Black Country Councils Water Cycle Study: Phase 1 Scoping Study

Final

May 2020

www.jbaconsulting.com

This page is intentionally left blank

JBA Project Manager

Hannah Coogan (nee Burgess) BSc FCIWEM C.WEM
The Library
St Philips Courtyard
Church Hill
Coleshill
B46 3AD

Revision History

Revision Ref/Date	Amendments	Issued to
V1.0 – 15/01/2020	Draft report	Kaliegh Lowe
V2.0 – 29/04/2020	Draft report	Internal review
V3.0 – 01/05/2020	Final report	Kaliegh Lowe

Contract

This report describes work commissioned by Sandwell Metropolitan Borough Council on behalf of the Black Country Councils (Dudley Metropolitan Borough Council, Sandwell Metropolitan Borough Council, Walsall Council and City of Wolverhampton Council) in November 2018. Kaliegh Lowe, on behalf of Sandwell Metropolitan Borough Council, for the Black Country Councils was the council representative for this contract. Kirstie Murphy and Richard Pardoe of JBA Consulting carried out this work.

Prepared by ..... Kirstie Murphy BSc MSc

Assistant Analyst

..... Richard Pardoe MSc MEng

Analyst

Reviewed by ..... Paul Eccleston BA CertWEM CEnv MCIWEM C.WEM

Technical Director

Purpose

This document has been prepared as a Final Report for the Black Country Councils. JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by the Councils for the purposes for which it was originally commissioned and prepared. JBA Consulting has no liability regarding the use of this report except to the Black Country Councils.

Acknowledgements

JBA Consulting would like to thank the planning teams at the Black Country Councils, Elaine Ring from Severn Trent Water and Ken MacDonald from South Staffs Water for their assistance in producing this report.

Copyright

Carbon Footprint

A printed copy of the main text in this document will result in a carbon footprint of 586g if 100% post-consumer recycled paper is used and 745g if primary-source paper is used. These figures assume the report is printed in black and white on A4 paper and in duplex.

JBA is aiming to reduce its per capita carbon emissions.

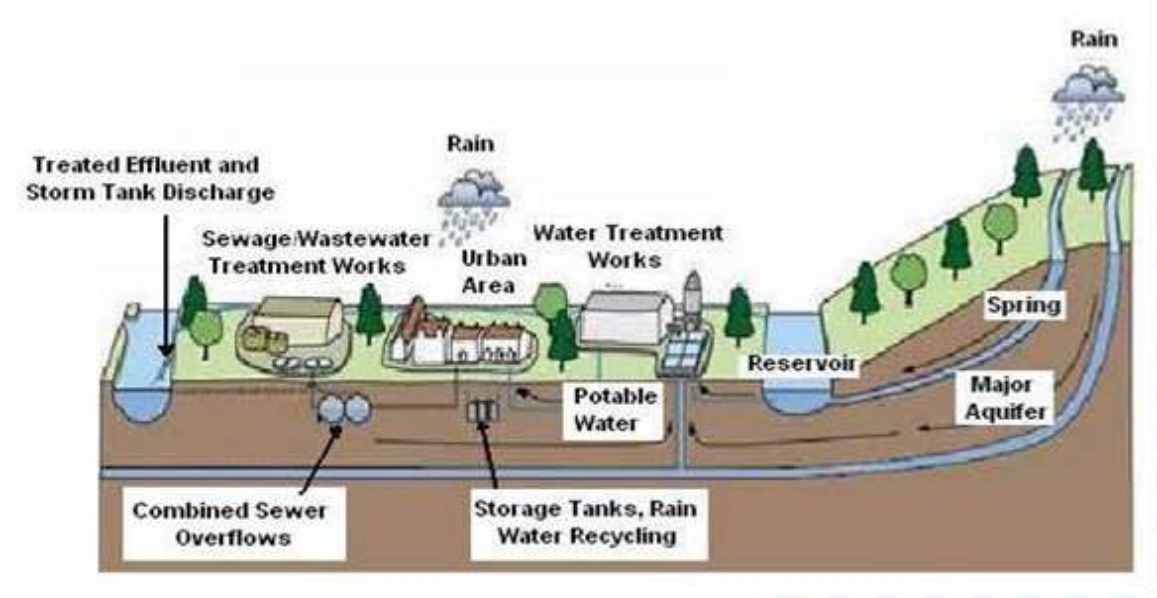
Executive summary

In October 2018, JBA Consulting was commissioned by the Black Country Councils to undertake a Water Cycle Study (WCS). This study assesses the potential issues relating to future development within the Black Country Councils and the impacts on water supply, wastewater collection and wastewater treatment. The Water Cycle Study is required to assess the constraints and requirements that will arise from potential growth on the water infrastructure.

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

In addition to increased housing demand, future climate change presents further challenges to pressures on 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 the Black Country Authorities to identify development locations where there is minimal impact on the environment, water quality, water resources, infrastructure, and flood risk. This will be 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.

The Water Cycle Study has been carried out in co-operation with Severn Trent Water, South Staffs Water and the neighbouring Local Planning Authorities (LPAs).

This Phase 2 Outline study focussed on available capacity and constrains in existing infrastructure. Available information was collated on water policy and legislation, water

resources, water quality, and environmental designations within the study area and used to assess the requirements for further study in a Phase 2 Outline study.

Water Resources

Black Country Councils are covered by four water resource zones (WRZ), supplied by Severn Trent Water (STW) for three WRZs; Shelton, Strategic Grid and Wolverhampton. South Staffordshire Water supplies the South Staffordshire WRZ. Growth accounted for within each company's Water Resource Management Plan is broadly in line the Ministry of Housing Communities and Local Government (MHCLG) household projections (2014 based data) for the four WRZs.

Both STW and SSW commented that their headroom assessments account for uncertainty in the demand side forecasts, and they do not have concerns about the anticipated level of growth. The is also sufficient time to take action should forecasts diverge from actual levels of supply or demand.

The is sufficient evidence to recommend that the Black Country Authorities adopt the optional water efficiency target of 110l/p/d across the study area. This is recommended in the River Basin Management Plans, in line with the new National Water Resources Framework and supported by the water companies.

Water supply infrastructure

Severn Trent stated that as long as a site is within a water resource zone with sufficient water resources, they do not envisage a problem with supply to that site.

South Staffs Water stated that there are no parts of their water resource zone with any constraints in terms of how much water is available. There may be individual locations where they need to adapt their infrastructure to accommodate new developments on a site by site basis.

Further assessment of water supply infrastructure in a Phase 2 Outline study is recommended once a preferred option list of sites is available.

Wastewater collection infrastructure

Development in areas where there is limited wastewater network capacity will increase pressure on the network, increasing the risk of a detrimental impact on existing customers, and increasing the likelihood of CSO operation. Early engagement with Severn Trent Water is required, and further assessment of the network is recommended once a preferred option list of sites is available. Further modelling of the network may be required at the planning application stage.

Where the STW network is a combined sewer system, there may be opportunities for separation of surface water through the application of suitably designed Sustainable Drainage Systems (SuDS).

Wastewater treatment capacity

Flow permit assessments were carried out at all of the wastewater treatment works that are expected to serve growth in the Black Country Plan period. Estimated hydraulic capacity, and estimated headroom based on current water quality performance were used to provide information on the ability to accommodate growth within each wastewater catchment in the study area. It should be noted that many of the wastewater treatment works have either recently been upgraded or are due to be upgraded over the next five years which may improve performance and/or increase capacity.

At present the Coven Heath catchment has limited capacity to increase its effluent discharge without an impact on the environment, whilst Barnhurst, Trescott and Gospel End has relatively more capacity.

Severn Trent Water have advised that Lower Gornal WwTW is expected to close and flows transferred to Roundhill WwTW. This has already been factored into Severn Trent Water's plans.

Water quality

The increased discharges at the WwTWs, serving growth across the Black Country area, have the potential to impact the downstream water quality of receiving waterbodies. Further assessment of the impact upon water quality should be undertaken, as part of a Phase 2 Outline study. In particular, consideration should be paid to those which already have a 'poor' or 'bad' status and are forecast for increased growth.

Flood risk from additional foul flow

The impact of increased effluent flows is not predicted to have a significant impact upon flood risk at most of the WwTWs likely to receive growth. The receiving watercourse for Goscote WwTW is at moderate risk that increased discharges will increase fluvial flood risk. Transfer of flows from Lower Gornal to Roundhill WwTWs is unlikely to significantly effect flood risk.

Further assessment of the impact of wastewater discharge on fluvial flood risk is recommended as part of a Phase 2 Outline study once there is greater certainty on which development sites may come forward in the Black Country Plan.

Odour from WwTW

Where new developments encroach upon an existing Wastewater Treatment Works (WwTW), odour from that site may become a cause for nuisance and complaints from residents. Sewerage undertakers recommend that an odour assessment may be required if the site of a proposed development is close to a WwTW and is encroaching closer to the WwTW than existing urban areas. For STW, this is development sites less than 800m from the WwTW. A further screening assessment of odour is recommended as part of a Phase 2 Outline study. Any future detailed assessment should be carried out as part of the planning process and funded by the developer.

Environmental opportunities and constraints

The Black Country has numerous sites designated for their importance for biodiversity, including sites of international or national importance. There are two Special Areas of Conservation (SACs) and a number of Sites of Special Scientific Interest (SSSIs). The Black Country Plan will be expected to promote the conservation, restoration and enhancement of these sites in line with the NPPF.

WwTWs serving growth areas in the Black Country are the most significant point sources of pollution in the study area.

There is potential for additional discharge from WwTW to impact on sites with environmental designations, and a water quality impact assessment is recommended in a Phase 2 Outline study to understand this further.

Development sites within the Black Country could be sources of diffuse pollution from surface runoff. This should be managed through implementation of appropriately designed SuDS schemes with a focus on treating water quality of surface runoff from roads and driveways. Opportunities exist for these SuDS schemes to offer multiple benefits of flood risk reduction, amenity value and biodiversity, therefore natural greenspace SuDS solutions are preferable wherever it is feasible to implement them.

SuDS for a single site could be demonstrated to have limited impact, but it is the cumulative impact of all development across the catchment (combined with the potential effects of climate change) that should be taken into account. For this reason, SuDS should be considered on all sites, including those that do not have a direct pathway to a site with an environmental designation. However, it is acknowledged that natural greenspace SuDS may not be feasible on every site in the Black Country, for example, on sites where surface water run-off is at high risk of contamination from chemicals or other serious waterborne pollutants.

This page is intentionally left blank

Contents

List of Figures

List of Tables

Abbreviations / Glossary

ALS	Abstraction Licensing Strategy
AMP	Asset Management Plan
AP	Assessment Point
BCP	Black Country Plan
BOD	Biochemical Oxygen Demand
BREEAM	Building Research Establishment Environmental Assessment Methodology
CAMS	Catchment Abstraction Management Strategies
CAPEX	Capital Expenditure
CED	Common End Date
CFMP	Catchment Flood Management Plan
CfSH	Code for Sustainable Homes
CSO	Combined Sewer Overflow
DCG	Design Construction Guidance
DCLG	Department of Communities and Local Government (Replaced by MHCLG)
DWF	Dry Weather Flow
DWI	Drinking Water Inspectorate
DWMP	Drainage and Wastewater Management Plan
EA	Environment Agency
EC	European Community
ECA	European Communities Act
EFI	Ecological Flow Indicator
EP	Environmental Permit
EU	European Union
FEH	Flood Estimation Handbook
FFT	Flow to Full Treatment
FWMA	Flood and Water Management Act
FZ	Flood Zone
GIS	Geographic Information Systems
HOF	Hands-Off Flow
HOL	Hands-off Level
JBA	Jeremy Benn Associates
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
l/p/d	Litres per person per day
Ml/d	Mega (Million) litres per day
MHCLG	Ministry of Housing Communities and Local Government
NH4	Ammonia
NPPF	National Planning Policy Framework
OAN	Objectively Assessed Need
OfWAT	Water Service Regulation Authority
OPEX	Operational Expenditure

OS	Ordnance Survey
P	Phosphorous
RAG	Red / Amber / Green assessment
RBD	River Basin District
RBMP	River Basin Management Plan
ReFH	Revitalised Flood Hydrograph
RoFSW	Risk of Flooding from Surface Water (replaced uFMfSW)
RQP	River Quality Planning tool
RZ	Resource Zone
SA	Sustainability Appraisals
SAC	Special Area of Conservation
SBP	Strategic Business Plan
SEA	Strategic Environmental Assessment
SfA	Sewers for Adoption
SFRA	Strategic Flood Risk Assessment
SHELAA	Strategic Housing and Economic Land Availability Assessment
SHMA	Strategic Housing Market Assessment
SPA	Special Protection Area
SPD	Supplementary Planning Document
SPZ	Source Protection Zone
SS	Suspended Solids
SSSI	Site of Special Scientific Interest
SSW	South Staffs Water
STW	Severn Trent Water
SU	Sewerage Undertaker
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
uFMfSW	Updated Flood Map for Surface Water
UWWTD	Urban Waste Water Treatment Directive
WaSC	Water and Sewerage Company
WCS	Water Cycle Study
WFD	Water Framework Directive
WRMP	Water Resource Management Plan
WRW	Water Resources West
WRZ	Water Resource Zone
WTW	Water Treatment Works
WwTW	Wastewater Treatment Works

1 Introduction

1.1 Terms of reference

JBA Consulting was commissioned by Sandwell Metropolitan Borough Council, on behalf of the Black Country Councils (Dudley Metropolitan Borough Council, Sandwell Metropolitan Borough Council, Walsall Council and City of Wolverhampton Council) to undertake a Water Cycle Study (WCS) to inform the Black Country Plan (BCP). The purpose of the WCS is to form part of a comprehensive and robust evidence base for the Black Country Plan which will set out a vision and framework for development in the area up to 2038 and will be used to inform decisions on the location of future development.

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 can occurs within environmental constraints, with the appropriate infrastructure in place in a timely manner so that planned allocations are deliverable.

1.2 The Water Cycle

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

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

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

The Environment Agency's guidance on WCS[2] recommends a phased approach:

- Phase 1: Scoping study, focussing on formation of a steering group, identifying issues for consideration and the need for an outline study.
- Phase 2: Outline study, to identify environmental constraints, infrastructure constraints, a sustainability assessment and consideration of whether a detailed study is required.
- Phase 3: Detailed study, to identify infrastructure requirements, when they are required, how they will be funded and implemented and an overall assessment of the sustainability of proposed infrastructure.

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.

---

1 National Planning Practice Guidance (NPPG): Water supply, wastewater and water quality, Department for Housing, Communities and Local Government (2019). Accessed online at: http://planningguidance.planningportal.gov.uk/blog/guidance/ on: 06/01/2020

2 Water Cycle Study Guidance, Environment Agency (2009). Accessed online at: http://webarchive.nationalarchives.gov.uk/20140328084622/http://cdn.environment-agency.gov.uk/geho0109bpff-e-e.pdf on: 06/01/2020

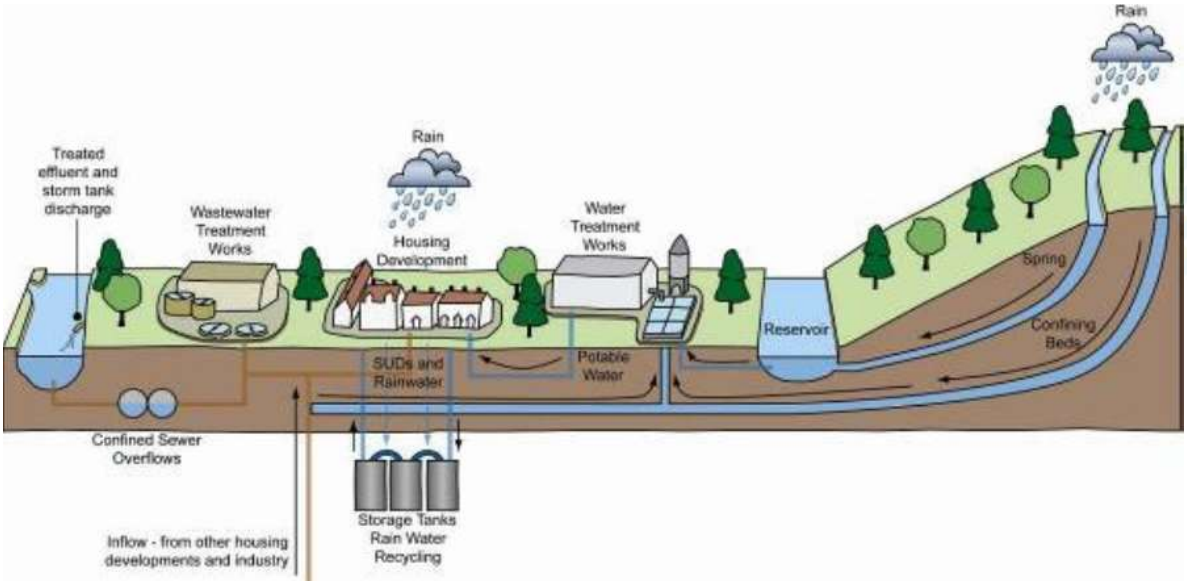


Figure 1.1 The Water Cycle

1.3 Impacts of Development on the Water Cycle

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.

1.4 Objectives

Although a WCS is not a statutory requirement, Local Planning Authorities are advised to prioritise the different stages of the WCS to integrate with their Local Plan programme. This scoping report has been prepared to support the development of the Draft Black Country Plan and to establish the current position on water supply and WwTW capacity. . The Phase 2 Outline study will consider the impact of projected growth over the new plan period up to 2038. Specific requirements for the overall project specified by the project brief, were to:

- To undertake a review of current infrastructure capacity and existing water cycle processes.
- Advise on the capacity of foul sewerage and wastewater treatment across the Black Country.
- Advise on the availability of water resources.
- Advise on the potential to extend water infrastructure to serve planned development and emerging allocations, taking into account potential development in neighbouring authorities where this may impact on capacity.
- Where appropriate, recommend the scope of any detailed WCS required to address water infrastructure constraints.
- Support the Black Country Plan and its allocations by providing information on how development should cause no significant deterioration in current spill

frequency/volume from storm related discharges (CSOs, storm tanks, pumping stations) as a result of any growth.

- Provide information on water supply provision and provide evidence to demonstrate adequate water can be made available to support the level and distribution of growth proposed.
- Consider various policies that need to be implemented as part of the Water Resources Management Plan to reduce demand. These should be taken into consideration for any development in the area, especially the Building Regulations 2015. Any development should consider water resource availability and implement water efficiency measures.
- Consider drought and non-drought events in the assessment of whether a sustainable supply of water is available to support the plan.
- Cross boundary pressures on water resources should be considered to ensure growth pressures in neighbouring authority areas and across the water catchment can be provided for as a whole.
- Refer to the EA's CAMS strategies when considering the water available in the natural environment.
- The WCS should assist Local Authorities when looking at potential for a site's development with regard to their duty under the Water Framework Directive.
- Produce a single report including relevant plans, tables and appendices of detailed information.

1.5 Study Area

This WCS scoping report has been written for the Black Country Councils. The Black Country Councils are inclusive of City of Wolverhampton, Dudley Metropolitan Borough, Sandwell Metropolitan Borough and Walsall. This Local Authority area covers 357km^2 with a population of 1,126,368 (2011 Census).

The main urban areas include, Wolverhampton, Bilston, Willenhall, Darlaston, Walsall, Bloxwich, Brownhills, Wednesbury, Tipton, West Bromwich, Oldbury, Smethwick, Rowley Regis, Blackheath, Cradley Heath, Sedgley, Coseley, Dudley, Kingswinford, Brierley Hill, Stourbridge and Halesowen.

The area is located within the Severn and Humber river catchment and contains the River Tame; a significant tributary of the River Trent. Water supply services are provided by Severn Trent Water in the East and South Staffs Water in the west. Wastewater services are provided by Severn Trent Water throughout the study area.

1.6 Record of Engagement

1.6.1 Introduction

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

1.6.2 Scoping Study Engagement

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

Inception meeting

Engaged Parties	City of Wolverhampton Council Walsall Council Dudley Metropolitan Borough Council Sandwell Metropolitan Borough Council Staffordshire County Council Severn Trent Water
Details	Inception meeting to discuss an overview of the Water Cycle Study process and timelines. 07.11.18

Progress meeting

Engaged Parties	City of Wolverhampton Council Walsall Council Dudley Metropolitan Borough Council Sandwell Metropolitan Borough Council Staffordshire County Council Environment Agency
Details	The councils gave an update on progress in the Black Country Plan process. JBA proposed how we would prepare the growth forecast. Severn Trent Water invited but could not attend. 13.03.19.

Neighbouring Authorities

Engaged Parties	South Staffordshire Council
Details	Where appropriate, neighbouring Local Authorities were contacted for information on growth within their area that may be served by infrastructure within or shared with the Black Country.

Collaboration with Water Companies

Engaged Parties	Severn Trent Water South Staffs Water
Details	Growth forecasts have been discussed with the two water companies, who provided comments and high-level assessments of the impact on their WRZs / assets

2 Future Growth in the Black Country

2.1 Approach

The study area consists of four Local Planning Authorities (LPAs) that are working together to produce a joint water cycle study. The four LPAs are at an early stage in their Local Plan process and are not yet in a position to provide a list of proposed development sites for assessment. This Phase 1 Scoping report therefore focuses on identifying the high-level constraints and capacity in existing water and wastewater infrastructure.

The Phase 2 Outline study will examine proposed development sites and collate them alongside committed sites that are already going through the planning system, and windfall. Recent completions will also need to be captured as they may not yet appear in water company flow data.

Water infrastructure does not fit neatly within council boundaries, and so growth in neighbouring authorities that will share infrastructure with the Black Country Authorities will need to be included in the growth forecast.

3 Legislative and Policy Framework

3.1 National Policy

3.1.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF)[3] was published on 27th March 2012, as part of reforms to make the planning system less complex and more accessible, to protect the environment and to promote sustainable growth. A comprehensive revision was issued in July 2018. This was further revised in February 2019[4], but the changes were not significant from the July 2018 version for policy areas relevant to the WCS. 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 149:

> *"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 170 (e):

> *"…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".*

In March 2014, the Planning Practice Guidance was issued by the Department for Communities and Local Government, with the intention of providing guidance on the application of the National Planning Policy Framework (NPPF) in England. Not all of this has yet been updated to take account of the 2018 or 2019 updates of the NPPF, however MHCLG have stated that this will, where necessary, be updated in due course. Of relevance to this study;

- Flood Risk and Coastal Change[5]
- Water Supply, Wastewater and Water Quality[6].

---

3 National Planning Policy Framework, Department for Communities and Local Government (2012)
4 National Planning Policy Framework, Ministry of Housing, Communities and Local Government (2019). Accessed online at: https://www.gov.uk/government/publications/national-planning-policy-framework--2 on: 06/01/2020
5 Planning Practice Guidance: Flood Risk and Coastal Change, Department for Communities and Local Government (2014). Accessed online at: http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/ on: 06/01/2020.
6 Planning Practice Guidance: Water supply, wastewater and water quality, Department for Communities and Local Government (2014). Accessed online at: https://www.gov.uk/guidance/water-supply-wastewater-and-water-quality

- Housing - Optional Technical Standards[7].

3.1.2 Planning Practice Guidance: Flood Risk and Coastal Change

Diagram 1 in the Planning Practice Guidance sets out how flood risk should be considered in the preparation of Local Plans (Figure 3.1). These requirements are addressed principally in the Councils' Strategic Flood Risk Assessment.

3.1.3 Planning Practice Guidance: Water Supply, Wastewater and Water Quality

A summary of the specific guidance on how infrastructure, water supply, wastewater and water quality considerations should be accounted for in both plan-making and planning applications is provided below in Figure 3.2.

on: 06/01/2020

7 Planning Practice Guidance: Housing - Optional Technical Standards, Department for Communities and Local Government (2014). Accessed online at: https://www.gov.uk/guidance/housing-optional-technical-standards on: 06/01/2020

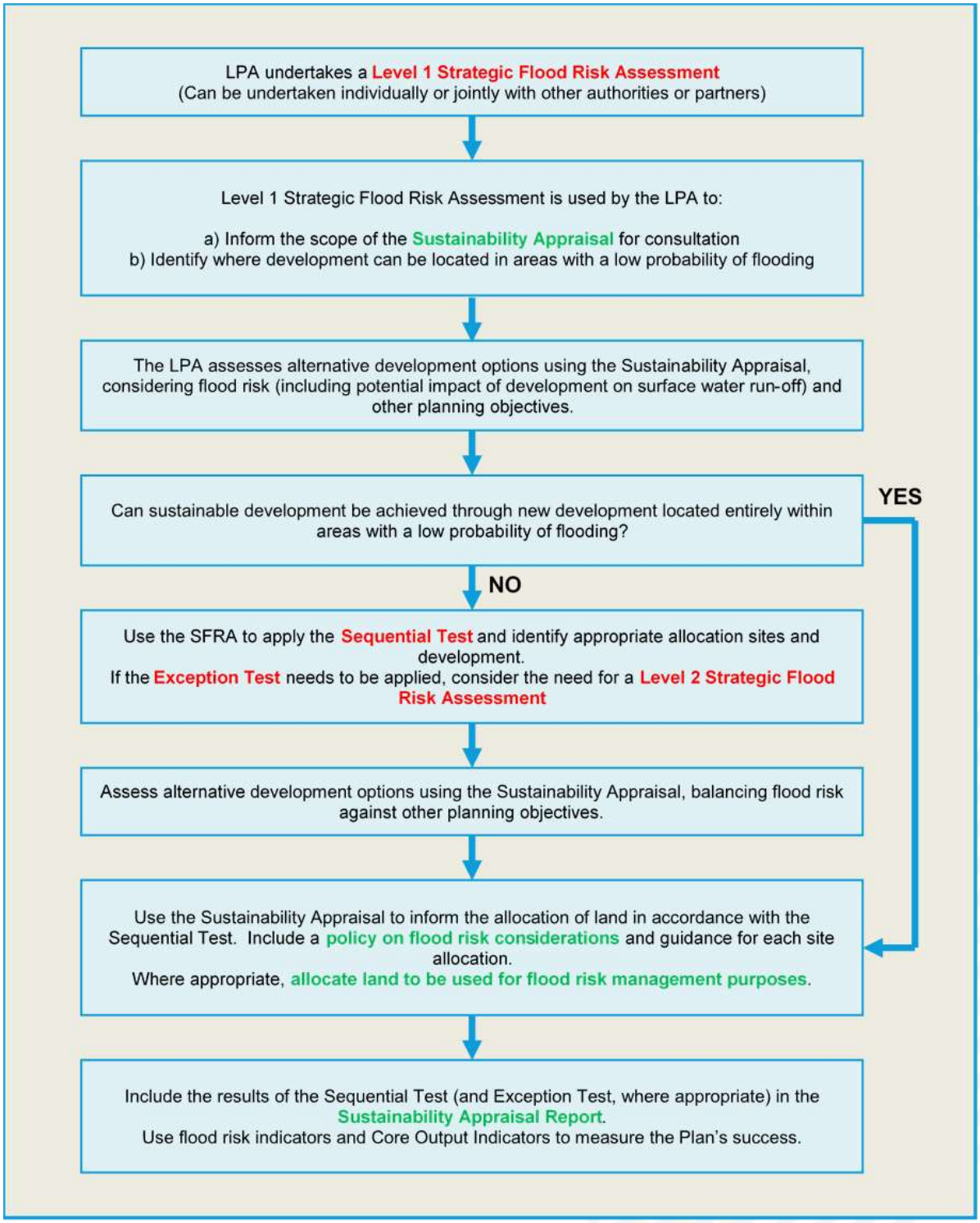


Figure 3.1 Flood Risk and the Preparation of Local Plans[8]

8 Based on Diagram 1 of NPPF Planning Practice Guidance: Flood Risk and Coastal Change (paragraph 004, Reference ID: 7-021-20140306

Plan-making		Planning applications
Infrastructure	Identification of suitable sites for new or enhanced infrastructure. Consider whether new development is appropriate near to water and wastewater infrastructure. Phasing new development so that water and wastewater infrastructure will be in place when needed.	Wastewater considerations include: First presumption is to provide a system of foul drainage discharging into a public sewer. Phasing of development and infrastructure. Circumstances where package sewage treatment plants or septic tanks are applicable.
Water supply	Not Specified	Planning for the necessary water supply would normally be addressed through the Local Plan, exceptions might include: Large developments not identified in Local Plans; Where a Local Plan requires enhanced water efficiency in new developments.
Water quality	How to help protect and enhance local surface water and groundwater in ways that allow new development to proceed and avoids costly assessment at the planning application stage. The type or location of new development where an assessment of the potential impacts on water bodies may be required. Expectations relating to sustainable drainage systems.	Water quality is only likely to be a significant planning concern when a proposal would: Involve physical modifications to a water body; Indirectly affect water bodies, for example as a result of new development such as the redevelopment of land that may be affected by contamination etc. or through a lack of adequate infrastructure to deal with wastewater.
Wastewater	The sufficiency and capacity of wastewater infrastructure. The circumstances where wastewater from new development would not be expected to drain to a public sewer.	If there are concerns arising from a planning application about the capacity of wastewater infrastructure, applicants will be asked to provide information about how the proposed development will be drained and wastewater dealt with.
Cross-boundary concerns	Water supply and water quality concerns often cross local authority boundaries and can be best considered on a catchment basis. Recommends liaison from the outset.	No specific guidance (relevant to some developments).
SEA and Sustainability	Water supply and quality are considerations in strategic environmental assessment and sustainability appraisal ... sustainability appraisal objectives could include preventing deterioration of current water body status, taking climate change into account and seeking opportunities to improve water bodies.	No specific guidance (should be considered in applications).

Figure 3.2 PPG: Water supply, wastewater and water quality considerations for plan-making and planning applications

3.1.4 Planning Practice Guidance: Housing – Optional Technical Standards

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. A 2014 study[9] into the cost of implementing sustainability measures in housing found that meeting a standard of 110 litres per person per day would cost only £9 for a four-bedroom house.

3.1.5 Building Regulations

The Building Regulations (2010) Part G[10] 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.

3.1.6 BRE Standards

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

New homes are most appropriately covered by the Home Quality Mark (HQM)[11], and commercial, leisure, educational facilities and mixed-use buildings by the Building Research Establishment Environmental Assessment Methodology (BREEAM) UK New Construction Standard[12].

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

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

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

The Councils have the opportunity to seek BREEAM or HQM status for all new, residential and non-residential buildings.

---

9 Housing Standards Review: Cost Impacts, Department for Communities and Local Government (2014). Accessed online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/353387/021c_Cost_Report_11th_Sept_2014_FINAL.pdf on: 06/01/2020

10 The Building Regulations (2010) Part G - Sanitation, hot water safety and water efficiency, 2015 edition with 2016 amendments. HM Government (2016). Accessed online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/504207/BR_PDF_AD_G_2015_with_2016_amendments.pdf on: 06/01/2020

11 Home Quality Mark, BRE, (2018). Accessed online at: https://www.homequalitymark.com/professionals/standard/ on: 16/04/2020

12 BREEAM UK New Construction, BRE, (2018). Accessed online at: https://www.breeam.com/NC2018/ on: 16/04/2020

3.1.7 Sustainable Drainage Systems (SuDS)

From April 2015, Local Planning Authorities (LPA) have been given the responsibility for ensuring through the planning system that sustainable drainage is implemented on developments of 10 or more homes or other forms of major development. Under the new arrangements, the key policy and standards relating to the application of SuDS to new developments are:

- The National Planning Policy Framework (NPPF), which requires that development in areas already at risk of flooding should give priority to sustainable drainage systems (NPPF paras. 163 – 165). The NPPF also suggests that undeveloped land can fulfil many different functions, including providing opportunities for SuDS (NPPF para. 118b).
- The House of Commons written statement[13] setting out governments intentions that LPAs should "ensure that sustainable drainage systems for the management of run-off are put in place, unless demonstrated to be inappropriate" and "clear arrangements in place for ongoing maintenance over the lifetime of the development." This requirement is also now incorporated in the 2019 update of the NPPF (paragraph 165). In practice, this has been implemented by making Lead Local Flood Authorities (LLFAs) statutory consultees on the drainage arrangements of major developments.
- The Defra non-statutory technical standards for sustainable drainage systems[14]. 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.
- Dudley Metropolitan Borough Council and the City of Wolverhampton Council alongside Staffordshire County Council are identified as lead local flood authorities (LLFA) and play a key role in ensuring that the proposed drainage schemes for all new developments comply with technical standards and policies in relation to SuDS. The "Sustainable Urban Drainage Systems (SuDS) Handbook" was published in February 2017[15] and contains guidance for the design and application of SuDS.
- An updated version of the CIRIA SuDS Manual[16] 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.
- CIRIA has also produced a range of other guidance and fact sheets on sustainable drainage under the 'Susdrain' banner, which are more relevant to planning requirements than the SuDS Manual. These include guides on surface

13 Sustainable drainage systems: Written statement - HCWS161, UK Government (2014). Accessed online at: http://www.parliament.uk/business/publications/written-questions-answers-statements/written-statement/Commons/2014-12-18/HCWS161/ on: 07/01/2020

14 Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems, Defra (2015).

15 Sustainable Urban Drainage Systems (SuDS) Handbook, Staffordshire County Council, (2017). Accessed online at: https://www.staffordshire.gov.uk/environment/Flood-Risk-Management/Documents/SuDS-Handbook.pdf on: 07/01/2020

16 The SuDS Manual (C753), CIRIA (2015).

water management, green infrastructure and delivering biodiversity benefits, SuDS components, applying climate change, SuDS challenges and designing attenuation storage[17,18].

- Severn Trent Water do not currently have a SuDS adoption manual. In its "Charting a Sustainable Course" document[19] it is stated that innovative approaches, such as SuDS, are required in order to reduce the pressure in their WRZs as drainage systems will not cope with the increasing pressure. It is also addressed that further clarification is required concerning legislation for the adoption of SuDS, by water companies, that third parties have built.
- SuDS features not adopted by the council or water companies need to be maintained by the developer or an appointed management company.

3.2 Regional Policy

3.2.1 Catchment Flood Management Plans

Catchment Flood Management Plans (CFMP) are high level policy documents covering large river basin catchments. They aim to set policies for sustainable flood risk management for the whole catchment covering the next 50 to 100 years. The study area is considered in two CFMPs. The Black Country drains into two river catchments; The Humber catchment and the Severn catchment. The River Trent CMFP[20] River Severn CFMP[21] are both considered in this study.

3.2.2 Surface Water Management Plans (SWMPs)

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. Wolverhampton City Council is a Lead Local Flood Authority and have developed their own SWMP[22]. The four councils in the Black Country are part of a Joint Core Strategy and follow a joint SWMP[23].

3.2.3 Water Resource Management Plans

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

- Future demand (due to population and economic growth)
- Future water availability (including the impact of sustainability reductions)

---

17 CIRIA Guidance on Water Management: https://www.susdrain.org/resources/ciria-guidance.html
18 Susdrain Fact Sheets: https://www.susdrain.org/resources/factsheets.html
19 Charting a Sustainable Course, Severn Trent Water (2015). Accessed online at: https://www.severntrent.com/content/dam/stw/ST_Corporate/About_us/Docs/Changing-course-delivering-a-better-future-for-customers.pdf on: 07/01/2020
20 River Trent Catchment Flood Management Plan, Environment Agency (2010). Accessed online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/289105/River_Trent_Catchment_Management_Plan.pdf on: 07/01/2020
21 River Severn Catchment Flood Management Plan, Environment Agency (2009). Accessed online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/289103/River_Severn_Catchment_Management_Plan.pdf on: 07/01/2020
22 Wolverhampton Surface Water Management Plan, URS (2012). Accessed online at: https://wolverhampton.moderngov.co.uk/documents/s15426/CC%209.6%20Surface%20Water%20Management%20Plan%20Interim%20Report%20Report%20Part%201.pdf on: 08/01/2020
23 Black country Water Cycle Study and Scoping Surface Water Management Plan, Black Country Local Authorities (2009). Accessed online at: https://blackcountryplan.dudley.gov.uk/media/11668/water_cycle_study_scoping_surface_water_mgmnt_plan.pdf on: 08/01/2020

- Demand management and supply-side measures (e.g. water efficiency and leakage reduction, water transfers and new resource development)
- How the company will address changes to abstraction licences
- How the impacts of climate change will be mitigated

Where necessary, they set out the requirements for developing additional water resources to meet growing demand and describe how the balance between water supply and demand will be balanced over the period 2015 to 2040.

- Using cost-effective demand management, transfer, trading and resource development schemes to meet growth in demand from new development and to restore abstraction to sustainable levels.
- In the medium to long term, ensuring that sufficient water continues to be available for growth and that the supply systems are flexible enough to adapt to climate change.

The WRMPs covering the Black Country Districts are provided by South Staffs Water and Severn Trent Water Ltd.

3.3 Local Policy

3.3.1 Localism Act

The Localism Act (2011) (as amended) abolished regional planning and introduced neighbourhood planning which allows local communities to prepare their own plans. In relation to the planning of sustainable development, Section 110 of the Act amends the Planning and Compulsory Purchase Act 2004 to place a 'duty to cooperate' on Local Authorities. This duty requires Local Authorities to *"engage constructively, actively and on an ongoing basis in any process by means of which development plan documents are prepared so far as relating to a strategic matter"*[24].

The Localism Act also provides new rights 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. This means that local people can decide where new homes and businesses should go and also what they should look like. As neighbourhoods draw up their proposals, Local Planning Authorities are required to provide technical advice and support. The only part of the Black Country where neighbourhood plans have been adopted is Wolverhampton[25][26].

3.3.2 Strategic and Local Plans

The existing Black Country Core Strategy (BCCS) is a joint strategic plan which was adopted by the four Black Country Authorities (Dudley Metropolitan Borough Council, Sandwell Metropolitan Borough Council, Walsall Council and City of Wolverhampton Council) in February 2011. The BCCS covers the period up to 2026. The Black Country Plan is a new plan being prepared to replace the existing BCCS, to meet current challenged and opportunities, up to 2038. This will plan for future housing and employment needs and ensure that the infrastructure and services are in place to support the planned housing and employment growth over the new plan period.

---

24 Localism Act 2011: Section 110, UK Government (2011). Accessed online at: http://www.legislation.gov.uk/ukpga/2011/20/section/110 on: 07/01/2020
25 Tettenhall and Heathfield Park Neighbourhood Plan (2014). Accessed online at: https://www.wolverhampton.gov.uk/planning/planning-policies/neighbourhood-planning on: 24/04/2020
26 Bilston Corridor Area Action Plan. Accessed online at: https://www.wolverhampton.gov.uk/planning/planning-policies/area-action-plans-aaps on: 24/04/2020

The BCCS only identifies the spatial strategy for the Black Country (based on the four Strategic Centres and sixteen Regeneration Corridors) and does not allocate sites for development. Each of the Black Country Authorities has therefore produced its own local plans to allocate land for housing, employment and other land uses to meet the needs identified in the BCCS up to 2026. Dudley, Sandwell and Walsall have adopted Site Allocation Documents as well as Area Action Plans for their Strategic Centres and other areas of change. Wolverhampton have prepared three Area Action Plans including one for the City Centre.

3.4 Environmental Policy

3.4.1 Urban Wastewater Treatment Directive (UWWTD)

The UWWTD[27] is an EU Directive that concerns the collection, treatment and discharge of urban wastewater and the treatment and discharge of wastewater from certain industrial sectors. The objective of the directive is to protect the environment from the adverse effects of wastewater discharges. More specifically Annex II A(a) sets out the requirements for discharges from urban wastewater treatment plants to sensitive areas which are subject to eutrophication. The Directive has been transposed into UK legislation through enactment of the Urban Waste Water Treatment (England and Wales) Regulations 1994 and 'The Urban Waste Water Treatment (England and Wales) (Amendments) Regulations 2003'.

3.4.2 Habitats Directive

The EU Habitats Directive aims to protect the wild plants, animals and habitats that make up our diverse natural environment. The directive created a network of protected areas around the European Union of national and international importance called Natura 2000 sites. These include:

- Special Areas of Conservation (SACs) - support rare, endangered or vulnerable natural habitats, plants and animals (other than birds).
- Special Protection Areas (SPAs) - support significant numbers of wild birds and habitats.

Special Protection Areas and Special Areas of Conservation are established under the EC Birds Directive and Habitats Directive respectively. The directive also protects over 1,000 animals and plant species and over 200 so called "habitat types" (e.g. special types of forests, meadows, wetlands, etc.), which are of European importance.

3.4.3 The Water Framework Directive

The Water Framework Directive (WFD) was first published in December 2000 and transposed into English and Welsh law in December 2003. It introduced a more rigorous concept of what "good status" should mean than the previous environmental quality measures. The WFD estimated that 95% of water bodies were at risk of failing to meet "good status".

River Basin Management Plans (RBMP) are required under the WFD and document the baseline classification of each waterbody in the plan area, the objectives, and a programme of measures to achieve those objectives. The study area falls into the River Severn Basin. Under the WFD the RBMPs, which were originally published in December 2009, were reviewed and updated in December 2015. 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 RBMPs. Another equally important

27 UWWTD. Accessed online at: http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:31991L0271 On: 07/01/2020.

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:

- to prevent deterioration of the status of surface waters and groundwater
- to achieve objectives and standards for protected areas
- to aim to achieve good status for all water bodies or, for heavily modified water bodies and artificial water bodies, good ecological potential and good surface water chemical status
- to reverse any significant and sustained upward trends in pollutant concentrations in groundwater
- the cessation of discharges/emissions of priority hazardous substances into surface waters
- progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants."

Local Planning Authorities (LPAs) must have regard to the Water Framework Directive as implemented in the Environment Agency's River Basin Management Plans. It is of primary importance when assessing the impact of additional wastewater flows on local river quality.

3.4.4 Protected Area Objectives

The WFD specifies 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.

Article 4 of the WFD required Member States to achieve compliance with the standards and objectives set for each protected area by 22 December 2015, unless otherwise specified in the Community legislation under which the protected area was established. Some areas may require special protection under more than one EC Directive or may have additional (surface water and/or groundwater) objectives. In these cases, all the objectives and standards must be met.

The types of protected areas are:

- Areas designated for the abstraction of water for human consumption (Drinking Water Protected Areas);
- Areas designated for the protection of economically significant aquatic species (Freshwater Fish and Shellfish);
- Bodies of water designated as recreational waters, including Bathing Waters;
- Nutrient-sensitive areas, including areas identified as Nitrate Vulnerable Zones under the Nitrates Directive or areas designated as sensitive under Urban Waste Water Treatment Directive (UWWTD); 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.

Many WFD protected areas coincide with water bodies; these areas will need to achieve the water body status objectives in addition to the protected area objectives. Where water body boundaries overlap with protected areas the most stringent objective applies; that is the requirements of one EC Directive should not undermine the requirements of another. The objectives for Protected Areas relevant to this study are as follows:

Drinking Water Protected Areas

- Ensure that, under the water treatment regime applied, the drinking water produced meets the requirements of the Drinking Water Directive plus any UK requirements to make sure that drinking water is safe to drink; and
- Ensure the necessary protection to prevent deterioration in the water quality in the protected area in order to reduce the level of purification treatment required.

Economically Significant Species (Freshwater Fish Waters)

- To protect or improve the quality of running or standing freshwater to enable them to support fish belonging to Indigenous species offering a natural diversity; or species, the presence of which is judged desirable for water management purposes by the competent authorities of the Member States.

Nutrient Sensitive Areas (Nitrate Vulnerable Zones)

- Reduce water pollution caused or induced by nitrates from agricultural sources; and
- prevent further such pollution.

Nutrient Sensitive Areas (Urban Waste Water Treatment Directive)

- To protect the environment from the adverse effects of urban waste water discharges and waste water discharges from certain industrial sectors.

Natura 2000 Protected Areas (water dependent SACs and SPAs)

The objective for Natura 2000 Protected Areas identified in relation to relevant areas designated under the Habitats Directive or Birds Directive is to *"protect and, where necessary, improve the status of the water environment to the extent necessary to achieve the conservation objectives that have been established for the protection or improvement of the site's natural habitat types and species of importance."*

3.4.5 Groundwater Source Protection Zones

The Environment Agency has a Groundwater Protection Policy to help prevent groundwater pollution. In conjunction with this the Environment Agency have defined groundwater Source Protection Zones (SPZs) to help identify high risk areas and implement pollution prevention measures. The SPZs show the risk of contamination from activities that may cause pollution in the area, the closer the activity, the greater the risk. There are three main zones (inner, outer and total catchment) and a fourth zone of special interest which is occasionally applied.

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.

The Environment Agency's approach to Groundwater protection[28] sets out a series of position statements that detail how the Environment Agency delivers government policy on groundwater and protects the resources from contamination. 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.

3.4.6 European Derived Legislation and Brexit

Much of the legislation behind the regulation of the water environment derives from the UK enactment of European Union (EU) directives. Following the departure of the United Kingdom from the European Union on 31st January 2020, this legislation remains in force during the transition period, until 31st December 2020. The UK government has signalled that "the UK will in future develop separate and independent policies in areas such as … the environment … maintaining high standards as we do so."

As the details of future changes to environmental regulation are not yet known, this study has used existing, European Union derived environmental legislation, most significantly the Water Framework Directive, to assess the environmental impacts of planned development during the plan period for the In Black Country Plan. Should this situation change, a review of this Water Cycle Study may be required considering any new or emerging regulatory regime.

3.5 Water Industry Policy

3.5.1 The Water Industry in England

Water and sewerage services in England and Wales are provided by ten Water and Sewerage Companies (WaSCs) and twelve 'water-only' companies. The central legislation relating to the industry is the Water Industry Act 1991. The companies essentially 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 - these are known as inset agreements.

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

- Non-domestic customers are able to switch their water supplier and/or sewerage undertaker (from April 2017)
- New businesses are able to enter the market to supply these services
- Measures to promote a national water supply network
- Enabling developers to make connections to water and sewerage systems

3.5.2 Regulations of the Water Industry

The water industry is primarily regulated by three regulatory bodies;

- The Water Services Regulation Authority (OfWAT) – economic / customer service regulation

28 The Environment Agency's approach to groundwater protection, Environment Agency (2018). Accessed online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/598778/LIT_7660.pdf on: 07/01/2020

- Environment Agency - environmental regulation
- Drinking Water Inspectorate (DWI) - drinking water quality

Every five years the industry submits a Business Plan to OfWAT for a Price Review (PR). These plans set out the company's 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. The industry is currently in Asset Management Plan 6 (AMP6) which runs from 2015 to 2020. AMP7 begins in 2020 and runs to 2025.

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

3.5.3 Drainage and Wastewater Management Plans

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

The group recognised that great progress has been made by the water industry in its drainage and wastewater planning over the last few decades, but that, in the future, there needs to be greater transparency and consistency of long-term planning. The Drainage and Wastewater Management Plan (DWMP) framework[29] sets out how the industry intends to approach this, with the objective of the water companies publishing plans by the end of 2022, in order to inform their business plans for the 2024 Price Review.

DWMPs will be prepared for wastewater catchments or groups of catchments and will encompass surface water sewers within those areas which do not drain to a treatment works. The framework defines drainage to include all organisations and all assets which have a role to play in drainage, although, as the plans will be water company led, it does not seek to address broader surface water management within catchments.

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

As the DWMP process is still at an early stage, it is too early to inform this study. In the future, however, DWMPs will 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.

3.5.4 Developer Contributions and Utility Companies

Developments with planning permission have a right to connect to the public water and sewerage systems, although this doesn't preclude the requirement to ensure capacity exists to serve a development.

---

29 A framework for the production of Drainage and Wastewater Management Plans, UK Water Industry Research (2018). Accessed online at: http://www.water.org.uk/wp-content/uploads/2018/12/Water-UK-DWMP-Framework-Report-Main-Document.pdf on: 07/01/2020.

Developers may either 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.

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 action to secure necessary upgrading or contributions.

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.

3.5.5 Changes to Charging Rules for New Connections

OfWAT, the water industry's economic regulator, has published new rules covering how water and wastewater companies may charge customers for new connections[30]. These rules apply to all companies in England and will commence on 1st April 2018. The two relevant water companies for the study area have now published their charging arrangements which can be found in the footnotes[31]. 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 payed for all new connections.
- The definition of network reinforcement has changed and will now apply only to works required as a direct consequence of the increased demand due to a development. Where the water company has not been notified of a specific development, for example when developing long-term strategic growth schemes, the expenditure cannot be recovered through infrastructure charges.
- Some suppliers offer charging incentives to encourage environmentally sustainable development:
    - Severn Trent Water[32] will provide 100% discount on the water infrastructure charge whereby builds are demonstrated to be below 110 litres per person per day. They also provide incentives for sewerage infrastructure charge. Whereby there is no surface water connection, 100% discount is applied. Alternatively, whereby a surface water

30 Charging rules for new connection services (English undertakers), OfWAT (2017). Accessed online at: https://www.ofwat.gov.uk/publication/charging-rules-new-connection-services-english-undertakers/ on: 07/01/2020
31 New Connections Charging, Severn Trent Water (2018). Accessed online at: https://www.stwater.co.uk/content/dam/stw/stw_buildinganddeveloping/new-connections/new-connections-charging-arrangement-2019-2020.pdf 07/01/2020
32 Infrastructure Charges Discount Scheme, Severn Trent Water (2018). Accessed online at: https://www.stwater.co.uk/building-and-developing/regulations-and-forms/application-forms-and-guidance/infrastructure-charges/ 07/01/2020

connection is available via a sustainable drainage system, the charge is reduced by 75%.

3.5.6 Design and Construction Guidance (DCG)

The Design and Construction Guidance[33] contains details of the water sector's approach to the adoption of SuDS, which meet the legal definition of a sewer. This replaces Sewers for Adoption 8 as the government made the decision not to implement Schedule 3 of the Flood and Water Management Act 2010. The new guidance will come into force in April 2020 and will differ from previous sewers for adoption guidance as compliance by water companies in England will be mandatory.

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

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

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

33 Water UK (2019) Design and Construction Guidance for foul and surface water sewers offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England ("the Code") Consultation Draft February 2019. Accessed online at: https://www.water.org.uk/wp-content/uploads/2019/03/RDY-SSG-Appendix-C.pdf on: 31/04/2020

4 Water Resources and Water Supply

4.1 Introduction

4.1.1 Surface Waters

Figure 4.1 shows the main watercourses within the study. The rivers in the four districts of the Black Country drain into two different catchments; the Severn Basin to the south west and the Humber Basin to the north east. The River Tame flows through the districts of Sandwell and Walsall towards the River Trent in a northernly direction. The River Tame is the main river of the West Midlands and meets the River Trent at the point of confluence in Alrewas, Staffordshire to the north east of Walsall. The majority of Dudley Metropolitan Borough drains into the River Stour, with a small part of Dudley draining into the River Tame. The River Stour flows westward from Halesowen and leaves the Black Country at Stourbridge.

The Black Country surface waters include an extensive canal network. Birmingham Canal passes through the centre of Wolverhampton and to the east of Dudley, while Dudley Canal travels to the south of Dudley. The Staffordshire and Worcester Canal travels to the east of the city of Wolverhampton. Wyrley and Essington Canal travels to the north of Walsall and Walsall Canal travels through the centre of Walsall. The canals and surrounding landscape corridors are a major unifying feature of the historic landscape of the Black Country. Any development of the canal network should be in line with the policy outlined in section 6.16 of the Black Country Core Strategy (2011).

4.1.2 Geology

The geology of the catchment can be an important influencing factor in the way that water runs off the ground surface. This is primarily due to variations in the permeability of the surface material and bedrock stratigraphy. Figure 4.2 shows the bedrock geology of the four districts in this study.

For its size, the Black Country is one of the most geologically diverse areas in the world. The bedrock geology is divided broadly into three zones by two major fault lines: the Eastern and Western Boundary Faults. The perimeter of the Black Country, to the east and west of the boundary faults, consists mainly of Triassic rocks (sandstone and conglomerate) and rocks from the Warwickshire group (mudstone, siltstone and sandstone). Through the centre of the Black Country there is a band of Pennine Lower and South Wales Lower Coal Measure Formation (undifferentiated). Sandwell, Wolverhampton and Dudley have small unnamed igneous intrusions (a form of dolerite, known locally as 'Rowley Rag') (carboniferous to Permian-Mafic Igneous rock).

The northern tip of Dudley includes Ludlow rocks (mudstone, sandstone and siltstone) which includes a band of Silurian rocks (limestone, mudstone and calcareous mudstone) and extends across the boundary into Wolverhampton. Dudley has a similar composition to Wolverhampton but with a wider variety of groups. The south east corner of Dudley District includes the Warwickshire group with ironstone, ferricrete and subordinate mudstone. To the south of Walsall and north east of Sandwell a band of Wenlock rocks exist (mudstone, siltstone and sandstone). Further details of the Black Country's geology can be found in the Black Country Minerals Study (2020), Wood.

The four districts of the Black Country are underlain by various types of superficial deposits, as shown in Figure 4.3. Diamicton contributes to the greatest percentage coverage of superficial deposits and covers the largest area of the districts of Wolverhampton, Walsall and Sandwell.

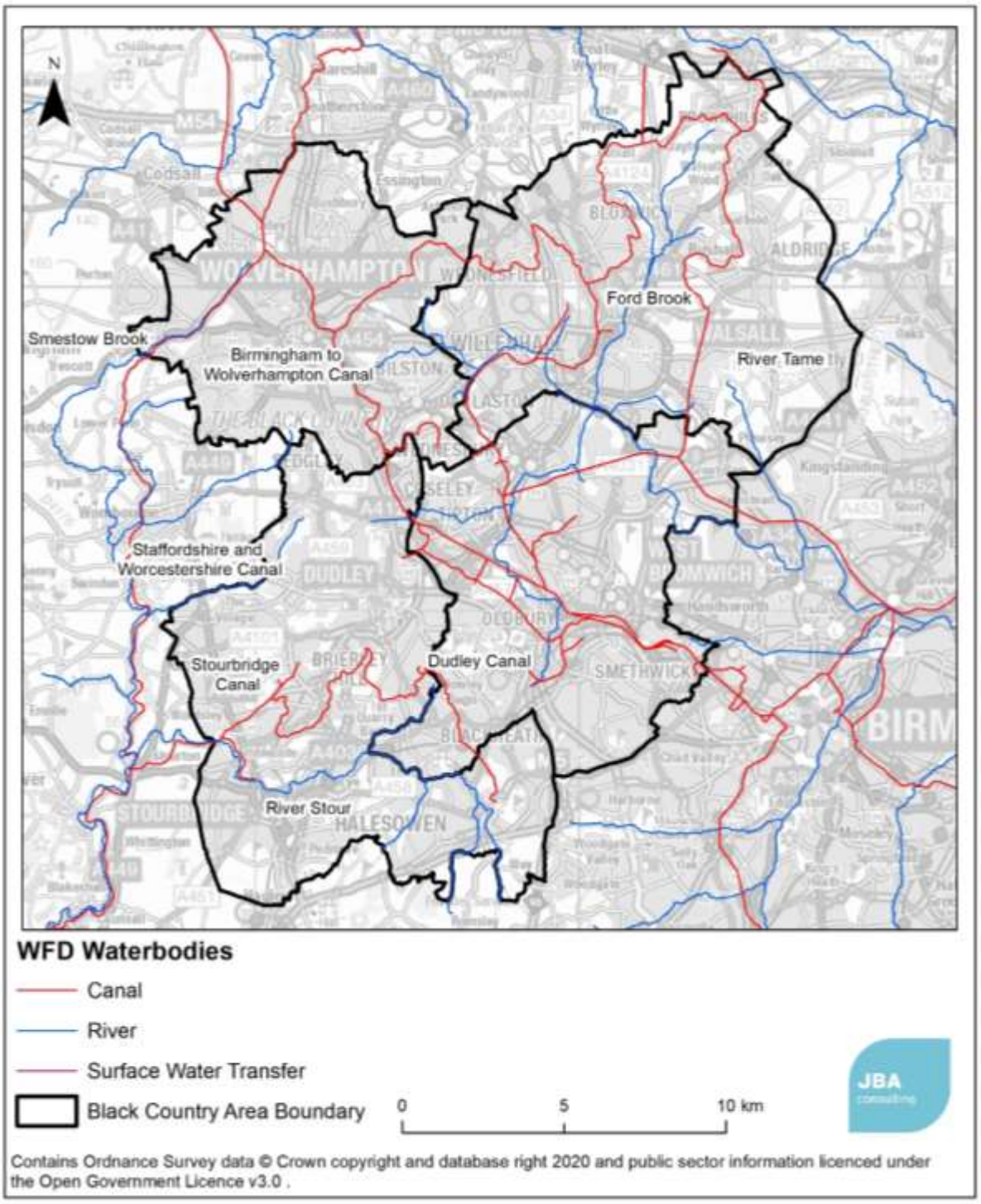


Figure 4.1 Main rivers within the Black Country study area.

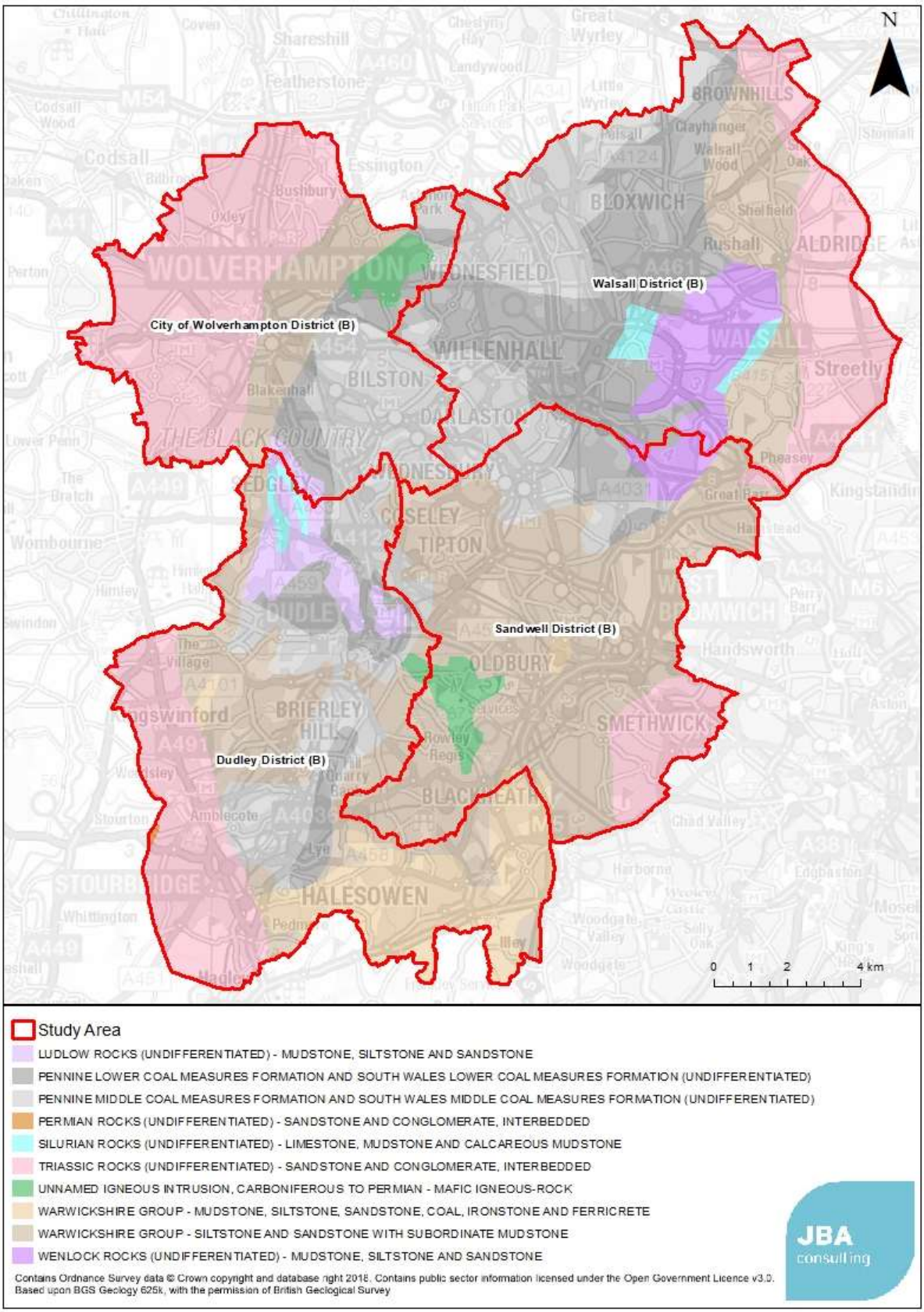


Figure 4.2 Bedrock geology of the four districts in the Black Country

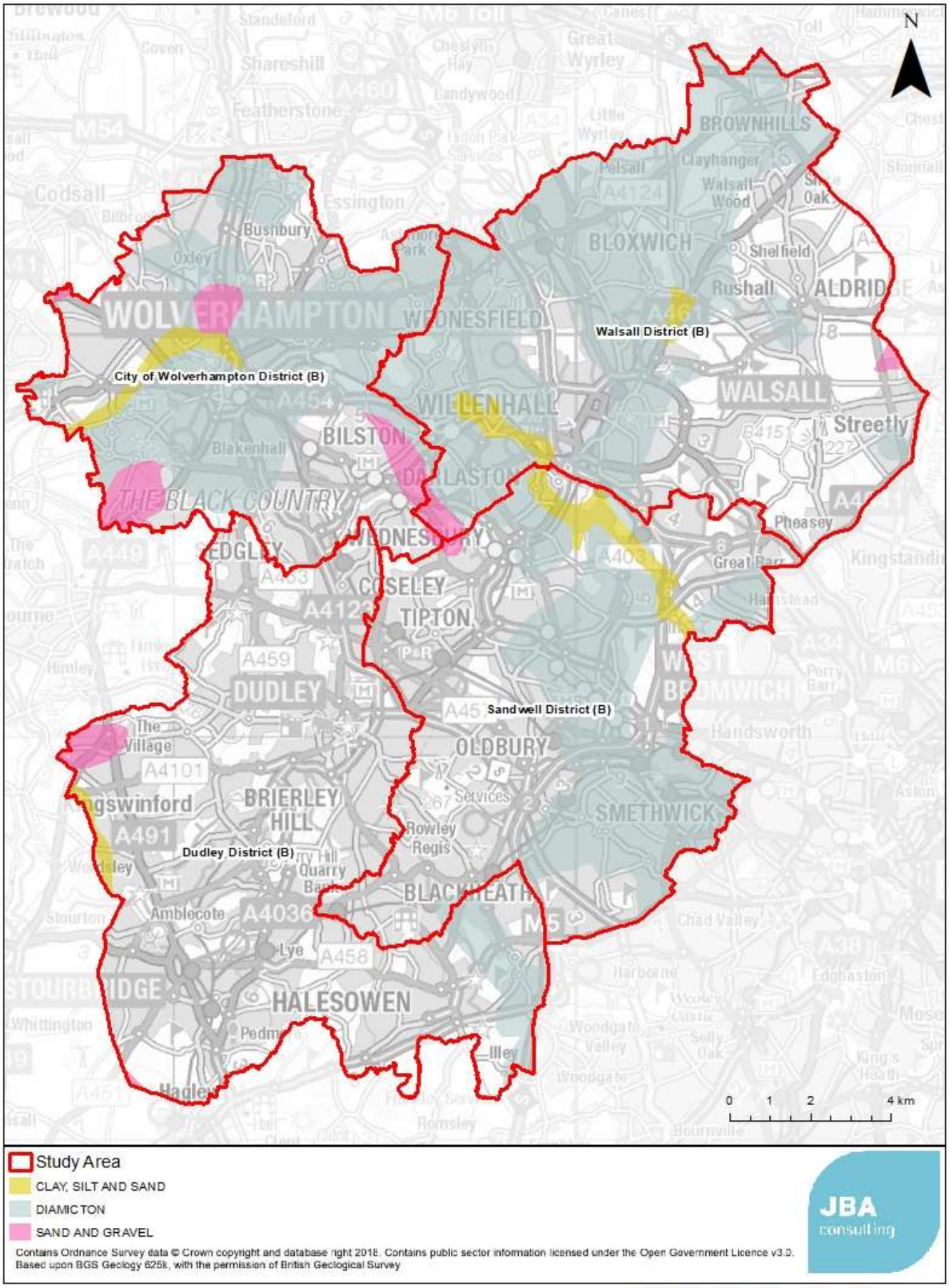


Figure 4.3 Superficial deposits in the Black Country

4.1.3 Availability of Water Resources

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 licences. 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.

All new licences, and some existing licences, 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 licence 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.

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[34]. The Black Country districts in this study are covered by three ALS areas: Staffordshire Trent Valley, Tame, Anker and Mease and Worcestershire Middle Severn. These are shown in the Catchment Abstraction Management Strategy (CAMS) boundaries in Figure 4.4 below.

34 Environment Agency (2018) Managing Water Abstraction. Accessed Online at: https://www.gov.uk/government/collections/water-abstraction-licensing-strategies-cams-process on: 12/04/2019

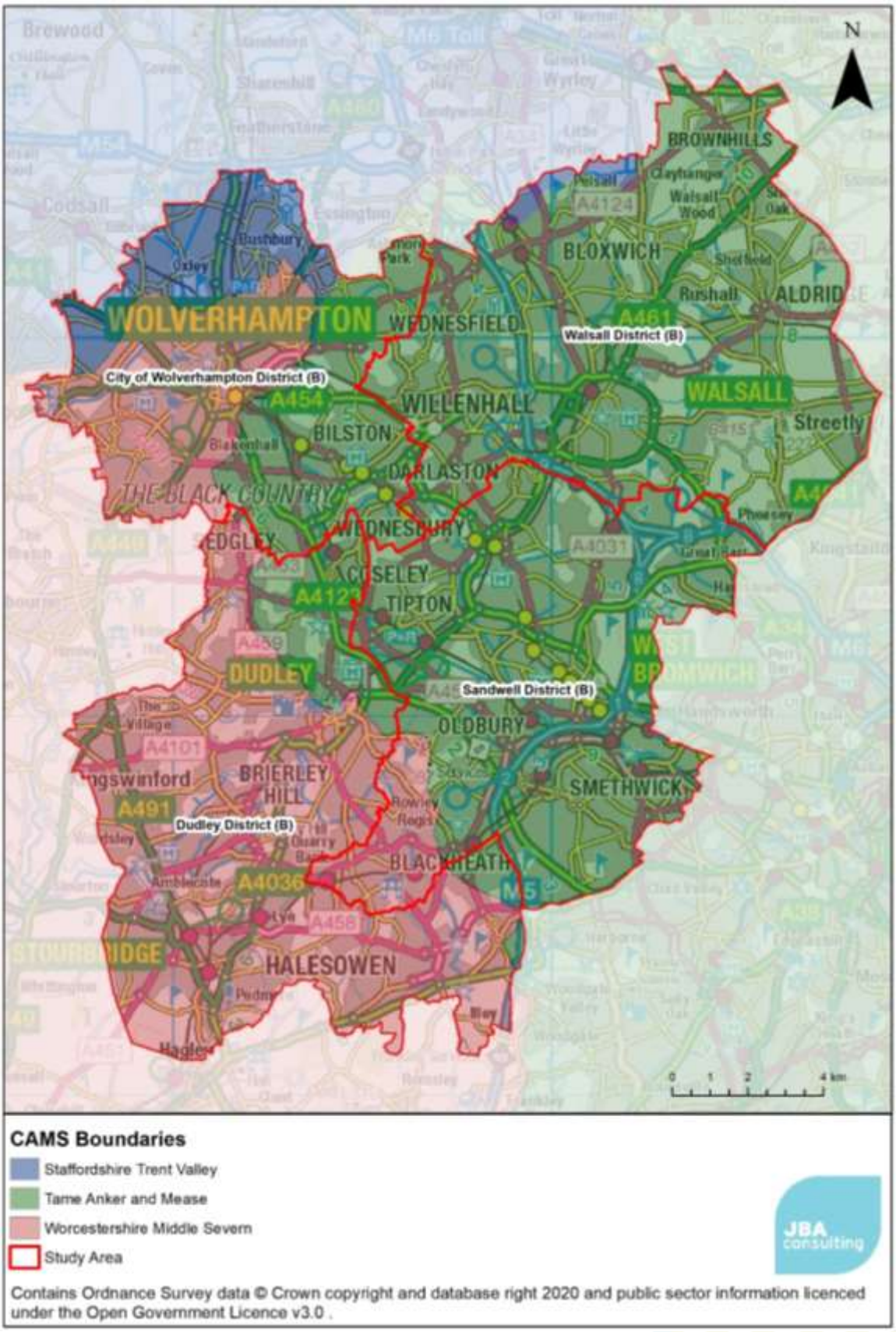


Figure 4.4 CAMS Boundaries covering the districts of Wolverhampton, Walsall, Dudley and Sandwell.

4.2 Resource Availability Assessment

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

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

The availability of water for abstraction is determined by the relationship between the fully licenced (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. In some cases, water may be scarce at low flows, but available for abstraction at higher flows. Licences can be granted that protect low flows, this usually takes the form of a "Hands-off Flow" (HOF) or Hands-off Level (HOL) condition on a licence.

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

Table 4.1 Implications of Surface Water Resource Availability Colours

Water Resource Availability Colour	Implications for Licensing
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 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.
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.
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.
HMWBs (and /or discharge rich water bodies)	These water bodies have a modified flow that is influenced by reservoir compensation releases or they have flows that are augmented. There may be water available for abstraction in discharge rich catchments.

4.2.1 Staffordshire Trent Valley ALS

The Staffordshire Trent Valley ALS[35] includes the Staffordshire River Trent and its tributaries, from its source on Biddulph Moor (north of Stoke-on-Trent) to the downstream confluence with the River Tame. The Staffordshire Trent Valley applies to the northern tip of Wolverhampton, as shown in Figure 4.4.

The only principal aquifer in the ALS consists of Sherwood Sandstone geology and provides a large quantity of water for abstraction (mainly for the use of drinking water). This aquifer typically contributes to the baseflow of rivers, however abstractions at the headwaters have resulted in lowering of the groundwater table. The greatest abstraction of water from surface water and groundwater is by water companies whereby water is used for agriculture, power and industry. Sewage discharges into the River Trent augment flows, in particular from the largest treatment works which is Strongford (south of Stoke-on-Trent).

Abstraction licences are required to abstract more than 20 m³/day (4,400 gallons) from a 'source of supply' (river, stream, lake, well, groundwater) and no consumptive water is available without a HOF. Table 4.2 shows the resource availability for the gauging station closest to the City of Wolverhampton. The HOF (Ml/d) is from the whole of the River Sow catchment. Less will be available further upstream and on tributaries due to lower flows.

Table 4.2 Staffordshire Trent Valley ALS resource availability

Name	Local resource availability	HOF Q (1)	Days p.a. (2)	HOF (Ml/d) (3)	Gauging station at AP?
River Penk	Water available for licensing	82 Ml/d at Penkridge	274	14.4 Ml/d	Yes

At the River Penk gauging station there is water available for licensing subject to HOF of 82 Ml/d. This means that for new licences:

- All new consumptive or partially consumptive licences will be issued with this HOF.
- Water is only available during periods of medium to high flows due to the HOF condition.
- There is a time limit of 31 March 2027.

Groundwater abstractions from solid or drift geology which are likely to impact surface water flow features and baseflow are assessed at the surface water AP, and a Hands-off Flow HoF) condition may be applied to the abstraction.

4.2.2 Tame, Anker and Mease ALS

The Tame, Anker and Mease ALS[36] catchment covers the West Midlands conurbation, and includes Walsall, Sandwell and the eastern parts of Wolverhampton and Dudley.

35 Staffordshire Trent Valley abstraction licensing strategy, Environment Agency (2013). Accessed online at: https://www.gov.uk/government/publications/cams-staffordshire-trent-valley-abstraction-licensing-strategy on: 07/01/2020

36 Tame, Anker and Mease abstraction licensing strategy, Environment Agency (2013). Accessed online at: https://www.gov.uk/government/publications/cams-tame-anker-and-mease-abstraction-licensing-strategy on: 07/01/2020

The catchment is discharge dominated and is impacted by a large number of sewage treatment works, the largest being Minworth and discharging into the River Tame. In the Tame, Anker and Mease catchment, the largest abstractions are used for public water supply, energy production and industry. The catchment has water dependent areas of significant ecological value, including 2 Special Areas of Conservation (SACs), Ensor's pool and the River Mease and 23 SSSIs. The landscape is varied and is relatively low lying (between 50m to 290m) and is gently undulating.

All abstraction licences have an imposed time limit with a Common End Date (CED) for when they are required to be reviewed. A licence issued with a Hands-Off Flow (HOF) restriction specified that if the flow in the river drops below that which is required to protect the environment, the abstraction must stop. No consumptive water is available in the Tame, Anker and Mease catchment without a HOF. The relevant abstraction information for the Black Country is displayed in Table 4.3.

Table 4.3 Tame, Anker and Mease ALS resource availability

AP	Name	Local resource availability	HOF Q (1)	Days p.a. (2)	HOF (Ml/d) (3)	Gauging station at AP?
1	Tame upstream of Bescot Gauging Station	Water available for licensing	85.4 Ml/d at Bescot gauging station	303	7.6 Ml/d	Yes

The principle aquifer in the Tame, Anker and Mease catchment is the Sherwood Sandstone. The area of the Sherwood Sandstone is divided into nine groundwater management units (GWMUs) and provides large volumes of potable water and sustains industrial and agricultural abstractions. Many Sherwood Sandstone catchments in the Midlands Region have been impacted by surface water low flows due to unacceptable groundwater abstractions. In order to restore sustainability, there are two schemes acceptable; conjunctive use and surface to groundwater exchange licence scheme.

- Conjunctive use schemes – arrangements considered for existing groundwater licences with relatively constant, high rates of abstraction.
- Surface to groundwater licence schemes – exchange of surface abstraction to groundwater abstraction considered when there are benefits to public water supplies.

Groundwater availability and licence restrictions are displayed in Table 4.4. All schemes will be subject to environmental assessment, and only those which achieve real improvements in surface water flow conditions will be considered for an abstraction licence.

Table 4.4 Licence restrictions on groundwater abstractions in the Tame Anker and Mease CAMS area

Groundwater body	Groundwater management unit	Water resource availability	Licence restriction
Tame, Anker Mease-Sandstone (Shenstone, Sutton, Birmingham, Linchfield)	Birmingham	Restricted water available for licensing	Closed as all available resources have been licensed. Water may be available if you can 'buy' (known as licence trading) the entitlement to abstract water from an existing licence holder.

4.2.3 Worcestershire Middle Severn ALS

The Worcestershire Middle Severn ALS[37] covers parts of the counties of Shropshire, Staffordshire, Worcestershire, and the West Midlands. Parts of the towns of Wolverhampton and Dudley lie within the CAMS area. The Worcestershire Middle Severn CAMS area comprises of numerous tributaries and several larger rivers such as the Sour and Worfe, all of which flow into the River Severn. The River Stour Flood Plain is a water related Site of Scientific Interest (SSSI).

As water resources have become committed within this area, the abstraction of water at higher flows to fill storage reservoirs which can then be used as a source for summer irrigation has increased. Table 4.5 shows the availability of water resources.

Table 4.5 Worcestershire Middle Severn water resource availability

AP	Name	Local resource availability	HOF Q (1)	Days p.a. (2)	HOF (Ml/d) (3)	Gauging station at AP?
1	River Worfe at Burcote	Restricted water available for licensing	162 Ml/d	36	4.8 Ml/d	Yes
3	River Stour at Stourbridge	Restricted water available for licensing	260 Ml/d at Callows Lane on the River Stour	73	26	Yes
4	River Stour at Smestow	Restricted water available for licensing	260 Ml/d at Callows Lane on the River Stour	73	26	No

(1) Hands off Flow restriction

(2) Number of days per annum abstraction may be available

(3) Approximate volume available at restriction (Ml/D)

Groundwater is mainly sourced from the permo-triassic sandstone aquifer; a high yielding aquifer that supports significant abstraction for public water supply, industry, agriculture and domestic use. Consequently, the groundwater is heavily abstracted, with most abstractions made by historic licences.

The main issue regarding water resources in this area is the historic over-abstraction of groundwater for public water supply and its accompanying environmental impact. There is also a high demand for water to irrigate agricultural land, and this has the potential to conflict with environmental needs as the peak demand for irrigation usually coincides with periods of low flows within watercourses. No groundwater available for licensing in the Middle Sever ALS. All units in Worcestershire Middle Severn area are closed to further consumptive abstraction as the existing levels of licensed abstraction currently exceed the long-term rate of recharge.

37 The Worcestershire Middle Severn abstraction licensing strategy, Environment Agency (2013) Accessed online at: https://www.gov.uk/government/publications/cams-worcestershire-middle-severn-abstraction-licensing-strategy on: 07/01/2020

Table 4.6 Groundwater abstractions in the Worcestershire Middle Severn CAMS area

Groundwater management unit	Resource availability colour	Implication for licensing
Stourbridge	Water not available for licensing	All units within the Worcestershire Middle Severn area are closed to further consumptive abstraction as the existing levels of licensed abstraction currently exceed the long-term rate of recharge.
Wombourne	Water not available for licensing	

4.2.4 Recommendations for better management practices

The main options for this identified in the ALS are to adopt water efficiency and demand management techniques. Methods include:

- Testing the level of water efficiency before granting an abstraction licence
- Promoting efficient use of water
- Taking actions to limit the demand
- Reducing leakage; and
- Embedding policies for low-water consumption design in new buildings into spatial plans.

This would ultimately cut the growth in abstraction and limit the impacts on flow and the ecology.

4.3 Water Resource Assessment: Water Resource Management Plans

4.3.1 Introduction

When new development within a Local Planning Authority 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, and without causing a negative impact on the waterbodies from which water is abstracted.

The aim of this assessment was to compare the future additional demand as a result of development proposed within the emerging Black Country Plan, with the demand allowed for by Severn Trent Water and South Staffs Water in their Water Resource Management Plans.

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 Staffs Water, and secondly by asking the water companies to comment on their ability to serve the proposed growth. Severn Trent Water's supply area is split into 15 Water Resources Zones (WRZs). Three of these zones cover the Black Country; Shelton, Wolverhampton and Strategic grid. South Staffordshire (which has a single WRZ) covers a large proportion of Walsall, Sandwell and Dudley and both company's WRZs are shown in Figure 4.5.

4.3.2 Methodology

STW and SSW's Water Resource Management Plans (WRMP)[38,39,] covering the period 2020 to 2080 were reviewed and 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

The spatial boundaries for each water company's water resource zones were used to overlay the local authority boundaries. The Ministry for Housing, Communities and Local Government (MHCLG) 2014-based estimates of household growth up to 2041[40] were collated for the local authorities which lie within each WRZ. The percentage of the current population of each local authority within the WRZ was estimated from the OS Code Point dataset and the WRZ boundary. The assessment has used MHCLG figures, because they are available for all LPAs within the water resource zone, and over a consistent timescale and methodology. The resulting total number of households in the base year within the WRZ is comparable with the figures quoted in the WRMPs.

38 Water Resources Management Plan 2019, Severn Trent Water (2019). Accessed online at: https://www.severntrent.com/about-us/future-plans/water-resource-management/wrmp-19-documents/ on: 07/01/2020

39 Water Resources Management Plan 2019, South Staffs Water (2019). Accessed online at: https://www.south-staffs-water.co.uk/media/2676/final-wrmp-2019-south-staffs-water.pdf on: 07/01/2020

40 2014-Based Household Projections for England, Office for National Statistics (2018). Accessed online at: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/householdprojectionsforengland on: 07/01/2020

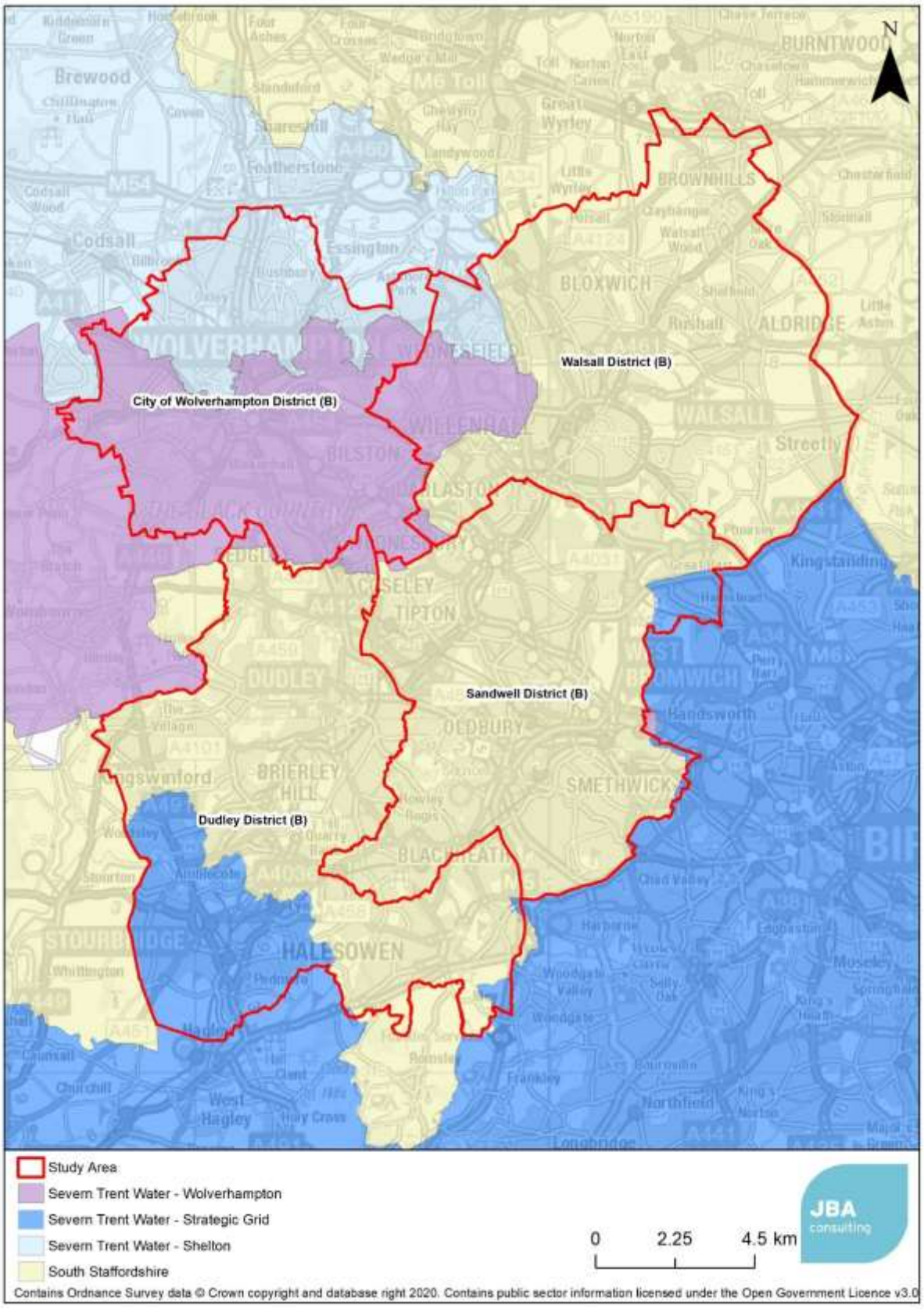


Figure 4.5 Black Country Water Resources Zones

4.3.3 Severn Trent Water

Severn Trent Water supply an area of 21,000km^2 across the Midlands and Mid-Wales, providing clean water to 7.9 million people and sewerage services to 8.95 million people. The area is divided into fifteen water resource zones (WRZs) which vary greatly in size. The largest is the strategic grid which encompasses the majority of the customers that Severn Trent supply. The water resource zones of Wolverhampton, the Strategic Grid and Shelton together, contain all the Black Country districts.

The WRMP[41] identifies the reliance on groundwater for water supply as a challenge, particularly during periods of extended low rainfall, and low groundwater recharge. A long-term aim of the plan is to develop a more diverse mix of sources to reduce risk.

Abstractions by water companies are limited by abstraction licences, which were set based on assumptions about sustainability at the time they were written. Investigations into future sustainability of water resources, based on modelling conducted by the EA has produced an assessment of the reductions required in deployable output of individual water resources in order to ensure long term sustainability. Early identification of these reductions will allow replacement water supply resources to be identified.

Within the WRMP, future challenges to water supply have been identified including:

- Sustainable abstraction and preventing environmental deterioration – the WRMP continues the programme of restoring sustainable abstraction and, as a result, abstraction reduction is required up to 69 Ml/d (over the next 10 years) for some sources. The WFD 'no-deterioration' issue will potentially result in a further 157 Ml/d of current deployable output being replaced.
- Climate change and uncertainty – Severn Trent Water's modelling is based upon the UKCP09 datasets which all point towards a reduction in deployable output.
- Meeting future growth – in order to meet the demand from population growth, it is planned that it will be offset using mitigation methods such as reducing leakage.
- Approach to climate change - drier summers and wetter winters make it harder to meet peak demand. The plan must be robust to change to future supply and demand forecasts, and resilient to a range of risks (drought, loss of supplies).
- Sustainable abstraction options - which do not deplete natural resources or have a negative effect on biodiversity and the local river environment.
- Planned proactive work – proactive maintenance of the network to reduce the amount of water wasted by leakage and optimise the use of STW sources.

The study area is supplied by the Strategic, Wolverhampton and Shelton Zones. The analysis in the WRMP shows that without any further investment, the WRZs will face a supply/demand shortfall over the next 25 years. The plan to address this deficit includes:

- Leakage - approximately 23% of total water is lost to leaks annually. Between 2020 and 2025, Severn Trent aim to reduce leakage by 15%. The long-term ambition is to reduce leakage by 50% over the next 25 years.
- Water efficient activities – this involves water demand management through providing free/subsidised products to increase efficiency. Severn Trent Water also provide home water efficiency checks aimed at customers saving water, energy and money.

41 Water Resources Management Plan 2019, Severn Trent Water (2019). Accessed online at: https://www.severntrent.com/content/dam/stw-plc/our-plans/severn-trent-water-resource-management-plan.pdf On: 07/01/2020

- Increasing water meters – Severn Trent plan to change their approach to water meters, whereby the current reactive programme becomes proactive resulting in increased household meter coverage.

The WRMP outlines a plan that protects the environment and the future ecological status of the water body:

- Adapting supply system and provide alternative ways of meeting future demand without increasing abstraction from sources that would deteriorate the Water Framework Directive stays
- Mitigating for the effects of abstraction and preventing future deterioration from occurring.
- Investigating the environmental impacts of current abstraction and better understanding of likelihood of future deterioration occurring.

The Water Resource Management Plan places a prioritisation of demand management and proposes a step change in leakage, water efficiency and metering activity. The targets to reduce leakage has been divided into different water resource zones. Table 4.7 displays the targets for each zone.

Table 4.7 Proposed leakage targets in the South Staffs WRMP

Optimised 25-year leakage targets per water resource zone (Ml/d) Water Resource Zone.	2019 - 2020	2024 - 2025	2029 - 2030	2034 - 2035	2039 - 2040	2044 - 2045
Wolverhampton	14.4	14.4	14.4	14.38	14.4	14.4
Shelton	26.6	26.6	26.6	26.6	26.6	26.6
Strategic Grid	272.1	213.9	213.9	213.0	199.0	199.0

The WRMP includes a programme for restoring sustainable abstraction investigations. These include short and long-term measures to remove or offset the environmental impact of unsustainable water abstractions. The aim is to help associated water bodies to achieve the objectives outlined by the Water Framework Directive (WFD). The proposals included in the WMRP for the next ten years and beyond which are flexible and do not require investment decisions to be made before the next WRMP is updated in 2024.

Not specifically focused upon the Black Country, Severn Trent aim to improve long term supply capability by replacing output from unsustainable sources of abstraction. This includes reducing the pressures upon groundwater abstraction ensuring that there is no future increase associated with this source. Consequently, Severn Trent are focusing their supply upon surface water abstraction and existing reservoir storage. Also, it is proposed that the strategic water distribution links will be enhanced to allow increased flexibility around the system to move water to locations that require it most.

Across the water supply area, 34% of supply is provided by groundwater, with the majority (approximately 88%) being derived from Sherwood Sandstone or sandstone aquifers in the Midlands region. The sandstone aquifers have substantial storage and are typically not sensitive to short term changes in precipitation.

Vulnerability assessments upon the WRZs across the supply area identified those most sensitive to the impacts of climate change. The results showed that the largest WRZ, the Strategic Grid, is vulnerable to potential changes in temperature and rainfall. However, 'high' vulnerability was applied to all WRZs to maintain consistency.

4.3.4 South Staffs Water

South Staffordshire water supply public water across parts of the West Midlands, Staffordshire and Worcestershire, serving approximately 1.25 million people. The resources comprise two surface water sources - the River Severn and Blithfield Reservoir - and provide 50% of the total water resources. There are 26 groundwater resources situated mainly in the central and southern areas of the region.

South Staffs Water consider their water sources to be linked by a connected, integrated and flexible supply system. In a water shortage, transfers between service reservoirs across the region can be made to maintain supplies to all customers.

Within the WRMP[42], future challenges to water supply have been identified, including:

- Leakage – Customers expect greater action to reduce leakage on network, to help save economically.
- Future Growth – increase in demand from a growing population, and an increase in the number of properties in the water resource zone.
- Abstractions – Alterations are required to the way in which water resources are used, as some abstractions could cause deterioration of the environment.
- Environmental Pressures – ensure that abstractions do not cause deterioration to the environment.

The WRMP for 2020-2025 is based on approaches with the aim of reducing demand in the South Staffs region. The targets for demand management include:

- 25% reduction in leakage by 2024/2025 and a reduction of over 40% across the 25-year planning period.
- Increasing the number of customers who choose to have a water meter by 50% over the lifetime of the WRMP.
- Reduce per capita consumption by 1 l/p/d
- Invest in two major water treatment works to ensure the demand for high quality water is met and to ensure long term resilience of network.

The WRMP outlines a close relationship with the Environment Agency that will be sustained to ensure the volume of water abstracted is sustainable, and to identify any measures if there is an impact occurring.

The South Staffordshire water resource zone is classified as having a 'medium' climate change vulnerability. This is because the two surface water sources, at Blithfield Reservoir and on the River Severn, are vulnerable to drought. However, groundwater sources rely on Sherwood Sandstone aquifer where water levels remain stable despite change in rainfall, because of the high storage within this aquifer.

Modelling of climate change has been completed as part of the WRMP, and a component for the impact of climate change has been included within the household demand forecast.

The intention of peak DO schemes is to provide additional water at times of peak demand, usually in the summer and for a maximum for 6-12 weeks a year. The storage capacity of the sandstone aquifer in this region, it is unlikely that short term peak abstractions will have an additional impact on the environment, providing the long-term abstraction does not increase above recent actual where a risk of deterioration has been identified.

42 Water Resources Management Plan 2019, South Staffs Water (2019). Accessed online at: https://www.south-staffs-water.co.uk/media/2676/final-wrmp-2019-south-staffs-water.pdf On: 07/01/2020

The water supply for South Staffs originates from three sources; Blithfield reservoir, the River Severn and abstractions from groundwater.

Blithfield reservoir is an impoundment reservoir with a capacity of 18 billion litres of water and was formed in 1953 by the construction of a dam across the River Blithe. The water is abstracted by pipeline to treatment works at Seedy Mill, near Lichfield before going into water mains. The River Severn is a regulated river controlled and operated by the Environment Agency. South Staffs abstract water from the River Severn at Hampton Loade, where it is stored in Chelmarsh Reservoir before being treated and supplied.

South Staffordshire groundwater is abstracted from a Triassic sandstone aquifer. There are 25 sites across the supply area and 60 boreholes, from which water is abstracted. The porosity of the sandstone enables large volumes of water to be maintained, and do not fall far during dry periods. The reliability of the groundwater supply is therefore high.

4.3.5 Population and household growth

Since 2000, the population within the Severn Trent water supply region has grown by 0.5 million people however the volume of water supplied has fallen by 3%, across the same timescale. This decrease was achieved through reducing leakage and providing support to customers to reduce their own water consumption.

It is estimated that over the next 25 years, the population across the region is likely to grow by a further 1.13 million people and water resources become increasingly scarce. Assessments show that, without any further investment there will be a supply/demand shortfall in the Strategic Grid, Shelton and Wolverhampton WRZs. The actions proposed to improve the supply/demand shortfall are explained in 4.3.3.

Household population in the SSW area is forecast to increase by 135,000 and therefore approximately 79,000 new homes are forecast to be built by 2038. This is an increase of 13% in connected household properties. Table 4.8 compares the MHCLG household projections dataset for the local authorities within each water resource zone, with the WRZ level forecast contained within the WRMPs. There is some discrepancy between the base-year estimate of the number of households due to the method used to calculate the proportion of each local authority within WRZs where lie across more than one. The percentage growth level is broadly in like across the Wolverhampton and Strategic Grid WRZs, and in the Shelton and South Staffs WRZs, the WRMPs have accounted for a higher level of growth than MHCLG projections.

Table 4.8 Comparison of household growth forecasts – water resource zone level (1,000s of households)

Forecast	2020	2038	Growth
MHCLG 2014-based forecast All Local Authorities in Wolverhampton (STW) WRZ	109	119	10.0%
WRMP Forecast – Wolverhampton WRZ (STW)	114	126	10.9%
MHCLG 2014-based forecast All Local Authorities in Shelton (STW) WRZ	214	231	8.0%
WRMP Forecast – Shelton WRZ (STW)	228	259	13.6%
MHCLG 2014-based forecast All Local Authorities in Strategic Grid (STW) WRZ	2183	2471	13.2%
WRMP Forecast – Strategic Grid WRZ (STW)	2406	2740	13.9%

Forecast	2020	2038	Growth
MHCLG 2014-based forecast All Local Authorities in South Staffs Water WRZ	569	631	10.9%
WRMP Forecast – South Staffs Water WRZ	603	682	13.0%

The water resource zone level forecasts average growth across multiple local authority areas, 43 in the case of the Strategic Grid WRZ. STW also provided a forecast at a local authority level, and a comparison between this forecast and the MHCLG projections is contained in Table 4.9. In three of the Black Country Authorities, STW have accounted for a higher level of growth than the MHCLG projections with the exception of Walsall.

Within their forecast they have included an allowance from the Greater Birmingham and Solihull Local Enterprise Partnership (GBSLEP). The Phase 2 Outline study will compare this forecast to the Authorities housing need.

Table 4.9 Comparison of household growth forecasts – Local Authority level (1,000s of households)

Forecast	2020	2038	Growth
MHCLG 2014-based forecast – Wolverhampton	108	121	12.0%
STW Forecast - Wolverhampton	108	127	14.2%
MHCLG 2014-based forecast – Dudley	134	144	7.5%
STW Forecast - Dudley	134	155	15.5%
MHCLG 2014-based forecast – Walsall	115	129	12.4%
STW Forecast - Walsall	115	127	10.5%
MHCLG 2014-based forecast – Sandwell	133	157	18.3%
STW Forecast - Sandwell	133	159	20.2%

4.3.6 Water company comments

Severn Trent Water

STW advised that if growth in the Black Country was in line with their forecast (contained in Table 4.9 then they do not have concerns on water resource.

There are WFD pressures (relating to over-abstraction of water) in the Wolverhampton and Walsall area that should be considered, and these would not be preferred areas for growth for STW, but their current plan accounts for the WFD pressures currently identified.

https://www.severntrent.com/about-us/future-plans/water-resource-management/wrmp-19-documents/

South Staffs Water

South Staffs Water have stated that they do not have concerns about the level of growth within their WRZ. *"Our 2019 water resources management plan (WRMP19) is available on our website at the following link and it sets out how we will supply any future increases in demand over the next 25 years."*

https://www.south-staffs-water.co.uk/about-us/our-strategies-and-plans/our-water-resources-plan

"We expect total demand (i.e. household demand + non household demand + forecast leakage) in the water resource zone to be lower in 2045 than it is in 2020. This is primarily due to leakage reductions and extra household water efficiency activity."

"Our headroom assessment accounts for uncertainty in both demand side forecasts and the supply side forecasts as well as uncertainty associated with factors such as climate change. Our demand forecasts are based on both ONS data and also the latest information supplied by local authorities."

"We publish new WRMPs on a five yearly cycle and we review them annually. This means that if any of our forecasts diverge significantly from actual levels of supply or demand then we are able to monitor this and take action if required."

"Our published WRMP19 and our business plan (which sets out the investment we intend to make over the next five years) describe what we expect to build in terms of new assets. There are no new reservoirs and there are no large-scale transfers included in either of these plans. Although we do intend to re-commission a small number of groundwater sites, we already own the land where these are located" No safeguarding of land is therefore required for SSW.

4.3.7 Summary

Without any future intervention, there will be a supply/demand imbalance within the next 25 years in all WRZs, however the proposed actions (Sections 4.3.3 and 4.3.4) would provide adequate supply to address this.

Table 4.10 Summary of water resources zone comments

Water company	Water Resource Zone	Comments
Severn Trent Water	Wolverhampton	Severn Trent Water stated that they would have adequate water resource for all proposed development sites.
	Shelton	
	Strategic Grid	
South Staffs Water	South Staffs	SSW have stated that they do not have concerns over the level growth in the South Staffs WRZ.

4.4 Water efficiency and water neutrality

It is widely recognised that the climate is changing and in response The Black Country Councils have each declared a climate emergency. Climate change is predicted to increase pressure on water resources, increasing the potential for a supply-demand deficit in the future, and making environmental damage from over abstraction of water resources more likely. Furthermore, the delivery of water and wastewater services and the heating of water in the home require high energy inputs, and therefore contribute directly to emissions of greenhouse gases. Water efficiency therefore reduces energy use and carbon emissions.

It is important therefore that new development does not result in an unsustainable increase in water abstraction. This can be done in a number of ways from reducing the

water demand from new houses through to achieving "water neutrality" in a region by offsetting a new developments water demand by improving efficiency in existing buildings.

Severn Trent Water provided the following comments on water efficiency:

> Part G of Building Regulations specify that new homes must consume no more than 125 litres of water per person per day. We recommend that you consider taking an approach of installing specifically designed water efficient fittings in all areas of the property rather than focus on the overall consumption of the property. This should help to achieve a lower overall consumption than the maximum volume specified in the Building Regulations.
>
> We recommend that in all cases you consider:
>
> - Single flush siphon toilet cistern and those with a flush volume of 4 litres.
> - Showers designed to operate efficiently and with a maximum flow rate of 8 litres per minute.
> - Hand wash basin taps with low flow rates of 4 litres or less.
> - Water butts for external use in properties with gardens.
>
> To further encourage developers to act sustainably Severn Trent currently offer a 100% discount on the clean water infrastructure charge if properties are built so consumption per person is 110 litres per person per day or less. More details can be found on our website
>
> https://www.stwater.co.uk/building-and-developing/regulations-and-forms/application-forms-and-guidance/infrastructure-charges/
>
> We would encourage you to impose the expectation on developers that properties are built to the optional requirement in Building Regulations of 110 litres of water per person per day.

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

- Existing sources of evidence such as:
  - The Environment Agency classification of water stress
  - Water resource management plans produced by water companies
  - River Basin Management Plans which describe the river basin district and the pressure that the water environment faces. These include information on where water resources are contributing to a water body being classified

as 'at risk' or 'probably at risk' of failing to achieve good ecological status, due to low flows or reduced water availability.

- Consultations with the local water and sewerage company, the Environment Agency and catchment partnerships
- Consideration of the impact on viability and housing supply of such a requirement

4.4.1 Water Stress

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

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

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

In the Environment Agency and Natural Resources Wales assessment[43] the Severn Trent Water and South Staffs Water supply regions are classed as areas of "moderate" water stress.

4.4.2 River Basin Management Plans

The Black Country is covered by two River Basin Districts (RBD), the Humber RBD and the Severn RBD. One of the challenges identified in both River Basin Management Plans (RBMP)[44],[45] is "changes to natural flow and levels of water". The management recommendations from the RBMP are listed below:

- 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.

---

43 Water Stressed Areas – final classification, Environment agency (2013). Accessed online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/244333/water-stressed-classification-2013.pdf on: 27/04/2020

44 Part1: Humber river basin district River basin management plan (LIT 10312), Environment Agency 2015. Accessed online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718328/Humber_RBD_Part_1_river_basin_management_plan.pdf on: 31/03/2020

45 Part 1: Severn River Basin Management Plan (LIT 10315), Environment Agency 2015. Accessed online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718336/Severn_RBD_Part_1_river_basin_management_plan.pdf 27/04/2020

The RBMPs go 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."

4.4.3 National Water Resources Framework

A new National Framework for Water Resources was published by the Government in March 2020. 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.

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 110l/p/d. This is achievable without policy interventions.

This aligns with the tighter standard of 110l/p/d per day as described in building regulations. A water efficiency target higher than 110 l/p/d would make the overall target for the UK harder to achieve.

Under the framework, England is divided into five regional planning areas which produce their own strategic regional plan. The Black Country lies within Water Resources West (WRW). WRW is a group of abstractors and their regulators working together for sustainable water resources. The group includes the water supply companies in the region and the Environment Agency as core members and has input from other stakeholders such as the National Farmers Union and the Canal and Rivers Trust.

4.4.4 Impact on viability

As outlined in section 3.1.4, 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. 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 as a result of such water efficiency measures[46]. Water efficiency is therefore not only viable but of positive economic benefit to both private homeowners and tenants.

4.4.5 Summary of evidence for tighter efficiency standard

The strategic direction in the UK set out in the new National Water Resources Framework is to attain an average household water efficiency of 110 l/p/d by 2050. This also aligns with the recommendation in the River Basin Management Plans aimed at reducing the impact of abstraction. There would also be a positive economic impact for residents in terms of reduced energy and water bills.

It is therefore recommended that 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 is adopted for the Black Country.

46 Waterwise (2018) Advice on water efficient new homes in England. Accessed online at: https://waterwise.org.uk/wp-content/uploads/2019/10/Advice-on-water-efficient-homes-for-England061118.pdf on 06/04/2020

4.4.6 Water neutrality concept

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[47] 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".***

It is useful to also refer to the refined definition below:

"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" (V Ashton, 2014)[48]

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.

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 particular 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.

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

Water neutrality can be achieved in a number of 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

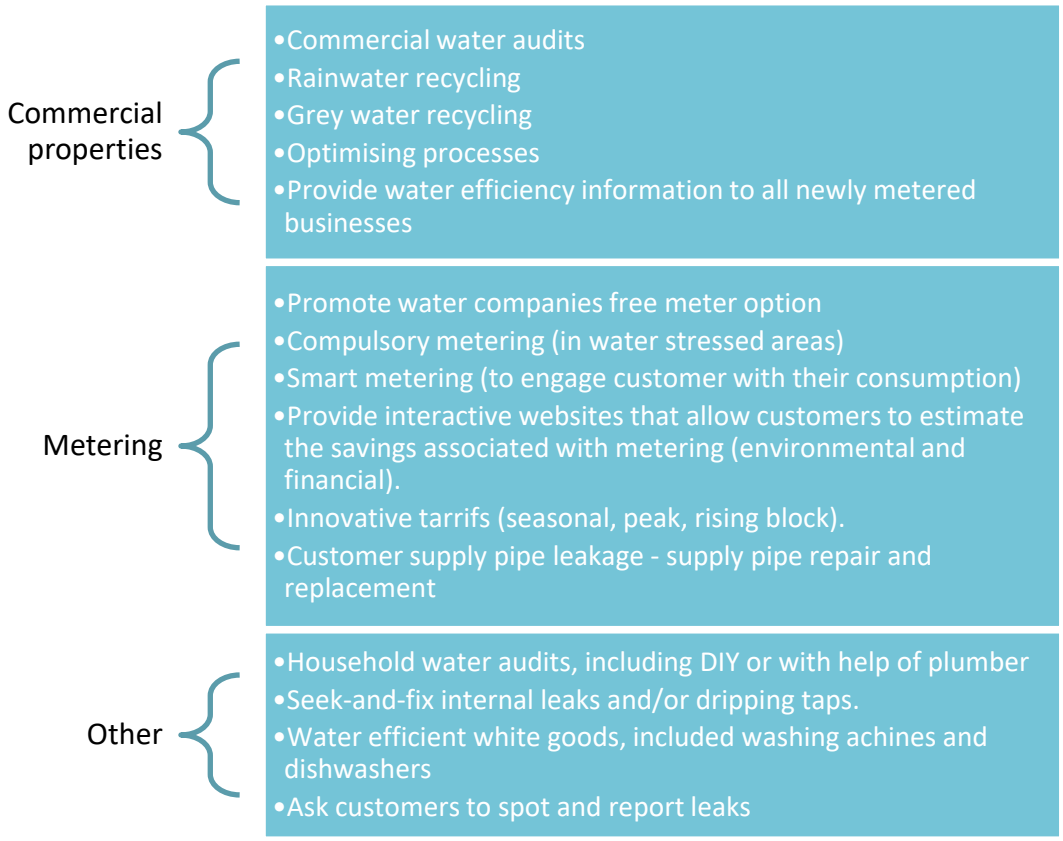
Suggestions for water-efficiency measures are listed in Figure 4.6 below.

47 Water Neutrality: An improved and expanded water resources management definition (SC080033/SR1), Environment Agency, 2009. Accessed online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291675/scho1009bqzr-e-e.pdf on: 26/11/2019

48 Water Resources in the Built Environment, edited by Booth and Charlesworth (2014). Published by Wiley.

4.4.7 Consumer 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
Water-efficient measures for toilets	•Cistern displacement devices to reduce volume of water in cistern •Retro-fit or replacement dual flush devices •Retro-fit interuptable 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 with water butt •Grey water recycling
Water-efficient measures addressing outdoor use	•Hosepipe flow restrictors •Hosepipe siphons •Hose guns (trigger hoses) •Drip irrigation systems •Mulches and composting



Source: Adapted from Booth and Charleswell 2014

Figure 4.6 Consumer water-efficiency measures

Water neutrality is a concept that addresses the wastage of water at all points in its supply and usage. It therefore requires measures in new build properties (that could be mandated through policy) as well as in existing properties, in the regulation of water using appliances and fittings, in tackling leakage in water supply systems and consumer pipework, and in public attitudes and behaviours to the use of water. So, meeting the higher efficiency standards in Building Regulations is one important step for new build properties, but is one part of the overall picture. 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.

4.4.8 Rainwater and Greywater Recycling

Rainwater harvesting

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.

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 RwH

- **RwH reduces the dependence on mains water supply – reducing bills for homeowners and businesses**
- **Less water needs to be abstracted from river, lakes and groundwater**
- **Stormwater is stored in a RwH system reducing the peak runoff leaving a site providing a flood risk benefit (for smaller storms)**
- **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

- **Dependency on rainfall can limit availability of harvested rainwater during drought and hot weather events.**
- **Increased capital (construction) costs to build rainwater harvesting infrastructure into new housing (£2,674 for a 3/4 bed detached home)**
- **Payback periods are long as the cost of water is low so there is little incentive for homeowners to invest. For further information see: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/353387/021c_Cost_Report_11th_Sept_2014_FINAL.pdf**

Greywater harvesting

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

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 that the water can rapidly become septic, so can only be stored for very short periods of time.

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.

Domestic water demand can be significantly reduced by using GwH, 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 GwH 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 in the UK. Communal systems may offer more opportunities where the cost can be shared between multiple households.

4.4.9 Energy and Water use

According to EU statistics (Eurostat 2017), 17% of the UK's domestic energy usage is for water heating. If less water was being used within the home, for instance through

more water efficient showers, less water would need to be heated, and overall domestic energy usage would be reduced.

The Government is currently consulting 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.

4.4.10 Funding for water neutrality

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).

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.

4.5 Conclusions

Policies to reduce water demand from new developments, or to go further and achieve water neutrality in certain areas could be defined to reduce the potential environmental impact of additional water abstractions in the Black Country, help to achieve reductions in carbon emissions and reduce energy and water bills for residents. Achieving water neutrality would require a range of measures including water efficient fittings in new homes, but would also require the implementation of measures beyond the scope of the Black Country Plan including regulation of water-using appliances and fittings, reduction of leakage from supply mains and consumer pipework, and changes to consumer attitudes and behaviours. Developing a plan for water neutrality is, therefore, beyond the scope of this study, however it is recommended that the Council continues to engage with Severn Trent Water, South Staffs Water, the Environment Agency and Water Resources West to consider how a water neutrality approach could contribute towards sustainable development in the region.

A policy requiring new residential development to achieve the tighter water efficiency target of 110 l/p/d as described in Part G of Building Regulations is line with the strategic direction outlined in the National Water Resources Framework, and the recommendations of the River Basin Management Plans. Furthermore, it is viable, can be implemented at negligible cost and will reduce energy and water bills for residents.

Further assessment of water resources is required as part of a Phase 2 Outline study to ensure that proposed growth in the Black Country Plan can be accommodated in water company plans.

4.5.1 Recommendations

Table 4.11 Recommendations for water resources

Action	Responsibility	Timescale
Continue to regularly review forecast and actual household growth across the supply region through WRMP Annual Update reports, and where significant change is predicted, engage with Local Planning Authorities.	STW / SSW	Ongoing
Provide yearly profiles of projected housing growth to water companies to inform future WRMPs.	BC Councils	Annually
Use planning policy to require the 110l/person/day water consumption target permitted by National Planning Practice Guidance[49] in water-stressed areas	BC Councils	In Black Country Plan
The concept of water neutrality has potentially a lot of benefit in terms of resilience to climate change and enabling all waterbodies to be brought up to Good status. Explore further with Severn Trent Water, South Staffs Water, Water Resources West and the Environment Agency how the Council's planning and climate change policies can encourage this approach.	BC Councils, EA, STW, SSW	In Black Country Plan and Climate Change Action Plan
STW and SSW should advise the Black Country Councils of any strategic water resource infrastructure developments where these may require safeguarding of land to prevent other type of development occurring.	STW, SSW, BC Councils	In Black Country Plan

49 Planning Practice Guidance, Housing: Optional Technical Standards, Paras 13, 14 & 15, MHCLG (2015)., Accessed online at: https://www.gov.uk/guidance/housing-optional-technical-standards on: 08/01/2020

5 Water Supply Infrastructure

5.1 Introduction

An increase in water demand due to growth can exceed the hydraulic capacity of the existing supply infrastructure. This is likely to manifest itself as low pressure at 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.

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 outline 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.

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.

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[50]. This is particularly feasible within property owned or managed by the local authorities, such as social housing.

5.2 Methodology

Severn Trent Water and South Staffs Water were asked to advise if there were any areas within their respective supply areas where there are constraints on the provision of water supply infrastructure, or where new strategic infrastructure was required in order to serve growth.

5.3 Results

5.3.1 Severn Trent Water

STW do not typically provide a site by site analysis as they do not have a team resourced to carry out such an assessment. They advise that as long as a site is within a water resource zone with sufficient water resources, then they "do not envisage a problem" with supply to that site. They also note that there are no new garden towns or villages proposed, which can prove more of a challenge to supply water to. Where a site is a long distance from the network, a requisition may be required which is assessed at the time of contact with developer.

It should be noted that proposed development sites have not received a detailed assessment, and so it is recommended that further analysis is conducted in a subsequent Phase 2 Outline study once a preferred options list of sites is available.

50 Water Efficiency Retrofitting: A Best Practice Guide, Waterwise (2009). Accessed online at: http://www.waterwise.org.uk/wp-content/uploads/2018/01/Waterwise-2009_Water-efficiency-Retrofitting_Best-practice.pdf on: 29/10/2018

5.3.2 South Staffs Water

The following comments were received from SSW:

"There are no parts of the South Staffs water resource zone with any constraints in terms of how much water we have. There may be individual locations where we need to adapt our infrastructure (e.g. install new pipes or booster stations) to accommodate new developments but this is very much a site by site process."

"Because we have a legal duty to connect household properties that require mains water supply, it is not a question of whether we can supply new homes with water or not but a question of how do we adapt our network in order to accommodate them. This legal duty to connect doesn't apply to new non-household connections but, unless they are really large, these would be processed via our established, BAU new connections process."

5.4 Conclusions

- No limitations on the provision of water supply infrastructure were identified by STW or SSW during the Black Country Plan period.
- A site by site assessment has not been completed as part of this study as suitable list of sites was not available at this stage. Once a preferred options list of sites is available, further assessment may be required in a Phase 2 Outline study to ensure that the water supply network has sufficient capacity locally to accommodate the additional demand without detriment to existing customers.

Further analysis of water supply infrastructure is recommended as part of a Phase 2 Outline study.

5.5 Recommendations

Table 5.1 Recommendations for water supply infrastructure

Action	Responsibility	Timescale
Undertake network modelling to ensure adequate provision of water supply is feasible	STW BC Councils	As part of the planning process
The BC Councils and Developers should engage early with STW and SSW to ensure infrastructure is in place prior to occupation.	BC Councils STW SSW Developers	Ongoing

6 Wastewater Collection

6.1 Sewerage undertakers

Severn Trent Water is the Sewerage Undertaker (SU) for the Black Country Councils. The role of the sewerage undertaker includes the collection and treatment of wastewater from domestic and commercial premises, and in some areas, it also includes the drainage of surface water from building curtilages to combined or surface water sewers. It excludes, unless adopted by the SU, systems that do not connect directly to the wastewater network. As of April 2020, new Design and Construction Guidance (DCG) came into force which 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 (see section 3.5.6 for details).

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

Likewise, headroom at Wastewater Treatment Works (WwTW) can be eroded by growth in population or per-capita consumption, requiring investment in additional treatment capacity. As the volumes of treated effluent rises, even if the effluent quality is maintained, the pollutant load discharged to the receiving watercourse will increase. In such circumstances the Environment Agency as the environmental regulator, may tighten 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.

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

6.2 Sewerage System Capacity Assessment

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

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

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

6.3 Methodology

A site by site assessment of wastewater network capacity was not appropriate in the scoping phase of the project. Severn Trent Water were asked to comment on capacity constraints within their sewer network, and a more detailed site by site assessment is expected to be undertaken in a Phase 2 Outline study.

6.4 Results

The following comments were received from STW:

"Sewerage Undertakers have a duty under Section 94 of the Water Industry Act 1991 to provide sewerage for new development. Providing surface water from development sites is not connected to the combined or foul system, the additional foul only flows can usually be accommodated. However, sewerage upgrades may be required where there are pre-existing capacity constraints or where the development proposes to connect high flow rates. Although Severn Trent assess the impact of planned growth on sewerage and have a duty to provide additional capacity to accommodate planned development, they also have a requirement to manage their assets efficiently to minimise customers' bills. Consequently, to avoid potential inefficient investment, upgrades are not usually provided unless there is sufficient confidence that a development will go ahead. Severn Trent therefore encourage developers and local councils to engage early to ensure adequate sewerage capacity can be provided."

6.4.1 Drainage and Wastewater Management Plans

Whilst publication of Drainage and Wastewater Management Plans (DWMPs) is not scheduled until 2022/23, STW have published a draft of their initial findings as they start the process[51]. This has been reviewed to report information on the sewer network of relevance to this WCS.

The Black Country Councils fall mostly within STW's Central Strategic Planning Area. The Minworth wastewater catchment is the largest serving the study area and the Severn Trent Waters largest wastewater treatment works. It serves 1.7 million people across Birmingham and the Black Country. It notes that growth is generally spread across the whole of the Minworth catchment with some focus around town/city centres. Due to the combined nature of the drainage system in this area, there is a potential for surface water separation to be included within the development proposals and installed in the existing system. This approach would reduce inflow and therefore increase capacity within the combined system.

6.5 Conclusions

Development in areas where there is limited wastewater network capacity will increase pressure on the network, increasing the risk of a detrimental impact on existing customers, and increasing the likelihood of CSO operation. Early engagement with Severn Trent Water is required, and further assessment of the network is recommended once a preferred option list of sites is available. Further modelling of the network may be required at the planning application stage.

Where the STW network is a combined sewer system, there may be opportunities for separation of surface water through a suitably designed SuDS.

Further study of the wastewater network is recommended as part of a Phase 2 Outline study.

---

51 A9: Drainage and Wastewater Management Plan 2018, Severn Trent Water (2018). Accessed online at: https://www.stwater.co.uk/content/dam/stw/about_us/pr19-documents/sve_appendix_a9_drainage_and_wastewater_management_plan.pdf on: 07/01/2020

6.6 Recommendations

Table 6.1 Recommendations from wastewater network assessment

Action	Responsibility	Timescale
Take into account wastewater infrastructure constraints in phasing development in partnership with the sewerage undertaker	BC Councils STW	Ongoing
Within combined sewerage systems including the Minworth catchment, planning applications should consider opportunities for surface water separation.	BC Councils	In Black Country Plan
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 set out the following: What – What is required to serve the site Where – Where are the assets / upgrades to be located When – When are the assets to be delivered (phasing) Which – Which delivery route is the developer going to use s104 s98 s106 etc. The Outline Drainage Strategy should be submitted as part of the planning application submission, and where required, used as a basis for a drainage planning condition to be set.	STW, UU and Developers	Ongoing
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.	Developers LLFA	Ongoing

7 Wastewater Treatment

7.1 Wastewater Treatment Works in the Black Country

There are fourteen WwTW within or close to the study area that are operated by STW. All of these are likely to serve a proportion of the proposed growth as well as growth from neighbouring authorities. The location of these WwTW are shown in Figure 7.1 below.

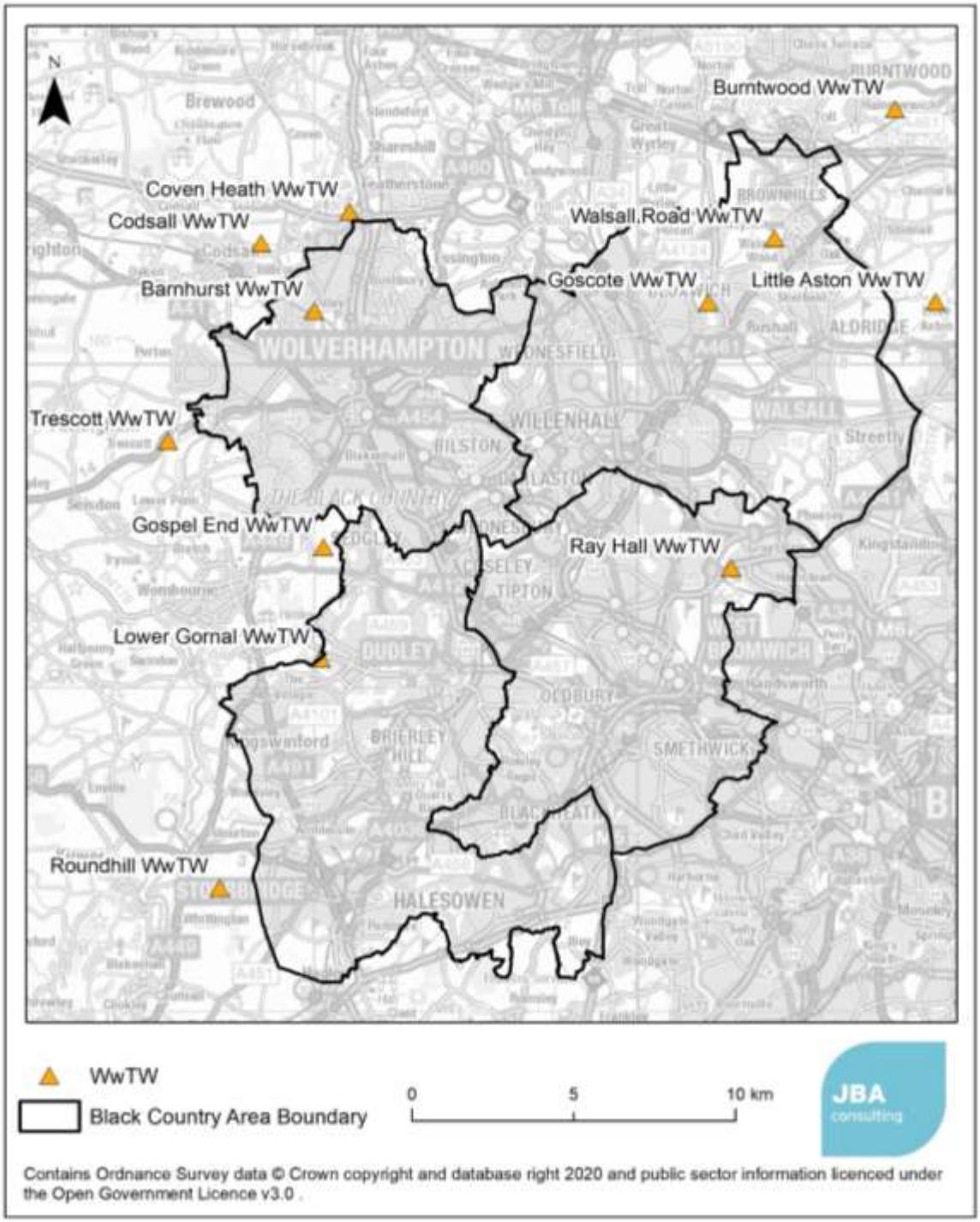


Figure 7.1 Location of Wastewater Treatment Works

Note: Minworth WwTW is located to the north east of Birmingham and therefore is not shown on this map, but it serves a large proportion of the study area.

7.2 Minworth Wastewater Treatment Works

Minworth WwTW serves a large proportion of the Black Country and much of Birmingham and is located 12.5km to the east of the Black Country. It is the largest sewage treatment works operated by Severn Trent Water, and serves an estimated population of 1.7 million people. The location of Minworth in relation to the Black Country boundary, and its catchment area are displayed in Figure 7.2. Ray Hall WwTW is located at the top end of the Black Country Trunk Sewer (BCTS) which drains through the catchment to Minworth and is designed to treat the base flow from West Bromwich, Wednesbury and Tipton areas with excess flows continuing along the BCTS to Minworth. For this reason, the catchment for Ray Hall is not shown in any of the mapping in the WCS.

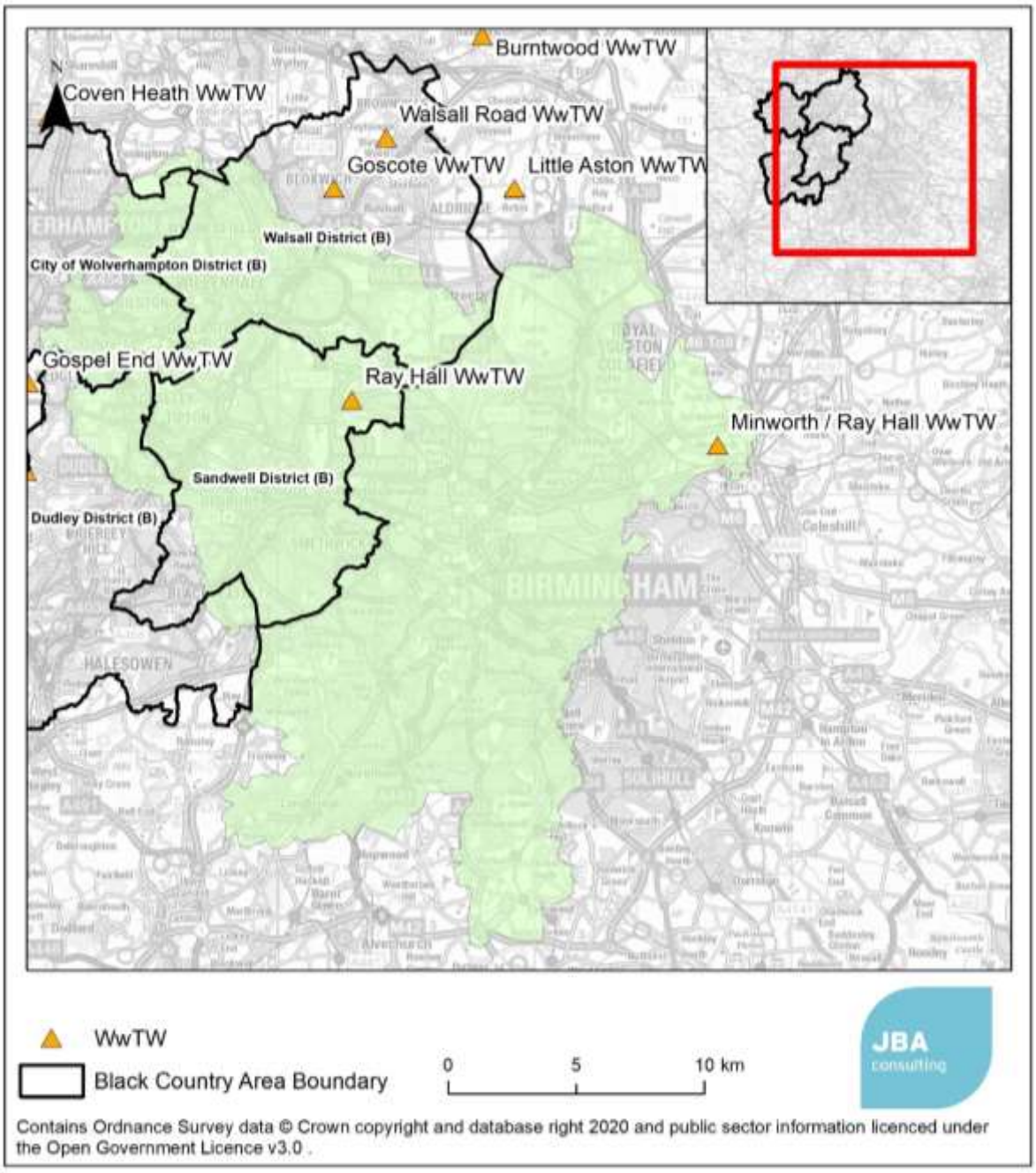


Figure 7.2 Minworth wastewater treatment works

7.3 Wastewater Treatment Works Flow Permit Assessment

7.3.1 Introduction

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 7.3 summarises the different types of wastewater releases that might take place, although precise details vary from works to works depending on the design.

During dry weather, the final effluent from the Wastewater Treatment Works (WwTW) should be the only discharge (1). With rainfall, the storm tanks fill and eventually start discharging to the watercourse (2) and Combined Sewer Overflows (CSOs) upstream of the storm tanks start to operate (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, freeing their capacity for the next rainfall event.

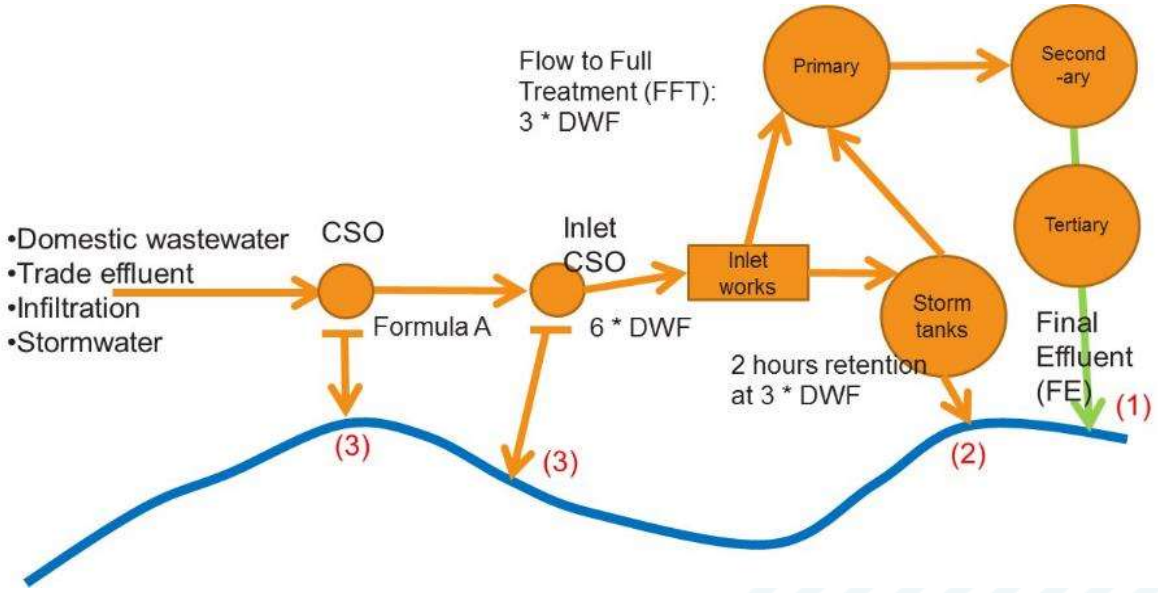


Figure 7.3 Overview of typical combined sewerage system and WwTW discharges

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 m3/day in dry weather.

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).

WwTW Environmental Permits also consent for maximum concentrations of pollutants, in most cases Suspended Solids (SS), Biochemical Oxygen Demand (BOD) and Ammonia (NH4). 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.

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.

7.4 Methodology

- Severn Trent Water provided information on each of their wastewater treatment works, including an assessment of future capacity based on current water quality performance, physical constraints and details of planned upgrades.

The following red / amber / green traffic light definition was used by Severn Trent Water to score each WwTW:

Capacity available to serve the proposed growth	Infrastructure and/or treatment upgrades will be required to serve proposed growth, but no significant constraints to the provision of this infrastructure have been identified	Infrastructure and/or treatment upgrades will be required to serve proposed growth. Major constraints have been identified.

7.5 Results

7.5.1 Barnhurst WwTW (Severn Trent Water)

Barnhurst WwTW predominantly serves the central, eastern and northern areas of Wolverhampton with the treatment works being located to the north west of the town centre (Figure 7.4). The Barnhurst catchment sits within the Wolverhampton Council area.

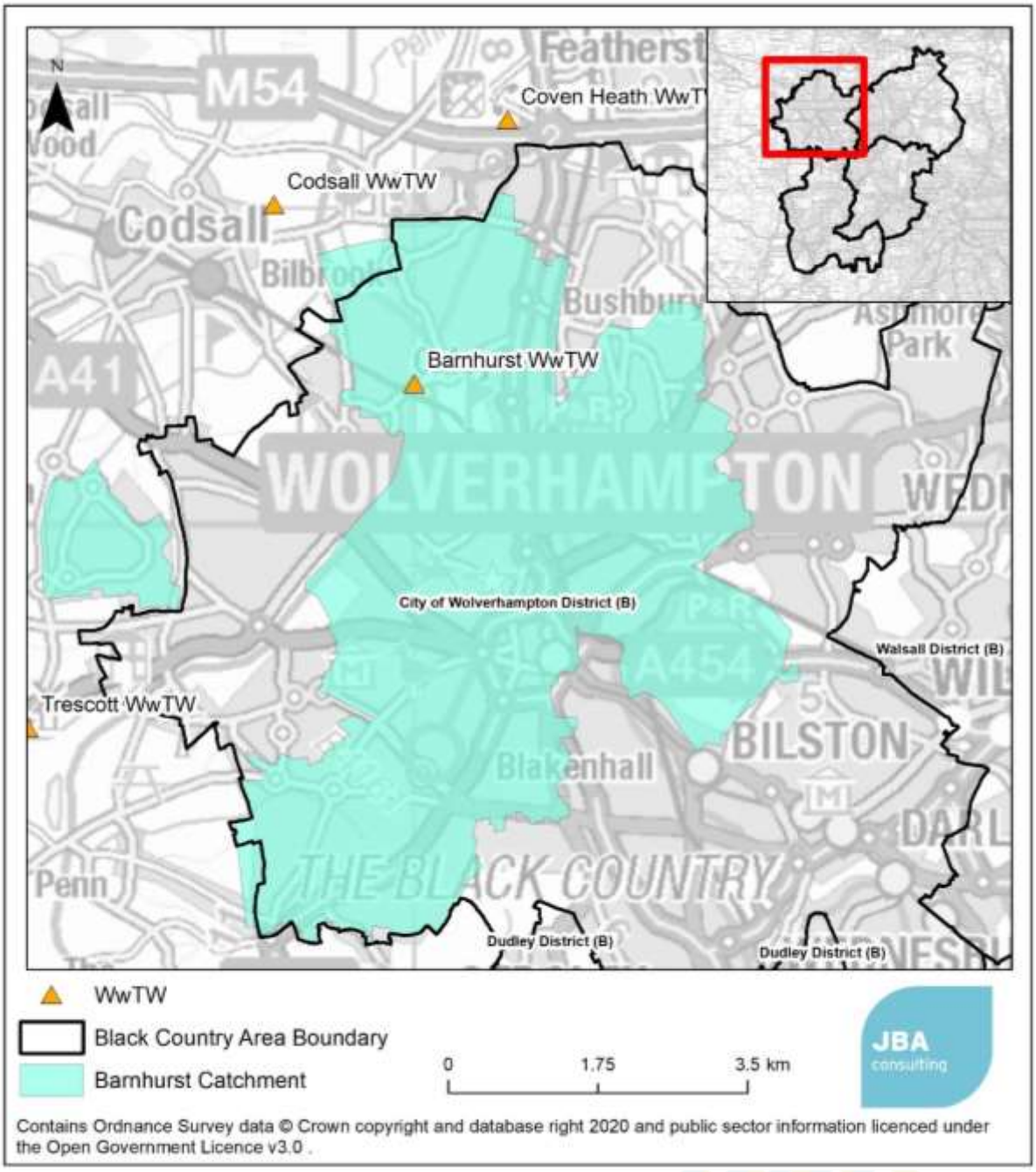


Figure 7.4 Barnhurst WwTW catchment

Table 7.1 Barnhurst WwTW capacity assessment

	Barnhurst WwTW
Receiving watercourse	50:50 between the Shropshire Union Canal and the Staffordshire and Worcestershire Canal
Consent Reference	S/06/55227/R
Current PE (population equivalent)	126,925
Current DWF	36,390 m^3/d
Permitted DWF	47,500 m^3/d
Estimated spare hydraulic capacity	28,056 houses
Estimated headroom based on current quality performance	Significant
Physical constraints regarding provision of additional treatment capacity	No land or other constraints preventing expansion
Additional comments	-

7.5.2 Burntwood WwTW (Severn Trent Water)

Burntwood WwTW is located to the north east of Walsall, and covers Heath Hayes, Burntwood and the north of Brownhill (Figure 7.5). This is a relatively small WwTW, not assessed by STW.

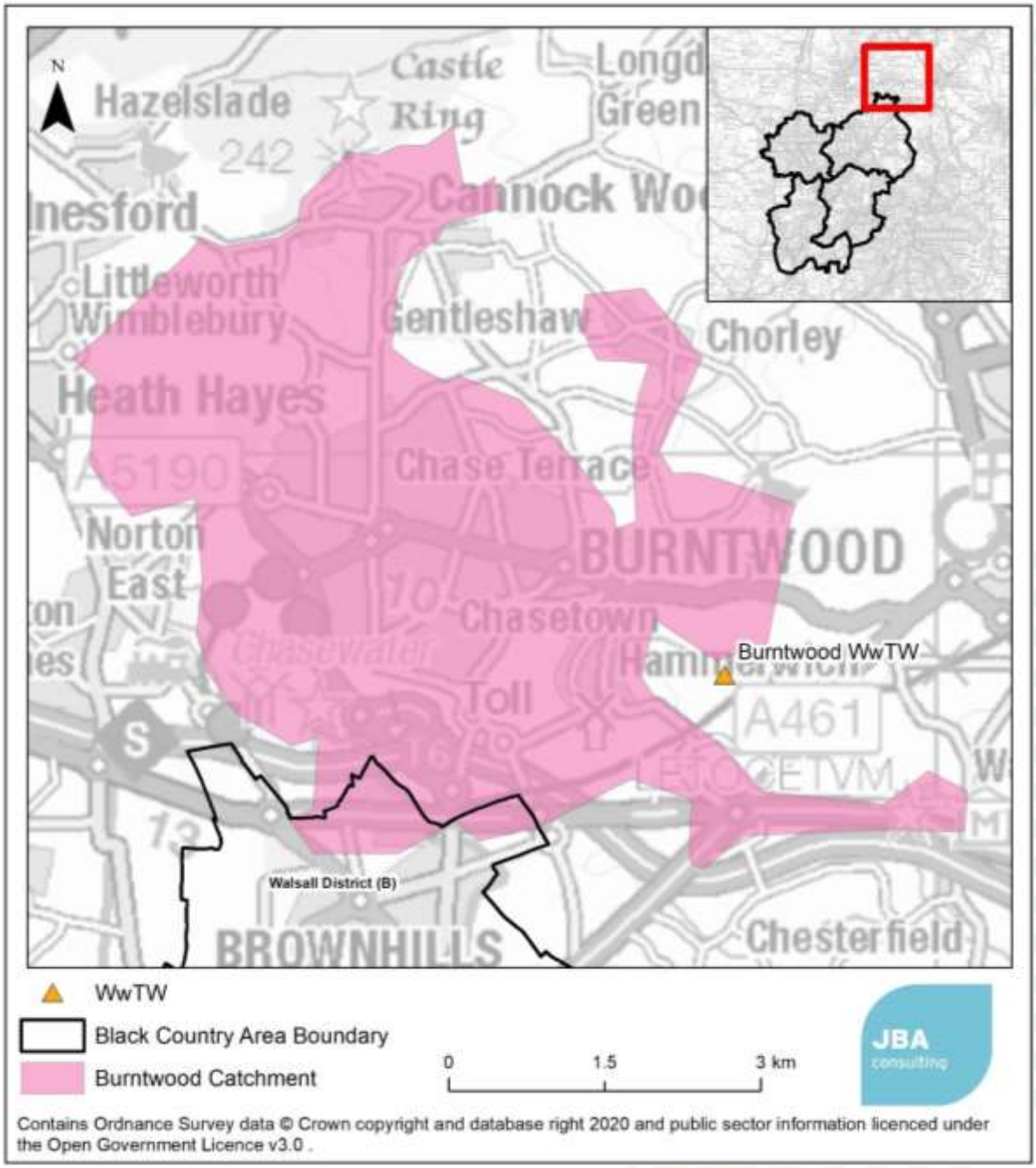


Figure 7.5 Burntwood WwTW catchment

Table 7.2 Burntwood WwTW assessment

	Burntwood WwTW
Receiving watercourse	Burntwood Brook
Consent Reference	T/17/35855/R
Current PE (population equivalent)	42,500
Current DWF	6,494 m^3/d
Permitted DWF	7,400 m^3/d
Estimated spare hydraulic capacity	5,941 houses
Estimated headroom based on current quality performance	n/a (AMP 7 upgrades)
Physical constraints regarding provision of additional treatment capacity	No land or other constraints preventing expansion
Additional comments	This works will be undergoing a major upgrade in AMP7 to deliver WFD objectives. Scheme design will make provision for forecast growth.

7.5.3 Codsall WwTW (Severn Trent)

Codsall is a small WwTW located to the north west of Wolverhampton, covering Codsall, Billbrook and Oaken, as shown in Figure 7.6.

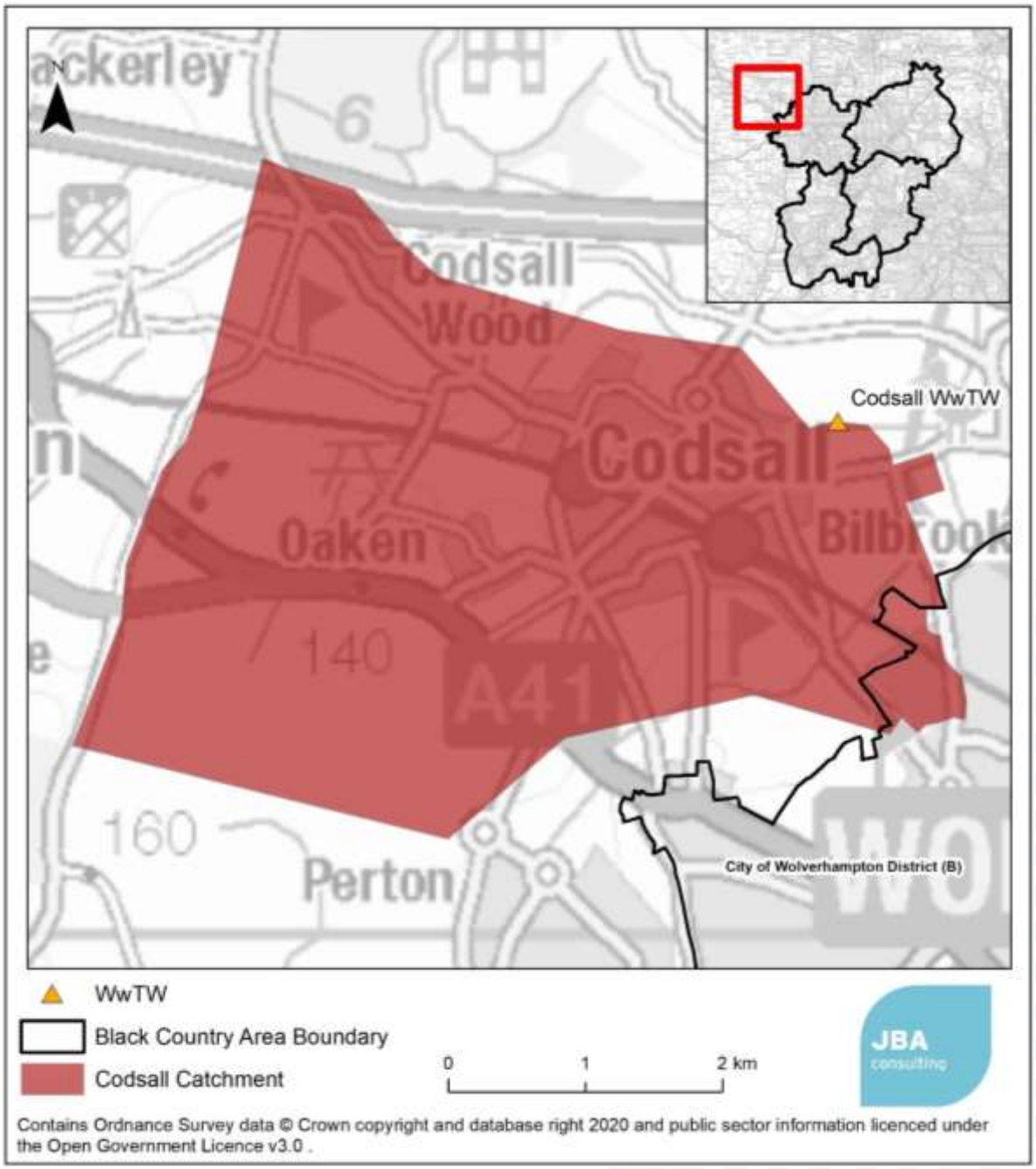


Figure 7.6 Codsall WwTW catchment

Table 7.3 Codsall WwTW assessment

	Codsall WwTW
Receiving watercourse	The Bilbrook
Consent Reference	T/03/35861/R
Current PE (population equivalent)	13,200
Current DWF	2,352 m^3/d
Permitted DWF	4,000 m^3/d
Estimated spare hydraulic capacity	9,988 houses
Estimated headroom based on current quality performance	n/a
Physical constraints regarding provision of additional treatment capacity	No land or other constraints preventing expansion
Additional comments	WwTW was upgraded in AMP6 to deliver WFD objectives. Scheme design made provision for forecast growth.

7.5.4 Coven Heath WwTW (Severn Trent)

Coven Heath WwTW is located to the north of Wolverhampton and covers Bushbury, Essington, Featherstonem Shareshill and Standeford, as shown in Figure 7.7. STW advised that significant development to the west of Coven Heath WwTW (particularly along the M54 corridor)may be directed to Barnhurst WwTW.

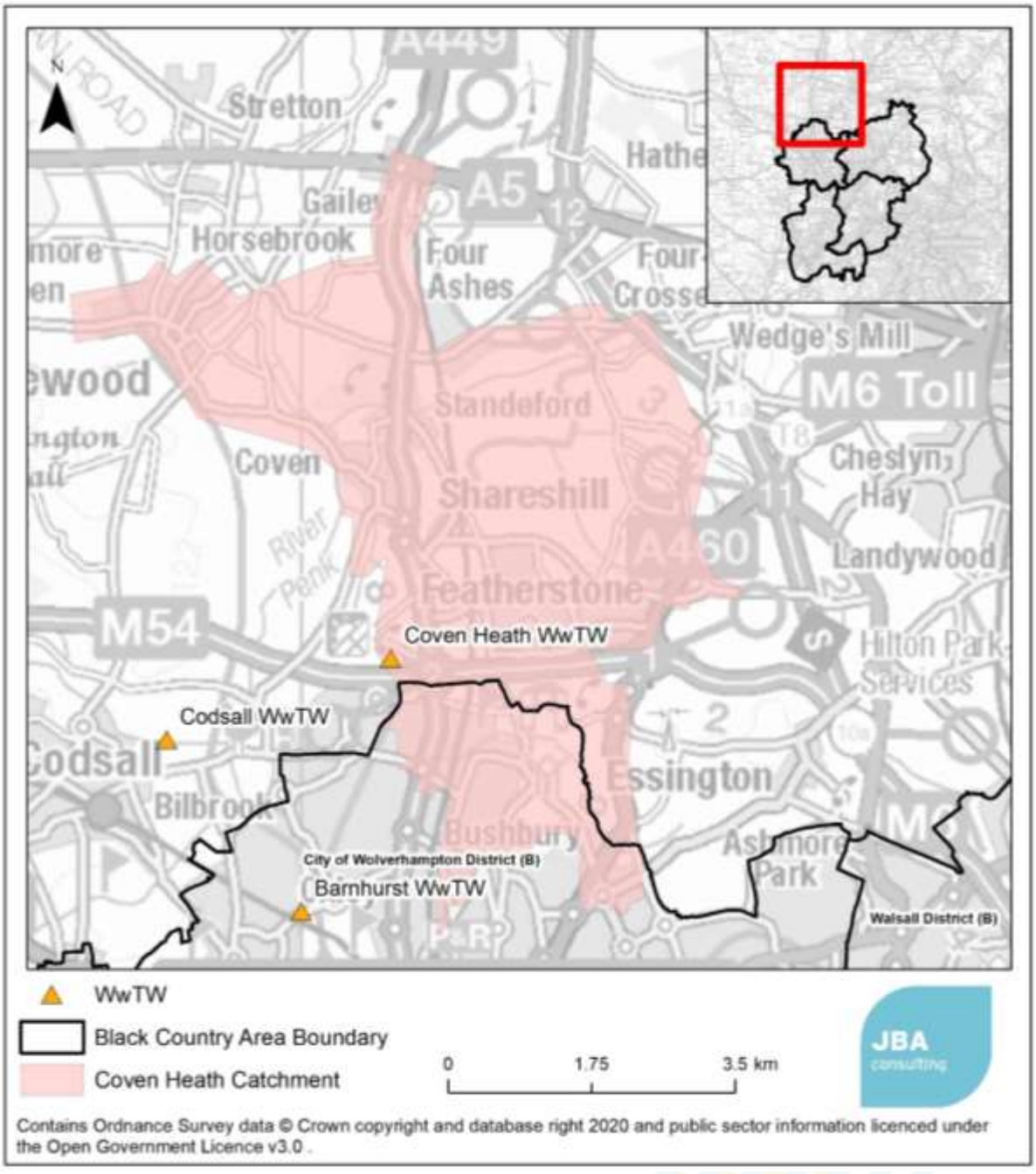


Figure 7.7 Coven Heath WwTW catchment

Table 7.4 Coven Heath WwTW assessment

	Coven Heath WwTW
Receiving watercourse	Staffs/Worcs Canal
Consent Reference	T/03/20783/R
Current PE (population equivalent)	26,973
Current DWF	6,214 m^3/d
Permitted DWF	8,810 m^3/d
Estimated spare hydraulic capacity	5,040 houses
Estimated headroom based on current quality performance	Minimal
Physical constraints regarding provision of additional treatment capacity	No land or other constraints preventing expansion
Additional comments	"Minimal capacity available for a small population increase." A large number of additional dwellings "would require significant upgrades." Significate development may be directed to Barnhurst WwTW.

7.5.5 Goscote WwTW (Severn Trent Water)

The Goscote WwTW catchment (Figure 7.8) is located to the north west of Walsall town centre with the treatment works being located in the centre of the catchment. The Goscote catchment is spread across three council authorities; Cannock chase Council, South Staffordshire Council and Walsall Council.

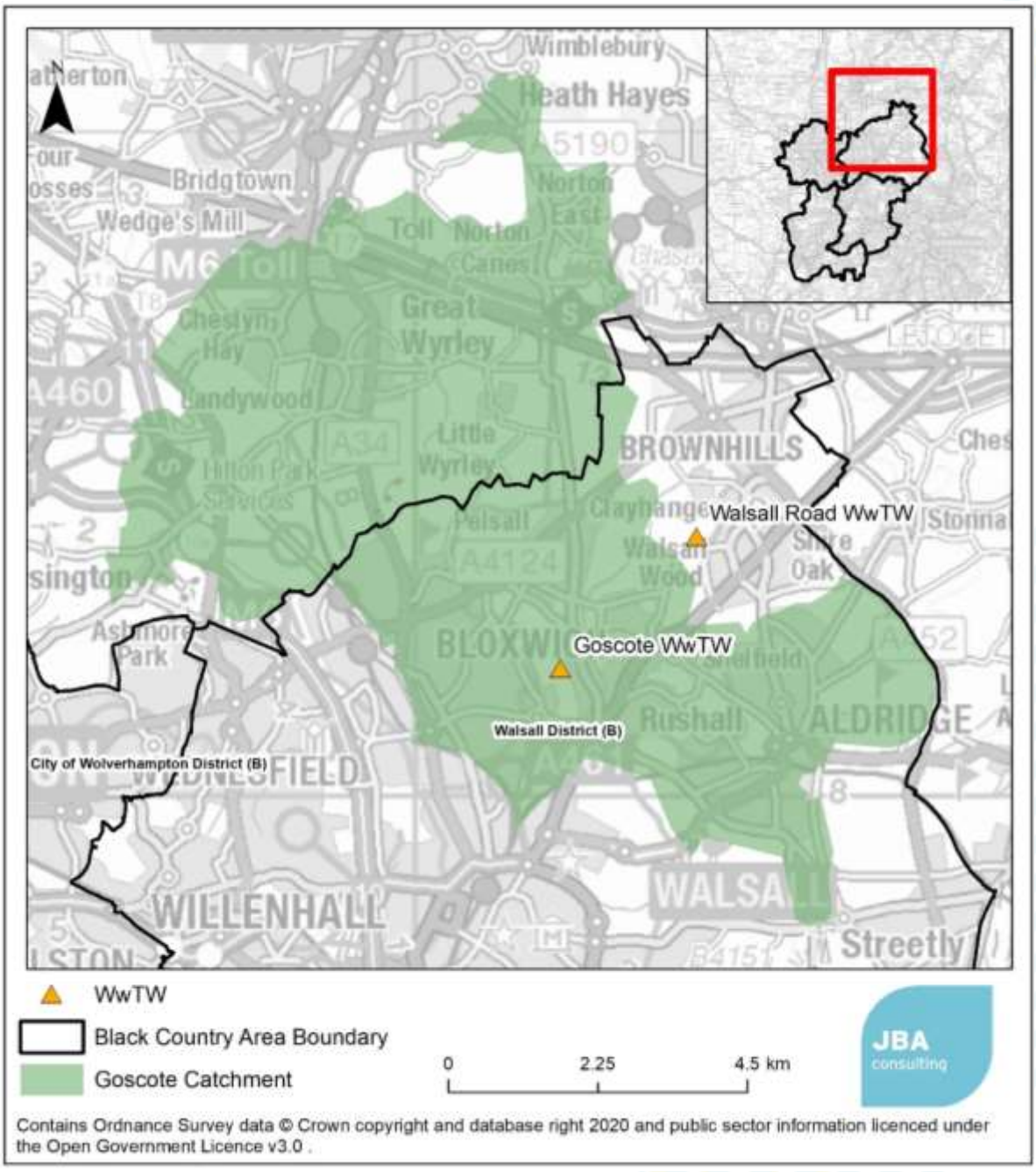


Figure 7.8 Goscote WwTW catchment

Table 7.5 Goscote WwTW assessment

	Goscote WwTW
Receiving watercourse	Rough Brook
Consent Reference	T/08/36220/R
Current PE (population equivalent)	106,306
Current DWF	23,625 m^3/d
Permitted DWF	24,900 m^3/d
Estimated spare hydraulic capacity	3,220 houses
Estimated headroom based on current quality performance	Limited
Physical constraints regarding provision of additional treatment capacity	No land or other constraints preventing expansion.
Additional comments	Site was upgraded in AMP6 (2015-2020) to deliver WFD objectives. The scheme design made provision for forecast growth.

7.5.6 Gospel End WwTW (Severn Trent Water)

Gospel End WwTW catchment (Figure 7.9) is located to the east of the Dudley District boundary and covers the north east area of Dudley.

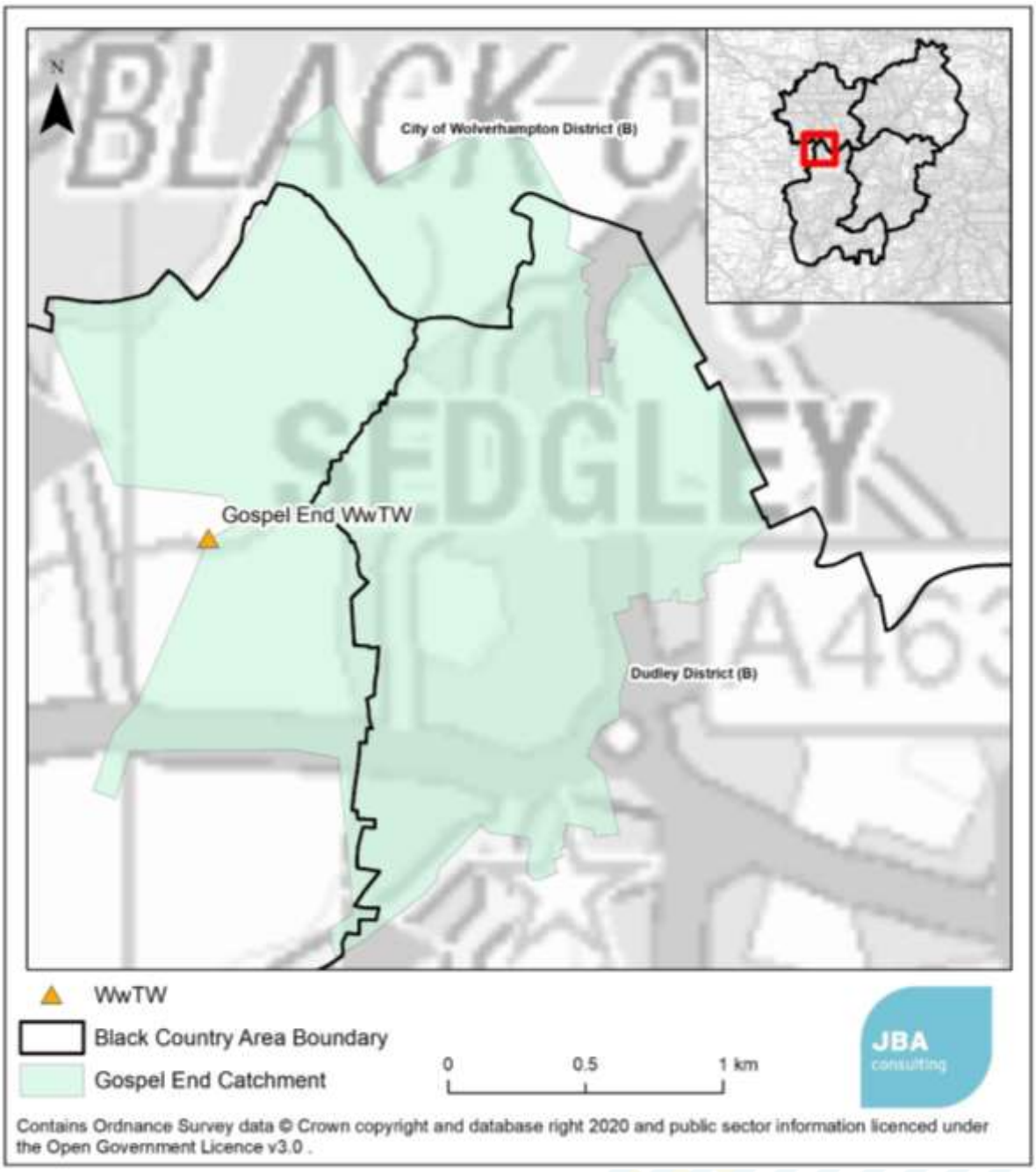


Figure 7.9 Gospel End WwTW

Table 7.6 Gospel End WwTW assessment

	Gospel End WwTW
Receiving watercourse	Penn Brook
Consent Reference	S/06/56015/R
Current PE (population equivalent)	7,944
Current DWF	1,147 m^3/d
Permitted DWF	1,800 m^3/d
Estimated spare hydraulic capacity	1,652 houses (scaled down after revised permitted DWF reduced from figure originally provided by STW)
Estimated headroom based on current quality performance	Significant
Physical constraints regarding provision of additional treatment capacity	No land or other constraints preventing expansion
Additional comments	"Significant capacity available for population increase." Site has recently been subject to upgrades in AMP6 (2015-2020)

7.5.7 Little Aston WwTW (Severn Trent Water)

The Little Aston WwTW is located outside Little Aston in Staffordshire, in a rural landscape broadly comprising arable fields (Figure 7.10).

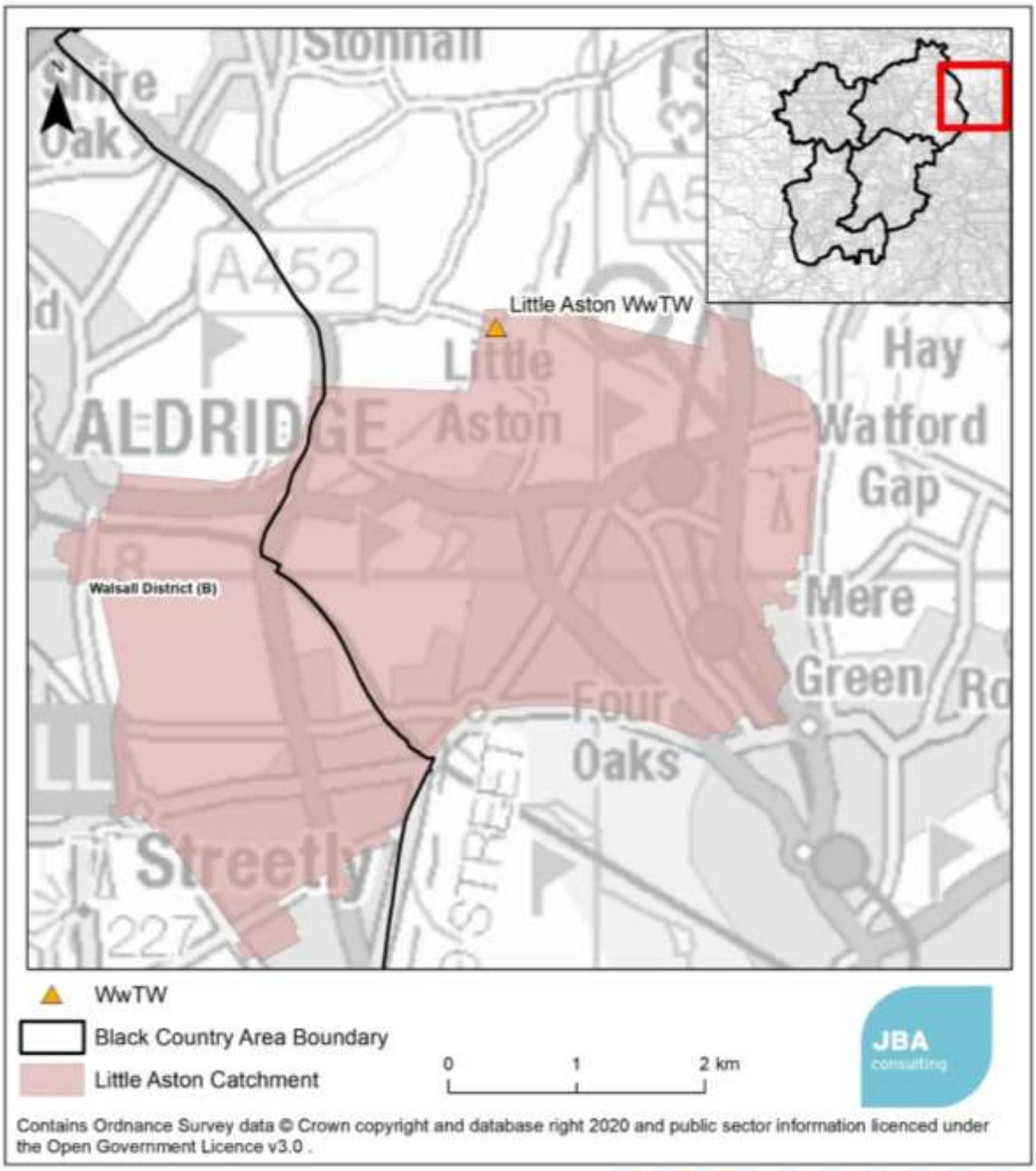


Figure 7.10 Little Aston WwTW catchment

Table 7.7 Little Aston WwTW assessment

	Little Aston WwTW
Receiving watercourse	Footherley Brook
Consent Reference	T/17/35743/R
Current PE (population equivalent	23,113
Current DWF	5,107 m^3/d
Permitted DWF	7,000 m^3/d
Estimated spare hydraulic capacity	4,780 houses
Estimated headroom based on current quality performance	Limited
Physical constraints regarding provision of additional treatment capacity	No land or other constraints preventing expansion
Additional comments	Limited capacity available for population increase. Capacity and performance would need to be monitored as growth arrived. Site is currently receiving upgrades in AMP6 (2015-2020) which has added capacity for some growth.

7.5.8 Lower Gornal WwTW (Severn Trent Water)

Lower Gornal WwTW is in the west of the Dudley District. The catchment is shown in Figure 7.11. It should be noted that the plan is to close this WwTW during AMP7 (2020-2025) and transfer flows to Roundhill WwTW. The permit at Roundhill will be increased to accommodate this transfer.

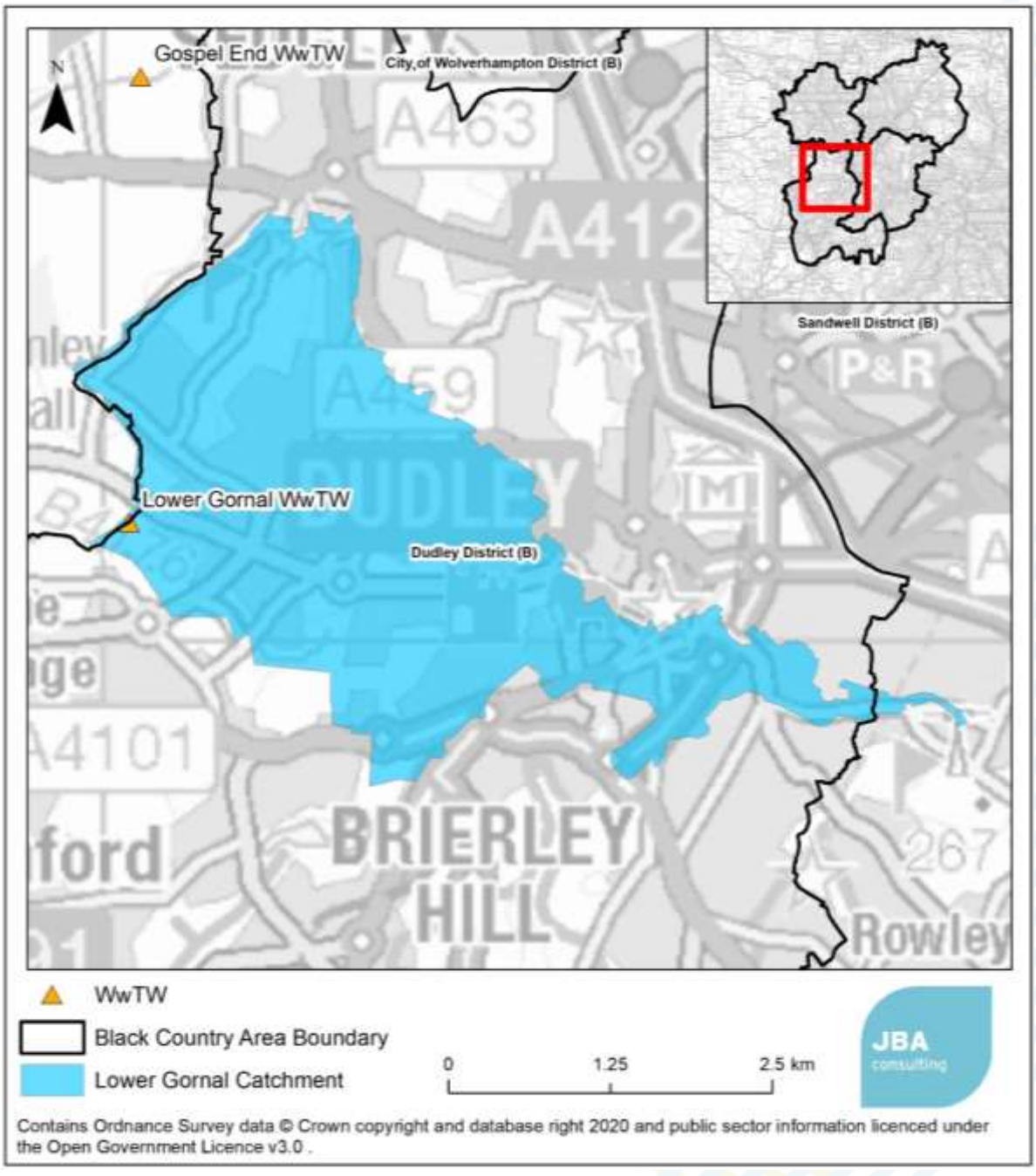


Figure 7.11 Lower Gornal WwTW catchment

Table 7.8 Lower Gornal WwTW assessment

	Lower Gornal WwTW
Receiving watercourse	Bobs Brook
Consent Reference	WB3835AM
Current PE (population equivalent	37,183
Current DWF	6,181 m^3/d
Permitted DWF	8,500 m^3/d
Estimated spare hydraulic capacity	5,856 houses
Estimated headroom based on current quality performance	Significant
Physical constraints regarding provision of additional treatment capacity	No land or other constraints preventing expansion
Additional comments	Current AMP7 (2020-2025) proposals are to close this site and transfer flows to Roundhill WwTW.

7.5.9 Minworth WwTW (Severn Trent Water)

Minworth WwTW is located approximately 13.5km to the west of the Black Country Boundary, and the catchment serves a large area of Sandwell, Walsall and Wolverhampton. Minworth is Severn Trent Water's largest sewage works and the second largest in the UK. It serves a population equivalent of 1.7 million within Birmingham and the Black Country. The WwTW catchment extent is shown in Figure 7.12.

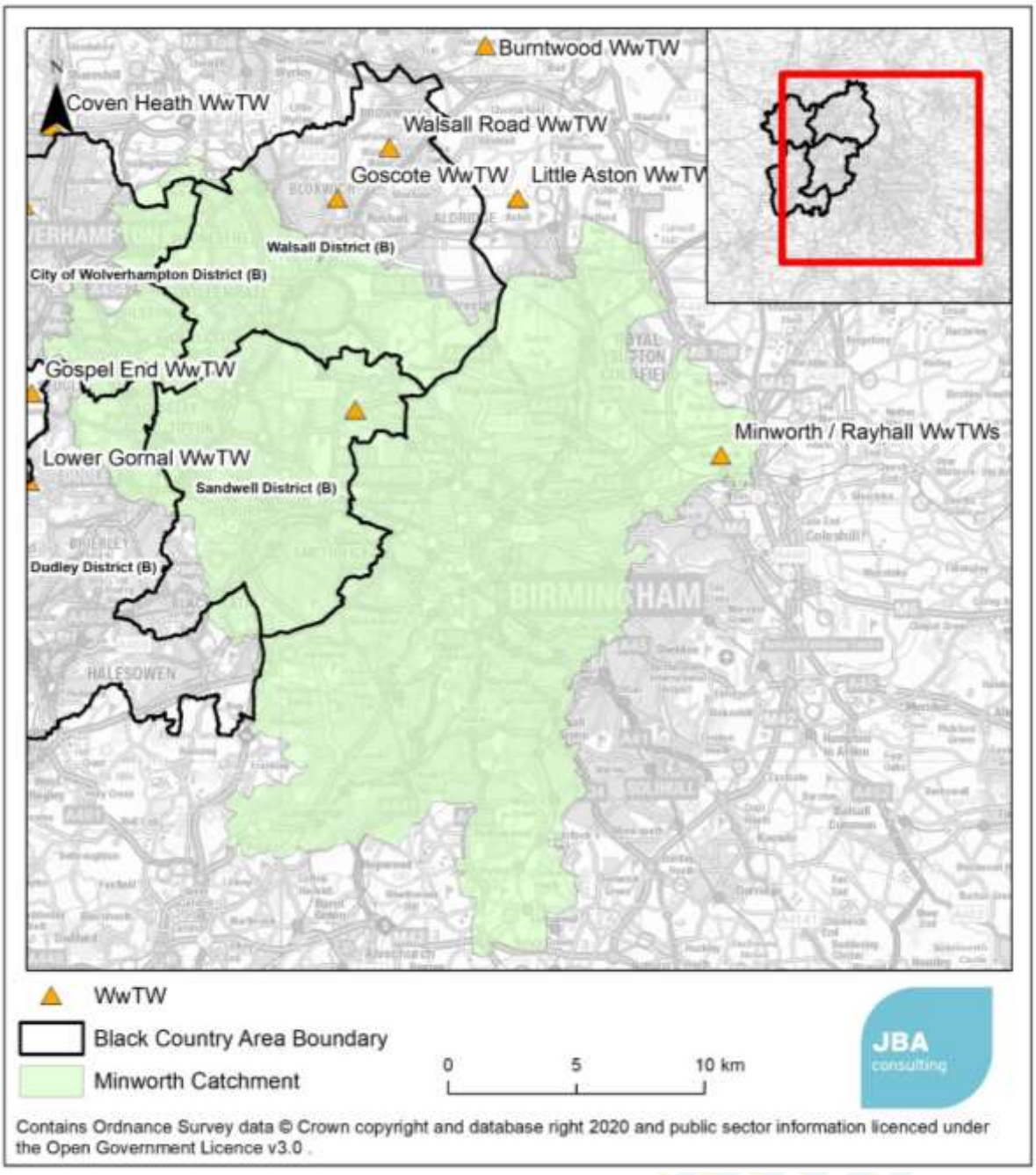


Figure 7.12 Minworth WwTW catchment

Table 7.9 Minworth WwTW assessment

	Minworth WwTW
Receiving watercourse	River Tame
Consent Reference	T/10/36212/R
Current PE (population equivalent	1,608,502
Current DWF	411,700 m^3/d
Permitted DWF	450,000 m^3/d
Estimated spare hydraulic capacity	96,717 houses
Estimated headroom based on current quality performance	Significant
Physical constraints regarding provision of additional treatment capacity	No land or other constraints preventing expansion
Additional comments	-

7.5.10 Roundhill WwTW (Severn Trent Water)

Roundhill is located outside the Black Country boundary to the south west of Dudley. The catchment includes a large area of Dudley, and south west Sandwell. The catchment extent is shown in Figure 7.13. Roundhill Sewage Treatment Works (STW) is an existing permitted and operational large sewage treatment works consisting of a traditional STW and a Thermal Sludge Destruction Plant. On average, the sewage works treats 85,000m³ of raw sewage per day from the equivalent of 253,341 people in Dudley and surrounding areas of the West Midlands. Roundhill Sewage Treatment Works is located to the north of Gibbet Lane, Stourbridge and 2.7km east of Kinver. STW have advised that Lower Gornal WwTW is likely to close in AMP7 (2020-25) and wastewater directed to Roundhill WwTW. The flow permit will be increased accordingly to accommodate this additional flow.

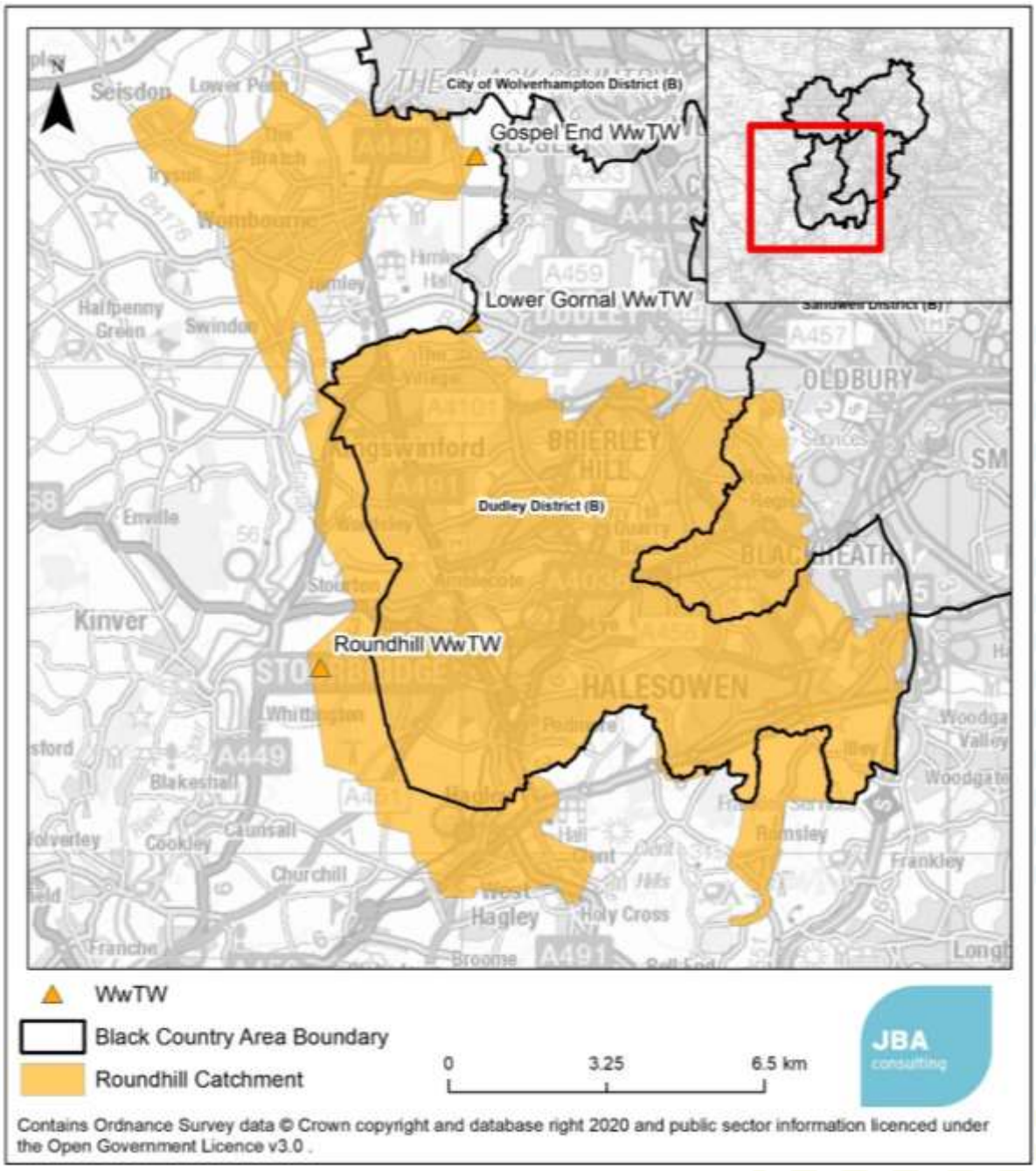


Figure 7.13 Roundhill WwTW catchment

Table 7.10 Roundhill WwTW assessment

	Roundhill WwTW
Receiving watercourse	River Stour
Consent Reference	S/06/55232/R
Current PE (population equivalent	270,262
Current DWF	40,115 m^3/d
Permitted DWF	59,836 m^3/d
Estimated spare hydraulic capacity	16,715 houses
Estimated headroom based on current quality performance	Significant
Physical constraints regarding provision of additional treatment capacity	No land or other constraints preventing expansion
Additional comments	Site is due to receive upgrades in AMP7 (2020-2025). Permitted DWF will increase to accommodate additional flows from the closure of Lower Gornal.

7.5.11 Trescott WwTW (Severn Trent)

Trescott WwTW is located outside the boundary the catchment covers the west of Wolverhampton. The catchment area is displayed in Figure 7.14.

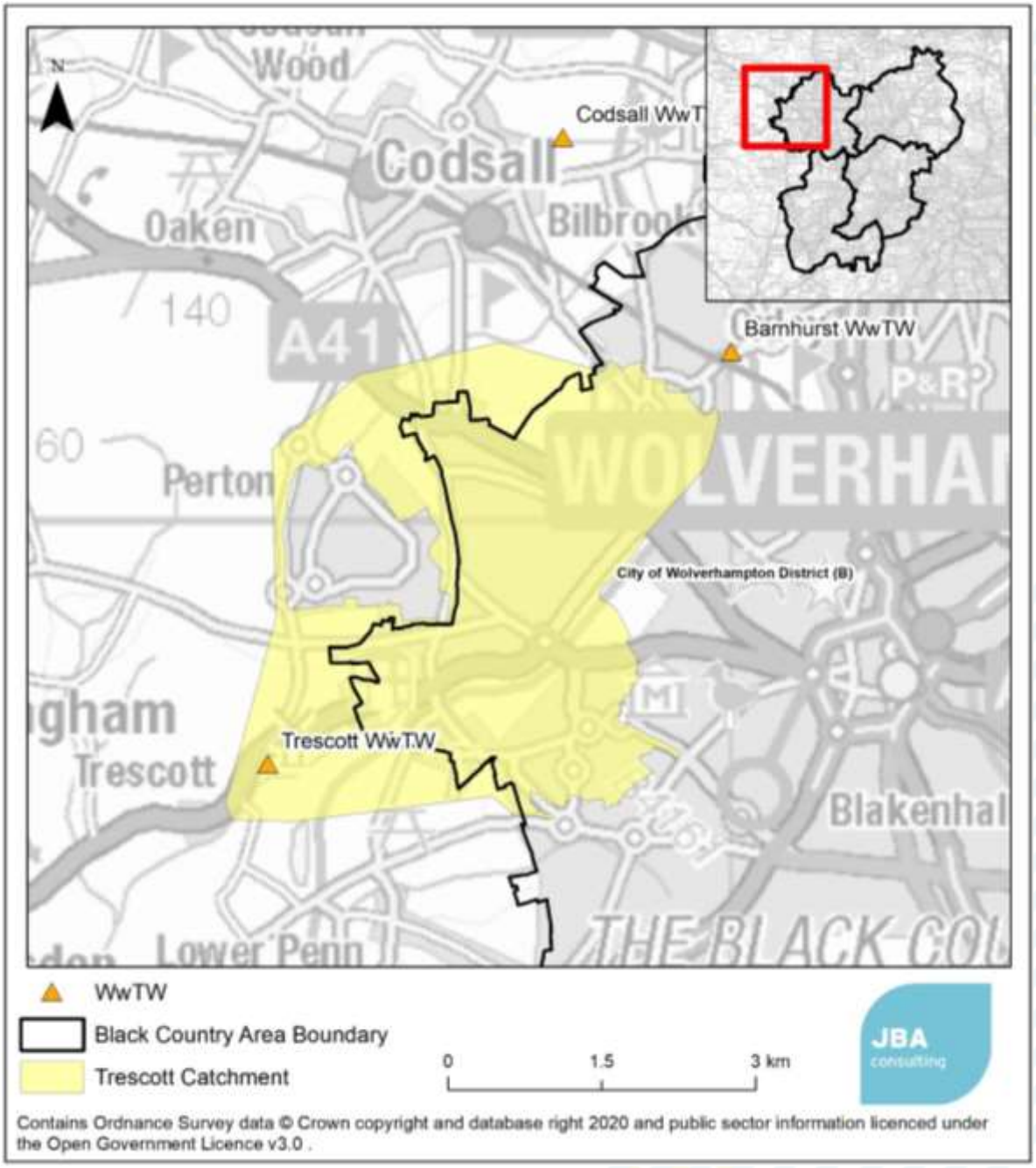


Figure 7.14 Trescott WwTW catchment

Table 7.11 Trescott WwTW assessment

	Trescott WwTW
Receiving watercourse	Smestow Brook
Consent Reference	S/06/55363/R
Current PE (population equivalent	35,316
Current DWF	4,939 m^3/d
Permitted DWF	6,460 m^3/d
Estimated spare hydraulic capacity	3,841 houses
Estimated headroom based on current quality performance	Significant
Physical constraints regarding provision of additional treatment capacity	No land or other constraints preventing expansion
Additional comments	Site is currently receiving upgrades in AMP6 (2015-2020) which has added capacity for some growth.

7.5.12 Walsall Wood WwTW (Severn Trent)

Walsall Wood WwTW is located in the north east of Walsall. The catchment is displayed in Figure 7.15.

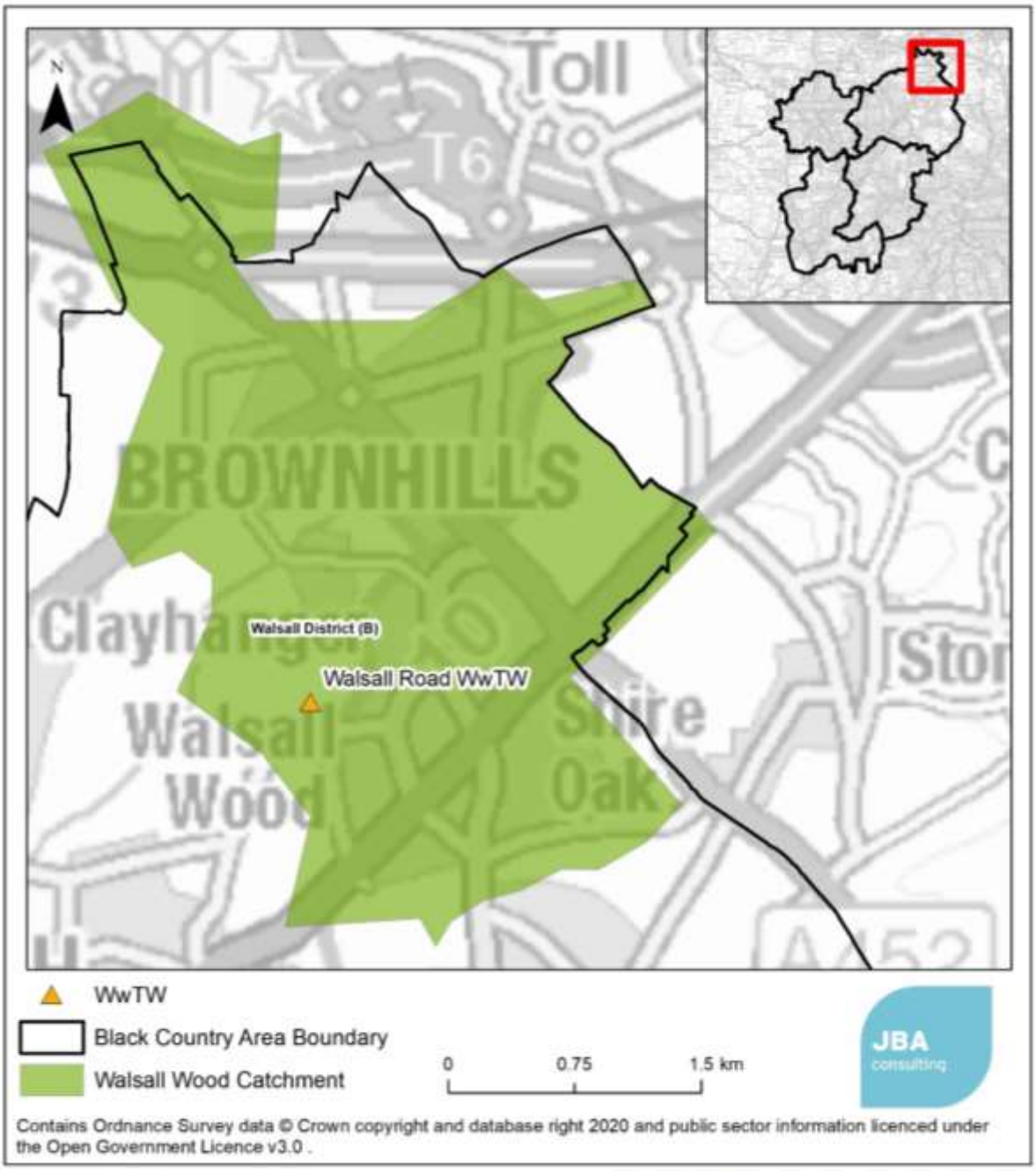


Figure 7.15 Walsall Wood WwTW catchment

Table 7.12 Walsall Wood WwTW assessment

	Walsall Wood WwTW
Receiving watercourse	Ford Brook
Consent Reference	T/08/36224/R
Current PE (population equivalent	23,272
Current DWF	3,545 m^3/d
Permitted DWF	4,784 m^3/d
Estimated spare hydraulic capacity	3,129 houses
Estimated headroom based on current quality performance	Limited
Physical constraints regarding provision of additional treatment capacity	No land or other constraints preventing expansion
Additional comments	Site is currently receiving upgrades in AMP6 (2015-2020) which has added capacity for some growth.

7.5.13 Summary

Figure 7.16 summarises the wastewater treatment assessments provided by STW. It can be seen that considerable hydraulic headroom exists across all of the catchments covering the Black Country, however neighbouring growth served by the same WwTW must also be considered, for instance Minworth WwTW will also serve much of Birmingham's growth during this period. A forecast of growth from Birmingham has been received and will be factored into assessments of capacity at Minworth in the Phase 2 Outline study.

The WwTW catchments have also been coloured in Figure 7.16 according to their environmental headroom, with the Coven Heath catchment having limited capacity to increase its effluent discharge without an impact on the environment. In contrast, Barnhurst, Trescott, Gospel End and Lower Gornal have relatively more environmental capacity. Water quality modelling using an approach such as SIMCAT is recommended to model the impact of growth in each catchment once a preferred option list of sites is available.

The environmental headroom assessment was provided by STW and is based on the current performance of the WwTWs. The majority of WwTWs in the study have been upgraded during AMP6 (2015-20) or are due to be upgraded in AMP7 (2020-25). The performance of these works is likely to improve but the new baseline performance will not be apparent until the works has operated with its new conditions for a period of time.

STW were also asked about any constraints on provision of additional treatment capacity should it be required, and there were no constraints identified at any of the WwTW in the study area.

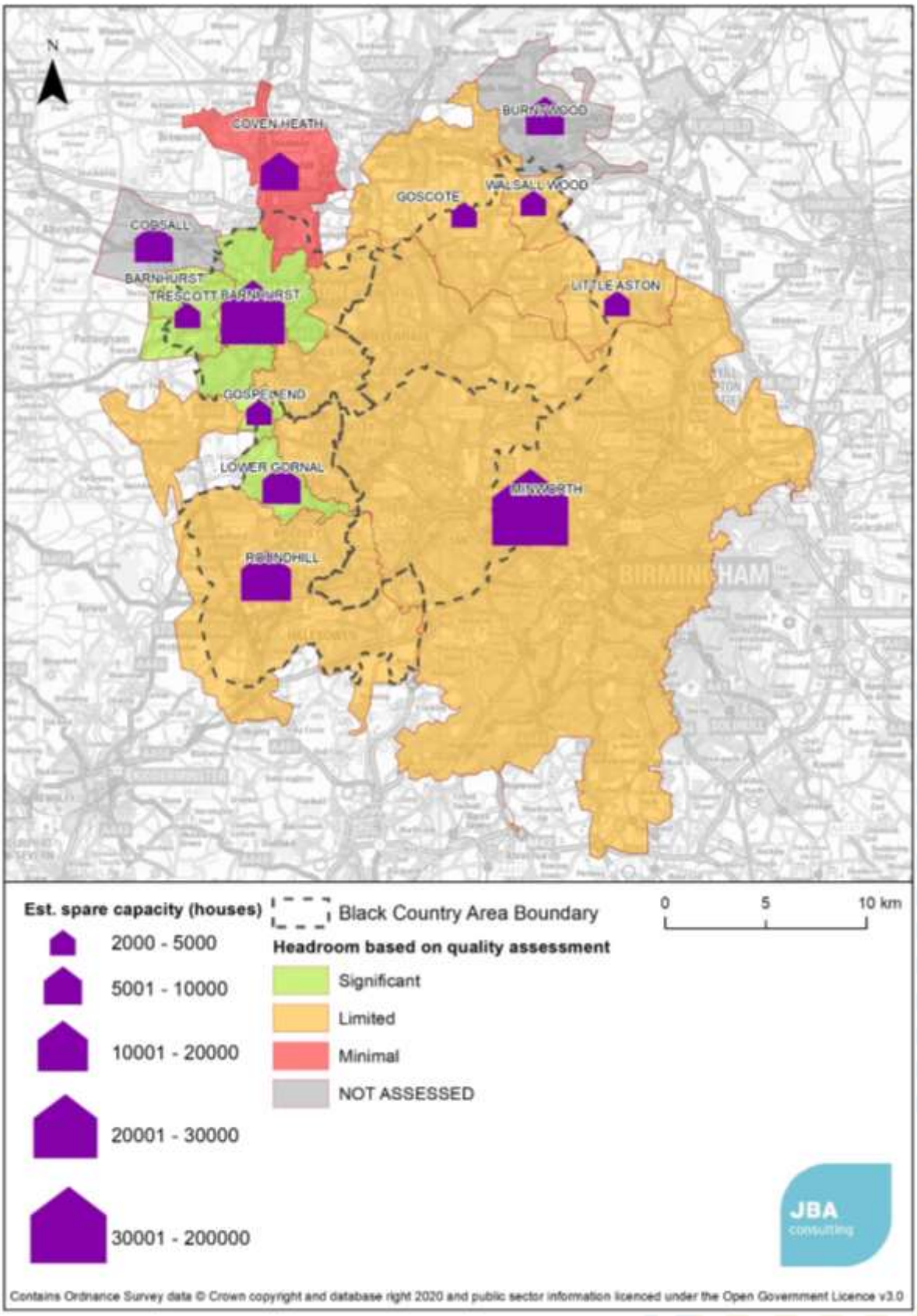


Figure 7.16 Summary of WwTW assessments

7.6 Conclusions

Flow permit assessments were carried out at all of the WwTW that are expected to serve growth in the Black Country Plan period. Across the sewer catchment that cover the study area there is hydraulic capacity for an equivalent of 260,000 new houses. However, much of this capacity is within the Minworth / Ray Hall catchments that also serves much of Birmingham's growth over that period. Water quality must also be taken into account, with the Coven Heath WwTW catchment having limited environmental headroom, and relatively more environmental headroom in the Trescott, Lower Gornal and Gospel End catchments.

Severn Trent Water have advised that they plan to close Lower Gornal WwTW in AMP7 (2020-25). The area served by this catchment will now be served by Roundhill WwTW which will increase its permitted flow to accommodate this transfer.

It is recommended that water quality modelling is carried out to assess the potential impact of growth in each catchment once a preferred option list of sites is available.

Severn Trent Water also provided some additional comments on wastewater treatment capacity:

"Whilst sewage treatment works may not have sufficient spare capacity to accept the levels of development being proposed in its catchment area this does not necessarily mean that development cannot take place. Under Section 94 of the Water Industry Act 1991 sewerage undertakers have an obligation to provide additional treatment capacity as and when required. Where necessary we will discuss any discharge consent implications with the Environment Agency. If there are specific issues which may prevent or delay the provision on additional capacity these have been highlighted below."

Further assessment of wastewater treatment capacity is recommended as part of a Phase 2 Outline study.

7.7 Recommendations

Action	Responsibility
Consider the available WwTW capacity when phasing development going to the same WwTW.	BC Councils
Provide Annual Monitoring Reports to STW and projected housing growth in the Local Authority.	BC Councils
STW to assess growth demands as part of their wastewater asset planning activities and feedback to the Councils if concerns arise.	STW
Undertake water quality modelling once further detail is available on the location of development sites	BC Councils

8 Odour Assessment

8.1 Introduction

Where new developments encroach upon an existing Wastewater Treatment Works (WwTW), odour from that site may become a cause for nuisance and complaints from residents. Managing odour at WwTWs can add considerable capital and operational costs, particularly when retro-fitted to existing WwTWs. National Planning Policy Guidance recommends that plan-makers consider whether new development is appropriate near to sites used (or proposed) for water and wastewater infrastructure, due to the risk of odour nuisance.

8.2 Methodology

Sewerage undertakers recommend that an odour assessment may be required if the site of a proposed development is close to a WwTW and is encroaching closer to the WwTW than existing urban areas. For STW, this is development sites less than 800m from the WwTW.

Another important aspect is the location of the site in respect to the WwTW, with sites north east of a WwTW potentially experiencing more frequent nuisance odour.

8.3 Results

Figure 8.1 below shows the 800m buffer applied around each WwTW in the study area.

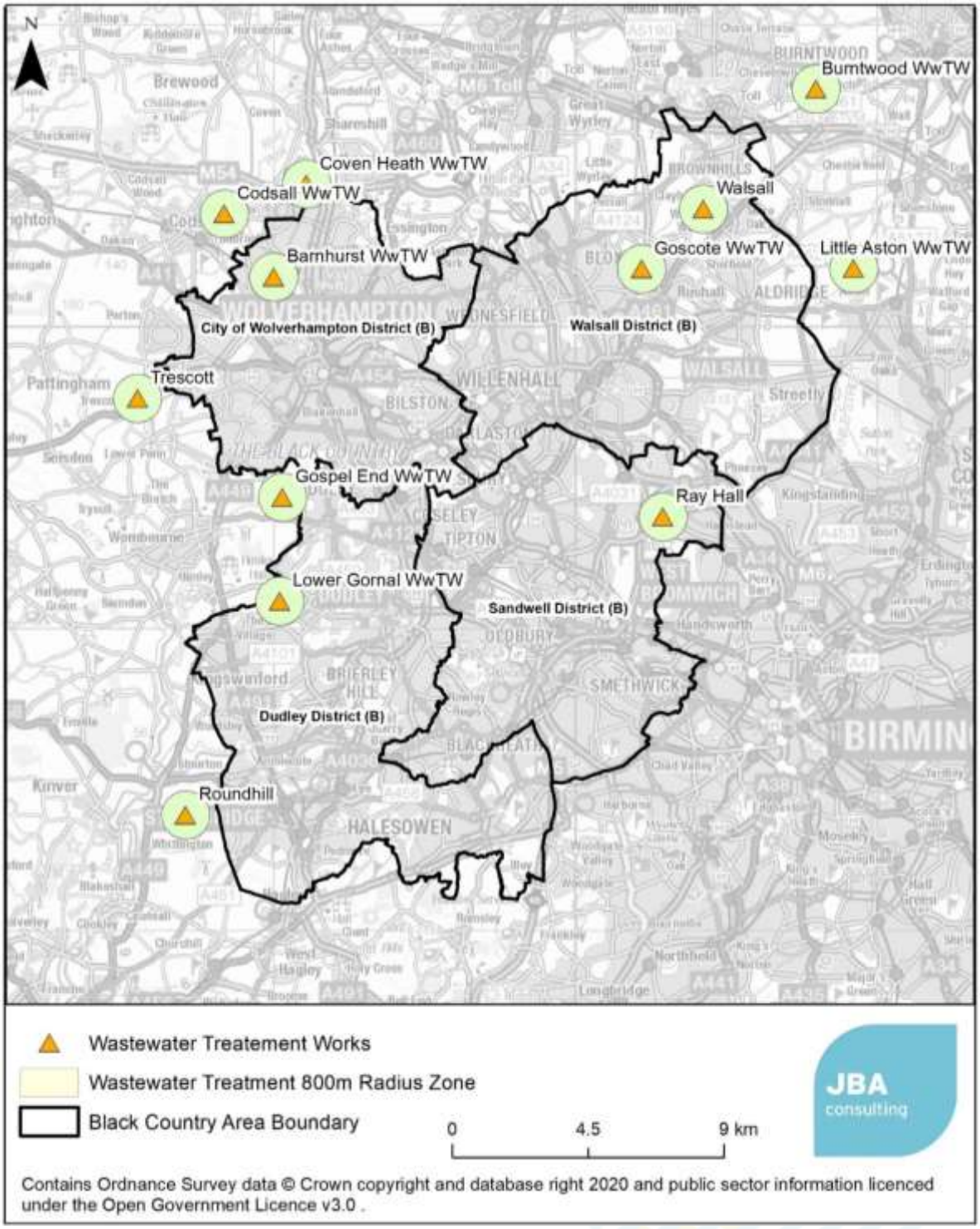


Figure 8.1 800m radius buffer zone surrounding each Wastewater Treatment Works.

8.4 Conclusions

Wastewater treatment works have the potential to cause odour nuisance to new developments where. The area impacted by odour will vary according to the size of the works, the nature of the treatment processes and technology and the positioning of development relative to the odour source and the prevailing winds

A further assessment of odour is recommended as part of a Phase 2 Outline study. Where sites are identified that are within 800m of a WwTW it is recommended that an odour assessment is carried out, funded by the developer as part of the planning process.

8.5 Recommendations

Table 8.1 Recommendations from the odour assessment

Action	Responsibility	Timescale
Consider odour risk in the sites identified to be potentially at risk from nuisance odour	BC Councils	Ongoing
Carry out an odour assessment for sites within 800m as part of the planning process.	Site Developers	Ongoing

9 Water Quality

9.1 Introduction

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

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

The Environment Agency operational instructions on water quality planning and no-deterioration are currently being reviewed. Previous operational instructions[52] (now withdrawn) 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"[53] 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.

9.2 Methodology

A qualitative assessment was conducted using available data on WFD Cycle 2 status for the receiving watercourse, forecast growth for each WwTW and existing water quality assessments conducted on each WwTW where available.

9.3 Results

9.3.1 Overview

Figure 9.1 shows the WFD status of the waterbodies within the Black Country, and the location of the WwTW that discharge to them.

---

52 Water Quality Planning: no deterioration and the Water Framework Directive, Environment Agency (2012). Accessed online at: http://www.fwr.org/WQreg/Appendices/No_deterioration_and_the_WFD_50_12.pdf on: 07/01/2020

53 PRESS RELEASE No 74/15, European Court of Justice (2015). Accessed online at: https://curia.europa.eu/jcms/upload/docs/application/pdf/2015-07/cp150074en.pdf on: 07/01/2020

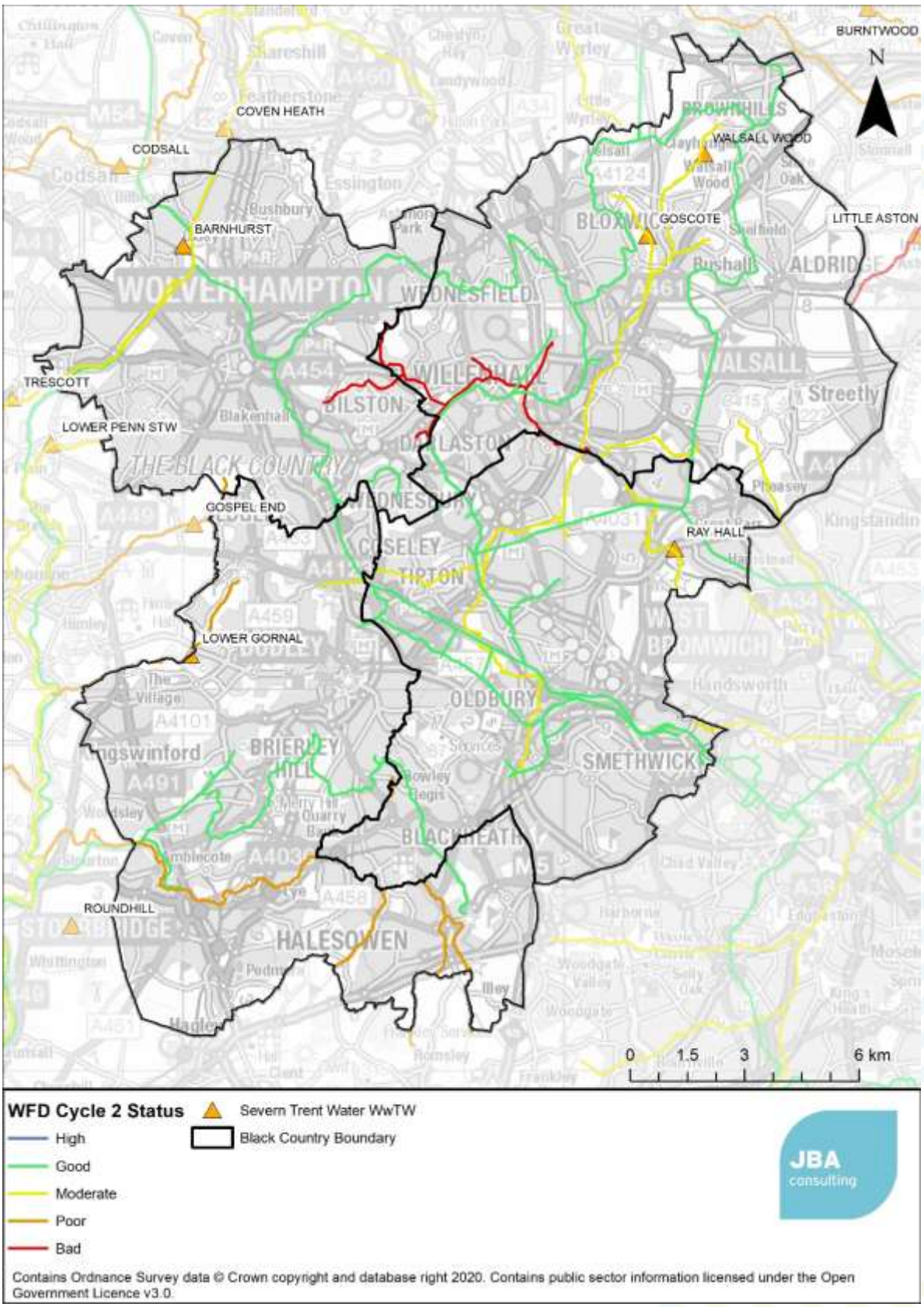


Figure 9.1 WFD status for waterbodies in the study area

9.3.2 Barnhurst WwTW

Barnhurst WwTW is located in the north west of Wolverhampton. It predominantly serves the central, eastern and northern areas of Wolverhampton. Barnhurst WwTW discharges into both the Shropshire Union Canal and the Staffordshire and Worcestershire Canal in a 50:50 ratio. The watercourses have overall "moderate" and "good" statuses.

Table 9.1 WFD classifications for Shropshire Union Canal (Wolverhampton to Belvide Reservoir feeder) and Staffordshire and Worcester Canal (Summit to Lower Penn).

Shropshire Union Canal (Wolverhampton to Belvide Reservoir feeder)	Overall Water Body	Biochemical Oxygen Demand (BOD)	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Good	N/A	N/A	N/A
Objectives	Good by 2015	N/A	N/A	N/A

Staffordshire and Worcester Canal (Summit to Lower Penn)	Overall Water Body	Biochemical Oxygen Demand (BOD)	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Moderate	High	High	Moderate
Objectives	Moderate by 2015	N/A	Good by 2015	Moderate by 2015

9.3.3 Burntwood WwTW

Burntwood WwTW is located outside the Black Country Boundary and is situated 2.3km to the north east of the Walsall District Boundary. It discharges to the Crane Brook stream. The watercourse is defined in the 2016 Cycle 2 Water Framework Directive as having an overall status of "poor". Among the reasons for not achieving good status is point source pollution from sewer discharge, relating to Ammonia, macrophytes and phytobenthos combined, phosphate and fish.

Table 9.2 WFD classification of Crane Brook, from the source to Footherley Brook

Crane Brook Stream	Overall Water Body	Biochemical Oxygen Demand (BOD)	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Poor	N/A	Poor	Bad
Objectives	Poor by 2015	N/A	Poor by 2015	Bad by 2015

9.4 Codsall WwTW

Codsall WwTW is located approximately 1.6 kilometres north west of Wolverhampton and is outside the Black Country boundary. Codsall WwTW discharges into the River Penk. This watercourse has an overall "poor" status, as defined in the 2016 Cycle 2 Water Framework Directive.

Table 9.3 WFD classification of the River Penk from Source to Saredon Brook.

River Penk	Overall Water Body	Biochemical Oxygen Demand (BOD)	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Poor	N/A	High	Poor
Objectives	Poor by 2015	N/A	Good by 2015	Good by 2021

9.4.1 Coven Heath WwTW

Coven Heath WwTW is located in Coven Heath, to the north of Wolverhampton and outside the Black Country Boundary. Coven Heath WwTW discharges into the Staffordshire and Worcester Canal (Summit to Lower Penn)and received an overall "moderate" status as defined in the 2016 Cycle 2 Water Framework Directive, the waterbody did not achieve good status because of sewage discharge pollution from the water industry and urban development.

Table 9.4 WFD classification of the Staffordshire and Worcester Canal (Summit to Lower Penn).

Staffordshire and Worcester Canal (Summit to Lower Penn)	Overall Water Body	Biochemical Oxygen Demand (BOD)	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Moderate	High	High	Moderate
Objectives	Moderate by 2015	N/A	Good by 2015	Moderate by 2015

9.4.2 Goscote WwTW

Goscote WwTW catchment is located to the north west of Walsall town centre, with the treatment works being located in the centre of the catchment. Goscote WwTW discharges into Ford Brook, which is a tributary into the River Tame. The Ford Brook watercourse from source to the River Tame, has an overall status of "moderate" in Cycle 2 of the Water Framework Directive (2016). The waterbody did not achieve good status because of pollution from sewage discharge and physical modifications.

Table 9.5 WFD classifications for Ford Brook, from source to the River Tame.

River Tame	Overall Water Body	Biochemical Oxygen Demand (BOD)	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Moderate	N/A	Bad	Bad
Objectives	Moderate by 2015	N/A	Moderate by 2021	Poor by 2021

The draft DWMP identifies a capital project at Goscote WwTW aimed at improving water quality. The performance of the WwTW inlet works has a significant impact on the performance of the trunk ewers and associated sewer assets. Results from the ongoing WFD investigations and flood alleviation feasibility work will enable the performance of Goscote WwTW to be better understood and allow option development to be appraised for the PR24 DWMP.

9.4.3 Gospel End WwTW

Gospel End WwTW discharges to the Merryhill Beck, which is a tributary to the River Severn. In the 2016 Cycle 2 of the Water Framework Directive, the watercourse received an overall "poor" status. The reasons for not achieving good status and for deterioration are linked to poor nutrient management from agriculture and rural land management. Sewage discharge, groundwater abstraction and urbanisation contribute greatly to the classification of water quality.

Table 9.6 WFD classifications for Merryhill Beck, from source to conference with Wom-Penn Beck

Merryhill Beck	Overall Water Body	Biochemical Oxygen Demand (Bod)	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Poor	N/A	High	Poor
Objectives	Moderate by 2027	N/A	Good by 2015	Good by 2027

9.4.4 Little Aston WwTW

Little Aston WwTW is located to the north east of Walsall, outside of the Black Country boundary, and discharges into the Footherley Brook watercourse. Table 9.7 shows that, in 2016, the Water Framework Directive identified the Footherley Brook from Source to Black-Bourne Brook as having an overall "bad" status. Reasons for not achieving good status is mainly because of point source sewage discharge from the water industry. However physical modification from industry creates ecological discontinuity. Diffuse source pollution from agriculture and urbanisation also contributes to the "bad" water quality status.

Table 9.7 WFD classifications for Footherley Brook

Footherley Brook	Overall Water Body	Biochemical Oxygen Demand (BOD)	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Bad	N/A	Moderate	Poor
Objectives	Poor by 2021	N/A	Good by 2021	Good by 2027

9.4.5 Lower Gornal WwTW

Lower Gornal WwTW is located on the east boundary of the Dudley District, whereby it discharges into the Bobs-Holbeche Beck. This watercourse received a "poor" status in 2016. The reasons for not achieving good status are sewage discharge from the water industry, and also diffuse source pollution from urbanisation and transport.

Table 9.8 WFD classification for Bobs-Holbeche Beck – source to conference Smestow Brook.

Bobs – Holbeche Bk	Overall Water Body	Biochemical Oxygen Demand (BOD)	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Poor	N/A	Moderate	Poor
Objectives	Moderate by 2027	N/A	Moderate by 2015	Moderate by 2027

9.4.6 Minworth WwTW

Minworth WwTW treats the largest proportion of the wastewater generated within the Black Country area. The treatment works is located over 13km to the east of the Black Country boundary, to the north east of Birmingham. Minworth treatment works is the largest WwTW that Severn Trent Water operate. The population served is equivalent of around 1.7 million, across Birmingham and the Black Country conurbations.

Minworth WwTW discharges into the River Tame, which is a principal tributary to the River Trent. The River Tame received an overall "moderate" classification for water quality. The reasons for not achieving good status are associated with sewage discharge, urbanisation and agricultural livestock, and influence the watercourse through point and diffuse source pollution.

Minworth WwTW is connected to wastewater treatment works across the Black Country. The Ray Hall WwTW is located at the top end of the Black Country Trunk Sewer (BCTS) which drains through the catchment to Minworth and is designed to treat the base flow from West Bromwich, Wednesbury and Tipton areas with excess flows continuing along the BCTS to Minworth.

Growth is a significant risk to the Minworth catchment which is covered by multiple councils; Walsall Metropolitan Borough and Sandwell Metropolitan Borough Councils. Development estimates equate to approximately 274,000 additional population which equates to an approximate 17% growth.

Table 9.9 WFD classification for the River Tame

River Tame	Overall Water Body	Biochemical Oxygen Demand (BOD)	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Moderate	N/A	Moderate	Poor
Objectives	Moderate by 2015	N/A	Moderate by 2015	Bad by 2015

9.4.7 Roundhill WwTW

Roundhill WwTW is located outside of the Black Country boundary, approximately 1.2km to the south west of the Dudley District. It discharges into the River Stour , and the overall water body is classified as moderate. The main reasons for the water quality not achieving "good" status are related to sewage discharge from the water industry.

Table 9.10 WFD classification for the River Stour, conference with the Smestow Brook to the conference with the River Severn.

Stour (Worcs) – conf Smestow Bk to conf R Severn	Overall Water Body	Biochemical Oxygen Demand (BOD)	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Moderate	High	High	Poor
Objectives	Good by 2027	N/A	Good by 2015	Good by 2027

9.4.8 Trescott WwTW

Trescott WwTW is located to the west of the City of Wolverhampton District and is outside the Black Country Boundary. The WwTW discharges into Smestow Beck watercourse, which received a "moderate" status in the 2016 WFD Cycle 2 Classification. The waterbody did not receive a good status due to water quality being affected by groundwater abstraction, sewage discharge, urban development and agriculture.

Table 9.11 WFD classification for the Smestow Beck - source to conference Wom-Penn Beck overview

	Overall Water Body	Biochemical Oxygen Demand (BOD)	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Moderate	Good	Moderate	Poor
Objectives	Moderate in 2015		Good in 2021	Good in 2027

9.4.9 Walsall Wood

Walsall Wood WwTW is located in the north of the Walsall District, in between Walsall Wood and Clayhanger within the Black Country boundary. The WwTW discharges into the Ford Brook, which is a tributary to the River Tame. In 2016 the watercourse received a "moderate" water quality status. Amongst the reasons why the waterbody did not receive a "good" status are pollution from sewage discharge, including ammonia and invertebrates, urban development and transport.

Table 9.12 WFD classification for Ford Brook, from source to River Tame overview

Ford Brook	Overall Water Body	Biochemical Oxygen Demand (BOD)	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Moderate	N/A	Bad	Bad
Objectives	Moderate by 2015	N/A	Moderate by 2021	Poor by 2021

9.5 Priority substances

As well as the general chemical and physicochemical water quality elements (BOD, Ammonia, Phosphate etc.) addressed above, a watercourse can fail to achieve Good Ecological Status due to exceeding permissible concentrations of hazardous substances. Currently 33 substances are defined as hazardous or priority hazardous substances by the Water Framework Directive (WFD) with others under review. 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.

Also considered is how the planning system might be used to manage priority substances:

- Industrial sources – whilst the WCS 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.
- 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 sections 11.3.4 and 11.3.6.
- Domestic wastewater sources - some priority substances are found in domestic wastewater as a result of domestic cleaning chemicals, detergents, pharmaceuticals, pesticides or materials used within the home. Whilst an

increase in the population due to housing growth could increase the total volumes of such substances being discharged to the environment, it would seem more appropriate to be managing 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 the Water Cycle Study.

9.6 Conclusions

The increased discharges at the WwTWs, serving growth across the Black Country area, have the potential to impact the downstream water quality of receiving waterbodies. **Further assessment of the impact upon water quality should be undertaken, as part of a Phase 2 Outline study.** In particular, consideration should be paid to those which already have a 'poor' or 'bad' status and are forecast for increased growth.

9.7 Proposed methodology for Phase 2 Outline study

Water Quality is a cross-boundary issue, and the impacts of growth can be cumulative where wastewater treatment works receiving growth from several local authorities, discharge to a river system. The Environment Agency advised that, where several treatment works discharge into the same river system, it is their preference that the impacts are assessed using catchment scale modelling, which is typically modelled using SIMCAT. In instances where a watercourse only receives discharges from a single WwTW, these impacts can be assessed using the EA's River Quality Planning (RQP) tool. Where applicable, water quality models will be updated using the most recent available data from the following sources:

- River flow – National River Flow Archive
- River quality – EA Water Quality Data Archive
- Effluent flow - baseline flow from STW for each WwTW
- Effluent quality – EA Water quality data Archive
- Future growth scenario - additional flow from development from the growth forecast defined during Phase 2 Outline study
- Recent or imminent changes to WwTWs such as an upgrade or change in permit level due in AMP7 should be incorporated into the model.

Barnhurst and Coven Heath WwTWs discharge to canals. The RQP method does not lend itself to assessment of water quality impacts in canals. The Environment Agency and Canal and River Trust should be consulted to agree appropriate assessment methods for these discharges.

10 Flood Risk Management

10.1 Assessment of additional flood risk from increased WwTW discharges

In catchments with a large planned growth in population, in which the WwTW discharges effluent to a small watercourse, the increase in the discharged effluent might have a negative effect on the risk of flooding. An assessment has been carried out to quantify such an effect.

10.2 Methodology

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

- Obtain the current observed Dry Weather Flow (DWF) for each WwTW from STW;
- Identify the point of discharge of these WwTWs at each watercourse;
- At each outfall point, use the FEH v1.0 catchment descriptors associated with the WwTW;
- Use FEH Statistical method to calculate peak 1 in 30 (Q30) and 1 in 100 (Q100) year fluvial flows;
- Calculate the DWF as a percentage of the Q30 and Q100 flow

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

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

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

10.3 Results

Table 10.1 reports the flow from each WwTW as a percentage of the Q30 and Q100 peak flow. This shows that in most cases, the flow from the WwTW does not make up a significant percentage of the peak flow in a Q30 or Q100 event. In these cases, additional effluent flow from development is unlikely to have a significant impact on downstream flood risk. In the case of Barnhurst and Goscote WwTWs, current observed discharge is 5-6% of peak flow in a 1 in 30-year event. These have therefore been highlighted as a moderate risk that increased effluent from growth will increase fluvial flood risk. A red or amber assessment does not necessarily mean that flooding will occur if development is planned in these catchments, but that the increased effluent flow will require further consideration.

The impact of Lower Gornal closing and flows being transferred to Roundhill WwTW was assessed and made a small but insignificant difference to flood risk.

Where the point of discharge is to a canal (Barnhurst and Coven Heath WwTWs), it is not possible to use this method to estimate the peak flows in the canal. The Canal and Rivers Trust should be consulted if discharges from these WwTWs were to increase above the permitted DWF.

Table 10.1 Summary of DWF as a percentage of Q30 and Q100 peak flow

WwTW	FEH Stat Q30 (m^3/s)	FEH Stat Q100 (m^3/s)	Current observed DWF (m^3/d)	Current observed DWF (m^3/s)	DWF as a % of Q30	DWF as a % of Q100
Trescott	12.7	17.6	4,939	0.057	0.5	0.3
Roundhill	53.8	74.3	53,217	0.616	1.2	0.8
Roundhill (+Lower Gornal)	53.8	74.3	59,398	0.688	1.28	0.93
Codsall	9.4	12.7	4,000*	0.046	0.8	0.4
Barnhurst	n/a	n/a	36,390	0.421	n/a	n/a
Lower Gornal	2.8	3.9	6,181	0.072	2.6	1.8
Gospel End	2.4	3.4	1,147	0.013	0.5	0.4
Coven Heath	n/a	n/a	6,214	0.072	n/a	n/a
Goscote Sewage	4.5	6.3	23,625	0.273	6.0	4.3
Ray Hall	109.4	155.9	38,206	0.442	0.4	0.3
Walsall Wood	2.2	3.1	3,545	0.041	1.9	1.3
Burntwood	6.2	8.5	7,400*	0.086*	1.4	1.0
Little Aston	2.0	2.8	5,107	0.059	3.0	2.1
Minworth	145.8	191.5	411,700	4.765	3.3	2.5

* From permit value not actual flow – this gives a conservative estimate

10.4 Conclusions

The impact of increased effluent flows is not predicted to have a significant impact upon flood risk at most of the WwTWs likely to receive growth. The receiving watercourse for Goscote WwTW is at moderate risk that increased discharge will increase fluvial flood risk downstream.

Further assessment of the impact of wastewater discharge on fluvial flood risk is recommended as part of a Phase 2 Outline study.

10.5 Recommendations

Table 10.2 Recommendations from flood risk assessment

Action	Responsibility	Timescale
Proposals to increase discharges to a watercourse may also require a flood risk activities environmental permit from the EA (in the case of discharges to Main River), a land drainage consent from the Lead Local Flood Authority (in the case of discharges to an Ordinary Watercourse) or from the Canal and Rivers Trust (in the case of discharges to a canal).	STW	During design of WwTW upgrades

11 Environmental Opportunities and Constraints

11.1 Introduction

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

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.

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."

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

After or during heavy rainfall, the first flush of water carrying accumulated dust and dirt of often highly polluting. Development has the potential to increase the diffuse pollution by providing additional sources from roads and housing estates.

Potential impacts on receiving surface waters include the blanketing of river beds 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.

11.2 Sites with Environmental Designation

11.2.1 Sites protected by European designations

The Habitats Regulations Assessment process is designed to ensure that consideration is given within planning policy to sites protected by European Directives, namely Special Areas of Conservation (SAC) or Special Protection Areas (SPA).

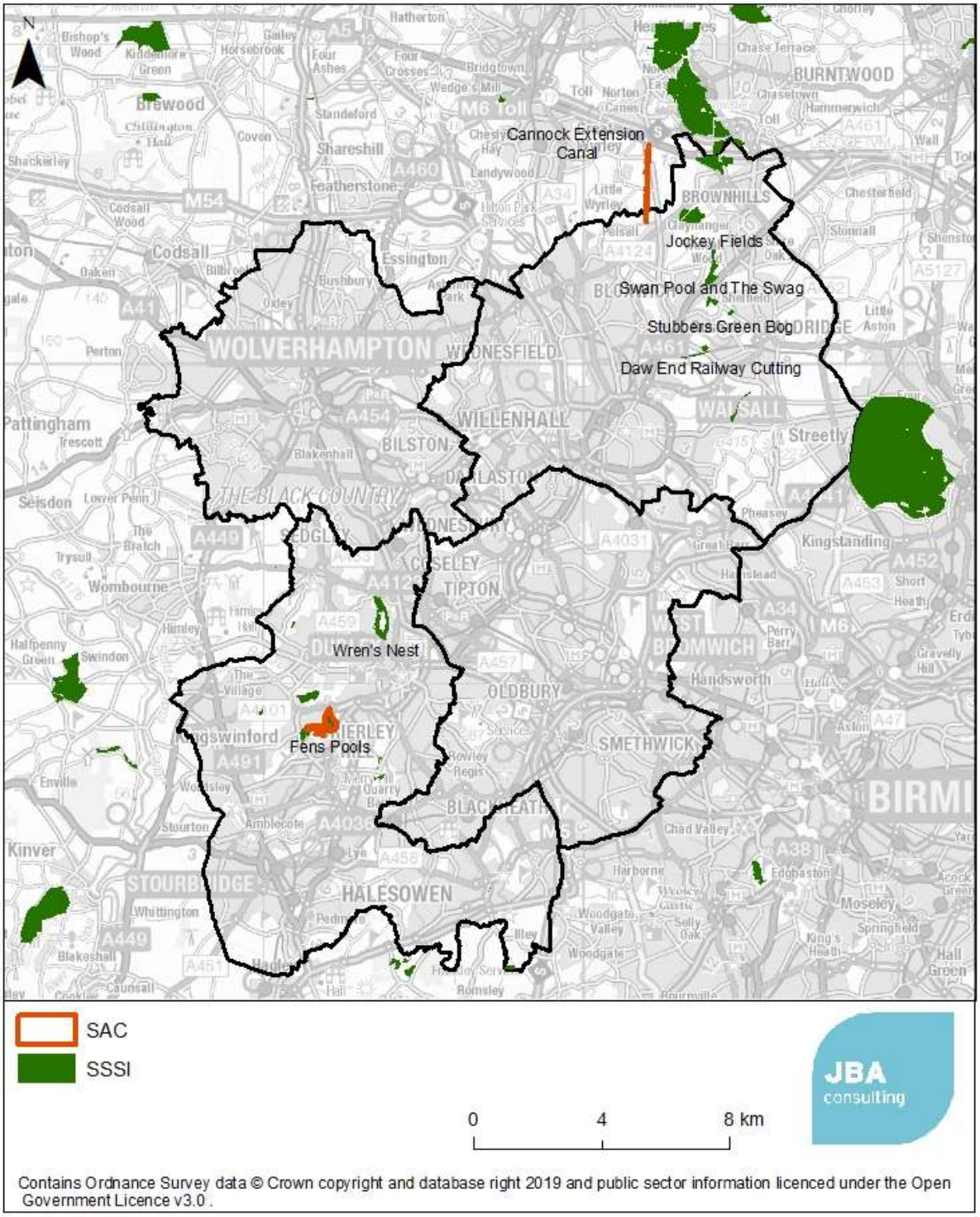
There are two SACs are located within the Black Country Boundary. The Cannock Extension Canal is located in the Walsall district on the northern boundary. The Cannock Extension Canal is designated as an SAC due to the diverse aquatic flora which has developed without any extensive reed swamp incursion, encouraged by the high water-quality, uneven canal bottom and the low volume of boat traffic.

Fens Pool is located within Dudley and covers an area of 21 ha. Fens Pool is an SAC and Site of Special Scientific Interest because it is the best amphibian site known in the West Midlands. Amphibians inhabit the whole site, using the pools for breeding. The site includes a wide range of habitats from open water through swamp, fen and inundation communities to unimproved neutral and acidic grassland and scrub.

11.2.2 Sites of Special Scientific Interest

Sites of Special Scientific Interest (SSSI) are not subject to the HRA process, but are protected under the Wildlife and Countryside Act, and the impact of development on these sites must also be considered. There are several SSSIs within Walsall and Dudley District within the study area boundary, as well as many outside which could be affected

by the effects of development upstream. SSSIs associated with the study area are shown in Figure 11.1 below.



Note: Not all SSSIs are labelled on this map for clarity – for mapping of environmental sites, refer to: https://magic.defra.gov.uk/MagicMap.aspx

Figure 11.1 Sites with environmental designations

11.3 Sources of pollution

11.3.1 Point source pollution

The main sources of point source pollution in the study area are the WwTWs. The effect of additional wastewater flows on water quality is discussed in sections 7 and 9, and a summary of their potential impact following a source-pathway-receptor approach is presented in Table 11.1. In many cases, deterioration in water quality from additional wastewater flow could be prevented by treatment at technically achievable limit (TAL), but this needs to be verified through water quality modelling.

Table 11.1 WwTW locations relative to environmental designations

Source	Pathway	Receptor	Distance downstream (km)	Potential Impact
Walsall Wood	Brick Kiln Pool	Jockey Fields SSSI	0.4	The site consists of a number of low-lying fields in a stream valley. A network of well-vegetated ditches run through the site, and it is an area of local interest for its wetland birds. Contains a number of plant species that area rare in the West Midlands. The variety of habitats, bird species, large size and rare plant species make it an important site for the country.
Walsall Wood	Un-named watercourse	Swan Pool and The Swag	1.8	Two pools, linked by a culvert under Stubbers Green Road, Walsall. They are important as their associated reedbeds hold the largest roost for swallows and other hirundines in the West Midlands. The reedbeds hold a peak population of around 10,000 hirundine birds during their autumn migration. Swan Pool surrounded by swamp and tall fen vegetation.
Walsall Wood	Un-named culverted watercourse	Stubbers Green Bog	2.4	Small wetland site in Walsall comprising a shallow pool with fringing valley mire. The combination of habitats is

Source	Pathway	Receptor	Distance downstream (km)	Potential Impact
				poorly represented in the country and valley mire is scarce nationally. Two drainage channels lead into the basin on its northern side and are important in supplying some of the water to the site. The site is water sensitive
Walsall Wood	Wyreley and Essington, Daw End and Rushall Canals	Daw End Railway Cutting	3.4	Important geological locality for the study of the Wenlock Series in Britain. Unlikely to be a water sensitive site.
Goscote	Ford Brook, from Source to River Tame	Wren's Nest	12.7	The site is of exceptional palaeontological importance particularly for rocks of Wenlock age. One of the most notable geological locations in the British Isles.
Roundhill	River Stour	Kinver Edge	3.3	The site lies on a ridge of soft red Permian sandstone. The acidic soils derived from the sandstone support heathland and oak-birch woodland.

11.3.2 Diffuse sources of water pollution

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.

11.3.3 Groundwater Protection

Groundwater is an important source of water in England and Wales. The Environment Agency is responsible for the protection of "controlled waters" from pollution under the Water Resources Act 1991. These controlled waters include all watercourses and groundwater contained in underground strata. The zones are based on an estimate of the time it would take for a pollutant which enters the saturated zone of an aquifer to reach the source of abstraction or discharge point (Zone 1 = 50 days, Zone 2 = 400 days, Zone 3 is the total catchment area). The Environment Agency will use SPZs

(alongside other datasets such as the Drinking Water Protected Areas (DrWPAs) and aquifer designations as a screening tool to show:

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

The EA have published a position paper[54] outlining its approach to groundwater protection which includes direct discharges to groundwater, discharges of effluents to ground and surface water runoff. This is of relevance to this water cycle study where a development may manage surface water through SuDS.

Sewage and trade effluent

Discharge of treated sewage of 2m^3 per day or less to ground are called small sewage discharges (SSDs). The majority of 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).

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.

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

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

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

A sceptic tank or small sewage treatment plant should be used to treat the sewage and then discharge the effluent (treated liquid) to the ground via a drainage field. A soakaway, well or borehole cannot be used for discharging effluent to the ground. A permit from the Environment Agency or upgrade to a drainage field is required, whereby the risk of the system can be used in the specified location.

54 The Environment Agency's approach to groundwater protection, Environment Agency (2018). Accessed online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/692989/Environment-Agency-approach-to-groundwater-protection.pdf on: 07/01/2020

The treatment system must meet the relevant British Standard in force at the time of installation. The requirements are:

- CE mark
- The manual or other documentation that came with tank or treatment plant has a certificate of compliance with a British Standard
- It's on British Water's list of approved equipment.

The treatment system must be installed correctly and have a capacity large enough to treat the maximum amount of sewage for the specified location.

Discharge of clean water

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

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

- be suitably designed
- meet Government non-statutory technical standards[55] for sustainable drainage systems – these should be used in conjunction with the NPPF and PPG
- and use a SuDS management treatment train (see sections 11.3.4 to 11.3.7)

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

55 Sustainable Drainage Systems: non-statutory technical standards, Department for Environment, Food & Rural Affairs (2015). Accessed online at: https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards on: 07/01/2020

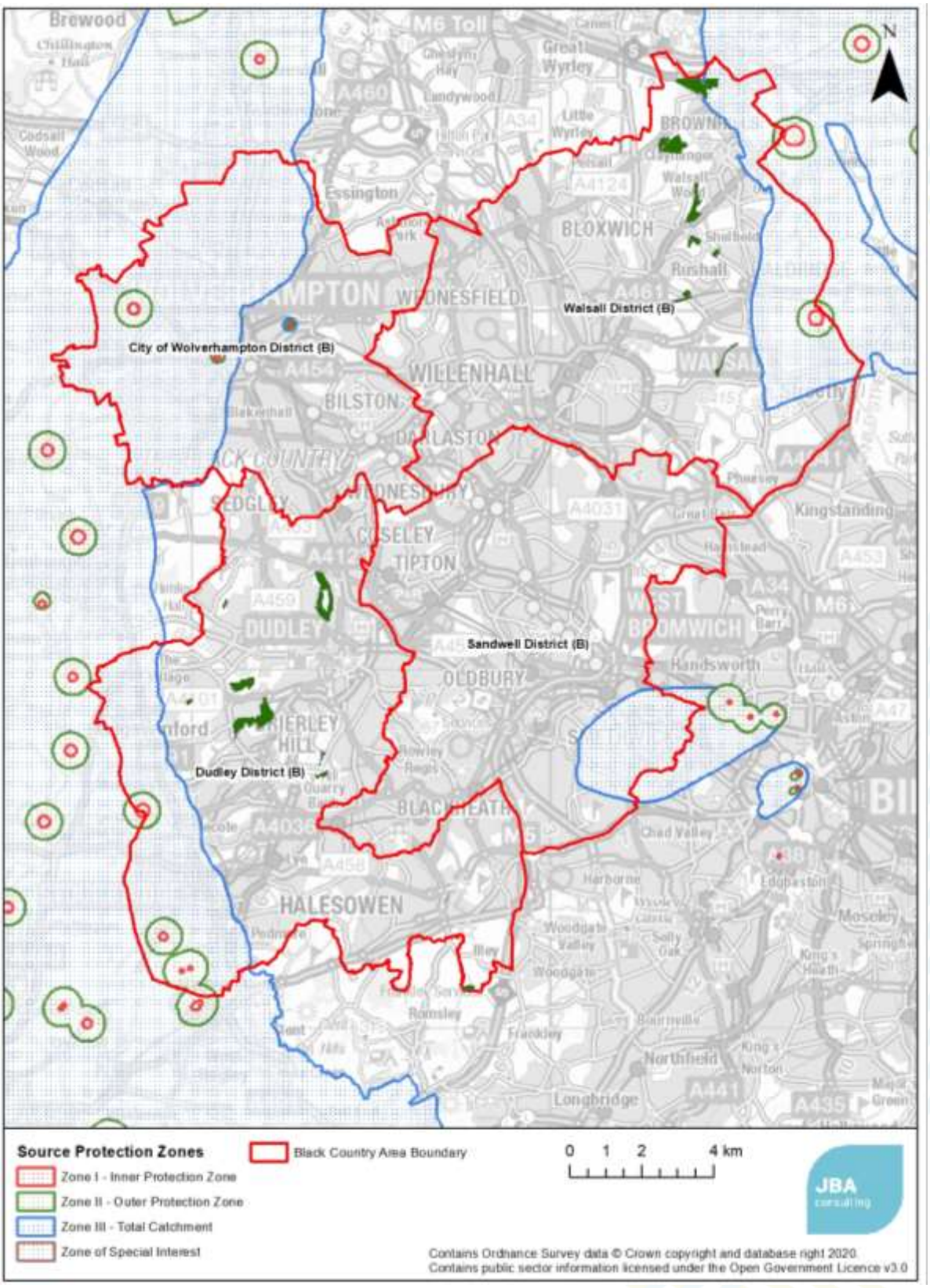


Figure 11.2 Source protection zones in the study area

Table 11.2 Guidance for Source Protection Zones

Source Protection Zone	Management advice / EA position statement
Zone 1 – Inner Protection Zone	G2 – Inside SPZ1 all sewage effluent discharges to ground must have an environmental permit. G4 – Inside SPZ1 the EA will object to any new trade effluent, storm overflow from sewage system or other significantly contaminated discharges to ground where the risk of groundwater pollution is high and cannot be adequately mitigated. G12 – Discharge of clean roof water to ground is acceptable both within and outside SPZ1, provided all roof water down-pipes are sealed against pollutants entering the system from surface runoff, effluent disposal or other forms of discharge. The method of discharge must not create new pathways for pollutants to groundwater or mobilise contaminant already in the ground. No permit is required if these criteria are met. G13 – Where infiltration SuDS are proposed for anything other than clean roof drainage in a SPZ1, a hydrogeological risk assessment should be undertaken, to ensure that the system does not pose an unacceptable risk to the source of supply. SuDS schemes must be suitably designed.
Zone 2 – Outer Protection Zone	A hydrogeological risk assessment is not a requirement for SuDS schemes, however they should still be "suitably designed", for instance following best practice guidance in the CIRIA SuDS Design Manual.
Zone 3 – Total Catchment	A hydrogeological risk assessment is not a requirement for SuDS schemes, however they should still be "suitably designed", for instance following best practice guidance in the CIRIA SuDS Design Manual.

11.3.4 Surface Water Drainage and SuDS

Since April 2015[56], management of the rate and volume of surface water has been a requirement for all major development sites, through the use of Sustainable Drainage Systems (SuDS).

As Lead Local Flood Authorities (LLFA), Dudley and Wolverhampton are statutory consultees to the planning system for surface water management within major development, which covers the following development scenarios:

- 10 or more dwellings
- a site larger than 0.5 hectares, where the number of dwellings is unknown

56 Department for Communities and Local Government (2014) House of Commons: Written Statement (HCWS161) Written Statement made by: The Secretary of State for Communities and Local Government (Mr Eric Pickles) on 18 Dec 2014. Available at: https://www.parliament.uk/documents/commons-vote-office/December%202014/18%20December/6.%20DCLG-sustainable-drainage-systems.pdf on: 07/01/2020

- a building greater than 1,000 square metres
- a site larger than 1 hectare

SuDS are drainage features which attempt to replicate natural drainage patterns, through capturing rainwater at source, and releasing it slowly into the ground or a water body. They can help to manage flooding through controlling the quantity of surface water generated by a development and improve water quality by treating urban runoff. SuDS can also deliver multiple benefits, through creating habitats for wildlife and green spaces for the community.

National standards on the management of surface water are outlined within the Defra Non-statutory Standards for Sustainable Drainage Systems[57]. The Black Country Councils do not yet provide local SuDS guidance; however, Staffordshire Council have the Sustainable Drainage Systems (SuDS) Handbook[58] and the CIRIA C753 SuDS Manual[59] provides the industry best practice guidance for design and management of SuDS. A Black Country SuDS manual is to be adopted soon.

11.3.5 Development and contaminated land

The Black Country, due its long and diverse industrial history has a significant legacy of contaminated land from historic mining and heavy industry. Development on contaminated land carries a risk of causing contamination to groundwater and/or surface water if not properly planned and designed. The presence of contaminated land needs to be considered when planning and designing any water or wastewater infrastructure, including SuDS. The CIRIA SuDS Manual C753 (chapter 8) offers guidance on application of SuDS on contaminated land.

11.3.6 Use of SuDS in Water Quality Management

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

This is usually facilitated via a SuDS Management Train of a number of 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 Figure 11.3 below.

57 Sustainable Drainage Systems, Non-statutory technical standards for sustainable drainage systems, DEFRA (2015). Accessed online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/415773/sustainable-drainage-technical-standards.pdf on: 07/01/2020

58 Sustainable Drainage Systems (SuDS) Handbook, Staffordshire County Council (2017). Accessed online at https://www.staffordshire.gov.uk/environment/Flood-Risk-Management/Documents/SuDS-Handbook.pdf on: 07/01/2020

59 CIRIA Report C753 The SuDS Manual, CIRIA (2015). Accessed online at: https://www.ciria.org/ItemDetail?iProductCode=C753F&Category=FREEPUBS on: 07/01/2020

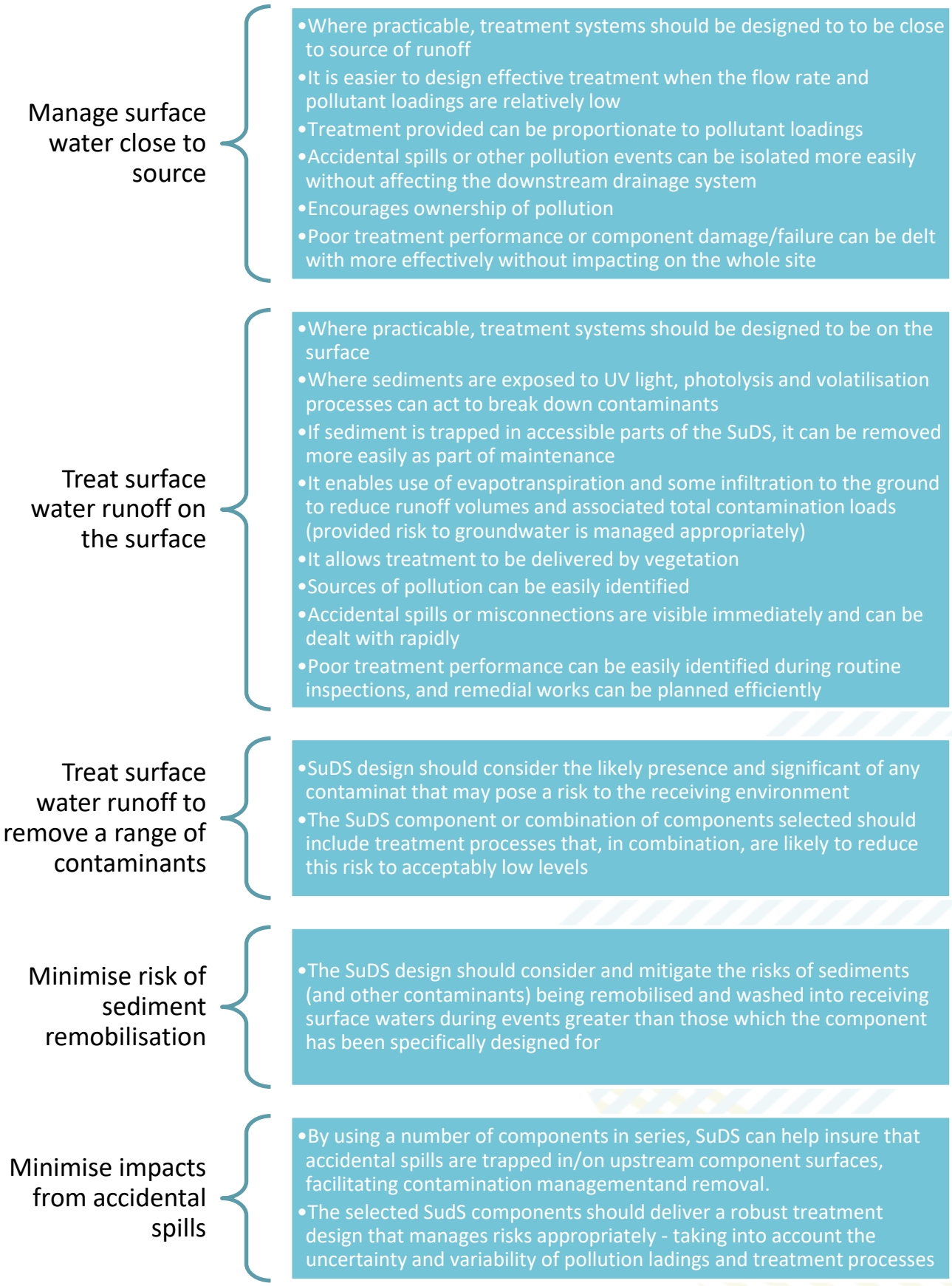


Figure 11.3 Considerations for SuDS design for water quality

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

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

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

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

11.3.7 Additional benefits

Flood Risk

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

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

Water Resources

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

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

Climate Resilience

Climate projections for the UK suggest that winters may become milder and wetter and summers may become warmer, but with more frequent higher intensity rainfall events, particularly in the south east. This would be expected to increase the volume of runoff, and therefore the risk of flooding from surface water, and diffuse pollution, and reduce water availability.

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

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

Biodiversity

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

opportunities for a variety of species including plants, amphibians, invertebrates, birds, bats and other animals.

Amenity

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

11.4 Conclusions

- The Black Country has two Special Areas of Conservation (SACs) and a number of Sites of Special Scientific Interest (SSSIs) which will be expected to be conserved, restored and enhanced through the Black Country Plan. This Phase 1 Scoping study has only considered SSSIs and SACs. A Phase 2 Outline study will also consider impacts on other sites of environmental significant such as Ramsar sites and nature reserves.
- WwTWs serving growth within the Black Country are the most significant point sources of pollution in the study area.
- There is potential for additional discharge from WwTW to impact sites with environmental designations. A water quality impact assessment is recommended in a Phase 2 Outline study to understand this further.
- Development sites within the Black Country could be sources of diffuse pollution from surface runoff.
- Runoff from development sites should be managed through implementation of a SuDS scheme with a focus on treating water quality of surface runoff from roads and driveways.
- Opportunities exist for these SuDS schemes to offer multiple benefits of flood risk reduction, amenity value and biodiversity.
- SuDS for a single site could be demonstrated to have limited impact, but it is the cumulative impact of all development across the catchment (combined with the potential effects of climate change) that should be taken into account. For this reason, SuDS should be considered on sites that do not have a direct pathway to a SSSI.

11.5 Recommendations

Table 11.3 Recommendations from environmental constraints and opportunities section

Action	Responsibility	Timescale
The Black Country Plan should include policies that require development sites, where a pathway exists for surface water to a site with an environmental designation, to adopt SuDS to manage water quality of surface runoff.	BC Councils	Ongoing
The Black Country Plan should include policies that encourage development sites, where no obvious pathway exists to a site with an environmental designation, to consider the adoption of SuDS to manage the cumulative impact of development within the catchment (unless it is not reasonably practicable to do so).	BC Councils	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.	BC Councils STW EA	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 connections into the foul network, as this is a significant cause of sewer flooding.	BC Councils Developers	Ongoing

12 Climate change impact assessment

12.1 Approach

A qualitative assessment was undertaken to assess the potential impacts of climate change on the assessments made in this water cycle study. This was completed using a matrix which considered both the potential impact of climate change on the assessment in question, and also the degree to which climate change has been considered in the information used to make the assessment.

The impacts have been assessed on a Black Country area wide basis; the available climate models are generally insufficiently refined to draw different conclusions for parts of the study area or doing so would require a degree of detail beyond the scope of this study.

Table 12.1 Climate change pressures scoring matrix

		Impact of pressure		
		Low	**Medium**	**High**
Have climate change pressures been considered in the assessment?	Yes - quantitative consideration			
	Some consideration but qualitative only			
	Not considered			

12.2 Results

Severn Trent Water have published a risk assessment[60] for water resources, wastewater treatment and wastewater sewerage networks that identifies the level of threat from climate change in key service areas. In the case of WwTW, the highest perceived risks are in asset performance and pollution incidents, both of which can be attributed to an increased risk of flooding. In the case of the wastewater network, sewer flooding, resulting from increased rainfall intensity overwhelming the sewer network is added to the risks of impacts on asset performance and pollution incidents.

Consideration of the impact of climate change on water resources is included in both STW and SSW's WRMP, with the main risk being the increased likelihood of severe drought events. Allowance is made within the baseline supply forecast by adjusting the "Water Available for Use". Each WRZ is classified as "low", "medium" or "high" vulnerability, which is then used to determine the level of detail for climate change modelling.

60 Climate Change Adaptation Report 2015-2020. Severn Trent Water (2015). Accessed online at: https://www.stwater.co.uk/content/dam/stw/about_us/documents/Full-Climate-change-adaptation-report-2015-2020.pdf on: 07/01/2020

Table 12.2 Scoring of climate change consequences for the water cycle study

Assessment	Impact of Pressure (source of information)	Have climate change pressures been considered in the Water Cycle Study (Phases 1)?	RAG
Water resources	High	Yes – quantitative assessment within the WRMPs. Vulnerability assessments were carried out following the methodology described in the EA's WRPG (2012).	
Water supply infrastructure	Medium - some increased demand in hot weather	Yes - quantitative assessment within the WRMPs.	
Wastewater Collection	High - Intense summer rainfall and higher winter rainfall increases flood risk	Yes – qualitative assessment in climate change adaptation reports by Severn Trent Water. No site-level investigations have been completed.	
Wastewater treatment	Medium - Increased winter flows and more extreme weather events reduces flow headroom	Yes – qualitative assessment in the Severn Trent Water climate change adaptation reports. No site-level assessment was completed.	
WwTW odour	Medium – higher temperatures will exacerbate existing odour control issues.	Severn Trent Water have not considered odour in their climate adaptation plan.	
Water quality	Nutrients: High Sanitary determinands: Medium to High	Qualitative assessments have been included in the climate change adaptation policy papers from Severn Trent Water.	
Flooding from increased WwTW discharge	Low	Not Assessed.	

12.3 Conclusions and Recommendations

The impact of Climate Change on water resources and water infrastructure are receiving increasing levels of attention by water companies and sewerage undertakers at a strategic level. This has not been included in assessments at a site level as detailed modelling has not been carried out by Severn Trent Water. Consideration of changes in water and wastewater demand should be considered when carrying out detailed site assessments in the future.

The impact of reduced river flows due to climate change on water quality should be included in the water quality assessment in Phase 2.

Table 12.3 Climate change recommendations

Action	Responsibility	Timescale
When undertaking detailed assessments of environmental or asset capacity, consider how the latest climate change guidance can be included.	EA, STW, BC Councils	As required
Take "no regrets"* decisions in the design of developments which will contribute to mitigation and adaptation to climate change impacts. For example, consider surface water exceedance pathways when designing the layout of developments.	BC Councils and Developers	As required
Water quality modelling in Phase 2 should include sensitivity testing to a reduction in river flow.	WQ modelling consultant	In Phase 2

*"No-Regrets" Approach: "No-regrets" actions are actions by households, communities, and local/national/international institutions that can be justified from economic, and social, and environmental perspectives whether natural hazard events or climate change (or other hazards) take place or not. "No-regrets" actions increase resilience, which is the ability of a "system" to deal with different types of hazards in a timely, efficient, and equitable manner. Increasing resilience is the basis for sustainable growth in a world of multiple hazards (Heltberg, Siegel, Jorgensen, 2009; UNDP, 2010).

13 Summary and overall conclusions

13.1 Summary of Phase 1 Scoping study

Table 13.1 Summary of conclusions and requirements for Phase 2 Outline study

Assessment	Conclusion	Requirement for Phase 2 Study
Water resources	A policy requiring new residential development to achieve the tighter water efficiency target of 110 l/p/d as described in Part G of Building Regulations is line with the strategic direction outlined in the National Water Resources Framework, and the recommendations of the River Basin Management Plans. Furthermore, it is viable, can be implemented at negligible cost and will reduce energy and water bills for residents. There is a plan to address the supply-demand deficit within each companies WRZs and sufficient time to adapt the long-term plan to include emerging trends in population.	Once proposed Black Country Plan allocations are available, the total forecast growth should be compared to water company plans to ensure sufficient water resource available.
Water supply infrastructure	No limitations on the provision of water supply infrastructure were identified by STW or SSW. A site by site assessment has not been completed as part of this study as suitable list of sites was not available at this stage. Once a preferred options list of sites is available, further assessment may be required in a Phase 2 Outline Study to ensure that the water supply network has sufficient capacity locally to accommodate the additional demand without detriment to existing customers.	Further assessment of water supply infrastructure is recommended as part of a Phase 2 Outline study.
Wastewater collection	Development in areas where there is limited wastewater network capacity will increase pressure on the network, increasing the risk of a detrimental impact on existing customers, and increasing the likelihood of CSO operation. Early engagement with Severn Trent Water is required, and further assessment of the network is	Further study of the wastewater network is recommended as part of a Phase 2 Outline study.

	recommended once a preferred option list of sites is available. Further modelling of the network may be required at the planning application stage. Where the STW network is a combined sewer system, there may be opportunities for separation of surface water through a suitably designed SuDS.	
Wastewater Treatment Works Flow Permit assessment	Flow permit assessments were carried out at all of the WwTW that are expected to serve growth in the Black Country Plan period. Across the sewer catchment that cover the study area there is hydraulic capacity for an equivalent of 260,000 new houses However, much of this capacity is within the Minworth / Ray Hall catchments that also serves much of Birmingham's growth over than period. Severn Trent Water have advised that they plan to close Lower Gornal WwTW in AMP7 (2020-25). The area served by this catchment will now be served by Roundhill WwTW which will increase its permitted flow to accommodate this transfer. Water quality must also be taken into account, with the Coven Heath WwTW catchment having limited environmental headroom, and relatively more environmental headroom in the Trescott, Lower Gornal and Gospel End catchments. "Whilst sewage treatment works may not have sufficient spare capacity to accept the levels of development being proposed in its catchment area this does not necessarily mean that development cannot take place. Under Section 94 of the Water Industry Act 1991 sewerage undertakers have an obligation to provide additional treatment capacity as and when required.	Further assessment of wastewater treatment capacity is recommended as part of a Phase 2 Outline Study.

	Where necessary we will discuss any discharge consent implications with the Environment Agency. If there are specific issues which may prevent or delay the provision on additional capacity these have been highlighted below."	
Odour Assessment	Sites within 800m of a WwTW may be at risk of nuisance odour. Where a site is within 800m it will not necessarily experience a significant level of nuisance odour, with the size of the works, and the treatment processes that it contains affecting the actual odour. An odour assessment as part of the planning process is recommended. Severn Trent Water recommend an odour assessment is carried out on these sites, and the cost of this should be borne by the developer.	A further screening assessment of odour is recommended as part of a Phase 2 Outline study. Any future detailed assessment should be carried out as part of the planning process.
Water quality impact assessment	The increased discharges at the WwTWs, serving growth across the Black Country area, have the potential to impact the downstream water quality of receiving waterbodies. It is recommended that water quality modelling is carried out to assess the potential impact of growth in each catchment once a preferred option list of sites is available.	Further assessment of the impact upon water quality should be undertaken, as part of a Phase 2 Outline study. In particular, consideration should be paid to those which already have a 'poor' or 'bad' status and are forecast for increased growth. Recent or imminent changes to WwTWs such as an upgrade or change in permit level due in AMP7 should be incorporated into the model.
Flood risk from additional WwTW flow	The impact of increased effluent flows is not predicted to have a significant impact upon flood risk at most of the WwTWs likely to receive growth. The receiving watercourse for Goscote WwTW is at moderate risk that increased discharge will increase fluvial flood risk.	Further assessment of the impact of wastewater discharge on fluvial flood risk is recommended as part of a Phase 2 Outline study.
Environmental Constraints	There are numerous SSSIs and two SACs within the Black Country	Water Quality modelling should be undertaken as

and Opportunities	which should be carefully considered in future plan-making. This Phase 1 Scoping study has only considered SSSIs and SACs. A Phase 2 Outline study will also consider impacts on other sites of environmental significant such as Ramsar sites and nature reserves. WwTWs serving growth within the Black Country are the most significant point sources of pollution in the study area. There is potential for additional discharge from WwTW to impact sites with environmental designations (see Section 11.2). A water quality impact assessment is recommended in a Phase 2 Outline study to understand this further. Development sites within the Black Country could be sources of diffuse pollution from surface runoff. Runoff from development sites should be managed through implementation of a SuDS scheme with a focus on treating water quality of surface runoff from roads and driveways Opportunities exist for these SuDS schemes to offer multiple benefits of flood risk reduction, amenity value and biodiversity. SuDS for a single site could be demonstrated to have limited impact, but it is the cumulative impact of all development across the catchment (combined with the potential effects of climate change) that should be taken into account. For this reason, SuDS should be considered on sites that do not have a direct pathway to a SSSI.	part of Phase 2 Outline study. Further assessment of Environmental Constraints is recommended as part of a Phase 2 study.

13.2 Recommendations

Table 13.2 below summarises the recommendations from each section of the report.

Table 13.2 Summary of recommendations

Aspect	Action	Responsibility	Timescale
Water resources	Continue to regularly review forecast and actual household growth across the supply region through WRMP Annual Update reports, and where significant change is predicted, engage with Local Planning Authorities.	STW / SSW	Ongoing
	Provide yearly profiles of projected housing growth to water companies to inform the WRMP.	BC Councils	Annually
	Use planning policy to require the 110l/person/day water consumption target permitted by National Planning Practice Guidance[61] in water-stressed areas.	BC Councils	In Black Country Plan
	The concept of water neutrality has potentially a lot of benefit in terms of resilience to climate change and enabling all waterbodies to be brought up to Good status. Explore further with Severn Trent Water, South Staffs Water, Water Resources West and the Environment Agency how the Council's planning and climate change policies can encourage this approach.	BC Councils, EA, STW, SSW	In Black Country Plan and Climate Change Action Plan
	STW and SSW should advise the Black Country Councils of any strategic water resource infrastructure developments where these may require safeguarding of land to prevent other type of development occurring.	STW, SSW, BC Councils	In Black Country Plan
Water supply	Undertake network modelling where appropriate to ensure	STW / SSW BC Councils	As part of the planning process

61 Planning Practice Guidance, Housing: Optional Technical Standards, Paras 13, 14 & 15, MHCLG (2015)., Accessed online at: https://www.gov.uk/guidance/housing-optional-technical-standards on: 23/01/2019

Aspect	Action	Responsibility	Timescale
	adequate provision of water supply is feasible		
	BC Councils and Developers should engage early with STW to ensure infrastructure is in place prior to occupation.	BC Councils STW / SSW Developers	Ongoing
Wastewater collection	Take into account wastewater infrastructure constraints in phasing development in partnership with the sewerage undertaker	BC Councils STW	Ongoing
	Planning applications should consider opportunities for surface water separation – particularly in the Minworth catchment.	BC Councils	In Black Country Plan
	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 set out the following: What – What is required to serve the site Where – Where are the assets / upgrades to be located When – When are the assets to be delivered (phasing) Which – Which delivery route is the developer going to use s104 s98 s106 etc. The Outline Drainage Strategy should be submitted as part of the planning application submission, and where required, used as a basis for a drainage planning condition to be set.	STW Developers	Ongoing
	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	Developers LLFA	Ongoing

Aspect	Action	Responsibility	Timescale
	water to foul sewers will be resisted by the LLFA.		
Wastewater treatment	Perform a headroom analysis based on the preferred options list once available to assess available capacity, and timing of upgrades.	BC Councils	Phase 2 Outline study
	Consider the available WwTW capacity when phasing development going to the same WwTW.	BC Councils STW	Ongoing
	Provide Annual Monitoring Reports to STW and UU detailing projected housing growth in the Local Authority.	BC Councils	Ongoing
	STW to assess growth demands as part of their wastewater asset planning activities and feedback to the Councils if concerns arise.	STW BC Councils	Ongoing
	Undertake water quality modelling once further detail on available on the location of development sites	BC Councils	Phase 2 Outline
Odour	Consider odour risk in the sites identified to be potentially at risk from nuisance odour	BC Councils	Ongoing
	Carry out an odour assessment for sites within 800m as part of the planning process (funded by developers)	Site Developers	Ongoing
Flood Risk Management	Proposals to increase discharges to a watercourse may also require a flood risk activities environmental permit from the EA (in the case of discharges to Main River), or a land drainage consent from the Lead Local Flood Authority (in the case of discharges to an Ordinary Watercourse) or from the Canal and Rivers Trust (in the case of discharges to a canal).	STW	During design of WwTW upgrades
Environment	The Black Country Plan should include policies that require development sites, where a pathway exists for surface water to a site with an	BC Councils	Ongoing

Aspect	Action	Responsibility	Timescale
	environmental designation, to adopt SuDS to manage water quality of surface runoff.		
	The Black Country Plan should include policies that encourage development sites, where no obvious pathway exists to a site with an environmental designation, to consider the adoption of SuDS to manage the cumulative impact of development within the catchment (unless it is not reasonably practicable to do so).	BC Councils	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.	BC Councils STW EA	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 connections into the foul network, as this is a significant cause of sewer flooding.	BC Councils Developers	Ongoing
Climate change	When undertaking detailed assessments of environmental or asset capacity, consider how the latest climate change guidance can be included.	EA, STW, BC Councils	As required
	Take "no regrets" decisions in the design of developments which will contribute to mitigation and adaptation to climate change impacts. For example, consider surface water exceedance pathways when designing the layout of developments.	BC Councils and Developers	As required

Aspect	Action	Responsibility	Timescale
	Water quality modelling in Phase 2 should include sensitivity testing to a reduction in river flow.	WQ modelling consultant	In Phase 2 Outline study

This page is intentionally left blank.

Offices at

Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Glasgow
Haywards Heath
Isle of Man
Limerick
Newcastle upon Tyne
Newport
Peterborough
Saltaire
Skipton
Tadcaster
Thirsk
Wallingford
Warrington

Registered Office
1 Broughton Park
Old Lane North
Broughton
SKIPTON
North Yorkshire
BD23 3FD
United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
www.jbaconsulting.com
Follow us:

Jeremy Benn Associates Limited

Registered in England 3246693

JBA Group Ltd is certified to:
ISO 9001:2015
ISO 14001:2015
OHSAS 18001:2007