reductions in nitrogen has delivered a 30% saving for Wessex Water compared to traditional catchment approaches.” Ruth Barden, Director of Environmental Strategy, Wessex Water

Case Study- Severn Trent Water, Farming Schemes

429. Farming for Water is a scheme set up by STW that works directly with farmers to "deliver integrated environmental solutions to protect river health and drinking water". Working with 5,000 farmers to date STW have provided over 1,500 grants to help enable farmers to improve their water management with their relevant catchment.

430. Farm to Tap is another scheme offered to help farmers manage water health and pesticides, focussing on themes of healthy crops and clean water.

431. The most recent work done within the Farm to Tap scheme focussed on run-off from farmland and the effects it was having on drinking water, with a particular focus on reducing and mitigating the use of metaldehyde (a substance found in banned slug pellets), which is difficult to treat.

10.5.2 Barriers

432. Whilst there are many benefits to implementing NFM and constructed wetlands, or modifying agricultural practises, the impact of these techniques is hard to quantify, and relies on ongoing maintenance to maintain that benefit. Where a potential scheme is not on a development site it will also require permission and support of the landowner. It may not be possible to influence this through planning policy.

10.5.3 Diffuse sources of water pollution

433. The most likely sources of diffuse pollution from new developments include drainage from housing estates, runoff from roads and discharges from commercial and industrial premises. The pollution risk posed by a site will depend on the sensitivity of the receiving environment, the pathway between the source of the runoff and the receiving waters, and the level of dilution available. A probable impact score of low, medium or high was applied to each site to provide an indication of the likely impact prior to any mitigation being applied. It should be noted that this is a desk-based assessment to highlight risk and should not replace the appropriate level assessment on a site-by-site basis. Other development sites not identified in the table, may still contribute to a cumulative impact within the catchment and so management of water quality of surface runoff from these sites should still be considered.

10.5.4 Groundwater Protection

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

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

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

436. The EA have published a position paper outlining its approach to groundwater protection which includes direct discharges to groundwater, discharges of effluents to ground and surface water runoff (Environment Agency e, 2018). This is of relevance to this water cycle study where a development may manage surface water through SuDS.

Sewage and trade effluent

437. Discharge of treated sewage of 2m^3 per day or less to ground are called small sewage discharges (SSDs). Most SSDs do not require an environmental permit if they comply with certain qualifying conditions. A permit will be required for all SSDs in Source Protection Zone 1 (SPZ1).

438. For treated sewage effluent discharges, the EA encourages the use of shallow infiltration systems, which maximise the attenuation within the drainage blanket and the underlying unsaturated zone. Whilst some sewage effluent discharges may not pose a risk to groundwater quality individually, the cumulative risk of pollution from aggregations of discharges can be significant. Improvement or pre-operational conditions may be imposed before granting an environmental permit. The EA will only agree to developments where the addition of new sewage effluent discharges to ground in an area of existing discharges is unlikely to lead to an unacceptable cumulative impact.

439. Generally, the Environment Agency will only agree to developments involving release of sewage effluent, trade effluent or other contaminated discharges to ground if it is satisfied that it is not reasonable to make a connection to the public foul sewer. The developer would have to provide evidence of why the proposed development cannot connect to the foul sewer in the planning application. This position will not normally apply to surface water run-off via sustainable drainage systems and discharges from sewage treatment works operated by sewerage undertakers with appropriate treatment and discharge controls.

440. Deep infiltration systems (such as boreholes and shafts) are not generally accepted by the EA for discharge of sewage effluent as they bypass soil layers and reduce the opportunity for attenuation of pollutants.

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

Discharge of clean water

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

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

- be suitably designed.
- meet Government non-statutory technical standards for sustainable drainage systems (UK Government n, 2015) – these should be used in conjunction with the NPPF and PPG
- and use a SuDS management treatment train (see sections 10.5.5 to 0)

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

Source Protection Zones in the sub-region

445. The Source Protection Zones (SPZs) that are present in the study are shown in Figure 10-2. There are several SPZ1s across the study area that need to be taken into consideration when carrying out future developments.

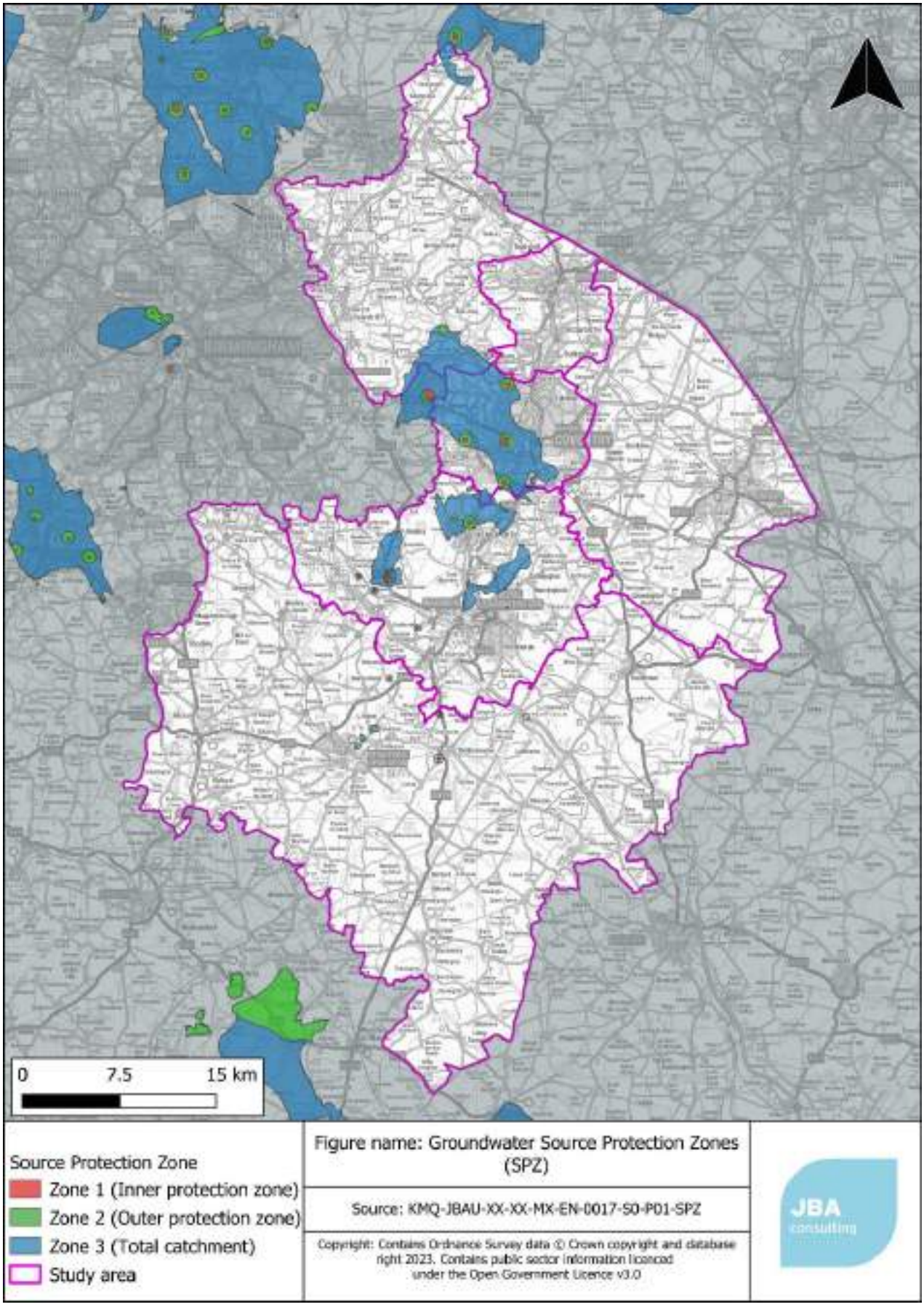

Figure 10-2 Groundwater Source Protection Zones (SPZ) in the sub-region.

10.5.5 Use of SuDS in Water Quality Management

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

447. This is usually facilitated via a SuDS Management Train of several components in series that provide a range of treatment processes delivering gradual improvement in water quality and providing an environmental buffer for accidental spills or unexpected high pollutant loadings from the site. Considerations for SuDS design for water quality are summarised in Table 10-1.

Table 10-1 Considerations for SuDS design for water quality

Design Principle	Details
Manage surface water close to source	Where practicable, treatment systems should be designed to be close to source of runoff. It is easier to design effective treatment when the flow rate and pollutant loadings are relatively low. Treatment provided can be proportionate to pollutant loadings. Accidental spills or other pollution events can be isolated more easily without affecting the downstream drainage system. Encourages ownership of pollution. Poor treatment performance or component damage/failure can be dealt with more effectively without impacting on the whole site.

Design Principle	Details
Treat surface water runoff on the surface	Where practicable, treatment systems should be designed to be on the surface. Where sediments are exposed to UV light, photolysis and volatilisation processes can act to break down contaminants. If sediment is trapped in accessible parts of the SuDS, it can be removed more easily as part of maintenance. It enables use of evapotranspiration and some infiltration to the ground to reduce runoff volumes and associated total contamination loads (provided risk to groundwater is managed appropriately). It allows treatment to be delivered by vegetation. Sources of pollution can be easily identified. Accidental spills or misconnections are visible immediately and can be dealt with rapidly. Poor treatment performance can be easily identified during routine inspections, and remedial works can be planned efficiently.
Treat surface water runoff to remove a range of contaminants	SuDS design should consider the likely presence and significance of any contaminate that may pose a risk to the receiving environment. The SuDS component or combination of components selected should include treatment processes that, in combination, are likely to reduce this risk to acceptably low levels.
Minimise risk of sediment remobilisation	The SuDS design should consider and mitigate the risks of sediments (and other contaminants) being remobilised and washed into receiving surface waters during events greater than those which the component has been specifically designed for.
Minimise impacts from accidental spills	By using a number of components in series, SuDS can help ensure that accidental spills are trapped in/on upstream component surfaces, facilitating contamination management and removal. The selected SuDs components should deliver a robust treatment design that manages risks appropriately - taking into account the uncertainty and variability of pollution ladings and treatment processes.

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

449. SuDS designs should control the ‘first flush’ of pollutants (usually mobilised by the first 5mm of rainfall) at source, to ensure contaminants are not

released from the site. Best practise is that no runoff should be discharged from the site to receiving watercourses or sewers for the majority of small (e.g., less than 5mm) rainfall events.

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

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

10.5.6 Use of SuDS in Nutrient Neutrality

452. SuDS can, through a variety of treatment processes, significantly reduce nutrients in urban runoff before discharge to the environment. This is particularly true of SuDS which include trees and plants which require phosphorous and nitrogen for growth. The CIRIA SuDS Manual (Woods Ballard, 2015) cites evidence from Australia that bioretention systems (for example rain gardens) can remove over 80% of the total phosphorous content of urban runoff.

453. Swales can also be used to manage phosphorus. They are a linear depression, usually in grass, which lead surface water to a storage of discharge system. The grass acts as a filter and slows down surface water movement allowing oily residues and sources of pollution to be broken down in the top layer of soil and vegetation. Aside from water being led to storage of discharge points, water can be lost from evapotranspiration or infiltration (SuDS Wales, 2023).

454. Within the EPAs Stormwater Management Model Reference Manual (EPA, 2016) it was found that swales have a TP removal rate/ concentration treatment of 29-45%. Another source found that the removal rate/ concentration treatment was 58-78% (Pratt, 2004).

10.5.7 Further benefits of SuDS

Flood Risk

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

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

Water Resources

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

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

Climate Resilience

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

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

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

Biodiversity

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

Amenity

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

10.5.8 Suitable SuDS Techniques

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

465. Appropriate SuDS techniques have been categorised into five main groups, as shown in Table 10-2. Further site-specific investigation should be conducted to determine what SuDS techniques could be used on a particular development, informed by detailed ground investigations.

Table 10-2 Summary of SuDS Categories

SuDS Type	Technique
Source Controls (Susdrain a, 2023)	Green Roof, Rainwater Harvesting, Pervious Pavements, Rain Gardens
Infiltration (Susdrain b, 2023)	Infiltration Trench, Infiltration Basin, Soakaway

SuDS Type	Technique
Detention (Susdrain c, 2023)	Pond, Wetland, Subsurface Storage, Shallow Wetland, Extended Detention Wetland, Pocket Wetland, Submerged Gravel Wetland, Wetland Channel, Detention Basin
Filtration (Susdrain d, 2023)	Surface Sand filter, Sub-Surface Sand Filter, Perimeter Sand Filter, Bioretention, Filter Strip, Filter Trench
Conveyance (Susdraine, 2023)	Dry Swale, Under-drained Swale, Wet Swale

10.5.9 Integrated constructed wetland management.

466. An integrated constructed wetland (ICW) is an artificial wetland created for the purpose of treating polluted water, whether this is municipal wastewater, grey water from residential properties, or agricultural runoff.

467. They are usually unlined, free surface flow wetlands, designed to contain and treat influents within emergent vegetated areas.

468. Defra carried out a systematic review of the effectiveness of various wetland types, including ICWs for mitigating agricultural pollution such as phosphate and nitrate. The overall conclusion was that all wetland types are very effective at reducing major nutrients and suspended sediments, except for nitrite in ICWs. Nitrate is only reduced when passing through overland buffer strips and through constructed wetlands with vegetation, where the systematic review showed a mean reduction of 29% across the evidence included in the study.

469. The mean reduction in Total Phosphorus across the evidence base was 78%.

Case Study – Frogshall ICW

470. The Upper River Mun in Norfolk was experiencing chronic pollution, and a loss in biodiversity in the river. Investigation found that nutrients from a Sewage Treatment Works upstream were contributing to this issue.

471. A pilot ICW was created consisting of three shallow ponds, filled with 18,000 emergent aquatic plants, and the outfall from the treatment works was diverted to pass through the wetland.

472. Early monitoring has shown that 90% of the phosphate is being removed by the wetland, and a large increase in biodiversity downstream observed.

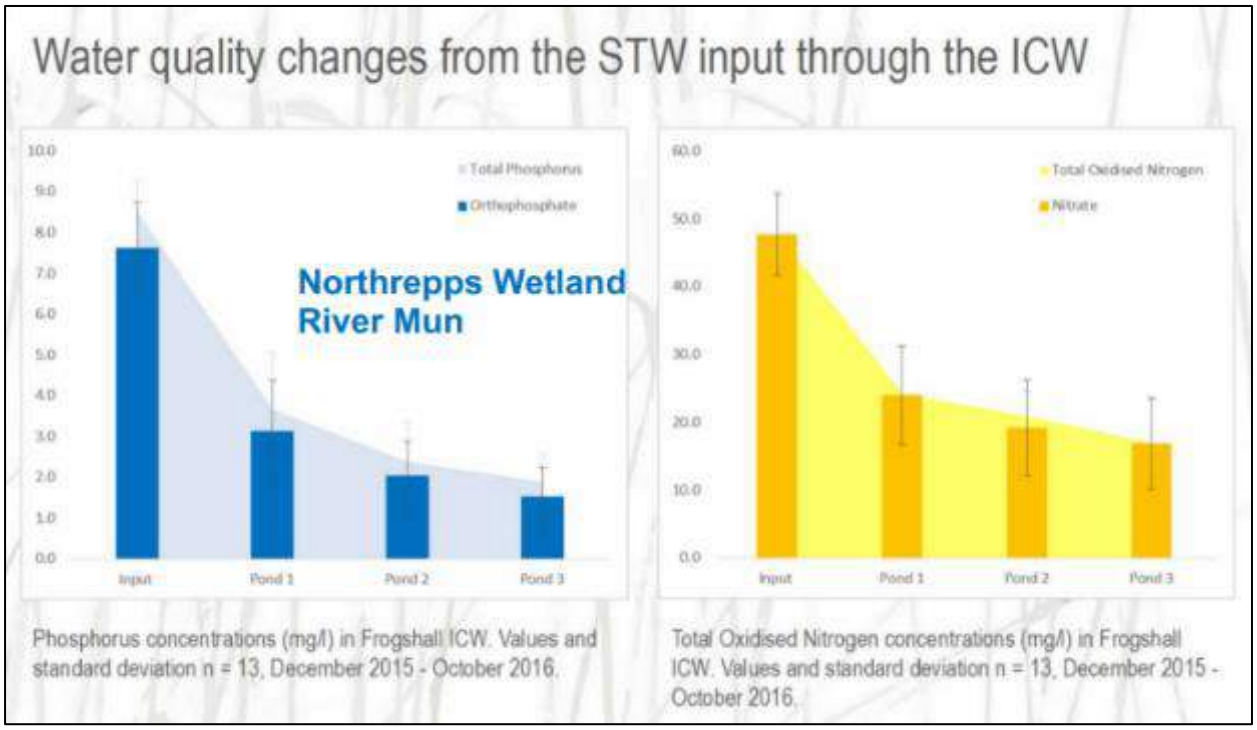

Figure 10-3 Reproduced from “Stripping the Phosphate” a presentation by the Norfolk Rivers Trust (2018).
https://www.theriverstrust.org/media/2018/08/2.-Stripping-the-phosphate-David-Diggens-Norfolk-Rivers-Trust.pdf

10.5.10 Natural Flood Management

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

- Peatland and moorland restoration in upland catchments
- Offline storage areas
- Re-meandering streams
- Targeted woodland planting

- Reconnection and restoration of functional floodplains
- Restoration of rivers and removal of redundant structures
- Installation or retainment of large woody material in river channels
- Improvements in management of soil and land use
- Creation of rural and urban SuDS

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

10.5.11 Multiple Benefits of NFM

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

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

477. Suitable techniques may include:

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

10.6 Summary

478. The potential impact of development on a number of protected sites such as SAC and SSSIs within, or downstream of the study area should be carefully considered in future plan making.

479. There are several Groundwater Source Protection Zones, in the study area. The impact of future development on groundwater should be investigated fully.

480. Development sites within the study area could be sources of diffuse pollution from surface runoff.

481. There are no official designated bathing areas within the study area. But there is one undesignated site called Midlands Open Water.

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

483. Opportunities exist for these SuDS schemes to offer multiple benefits of flood risk reduction, amenity value and biodiversity.

484. The sub-region LPAs should be consulted at an early stage of development to ensure that SuDS are implemented and designed in response to site characteristics and policy factors.

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

10.7 Recommendations

Table 10-3 Recommendations for managing environmental opportunities and constraints.

Action	Responsibility	Timescale
Consider the environmental impact of development on protected sites downstream of receiving wastewater treatment works in the Habitats Regulations Assessment.	All LPAs in study area	Local Plan development

Action	Responsibility	Timescale
The Local Plan should include policies that require all development proposals with the potential to impact on areas with environmental designations to be considered in line with the relevant legislation and where stated, in consultation with Natural England (for national and international designations and priority habitats).	All LPAs in study area	Ongoing
The Local Plan of each LPA should include policies that require development sites to adopt SuDS to manage water quality of surface runoff.	All LPAs in study area	Ongoing
In partnership, identify opportunities for incorporating SuDS into open spaces and green infrastructure, to deliver strategic flood risk management and meet WFD water quality targets.	All LPAs in study area STW	Ongoing
Developers should include the design of SuDS at an early stage to maximise the benefits of the scheme.	Developers	Ongoing
Work with developers to discourage connection of new developments into existing surface water and combined sewer networks. Prevent surface water connections into the foul network, as this is a significant cause of sewer flooding.	All LPAs in study area Developers	Ongoing
Opportunities for Natural Flood Management that include schemes aimed at reducing / managing runoff should be considered to reduce nutrient and sediment pollution within the sub-region.	All LPAs in study area.	Ongoing

11 Summary

11.1 Recommendations

Action	Responsibility	Timescale
Water Resources and Water Supply		
Continue to regularly review forecast and actual household growth across the supply region through WRMP Annual Update reports, and where significant change is predicted, engage with Local Planning Authorities.	STW, SSW	Ongoing
Provide yearly profiles of projected housing growth to water companies to inform the WRMP update.	All LPAs	Ongoing
Use planning policy to require a water efficiency target of 100l/pd to be achieved using a fittings-based approach.	All LPAs	In LPs
Use planning policy to require new build non-residential development greater than 1000sqm to achieve at least 4 credits in the Wat01 Measure for water in the BREEAM New Construction standard.	All LPAs	In LPs
The concept of water neutrality has the potential to provide a benefit in improving resilience to climate change and enabling all waterbodies to be brought up to Good status. Explore further with the water companies and the Environment Agency how the Council's planning and climate change policies can encourage this approach. This approach could have application in strategic sites and new settlements	All LPAs, EA, STW, SSW	In LPs and Climate Change Action Plan
Larger residential developments (including new settlements), and commercial developments should consider incorporating greywater recycling and/or rainwater harvesting into development at the master planning stage to reduce water demand.	All LPAs, STW, SSW	In LPs
Water companies should advise all LPAs of any strategic water resource infrastructure developments within the study, where these may require safeguarding of land to prevent other type of development occurring.	All LPAs, STW, SSW	Part of LP process
Wastewater Collection		
Consider the available WwTW capacity when phasing development going to the same WwTW.	All LPAs STW	Ongoing

Action	Responsibility	Timescale
Provide Annual Monitoring Reports to STW detailing projected housing growth.	All LPAs	Ongoing
STW to assess growth demands as part of their wastewater asset planning activities and feedback to the LPAs if concerns arise.	STW	Ongoing
In the stage 2 WCS, work with water companies to determine whether allocation sites could increase the frequency of storm overflow operation.	STW	Stage 2 WCS
Wastewater Treatment		
Early engagement with STW and TW is required to ensure that provision of WwTW capacity is aligned with delivery of development.	All LPAs	Ongoing
Provide Annual Monitoring Reports to STW and TW detailing projected housing growth.	All LPAs	Ongoing
STW to assess growth demands as part of their wastewater asset planning activities and feedback to the Council if concerns arise.	STW	Ongoing
Water Quality		
Provide annual monitoring reports to STW and SSW detailing projected housing growth in the Local Authority.	Relevant LPAs	Ongoing
When preferred options for growth are identified, undertake water quality impact modelling as part of a Stage 2 WCS.	Relevant LPAs	Ongoing
Consider the full volume of growth (from relevant LPAs and neighbouring authorities) within the catchment when considering WINEP schemes or upgrades at WwTWs.	STW	Ongoing
Environmental Opportunities and Constraints		
Consider the environmental impact of development on protected sites downstream of receiving wastewater treatment works in the Habitats Regulations Assessment	All LPAs in study area	Local Plan Development
The Local Plan should include policies that require all development proposals with the potential to impact on areas with environmental designations to be considered in line with the relevant legislation and where stated, in consultation with Natural England (for national and international designations and priority habitats).	All LPAs in study area	Ongoing
The Local Plan of each LPA should include policies that require development sites to adopt SuDS to manage water quality of surface runoff.	All LPAs in study area	Ongoing
In partnership, identify opportunities for incorporating	All LPAs in	Ongoing

Action	Responsibility	Timescale
SuDS into open spaces and green infrastructure, to deliver strategic flood risk management and meet WFD water quality targets.	study area STW	
Developers should include the design of SuDS at an early stage to maximise the benefits of the scheme.	Developers	Ongoing
Work with developers to discourage connection of new developments into existing surface water and combined sewer networks. Prevent surface water connections into the foul network, as this is a significant cause of sewer flooding.	All LPAs in study area Developers STW	Ongoing
Opportunities for Natural Flood Management that include schemes aimed at reducing / managing runoff should be considered to reduce nutrient and sediment pollution within the sub-region.	All LPAs in study area.	Ongoing

A Appendices

A.1 Further water quality information

486. The overall WFD classification of a water body is based on a wide range of ecological and chemical classifications. The assessments in a WCS focus on three physico-chemical quality elements; Biochemical Oxygen Demand (BOD), Ammonia, and Phosphate as set out in the EA guidance.

BOD – Biochemical Oxygen Demand

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

Ammonia

488. Nitrogen is an essential nutrient required by all plants and animals for the formation of amino acids. In its molecular form nitrogen cannot be used by most aquatic plants, and so it is converted into other forms. One such form is ammonia (NH3). This may then be oxidized by bacteria into nitrate (NO3) or nitrite (NO2). Ammonia may be present in water in either the unionized form NH3 or the ionized form NH4 (also called ammonium). Taken together these forms care called Total Ammonia Nitrogen.

489. In the SIMCAT water quality model, it is referred to as Ammonia (NH_4).

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

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

492. Although ammonia

Phosphate

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

494. Phosphorus (P) occurs in rivers mainly as Phosphate (PO4), which are divided into Orthophosphates (reactive phosphates), and organic Phosphates.

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

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

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

A.2 Appendix: Full list of SSSIs

SSSIs	Reference
Alvecote Pools	SK255044
Ashby Canal	SK364073
Aston Grove & Withycombe Wood	SP140571
Badby Wood	SP563582
Bannam's Wood	SP114642
Baynhall Meadow	SO980531
Bentley Park Wood	SP289954
Berkswell Marsh	SP228797
Berry Mound Pastures	SP092776
Bickenhill Meadows	SP188816
Birches Barn Meadows	SK281020
Bittell Reservoirs	SP019749
Boon's Quarry	SP329946
Bosworth Mill Meadow	SP628822
Botcheston Bog	SK485046
Bradgate Park and Cropston Reservoir	SK533106
Brandon Marsh	SP386754
Bromsgrove Road Cutting, Tenterfields	SO970835
Brook Meadow, Darley Green	SP179743
Broom Railway Cutting	SP086528
Burbage Wood and Aston Firs	SP452940
Burcot Lane Cutting	SO970716
Calcutt Locks Meadows	SP465633
Cannock Extension Canal	SK019056
Cave's Inn Pits	SP538795
Chasewater And The Southern Staffordshire Coalfield Heaths	SK028094
Clayhanger	SK033046
Cliffe Hill Quarry	SK474107
Clowes Wood & New Fallings Coppice	SP100739
Coleshill and Bannerly Pools	SP198859
Combe Pool	SP390793
Copmill Hill	SP152578
Coten End Quarry	SP290654
Croft and Huncote Quarry	SP511964
Croft Hill	SP509966

SSSIs	Reference
Croft Pasture	SP509958
Dagnell End Meadow	SP051691
Daw End Railway Cutting	SK037003
Dormston Church Meadow	SO986575
Draycote Meadows	SP450707
Edgbaston Pool	SP054840
Enderby Warren Quarry	SK541000
Ensor's Pool	SP348903
Everdon Stubbs	SP605566
Foster's Green Meadows	SO978649
Gentleshaw Common	SK051111
Gipsy Lane Pit	SK619071
Grafton Wood	SO973560
Griff Hill Quarry	SP362889
Groby Pool and Woods	SK519082
Guy's Cliffe	SP293667
Harbury Quarries	SP381589
Harbury Railway Cutting	SP379602
Hay Head Quarry	SP047984
Herald Way Marsh	SP379769
Hewell Park Lake	SP010689
High Close Farm, Snitterfield	SP233596
High Wood and Meadow	SP591547
Hoar Park Wood	SP265932
Hopwood Dingle	SP033762
Illey Pastures	SO977811
Illing's Trenches	SP323942
Ipsley Alders Marsh	SP078676
Jockey Fields	SK040029
Kendall's Meadow	SP393980
Kilby - Foxton Canal	SP652959
Kingsbury Brickworks	SP220992
Kingsbury Wood	SP233975
Long Itchington & Ufton Woods	SP388627
Long Meadow, Thorn	SP015552
Loxley Church Meadow	SP259532
Mantles Heath	SP597552

SSSIs	Reference
Merriman's Hill Farm Meadows	SP135686
Middleton Pool	SP189982
Misterton Marshes	SP556851
Monkspath Meadow	SP145763
Napton Hill Quarry	SP457611
Narborough Bog	SP549978
Newton Burgoland Marshes	SK381089
Oak Tree Farm Meadows	SP189666
Portway Farm Meadows	SO986549
Rabbit Wood	SO958578
Racecourse Meadow	SP185536
Railway Meadow, Langley	SP199632
Ramsden Corner Plantation	SP623564
River Blythe	SP211775
River Itchen	SP404557
River Mease	SK264113
Romsley Hill	SO959790
Romsley Manor Farm	SO965790
Rookery Cottage Meadows	SO996612
Rough Hill & Wirehill Woods	SP053641
Ryton and Brandon Gravel Pits	SP386760
Ryton Wood	SP381723
Salt Meadow, Earl's Common	SO961591
Sheepy Fields	SK332025
Sheet Hedges Wood	SK529087
Sherbourne Meadows	SP240618
Shrewley Canal Cutting	SP212674
Snitterfield and Bearley Bushes	SP200606
Stanford Park	SP586792
Stock Wood Meadows	SO998586
Stockton Railway Cutting and Quarry	SP442643
Stowe Pool and Walk Mill Clay Pit	SK121101
Stubbers Green Bog	SK046016
Sutton Park	SP098970
Swan Pool & The Swag	SK039019
The Leasowes	SO979840
Tilehill Wood	SP279789

SSSIs	Reference
Trickses Hole	SP003639
Ufton Fields	SP381615
Ullenhall Meadows	SP121678
Ulverscroft Valley	SK492127
Waverley Wood Farm	SP366714
Welford Field	SP139528
Whitacre Heath	SP209927
Wilmcote Quarry	SP151593
Windmill Naps Wood	SP092723
Wolston Gravel Pit	SP410747
Woodlands Quarry	SP324947
Wylde Moor, Feckenham	SP010603
Yellow House Meadow	SO966527

*Some SSSIs have multiples due to having multiple sites under one name.

A.3 Appendix: Full list of WFD waterbodies

WB_ID	WB_NAME	Overall Status
GB109054043920	Avon - ClaycotonYelvertoft Bk to conf R Sowe	Poor
GB109054044480	Finham Bk - conf Canley Bk to conf R Sowe	Moderate
GB109054044520	Canley Bk - source to conf with Finham Bk	Moderate
GB109054044540	Sowe - conf Withy Bk to conf R Avon	Poor
GB109054044620	Sherbourne - source to conf R Sowe	Poor
GB109054044630	Smite Bk - source to conf R Sowe	Poor
GB109054044640	Withy Bk - source to conf R Sowe	Moderate
GB109054044660	Sowe - conf Breach Bk to conf Withy Bk	Moderate
GB109054044690	Breach Bk - source to conf R Sowe	Poor
GB109054044700	Sowe - source to conf Breach Bk	Moderate
GB104028042410	Didgeley Brook from Source to R Bourne	Moderate
GB104028042420	Cole from Hatchford-Kingshurst Brook to R Blythe	Moderate
GB104028042430	Wem Brook from Source to River Anker	Moderate
GB104028042440	Anker - source to Wem Bk	Good
GB104028042481	Bourne - source to R Tame	Moderate
GB104028042572	Blythe from Patrick Bridge to R Tame	Moderate
GB104028042630	Dog Lane Brook from Source to R Tame	Poor
GB104028046430	Anker from Wem Brook to River Sence	Poor
GB104028046440	Tame from R Blythe to River Anker	Poor
GB104028046460	Anker from River Sence to River Tame	Poor
GB104028046841	Tame - R Rea to R Blythe	Moderate
GB104028046901	Langley Bk - source to conf R Tame	Moderate
GB104028042470	Sketchley Brook from Source to River Anker	Moderate
GB104028042580	Soar from Source to Soar Brook	Moderate
GB109054043880	Sow Bk - source to conf R Avon	Moderate
GB109054043900	Clifton Bk - source to conf R Avon	Poor

WB_ID	WB_NAME	Overall Status
GB109054043940	Swift source to conf Avon	Poor
GB109054044070	Itchen - source to conf with R Stowe	Moderate
GB109054044090	Stowe - source to conf R Itchen	Poor
GB109054044110	Itchen - conf R Stowe to conf R Leam	Poor
GB109054044120	Leam - source to conf Rains Bk	Moderate
GB109054044130	Leam - conf Rains Bk to conf R Itchen	Bad
GB109054044140	Leam - conf R Itchen to conf R Avon	Poor
GB109054044150	Rains Bk - source to conf R Leam	Poor
GB104028042380	Temple Balsall Brook from Source to R Blythe	Moderate
GB104028042390	Cuttle Brook from Source to River Blythe	Poor
GB104028042400	Blythe from Source to Cuttle Brook	Poor
GB109054043690	Thelsford Bk - source to conf R Avon	Moderate
GB109054043730	Sherbourne Bk - source to conf R Avon	Poor
GB109054043740	Tach Bk - source to conf R Avon	Poor
GB109054043760	Alne conf Preston Bagot Bk to conf Claverdon Bk	Moderate
GB109054043800	Gog Bk - source to conf R Avon	Moderate
GB109054043810	Claverdon Bk - source to conf R Alne	Moderate
GB109054043830	Alne - source to conf Preston Bagot Bk	Good
GB109054043840	Avon (Warks) - conf R Sowe to conf R Leam	Poor
GB109054043850	Preston Bagot Bk - source to conf R Alne	Moderate
GB109054044080	Radford Bk - source to conf R Leam	Good
GB109054044402	Avon (Wark) conf R Leam to Tramway Br, Stratford	Poor
GB109054044470	Finham Bk - source to conf Canley Bk	Good
GB104028042501	Cole from Source to Springfield	Poor
GB106039037320	Sor Brook (Source to Broughton)	Moderate
GB106039037340	Hanwell Brook	Good
GB106039037390	Little Compton Brook and tributaries (Source to Evenlode)	Good
GB106039042660	Highfurlong Brook (to Cherwell)	Good

WB_ID	WB_NAME	Overall Status
GB109054039470	Noleham Bk - source to conf R Avon	Moderate
GB109054039490	Marchfont Bk - source to conf R Avon	Moderate
GB109054039501	Dene - source to Butlers Marston	Good
GB109054039540	Dene - Butlers Marston to conf R Avon	Poor
GB109054039820	Nethercote Bk - source to conf R Stour	Poor
GB109054039840	Knee Bk - conf Blockley Bk to conf R Stour	Moderate
GB109054039860	Stour (Warks) - source to conf Nethercote Bk	Moderate
GB109054039890	Wagtail Bk - source to conf R Stour (Warks)	Moderate
GB109054039921	Stour - conf Back Bk to conf R Avon	Poor
GB109054039922	Stour - conf Nethercote Bk to conf Back Bk	Moderate
GB109054043680	Arrow - conf R Alne to conf R Avon	Moderate
GB109054043720	Alne - conf Claverdon Bk to conf R Arrow	Poor
GB109054043750	Cain Bk - source to conf R Arrow	Good
GB109054043780	Arrow - Spernall Hall Fm, Studley to conf R Alne	Poor
GB109054043890	Arrow - source to Spernall Hall Fm, Studley	Moderate
GB109054044401	Avon- Tramway Br Stratford to Workman Br Evesham	Moderate

A.4 Appendix: WwTW catchments

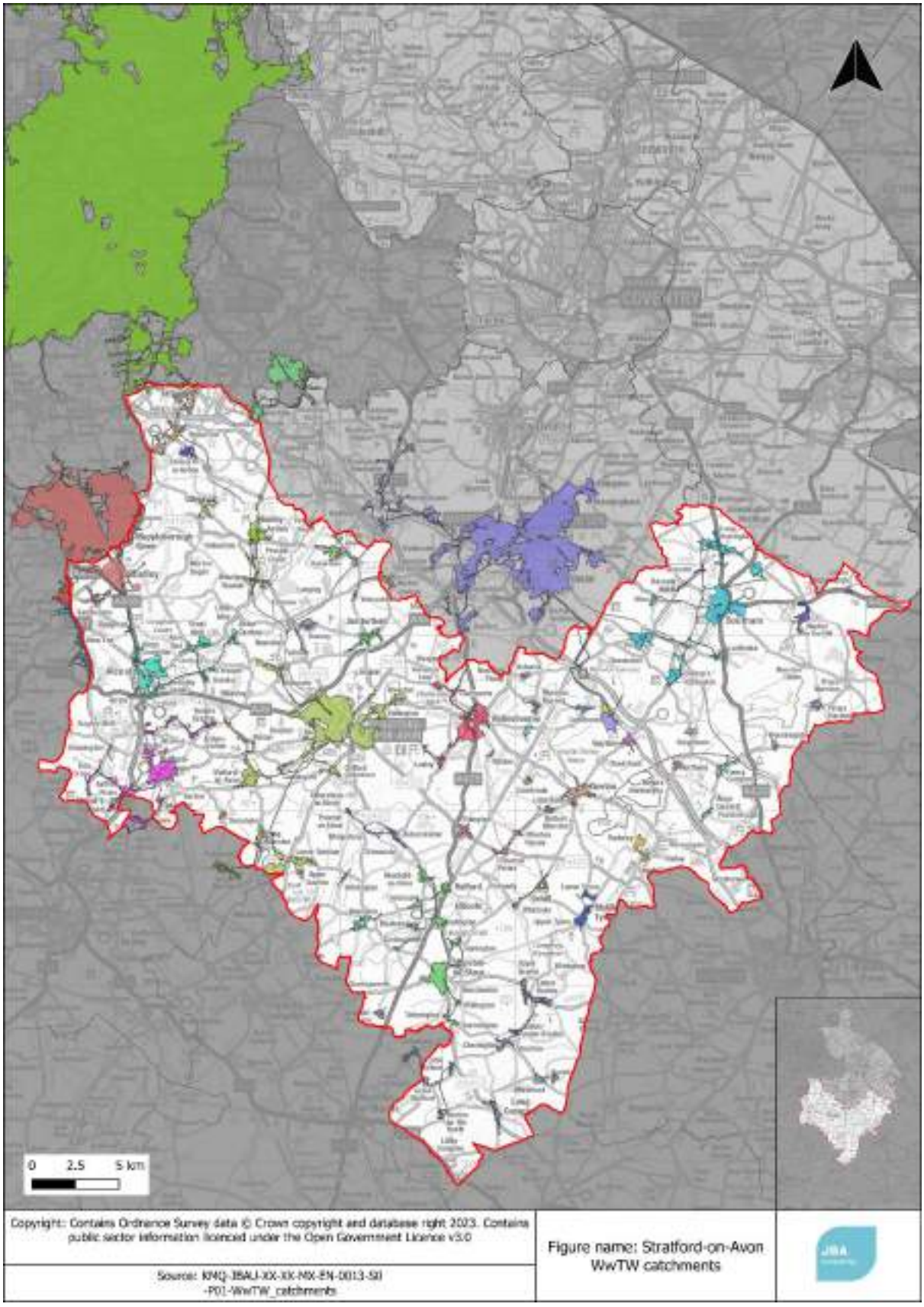

Figure 11-1 WwTW catchments either fully or partially within Stratford on Avon council area** Legend below.

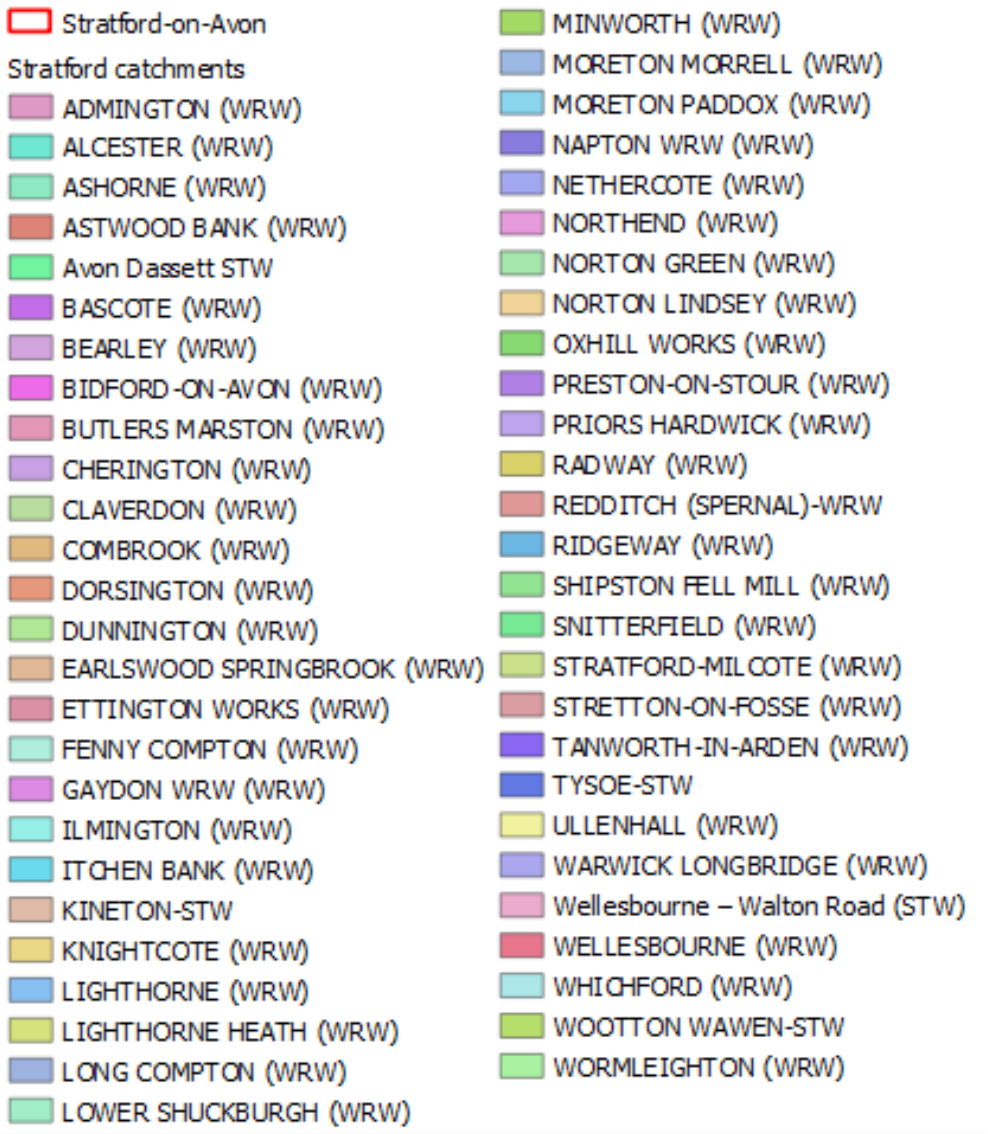

Figure 11-2 Stratford-on-Avon legend for the WwTW catchment map

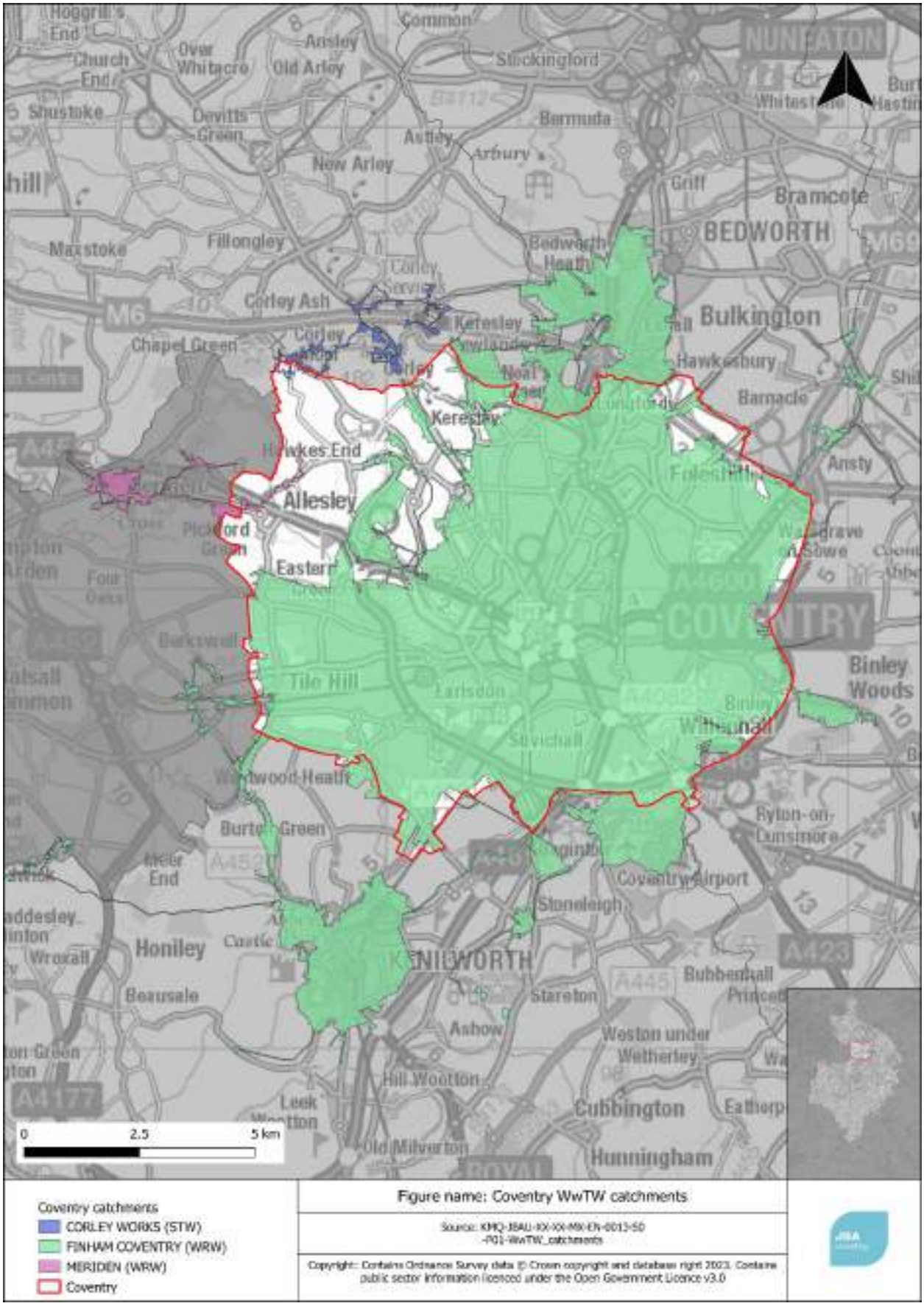

Figure 11-3 Coventry WwTW Catchments

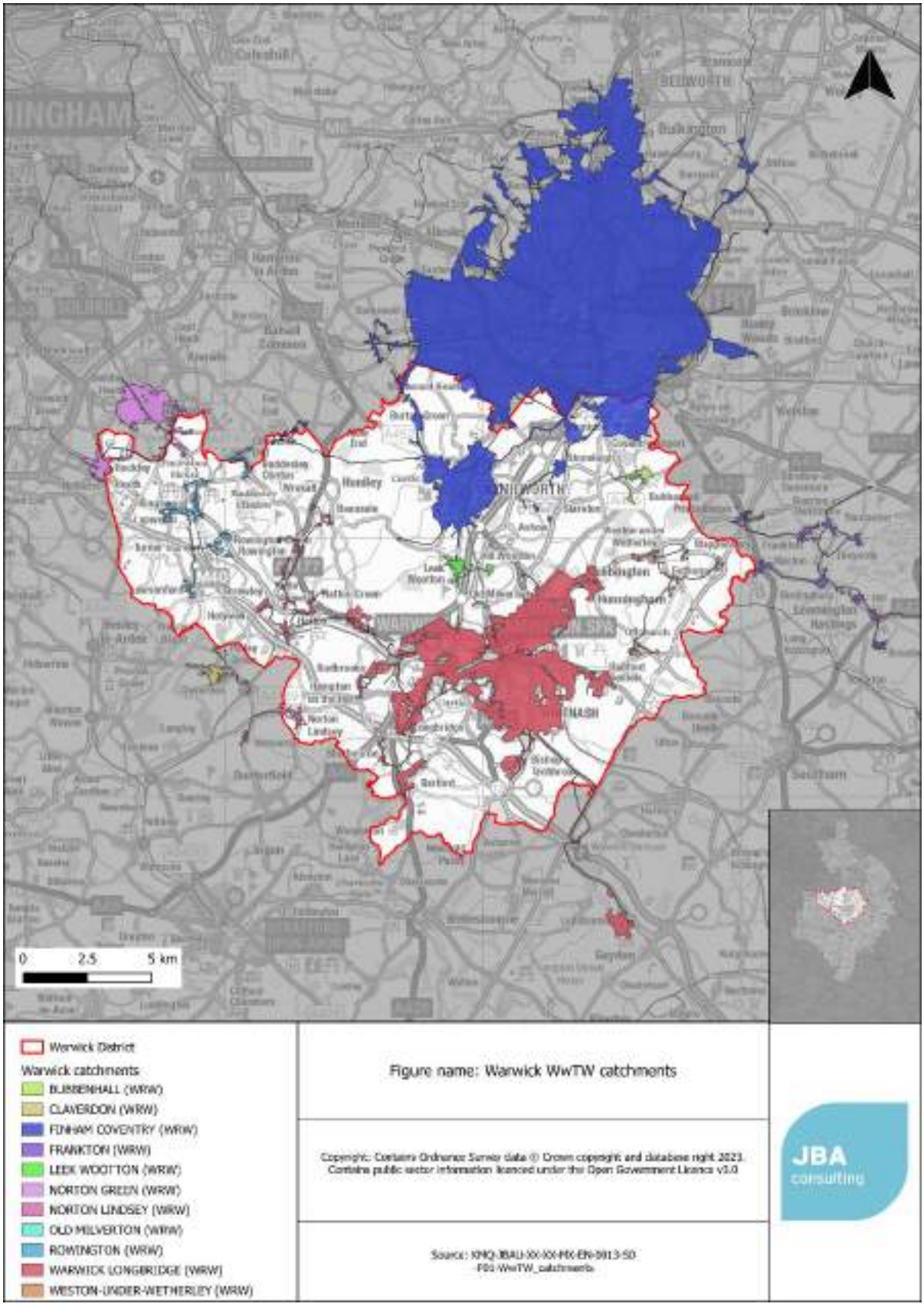

Figure 11-4 Warwick WwTW catchments.

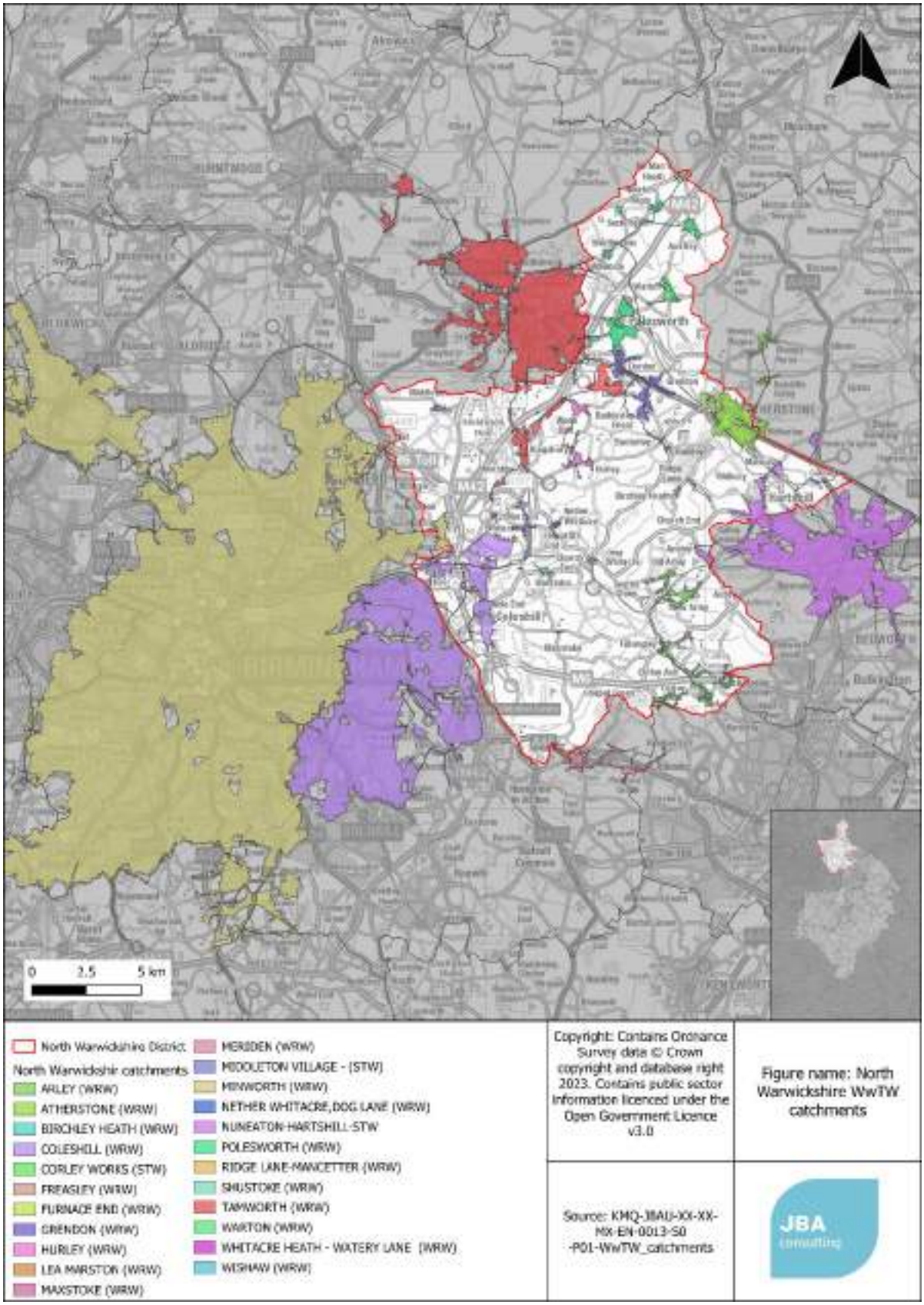

Figure 11-5 North Warwickshire WwTW catchments.

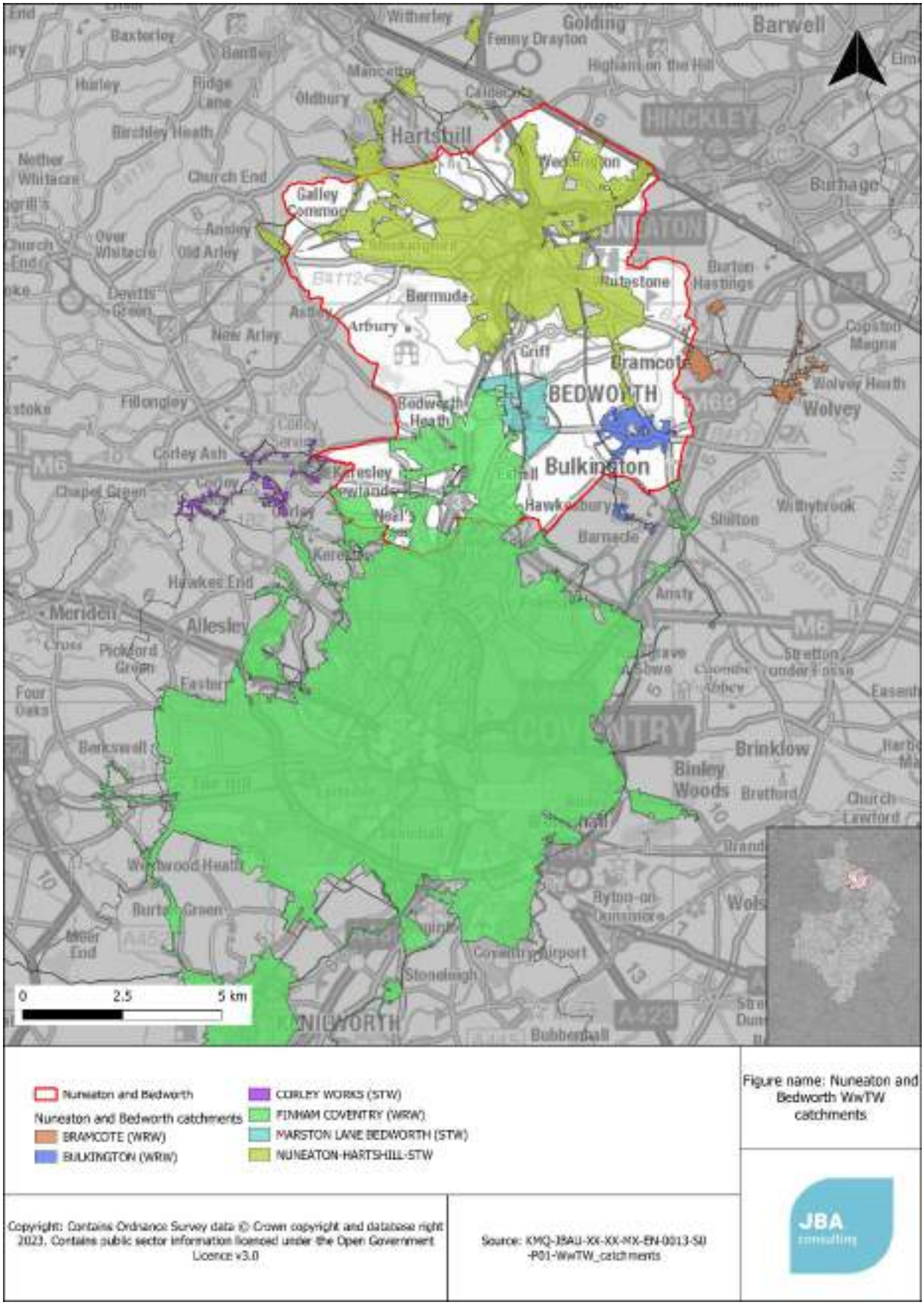

Figure 11-6 Nuneaton and Bedworth WwTW catchments.

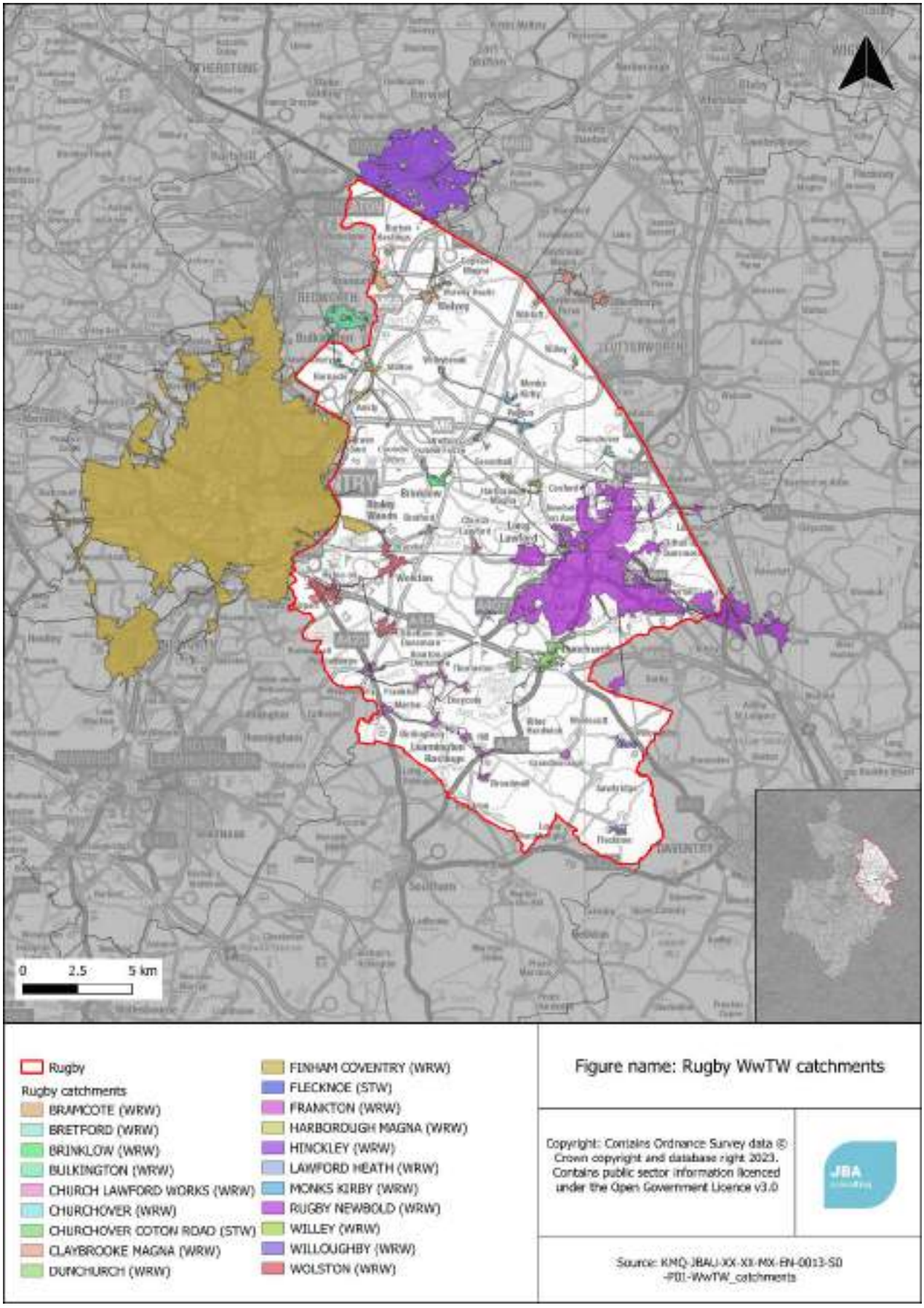

Figure 11-7 Rugby WwTW catchments

A.5 Appendix: WINEP waterbody actions

Waterbody Name	WINEP ID	Unique ID	Scheme Name(s)	Type of scheme/ notes
Anker from Wem Brook to River Sence	WMD00591 WMD00849 WMD01112 FLO00275 FLO00276 WMD01393 WMD01548 WMD00456 CHM00143 WMD01394	7ST200977 7ST201235 7ST201498 7ST300257 7ST300258 7ST201766 7ST300215 7ST200842 7ST300051 7ST201767	ATHERSTONE (STW) St Marys Rd Nuneaton PS NUNEATON-HARTSHILL (STW) WEDDINGTON - CHURCH LANE (CSO) Nuneaton Hartshill STW (CIP2 T1)	Undertake full investigation following the Storm Overflow Assessment Framework to Stage 4 (Decision), including Environmental Impact Assessment and Cost Benefit Assessment of Options to determine an agreed (between WaSC and Environment Agency) outcome (Need for spill reduction scheme and detail of that scheme).” 18 - 20 effluent samples to assess substance reduction. New targets required to meet conservation objective standards since PR14 (CSMG)

Waterbody Name	WINEP ID	Unique ID	Scheme Name(s)	Type of scheme/ notes
Tame from R Blythe to River Anker	WMD00702	7ST201088	HURLEY (STW)	
Anker from River Sence to River Tame	WMD00763 WMD01532 EDM00729 WMD01323 WMD01324 WMD01325	7ST201149 7ST300199 7ST300107 7ST201703 7ST201704 7ST201705	POLESWORTH (STW) GRENDON (STW) POLESWORTH BRIDGE (TPS) Grendon STW (CIP2 T1)	
Mease from Source to Gilwiskaw Brook	WMD00563 WMD00784	7ST200949 7ST201170	SNARESTONE (STW)	The WwTW storm tank capacity must be increased to 68 litres/head or 2 hours at max flow through the tanks. Intermittent Discharge
Mease from Hooborough Brook to Trent	WMD00746 WMD00754	7ST201132 7ST201140	NETHERSEAL (STW) OVERSEAL (STW)	
Blythe from Temple Balsall Brook to Patrick Bridge	WMD01237 WMD01275 WMD01520 CHM00096 CHM00097 WMD01276 WMD01277 WMD01278 CHM00160	7ST201623 7ST201658 7ST201828 7ST300004 7ST300005 7ST201659 7ST201660 7ST201661 7ST300068	SPINNEY STW BARSTON (STW) Barston STW (CIP1) Solihull Barston STW	18 - 20 effluent samples to assess substance reduction and environmental monitoring for reduction in concentration.

Waterbody Name	WINEP ID	Unique ID	Scheme Name(s)	Type of scheme/ notes
Blythe from Patrick Bridge to R Tame	EMD00961 EDM00713 WMD01373 WMD01374	7ST300176 7ST300091 7ST201749 7ST201750	MERIDEN (STW) COLESHILL - COVENTRY RD (SO) Meriden STW (CIP2 T1)	New targets required to meet conservation objective standards since PR14 (CSMG).
Stoke Golding Brook from Source to R Sence	FLO00283 FLO00284 FLO00285 FLO00286 WMD01369 WMD01417	7ST300259 7ST300260 7ST300261 7ST300262 7ST201746 7ST201788	SHENTON WEST (TPS) SIBSON (TPS) MARKET BOSWORTH (STW) SIBSON (STW)	
Cuttle Brook from Source to River Blythe	WMD00752 WMD01386 WMD01387	7ST201138 7ST100265 7ST201760	NORTON GREEN (STW)	
Blythe from Source to Cuttle Brook	EDM00714 EDM00715	7ST300092 7ST300093	SOLIHULL - MALVERN PARK (CSO) Church Hill Close CSO	
Wem Brook from Source to River Anker	WMD00531 WMD00603 WMD00624 WMD00445 WMD01289 WMD01290	7ST200917 7ST200989 7ST201010 7ST200831 7ST201671 7ST201672	BEDWORTH (STW) BULKINGTON (STW) BEDWORTH - MARSTON LANE STW (CSO)	The WwTW storm tank capacity must be increased to 68 litres/head or 2 hours at max flow through the tanks.
Anker - source to Wem Bk	FLO00566 FLO00567	7ST300315 7ST300316	Bramcote - Anker Bridge	

Waterbody Name	WINEP ID	Unique ID	Scheme Name(s)	Type of scheme/ notes
Sketchley Brook from Source to River Anker	WMD00694 WMD00448 WMD00449 WMD00450 WMD01329 WMD01330 WMD01331 WMD01332 WMD01543 EDM00769	7ST201080 7ST200834 7ST200835 7ST200836 7ST201709 7ST201710 7ST201711 7ST201712 7ST300210 7ST300147	HINCKLEY - FOREST ROAD (CSO) HINCKLEY - SOUTHFIELD ROAD (CSO) HINCKLEY - WESTRAY DRIVE (CSO) HINCKLEY (STW) HINCKLEY - LANGDALE ROAD (CSO) HINCKLEY - FOREST ROAD (CSO)	Undertake spill reduction scheme or agreed alternative as defined by the agreed (by WaSC and Environment Agency) outcome from the U_INV investigation
Bourne - source to R Tame	WMD00770 WMD00781 WMD01268 WMD01416	7ST201156 7ST201167 7ST100254 7ST201787	RIDGE LANE-MANCETTER (STW) SHENSTONE (STW) ARLEY (STW) SHUSTOKE (STW)	
Hatchford-Kingshurst Brook from Source to R Cole	EDM00711 EDM00712	7ST300089 7ST300090	OLTON - ULVERLEY GREEN RD (SPS) MARSTON GREEN - BELL LANE (CSO)	
Langley Bk - source to conf R Tame	WMD00599 WMD00735 EMD00945	7ST200985 7ST201121 7ST300160	BASSETTS POLE (STW) MIDDLETON VILLAGE (STW) BASSETTS POLE (STW)	

Waterbody Name	WINEP ID	Unique ID	Scheme Name(s)	Type of scheme/ notes
Avon - ClaycotonYelvertoft Bk to conf R Sowe	WMD00623 WMD00537 WMD00633 WMD00685 WMD00775 FLO00301 FLO00302 WMD00027 WMD01558	7ST201009 7ST200923 7ST201019 7ST201071 7ST201161 7ST300265 7ST300266 7ST200795 7ST300222	BUBBENHALL (STW) CHURCH LAWFORD (STW) HARBOROUGH MAGNA (STW) RUGBY NEWBOLD (STW) RYTON-ON-DUNSMORE - CHURCH ROAD (TPS) Wolston STW site RUGBY NEWBOLD (STW)	Scheme at former Wolston STW to create / improve priority habitat, to contribute towards biodiversity priorities. Opportunity for natural flood management , enhance biodiversity and habitat on this Water Company owned site close to a SSSI, this will also improve wildlife corridors to a nearby SSSI (Brandon Marsh). Tightening of permit for Ammonia from 5 to 4mg/l.
Avon (Warks) - source to Claycoton-Yelvertoft Bk	WMD00743 WMD00813	7ST201129 7ST201199	NASEBY (STW) WELFORD (STW)	
Swift source to conf Avon	EDM00754	7ST300132	LUTTERWORTH - FOX INN (CSO)	Undertake full investigation following the Storm Overflow Assessment Framework to Stage 4 (Decision), including Environmental Impact Assessment and Cost Benefit Assessment of Options to determine an agreed (between WaSC and Environment Agency) outcome (Need for spill reduction scheme and detail of that scheme).”

Waterbody Name	WINEP ID	Unique ID	Scheme Name(s)	Type of scheme/ notes
Stowe - source to conf R Itchen	EDM00758	7ST300136	SOUTHAM - BANBURY ROAD (CSO)	Undertake full investigation following the Storm Overflow Assessment Framework to Stage 4 (Decision), including Environmental Impact Assessment and Cost Benefit Assessment of Options to determine an agreed (between WaSC and Environment Agency) outcome (Need for spill reduction scheme and detail of that scheme).”
Itchen - conf R Stowe to conf R Leam	WMD00706 WMD01346	7ST201092 7ST100262	ITCHEN BANK (STW)	
Leam - source to conf Rains Bk	WMD00616 FLO00570 FLO00571	7ST201002 7ST300323 7ST300324	BRAUNSTON (STW) Hellidon - Stockwell Lane SPS	
Leam - conf Rains Bk to conf R Itchen	WMD00664 WMD00677	7ST201050 7ST201063	DUNCHURCH (STW) FRANKTON (STW)	
Leam - conf R Itchen to conf R Avon	FLO00303 FLO00304 WMD00570 WMD00818	7ST300267 7ST300268 7ST200956 7ST201204	STRETTON-ON-DUNSMORE (TPS) WESTON-UNDER-WETHERLEY (STW)	

Waterbody Name	WINEP ID	Unique ID	Scheme Name(s)	Type of scheme/ notes
Rains Bk - source to conf R Leam	WMD00709 WMD01541 CHM00127 CHM00128	7ST201095 7ST300208 7ST300035 7ST300036	KILSBY (STW) Kilsby STW (CIP2 T2)	18 -20 effluent samples to assess substance reduction and environmental monitoring for reduction in concentration
Thelsford Bk - source to conf R Avon	FLO00261 FLO00262 WMD01270 WMD01357	7ST300251 7ST300252 7ST201653 7ST201735	LIGHTHORNE - MORTON MORRELL LANE (SPS) ASHORNE (STW) LIGHTHORNE (STW)	
Sherbourne Bk - source to conf R Avon	WMD00785 WMD01392 WMD01418	7ST201171 7ST201765 7ST201789	NORTON LINDSEY (STW) SNITTERFIELD (STW)	
Tach Bk - source to conf R Avon	WMD00717 WMD01358	7ST201103 7ST201736	LIGHTHORNE HEATH (STW) LIGHTHORNE HEATH (STW)	
Claverdon Bk - source to conf R Alne	WMD00600	7ST200986	BEARLEY (STW)	
Alne - source to conf Preston Bagot Bk	FLO00576 FLO00577	7ST300325 7ST300326	Tamworth In-Arden - Danzey Grn La SPS	
Preston Bagot Bk - source to conf R Alne	WMD00774 WMD01555	7ST201160 7ST300221	ROWINGTON (STW)	

Waterbody Name	WINEP ID	Unique ID	Scheme Name(s)	Type of scheme/ notes
Sowe - conf Withy Bk to conf R Avon	CHM00109	7ST300017	Coventry Finham STW	
Sherbourne - source to conf R Sowe	WMD01585	7ST300312	Sherbourne - source to conf R Sowe	
Sowe - conf Breach Bk to conf Withy Bk	WMD01584	7ST300311	Coventry Coal Measures	
Avon (Wark) conf R Leam to Tramway Br, Stratford	WMD00740 WMD00811 WMD01430	7ST201126 7ST201197 7ST201800	MORETON MORRELL (STW) WARWICK - LONGBRIDGE (STW) Warwick(Longbridge) STW (CIP2 T1)	

A.6 Appendix: Storm overflows - sewer network

Table 11-1 Storm overflows on sewer network

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages* +	RAG rating
169 WARWICK ROAD CSO	S/13/26837/O	49.51	32	63.27	42	24.07	23	32.33	Amber
ADJACENT NO. 177 EVESHAM ROAD CSO	S/13/09239/O	149.74	18.00	578.16	45.00	168.73	29.00	30.67	Amber
ALCESTER ROAD CSO	S/13/23220/O	68.24	41.00	67.40	40.00	46.13	42.00	41.00	Amber
ANKER BRIDGE PUMPING STATION	T/19/36340/O	922.23	44.00	19.52	7.00	33.60	10.00	20.33	Amber
BANBURY - ORCHARD CLOSE (CSO)	TBC	No data	No data	No data	No data	No data	No data	No data	No data

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages* +	RAG rating
BANBURY ROAD CSO	S/13/20324/O	No data	No data	0.49	2.00	No data	No data	2.00	No data
BARTON ROAD COMBINED SEWER OVERFLOW	S/13/08946/O	No data	No data	55.70	14	9.65	8	11.00	Amber
BATH PLACE CSO	EPRWP3926XH	26.54	20.00	21.19	19.00	10.48	17.00	18.67	Amber
BEDWORTH ROAD CSO	T/19/01498/O	No data	No data	0.05	1.00	No data	No data	1.00	Green
BRIDGEWAY CSO	S/13/26430/O	No data	No data	12.94	8.00	6.25	8.00	8.00	No data
BRINDLEY ROAD SPS	TBC	No data	No data	No data	No data	No data	No data	No data	No data
BRINKLOW COMBINED CSO	NPSWQD000303	No data	No data	73.29	29.00	20.79	16.00	22.50	Amber

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages* +	RAG rating
BROOKSIDE AVENUE CSO	S/11/05067/O	No data	No data	4.47	6.00	0.95	3.00	4.50	Green
CANLEY - TOLCIL CROFT STORM TANK 1 (CSO)	TBC	No data	No data	No data	No data	No data	No data	No data	No data
CANLEY - TOLCIL CROFT STORM TANK 1 (CSO)	TBC	No data	No data	No data	No data	No data	No data	No data	No data
CANLEY CSO	S/11/04668/R	14.44	8.00	40.55	14.00	27.72	16.00	12.67	Amber
CASTLE CRESCENT CSO	S/13/20328/O	No data	No data	No data	No data	No data	No data	No data	No data
CASTLE ROAD CSO	S/15/23166/O	3.90	2.00	No data	No data	3.22	3.00	2.50	Green

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages* +	RAG rating
CAUDLE WELL PUMPING STATION	S/14/23238/O	58.99	9.00	1.19	1.00	4.61	1.00	3.67	Green
CHURCH LANE COMBINED SEWER OVERFLOW	T/19/00771/O	47.35	10	2.72	3	0.71	2	5.00	Green
CHURCH LANE RYTON PUMPING STATION	S/10/26087/O	No data	No data	No data	No data	No data	No data	No data	No data
CHURCH ROAD CSO/ Wilmcote	S/13/26500/O	1.64	3.00	0.17	1.00	0.26	2.00	2.00	Green
CLIFFORD CHAMBERS - THE CLOSE (CSO)	TBC	No data	No data	70.95	6.00	No data	No data	6.00	Green
COLE	T/12/0249	195.13	21.00	167.96	26.00	119.48	16.00	21.00	Amber

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages* +	RAG rating
END SPS	2/O								
COLESHILL - 54 OLD MILL ROAD CSO	T/12/36069/O	54.63	13.00	65.52	17.00	53.68	15.00	15.00	Amber
COLLYCROFT COMBINED SEWER OVERFLOW/ Bedworth-Nuneaton Road	T/19/02814/O	2.64	14	0.78	2	No data	No data	8.00	Green
COTTAGE LANE CSO	S/13/21484/O	15.61	21.00	15.05	30.00	8.77	13.00	21.33	Amber
COVENTRY - MAUDSLAY ROAD (CSO)	TBC	No data	No data	0.58	1.00	No data	No data	1.00	Green

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages* +	RAG rating
CUBBINGTON SEWAGE PUMPING STATON	S/12/23084/O	114.15	23.00	68.05	22.00	53.05	20.00	21.67	Amber
DANZEY GREEN SPS - STORM/EMERG 0/F	S/15/12208/O	85.40	27.00	59.98	26.00	2.22	8.00	20.33	Amber
DORRIDGE - NORTON GREEN LANE SPS	T/11/35890/O	No data	No data	260.62	25.00	9.86	4.00	14.50	Amber
DUNCHURCH - DAVENTRY ROAD (SPS)	TBC	No data	No data	No data	No data	No data	No data	No data	No data

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages* +	RAG rating
EARLSWOOD (WOOD END) SEWAGE PS	T/11/0845 7/O	No data	No data	No data	No data	No data	No data	No data	No data
FAIRWATER CRESCENT SPS	TBC/ TSC3360	58.62	8.00	118.27	18.00	6.65	5.00	10.33	Amber
FILLONGLEY - TAMWORTH ROAD SPS	T/15/3529 8/O	115.07	32.00	209.31	45.00	144.05	34.00	37.00	Amber
FINDON CLOSE SEWAGE PUMPING STATION	T/19/3539 7/O	623.03	65.00	3.27	3.00	1.26	2.00	23.33	Amber
Hampton on the Hill - Henley Road (SPS)	TBC	No data	No data	No data	No data	No data	No data	No data	Amber
HARBUR	TSC3453	361.08	28.00	20.38	16.00	2.42	4.00	16.00	Amber

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages* +	RAG rating
Y - MILL STREET SPS									
HILL (A426) SEWAGE PUMPING STATION	TBC	100.68	7	No data	No data	No data	No data	7.00	Green
HOLBROOKS - WHITMORE PARK ROAD (CSO)	TBC	No data	No data	No data	No data	No data	No data	No data	No data
Hunters Lane (Avon Mill) Rugby PS	TBC	No data	No data	95.71	14.00	No data	No data	14.00	Amber
KENILWORTH - DALEHOUSE LANE TPS	S/11/07065/O	103.02	18.00	217.74	32.00	132.25	28.00	26.00	Amber

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages* +	RAG rating
KENILWORTH - THE CLOSE-MILL END CSO	S/11/26415/O	0.49	1.00	5.07	4.00	2.24	2.00	2.33	Green
KINGS COUGHTON - BIRMINGHAM ROAD SPS	S/15/08983/O	56.63	9.00	87.00	9.00	9.04	5.00	7.67	Green
KINGSBURY PUMPING STATION	T/16/07864/O	No data	No data	No data	No data	1.75	1.00	1.00	Green
LEAMINGTON - ALDWICK CLOSE (CSO)	TBC	No data	No data	No data	No data	No data	No data	No data	No data
LEAMINGTON CSO 50	S/12/20259/O	No data	No data	No data	No data	No data	No data	No data	No data
LEAMING	S/12/2026	9.59	7.00	227.11	30.00	36.03	18.00	18.33	Amber

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages* +	RAG rating
TON-PRINCES DRIVE CSO 19B	4/O								
LIGHTHORNE SEWAGE PUMPING STATION	S/13/23222/O	25.34	13.00	170.99	21.00	8.79	6.00	13.33	Amber
Lion Fields Avenue / Birmingham Road CSO	TBC	No data	No data	1.31	7.00	No data	No data	7.00	Green
LITTLE KINETON CSO	S/13/20327/O	4.19	1.00	0.54	1.00	0.07	1.00	1.00	Green
LODGE FARM DRIVE CSO	S/13/23221/O	36.34	9.00	86.15	21.00	6.34	7.00	12.33	Amber
LONG ITCHINGTON SPS	S/12/25044/O	131.46	13.00	218.28	22.00	28.36	7.00	14.00	Amber
LONG LAWFOR	S/10/2606	3092.82	155.00	No data	No data	No data	No data	155.00	No data

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages* +	RAG rating
D SEWAGE PUMPING STATION	6/R								
LUTTERWORTH RD PUMPING STATION	S/11/23198/O	No data	No data	No data	No data	No data	No data	No data	No data
MAIN STREET COMBINED SEWER OVERLOW	S/13/08803/O	15.86	20	1.65	4	0.57	1	8.33	Green
MEADOW STREET CSO	S/11/25660/O	0.11	3.00	0.02	1.00	No data	No data	2.00	Green
MERRYFIELDS FARM SPS	S/13/07698/O	384.89	26.00	No data	No data	No data	No data	26.00	Amber
MIDDLETON CHURCH LANE CSO	T/16/02646/O	1.02	3.00	5.29	8.00	2.10	5.00	5.33	Green

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages* +	RAG rating
MILL HOUSE PUMPING STATION	S/14/09258/O	75.55	18.00	98.56	24.00	56.47	23.00	21.67	Amber
MILL LANE PUMPING STATION	S/14/12195/O	67.78	7.00	47.40	8.00	5.36	2.00	5.67	Green
N LEAMINGTON FOUL SEWER CSO 90	S/12/20261/O	20.11	10.00	31.90	25.00	22.57	22.00	19.00	Amber
NEWBOLD-AVON LANE CSO	S/10/26458/O	41.24	30.00	102.76	38.00	27.62	28.00	32.00	Amber
NEWTON REGIS SPS (CSO)	T/21/00159/O	No data	No data	22.04	17.00	37.10	25.00	21.00	Amber

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages* +	RAG rating
NUNEATON - ST MARYS ROAD O/F 2 (CSO)	TBC	No data	No data	No data	No data	No data	No data	No data	No data
Nunts Lane CSO	TBC	No data	No data	1.10	1.00	No data	No data	1.00	Green
PADDOCK LANE SEWAGE PUMPING STATION	S/13/08373/O	No data	No data	175.32	42.00	108.27	35.00	38.50	Amber
POLESWORTH BRIDGE PUMPING STATION	T/21/22068/O	No data	No data	142.83	36.00	70.71	18.00	27.00	Amber
PRINCES DRIVE CSO 19A	S/12/20263/O	142.29	30.00	339.62	59.00	10.47	9.00	32.67	Amber
ROYAL MEADOW DRIVE CSO	NPSWQD003812	102.30	47.00	No data	No data	No data	No data	47.00	Amber

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages* +	RAG rating
RUGBY ROAD PUMPING STN. - EMERG O/F	S/10/12219/O	No data	No data	3.49	1.00	1.37	1.00	1.00	Green
SCHOOL ROAD PS - STORM/EMERG O/F	S/15/09257/O	No data	No data	No data	No data	No data	No data	No data	Amber
SHERBOURNE (CSO)	TBC. S/11/26637/R	213.28	19.00	No data	No data	No data	No data	19.00	Amber
SHILTON -SHILTON LANE BRICKYARD SPS	TBC/ TSC3881	88.94	14.00	9.75	2.00	No data	No data	8.00	Green
SHIPSTON ROAD CSO	S/13/21639/O	No data	No data	1.26	5.00	No data	No data	5.00	Green
SHUTTINGTON - NEW	TBC	No data	No data	No data	No data	0.00	0.00	0.00	Amber

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages* +	RAG rating
ROAD (TPS)									
SOUTHAM - BANBURY ROAD CSO	S/12/07887/O	No data	No data	4.51	9.00	5.83	11.00	10.00	Green
SOUTHAM PUMPING STATION (SPS)	S/12/25045/O	No data	No data	No data	No data	92.54	14.00	14.00	Amber
SOUTHAM STREET CSO	S/13/20323/O	No data	No data	0.14	1.00	No data	No data	1.00	Green
ST. MARYS ROAD PUMPING STATION	T/19/08001/O	No data	No data	6.44	3.00	No data	No data	3.00	Green
ST. MARYS ROAD PUMPING STATION	T/19/08001/O	20.70	7.00	No data	No data	169.83	20.00	13.50	Amber

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages* +	RAG rating
STAMFORD GARDENS CSO OVERFLOW 20	S/12/21859/O	0.35	1.00	369.23	34.00	No data	No data	17.50	Amber
STATION ROAD CSO	S/17/21775/O	13.36	11.00	2.55	15.00	10.88	8.00	11.33	Green
STOCKTON-NEW ZEALAND /NAPTON RDSPS	S/12/25046/O	212.31	25.00	386.47	47.00	395.65	41.00	37.67	Amber
STRATFORD - BANBURY RD/SWANS NEST (CSO)	TBC	No data	No data	1.15	1.00	No data	No data	1.00	Amber
THE LODGE - STATION ROAD SPS	TSC3930	No data	No data	No data	No data	No data	No data	No data	Amber

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages* +	RAG rating
TIDDINGTON ROAD CSO	S/13/09259/O	3.71	2.00	10.43	11.00	No data	No data	6.50	Green
TIDDINGTON ROAD CSO	S/13/09259/O	No data	No data	1.22	3.00	0.01	1.00	2.00	Green
UPPER TYSOE - SMARTS LANE SPS	S/14/09028/O	2.75	5.00	1.75	5.00	No data	No data	5.00	Green
WEDDINGTON SEWAGE PUMPING STATION	T/19/02830/O	1065.55	57.00	71.64	17.00	95.81	21.00	31.67	Amber
WELFORD ON AVON CSO	TSC4064	134.57	34.00	258.96	49.00	No data	No data	41.50	Amber
WESTON PUMPING STATION	S/13/05334/O	No data	No data	No data	No data	111.86	40.00	40.00	Amber

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages* +	RAG rating
WESTON-ON-AVON (SPS)	TBC	No data	No data	489.71	56.00	No data	No data	56.00	Amber
WHITACRE HEATH - STATION ROAD X (SPS)	TBC	No data	No data	No data	No data	No data	No data	No data	Amber
WHITEBROOK CSO	TSC4102	7.28	2.00	No data	No data	No data	No data	2.00	Amber
WOLVERTON SEWAGE PUMPING STATION	S/13/09366/O	3.55	1.00	No data	No data	No data	No data	1.00	Amber
WOLVERTON SEWAGE PUMPING STATION	S/13/09366/O	No data	No data	No data	No data	No data	No data	No data	Amber
WOOD END CSO	T/14/35328/O	38.47	36.00	22.66	26.00	28.67	34.00	32.00	Amber

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Averages*+	RAG rating
WOOD STREET - KIMBERLEY ROAD CSO	S/10/04488/O	No data	No data	No data	No data	No data	No data	No data	No data

*+ Averages of data available

A.7 Appendix: Storm overflows - WwTW storm tanks

Table 11-2 WwTW Storm Tank Overflows

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Average*+	RAG rating
ALCESTER (OVERSLEY GREEN) STW	S/15/26435/B-3	No data	No data	3.58	2.00	0.00	0.00	1.00	Green
ASHORNE STORM TANKS	S/13/25762/R	No data	No data	No data	No data	No data	No data	No data	No data
AVON DASSETT WWTW	TEMP. 2362	No data	No data	56.91	13.00	80.24	11.00	12.00	Amber
BASCOTE SEWAGE TREATMENT WORKS	S/12/25831/R	628.34	47.00	0.00	0.00	0.00	0.00	15.67	Amber
BASSETTS POLE STW	T/16/36166/R	129.98	22.00	253.46	34.00	154.22	28.00	28.00	Amber

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Average*+	RAG rating
BEDWORTH MARSTON LANE STW	T/19/36017/R	45.65	18.00	0.00	0.00	29.27	14.00	10.67	Amber
BEDWORTH MARSTON LANE STW	T/19/36017/R	No data	No data	35.72	15.00	0.00	0.00	7.50	Green
BIRMINGHAM ROAD STORM OVERFLOW	T/10/22019/O	No data	No data	No data	No data	0.00	0.00	No data	No data
BROADWELL - STORM & EMERG	S/12/07849/O	72.77	9.00	37.52	9.00	0.00	0.00	6.00	Green

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Average*+	RAG rating
BUBBENHALL SEWAGE TREATMENT WORKS	S/10/26091/R	40.44	4.00	174.28	18.00	2.23	1.00	7.67	Green
CHURCH LAWFORD STW	S/10/25784/R	22.79	17.00	98.03	52.00	67.33	29.00	32.67	Amber
CHURCH ROAD/ Claverdon	TSC3240	1.85	4.00	0.54	1.00	0.46	1.00	2.00	Green
CHURCH OVER SEWAGE TREATMENT WORKS	S/10/25817/R	0.38	3.00	0.48	5.00	0.42	1.00	3.00	Green
COVENTRY ROAD STORM OVERFLOW	T/13/30009/O	No data	No data	7.77	6.00	2.21	4.00	5.00	Green
COVENT	S/11/2	No data	No data	567.90	43.00	230.04	25.00	15.50	Amber

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Average*+	RAG rating
RY-FINHAM WWTW	6637/R								
COVENTRY-FINHAM WWTW	S/11/26637/R	213.20	21.00	297.98	27.00	No data	No data	24.00	Amber
Cromer Road/Gresham Avenue	TBC	No data	No data	0.00	0.00	No data	No data	No data	No data
DUNCHURCH SEWAGE TREATMENT WORKS	S/12/26162/R	428.30	30.00	55.59	14.00	34.76	14.00	19.33	Amber
ETTINGTON SEWAGE WORKS	S/13/25835/R	No data	No data	53.20	35.00	19.97	22.00	28.50	Amber
FRANKTON PPG STN - STORM O/F	S/12/09044/O	14.20	2.00	18.23	6.00	1.45	2.00	3.33	Green

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Average*+	RAG rating
FURNACE END SEWAGE TREATMENT WORKS	T/15/35597/R	0.00	0.00	0.00	0.00	22.45	5.00	1.67	Green
GRENDON SEWAGE TREATMENT WORKS	T/21/36278/R	203.84	29.00	129.52	25.00	32.64	6.00	20.00	Amber
HABURY SEWAGE PMP.STN - STORM	S/12/25043/O	6.71	3.00	8.53	3.00	10.57	4.00	3.33	Green
HILLMORTON STORM TANKS	S/10/12157/O	137.09	12.00	134.93	13.00	50.01	7.00	10.67	Amber
LEAMINGTON SSO 11 AND 12	S/12/20258/O	No data	No data	0.00	0.00	0.00	0.00	0.00	No data

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Average*+	RAG rating
LIGHTHORNE HEATH STW	S/13/25884/R	59.25	38.00	59.60	46.00	33.14	23.00	35.67	Amber
LONG MARSTON STW	S/13/26592/R	49.26	4.00	0.00	0.00	0.00	0.00	1.33	Green
LOWER FARM PPG. STATION - STORM O/F	S/14/09243/O	679.16	41.00	967.74	57.00	124.31	12.00	36.67	Amber
LOXLEY	TBC	No data	No data	No data	No data	No data	No data	No data	No data
MIDDLETON SEWAGE TREATMENT WORKS	T/16/35964/R	78.49	26.00	407.48	47.00	124.74	26.00	33.00	Amber
POLESWORTH SEWAGE TREATMENT	T/21/35970/R	0.00	0.00	121.41	95.00	197.31	27.00	40.67	Amber

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Average*+	RAG rating
WORKS									
POLESWORTH SEWAGE TREATMENT WORKS	T/21/35970/R	426.66	42.00	470.96	41.00	0.00	0.00	27.67	Amber
RATLEY WWTW	TEMP. 2851	No data	No data	6.89	4.00	4.60	7.00	5.50	Green
REDDITCH - SPERNAL STW	S/15/26260/R	303.40	36.00	368.21	37.00	511.64	39.00	37.33	Amber
RUGBY NEWBOLD STW	S/10/26528/R	93.49	10.00	254.14	24.00	2.87	1.00	11.67	Amber
RUGBY NEWBOLD STW	S/10/26528/R	0.00	0.00	2.03	3.00	27.72	8.00	3.67	Green
SHOTTESWELL WWTW	TEMP. 2892	No data	No data	286.32	41.00	103.67	22.00	31.50	Amber

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Average*+	RAG rating
SHUTTINGTON OUTFALL	TSC3884	No data	No data	0.00	0.00	No data	No data	0.00	No data
SNITTERFIELD STW	S/13/25980/R	25.52	12.00	36.64	12.00	4.02	2.00	8.67	Green
SO HIGH ST AND SO PLECK	S/13/07378/O	No data	No data	No data	No data	No data	No data	#DIV/0!	No data
SO HIGH ST AND SO PLECK	S/13/07378/O	No data	No data	No data	No data	0.19	1.00	1.00	Green
SO HIGH ST AND SO PLECK	S/13/07378/O	No data	No data	2.87	4.00	10.82	22.00	13.00	Amber
SO HIGH ST AND SO PLECK	S/13/07378/O	No data	No data	25.23	30.00	14.75	26.00	28.00	Amber
SPUR ROAD	T/21/01674/O	No data	No data	6.44	3.00	0.42	1.00	2.00	Amber

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Average*+	RAG rating
STRATFORD(MILCOTE) STW	S/13/25718/R	583.43	49.00	372.13	33.00	19.48	5.00	29.00	Amber
VARIOUS OVERFLOWS AT KINGSBURY SW	2112	68.99	16.00	156.17	31.00	73.07	15.00	20.67	Amber
WARMINGTON WWTW	TEMP. 2991	No data	No data	85.71	26.00	116.52	21.00	23.50	Amber
WELLESBOURNE SEWAGE TREATMENT WORKS	S/13/26721/R	679.20	62.00	5.43	1.00	245.93	20.00	27.67	Amber
WELLESBOURNE SEWAGE TREATMENT WORKS	S/13/26721/R	0.00	0.00	1654.81	84.00	0.35	3.00	29.00	Amber

Wastewater Treatment Works	Permit number	Operation durations in 2020 (hours)	Number of operations in 2020	Operation durations in 2021 (hours)	Number of operations in 2021	Operation durations in 2022 (hours)	Number of operations in 2022	Average*+	RAG rating
WOOTTON WAWEN WWTW	S/15/26259/R	141.07	18.00	271.75	31.00	58.64	20.00	23.00	Amber
WORMLEIGHTON STW	S/12/25850/R	No data	No data	No data	No data	16.22	5.00	5.00	No data

A.8 Appendix: SSSIs in Flood Zone 2

Table 11-3 SSSIs in Flood Zone 2 and downstream of a WwTW

SSSI name	Reference	In Flood Zone 2	Downstream of WwTW
Alvecote Pools	SK255044	N	Y
Ashby Canal	SK364073	N	Y
Aston Grove & Withycombe Wood	SP140571	N	Y
Badby Wood	SP563582	N	Y
Bannam's Wood	SP114642	N	Y
Baynhall Meadow	SO980531	N	Y
Bentley Park Wood	SP289954	N	Y
Bickenhill Meadows	SP188816	N	Y
Boon's Quarry	SP329946	N	Y
Bromsgrove Road Cutting, Tenterfields	SO970835	N	Y
Broom Railway Cutting	SP086528	N	Y
Burbage Wood and Aston Firs	SP452940	N	Y
Burcot Lane Cutting	SO970716	N	Y
Calcutt Locks Meadows	SP465633	N	Y
Cannock Extension Canal	SK019056	N	Y
Chasewater And The Southern Staffordshire Coalfield Heaths	SK028094	N	Y
Clayhanger	SK033046	N	Y
Cliffe Hill Quarry	SK474107	N	Y

SSSI name	Reference	In Flood Zone 2	Downstream of WwTW
Coleshill and Bannerly Pools	SP198859	N	Y
Copmill Hill	SP152578	N	Y
Coten End Quarry	SP290654	N	Y
Croft and Huncote Quarry	SP511964	N	Y
Croft Hill	SP509966	N	Y
Daw End Railway Cutting	SK037003	N	Y
Dormston Church Meadow	SO986575	N	Y
Draycote Meadows	SP450707	N	Y
Enderby Warren Quarry	SK541000	N	Y
Ensor's Pool	SP348903	N	Y
Everdon Stubbs	SP605566	N	Y
Foster's Green Meadows	SO978649	N	Y
Gentleshaw Common	SK051111	N	Y
Gipsy Lane Pit	SK619071	N	Y
Griff Hill Quarry	SP362889	N	Y
Harbury Quarries	SP381589	N	Y
Harbury Railway Cutting	SP379602	N	Y
Hay Head Quarry	SP047984	N	Y
Herald Way Marsh	SP379769	N	Y
High Close Farm, Snitterfield	SP233596	N	Y
High Wood and Meadow	SP591547	N	Y
Hoar Park Wood	SP265932	N	Y

SSSI name	Reference	In Flood Zone 2	Downstream of WwTW
Hopwood Dingle	SP033762	N	Y
Illing's Trenches	SP323942	N	Y
Ipsley Alders Marsh	SP078676	N	Y
Jockey Fields	SK040029	N	Y
Kingsbury Brickworks	SP220992	N	Y
Kingsbury Wood	SP233975	N	Y
Long Itchington & Ufton Woods	SP388627	N	Y
Loxley Church Meadow	SP259532	N	Y
Mantles Heath	SP597552	N	Y
Merriman's Hill Farm Meadows	SP135686	N	Y
Napton Hill Quarry	SP457611	N	Y
Portway Farm Meadows	SO986549	N	Y
Rabbit Wood	SO958578	N	Y
Ramsden Corner Plantation	SP623564	N	Y
Romsley Hill	SO959790	N	Y
Romsley Manor Farm	SO965790	N	Y
Rookery Cottage Meadows	SO996612	N	Y
Rough Hill & Wirehill Woods	SP053641	N	Y
Ryton and Brandon Gravel Pits	SP386760	N	Y
Ryton Wood	SP381723	N	Y
Sheet Hedges Wood	SK529087	N	Y
Shrewley Canal Cutting	SP212674	N	Y

SSSI name	Reference	In Flood Zone 2	Downstream of WwTW
Snitterfield and Bearley Bushes	SP200606	N	Y
Stock Wood Meadows	SO998586	N	Y
Stockton Railway Cutting and Quarry	SP442643	N	Y
Stubbers Green Bog	SK046016	N	Y
The Leasowes	SO979840	N	Y
Tilehill Wood	SP279789	N	Y
Trickses Hole	SP003639	N	Y
Ufton Fields	SP381615	N	Y
Ullenhall Meadows	SP121678	N	Y
Waverley Wood Farm	SP366714	N	Y
Wilmcote Quarry	SP151593	N	Y
Windmill Naps Wood	SP092723	N	Y
Wolston Gravel Pit	SP410747	N	Y
Woodlands Quarry	SP324947	N	Y
Wylde Moor, Feckenham	SP010603	N	Y

*Some SSSI names and references are the same but have different results because of the SSSI being spread across multiple sites.

A.9 Appendix: STW headroom assessment

Table 11-4 STW headroom assessment

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
ADMINGTON (STW)	4	N/a	N/a	Non-mcerted**	N/a	Low	No risk identified
ALCESTER (STW)	468	N/a	3134	No- 26% of headroom left.	Green	Low	AMP7 quality scheme in progress - no risk identified for this site
ARLEY (STW)	No growth served by WwTW	No growth served by WwTW	2676	No- 50.7% of headroom left.	Green	Low	AMP7 quality scheme in progress to ensure compliance with new permit
ASHORNE (STW)	1	N/a	N/a	Non-mcerted**	N/a	Low	No risk identified

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
ASTWOOD BANK (STW)	No growth served by WwTW	No growth served by WwTW	291	No- 13.6% of headroom left.	Green	Low	AMP7 quality scheme in progress to ensure compliance with new permit
ATHERSTONE (STW)	2,179	27,200	-1475	Yes- Headroom exceeded by 9.8%.	Amber	Medium	AMP7 quality scheme - the scope will contribute towards environmental compliance. AMP8 scheme planned to ensure compliance with new ammonia permit and to accommodate expected growth

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
BASCOTE (STW)	4	N/a	N/a	Non-mcerted**	N/a	Low	No risk identified
BASSETTS POLE (STW)	No growth served by WwTW	No growth served by WwTW	-11	Yes- Headroom exceeded by 5.5%.	Amber	Low	Risk of high flows from hospitality trade within catchment being monitored
BEARLEY (STW)	7	N/a	87	No- 13.2% of headroom left.	Green	Medium	No risk identified
BEDWORTH - MARSTON LANE (STW)	29	42,642.50	3282	No- 29.4% of headroom left.	Green	Low	AMP8 investment to reduce permitted storm water discharge frequency
BIDFORD-ON-AVON (STW)	120	N/a	-721	Yes- Headroom	Amber	High	AMP7 scheme in progress to be delivered by 2028

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
				exceeded by 10.1%.			including additional capacity to accommodate expected growth
BIRCHLEY HEATH (STW)	No growth served by WwTW	No growth served by WwTW	N/a	Non-mcerted**	N/a	Low	No risk identified
BRAMCOTE (STW)	105	N/a	895	No- 33.8% of headroom left.	Green	Low	No risk identified
BRAUNSTON (STW)	No growth served by WwTW	No growth served by WwTW	861	No- 45% of headroom left.	Green	Low	No risk identified
BRETFORD (STW)	No growth served by WwTW	No growth served by WwTW	N/a	Non-mcerted**	N/a	Low	No risk identified

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
BRINKLOW (STW)	No growth served by WwTW	No growth served by WwTW	429	No- 38.1% of headroom left.	Green	Low	No risk identified
BUBBENHALL (STW)	No growth served by WwTW	No growth served by WwTW	655	No- 46.7% of headroom left.	Green	Low	No risk identified
BULKINGTON (STW)	1,123	130	1764	No- 24.9% of headroom left.	Green	Low	AMP7 quality scheme in progress to ensure compliance with new permit
BUTLERS MARSTON (STW)	11	N/a	199	No- 27.4% of headroom left.	Green	Low	AMP8 quality scheme planned the scope of which will contribute towards environmental compliance

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
CHERINGTON (STW)	12	N/a	286	No- 20.5% of headroom left.	Green	Low	AMP7 quality scheme to increase capacity which in turn will reduce permitted storm water discharge frequency AMP8 quality scheme planned - no risk identified for this site
CHURCH LAWFORD (STW)	No growth served by WwTW	No growth served by WwTW	111	No- 32.7% of headroom left.	Green	Low	No risk identified
CHURCHOVER - COTON ROAD (STW)	No growth served by WwTW	No growth served by WwTW	N/a	Non-mcerted**	N/a	Low	No risk identified

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
CHURCHOVER (STW)	No growth served by WwTW	No growth served by WwTW	N/a	Non-mcerted**	N/a	Low	No risk identified
CLAVERDON (STW)	9	N/a	147	No- 15.4% of headroom left	Green	Medium	Site can accommodate expected growth within the catchment
CLAYBROOKE MAGNA (STW)	No growth served by WwTW	No growth served by WwTW	329	No- 23.4% of headroom left.	Green	Low	AMP6 scheme delivered to ensure P compliance was achieved

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
COLESHILL (STW)	3,155	12,000	23446	No- 9.4% of headroom left. An upgrade to treatment capacity is likely in order to accommodate Warwickshire allocations.	Amber	Low	AMP8 quality scheme planned the scope of which will contribute towards environmental compliance
COMBROOK (STW)	3	N/a	N/a	Non-mcerted**	N/a	Low	No risk identified

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
CORLEY WORKS (STW)	No growth served by WwTW	No growth served by WwTW	620	No- 36% of headroom left.	Green	Low	AMP8 quality scheme planned the scope of which will contribute towards environmental compliance
DORSINGTON (STW)	1	N/a	N/a	Non-mcerted**	N/a	Low	No risk identified
DUNCHURCH (STW)	202	N/a	953	No- 25.5% of headroom left.	Green	Low	AMP8 quality scheme planned the scope of which will contribute towards environmental compliance
DUNNINGTON (STW)	9	N/a	N/a	Non-mcerted**	N/a	Low	No risk identified

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
EARLSWOOD - SPRINGBROOK (STW)	23	N/a	152	No- 9.4% of headroom left. An upgrade to treatment capacity is likely in order to accommodate Warwickshire allocations.	Amber	High	AMP8 quality scheme planned the scope of which will contribute towards environmental compliance
ETTINGTON WORKS (STW)	29	N/a	1,164	No- 66.1% of headroom left.	Green	Low	AMP8 quality scheme planned the scope of which will contribute towards environmental compliance

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
FENNY COMPTON (STW)	108	N/a	256	No- 32.7% of headroom left.	Green	Low	AMP6 scheme delivered to ensure P compliance was achieved and to accommodate expected growth
FINHAM COVENTRY (WRW)	17,178	1,187,324	-39,502	Yes- Headroom exceeded by 9%.	Amber	High	AMP8 quality scheme planned the scope of which will contribute towards environmental compliance
FLECKNOE (STW)	No growth served by WwTW	No growth served by WwTW	N/a	Non-mcerted**	N/a	Low	No risk identified

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
FRANKTON (STW)	No growth served by WwTW	No growth served by WwTW	1,393	No- 41% of headroom left	Green	Low	
FREASLEY (STW)	No growth served by WwTW	No growth served by WwTW	N/a	Non-mcerted**	N/a	Low	No risk identified
FURNACE END (STW)	No growth served by WwTW	No growth served by WwTW	N/a	Non-mcerted**	N/a	Low	No risk identified
GAYDON WRW (STW)	131	N/a	180	No- 42.8% of headroom left.	Green	Low	AMP8 quality scheme planned the scope of which will contribute towards environmental compliance

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
GRENDON (STW)	1,981	13,800	-1,676	Yes- Headroom exceeded by 29.4%	Amber	Low	AMP8 quality scheme planned the scope of which will contribute towards environmental compliance
HARBOROUGH MAGNA (STW)	No growth served by WwTW	No growth served by WwTW	333	No- 39.5% of headroom left.	Green	Low	No risk identified
HINCKLEY (STW)	N/a	21,000	15,730	No- 25.1% of headroom left.	Green	Low	site closing at the end of AMP7 and its flows will be transferred to Nuneaton-Hartshill
HURLEY (STW)	33	N/a	560	No- 21.5% of headroom left.	Green	Low	No risk identified

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
ILMINGTON (STW)	16	N/a	410	No- 51% of headroom left.	Green	Low	AMP8 investment to reduce permitted storm water discharge frequency
ITCHEN BANK (STW)	974	N/a	-154	Yes- Headroom exceeded by 1.4%	Amber	Very High	AMP7 scheme in progress to be delivered by 2028 including additional capacity to accommodate expected growth
KINETON (STW)	92	N/a	1,508	No- 52.5% of headroom left.	Green	Low	AMP7 quality scheme in progress to ensure compliance with new permit

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
KNIGHTCOTE (STW)	No growth served by WwTW	No growth served by WwTW	N/a	Non-mcerted**	N/a	Low	No risk identified
LAWFORD HEATH (STW)	No growth served by WwTW	No growth served by WwTW	N/a	Non-mcerted**	N/a	Low	No risk identified
LEA MARSTON (STW)	No growth served by WwTW	No growth served by WwTW	N/a	Non-mcerted**	N/a	Low	site closing at the end of AMP7 and its flows will be transferred to Coleshill
LEEK WOOTTON (STW)	No growth served by WwTW	No growth served by WwTW	92	No- 11.4% of headroom left.	Green	Low	No risk identified

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
LIGHTHORNE (STW)	10	N/a	127	No- 27.5% of headroom left.	Green	Low	site closing at the end of AMP7 and its flows will be transferred to Lightthone Heathe
LIGHTHORNE HEATH (STW)	1,334	N/a	-1,473	Yes- Headroom exceeded by 199.4%	Amber	Low	AMP7 quality scheme in progress to ensure compliance with new permit. Growth in this catchment will connect to Warwick Longbridge due to insufficient capacity at Lighthorne Heath.

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
LONG COMPTON (STW)	4	N/a	-158	Yes- Headroom exceeded by 25%	Amber	Very High	AMP7 scheme in progress to be delivered by 2026 including additional capacity to accommodate expected growth
LOWER SHUCKBURGH (STW)	No growth served by WwTW	No growth served by WwTW	N/a	Non-mcerted**	N/a	Low	No risk identified
MANCETTER - RIDGE LANE (STW)	No growth served by WwTW	No growth served by WwTW	176	No- 39% of headroom left.	Green	Low	AMP8 quality scheme planned the scope of which will contribute towards environmental compliance

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
MAXSTOKE (STW)	No growth served by WwTW	No growth served by WwTW	N/a	Non-mcerted**	N/a	Low	No risk identified
MERIDEN	50	N/a	623	No- 21.6% of headroom left.	Green	Low	AMP8 scheme planned the scope of which will contribute towards environmental compliance
MIDDLETON VILLAGE (STW)	No growth served by WwTW	No growth served by WwTW	-153	Yes- Headroom exceeded by 250%.	Amber	Very High	Flow data profiles vary over the years with an average of the last 5 years being below the pDWF; thus we are not anticipating investment to

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
							accommodate growth to 2027
MINWORTH WORKS (STW)	76,578	N/a	-921,042	Yes- Headroom exceeded by 106.9%	Amber	Medium	
MONKS KIRBY (STW)	11	N/a	125	No - 11% headroom left	Green	Low	No risk identified AMP8 scheme planned which will contribute towards

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
							environmental compliance.
MORETON MORRELL (STW)	No growth served by WwTW	No growth served by WwTW	237	No- 41.9% headroom left.	Green	Low	No risk identified
MORETON PADDOX (STW)	1	N/a	N/a	Non-mcerted**	N/a	Low	No risk identified
NAPTON (STW)	6	N/a	31	No- 4.1% of headroom left. An upgrade to treatment capacity is likely in order to accommodate Warwickshire allocations.	Amber	High	AMP8 scheme planned the scope of which will contribute towards environmental compliance and make allowances for expected growth

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
NETHER WHITACRE - DOG LANE (STW)	No growth served by WwTW	No growth served by WwTW	N/a	Non-mcerted**	N/a	Low	No risk identified
NETHERCOTE (STW)	8	N/a	180	No- 23.5% of headroom left.	Green	Low	AMP7 quality scheme in progress to ensure compliance with new permit
NORTHEND (STW)	104	N/a	116	No- 25.5% of headroom left.	Green	Low	AMP7 quality scheme in progress to ensure compliance with new permit
NORTON GREEN (STW)	756	N/a	2,129	No- 17.5% of headroom left.	Green	Low	No risk identified

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
NORTON LINDSEY (STW)	2	N/a	-3	Yes- Headroom exceeded by 0.5%	Amber	Medium	AMP7 scheme in progress the scope of which will contribute towards environmental compliance and includes allowances for expected growth

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
NUNEATON - HARTSHILL (STW)	16,954	593,556	-35,254	Yes- Headroom exceeded by 40.8%	Amber	Very High	AMP7 scheme in progress the scope of which will contribute towards environmental compliance and includes allowances for known growth and the transfer of flows from Hinckley STW
OLD MILVERTON (STW)	No growth served by WwTW	No growth served by WwTW	N/a	Non-mcerted**	N/a	Low	No risk identified
OXHILL WORKS (STW)	10	N/a	215	No- 43.1% of headroom left.	Green	Low	AMP7 quality scheme in progress - no risk identified for this site

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
POLESWORTH (STW)	52	N/a	2,232	No- 22.4% of headroom left.	Green	Low	No risk identified
PRESTON ON STOUR (STW)	3	N/a	168	No- 31.4% of headroom left.	Green	Low	No risk identified
PRIORS HARDWICK (STW)	15	N/a	N/a	Non-mcerted**	N/a	Low	No risk identified
RADWAY (STW)	4	N/a	-39	Yes- Headroom exceeded by 28.6%	Amber	Low	AMP8 quality scheme planned the scope of which will contribute towards environmental compliance

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
REDDITCH - SPERNAL (STW)	3,666	N/a	31,808	No- 30.2% of headroom left.	Green	Low	AMP7 quality scheme in progress to ensure compliance with new permit
RIDGEWAY (STW)	9	N/a	70	No- 9.1% of headroom left	Amber	Medium	AMP8 quality scheme planned
ROWINGTON (STW)	71	N/a	54	No- 3% of headroom left.	Amber	Low	
RUGBY - NEWBOLD (STW)	12,375	241,480	-15,490	Yes- Headroom exceeded by 18.7%	Amber	Medium	AMP8 planned scheme to increase capacity to accommodate expected growth

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
SHIPSTON - FELL MILL (STW)	405	N/a	-249	Yes- Headroom exceeded by 3.8%	Amber	Low	AMP8 quality scheme planned the scope of which will contribute towards environmental compliance
SHUSTOKE (STW)	No growth served by WwTW	No growth served by WwTW	42	No- 15.9% of headroom left	Green	Medium	AMP7 scheme in progress the scope of which includes allowances for expected growth
SNITTERFIELD (STW)	10	N/a	429	No- 32.7% of headroom left.	Green	Low	AMP7 quality scheme in progress to ensure compliance with new permit

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
STRATFORD - MILCOTE (STW)	2820	N/a	6,132	No- 12.2% of headroom left.	Green	Low	No risk identified
STRETTON ON FOSSE (STW)	3	N/a	-61	Yes- Headroom exceeded by 22.2%	Amber	Very High	
TAMWORTH - COTON LANE (STW)	7088	20,400	72,963	No- 80% of headroom left.	Green	Low	AMP7 quality scheme in progress - expected domestic population growth to 107k PE considered

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
TANWORTH IN ARDEN (STW)	29	N/a	108	No- 28.5% of headroom left.	Green	Low	AMP8 quality scheme planned the scope of which will contribute towards environmental compliance
TYSOE (STW)	3	N/a	-92	Yes- Headroom exceeded by 13.2%	Amber	Very High	AMP7 scheme in progress to be delivered by 2025 including additional capacity to accommodate expected growth
ULLENHALL (STW)	1	N/a	204	No- 45.3% of headroom left	Green	Low	AMP8 quality scheme planned

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
WARTON (STW)	147	N/a	-306	Yes- Headroom exceeded by 45.2%	Amber	Very High	AMP8 scheme planned the scope of which will contribute towards environmental compliance and make allowances for expected growth
WARWICK - LONGBRIDGE (STW)	6420	184	8,219	No- 6% of headroom left	Green	Medium	AMP7 scheme in progress to be delivered by 2028 including additional capacity to accommodate expected growth

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
WELLESBOURNE – WALTON ROAD (STW)	No growth served by WwTW	No growth served by WwTW	N/a	Non-mcerted**	N/a	Very High	AMP7 scheme in progress to be delivered by 2026 including additional capacity to accommodate expected growth
WELLESBOURNE (STW)	155	N/a	-603	Yes-Headroom exceeded by 10.1%.	Amber	Very High	AMP7 scheme in progress to be delivered by 2026 including additional capacity to accommodate expected growth

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
WESTON-UNDER-WETHERLEY (STW)	1	N/a	286	No- 26.9% of headroom left.	Green	Low	AMP7 investment to reduce permitted storm water discharge frequency
WHICHFORD (STW)	6	N/a	490	No- 65.7% of headroom left.	Green	Low	AMP8 quality scheme planned the scope of which will contribute towards environmental compliance
WHITACRE HEATH - WATERY LANE (STW)	No growth served by WwTW	No growth served by WwTW	N/a	Non-mcerted**	N/a	Low	No risk identified

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
WILLEY (STW)	No growth served by WwTW	No growth served by WwTW	N/a	Non-mcerted**	N/a	Low	No risk identified
WILLOUGHBY (STW)	No growth served by WwTW	No growth served by WwTW	134	No- 26.9% of headroom left.	Green	Low	AMP8 quality scheme planned
WISHAW (STW)	No growth served by WwTW	No growth served by WwTW	N/a	Non-mcerted**	N/a	Low	No risk identified
WOLSTON (STW)	179	66,800	-1,984	Yes- Headroom exceeded by 39%	Amber	Low	No risk identified
WOOTTON WAWEN (STW)	15	N/a	1,801	No- 21.4% of headroom left.	Green	Low	No risk identified

WwTW	Proposed growth over Local Plan period – baseline growth (residential dwellings)	Proposed growth over Local Plan period – baseline growth (employment m2)	Approximate headroom (no. dwellings)	Does DWF flow exceed permitted flow over Local Plan period before allocations?	JBA RAG assessment	STW Rating	STW Comments
WORMLEIGHTON (STW)	1	N/a	N/a	Non-mcerted**	N/a	Low	No risk identified

*includes commitments, recent completions, windfall, and neighbouring authority growth

**DWF reading from STW was 'Non-Mcerted' meaning that the flow from the treatment works does not require monitoring.

A.10 Appendix: Water quality maps

Supplied separately as PDF

A.11 Appendix: A3 mapping pack

This is a separate document formed of the maps contained within the main report at a high resolution A3 scale.

12 References

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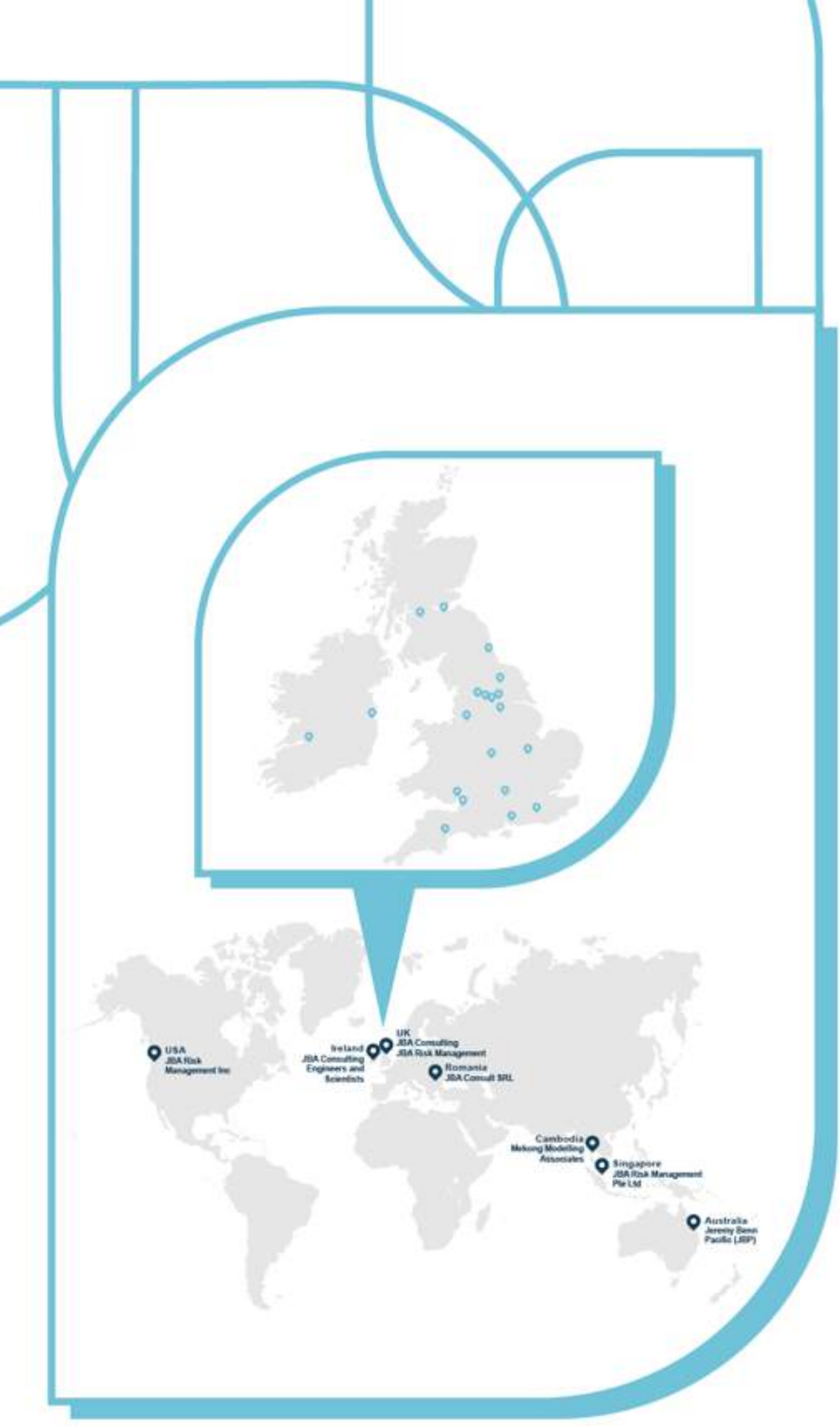

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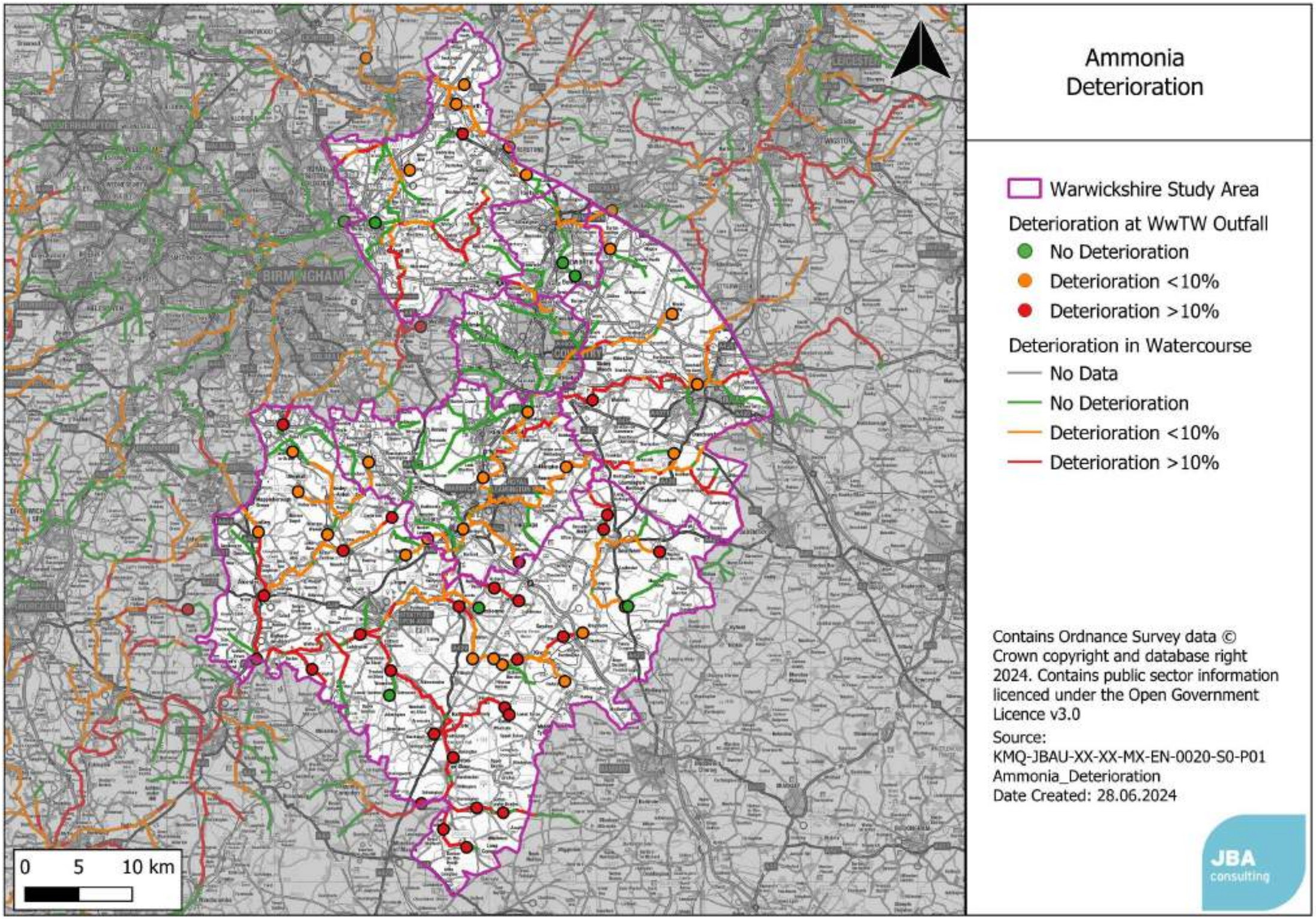
Ammonia
Deterioration
Warwickshire Study Area
Deterioration at WwTW Outfall
No Deterioration
Deterioration <10%
Deterioration >10%
Deterioration in Watercourse
No Data
No Deterioration
Deterioration <10%
Deterioration >10%
BIRMINGHAM
0 5 10 km
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Source:
KMQ-JBAU-XX-XX-MX-EN-0020-S0-P01 Ammonia_Deterioration
Date Created: 28.06.2024
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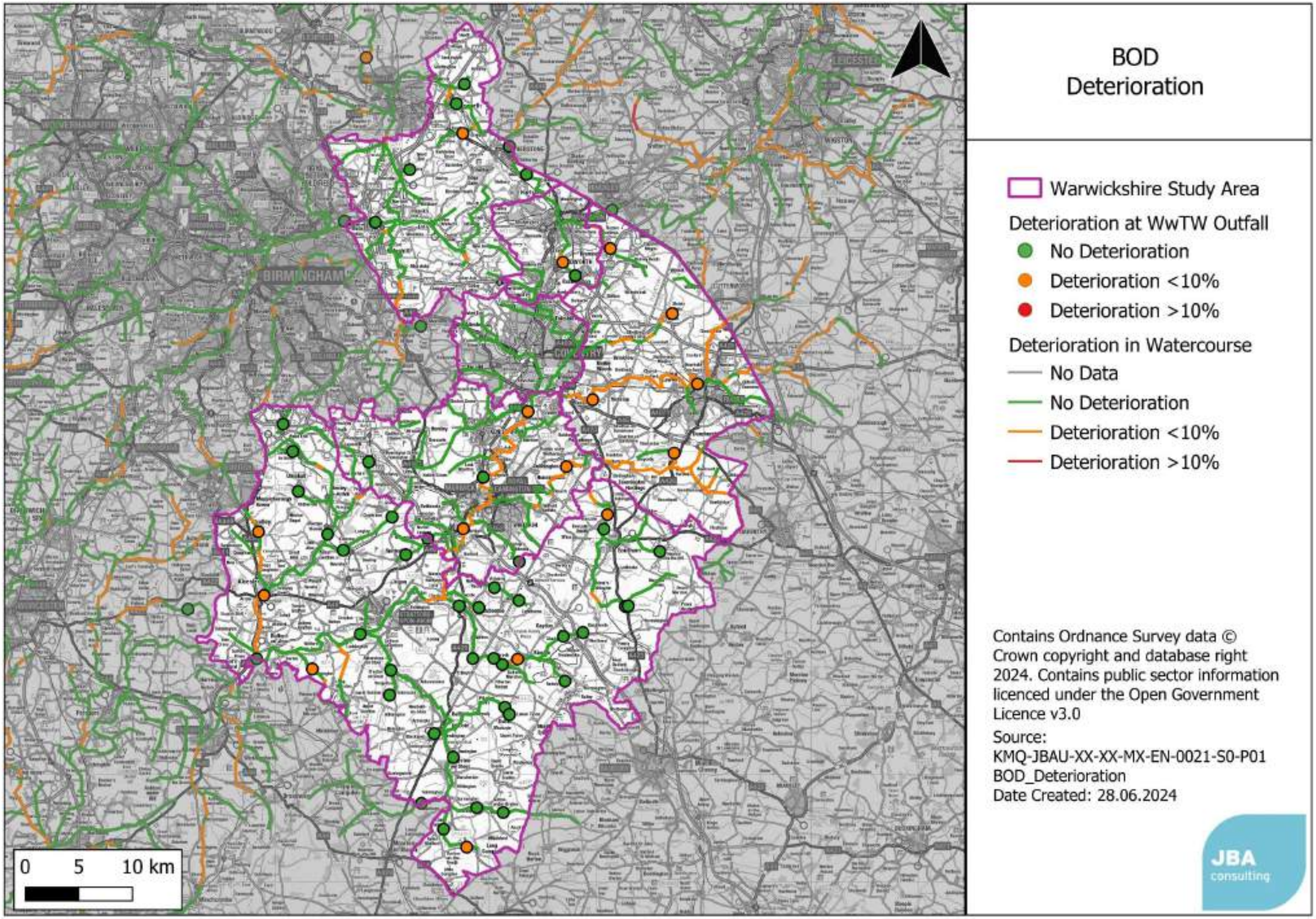

BOD Deterioration

Warwickshire Study Area

Deterioration at WwTW Outfall
- No Deterioration
- Deterioration <10%
- Deterioration >10%

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

Source:
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BOD_Deterioration
Date Created: 28.06.2024

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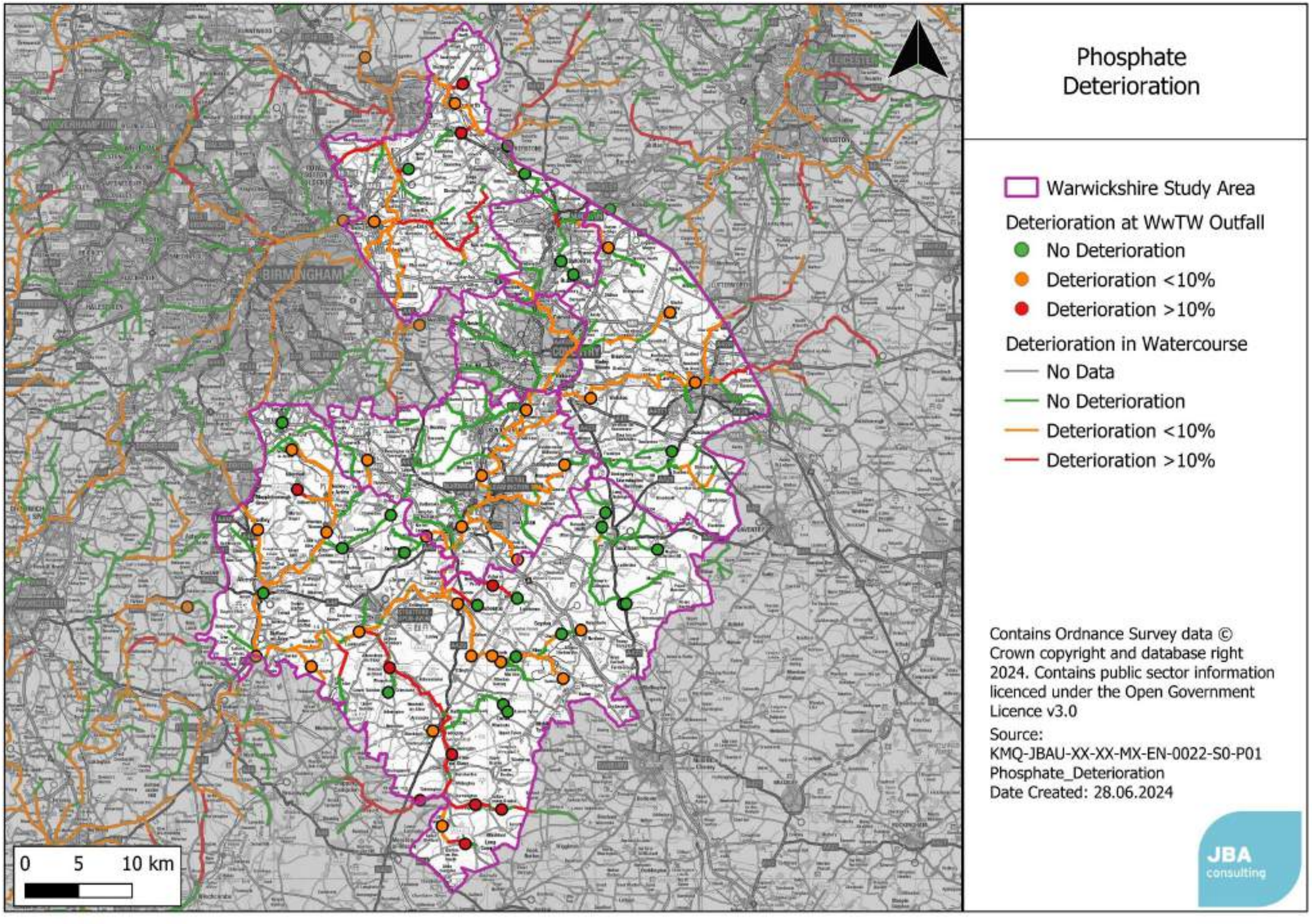

Phosphate Deterioration

Warwickshire Study Area

Deterioration at WwTW Outfall
- No Deterioration
- Deterioration <10%
- Deterioration >10%

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

Source:
KMQ-JBAU-XX-XX-MX-EN-0022-S0-P01 Phosphate_Deterioration
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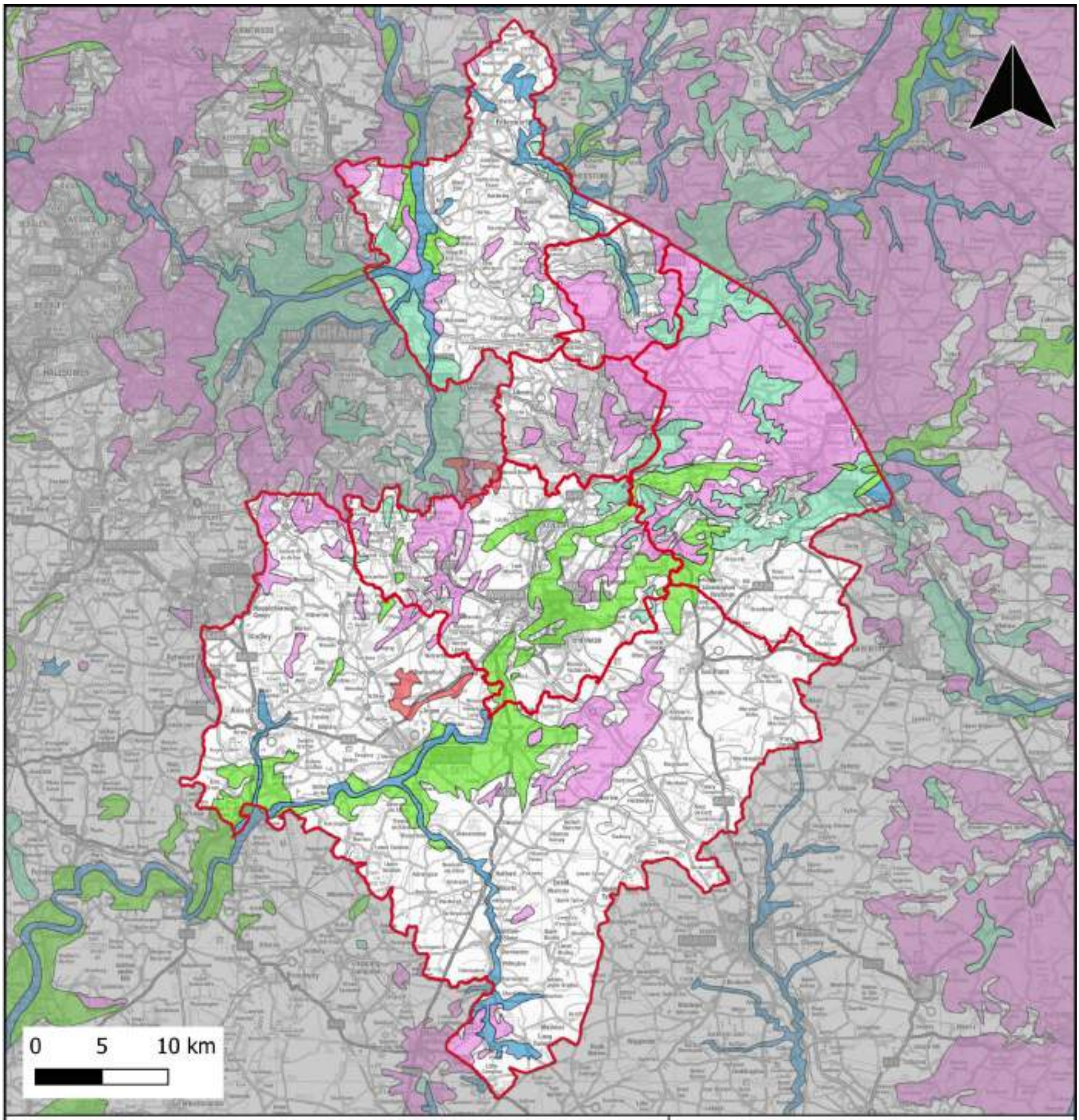

Study Area

Superficial Geology

ALLUVIUM

DRIFT GEOLOGY NOT MAPPED [FOR DIGITAL MAP USE ONLY]

GLACIAL SAND AND GRAVEL

LACUSTRINE DEPOSITS (UNDIFFERENTIATED)

RIVER TERRACE DEPOSITS (UNDIFFERENTIATED)

TILL

Figure name: Superficial Geology

Source:
MWQ-JBAU-XX-XX-MX-EN-0003-S0-P01-Geology

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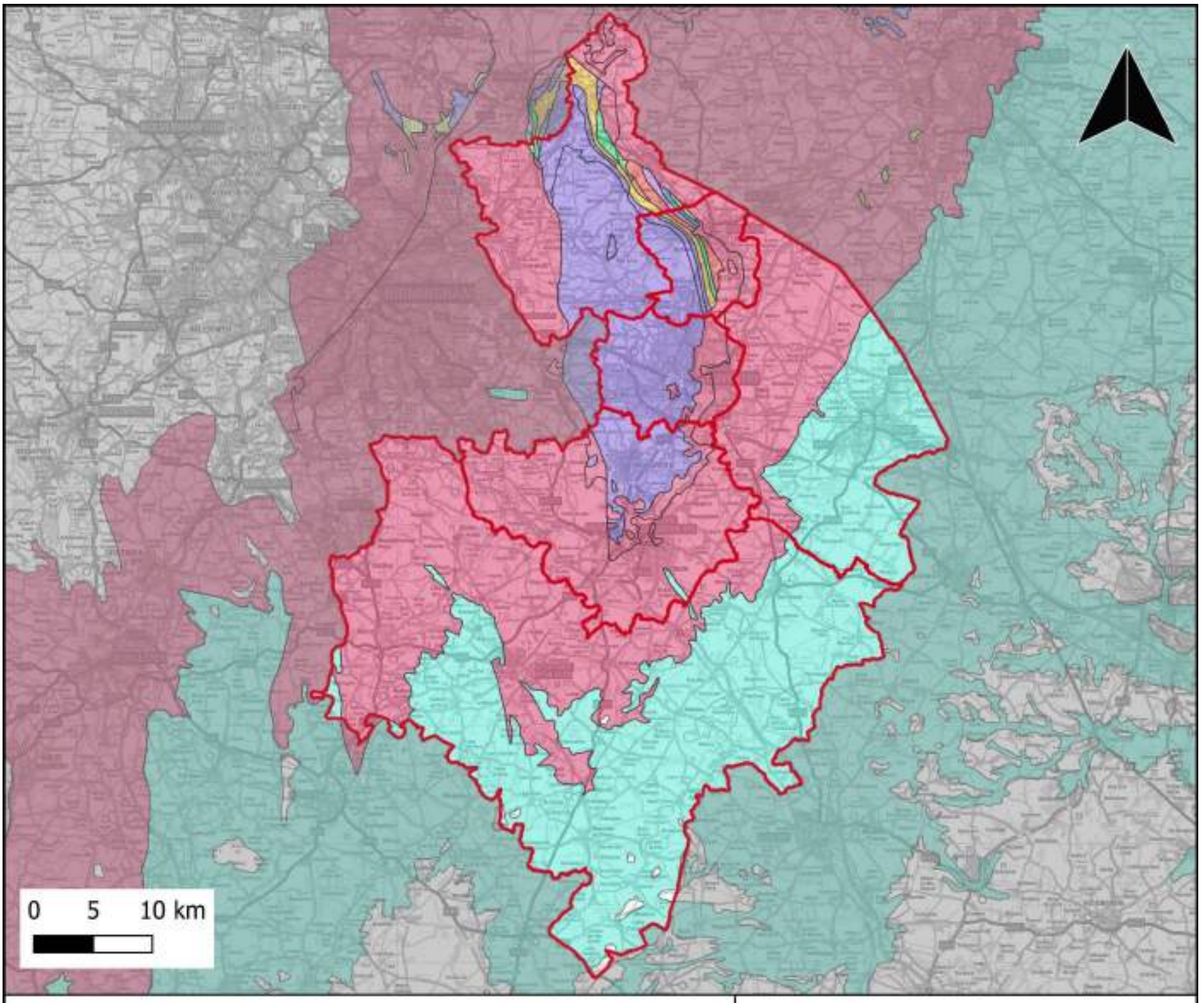

Study Area

Bedrock Geology

- LIAS GROUP
- LOWER CAMBRIAN ROCKS (UNDIFFERENTIATED)
- MIDDLE CAMBRIAN
- MILLSTONE GRIT GROUP [SEE ALSO MIGR]
- PENNINE LOWER COAL MEASURES*
- PENNINE MIDDLE COAL MEASURES**
- PERMIAN ROCKS (UNDIFFERENTIATED)
- TREMADOC ROCKS (UNDIFFERENTIATED)
- TRIASSIC ROCKS (UNDIFFERENTIATED)
- UNNAMED EXTRUSIVE ROCKS, NEOPROTEROZOIC
- UNNAMED IGNEOUS INTRUSION, NEOPROTEROZOIC
- UNNAMED IGNEOUS INTRUSION, ORDOVICIAN TO SILURIAN
- UNNAMED METASEDIMENTARY ROCKS, NEOPROTEROZOIC
- UPPER CAMBRIAN, INCLUDING TREMADOC
- UPPER DEVONIAN ROCKS (UNDIFFERENTIATED)
- WARWICKSHIRE GROUP

Figure name: Bedrock Geology

Source:
MWQ-JBAU-XX-XX-MX-EN-0003-S0-P01-Geology

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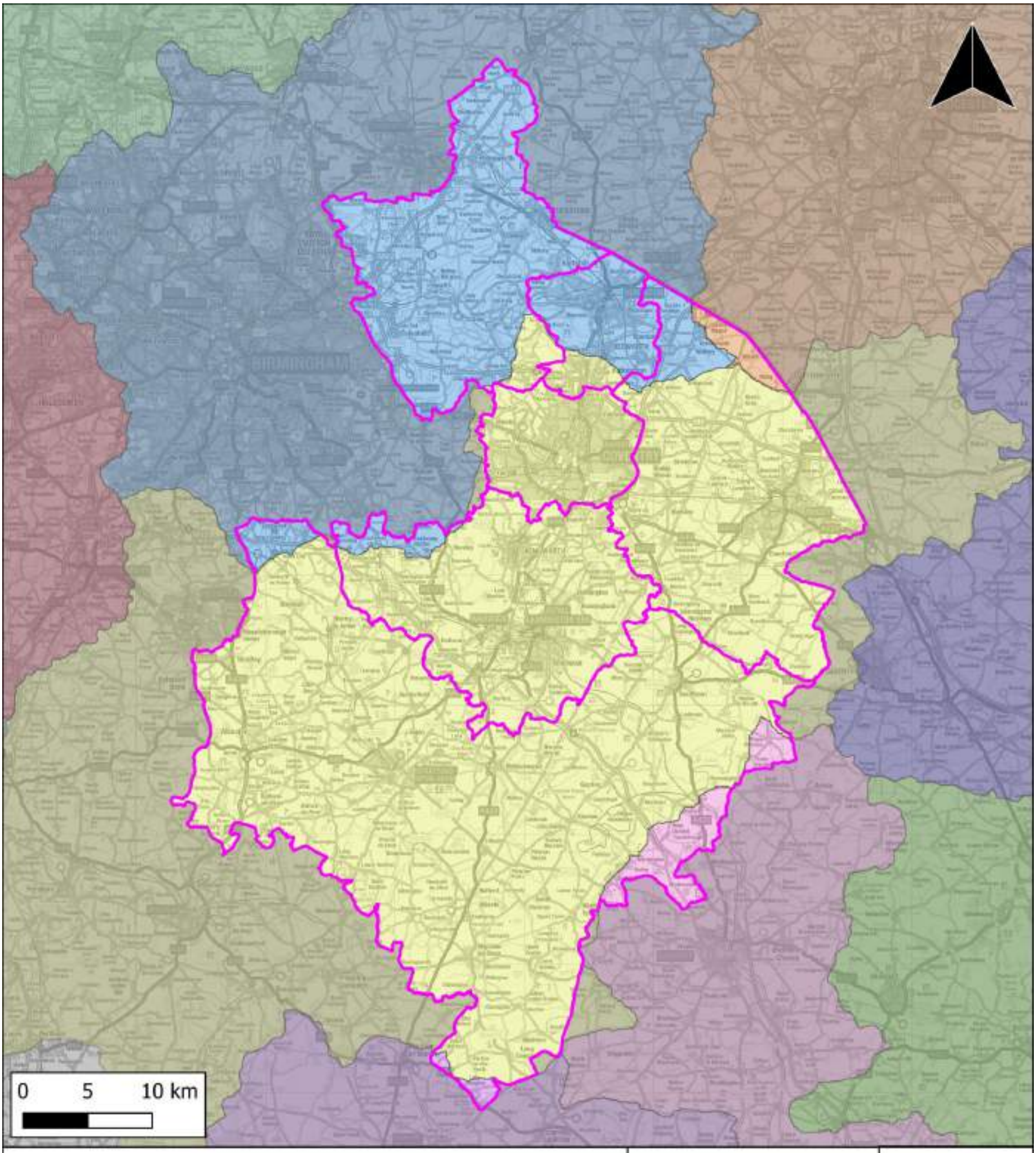

Study Area

CAMS

Cherwell, Thame and Wye

Cotswolds

Soar

Staffordshire Trent Valley

Tame Anker and Mease

Upper and Bedford Ouse

Warwickshire Avon

Welland and Nene

Worcestershire Middle Severn

Figure name: CAMS boundaries

Source: KMQ-JBAU-XX-XX-MX-EN-0005-S0-P01-WRZ.qgz

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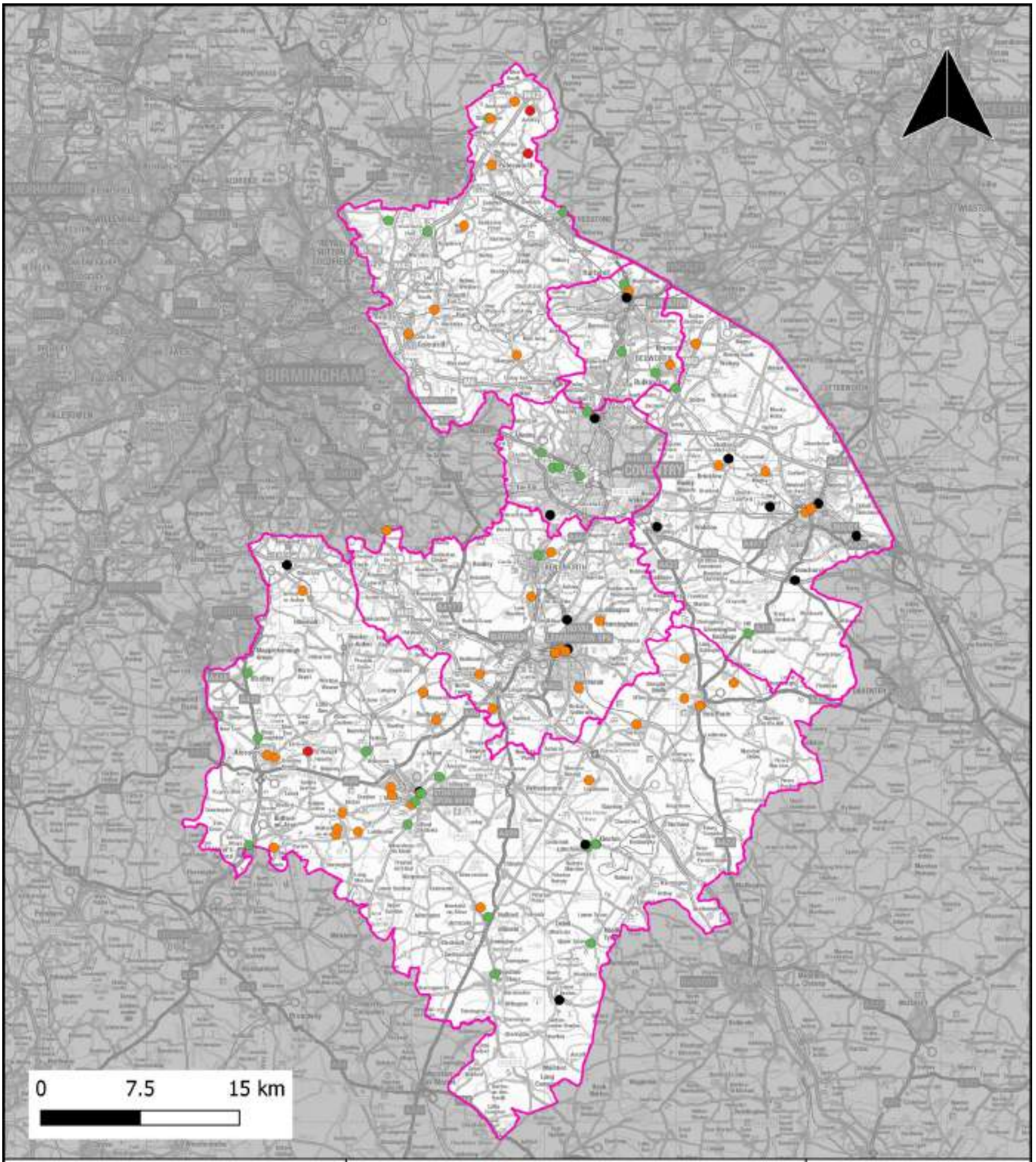

Network storm overflow RAG

- Red
- Amber
- Green
- No data
- Study Area

Figure name: Averages of spills at CSOs that serve the sub-region

Source:
KMQ-JBAU-XX-XX-MX-EN-0002-S0-P01-EDM_2022

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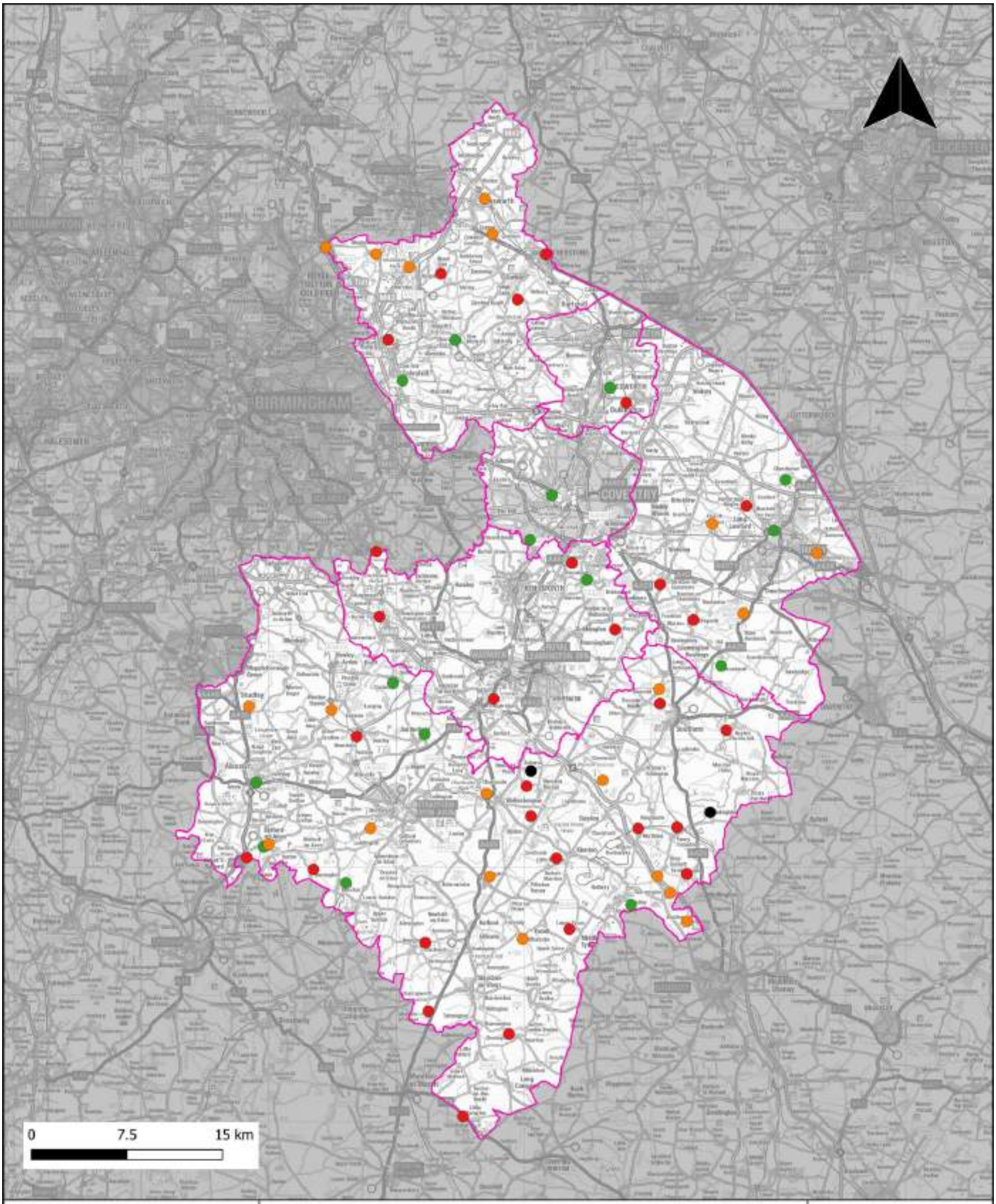

WwTW storm overflow RAG
- Red
- Amber
- Green
- No data
- Study Area

Figure name: Averages of storm tanks at WwTW that serve the sub-region

Source: KMQ-JBAU-XX-XX-MX-EN-0002-S0-P01-EDM_2022

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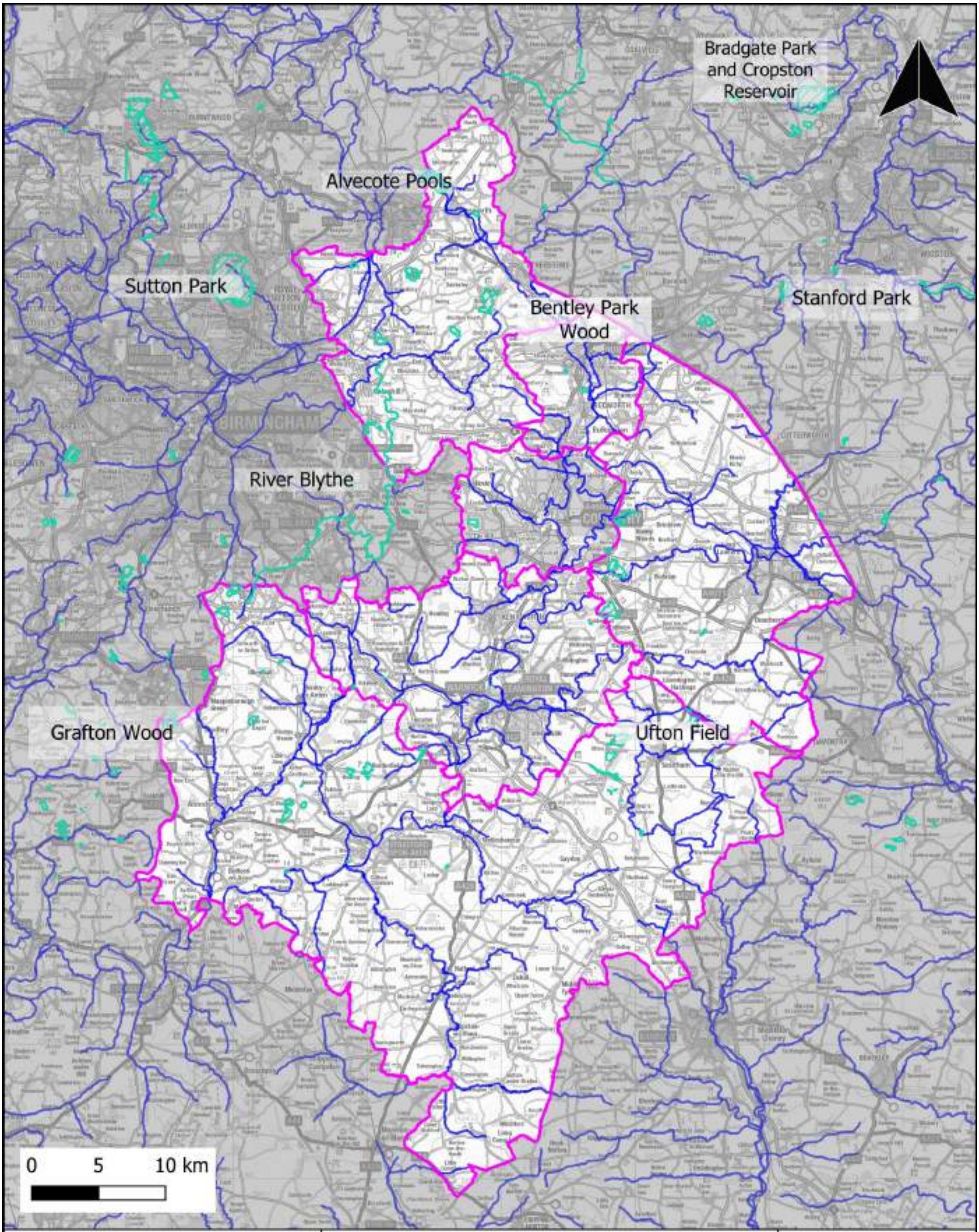
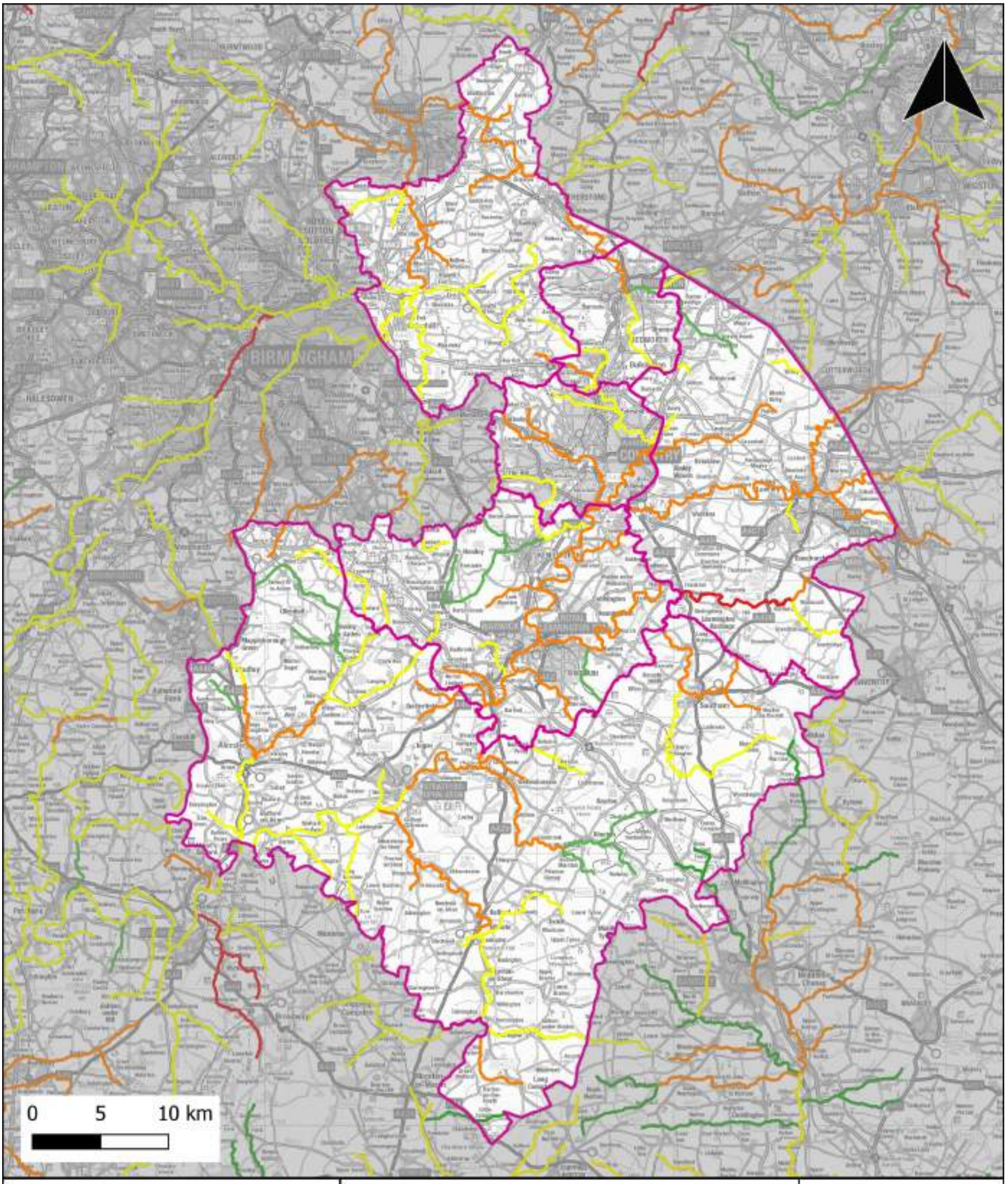


Figure name: SSSIs

Source: KMQ-JBAU-XX-XX-MX-EN-0012-S0-P01-Protected_sites



Overall WFD Status
- Bad
- Good
- High
- Moderate
- Study area
- Poor

Figure name: WFD Overall Status

Source: MWQ-JBAU-XX-XX-MX-EN-0001-S0-P01-Sites

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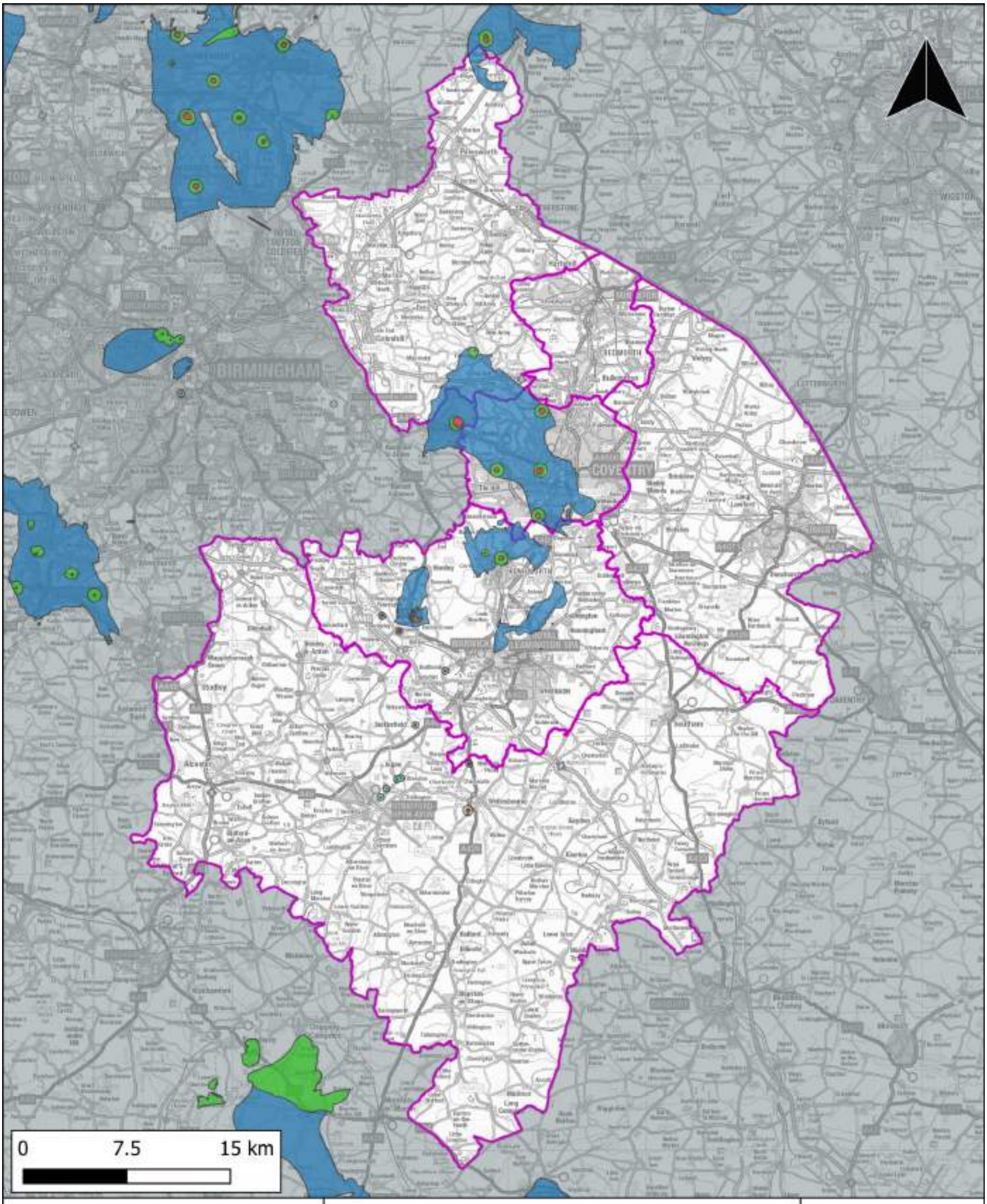

Source Protection Zone
- Zone 1 (Inner protection zone)
- Zone 2 (Outer protection zone)
- Zone 3 (Total catchment)
- Study area

Figure name: Groundwater Source Protection Zones (SPZ)

Source: KMQ-JBAU-XX-XX-MX-EN-0017-S0-P01-SPZ

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