

# **Wokingham Borough Council Water Cycle Study – Phase 1 Scoping Study**

**January 2019**

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## Contract

This report describes work commissioned by Wokingham Borough Council in May 2018. Wokingham Borough council's representative for the contract was Ian Church. Richard Pardoe carried out this work.

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## Purpose

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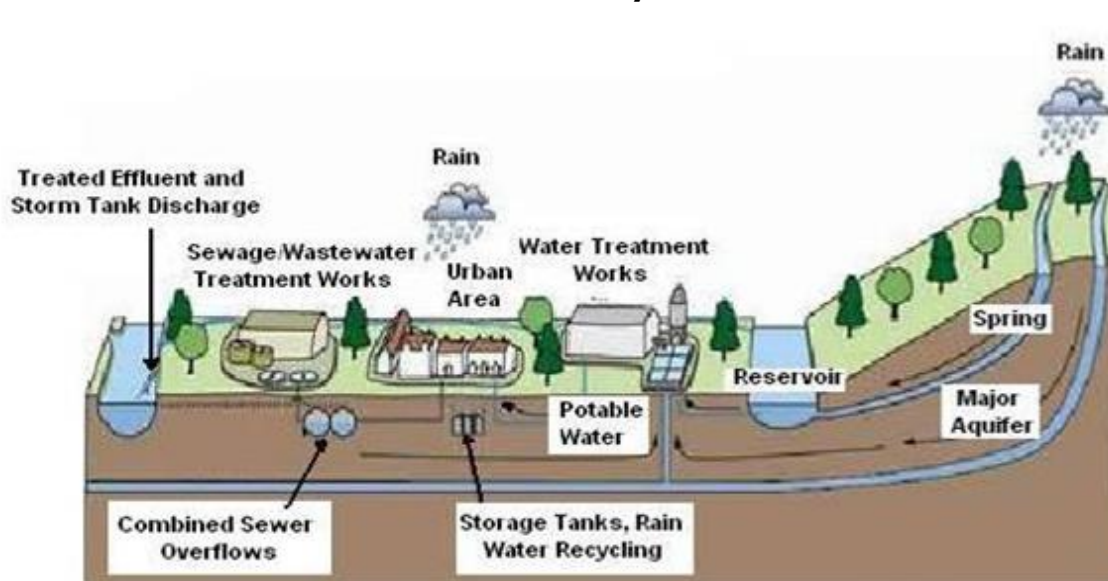
## Executive summary

In May 2018, JBA Consulting was commissioned by Wokingham Borough Council to undertake a Water Cycle Study (WCS). This study assesses the potential issues relating to future development within the Wokingham borough and the impacts on water supply, wastewater collection and waste water 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 council to select and develop sustainable development allocations where there is minimal impact on the environment, water quality, water resources, infrastructure, and flood risk. This has been achieved by identifying areas where there may be conflict between any proposed development, the requirements of the environment and by recommending potential solutions to these conflicts.

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

Potential development sites were provided by Wokingham Borough Council and wastewater treatment works (WwTW) likely to serve growth in the area were identified using the Environment Agency Consents database. Each development site was then allocated to a



WwTW in order to understand the additional wastewater flow resulting from the planned growth. Available information was collated on water policy and legislation, water resources, water quality, and environmental designations within the study area and used to assess the requirements for further study in Phase 2. Where further study is required, a proposed methodology is provided.

### **Water Resources**

Wokingham Borough is covered by three water resource zones (WRZ), two of which are supplied by Thames Water (TW); Henley and Kennet, and one by South East Water (SEW); WRZ04. Growth accounted for within each company's Water Resource Management Plan (WRMP) is broadly in line the Ministry of Housing Communities and Local Government (MHCLG) household projections (2014 based data) for Wokingham, but less than will occur if growth is delivered in line with the identified housing need.

**Henley WRZ** – A water surplus is shown in the WRMP until 2100, and Thames Water have confirmed that there is available water to supply all of the sites identified in the call for sites process. However, issues have been identified by Thames Water in reservoir storage and bulk transfer, which may require addressing should this water resource zone experience a high level of growth. This would be addressed as part of the Pricing Review process, and no significant constraints have been identified. For this reason, an “amber” rating has been applied to this water resource zone.

**Kennet WRZ** – A water surplus is shown in the WRMP until 2070-75, and Thames Water have confirmed that there is available water to supply all of the sites identified in the call for sites process. However, as in the Henley WRZ, issues have been identified by Thames Water in reservoir storage and bulk transfer, which may require addressing should this water resource zone experience a high level of growth. This would be addressed as part of the Pricing Review process, and no significant constraints have been identified. For this reason, an “amber” rating has been applied to this water resource zone.

**WRZ04** – A water surplus is shown in the WRMP until 2050, and South East Water have confirmed that there is sufficient water to supply all of Wokingham Borough's housing need within this zone. No issues in reservoir storage or bulk transfer were identified by South East Water.

**As there is a water surplus predicted across all three water resource zones until 2050, and there is sufficient time to adjust the long-term plan to include emerging trends in population, no further assessment of water resources is required in a phase two outline study.**

### **Water supply infrastructure**

Thames Water and South East Water were provided with the potential development sites identified in the call for sites process.

Thames Water applied a Red / Amber / Green (RAG) assessment to each site based on its size. Sites less than 50 homes would not require a development impact assessment and so were given a “green” rating. Sites between 50 and 250 homes MAY require a development impact assessment, and some network reinforcement may be required. Sites with more than 250 homes WILL require a development impact assessment and network reinforcement is likely to be required in order to accommodate this growth.

South East Water made an assessment based on both the size of the site and known network constraints. Significant network reinforcement may be required in order to serve the developments between the A329(M) (east of the junction), and to the south of Wokingham.

**Early developer engagement with SEW and TW is essential to ensure that, where necessary, network reinforcement is delivered prior to developments becoming occupied. Further modelling of the water supply network is required once a preferred options list is defined. This could be conducted as part of a phase two WCS.**

### **Wastewater collection infrastructure**

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

Due to the large number of sites identified in the call for sites process, a detailed site by site assessment of the wastewater network was not practical. Growth in Wokingham was therefore assessed at the sewerage catchment level with a RAG score applied to each catchment based on current headroom.

Sites smaller than 50 homes, that were within a catchment assessed as being of very low or low concern were given a “green” score. Sites larger than 50 homes were given an amber score on the basis that some network improvements are likely to be required in order to accommodate growth.

Areas with the least capacity include the north east and west of Woodley CP, Wargrave, Twyford south of the railway line, Hurst, northern Winnersh CP, Three Mile Cross, Arborfield, the western part of Finchampstead CP, and Riseley.

Areas with the most capacity include central Woodley, and Early, Wokingham and Barkham.

**Further modelling of the wastewater network may be required once a preferred options list is defined. This could be conducted as part of a phase two WCS.**

### **Wastewater treatment capacity**

Flow permit assessments were carried out at all of the WwTW that are expected to serve growth in the Local Plan period. Bracknell, Reading, and Sandhurst WwTWs have sufficient capacity to serve all of the sites identified in those catchments in the call for sites process. Easthampstead Park has capacity but is very close to its DWF permit limit and could exceed this should additional sites be identified. Wargrave WwTW can accommodate up to 80% of the sites identified but would exceed its permit level should growth exceed this. Arborfield WwTW has the capacity to accommodate the 20% growth scenario, but growth above this level would require an increase to the DWF permit and a capacity upgrade. No upgrades have been included in Thames Water’s plan in the timescale 2020-25 and so this could be a constraint to growth in the 100% and 120% growth scenarios.

**No further assessment of wastewater treatment infrastructure is required as part of a phase 2 study; however, the flow permit assessment should be re-visited once a preferred options list of sites is defined.**

## Water quality

The increased wastewater discharges at the WwTWs serving growth in Wokingham have the potential to impact downstream water quality in the receiving watercourses.

In the case of Bracknell, Easthampstead Park and Sandhurst WwTWs an assessment has been completed as part of the Bracknell Forest Phase 2 WCS (2018) and concluded that the proposed growth could be accommodated with a tighter permit and treatment at the Technically Achievable Limit. This level of growth assessed was comparable or higher than currently forecast so this assessment does not need to be repeated. For Easthampstead Park and Sandhurst WwTWs they would be included in a catchment scale model of the River Loddon.

Detailed water quality modelling has not been conducted at Arborfield or Wargrave, and the level of growth currently forecast at Reading and Ash Ridge WwTW has not been assessed. A water quality assessment is therefore required at these WwTW.

**Further assessment of water quality from increased wastewater discharges at Arborfield, Ash Ridge, Reading and Wargrave WwTW should be undertaken as part of a Phase 2 Water Cycle Study.**

## Flood risk from additional foul flow

A detailed assessment of flood risk can be found in the Wokingham Borough Council Level 1 Strategic Flood Risk Assessment (SFRA). The impact of increased discharges of treated wastewater effluent flows due to planned growth was quantified and is not predicted to have a significant impact on flood risk in any of the receiving watercourses.

**No further assessment is recommended in a phase 2 WCS.**

## Odour from WwTW

36 sites are close enough to a WwTW that a further odour assessment is recommended as part of the planning process. The cost of this should be met by the developer.

**No further assessment of odour is recommended in a phase 2 WCS. Any future assessment should be carried out as part of the planning process.**

## Environmental constraints

A number of SSSIs exist within Wokingham Borough, and there is a possibility of point source pollution (from WwTW) or diffuse pollution (for example from surface runoff from development) to impact these sites. Opportunities exist to mitigate this through implementation of SuDS schemes to manage surface runoff.

**The impact of WwTW on water quality should be assessed in a Phase 2 Study.**

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## Abbreviations

ALS	Abstraction Licensing Strategy
AMP	Asset Management Plan
AMR	Automatic Meter Reading
AONB	Area of Outstanding Natural Beauty
AP	Assessment Point
ASNW	Ancient Semi-Natural Woodland
BIDS	Business, Industrial, Distribution and Storage
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
DCLG	Department of Communities and Local Government (Replaced by MHCLG)
DWF	Dry Weather Flow
DWI	Drinking Water Inspectorate
DYAA	Dry Year Annual Average
DYCP	Dry Year Critical Period
EA	Environment Agency
EC	European Community
ECA	European Communities Act
EDNA	Economic Development Needs Assessment
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
GES	Good Ecological Status
GIS	Geographic Information Systems
HOF	Hands-Off Flow
HOL	Hands-off Level
IDB	Internal Drainage Board
IDP	Infrastructure Delivery Plan
JBA	Jeremy Benn Associates
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
LPU	Local Plan Update



l/p/d	Litres per person per day
MI/d	Mega (Million) litres per day
MHCLG	Ministry of Housing Communities and Local Government
NE	Natural England
NH <sub>4</sub>	Ammonia
NPPF	National Planning Policy Framework
NYAA	Normal Year Average Annual
OAN	Objectively Assessed Need
OfWAT	Water Service Regulation Authority
ONS	Office of National Statistics
OPEX	Operational Expenditure
OS	Ordnance Survey
P	Phosphorous
PDL	Previously Developed Land
PE	Population Equivalent
p/h	Person per house
PPS	Planning Policy Statement
RAG	Red / Amber / Green assessment
RBD	River Basin District
RBMP	River Basin Management Plan
ReFH	Revitalised Flood Hydrograph
RNAG	Reason for Not Achieving Good (Status)
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
SEPA	Scottish Environmental Protection Agency
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
SU	Sewerage Undertaker
SW	Southern Water
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan

TCAMS	Thames Catchment Abstraction Management Strategy
TW	Thames Water
uFMfSW	Updated Flood Map for Surface Water
UWWTD	Urban Waste Water Treatment Directive
WaSC	Water and Sewerage Company
WBC	Wokingham Borough Council
WCS	Water Cycle Study
WFD	Water Framework Directive
WRMP	Water Resource Management Plan
WRZ	Water Resource Zone
WQA	Water Quality Assessment
WSZ	Water Supply Zone
WTW	Water Treatment Works
WwTW	Wastewater Treatment Works

## 1. Introduction

### 1.1 Terms of Reference

JBA Consulting was commissioned by Wokingham Borough Council to undertake a Water Cycle Study (WCS) for Wokingham borough to inform the Local Plan. The purpose of the WCS is to form part of a comprehensive and robust evidence base for the Local Plan which will set out a vision and framework for development in the area up to 2036 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 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<sup>1</sup> 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<sup>2</sup> recommends a phased approach:

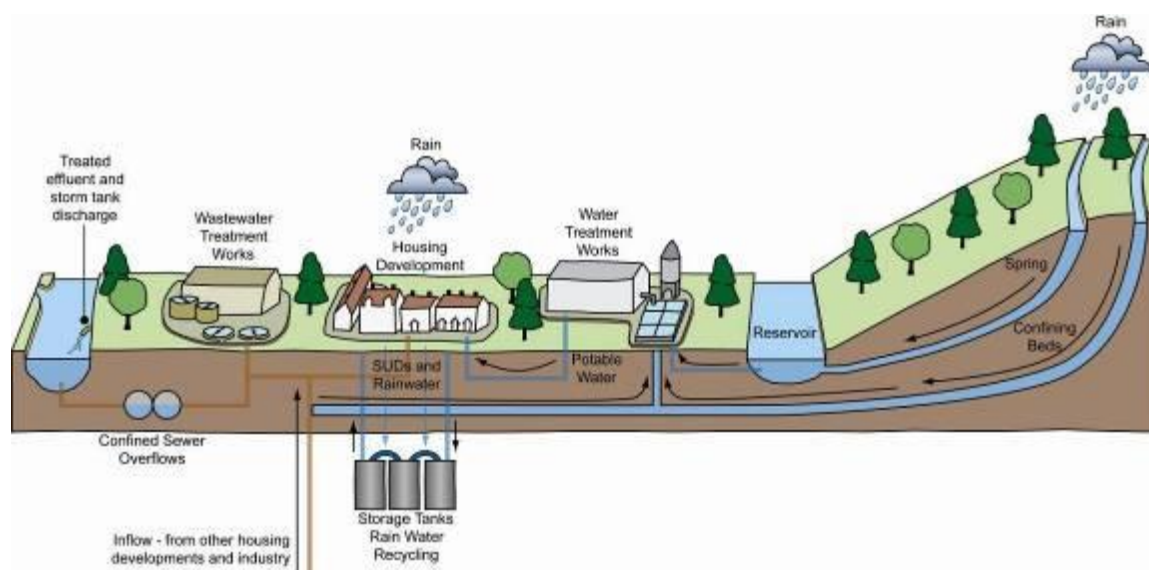
- Phase 1: Scoping study, focussing on formation of a steering group, identifying issues for consideration and the need for an outline study.
- Phase 2: Outline study, to identify environmental constraints, infrastructure constraints, a sustainability assessment and consideration of whether a detailed 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.

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1 Planning Practice Guidance: Water supply, wastewater and water quality, Department for Communities and Local Government (2014). Accessed online at: <http://planningguidance.planningportal.gov.uk/blog/guidance/> on: 09/06/2018

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: 09/06/2018



**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

As a WCS is not a statutory instrument, Local Planning Authorities are advised to prioritise the different stages of the WCS to integrate with their Local Plan programme. This scoping report is written to support the development of the Local Plan Update (LPU) and to identify whether an outline / detailed WCS is required. Specific requirements, specified by the project brief, were to:

- Provide a scoping report, taking into account guidance in the NPPF, NPPG, The Water Framework Directive, The Thames River Basin Management Plan and the EA Water Cycle Study Requirements and Guidance – Thames Area (September 2016);
- Produce an effective water cycle study in the context of the scoping stage so that:
  - New development takes place only within environmental constraints;
  - New development occurs in the most sustainable location, in relation to the water environment;
  - Water cycle infrastructure is in place before new development is occupied and;
  - Opportunities for more sustainable infrastructure options are realised.
- Quantify growth within the study area
- Include the outcomes of stakeholder engagement within the scoping study;

- Gather, assess and use existing data and evidence available, in order to prepare the scoping report and address specific questions;
- Determine any gaps in knowledge/evidence;
- Identify any environmental and major infrastructure constraints;
- Where relevant, cross reference with the replacement Strategic Flood Risk Assessment currently being prepared and its outcomes;
- Identification of the issues and questions to be considered with regards to water resources and water quality;
- Establish whether an outline study is required and define its required scope.

## 1.5 Study Area

This WCS scoping report has been written for Wokingham Borough Council. This Local Authority area covers 178km<sup>2</sup> and includes the settlements of Wokingham, Woodley, Earley and Twyford and has a population of approximately 65,000.

The area is located within the River Thames catchment, and contains the River Blackwater and River Loddon; significant tributaries to the Thames.

Water supply services are provided by Thames Water in the West and South East Water in the east. Wastewater services are provided by Thames Water.

## 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	WBC Thames Water Environment Agency (could not attend inception meeting but were contacted for data collection)
Details	Scope of works and data collection requirements reviewed.



### Neighbouring authorities

Engaged Parties	<p>Wokingham Borough Council</p> <p>Basingstoke and Deane District Council</p> <p>Bracknell District Council</p> <p>Hart District Council</p> <p>Reading Borough Council</p> <p>South Oxfordshire District Council</p> <p>West Berkshire District Council</p> <p>Windsor and Maidenhead Borough Council</p> <p>Wycombe District Council</p>
Details	Request for water cycle studies conducted in their area, and housing growth that would be served by WwTW within or shared with WBC.

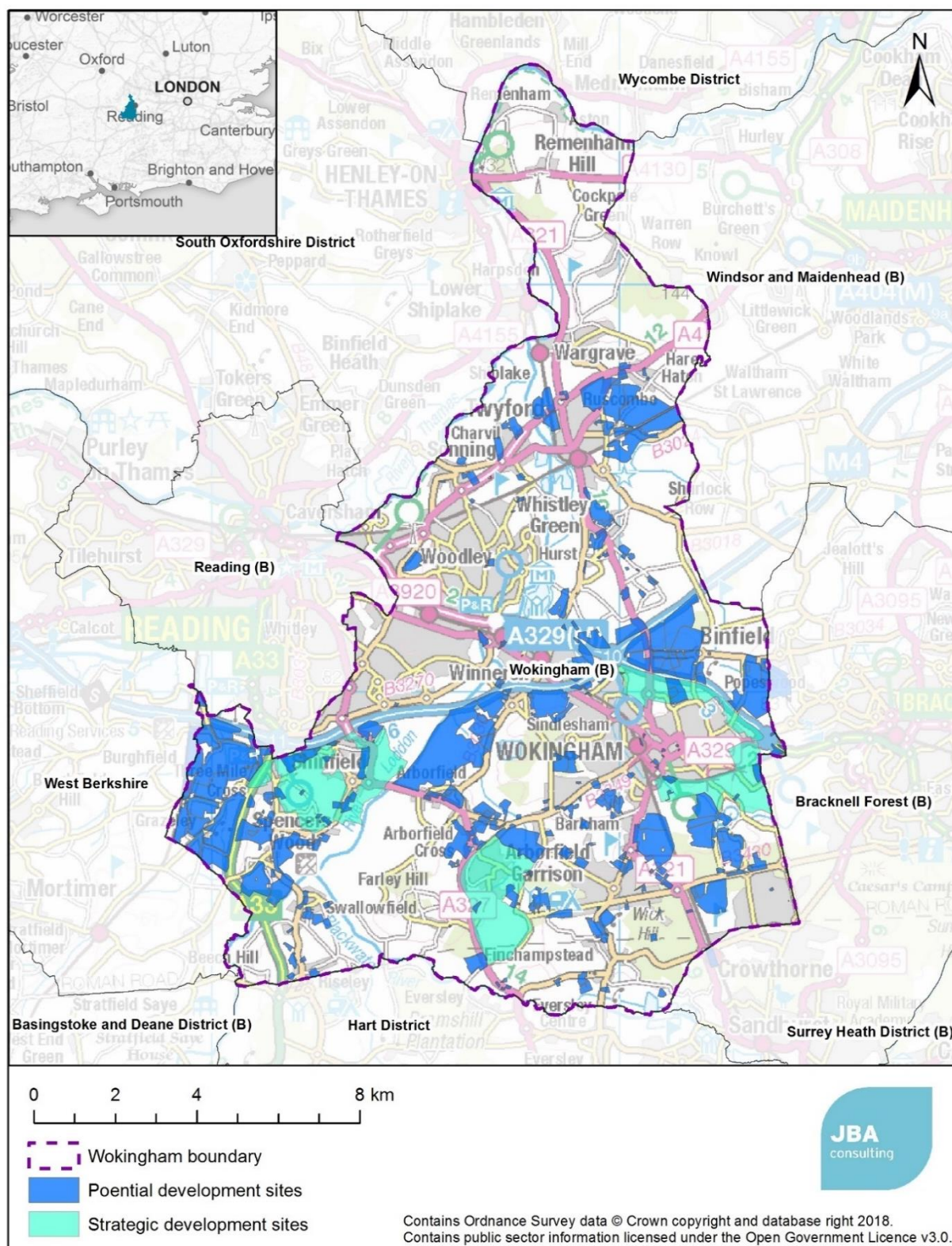
### Collaboration with Water Companies

Engaged Parties	<p>Thames Water</p> <p>South East Water</p>
Details	Water company assessments of water and wastewater infrastructure and capacity constraints.

## 2. Future Growth in Wokingham

### 2.1 Wokingham Borough Council

Figure 2.1 shows the location of development sites under consideration within the Wokingham Borough Council boundary.



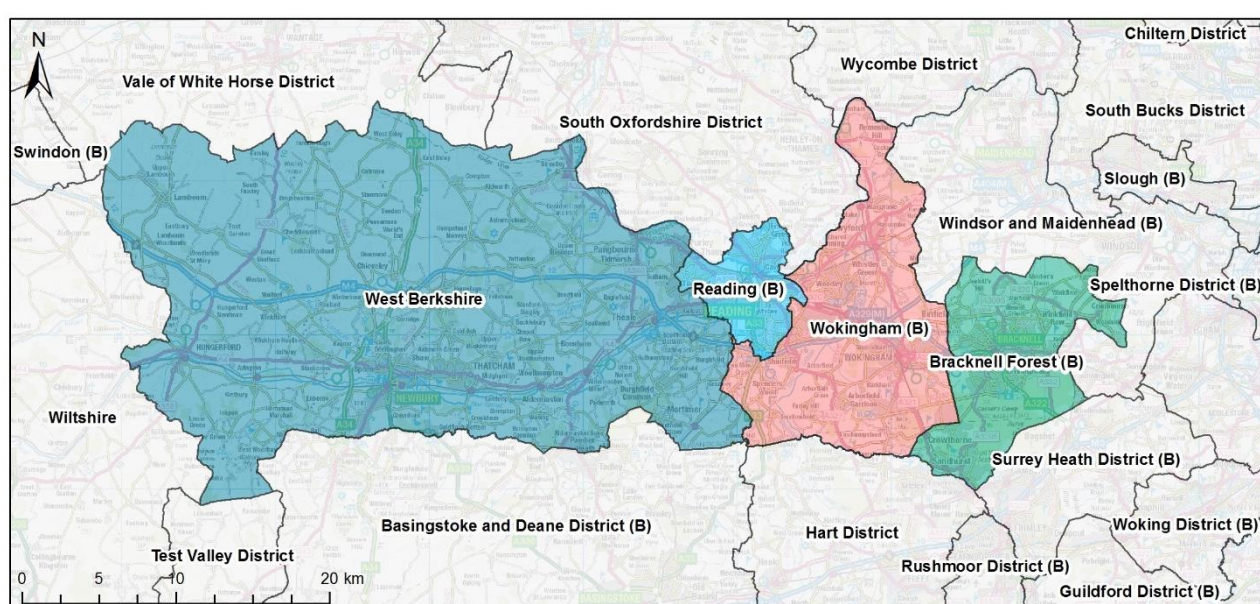
**Figure 2.1 Map of the water cycle study area**



## 2.2 Growth in Wokingham

Wokingham Borough is subject to growth pressures for new development, specifically relating to housing. The western area of Berkshire has been identified in the Berkshire (including South Bucks) Strategic Housing Market Assessment (SHMA)<sup>3</sup> as a “distinct and functioning” housing market area. The West of Berkshire Spatial Planning Framework (2016) has since been produced as a result of collaborative work by the four constituent local authorities on how to meet their future housing needs:

- Bracknell Forest Council
- Reading Borough Council
- West Berkshire Council
- Wokingham Borough Council



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**Figure 2.2 Berkshire Strategic Housing Market Area**

The SHMA (2016) noted that between 2013 and 2036 the area needs to deliver in the region of 65,665<sup>4</sup> new dwellings to tackle population growth, affordability, market factors, sustaining and improving economic growth and the continued growth from London. To achieve this requires just under 3000 homes to be built every year. The housing need for Wokingham Borough was therefore set at 856 dwellings per annum (dpa).

Since the publication of the SHMA (2016), planning appeal Inspectors preferred a higher affordability adjustment than that used in the SHMA study, resulting in a housing need of between 862 and 894 dwellings per annum.

However, the publication of the revised National Planning Policy Framework (2018) confirmed the government’s commitment to using a standardised methodology to calculate housing need for each authority. When applying the 2016 based household

3 Berkshire (including South Bucks) Strategic Housing Market Assessment, GL Hearn (2016). Accessed online at: <http://info.westberks.gov.uk/CHttpHandler.ashx?id=40949&p=0> on: 29/10/2018

4 West of Berkshire Spatial Planning Framework (2016), Accessed online at: <https://info.westberks.gov.uk/CHttpHandler.ashx?id=44630&p=0> on: 29/10/2018

projections released by the ONS in September 2018, the local housing need for the borough is reduced to 752 dpa.

In response, in October 2018 the Ministry for Housing, Communities and Local Government released a technical consultation, proposing that 2014 based data will be used to provide the demographic baseline for assessment of local housing need. In this case the housing need for Wokingham would be 864 dpa. These changes are subject to government announcements in 2019, and as such a cautious approach has been taken, with the higher housing need figure of 894 dpa used in this study.

### **2.3 Components of development forecast**

For the purpose of the assessments within the water cycle study, a baseline growth forecast is defined for development in Wokingham over the Local Plan period. This forecast is made up of the following components:

- Initial site assessment (that will inform the Housing and Economic Land Availability Assessment) (HELAA)
- Strategic development sites
- Commitments (development sites already in the planning system, but not yet built)
- Windfall
- Development from outside the Wokingham boundary, but served by infrastructure within or shared with Wokingham

These have been collated into an overall forecast contained in Appendix A.

## 2.4 Housing

### 2.4.1 HELAA

The Wokingham Borough Council Housing and Economic Land Availability Assessment (HELAA) is an important piece of evidence in preparing local plans and identifies possible sites for future housing and economic development. It also contains an assessment of development potential, suitability, likelihood and timing of development. It does not determine whether a site should be allocated; this decision remains part of the local planning process. The HELAA is still being prepared by the Council, but initial considerations have helped to inform this study.

The first stage in the HELAA process is to identify sites for further assessment, and a “call for sites” has taken place. 293 potential sites were identified, and site assessments are under way. Further sites continue to be promoted, with this evidence based on a specific point in time.

Not all of the sites identified will be taken forward in the local plan process, and until the detailed site assessments are completed, it is not certain which sites will be adopted, and how growth will be distributed throughout the Borough. For the purpose of this study, different levels of growth in each waste water catchment were analysed by adjusting the number of houses / employment floorspace on each site according to the following percentages:

- 20%
- 40%
- 60%
- 80%
- 100%
- 120%

As an example, if there were 10 sites identified in a particular wastewater catchment, each with the potential for 100 houses, the total number of houses in the catchment was 1000, this is the 100% growth scenario.

In the case where less sites in that catchment are adopted, or the adopted sites are smaller than expected, lower overall growth in that catchment was simulated by taking 20%, 40%, 60% and 80% of the total for each site, giving a catchment total of 200, 400, 600 and 800 houses respectively.

By way of comparison, if growth was distributed uniformly across the Borough, the 20% growth scenario would provide sufficient houses to meet cautious approach to housing need used in this study of 894dpa. A more realistic scenario would see some concentration of growth, and a higher growth scenario would therefore apply in certain catchments.

A further scenario was analysed where more sites than have previously been identified are adopted, or densification of the sites occurs resulting in a higher level of growth than anticipated. In this scenario 120% of the total for each site will be assumed and the catchment total would therefore be 1200 houses.

A similar approach was taken with economic sites, with the number of employees varied by a percentage. These variations were applied to the overall wastewater demand for each catchment.

Three initial sites were identified that are larger and more complex, and these have been subject to a masterplanning exercise by consultants David Lock Associates and Peter Brett Associates. The three sites are:



- Land around Grazeley (5SH029, 040, 041)
- Land at Barkham Square (5BA010)
- Land to the east of Twyford (5RU001 – 006)

A further two large areas were identified that have also been considered by the consultants:

- Hall Farm (close to Arborfield) (5AR015)
- Ashridge (between the M4 and A329(M)) (5HU009 – 0015, 020-023, 041)

As site assessments have not been completed and there is limited information on the deliverability of individual sites, the build out rates of each site were spread evenly across the local plan period, from a start year to 2036. For example, a site with a capacity of 45 homes was assumed to deliver 3 per year over the 15 years to 2036. For small sites development was assumed to complete earlier in the plan period, for larger sites the build out rate was capped at 200 per year and the build period was allowed to extend beyond 2036. Whilst this is unrealistic at an individual site level, it allows a calculation of a notional trajectory which can be adjusted for different levels of growth in different regions within the study area.

#### 2.4.2 Strategic development sites

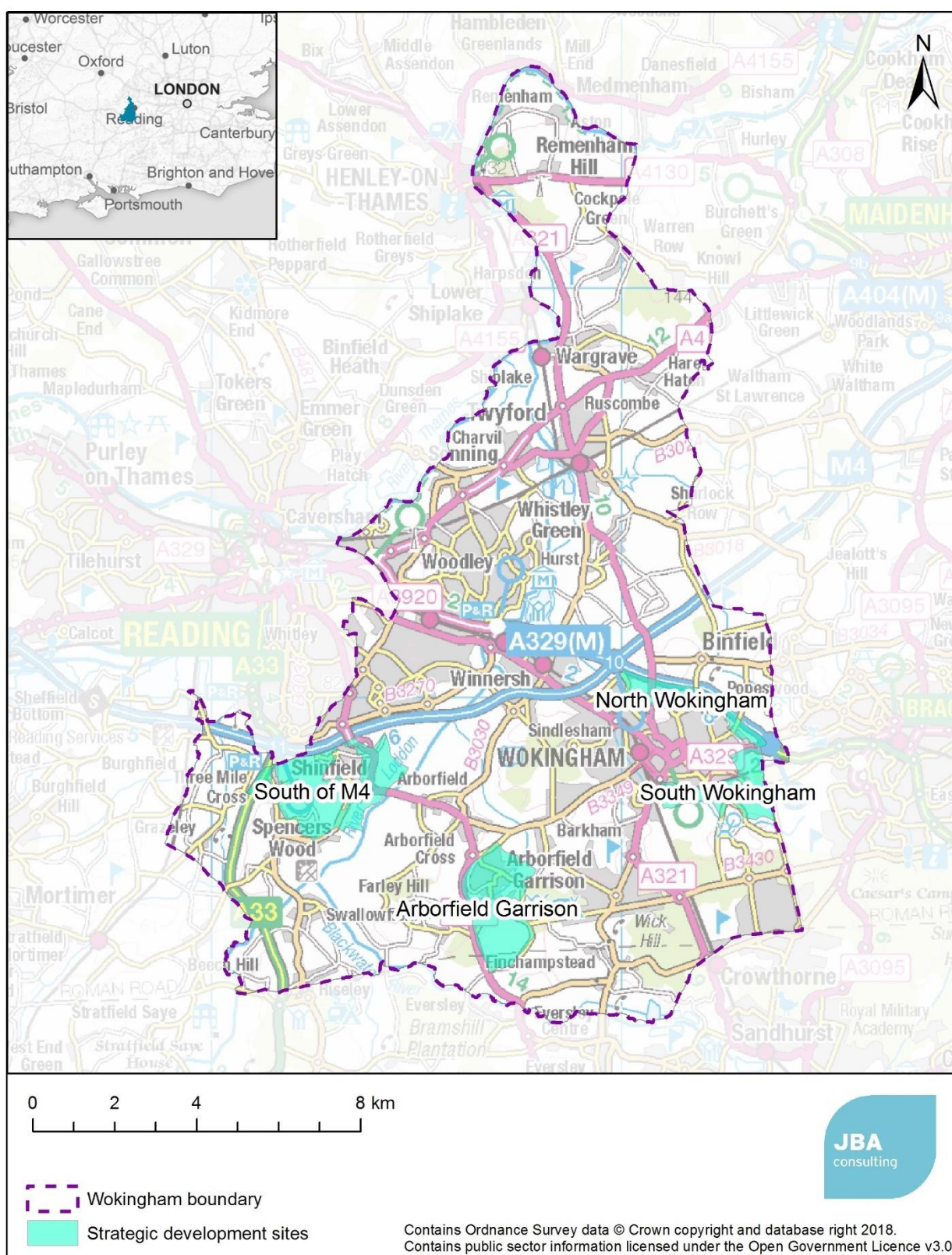
The Core Strategy (2010) sets out the council's current development strategy up to 2026 and allocated four Strategic Development Locations (SDLs). The majority of Wokingham's housing need in the next ten years will be supplied by these SDLs:

- Arborfield Garrison
- Land south of the M4 (Shinfield Parish)
- North Wokingham
- South Wokingham

Work is underway on these sites and they are expected to accommodate a total of 10,000 homes by 2026.<sup>5</sup> The location of these sites is shown in Figure 2.3 below.

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<sup>5</sup> Further information on the progress of these sites is available from: <http://www.wokingham.gov.uk/major-developments/overview-of-major-developments/>  
2018s0545 Wokingham WCS Phase 1 v4.0



**Figure 2.3 Location of strategic development sites**

### 2.4.3 5-year land supply

The National Planning Policy Framework (NPPF) requires local authorities to identify and update annually a supply of deliverable sites sufficient to provide five years' worth

of housing against their housing requirement. The latest update of was published on 9<sup>th</sup> October 2018 that takes into account data up to 31<sup>st</sup> March 2018.<sup>6</sup> This Statement was republished to take into account the government's introduction of the standardised methodology for calculating housing need alongside the revised NPPF in July 2018. Sites identified in this document may already be in the planning system so do not appear in the HELAA but have not yet been completed so are not taken into account in the current water demand.

On the Site Tracker spreadsheet, they have each been allocated to a WwTW based on the site address and proximity to existing housing.

#### 2.4.4 **Windfall**

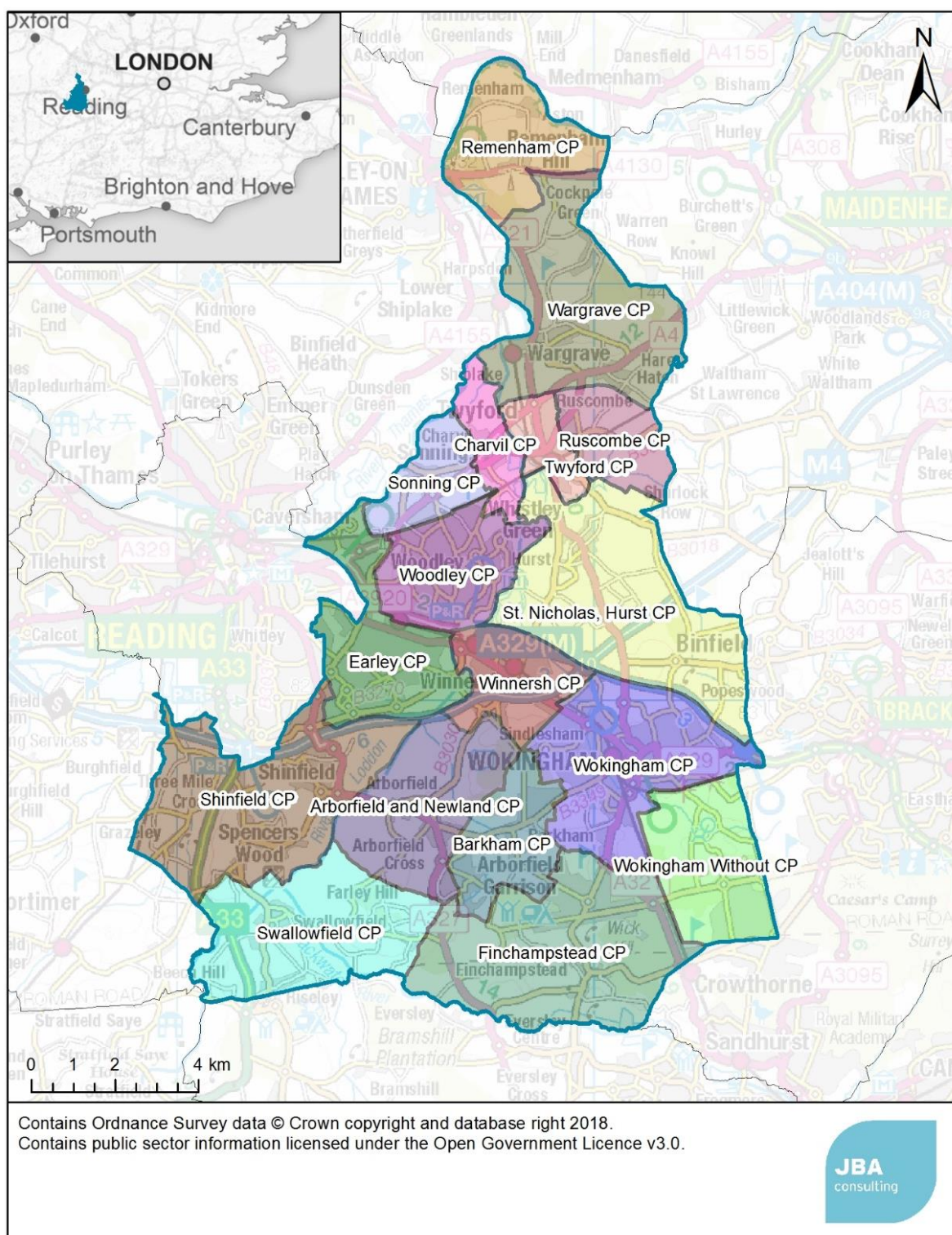
Windfall sites are sites that have not been specifically identified in the Local Plan. They normally comprise previously developed sites that have unexpectedly become available.

Figure 2.4 shows the location of Parishes in the borough. Table 2.1 then shows completions on small previously developed sites broken down by parish.

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<sup>6</sup> Five Year Housing Land Supply Statement (2018) available at:  
<http://www.wokingham.gov.uk/EasySiteWeb/GatewayLink.aspx?allId=4632072018s0545> Wokingham WCS Phase 1 v4.0





**Figure 2.4 Parishes within Wokingham**

**Table 2.1 Completions (net) on small PDL sites by Parish**

Parish	Year	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	Total
Arborfield and Newland		0	1	0	1	1	0	1	0	0	0	0	4
Barkham		1	0	0	1	0	0	2	2	0	1	0	7
Charvil		-1	4	-2	2	1	0	1	0	-1	2	0	6
Earley		7	14	16	1	6	3	2	26	6	0	2	83
Finchampstead		7	-6	7	7	1	1	2	8	-2	9	-3	31
Remenham		1	0	0	-7	0	0	0	-2	3	3	0	-2
Ruscombe		-1	3	-2	3	3	0	-1	1	0	0	-1	5
Shinfield		4	4	0	0	2	2	-1	11	11	6	15	54
Sonning		3	-6	0	4	1	0	2	4	3	0	-1	10
St. Nicholas Hurst		0	3	0	-3	0	2	3	2	-1	-3	1	4
Swallowfield		1	0	0	0	1	3	-3	2	5	-3	0	6
Twyford		4	9	2	5	3	2	0	0	0	2	2	29
Wargrave		1	0	1	4	4	4	0	-1	2	4	0	19
Winnersh		17	13	9	-1	10	0	7	-3	1	14	0	67
Wokingham		48	10	3	7	15	20	13	33	36	12	28	225
Wokingham Without		1	0	-2	1	0	-2	2	1	1	0	4	6
Woodley		11	0	7	2	2	7	2	-2	4	14	5	52
<b>Total</b>		<b>104</b>	<b>49</b>	<b>39</b>	<b>27</b>	<b>50</b>	<b>42</b>	<b>32</b>	<b>82</b>	<b>68</b>	<b>61</b>	<b>52</b>	<b>606</b>

Source: Wokingham Borough Council, 5 Year Housing Land Supply Statement (October 2018)

The windfall allowance for this study was based on the 5-year Housing Land Supply Statement which contains a windfall allowance of 60 per year for small sites and 32 for large sites. This gives a total windfall of 92 dwellings per year.

This was allocated to wastewater treatment works (Table 2.2) within Wokingham based on the percentage of growth within each catchment outlined in Table 2.1.

**Table 2.2 Allocation of windfall by WwTW**

WwTW	Housing units per year
Arborfield	8
Reading	9
Wargrave	64
Wokingham (Ash Ridge)	11



## 2.5 Growth from outside Wokingham Borough

Where growth within a neighbouring Local Planning Authority (LPA) area may be served by infrastructure within or shared with Wokingham, the LPA were contacted as part of a duty to cooperate request to provide information on:

- Any Water Cycle Study completed in the authority's area
- The latest growth forecast (housing and employment) for the district
- Details of future growth within the catchments of WwTW which serve part of their council area and Wokingham.
- Details of future growth within the catchments of WwTW which do not serve Wokingham, but discharge to a watercourse that will be a modelled if a catchment-based approach to assessing water quality is chosen.

### 2.5.1 Basingstoke and Deane Borough Council

Basingstoke and Deane completed a Phase 2 Water Cycle Study in 2009, which was used as part of the evidence base for their adopted Local Plan (2011-2029). It made the assumption that all foul flow from development would be sent to Basingstoke WwTW. This is summarised in Table 2.3. Whilst Basingstoke WwTW does not serve any growth within Wokingham, it discharges to the River Loddon which subsequently flows through the study area and has Arborfield, Ash Ridge and Wargrave WwTW within its catchment. It is therefore important to understand growth served by Basingstoke WwTW in order to allow water quality within Wokingham to be adequately assessed.

**Table 2.3 Growth in Basingstoke and Deane**

WwTW	Housing (units)		Employment (m2 or employees)		Notes (e.g. any additional information such as the trajectory, the type of employment space etc).
	Expected housing growth 2011-2033	Allocated (reg. 18 or reg. 19)	Committed	Allocated (reg. 18 or reg. 19)	
<b>Basingstoke</b>	12,345 *	0 (or 5,950)**	0 ***	0	The Basingstoke and Deane Water Cycle Study assumed that all additional foul from all new development would be sent to Basingstoke WwTW.
<b>Sherfield-on-Loddon</b>	-	-	-	-	Whilst there are likely to be additional dwellings in this catchment, the number of units will be minimal.
<b>Sherborne St John</b>	-	-	-	-	Whilst there are likely to be additional dwellings in this catchment, the number of units will be minimal.

\* The Council's adopted Local Plan covers the time frame 2011-2029. This figure represents the remaining number of dwellings as at 1 April 2018 which have not yet been built. 6,000 of the 12,345 have already been granted planning permission.

\*\*As the Local Plan was only adopted in 2016 the Council is yet to commence a review. To estimate the number of units from 2029 to 2036 a reasonable approach would be to use the annual requirement of 850 dwellings (totalling 5,950 dwellings). It would

also be sensible to assume that all of the dwellings would be within the Basingstoke WWTW.

\*\*\* The Economic Needs Assessment identifies only a very minor requirement for 4ha of industrial land, and 18ha of storage and distribution land up to 2029.

Basingstoke and Deane provided some further comments regarding water quality in the River Loddon:

*"Of key concern to the council is the capacity of the River Loddon to accommodate future growth which is potentially a significant constraint to development as set out in the Basingstoke Water Cycle Study. There is limited capacity at the Basingstoke Sewage Treatment Works and there are significant problems with phosphorus levels in the Loddon. In response solutions to handling waste water, such as use of different types of SUDS within developments seeks to address concerns about the future impact of increased sewage on the quality of the Loddon catchment and the adopted Basingstoke and Deane Local Plan includes a policy (EM6) which requires ongoing monitoring and reporting of the status of the water environment and a policy approach to intervention should deterioration occur. "*

### 2.5.2 Bracknell Forest Council

JBA Consulting prepared the WCS for Bracknell Forest Council, who have confirmed that the growth forecasts that formed part of the Phase 2 (Outline) Study were appropriate to use in this study. Forecast housing growth for each WwTW shared with Wokingham is summarised in Table 2.4. It should be noted that these figures are the total number of houses within each WwTW catchment should all the sites identified be adopted. It therefore represents a worse-case scenario for wastewater demand.

**Table 2.4 Summary of growth in BFC served by infrastructure within or shared with Wokingham**

WwTW	Housing units
Bracknell	6,452
Easthampstead Park	104
Sandhurst	1,228

Source: Bracknell Forest Water Cycle Study (2018)

### 2.5.3 Hart District Council

Hart District Council carried out a Water Cycle Study in 2017 alongside Rushmoor and Surrey Heath<sup>7</sup> local authorities. This document provides a WwTW headroom capacity assessment consisting of a housing growth forecast broken down by WwTW catchment (Table 2.5). They commented that the data in the WCS remains broadly in line with expected future development as a result of the emerging Local Plan.

**Table 2.5 Summary of growth in Hart District served by infrastructure within or shared with Wokingham**

WwTW	Housing units
Sandhurst	200
Wargrave	50

Employment growth figures are shown for the whole study area, so it is not possible to ascertain to which WwTW such development areas would connect.

<sup>7</sup> Water Cycle Study, Hart District Council (2017). Accessed online at:

[https://www.hart.gov.uk/sites/default/files/4\\_The\\_Council/Policies\\_and\\_published\\_documents/Planning\\_policy/Hart\\_Rushmoor\\_SurreyHeath\\_WCS.pdf](https://www.hart.gov.uk/sites/default/files/4_The_Council/Policies_and_published_documents/Planning_policy/Hart_Rushmoor_SurreyHeath_WCS.pdf) on: 21/08/2018

#### 2.5.4 Reading Borough Council

Reading Borough Council's response to the request for information quoted a net increase of 112,000m<sup>2</sup> of office floor space and 148,000m<sup>2</sup> of industrial / warehouse floorspace. For housing growth, a link to the Water Quality Assessment<sup>8</sup> published in 2018 for Reading WwTW was used. This outlines housing growth during the Reading Local Plan period of 671 per year, all of which would be served by Reading WwTW.

#### 2.5.5 South Oxfordshire District Council (SODC)

The South Oxfordshire Local Plan 2011-2033 (October 2017) identifies a housing need of 20,800 during the plan period, including 3,750 homes to meet Oxford City's unmet need. A requirement of 35.9ha of employment land was also identified.

The SODC Water Cycle Study<sup>9</sup> identified a small number of houses that would be served by infrastructure shared with Wokingham (summarised in Table 2.6).

**Table 2.6 Summary of growth in SODC served by infrastructure within or shared with Wokingham**

WwTW	Housing (units)	Employment (m <sup>2</sup> or employees)		Notes (e.g. any additional information such as the trajectory, the type of employment space etc).
	Expected housing growth 2011-2033	Committed	Allocated (reg. 18 or reg. 19)	
Reading	6	Not identified	Not identified	**Comment from SODC below
Wargrave	26	Not identified	Not identified	

*\*\*The South Oxfordshire Local Plan 2011-2033 Final Publication Version (October 2017) did not proposed any strategic allocations within these WwTW catchment areas. However, it should be noted that the council has since decided to review the strategic allocations. The sites now under consideration as potential strategic allocations in a Revised Publication Version Local Plans include sites at the edge of Reading. This site assessment process is currently in progress and it is too early to say whether or not these potential allocations may be taken forward.*

#### 2.5.6 Other Neighbouring Authorities

Growth within Wycombe District Council and Royal Borough of Windsor and Maidenhead is not likely to be served by WwTW within Wokingham, and wastewater infrastructure within these two local authority areas is unlikely to be shared with Wokingham. For this reason, they were not contacted for information during this study.

8 Water Quality Assessment, Reading Borough Council (2018). Accessed online at: [http://www.reading.gov.uk/media/8689/EV029-Water-Quality-Assessment-March-2018/pdf/EV029\\_Water\\_Quality\\_Assessment\\_March\\_2018.pdf](http://www.reading.gov.uk/media/8689/EV029-Water-Quality-Assessment-March-2018/pdf/EV029_Water_Quality_Assessment_March_2018.pdf) on: 21/08/2018

9 SODC Water Cycle Study, JBA Consulting (2018). Accessed online at:

[http://www.southoxon.gov.uk/ccm/support/dynamic\\_serve.jsp?ID=833941142&CODE=B06F1BD3F3F62FFAA9EDE3C0FBF94484](http://www.southoxon.gov.uk/ccm/support/dynamic_serve.jsp?ID=833941142&CODE=B06F1BD3F3F62FFAA9EDE3C0FBF94484) on: 21/08/2018

## 2.6 Employment Land

### 2.6.1 Economic Needs Assessment

Wokingham forms part of the Central Berkshire Functional Economic Market Area (FEMA) along with Bracknell Forest, Reading and Windsor and Maidenhead. The Economic Needs Assessment (EDNA)<sup>10</sup> for this area was updated in October 2016 and summarises the forecast economic growth in the FEMA over the period 2013-2036 and its resultant requirement for land.

Three different growth scenarios were analysed in the EDNA, labour demand (derived from economic forecasts produced by Cambridge Econometrics), past trends in completions of employment space, and labour supply based on population projections for Central Berkshire. After allowing for a safety margin, and taking into account the replacement of floorspace losses, the requirement for land is presented in Table 2.7.

**Table 2.7 Forecast change in employment land requirements (2013-2036)**

Scenario	Baseline labour demand (ha)	Past completion rates (ha)	Labour supply (ha)
Offices (B1a/B1b)	29.1	22.0	30.9
Industrial (B1c/B2/B8)	28.0	18.4	33.0
<b>Total B Class land</b>	<b>57.1</b>	<b>40.4</b>	<b>63.9</b>

*Source: Central Berkshire EDNA 2016*

The council is in the process of preparing additional employment evidence to support the Local Plan Update.

<sup>10</sup> Economic Development Needs Assessment, Nathaniel Lichfield & Partners (2016). Accessed online at: <http://www.wokingham.gov.uk/planning/planning-policy/evidence-topics/> on: 02/07/2018  
2018s0545 Wokingham WCS Phase 1 v4.0



### 3. Legislative and Policy Framework

#### 3.1 Introduction

The following sections introduce several national, regional and local policies that must be considered by the LPAs, water companies and developers during the planning stage. Key extracts from these policies relating to water consumption targets and mitigating the impacts on the water from the new development are summarised below.

#### 3.2 National Policy

##### 3.2.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF)<sup>11</sup> 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<sup>12</sup>. The NPPF provides guidance to planning authorities to take account of flood risk, 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. This has not yet been updated to take account of the 2018 update 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<sup>13</sup>

11 National Planning Policy Framework, Department for Communities and Local Government (2012)

12 National Planning Policy Framework, Ministry of Housing, Communities and Local Government (2018)

13 Planning Practice Guidance: Flood Risk and Coastal Change, Department for Communities and Local Government

- Water Supply, Wastewater and Water Quality<sup>14</sup>.
- Housing - Optional Technical Standards<sup>15</sup>.

### 3.2.2 **Planning Practice Guidance: Flood Risk and Coastal Change**

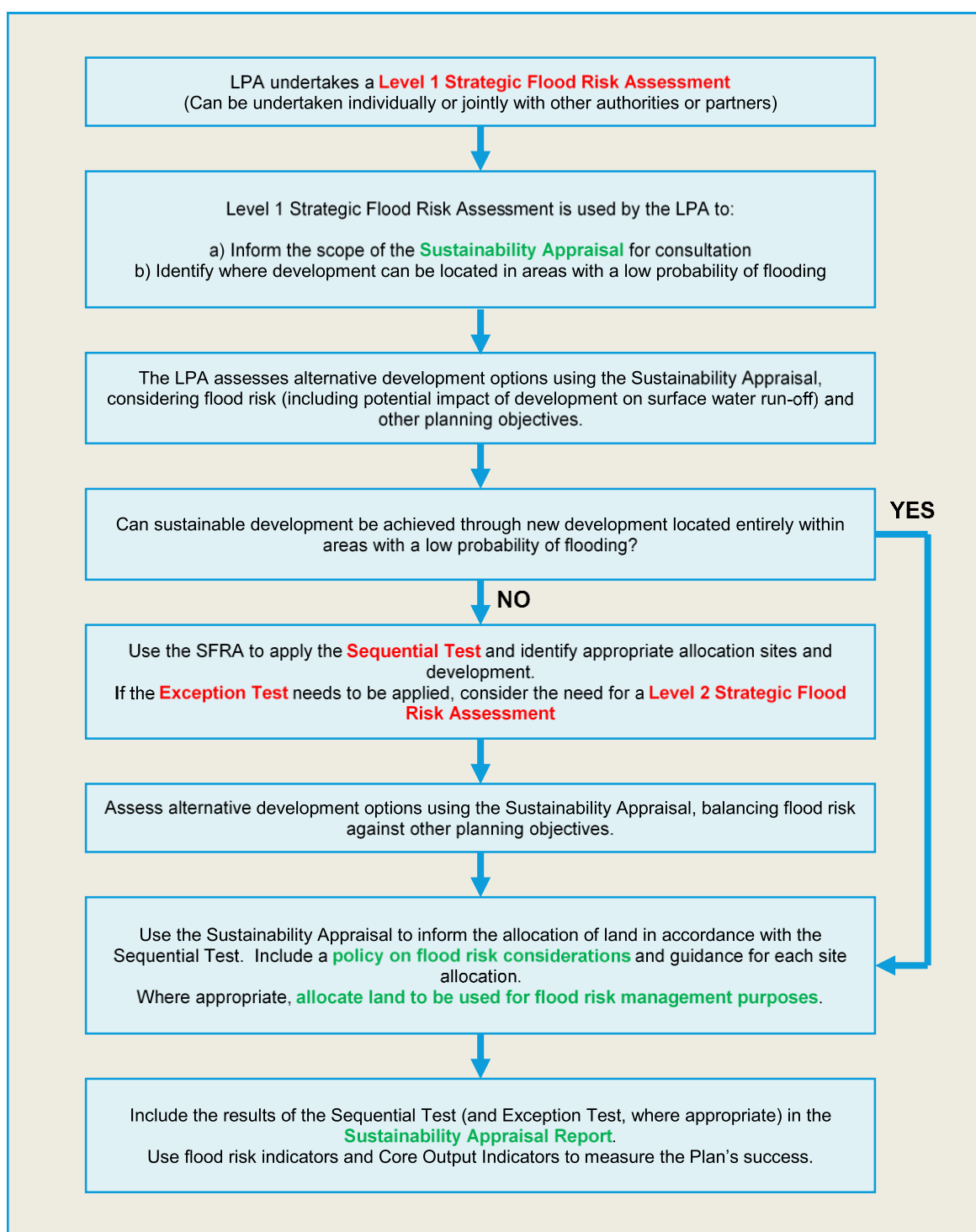
Diagram 1 in the Planning Practice Guidance sets out how flood risk should be considered in the preparation of Local Plans (Figure 3.1). These requirements are addressed principally in the Council's Strategic Flood Risk Assessment.

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(2014). Accessed online at: <http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/> on: 09/06/2018.

14 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> on: 09/06/2018

15 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: 09/06/2018



**Figure 3.1 Flood Risk and the Preparation of Local Plans<sup>16</sup>**

### 3.2.3 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 summarised below in Figure 3.2.

<sup>16</sup> 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**



### 3.2.4 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<sup>17</sup> 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.

### 3.2.5 Building Regulations and Code for Sustainable Homes

The Building Regulations (2010) Part G<sup>18</sup> 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.

The Code for Sustainable Homes (CfSH) was, from 2007 to March 2015, the Government’s optional national standard for new housing. It became effective in England in April 2007 and a Code rating for new homes became mandatory in May 2008. The Code included six levels of water efficiency for new homes seeking to simplify the various building codes that house builders have to adhere to, the Government withdrew CfSH in March 2015, with the exception of legacy cases: *“where residential developments are legally contracted to apply a code policy (e.g. affordable housing funded through the National Affordable Housing Programme 2015 to 2018, or earlier programme), or where planning permission has been granted subject to a condition stipulating discharge of a code level, and developers are not appealing the condition or seeking to have it removed or varied”*.

### 3.2.6 BREEAM

The Building Research Establishment Environmental Assessment Methodology (BREEAM) is an internationally recognised method for assessing, rating and certifying the sustainability of buildings. BREEAM can be used to assess the environmental performance of any type of building: new and existing. Standard BREEAM schemes exist for assessment of common domestic and non-domestic building types and less common building types can be assessed by developing bespoke criteria.

Using independent, licensed assessors, BREEAM 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. Buildings are rated and certified on a scale of ‘Pass’, ‘Good’, ‘Very Good’, ‘Excellent’ and ‘Outstanding’.

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17 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](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/353387/021c_Cost_Report_11th_Sept_2014_FINAL.pdf) on: 09/06/2018

18 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](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/504207/BR_PDF_AD_G_2015_with_2016_amendments.pdf) on: 09/06/2018

BREEAM has expanded from its original focus on individual new buildings at the construction stage to encompass the whole life cycle of buildings from planning to in-use and refurbishment. The standard is regularly revised to improve sustainability, respond to industry feedback and support sustainability strategies and commitments. BREEAM standard can be applied to virtually any building and location, with versions for new buildings, existing buildings, refurbishment projects and large developments.

WBC has the opportunity to seek BREEAM status for all new, residential and non-residential buildings. It currently has an aspiration for new build water consumption to achieve 105 l/p/d though the 2010 Core Strategy<sup>19</sup> and Sustainable Design and Construction Supplementary Planning Documents<sup>20</sup>. Whilst BREEAM contains the flexibility to achieve this in a number of ways, a "Very Good" rating for water resources would typically relate to a 40% improvement over baseline building water consumption<sup>21</sup>. As a minimum, a 12.5% improvement must be demonstrated to obtain BREEAM status. Guidance is provided on how to calculate this. Table 3.1 shows the BREEAM credits available for percentage improvement over baseline building water consumption in precipitation zone 1, which covers the whole of the UK.

**Table 3.1 BREEAM credits for percentage improvement over baseline water consumption**

BREEAM Credits	Percentage improvement over baseline water consumption
1	12.5%
2	25%
3	40%
4	50%
5	55%
Exemplary	65%

### 3.2.7 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, which requires that development in areas already at risk of flooding should give priority to sustainable drainage systems.

19 Wokingham Borough Core Strategy, Wokingham Borough Council (2010). Accessed online at: <http://www.wokingham.gov.uk/council-and-meetings/open-data/plans-policies-and-strategies/?assetdet91f252ff-550d-4cfa-a838-92ef2cb5f83c=151148&categoryesctI91f252ff-550d-4cfa-a838-92ef2cb5f83c=7733> on: 02-07-2018

20 Sustainable Design and Construction Supplementary Planning Document, Wokingham Borough council, (2010). Accessed online at: <http://www.wokingham.gov.uk/planning/planning-policy/supplementary-planning-guidance-and-documents/> on: 02-07-2018

21 BREEAM International New Construction 2016: Technical Manual SD233 2.0, BREEAM (2016). Accessed online at: <https://www.breeam.com/discover/technical-standards/newconstruction/> on: 09/06/2018

- The House of Commons written statement<sup>22</sup> 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 2018 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<sup>23</sup>. 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.
- Wokingham Borough Council are the LLFA and play a key role in ensuring that the proposed drainage schemes for all new developments comply with technical standards and policies in relation to SuDS. The “Wokingham SuDS Strategy” was published in April 2016<sup>24</sup> (and updated in January 2017), and contains guidance for the design and application of SuDS in the Borough.
- An updated version of the CIRIA SuDS Manual<sup>25</sup> 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 also publish “Guidance on the Construction of SuDS” (C768)<sup>26</sup>, which contains detailed guidance on all aspects of SuDS construction, with specific information on each SuDS component available as a downloadable chapter.
- Thames Water do not currently have a SuDS adoption manual. In its Addendum to Sewers for Adoption 7th Edition<sup>27</sup> TW states that it “will not adopt geocellular structures, balancing ponds or swales of any type. Where such features are incorporated as part of a drainage design for a site, the developer should arrange for the Local Authority, the SuDS Adopting body or a properly constituted company to maintain them.” In a Developer Day in January 2018, Thames Water stated that Ofwat has agreed a series of Adoption Codes, (the

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22 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: 09/03/2018

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

24 Wokingham SuDS Strategy, Wokingham Borough Council (2017). Accessed online at: <http://www.wokingham.gov.uk/EasySiteWeb/GatewayLink.aspx?alId=417843> on: 19/11/2018

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

26 Guidance on the Construction of SuDS (C768), CIRIA (2017), Accessed online at: [https://www.ciria.org/Resources/Free\\_publications/Guidance\\_on\\_the\\_construction\\_of\\_SuDS\\_-\\_C768.aspx](https://www.ciria.org/Resources/Free_publications/Guidance_on_the_construction_of_SuDS_-_C768.aspx) on: 19/11/2018

27 Addendum to Sewers for Adoption 7th Edition July 2015, Thames Water (2015). Accessed online at: [http://sfa.wrcplc.co.uk/Data/Sites/4/media/GalleryImages/WebImages/pdfs/TW%20Addendum%20to%20Sewers%20for%20Adoption%207th%20Edition%20June%20%202016\\_030117.pdf](http://sfa.wrcplc.co.uk/Data/Sites/4/media/GalleryImages/WebImages/pdfs/TW%20Addendum%20to%20Sewers%20for%20Adoption%207th%20Edition%20June%20%202016_030117.pdf) on: 09/06/2018

detail of which is still to be determined). These are expected to be presented to Ofwat in April 2019 and it is highly likely that under these codes, some SuDS will be adoptable by sewerage companies.

- The water industry is currently developing Sewers for Adoption version 8, the guide to the standards that sewers must meet if they are to be adoptable by water and sewerage companies in England. This is expected to include a significant expansion of what can be considered to be an adoptable surface water sewer, to include some forms of SuDS. If implemented, this could lead to many more SuDS systems being adopted by Thames Water and South East Water during the plan period.<sup>28</sup> A pre-implementation version released in April 2018 included this in section C3.
- SuDS features not adopted by WBC or the WaSCs need to be maintained by householders (in the case of SuDS on private land) and by management companies for other SuDS on public open spaces and highways.

### 3.3 Regional Policy

#### 3.3.1 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. Wokingham is covered by the Thames CFMP<sup>29</sup>.

#### 3.3.2 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. There is not currently a SWMP within Wokingham area.

#### 3.3.3 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)
- 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.

28 Water UK (2017) Sewers for Adoption 8: Revised Principles Paper

29 Thames Catchment Flood Management Plan, Environment Agency (2009). Accessed online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/293903/Thames\\_Catchment\\_Flood\\_Management\\_Plan.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/293903/Thames_Catchment_Flood_Management_Plan.pdf) on: 09/63/2018



- 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 Wokingham are reviewed in section 0.

### 3.4 Local Policy

#### 3.4.1 Localism Act

The Localism Act (2011) changes the powers of local government, it re-distributes the balance of decision making from central government back to councils, communities and individuals. In relation to the planning of sustainable development, provision 110 of the Act places 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"*<sup>30</sup>.

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.

#### 3.4.2 Local Plan and Local Strategy

Wokingham Borough Council is currently working on a Local Plan. This will include the overall strategy for Wokingham, site allocations and development management policies and replaces the Council's planning policies currently set out in the Core Strategy (2010), and detailed policies where appropriate.

#### 3.4.3 Infrastructure Delivery Plan

The purpose of an Infrastructure Delivery Plan (IDP) is to evaluate various services to determine if there is sufficient infrastructure to support the future levels of housing and employment in the area. The IDP presents sources of funding to assist in the delivery of infrastructure to help upgrade facilities, promote economic growth to ultimately increase the quality of life. The plan aims to sustainably develop towns and districts whilst maintaining a high-quality environment. The provision of infrastructure to support new housing in Wokingham is essential, this includes roads, schools, water and sewerage provision. The implications of this will lead to the need to produce an updated IDP.

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30 Localism Act 2011: Section 110, UK Government (2011). Accessed online at: <http://www.legislation.gov.uk/ukpga/2011/20/section/110> on: 09/06/2018

## 3.5 Environmental Policy

### 3.5.1 Urban Wastewater Treatment Directive (UWWTD)

The UWWTD<sup>31</sup> 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'.

### 3.5.2 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.

### 3.5.3 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. Wokingham falls into the Thames River Basin District (RBD)<sup>32</sup>. 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 Final Thames River Basin Management Plan. Another equally important objective requires all water bodies to achieve good ecological status. Future development needs to be planned carefully so that it helps towards achieving the WFD and does not result in further pressure on the water environment and compromise WFD objectives. The WFD objectives as outlined in the updated RBMPs are summarised below:

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31 UWWTD. Accessed online at: <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:31991L0271>  
On: 19/06/2017.

32 Thames River Basin District River Basin Management Plan: 2015, Environment Agency (2015). Accessed at: <https://www.gov.uk/government/publications/thames-river-basin-district-river-basin-management-plan>  
on: 09/63/2018

- "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.

#### 3.5.4 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.

**3.5.5 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<sup>33</sup> 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. Further information on groundwater protection is included in section 11.3.2.

## **3.5.6 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 referendum decision of June 2016 that the United Kingdom would leave the EU, the UK Government announced that it would introduce the "European Union (Withdrawal) Bill" to repeal the European Communities Act 1972 and to transpose European Union law into domestic law "wherever practical". This Bill received Royal Assent on 26 June 2018. A White Paper published in March 2017<sup>34</sup> states the following objectives for the Bill:

- Repeal of European Communities Act (ECA) 1972
- Conversion of EU law into UK law
- Conversion of directly applicable EU laws into UK law
- Preservation of secondary legislation made under the ECA

EU regulations - as they applied in the UK the moment before the country leaves the EU - will be converted into domestic law by the Bill and will continue to apply until legislators in the UK decide otherwise.

It is therefore assumed for the purposes of this study that European Union derived environmental legislation, most significantly the Water Framework Directive, will continue to be a key driver for environmental planning during the plan period for the Local Plan. Should this situation change, a review of this Water Cycle Study may be required considering any new emerging regulatory requirements.

## **3.6 Water Industry Policy**

### **3.6.1 The Water Industry in England**

Water and sewerage services in England and Wales are provided by 10 Water and Sewerage Companies (WaSCs) and 12 '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

33 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](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/598778/LIT_7660.pdf) on: 29/10/2018

34 "Our Approach to the Great Repeal Bill", UK Government (2017) Accessed online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/604516/Great\\_repeal\\_bill\\_white\\_paper\\_accessible.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/604516/Great_repeal_bill_white_paper_accessible.pdf) on: 09/06/2018

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 could influence the future provision of water and wastewater services include:

- Non-domestic customers will be able to switch their water supplier and/or sewerage undertaker (from April 2017)
- New businesses will be 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

### 3.6.2 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
- 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.

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.

### 3.6.3 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.

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.

#### 3.6.4 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<sup>35</sup>. These rules apply to all companies in England and will commence on 1st April 2018. The two relevant water companies for Wokingham have now published their charging arrangements which can be found in the footnotes. 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, for example for the provision of rainwater harvesting.
  - Thames Water<sup>36</sup> is not proposing any such incentives in 2018/19 but is proposing further engagement with customers on this issue.
  - South East Water do not currently offer any incentives as their position is that higher standards should be the norm, and not incentivised.

35 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: 09/06/2018

36 Charging arrangements for new connection services, Thames Water (2018). Accessed online at: <https://developers.thameswater.co.uk/-/media/Site-Content/Developer-Services/New-connections-charging/Charging-Arrangements-FINAL.pdf?la=en> on:09/06/2018

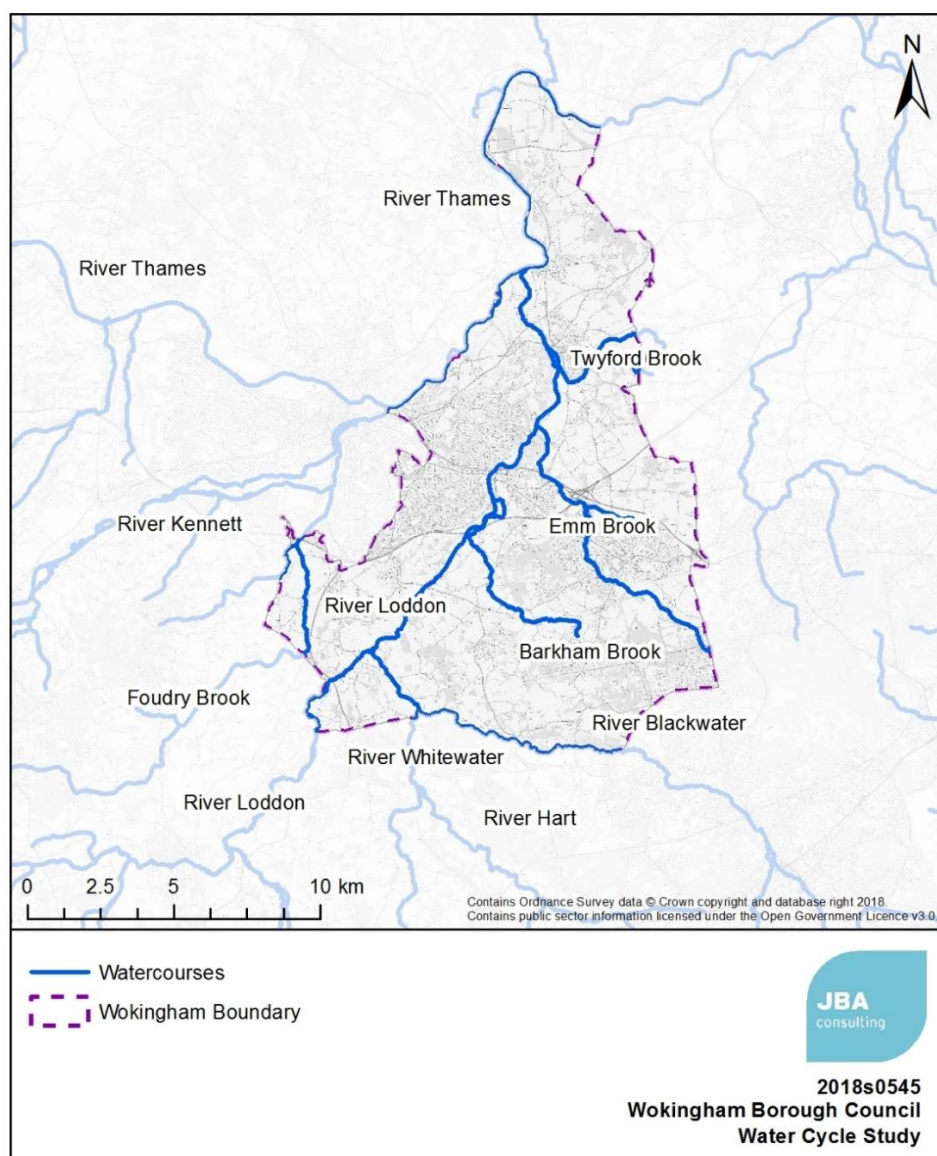
## 4. Water Resources and Water Supply

### 4.1 Introduction

#### 4.1.1 Surface Waters

Figure 4.1 shows the main watercourses within the study area, which lies within the River Thames catchment. The River Thames itself forms the north western boundary of Wokingham from Woodley to the village of Aston in the Parish of Remenham. The River Loddon flows from south to north through the area, joining the Thames just west of Wargrave. The River Loddon is fed by the tributaries Twyford Brook, which joins south of Twyford, Emm Brook which flows through Wokingham, Barkham Brook which joins close to where the Loddon passes under the M4, and the River Blackwater in the south of the area.

The Blackwater forms the southern boundary of the study area and has the River Whitewater as a significant tributary. Foudry Brook crosses the south west of the area by Grazeley and joins the River Kennett south of Reading, before eventually joining the River Thames in Reading itself.

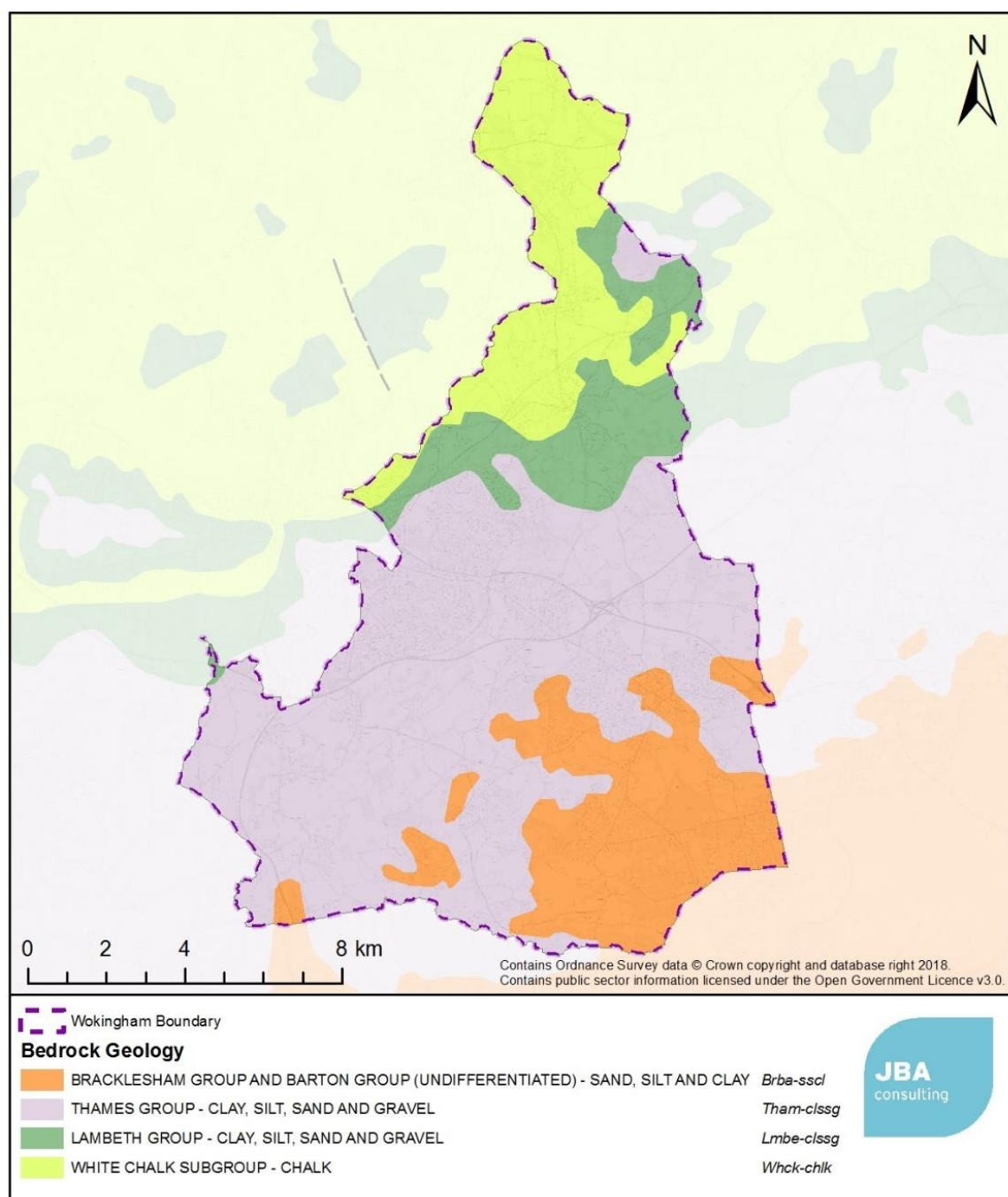


**Figure 4.1 Significant watercourses within Wokingham**



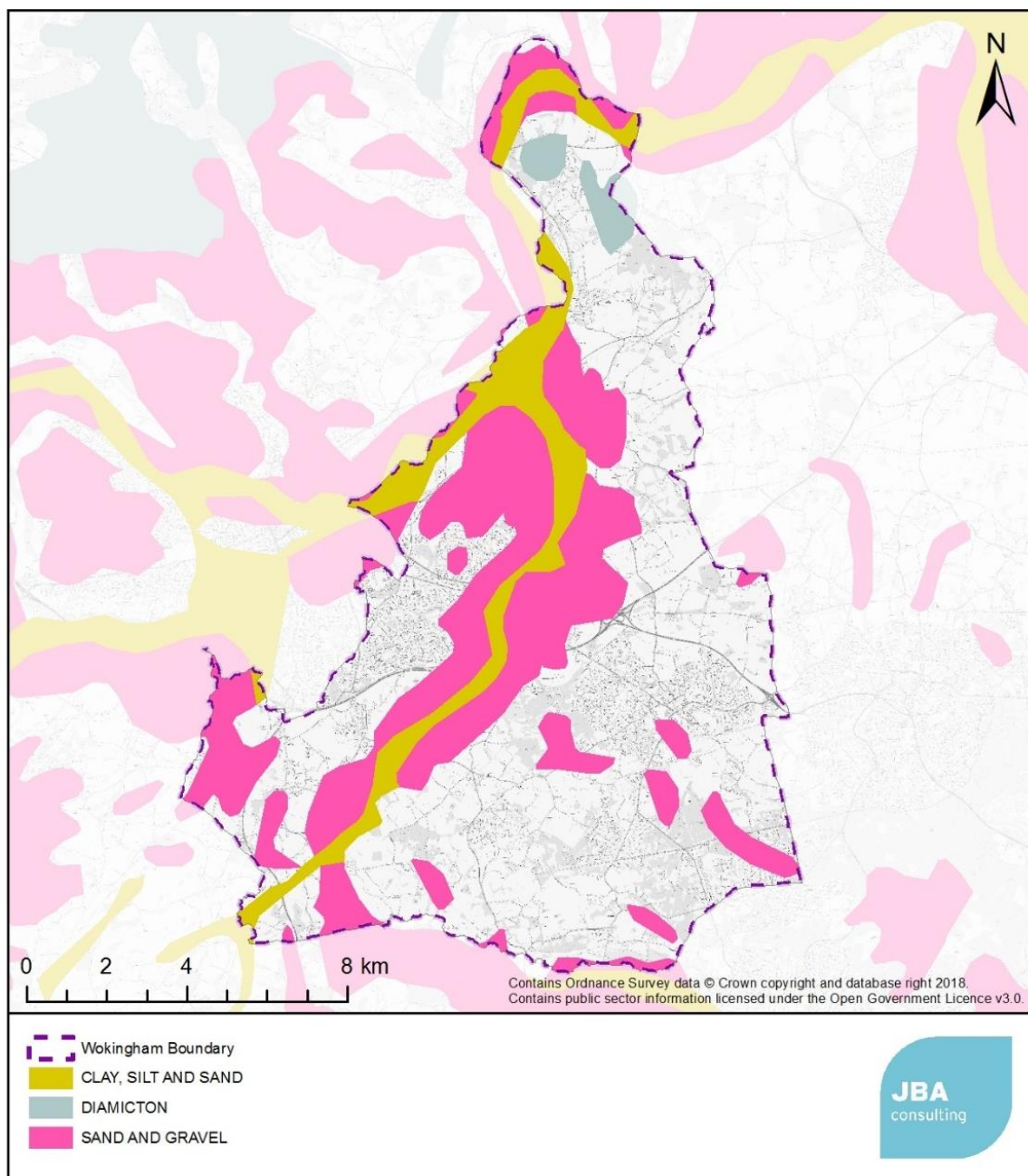
### 4.1.2 Geology

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 Wokingham study area which has four distinct geological bands. In the north of the area is White Chalk subgroup with a narrow band of Lambeth Group clay, silt, sand and gravel running east-west south of Charvil and Twyford. The south east of the area is underlain by Bracklesham Group and Barton Group (undifferentiated) sand silt and clay. The remaining area consists of Thames Group clay, silt, sand and gravel. An isolated area of Thames Group surrounded by Lambeth group can be found in the north east of the study area centred on Bowsey Manor.



**Figure 4.2 Bedrock geology of Wokingham**

Figure 4.3 shows superficial (at the surface) deposits of clay, silt and sand along the course of the River Loddon and River Thames within a wider area of sand and gravel. Deposits of Diamicton (clay with flints) can be found in the north of the study area.



**Figure 4.3 Superficial (at surface) geology of Wokingham**

#### 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 licenses. The licences require abstractions to stop or reduce when a flow or water level falls below a specific threshold, as a restriction to protect the environment and manage the

balance between supply and demand for water users. The CAMS process is published in a series of ALSs for each river basin.

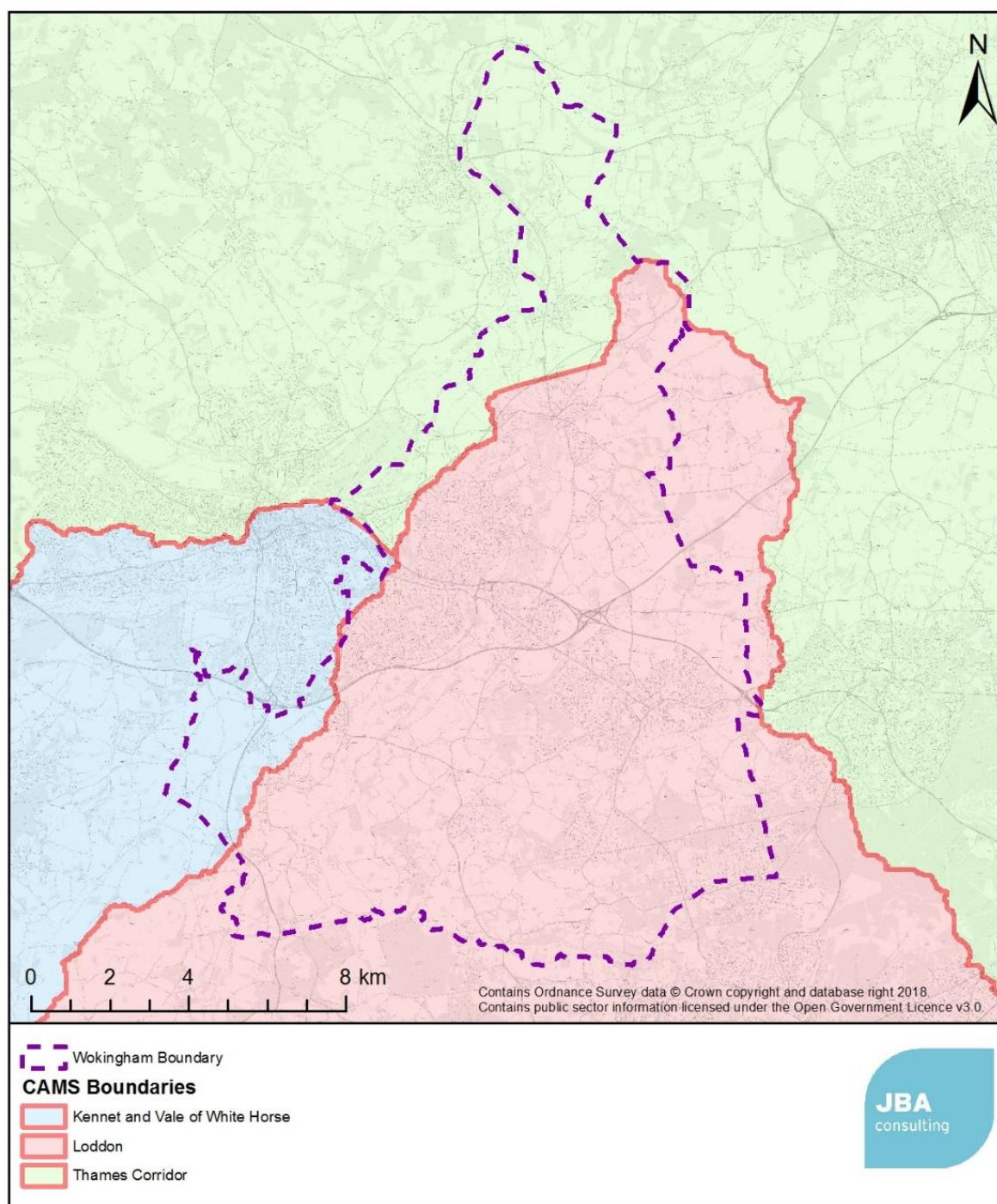
All new licences, and some existing licenses, are time limited. This allows time for a periodic review of the specific area as circumstances may have changed since the licences were initially granted. These are generally given for a twelve-year duration, but shorter license durations may also be granted.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

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<sup>37</sup>. Wokingham is covered by three ALS areas: Thames Corridor, Loddon and Kennet and Vale of White Horse, as shown in Figure 4.4 below.

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37 Environment Agency (2018) Managing Water Abstraction. Accessed Online at:  
<https://www.gov.uk/government/collections/water-abstraction-licensing-strategies-cams-process> on: 06/06/2018  
2018s0545 Wokingham WCS Phase 1 v4.0





**Figure 4.4 CAMS Boundaries covering Wokingham**



## 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 licensed for abstraction;
- whether there is more water available for abstraction in the area;
- areas where abstraction may need to be reduced.

The availability of water for abstraction is determined by the relationship between the fully licensed (all abstraction licences being used to full capacity) and recent actual flows (amount of water abstracted in the last 6 years) in relation to the Environmental Flow Indicator (EFI). Results are displayed using different water resource availability colours, further explained in Table 4.1 Implications of Surface Water Resource Availability Colours. In some cases, water may be scarce at low flows, but available for abstraction at higher flows. Licences can be granted that protect low flows, this usually takes the form of a "Hands-off Flow" (HOF) 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**

<b>Water Resource Availability Colour</b>	<b>Implications for Licensing</b>
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

Water Resource Availability Colour	Implications for Licensing
	augmented. There may be water available for abstraction in discharge rich catchments.

#### 4.2.1 Thames Corridor ALS

The Thames Corridor ALS<sup>38</sup>, referred to as TCAMS, extends the length of the non-tidal River Thames, from its source near to Kemble, through to the non-tidal limit at Teddington. Whilst it only covers a small area in the north of Wokingham, it has a significant impact on the other two CAMS areas. The TCAMS area supports significant abstractions for public water supply and to a lesser extent industry and agriculture. These are from both groundwater and the River Thames itself.

There are six gauging stations within the TCAMS area along the non-tidal Thames, with the closest to the study area being AP5 (Windsor gauging station) and AP6 (Kingston gauging station). AP6 is particularly significant as the resource availability at this gauging station overrides the availability at the other gauging stations and in the tributary ALS including the Loddon.

A bespoke licencing strategy has been adopted in the TCAMS area based on a tiered approach. The resource assessment process calculated that in order to protect the requirements for minimum flow at the critical AP6, an HOF of Q21 (7209 MI/d) was required, i.e. abstraction will only be permitted at flows that occur 21% of the time or less. Investigations have shown that the current management of abstraction in the Lower Thames is not preventing the WFD requirement of "Good ecological status/potential" being met, and there was no evidence to suggest that significantly reducing abstraction would benefit the river. It was therefore decided to retain the existing Q50 HOF for the majority of abstractions.

The licencing strategy has the following levels:

- New consumptive licences below 2 MI/d – no abstraction will take place when the average of the daily mean flows of the proceeding 5 days gauged at Kingston is less than or equal to Q50 (1780 MI/d).
- New consumptive licences above 2 MI/d – an HOF between Q21 and Q50 will be applied based on perceived risk to the waterbody. The applicant must provide a WFD assessment to show the abstraction will not cause environmental deterioration under the WFD or prevent the achievement of "Good ecological status/potential".
- For abstractions of all sizes – additional HOFs may be applied to protect local features or existing abstractors.

Resource availability for AP5 and AP6 after the application of the licencing strategy is presented in Table 4.2 below.

<sup>38</sup> Thames catchment abstraction licensing strategy, Environment Agency (2014). Accessed online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/321005/LIT\\_1855.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/321005/LIT_1855.pdf) on: 18/10/2018

**Table 4.2 Thames Corridor ALS resource availability**

AP	Name	ALS	Local Resource Availability	HOF Q (1)	Days p.a. (2)	HOF (MI/d) (3)	Gauging station at AP?
5	Windsor gauging station	Thames Corridor	Restricted water available for licensing	50 (If abstraction less than <2 MI/d)	183	1,780	Yes
6	Kingston gauging station	Thames Corridor	Restricted water available for licensing	50 (If abstraction less than <2 MI/d)	183	1,780	Yes

(1) Hands off Flow restriction

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

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

Reliability of consumptive abstraction within the TCAMS area is dependent on the level of abstraction (due to the application of the bespoke licencing system). For abstractions greater than 2 MI/d, reliability is less than 30%, therefore abstraction is only possible for approximately 77 days per year. For abstractions of 2 MI/d or less, reliability is >50% and <70% and so abstraction is possible approximately 183 days per year.

All new licences have a common end date (CED), the next CED being 31st March 2028.

Consumptive groundwater licences which do not have a direct impact upon main river flows may be permitted but may be subject to restrictions such as prescribed groundwater levels. Restrictions will be determined on a case-by-case basis, dependent upon the nature and scale of any abstraction.

Within the TCAMS areas there is an area of confined chalk south of Windsor. This aquifer does not directly or indirectly contribute to flow in the River Thames and is not linked to any of the assessment points. As it does not have an outcrop area, it receives no direct recharge, being maintained by inflow from the Maidenhead aquifer, River Loddon and River Wey chalk outcrops. Groundwater levels are therefore sensitive to abstraction, with large scale abstraction unlikely to be viable. Small scale abstraction will be subject to a local assessment.

#### 4.2.2 Loddon ALS

The Loddon ALS<sup>39</sup> area covers the majority of the Wokingham area, from Twyford in the north southwards. It has seven assessment points, the catchments for five of these, AP1, AP2 and AP5-7, are relevant to this study.

Four of the assessment points have a local resource status of "water available for licencing", and one (AP5 – Whitewater) has the status "Water not available for licencing". However, consumptive abstraction licences in this area are constrained by the need to maintain flow in the Lower Thames, and the Q50 restriction as measured at Kingston gauging station will apply.

39 Loddon Catchment Abstraction Licensing Strategy, Environment Agency (2012). Accessed online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/289881/LIT\\_1777\\_a16a18.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289881/LIT_1777_a16a18.pdf) on: 18/10/2018

In AP5 (Whitewater), there may be situations where the Loddon ALS area is subject to a dual HOF. Where this is applied, abstraction must cease when either the local or the TCAMS condition is met and can only resume once all conditions are clear.

Reliability of consumptive abstraction within the Loddon area is dependent upon conditions in the TCAMS area. For abstractions greater than 2 MI/d, reliability is less than 30%, therefore abstraction is only possible for approximately 77 days per year.

A chalk formation to the south provides the dominant aquifer in the area. The groundwater availability in the Loddon ALS region is guided by the surface water assessment unless specific information on principle aquifers exists or local issues that need protecting overrule it.

Consumptive groundwater licences which do not have a direct impact upon main river flows may be permitted but may be subject to restrictions such as prescribed groundwater levels. Restrictions will be determined on a case-by-case basis, dependent upon the nature and scale of any abstraction.

**Table 4.3 Loddon ALS resource availability**

AP	Name	ALS	Local Resource Availability	HOF Q (1)	Days p.a. (2)	HOF (MI/d) (3)	Gauging station at AP?
1	Lower Loddon	Loddon	Water available for licensing	No local HOF	365	76.6	Yes
2	Middle Loddon	Loddon	Water available for licensing	No local HOF	365	21.1	Yes
5	Whitewater	Loddon	Water not available for licensing	Q64	233	1.6	Yes
6	Hart	Loddon	Water available for licensing	No local HOF	365	9.4	No
7	Blackwater	Loddon	Water available for licensing	No local HOF	365	45.2	No

(1) Hands off Flow restriction

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

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



### 4.2.3 Kennet and Vale of White Horse ALS

The Kennet and Vale of White Horse ALS<sup>40</sup> covers a small area in the west of the Wokingham study area. The majority of abstractions within this CAMS area are from groundwater, with public supply the main use.

Both assessment points have a local resource status of “water available for licencing”. However, consumptive abstraction licences in this area are constrained by the need to maintain flow in the Lower Thames, and the Q50 restriction as measured at Kingston gauging station will apply.

There may be situations where this ALS area is subject to a dual HOF. Where this is applied, abstraction must cease when either the local or the TCAMS condition is met and can only resume once all conditions are clear.

**Table 4.4 Kennet and Vale of White Horse resource availability**

AP	Name	ALS	Local Resource Availability	HOF Q (1)	Days p.a. (2)	HOF (MI/d) (3)	Gauging station at AP?
11	Foudry Brook	Kennet and Vale of White Horse	Water available for licencing	No local HOF	365	57.1	No
12	Lower Kennet	Kennet and Vale of White Horse	Water available for licencing	No local HOF	365	21.7	No

(1) Hands off Flow restriction

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

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

Reliability of consumptive abstraction is dependent upon conditions in the TCAMS area. For abstractions greater than 2 MI/d, reliability is less than 30%, therefore abstraction is only possible for approximately 77 days per year.

The groundwater availability in the Kennet and Vale of White Horse ALS region is guided by the surface water assessment unless specific information on principle aquifers exists or local issues that need protecting overrule it.

Consumptive groundwater licences which do not have a direct and immediate impact on river flow may be permitted all year, providing the level of resource use allows, but may have restrictions such as a prescribed groundwater level.

### 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

40 Kennet and Vale of White Horse Abstraction Licencing Strategy, Environment Agency (2014). Accessed online at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/289893/LIT\\_2517\\_39dc0f.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/289893/LIT_2517_39dc0f.pdf) on: 18/10/2018

- 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.

#### 4.2.5 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 from achieving 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<sup>41</sup> both the South East Water and Thames Water supply regions are classed as areas of "serious" water stress.

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41 Water Stressed Areas - Final Classification, Environment Agency and Natural Resources Wales (2013). Accessed online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/244333/water-stressed-classification-2013.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/244333/water-stressed-classification-2013.pdf) on: 31/10/2018

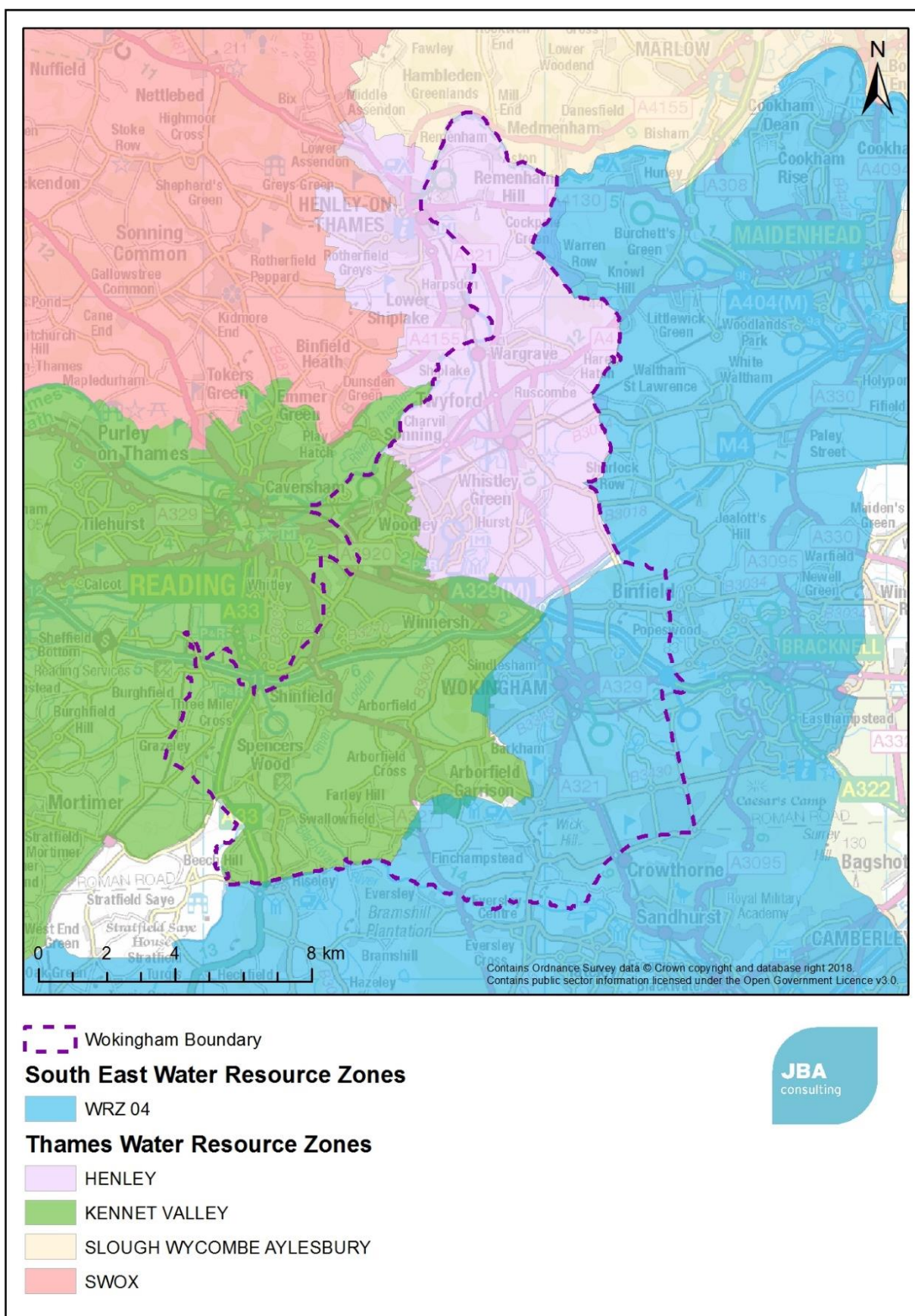
## **4.3 Water Resource Assessment: Water Resource Management Plans**

### **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 Local Plan, with the demand allowed for by South East Water and Thames 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 South East Water and Thames Water, and secondly by providing the water companies with growth scenarios for each settlement allowing them to assess each settlement and the housing yields proposed.



**Figure 4.5 Water supply company boundaries**



### 4.3.2 Methodology

South East Water and Thames Water's draft Water Resource Management Plans (WRMP)<sup>42,43</sup> 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<sup>44</sup> 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.

The MHCLG 2016-based estimates of household growth are available, however the analysis contained in the WRMP was carried out prior to these becoming available and so both WRMPs utilised the 2014-based estimates. For consistency this WCS report presents the 2014-based estimates in the results tables, however the calculations were repeated using the 2016-based figures as a check. The use of the 2016 figures results in a lower estimate of growth but does not change any of the conclusions. The Government is currently consulting on proposals to use the 2014-based projections to calculate housing need in the future.

The results were assessed using a red / amber / green traffic light definition to score the water resource zone:

Adopted WRMP has planned for the increase in demand, or sufficient time to address supply demand issues in the next WRMP.	Insufficient evidence in adopted WRMP to confirm that the planned increase in demand can be met.	Adopted WRMP does not take into consideration the planned increase in demand. Additional water resources may be required.
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42 Revised Water Resource Management Plan 2019, South East Water (2018). Accessed online at: <https://corporate.southeastwater.co.uk/about-us/our-plans/water-resources-management-plan-2019> on: 31/10/2018

43 Draft Water Resources Management Plan 2019, Thames Water (2018). Accessed online at: <https://www.thameswater.co.uk/sitecore/content/corporate/corporate/about-us/our-strategies-and-plans/water-resources> on: 31/10/2018

44 2016-Based Household Projections for England, Office for National Statistics (2018). Accessed online at: <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/householdprojectionsforengland> on: 31/10/2018

#### 4.3.4 South East Water

South East Water supply water to two areas in south east England totalling 6,657km<sup>2</sup> and with a population exceeding 2 million, one covering Sussex and Kent, and the second in Berkshire, Surrey and Hampshire. This is divided into two water resource zones (WRZ04 and WRZ05) and the south east of the study area, including the town of Wokingham is covered by WRZ04. Outside the study area the resource zone also contains the large urban areas of Bracknell, Maidenhead and Basingstoke.

Within WRZ04, 65% of the water supply is from groundwater using twelve groundwater sources in Chalk, Greensand and Hythe aquifers. 20% is supplied by one surface water source and the remaining 15% is supplied by inter-company transfer from Affinity Water. There is also some transfer of water between WRZ04 and WRZ05.

The WRMP 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.

The per capita consumption has fallen over the last 5 years, largely due to the roll out of a compulsory metering scheme but is higher than the national average at 151l/h/d (litres per head per day). The reasons for this are explained as a combination of socio-economic (higher level of affluence than average) and climate influences.

The impact of climate change has also been factored into the demand forecast, with an increase in demand of 2.2% by 2045 in WRZ04.

Climate modelling has been conducted in conjunction with HR Wallingford and following EA guidance. Most of the water resource zones are predicted to have a reduction in available water supply by 2080 due to climate change, but WRZ04 shows a slight increase during this time (the impact of increased winter rainfall offsets the drier summers). This has been factored into the supply forecasts for the planning period.

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.

Supply-demand balance is presented for WRZ04 and WRZ05 combined and shows that a surplus is present until 2050. The most significant driver for this deficit is the reduction in abstractions to ensure sustainability. A plan is presented in the WRMP<sup>45</sup> to tackle this and is summarised in Table 4.5.

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<sup>45</sup> Revised Draft Water Resource Management Plan, South East Water (2018). Accessed online at: <https://corporate.southeastwater.co.uk/about-us/our-plans/water-resources-management-plan-2019> on: 19/11/2018  
2018s0545 Wokingham WCS Phase 1 v4.0

**Table 4.5 South East Water's preferred plan for WRZ04**

Year	Measure
2020-2025	Leakage Water efficiency Reduced transfer from WRZ4 to Affinity Water – Egham to Surrey Hills
2025-2045	Catchment management at Woodgarston
2045-2080	Aquifer storage and recovery near Maidenhead New groundwater source near Farnborough Regional transfer from Thames Water Raw water abstraction from the River Thames Improved connectivity within the zone

The catchment management option in Woodgarston (within Basingstoke & Deane) consists of education for landowners about septic tank discharges, and for farmers about best practice nutrient management to improve raw water quality. This is expected to yield 3MI/d.

#### 4.3.5 Thames Water

Thames Water are responsible for two water resource zones that cover Wokingham, Henley WRZ in the north west and Kennet in the south west. In the Thames Valley, 30% of water supply is from surface water, and 70% from groundwater. Neither the Kennet or Henley WRZs have any bulk transfer arrangements with other WRZ or with other water supply companies.

The impact of climate change on the water available for use was estimated, taking the "Medium Emissions Scenario". This was shown to have no effect on the Henley WRZ but would reduce Water Available for Use (WAFU) by approximately 4% by 2045.

Analysis of the supply-demand balance (dry-year) shows that the Kennet Valley is forecast to have a supply surplus until 2070-75, as population growth outstrips water demand management activities, and climate change reduces the volume of water available. The Henley WRZ is forecast to retain a surplus until 2100.

**Table 4.6 Thames Water's preferred plan<sup>46</sup>**

Water Resource Zone	Measures
Kennet WRZ	Roll-out of metering programme with 97% household penetration by 2040 Reward based incentive scheme and proactive water efficiency campaign (3MI/d by 2040) Groundwater scheme at Mortimer (4.5MI/d) in 2080 Removal of network constraint at East Woodhay (2.3MI/d) in 2073
Henley WRZ	Reduction in leakage of 0.4 MI/d Reduction in demand by 1.85MI/d through water efficiency programme

46 Revised Daft Water Resources Management Plan, Thames Water (2018). Accessed online at: <https://corporate.thameswater.co.uk/About-us/our-strategies-and-plans/water-resources> on: 19/11/2018  
2018s0545 Wokingham WCS Phase 1 v4.0

#### 4.3.6 Population and household growth

##### South East Water

Experian were commissioned by SEW in 2017 to provide population and household growth forecasts as part of a project including other water companies in the South East. This forms Appendix 5A of their WRMP<sup>47</sup>. Four forecasts were prepared using different methods (Trend based – from ONS statistics, Plan based – from LPA plans, Econometric – taking into account economic pressures, and Hybrid – a combination of plan based and econometric). The plan-based forecast was used by SEW to project household demand in the WRMP. Table 4.7 shows a comparison of the household forecast for WRZ04 with the MHCLG forecast for Wokingham Borough.

MHCLG 2014-based projections forecast a 12.4% increase in the number of households within Wokingham Borough. This is slightly higher than the level of growth forecast for the rest of the water resource zone, and less than that accounted for in SEW's WRMP.

If growth occurred according to the housing need, it would result in an increase in the number of households of nearly 21.6% during the local plan period. This exceeds what has been accounted for the WRMP.

**Table 4.7 Comparison on household growth forecasts (South East Water)**

Forecast	2020	2036	% Increase
<b>MHCLG 2014-based forecast – Wokingham Borough Council</b>	<b>66,362</b>	<b>74,620</b>	<b>12.4</b>
MHCLG 2014-based forecast all Local Authorities in WRZ04	275,125	307,060	11.6
WRMP Forecast – WRZ04	290,326	338,670	16.7
<b>Housing need – Wokingham Borough Council</b>	<b>66,362</b>	<b>80,666</b>	<b>21.6</b>

Note: 894 was used as the annual OAN figure as part of a cautious approach

##### Thames Water

Thames Water commissioned Edge Analytics to work with Local Authorities to develop a plan-based population and household forecast up to 2045. This is contained in Appendix E of the Revised WRMP<sup>48</sup>. Leeds University were used to develop a longer-term plan to 2100. Table 4.8 shows a comparison of household forecasts for the two Thames Water WRZs and the 2014-based MHCLG household projections. Growth in Wokingham is slightly higher than the level of growth forecast for the rest of the water resource zones. For Kennet WRZ the growth accounted for in the WRMP is in line with

47 Appendix 5A Population, Household, Property and Occupancy Forecasts for WRMP19, South East Water (2017). Accessed online at:

<https://corporate.southeastwater.co.uk/media/2169/appendix-5a-dwrmp19-property-and-population-report.pdf> on: 19/11/2018

48 Population, Household & Property Forecasts, Thames Water (2018). Accessed online at:

<https://corporate.thameswater.co.uk/-/media/Site-Content/Your-water-future-2018/Appendices/dWRMP19-Appendix-E---Population-and-property-projections-011217.pdf> on: 19/11/2018



the MHCLG projections, however for Henley WRZ, the WRMP only accounts for half the projected growth.

This is significantly less than the level of growth that may occur if housing is delivered to meet to the housing need.

**Table 4.8 Comparison of household growth forecasts (Thames Water)**

Forecast	2020	2036	% Increase
<b>MHCLG 2014-based forecast – Wokingham Borough Council</b>	<b>66,362</b>	<b>74,620</b>	<b>12.4</b>
MHCLG 2014-based forecast All Local Authorities in Kennet WRZ	160,457	177,778	10.8
WRMP Forecast – Kennet	177,600	199,500	12.3
MHCLG 2014-based forecast All Local Authorities in Henley WRZ	21,067	23,612	12.1
WRMP Forecast – Henley	23,441	25,030	6.8
<b>Housing need– Wokingham Borough Council</b>	<b>66,362</b>	<b>80,666</b>	<b>21.6</b>

Note: 894 was used as the annual OAN figure as part of a cautious approach

#### 4.3.7 South East Water's Assessment

South East Water confirmed the analysis in 4.3.6 and advised that although the level of growth that would occur if Wokingham delivers its housing need is higher than that accounted for in the WRMP, there were sufficient water resources to accommodate all of Wokingham's housing need. No issues of bulk water storage or transfer were identified.

A "green" RAG score was therefore applied to all sites in SEW's water resource zone. This reflects the understanding that there is sufficient time to adapt long term plans to emerging trends in population.

#### 4.3.8 Thames Water's Assessment Kennet Valley WRZ

All of the proposed development within this WRZ would be supplied by Fobney Water Treatment Works (WTW). Should all of the identified sites be developed in this WRZ, the resulting water demand would exceed that planned for in Thames Water's WRMP. There is sufficient surplus water resource and treatment capability at Fobney WTW to accommodate all of this growth, however there are issues at the reservoir storage level.

Thames Water provided the following additional comment:

*"TW have invested in recent AMP periods in additional reservoir storage at Earley (an underground reservoir at Elm Lane serving 100,000 people), that is likely to support a number of the developments (full addresses aren't provided). The area where current*

*reservoir storage is running close to capacity is at Bearwood, which supplies the Barkham, Farley Hill and Arborfield areas. Therefore, we would prefer significant growth away from these areas. However, it should be noted that if significant growth in this area triggers the need for additional storage and/or additional bulk transfer capacity, this would be sought through TW's price review process."*

No significant constraints to providing additional infrastructure were identified, so an Amber assessment was considered appropriate for all development in this WRZ.

### **Henley WRZ**

All of the proposed development within this WRZ would be supplied by Sheeplands WTW. Should all of the identified sites be developed in this WRZ, the resulting water demand would exceed that planned for in Thames Water's WRMP. There is sufficient surplus water resource and treatment capability at Sheeplands WTW to accommodate all of this growth, however there are issues at the reservoir storage level.

Thames Water provided the following additional comment:

*"TW have concerns regarding the capacity of reservoir storage at Bowsey Hill, which would likely be the service reservoir that balances water treatment work supply prior to customer demands within the Woodley, Twyford and Wargrave areas. Development would be preferred away from this area. However, and similarly to the Kennet Valley, if significant growth in this area triggers the need for additional storage and/or additional bulk transfer capacity, this would be sought through TW's price review process."*

No significant constraints to providing additional infrastructure were identified, so an Amber assessment was considered appropriate for all development in this WRZ.

#### 4.3.9 Summary

**Table 4.9 Summary of RAG scores for water resources**

Water company	Water Resource Zone	RAG score description	Comments
South East Water	WRZ4	Adopted WRMP has planned for the increase in demand, or sufficient time to address supply demand issues in the next WRMP.	A water supply surplus exists until 2050. No issues with bulk transfer or storage have been identified.
Thames Water	Henley	Insufficient evidence in adopted WRMP to confirm that the planned increase in demand can be met	Whilst there is a sufficient water to supply all of the development identified in the call for sites process, this exceeds the growth planned for in the WRMP. <sup>49</sup> Issues exist in transfer and storage.
Thames Water	Kennet Valley	Insufficient evidence in adopted WRMP to confirm that the planned increase in demand can be met	Whilst there is a sufficient water to supply all of the development identified in the call for sites process, this exceeds the growth planned for in the WRMP. Issues exist in transfer and storage.

#### 4.4 Conclusions

Whilst there is sufficient water resource to supply all of the development within Wokingham identified in the call for sites process constraints exist at the reservoir storage and bulk transfer level in Henley and Kennet Valley WRZs.

Large scale development in Arborfield, Barkham, Farley Hill within Kennet Valley WRZ, and Woodley, Twyford and Wargrave areas in Henley WRZ may require additional storage and/or additional bulk transfer capacity. Growth in these areas should be carefully planned with Thames Water to ensure that sufficient infrastructure is in place prior to developments being occupied.

A water supply surplus is identified in WRZ4 until 2050, and no constraints at the reservoir storage level have been identified by South East Water.

**On the basis that there is a water supply surplus predicted across all three water resource zones until 2050 and there is sufficient time to adapt the long-term plan to include emerging trends in population, no further assessment of water resources if recommended in a phase 2 outline study.**

<sup>49</sup> This is anticipated, as the majority of sites promoted through the call for sites will not be proposed for allocation through the Local Plan process.

## 4.5 Recommendations

**Table 4.10 Recommendation 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. Take the latest growth forecasts into account in the emerging 2019 WRMP.	SEW / TW	Ongoing
Provide yearly profiles of projected housing growth to water companies to inform the WRMP.	WBC	Ongoing
Use planning policy to require the 110l/person/day water consumption target permitted by National Planning Practice Guidance <sup>50</sup> in water-stressed areas and use the BREEAM standard to require percentage improvement over baseline building water consumption of at least 12.5%.	WBC	In Local Plan

<sup>50</sup> 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: 19/12/2018  
2018s0545 Wokingham WCS Phase 1 v4.0



## 5. Water Supply Infrastructure

### 5.1 Introduction

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

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<sup>51</sup>. This is particularly feasible within property owned or managed by the local authorities, such as social housing.

### 5.2 Methodology

South East Water and Thames Water were provided with a complete list of sites and the potential / equivalent housing numbers for each as well as an indicative number of employees. Using this information, they were asked to comment on the impact of the proposed growth on water supply infrastructure in the Wokingham area. A RAG assessment was then applied using the following definitions to score each site:

Capacity available to serve the proposed growth	Infrastructure and/or treatment work upgrades are 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.
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Thames Water applied a RAG score based on the size of the potential site. Sites with less than 50 homes would not require a development impact assessment and so were given a “green” rating. Sites between 50 and 250 homes MAY require a development impact assessment, and some network reinforcement may be required. Sites with

51 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](http://www.waterwise.org.uk/wp-content/uploads/2018/01/Waterwise-2009_Water-efficiency-Retrofitting_Best-practice.pdf) on: 29/10/2018

more than 250 homes WILL require a development impact assessment and network reinforcement is likely to be required in order to accommodate this growth.

South East Water produced a RAG assessment based on the size of the potential site in combination with known network constraints.

## **5.3 Results**

### **5.3.1 Thames Water**

Table 5.1 summarises the scoring given to each site by SEW and TW. A site by site list of these assessments is contained in Appendix A.

**Table 5.1 Summary of TW water supply RAG scores**

Water supply networks RAG score	RAG Score description	Number of sites	Comments
RED	Infrastructure and/or treatment upgrades will be required to serve proposed growth. Major constraints have been identified.	None	No major constraints on providing water supply infrastructure have been identified by Thames Water
Amber	Infrastructure and/or treatment work upgrades are required to serve proposed growth, but no significant constraints to the provision of this infrastructure have been identified.	24 out of 181 development sites $\geq 250$ houses	"The proposed level of development will definitely require a development Impact Assessment as the as the net property equivalent increase is above the agreed upon DMA upper threshold for growth" Significant network reinforcement is likely to be required.
		51 out of 181 development sites $> 50$ and $< 250$ houses	"A Development Impact Assessment may be required pending review by the NMG". Network reinforcement MAY be required.
Green	Capacity available to serve the proposed growth	106 out of 181 development sites $< 50$ houses	The proposed level of development will not require a study as the net property equivalent increase falls below the agreed upon DMA lower threshold value for growth. A Letter 2 can be issued with no requirement for an Impact Assessment.

### 5.3.2 South East Water

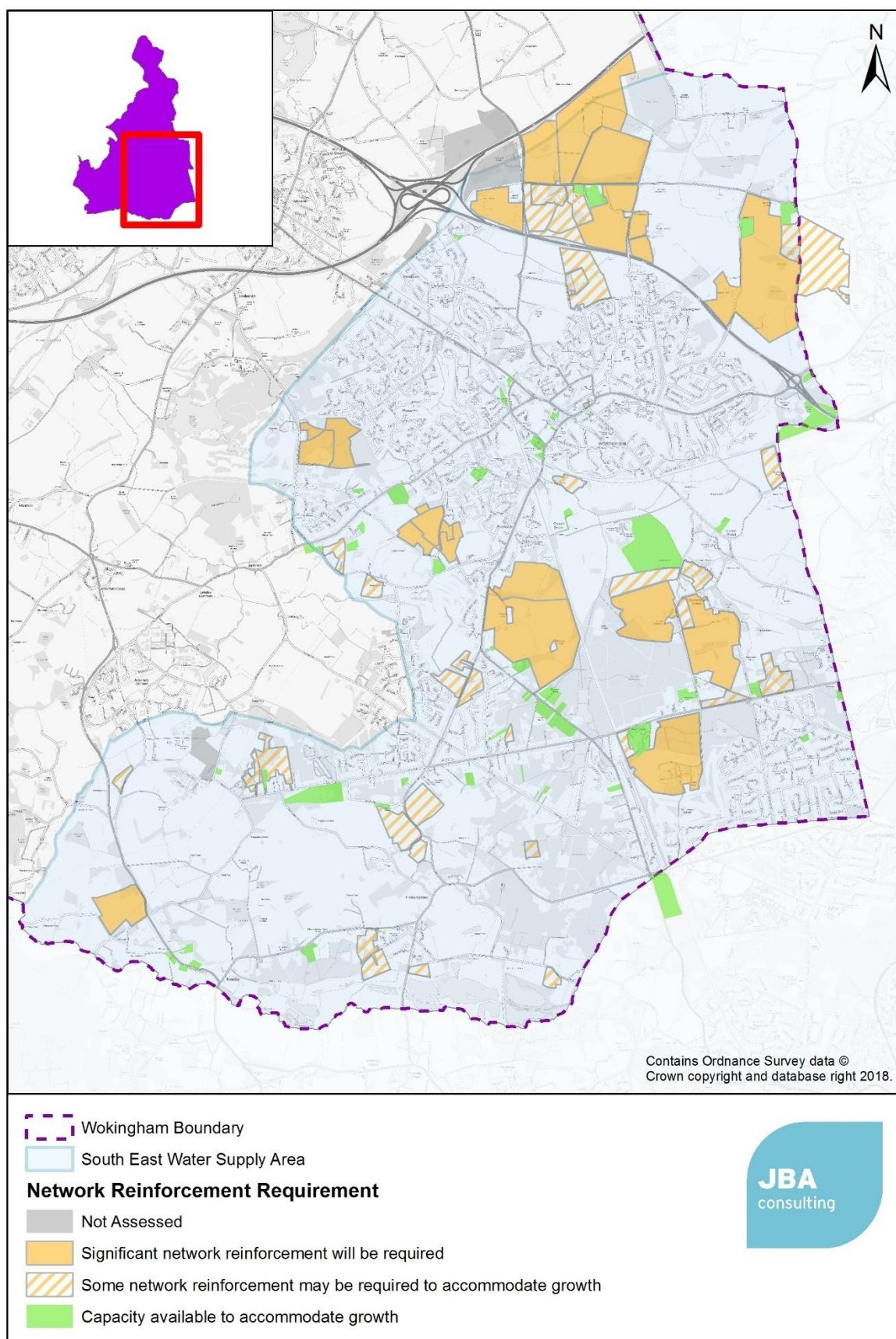
SEW noted that many of the proposed growth in Wokingham is towards the end of their distribution network. It has been *"identified in our business plan modelling that we need to continue reinforcing our existing mains out of Buckhurst Reservoir and into Wokingham further along London Road to bring water into the north of the area from Binfield to serve the 5HU developments"* (east of the motorway junction between the A329(M) and the M4), and *"to bring water to the south along Nine Mile Ride from*

*Crowthorne reservoir for some of the 5WK sites, 5WW sites, 5FI sites and 5BA sites” (south of Wokingham).*

Where network reinforcement is likely to be required, an amber score has been given to the site. These have then been differentiated based on the likelihood and difficulty of providing water supply infrastructure.

It should be noted that where several sites rate as green individually are delivered together, the cumulative impact may cause network reinforcement to be needed. The assessment by South East Water is shown visually in Figure 5.1, and summarised in Table 5.2 below.





**Figure 5.1 SEW water supply network assessment**

**Table 5.2 Summary of SEW water supply RAG scores**

Water supply networks RAG score	RAG Score description	Number of sites	Comments
RED	Infrastructure and/or treatment upgrades will be required to serve proposed growth. Major constraints have been identified.	None	No major constraints on providing water supply infrastructure have been identified by South East Water.
Amber	Infrastructure and/or treatment work upgrades are required to serve proposed growth, but no significant constraints to the provision of this infrastructure have been identified.	18 of 108 development sites	Significant network reinforcement is likely to be required in order to accommodate this growth. (Solid amber shading in Figure 5.1)
		32 of 108 development sites	Network reinforcement MAY be required in order to accommodate growth. (Hatched amber shading in Figure 5.1)
Green	Capacity available to serve the proposed growth	58 of 108 development sites	Capacity available to serve the proposed growth.

## 5.4 Conclusions

- In the Thames Water supply area, sites smaller than 50 houses can in general be accommodated without significant water supply infrastructure upgrades. Sites larger than 50, but smaller than 250 houses may require network reinforcement in order to be accommodated, and sites larger than 250 houses are likely to require significant network reinforcement.
- In the South East Water supply area, the conclusion above applies in general, however SEW noted specific network constraints in the area between the A329(M) and the M4 (east of the junction) and to the south of Wokingham. Development in these area may require more extensive water supply infrastructure.
- Thames Water and South East Water did not identify any significant constraints to providing additional water supply infrastructure.
- South East Water also wanted to note that it has a statutory duty to serve new development. Given sufficient planning certainty over the locations and timing of new growth, this will be accommodated within the water supply network.

**Early developer engagement with SEW and TW is essential to ensure that, where necessary, network reinforcement is delivered prior to developments becoming occupied. No further assessment is recommended in a phase 2 WCS.**

## 5.5 Recommendations

**Table 5.3 Recommendations for water supply infrastructure**

Action	Responsibility	Timescale
Undertake network modelling to ensure adequate provision of water supply is feasible once a preferred option has been developed.	SEW TW WBC	Once preferred option is defined.
WBC and Developers should engage early with SEW and TW to ensure infrastructure is in place prior to occupation.	WBC SEW TW Developers	In local plan



## 6. Wastewater Collection

### 6.1 Sewerage undertaker for Wokingham

Thames Water is the Sewerage Undertaker (SU) for Wokingham. The role of sewerage undertaker includes the collection and treatment of wastewater from domestic and commercial premises, and in some areas, it also includes the drainage of surface water from building curtilages to combined or surface water sewers. It excludes, unless adopted by the SU, systems that do not connect directly to the wastewater network, e.g. Sustainable Drainage Systems (SuDS) or highway drainage. At present, Thames Water do not adopt most forms of SuDS systems, however they will adopt conventional piped surface water drainage systems downstream of private or third-party SuDS, where these drain the building curtilage.

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. In some areas of Wokingham, there are known issues of surface water causing localised flooding. Strategic schemes to provide improved local surface water drainage may be required in such areas, rather than solely relying upon on-site soakaways on brownfield or infill plots.

### 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

Thames Water were provided with a list of the sites and forecast housing numbers. Using this information, they were asked to assess each site using the range of datasets they hold.

Due to the large number of sites, identified in the call for sites process, a detailed site by site assessment of the wastewater network was not practical. Thames Water therefore carried out an assessment at the wastewater catchment scale based on current headroom. A RAG score was then applied to each development site based on the wastewater catchment they were in, and the size of the development.

Developments with less than 50 homes in an area of very low or low headroom concern were given a green rating. Sites larger than 50 homes, or developments in an area of moderate, high or very high headroom concern were given an amber score on the basis that some network reinforcement would be required.

The following red / amber / green traffic light definition was used to score each site:

Capacity available to serve the proposed growth	Infrastructure and/or treatment work upgrades are 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.
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#### 6.3.1 Data collection

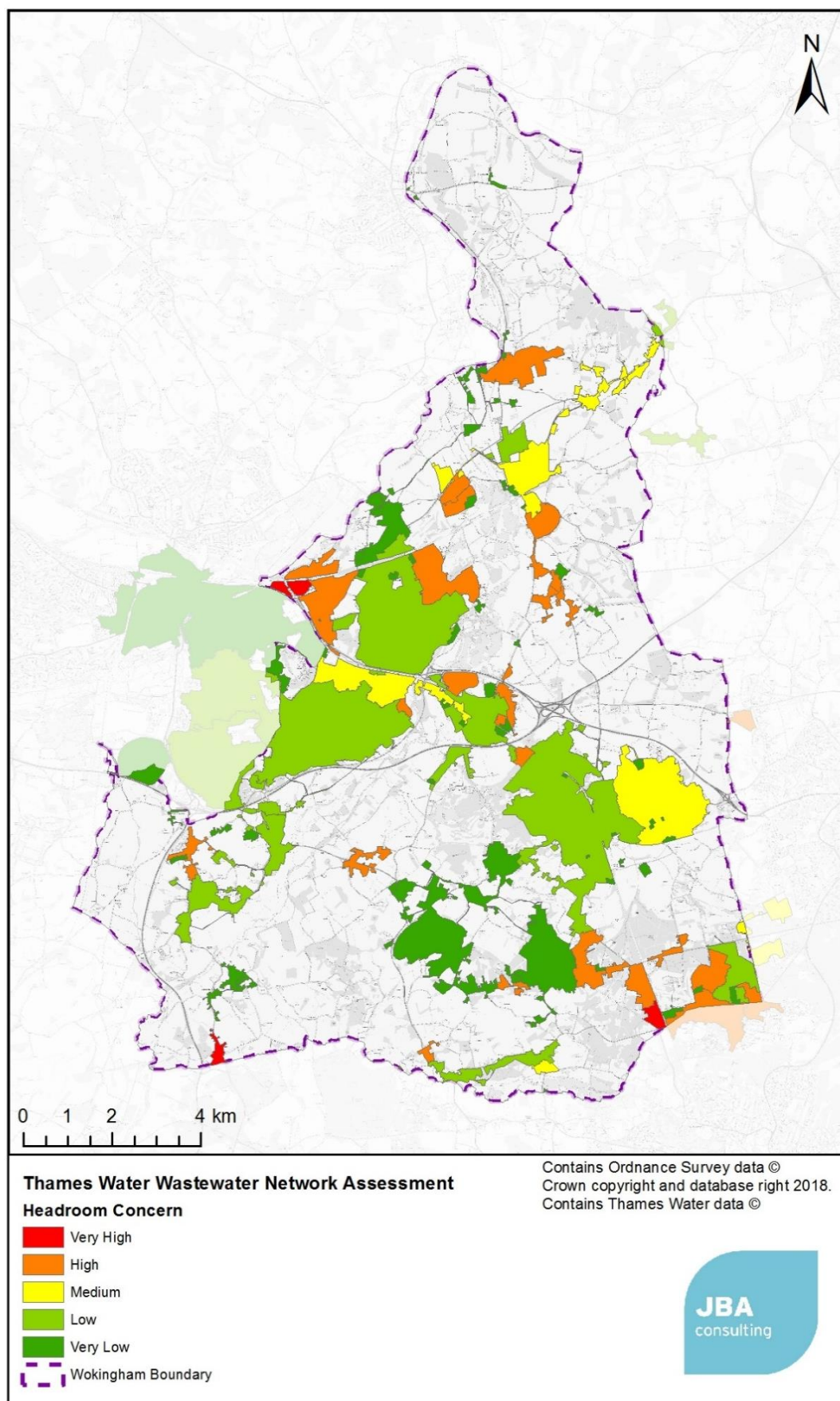
The following datasets were to assess the sewerage system capacity:

- Locations of promoted sites in GIS format (provided by Wokingham Borough Council)
- Site tracker spreadsheet (see Appendix A)
- Wastewater catchments (provided by Thames Water)

### 6.4 Results

Thames Water provided an assessment of wastewater network headroom at the wastewater catchment level. This is shown in Figure 6.1 below and represents the theoretical volume of the sewerage network in a catchment compared with the estimated current population. It is therefore a view of existing network capacity (before future growth from sites identified in the call for sites) and gives an indication of where there is capacity for additional foul flows from development sites, and where reinforcement of the network may be required.

Areas with the least capacity for future growth include the north of Earley CP, the north east of Woodley CP, Wargrave, Twyford south of the railway line, Hurst, northern Winnersh CP, Three Mile Cross, Arborfield, the western part of Finchampstead CP, and Riseley.



**Figure 6.1 Wastewater catchment assessment provided by Thames Water**

Thames Water provided additional comments on wastewater network capacity:

*"Grazeley/Shinfield – This area drains to either Reading STW or to Wargrave STW. Due to ongoing and recent development in this area, any further increase in flows require further analysis to understand the risk of detriment to the existing sewerage system. During previous consultations concerning the Grazeley strategic development location, Thames Water have advised that foul wastewater flows should drain to the Reading catchment and not to the pumping stations that are part of the Wargrave STW catchment. Additionally, flows from Grazeley should not discharge to 3 Mile Cross SPS."*

*"Further additions to the Arborfield sewerage network should be assessed carefully as it is believed that the catchment is approaching capacity based on previous growth modelling ahead of the Garrison development."*

*"The strategic development area at Twyford is likely to require a more detailed assessment as the development would represent a significant % increase in flow from this part of the Wargrave catchment."*

## 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. Early engagement with Thames Water is required, and further modelling of the network may be required once a preferred options list of sites is defined.

Areas where the current sewerage network is more constrained, and consequently require more extensive upgrades / reinforcement include, the north of Earley CP, north east of Woodley CP, Wargrave, Twyford south of the railway line, Hurst, northern Winnersh CP, Three Mile Cross, Arborfield, the western part of Finchampstead CP, and Riseley.

Any development proposals planned within the Arborfield catchment, and around Twyford will require a more detailed assessment due to the quantity of growth, and the network constraints in those areas.

**Further study of the wastewater network is recommended as part of a Phase 2 Water Cycle Study.**

## 6.6 Recommendations

**Table 6.1 Recommendations for wastewater network infrastructure**

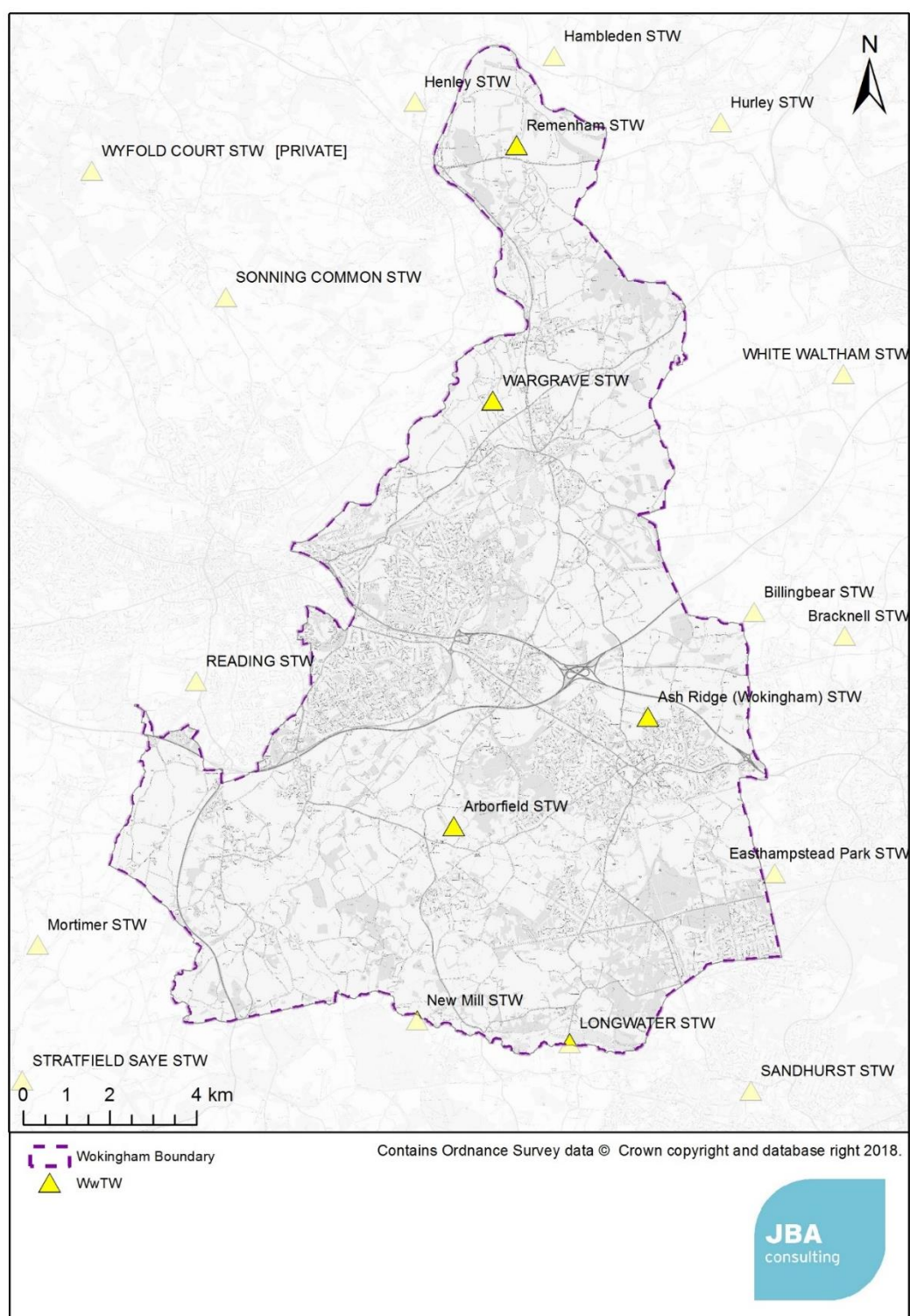
Action	Responsibility	Timescale
Take into account wastewater infrastructure constraints in phasing development in partnership with the sewerage undertaker	WBC TW	Ongoing
Developers will be expected to work with the sewerage undertaker closely and early in the planning promotion process to develop an outline Drainage Strategy for sites. The Outline Drainage strategy should 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.	TW 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 Wokingham

There are five WwTW within Wokingham that are operated by Thames Water. Three of these are likely to serve growth within Wokingham Borough. In addition, there are four WwTW in neighbouring authority areas that are likely to serve growth from within Wokingham. The location of these WwTW is shown in Figure 7.1 below.



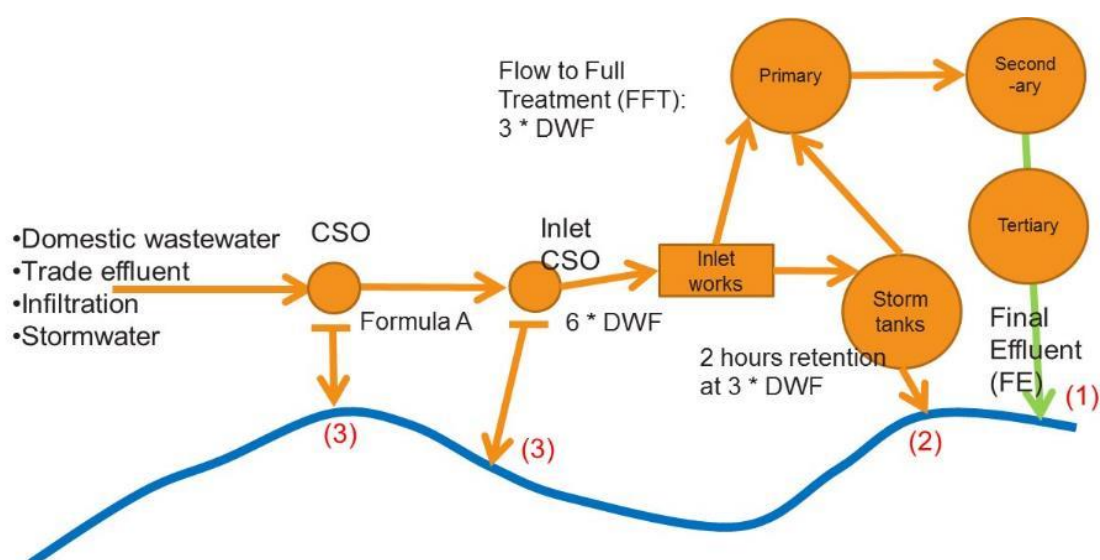
**Figure 7.1 Location of WwTWs**

## 7.2 Wastewater Treatment Works Flow Permit Assessment

### 7.2.1 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 7.2 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 7.2 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 m<sup>3</sup>/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 (NH<sub>4</sub>). 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.

### 7.3 Methodology

Thames Water were provided with the list of proposed development sites and the potential housing numbers for each site (See Appendix A). TW were then invited to provide an assessment of the receiving WwTW and provide any additional comments about the impacts of the development.

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

- Calculate the current measured Dry Weather Flow (DWF). This was calculated as the 80-percentile exceedance flow for the period January 2013 to December 2017.
- The flow data was cleaned to remove zero values and low outlier values which would bring the measured DWF down.
- Potential development sites and existing commitments were assigned to a WwTW using the sewerage drainage area boundaries.
- For each site, the future DWF was calculated using the occupancy rates and per-capita consumption values obtained from the Water Resource Management Plans (Table 7.1), and the assumption that 95% of water used is returned to sewer. Permitted headroom was used as a substitute for actual designed hydraulic capacity for each WwTW being assessed.

**Table 7.1 Values used in water demand calculations**

Water Company	Water Resource Zone	Occupancy rate (persons per dwelling)	Per capita consumption (m <sup>3</sup> /person/day)
South East Water	WRZ4	2.47	0.126
Thames Water	Henley	2.4	0.143
Thames Water	Kennet Valley	2.4	0.135

The demand forecast contains data from all of the sites identified in the call for sites process, however not all of these sites will be taken forward in the Local Plan. It is possible that all of the sites in a particular catchment are adopted, and for that reason wastewater demand has been calculated at a number of different growth levels; 20%, 40%, 60%, 80%, 100% and 120%. The 20% growth scenario applied across each catchment would allow Wokingham's housing need to be met.

The following red / amber / green traffic light definition was used by TW to score each site:

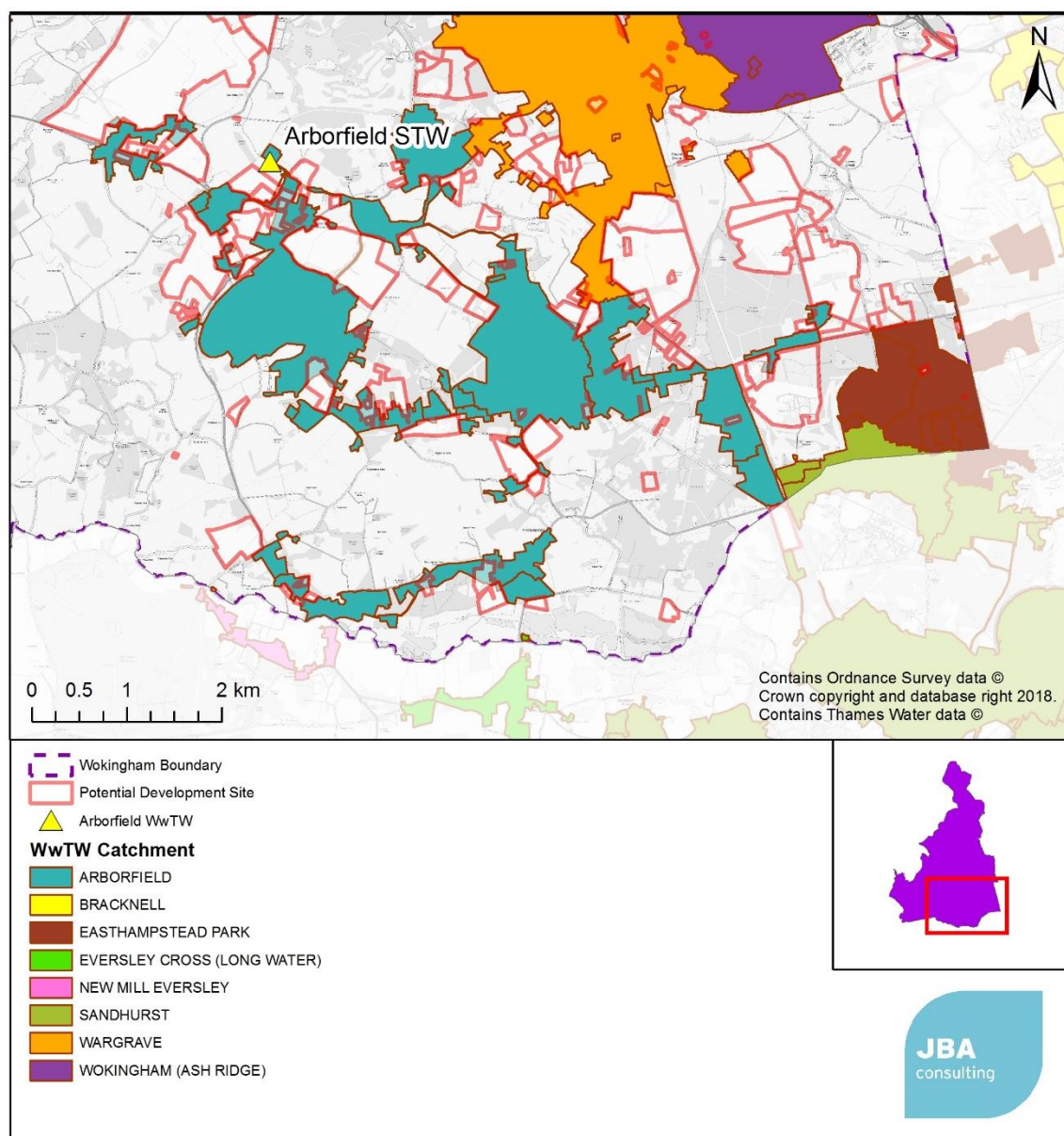
Capacity available to serve the proposed growth	Infrastructure and/or treatment upgrades will be required to serve proposed growth, but no significant constraints to the provision of this infrastructure have been identified	Infrastructure and/or treatment upgrades will be required to serve proposed growth.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

### 7.4.1 Arborfield WwTW

Arborfield WwTW is located north east of Arborfield Cross, and has a catchment that covers Arborfield Garrison, Arborfield Cross, Finchampstead and Barkham (Figure 7.3).



**Figure 7.3 Arborfield WwTW catchment**

Thames Water advised that modelling conducted for the Arborfield Garrison development showed that the Arborfield catchment was approaching capacity. This is supported by the flow permit assessment conducted by JBA and shown in Figure 7.4.

A new permit was applied to this WwTW in 2018, along with associated upgrades. This allowed an increased effluent discharge from the works, with a tighter water quality consent to ensure pollutant load did not increase. Flow data supplied by Thames Water for the period 2013 to 2017 showed that Arborfield WwTW is currently operating within its flow permit, and that the 20% growth scenario could be accommodated. The higher growth scenarios may cause its permit to be exceeded and so growth above the 20% level must be carefully phased with upgrades to the WwTW.

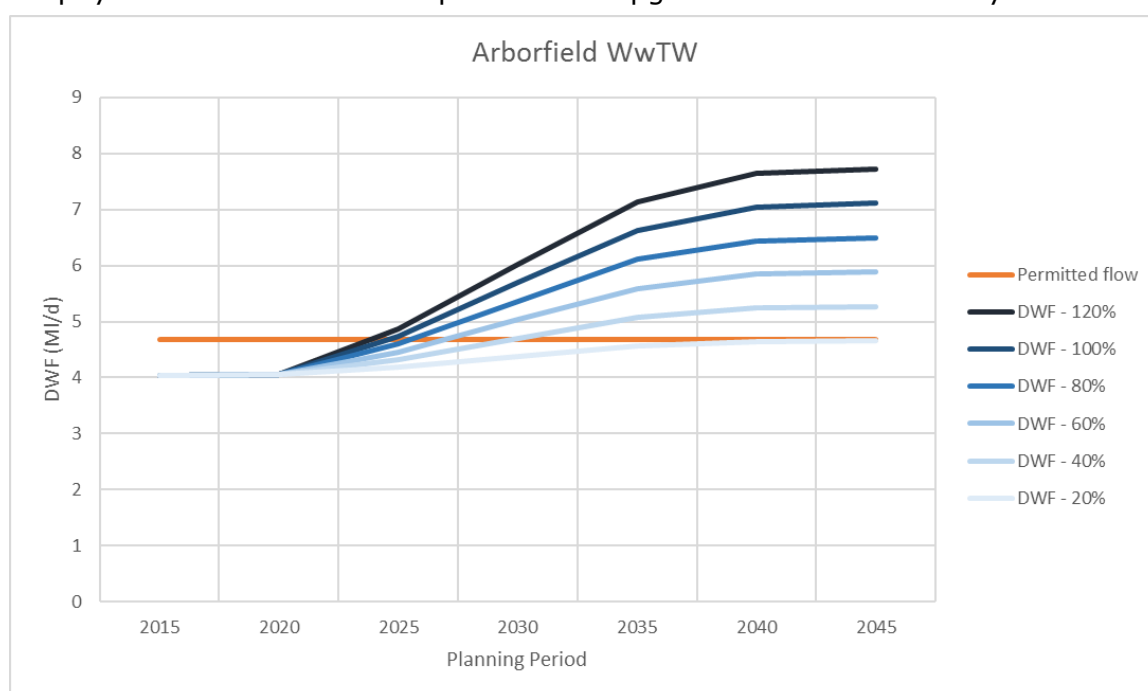


Water companies operate on a 5-yearly cycle for upgrades, with business cases being submitted for approval prior to each 5-year plan period. Thames Water advised that proposals for the 2020-25 planning period have been submitted and no upgrades were proposed for Arborfield WwTW. Figure 7.4 shows that if there were no changes to the current consent until after 2025, growth scenarios up to the 80% scenario could be accommodated.

If the 100% growth scenario were to go ahead, the capacity at Arborfield WwTW could be a constraint to growth and would require phasing of the development in the catchment to be managed in line with future upgrades.

Thames Water advised that if development was phased appropriately, they would give Arborfield WwTW an "Amber" RAG assessment. If the 100% or 120% growth scenarios were to be realised in this catchment, they would apply a "red" score.

No physical constraints to the provision of upgrades were identified by Thames Water.

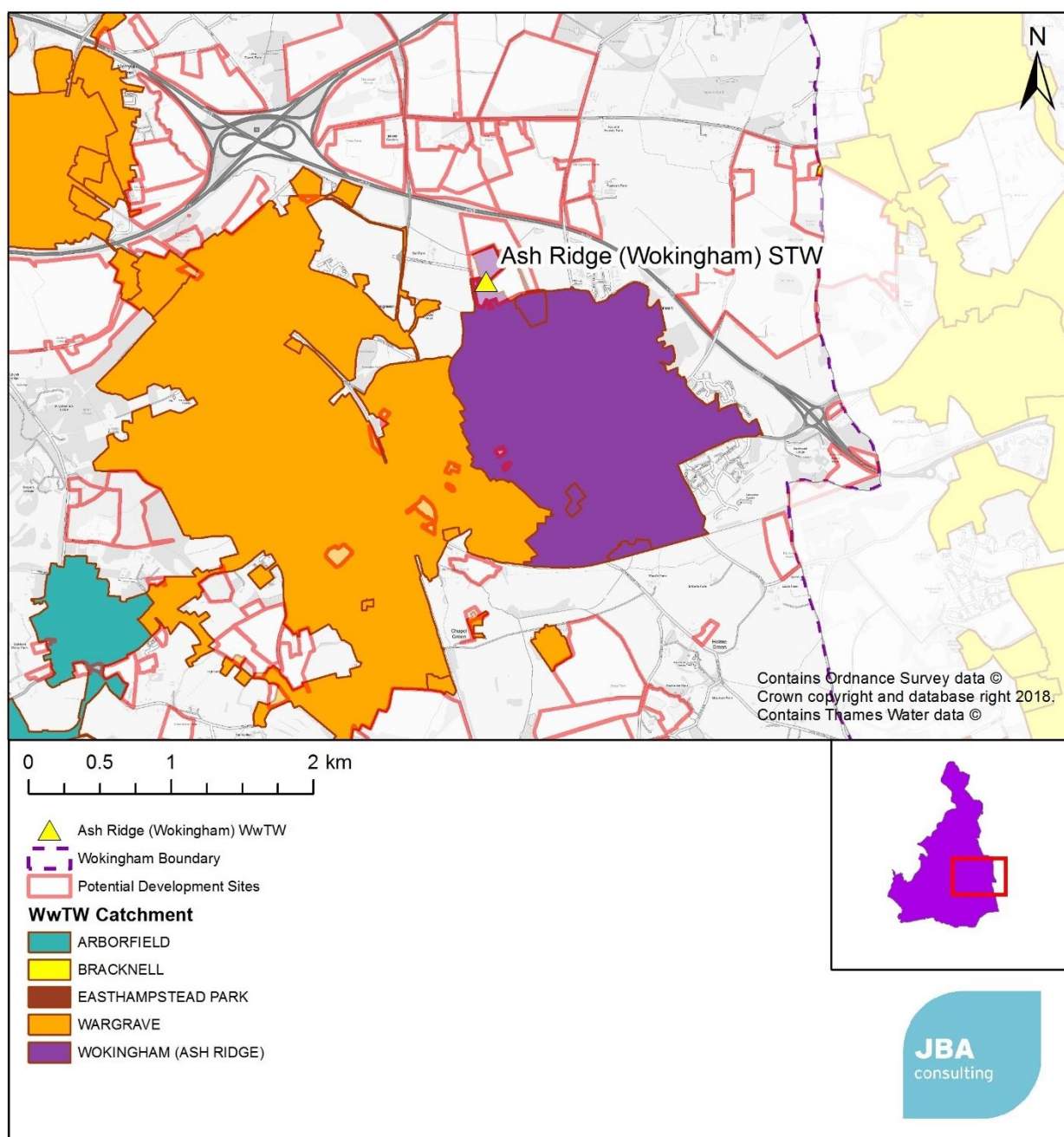


**Figure 7.4 Flow permit assessment for Arborfield WwTW**

WwTW Flow capacity RAG Score	Comments from TW
Infrastructure and/or treatment work upgrades are required to serve proposed growth, but no significant constraints to the provision of this infrastructure have been identified.	"Further additions to the Arborfield sewerage network should be assessed carefully as it is believed that the catchment is approaching capacity based on previous growth modelling ahead of the Garrison development"

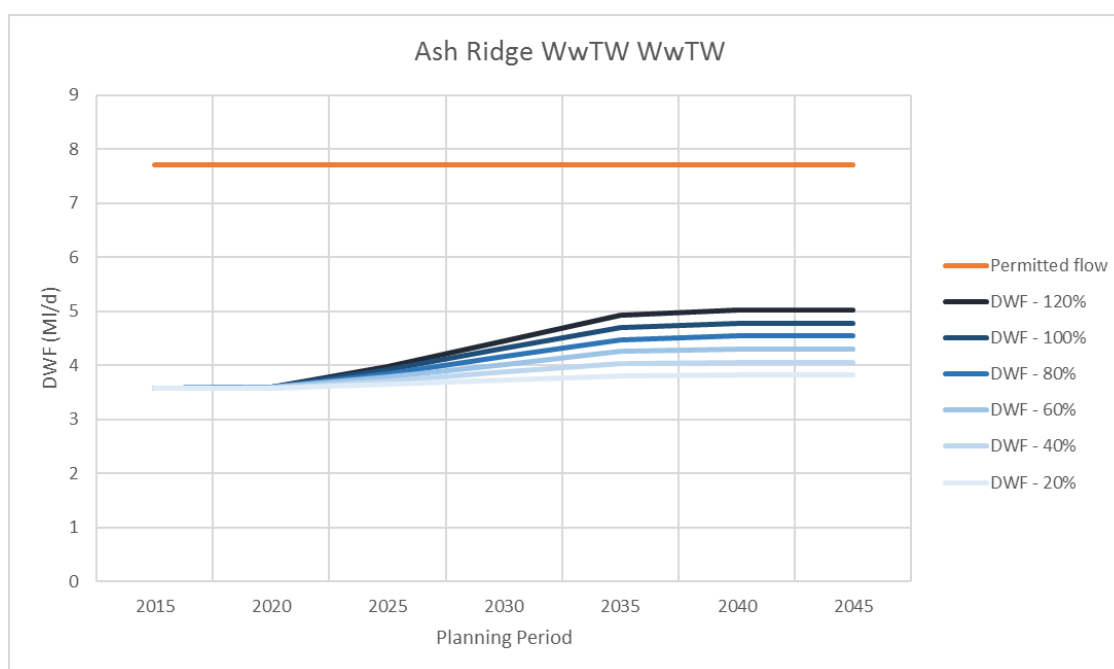
### 7.4.2 Ash Ridge (Wokingham) WwTW

Ash Ridge WwTW is located to the north of the town of Wokingham and has a catchment that covers the eastern part of Wokingham, shown in Figure 7.5 below. It is likely to serve growth between the M3 and A329(M) close to the junction.



**Figure 7.5 Ash Ridge WwTW catchment**

Comparison of the flow permit against the current and future flow from proposed development (Figure 7.6) shows that there is sufficient capacity at the treatment works to accommodate all of the sites identified in the call for sites process.

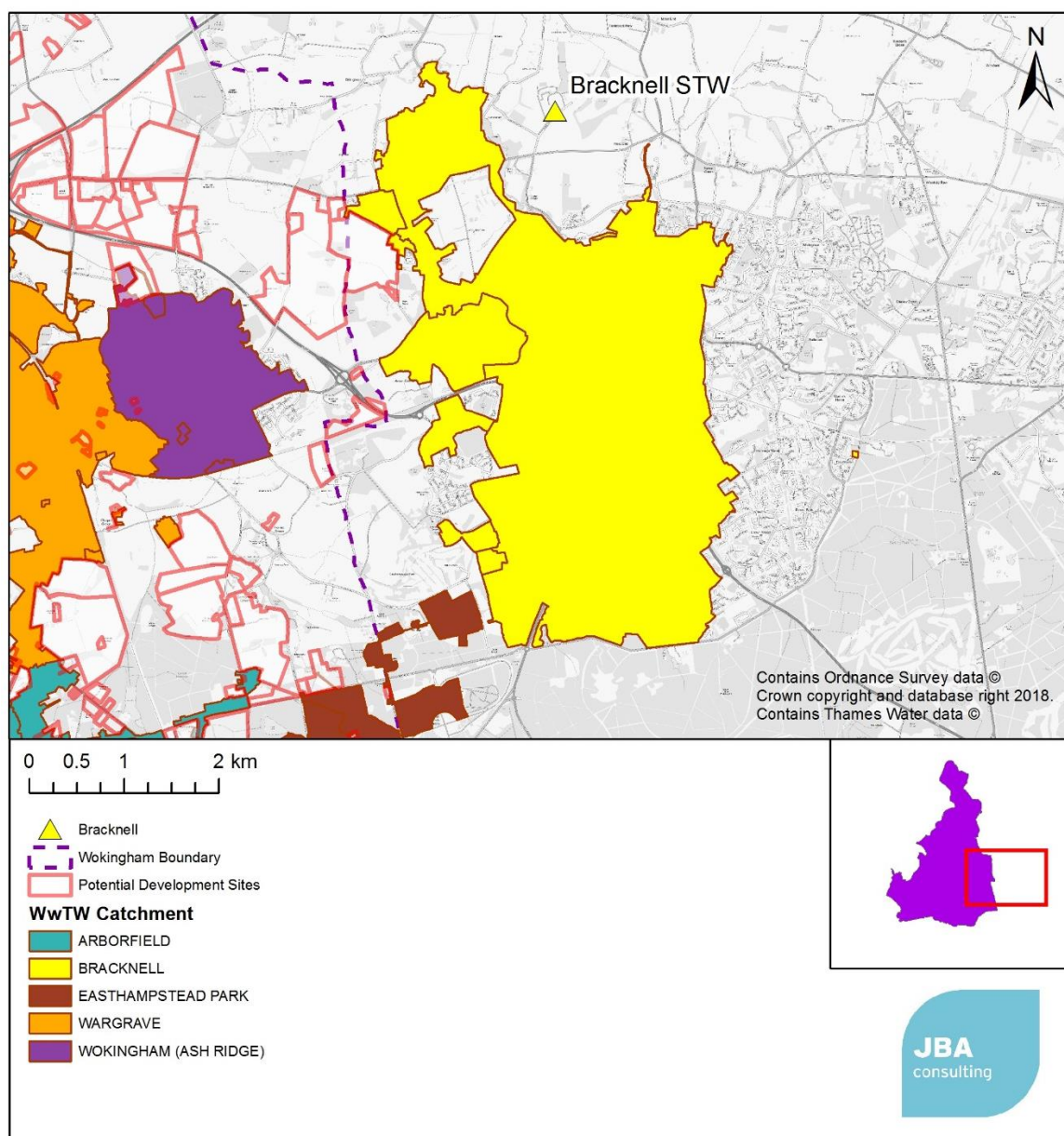


**Figure 7.6 Flow permit assessment for Ash Ridge (Wokingham) WwTW**

WwTW Flow capacity RAG Score	Comments from TW
Capacity available to serve the proposed growth	No comments provided by Thames Water

### 7.4.3 Bracknell WwTW

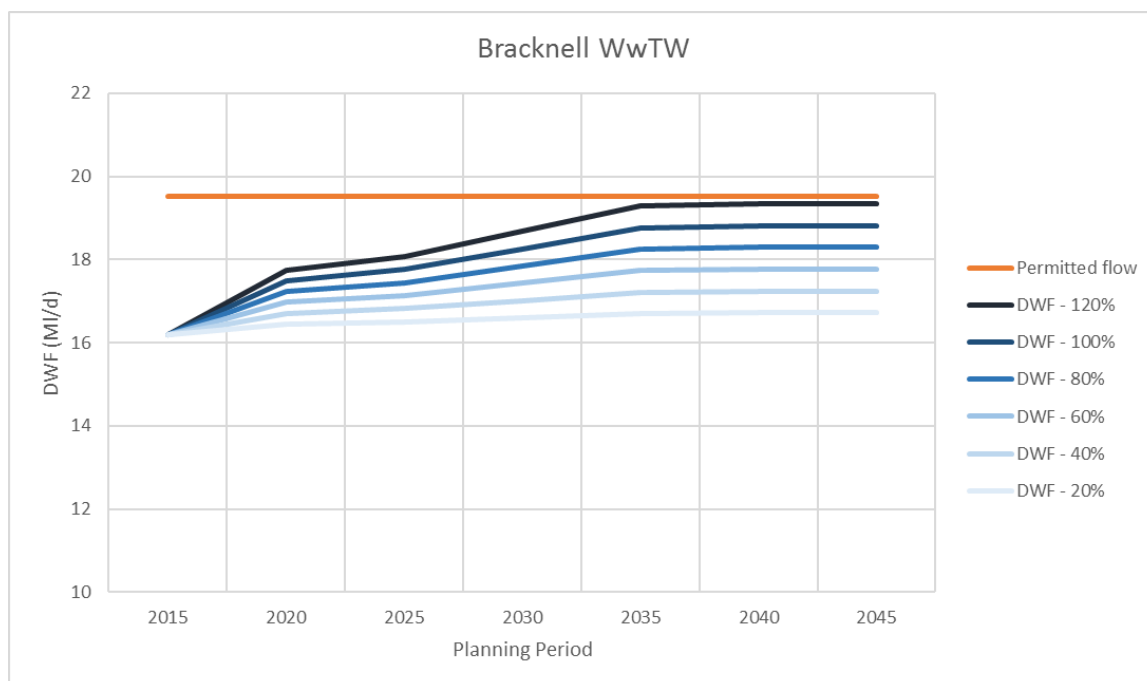
This WwTW is located north of the town of Bracknell and within the Bracknell Forest Council area. Its catchment covers most of the Bracknell town, as well as outlying areas such as Binfield. It extends into Wokingham Borough north of the M4 (Figure 7.7) and is likely to serve development sites north of the A329(M) close to the boundary with Bracknell Forest (5HU024, 5HU033, 5HU039, and 5HU045, 5WK011).



**Figure 7.7 Bracknell WwTW catchment**

The flow permit assessment conducted by JBA indicates that there is sufficient capacity at Bracknell WwTW to accommodate all of the development sites identified in the call for sites process (Figure 7.8).



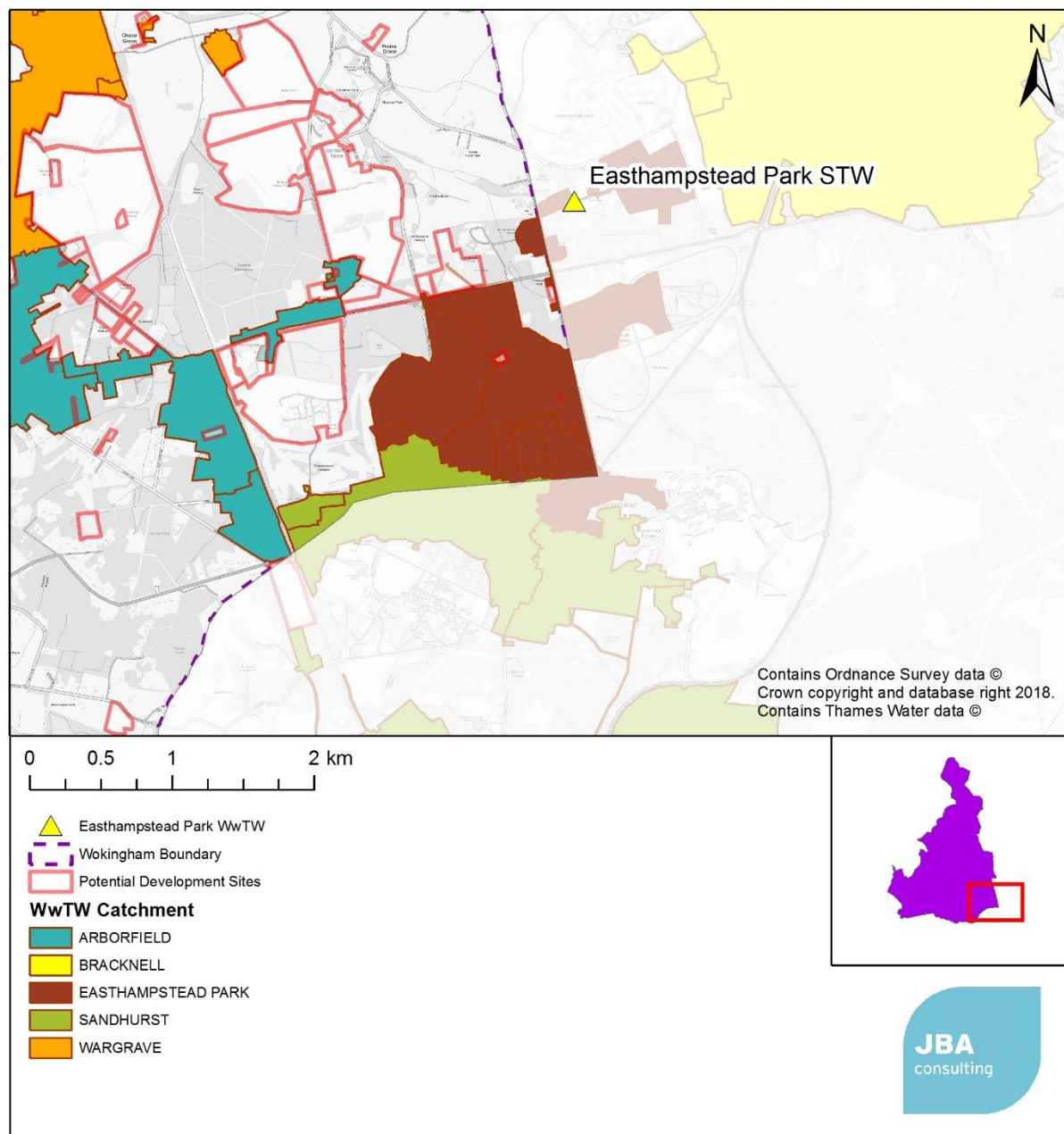


**Figure 7.8 Flow permit assessment for Bracknell WwTW**

WwTW Flow capacity RAG Score	Comments from TW
Capacity available to serve the proposed growth	No comments provided by Thames Water

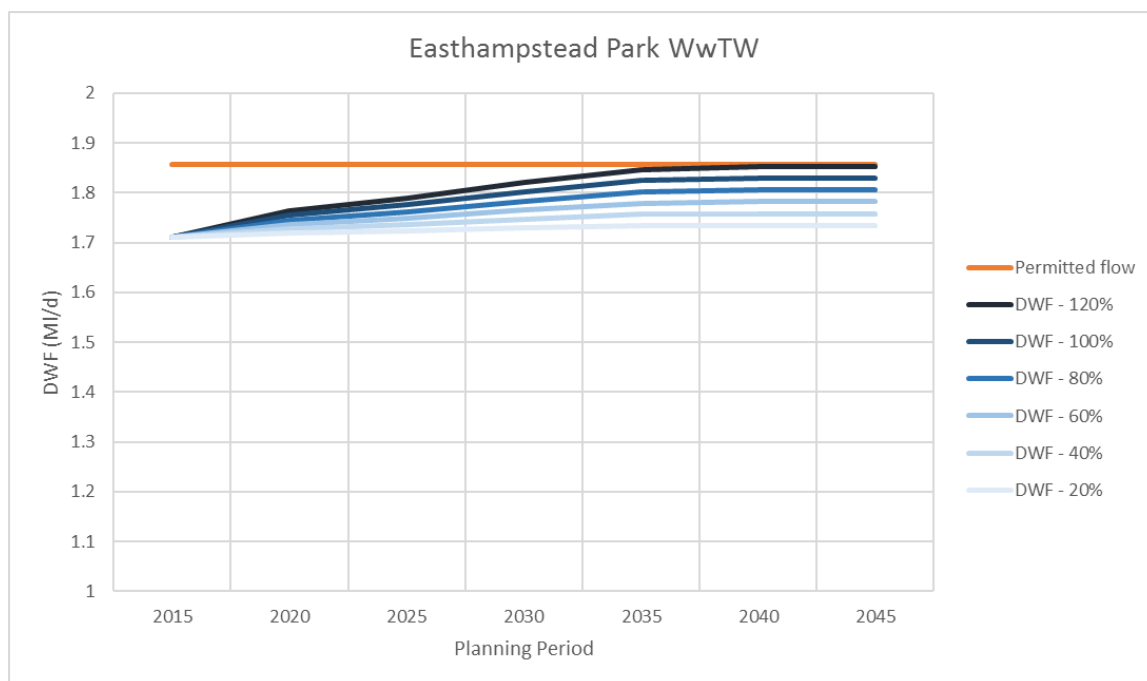
#### 7.4.4 Easthampstead Park WwTW

This WwTW is located in Bracknell Forest, close to the boundary with Wokingham. Its catchment covers the north of Crowthorne and the former Transport Research Laboratory site (Figure 7.9).



**Figure 7.9 Easthampstead Park WwTW catchment**

The flow permit assessment conducted by JBA indicates that all of the identified growth can be accommodated, however the current flow is already approaching the permit limit. Should a large development site come forward beyond those promoted by land owners and developers in the call for sites process, its flow permit may be exceeded.

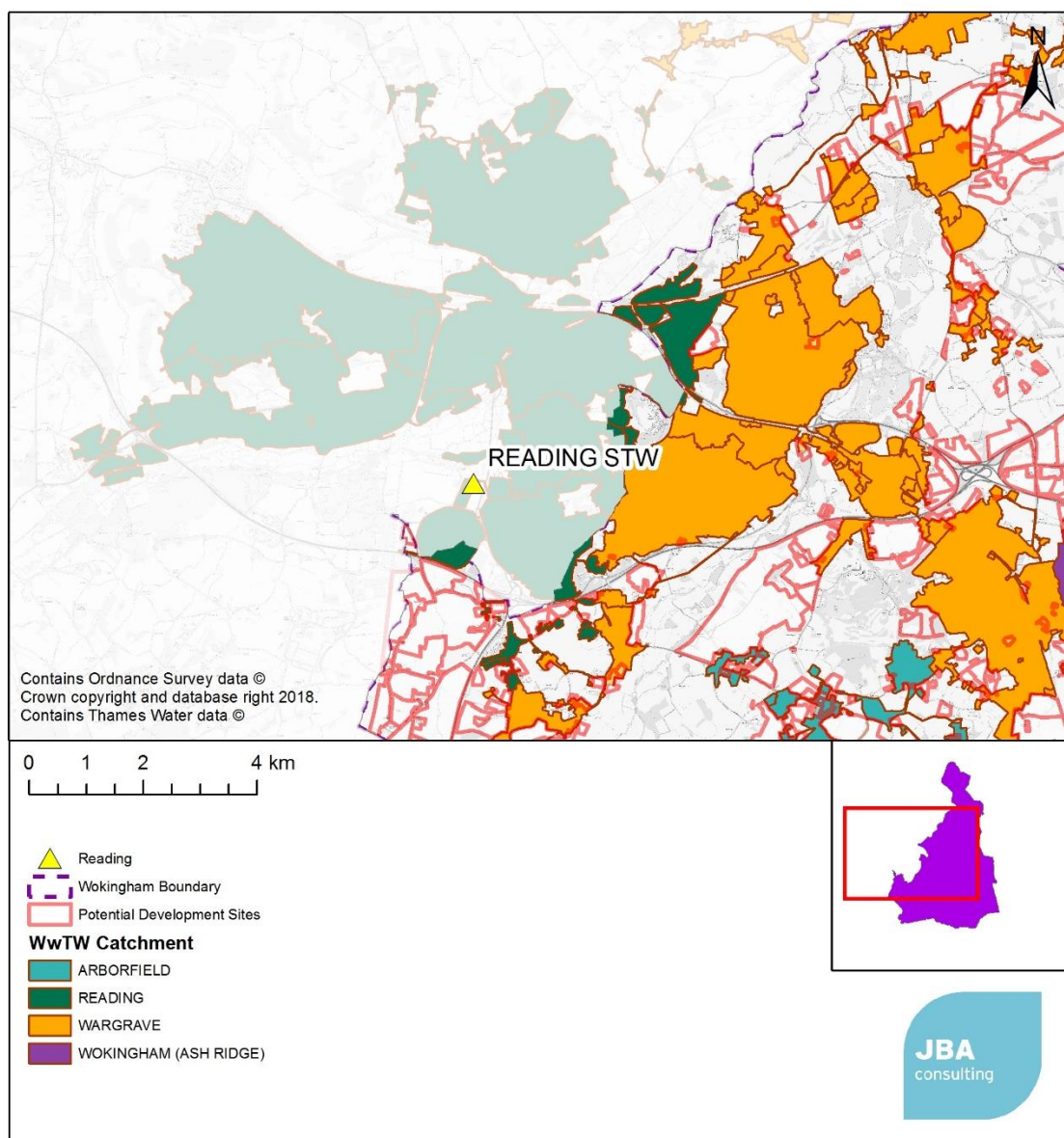


**Figure 7.10 Flow permit assessment for Easthampstead Park**

WwTW Flow capacity RAG Score	Comments from TW
Capacity available to serve the proposed growth	No comments provided by Thames Water

#### 7.4.5 Reading WwTW

Reading WwTW is located outside of Wokingham Borough on the southern side of Reading. Its catchment covers all of Reading and extends into Wokingham south of the M4 at Three Mile Cross and the western part of Woodley (Figure 7.11). It was constructed as a new WwTW, commencing service in 2004, after which the old works was decommissioned and redeveloped for housing and commercial uses.

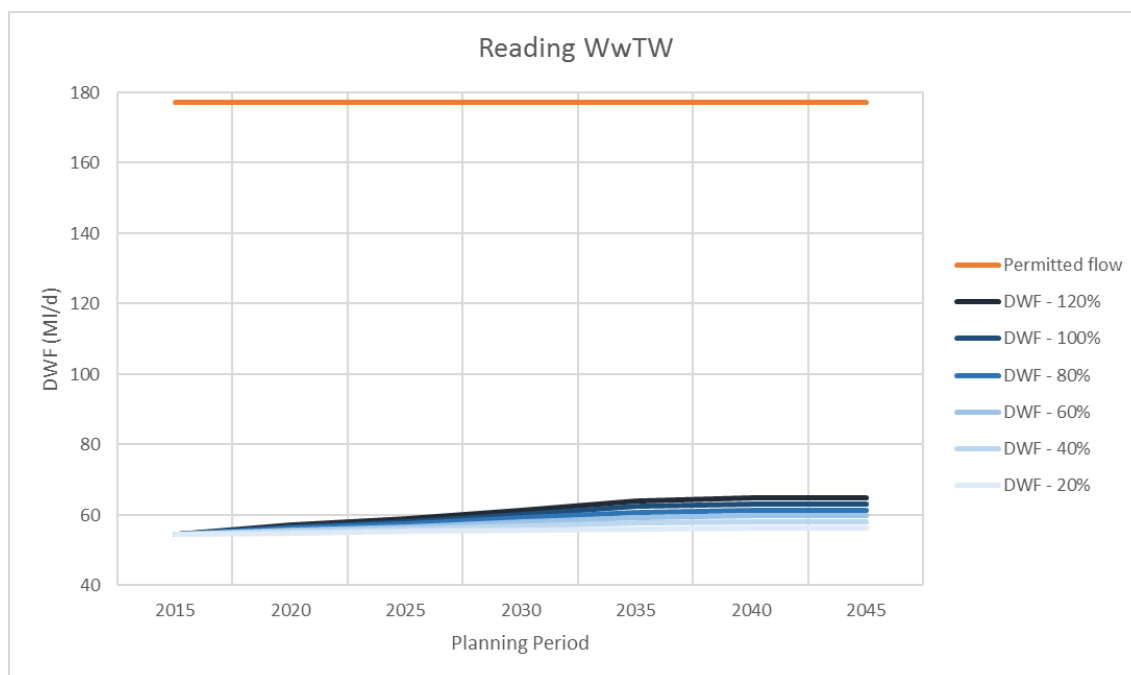


**Figure 7.11 Reading WwTW catchment**

The flow permit assessment conducted by JBA (Figure 7.12) showed this WwTW has considerable headroom. This is supported by the Water Quality Assessment carried out by Reading Borough Council (2018)<sup>52</sup>.

52 Water quality Assessment, Reading Borough Council (2018). Accessed online at: [http://www.reading.gov.uk/media/8689/EV029-Water-Quality-Assessment-March-2018/pdf/EV029\\_Water\\_Quality\\_Assessment\\_March\\_2018.pdf](http://www.reading.gov.uk/media/8689/EV029-Water-Quality-Assessment-March-2018/pdf/EV029_Water_Quality_Assessment_March_2018.pdf) on: 31/10/2018  
2018s0545 Wokingham WCS Phase 1 v4.0



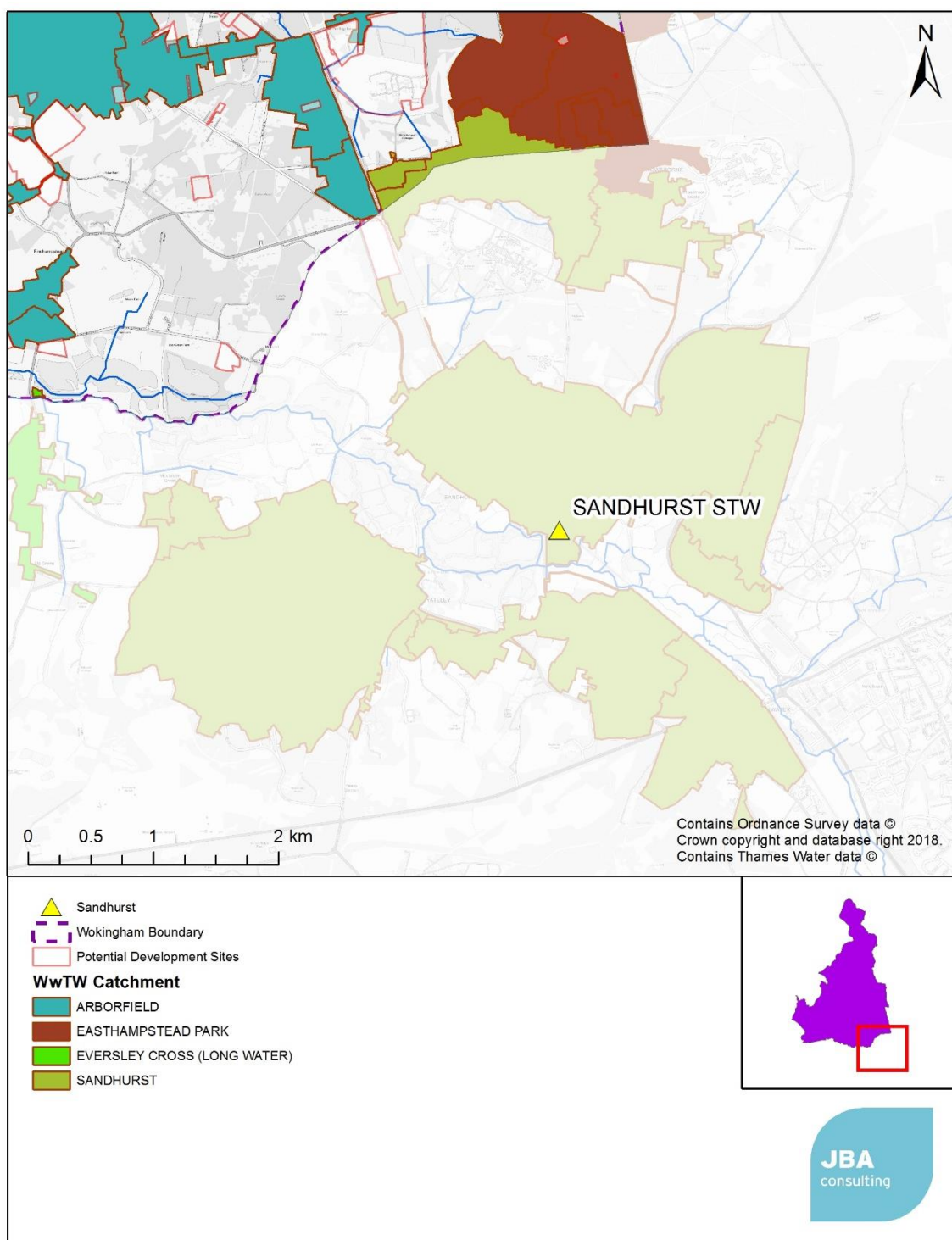


**Figure 7.12 Flow permit assessment for Reading WwTW**

WwTW Flow capacity RAG Score	Comments from TW
Capacity available to serve the proposed growth	No comments provided by Thames Water

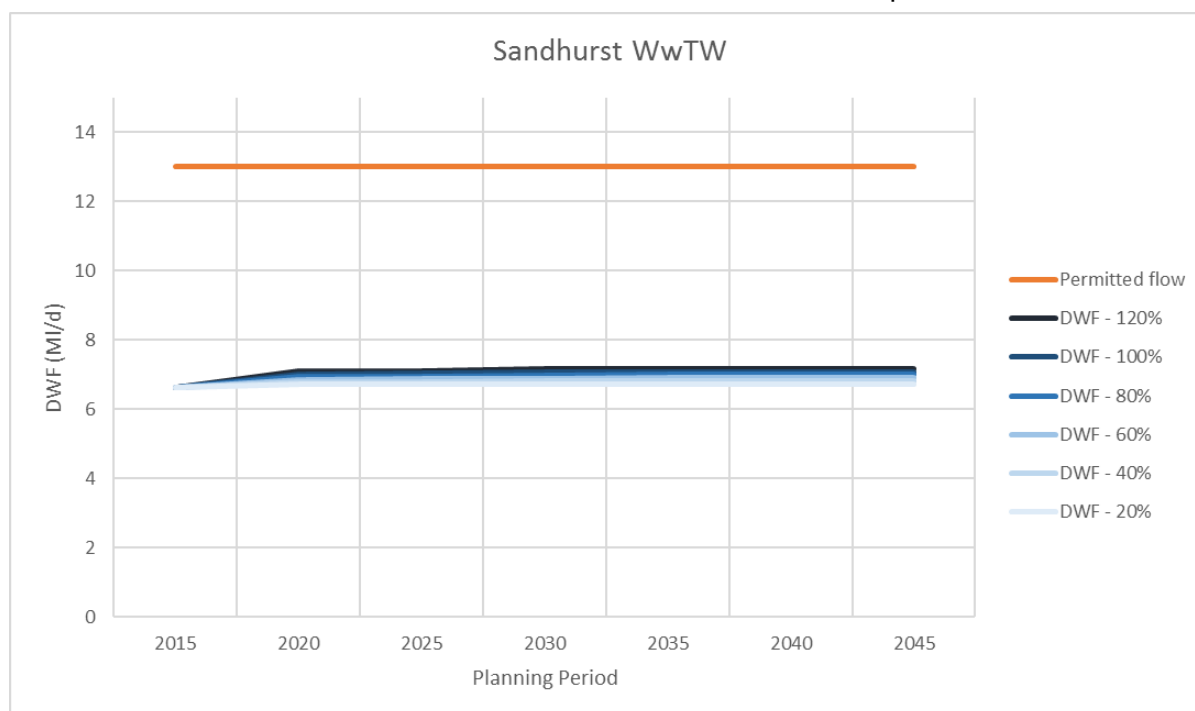
#### 7.4.6 Sandhurst WwTW

Sandhurst WwTW is located in Bracknell Forest south of the town of Sandhurst, and has a catchment that covers Yateley, Sandhurst, Blackwater, and the southern part of Crowthorne. It extends into Wokingham west of Crowthorne.



**Figure 7.13 Sandhurst WwTW catchment**

The flow permit assessment (Figure 7.14) indicates that there is sufficient headroom to accommodate all of the sites identified in the call for sites process.

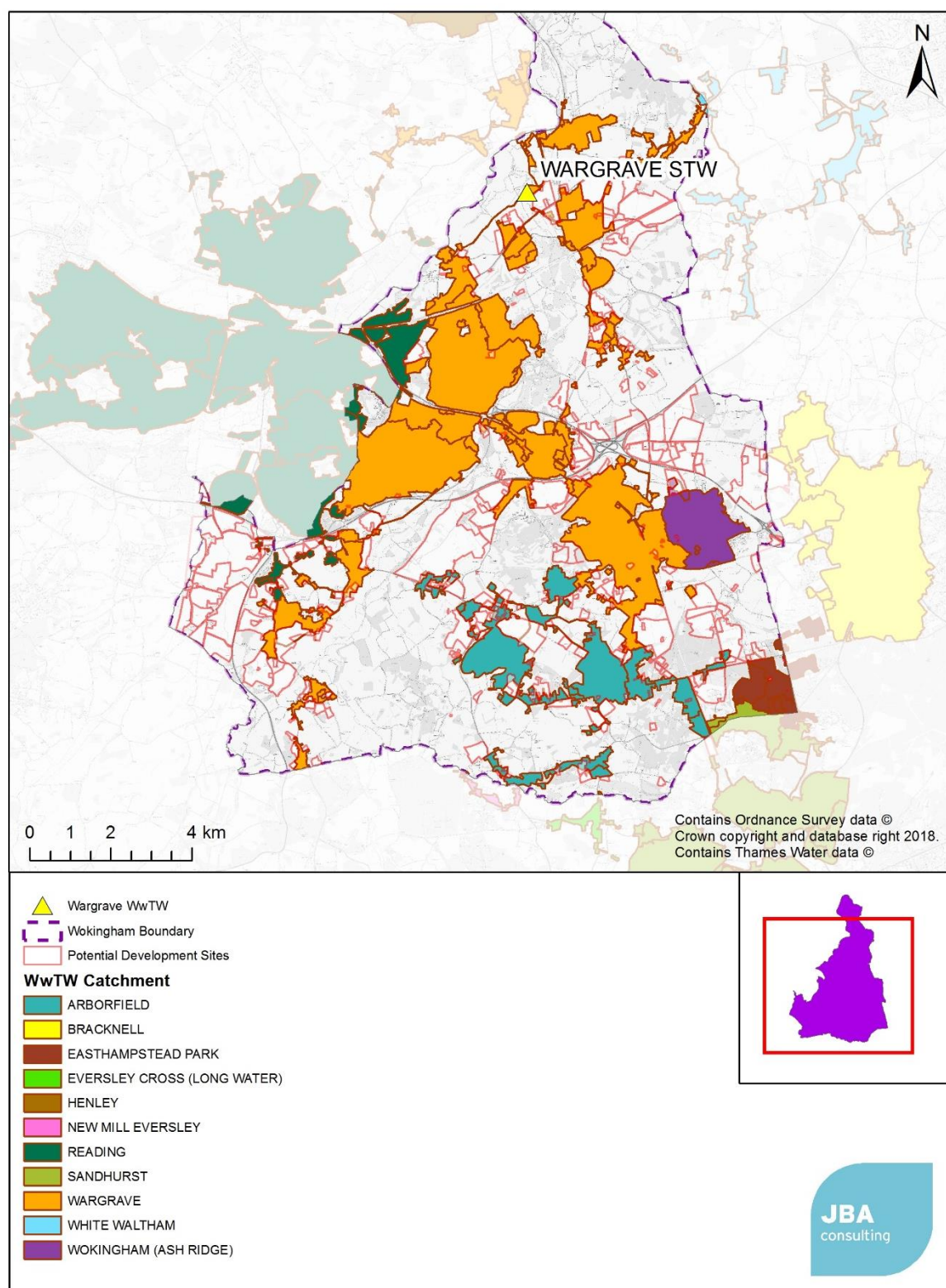


**Figure 7.14 Flow permit assessment for Sandhurst WwTW**

WwTW Flow capacity RAG Score	Comments from TW
Capacity available to serve the proposed growth	No comments provided by Thames Water

#### 7.4.7 Wargrave WwTW

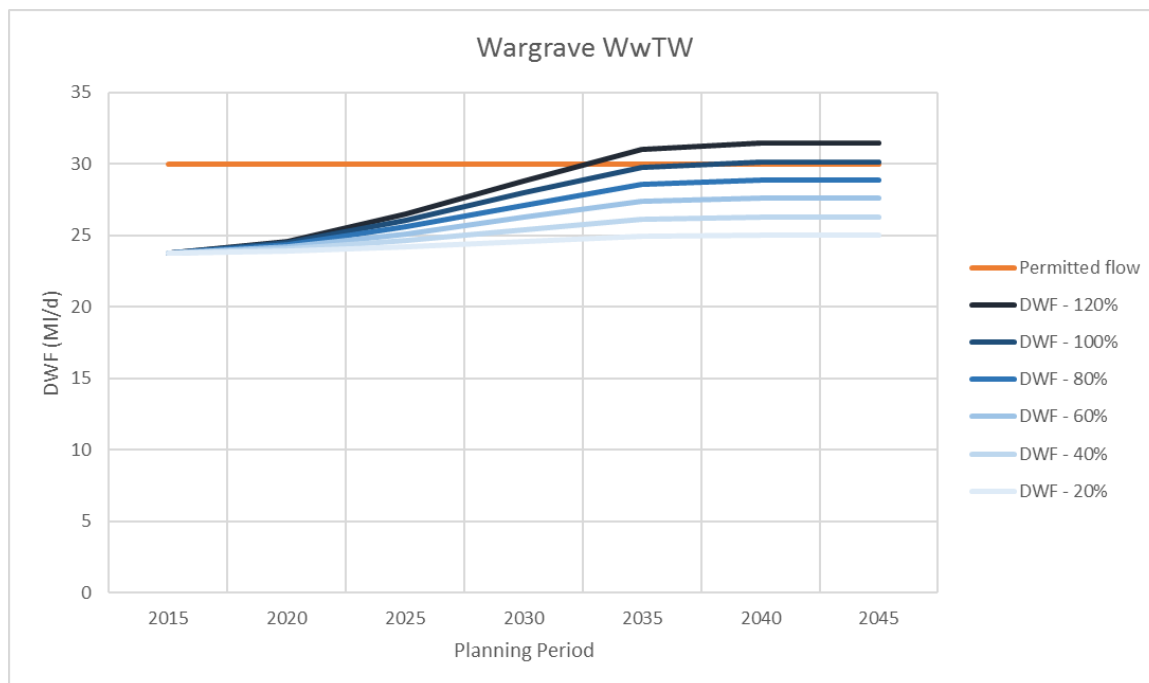
Wargrave WwTW is located in the northern part of the Borough between Twyford and Wargrave. It has an extensive catchment that includes Twyford, Winnersh, much of Woodley, and Wokingham Town, and extends to Wokingham's southern boundary at Riseley (Figure 7.15).



**Figure 7.15 Wargrave WwTW catchment**



The flow permit assessment (Figure 7.16) indicates that there is sufficient headroom to accommodate 80% of the sites identified in the call for sites process, however higher levels of growth will require an upgrade to the WwTW and an increase in its flow permit.



**Figure 7.16 Flow permit assessment for Wargrave WwTW**

WwTW Flow capacity RAG Score	Comments from TW
Infrastructure and/or treatment work upgrades are required to serve proposed growth, but no significant constraints to the provision of this infrastructure have been identified.	No comments provided by Thames Water

#### 7.4.8 Remenham and Longwater WwTW

Remenham WwTW is located in the north of Wokingham Borough and serves a very small wastewater catchment, discharging to groundwater. It is not expected to serve any new growth during the Local Plan period and so has not been assessed in this study.

Longwater WwTW is located on the north bank of the River Blackwater. This is also a small works and is not expected to serve any growth in the Local Plan period, and has not been assessed in this study.

## 7.5 Conclusions

Flow permit assessments were carried out at all of the WwTW that are expected to serve growth in the Local Plan period. Bracknell, Reading, and Sandhurst WWTWs have sufficient capacity to serve all of the sites identified in the call for sites process. Easthampstead Park has capacity but is very close to its DWF permit limit and could exceed this should additional sites be identified. Wargrave WwTW can accommodate up to 80% of the sites identified but would exceed its permit level should growth exceed this. Arborfield WwTW has capacity to accommodate all of the sites in the 20% growth scenario, but growth above this level would require upgrades. No upgrades have been

planned for in the 2020-25 plan period, and so capacity at this works may be a constraint to growth in the 100% and 120% growth scenarios.

**No further assessment of wastewater treatment infrastructure is required as part of a phase 2 study; however, the flow permit assessment should be re-visited once a preferred options list of sites is defined.**

## 7.6 Recommendations

**Table 7.2 Recommendations for wastewater treatment**

Action	Responsibility	Timescale
Consider the available WwTW capacity when phasing development going to the same WwTW. This is particularly the case for developments to be served by Wargrave and Arborfield WwTWs, until such time as there is sufficient available evidence that headroom capacity is not an issue.	WBC	Ongoing
Provide Annual Monitoring Reports to Thames Water detailing projected housing growth in the Local Authority.	WBC	Ongoing
Thames Water to assess growth demands as part of their wastewater asset planning activities and feedback to WBC if concerns arise.	TW WBC	Ongoing

## 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. Thames Water have advised a distance of 800m should be used as a screening distance for development sites.

Another important aspect is the location of the site in respect to the WwTW. Historic wind direction records for sites around Wokingham indicate that the prevailing wind is from south southwest (Farnborough) to west southwest / southwest at (Heathrow) recorded at METAR weather stations<sup>53</sup>.

A red / amber / green assessment was applied:

Site is unlikely to be impacted by odour from WwTW	Site location is such that an odour impact assessment is recommended	Site is in an area with confirmed WwTW odour issues
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#### 8.2.1 Data Collection

The datasets used to assess the impact of odour from a WwTW were:

- Site location in GIS format (provided by WBC)
- WwTW locations (from "Consented discharges to controlled waters with conditions" database)
- Site tracker spreadsheet (see Appendix A)

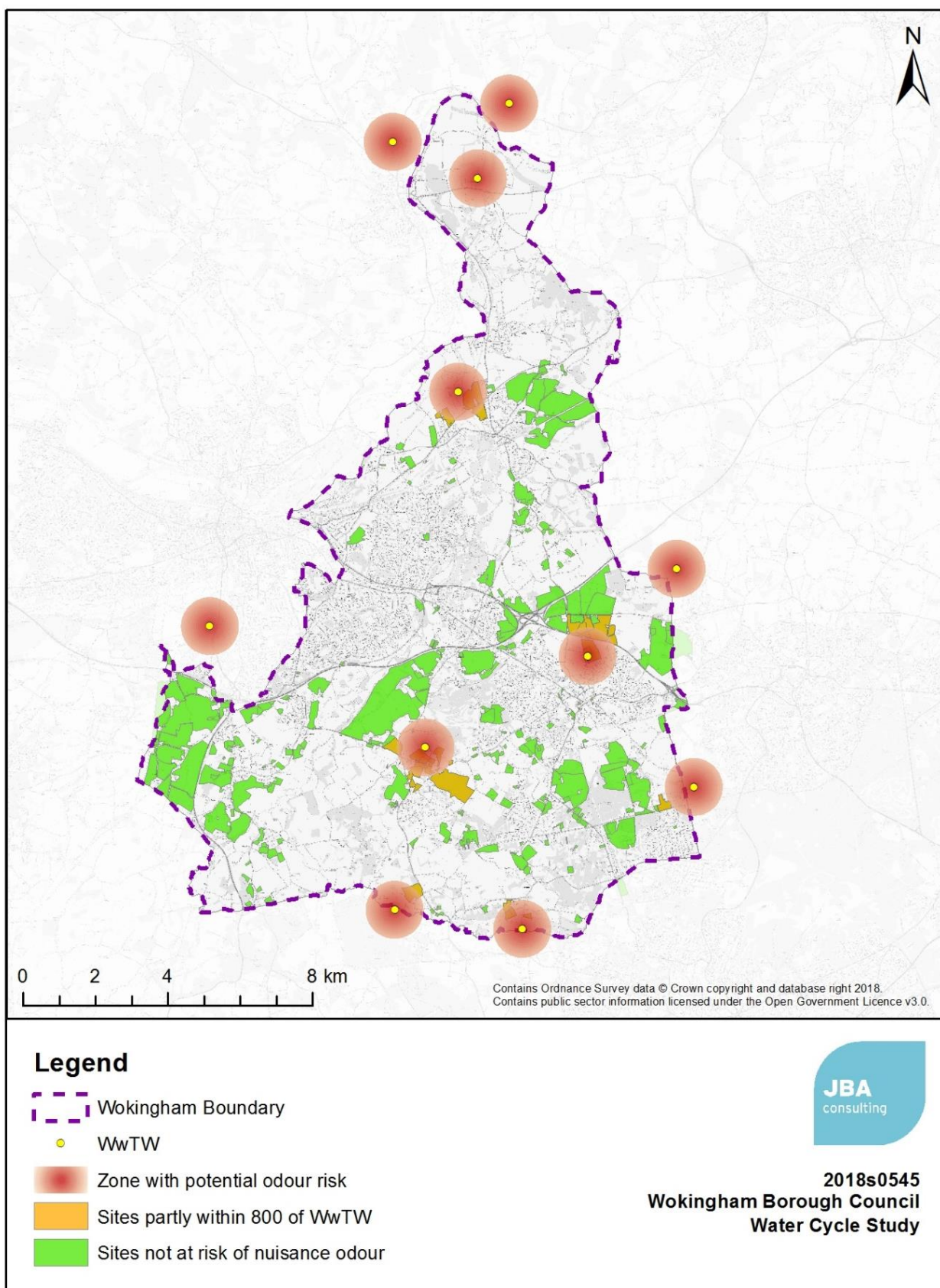
### 8.3 Results

There are 36 potential development sites that are within 800m of a WwTW, 16 of which would be closer to the WwTW than the existing urban area. A full list of sites is contained in Table 8.1, and shown graphically in Figure 8.1.

**Table 8.1 Sites with a potential risk of nuisance odour**

WwTW	Site Ref.	Distance from WwTW	Direction to WwTW	Encroaches closer than existing urban area (Y/N)
Arborfield	5AR007	141	NE	Y
	5AR008	438	NNE	N
	5AR009	261	NNE	Y
	5AR010	440	NNE	N
	5AR016	542	SE	Y
	5AR018	754	NNE	N
	5AR020	656	E	N
	5AR021	410	N	N
	5AR022	390	NNW	Y
	5BA010	665	NNW	N
	5BA013	770	NNW	Y
	5BA014	313	NNW	N
	5BA015	507	N	N
	5BA016	641	NNW	Y
	5BA026	247	WNW	N
Ash Ridge (Wokingham)	5HU009	645	SSE	N
	5HU010	506	S	N
	5HU015	503	SSW	N
	5HU020	728	SSE	N
	5HU023	699	S	N
	5WK002	13	NW	Y
	5WK009	0	N	Y
Easthampstead Park	5WW001	607	NNE	N
	5WW002	773	ENE	N
Longwater	5FI013	410	SSE	Y
	5FI014	777	SSE	N
	5FI037	615	SSE	N
	5FI047	330	S	Y
New Mill (Eversley Cross)	5FI039	436	WSW	N
Wargrave	5CV001	529	NE	Y
	5TW005	604	NW	Y
	5TW007	154	WNW	Y
	5TW009	652	WNW	Y
	5TW010	599	NW	Y
	5TW011	158	WNW	Y





**Figure 8.1 Location of development sites relative to WwTW**

## 8.4 Conclusions

36 sites are within 800m of a WwTW and 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. Thames Water recommend an odour assessment is carried out on these sites, and the cost of this should be borne by the developer.

**No further assessment of odour is recommended as part of a phase 2 WCS. Any future assessment should be carried out as part of the planning process.**

## 8.5 Recommendations

**Table 8.2 Recommendations for odour assessment**

Action	Responsibility	Timescale
Consider odour risk in the sites identified to be potentially at risk from nuisance odour	WBC	Ongoing
Carry out an odour assessment for 'amber' assessed sites.	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<sup>54</sup> (now withdrawn) set out a hierarchy for how the no-deterioration requirements of the WFD should be implemented on inland waters and in the absence of new guidance remain the most relevant document. 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"<sup>55</sup> 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.

54 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](http://www.fwr.org/WQreg/Appendices/No_deterioration_and_the_WFD_50_12.pdf) on: 29/10/2018

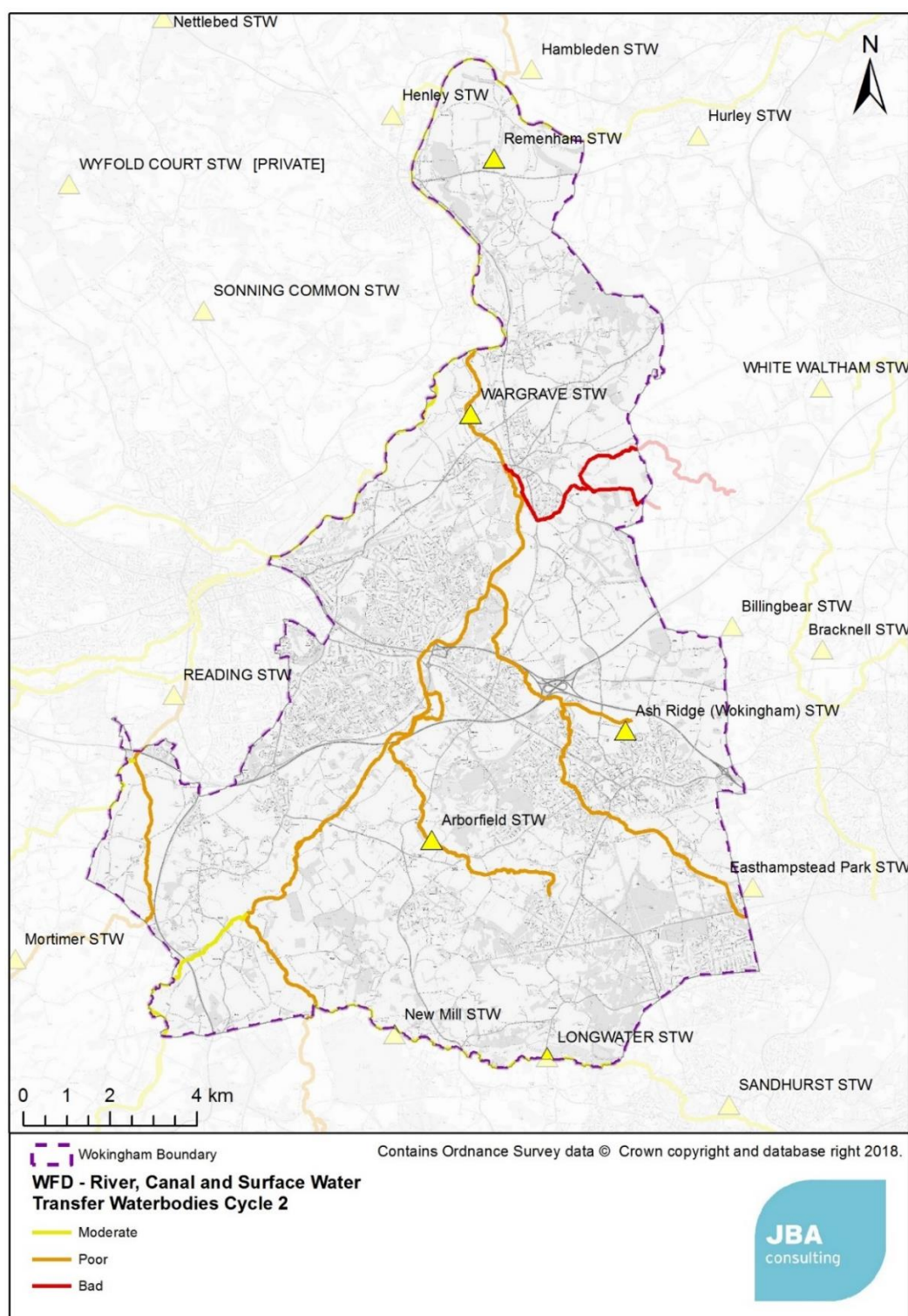
55 PRESS RELEASE No 74/15, European Court of Justice (2015). Accessed online at: <https://curia.europa.eu/jcms/upload/docs/application/pdf/2015-07/cp150074en.pdf> on: 20/12/2018



## 9.3 Results

### 9.3.1 Overview

Figure 9.1 shows the Cycle 2 Water Framework Directive overall waterbody classifications for watercourse in or close to Wokingham, and the location of WwTW. Seven WwTW are likely to serve growth in Wokingham, with some also serving growth from outside the study area.



**Figure 9.1 WFD Status for waterbodies in Wokingham**



### 9.3.2 Arborfield

Arborfield WwTW is located to the north east of Arborfield Cross and discharges to Barkham Brook, a tributary to the river Loddon. This watercourse has been assessed as having a Poor overall waterbody classification in Cycle 2 of the Water Framework Directive (Table 9.1). Reasons for not achieving good status for Dissolved Oxygen (BOD), Ammonia and Phosphate were given as "sewage discharge (continuous)". The Cut is a small watercourse, indicating that there will be limited potential dilution.

**Table 9.1 WFD classifications for Barkham Brook**

Barkham Brook	Overall Water Body	Dissolved Oxygen	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Poor	Poor	Moderate	Poor
Objectives	Poor by 2015	Good by 2027	Good by 2027	Poor by 2015

Table 9.2 summarises the growth that may be served by Arborfield WwTW. All of this growth will come from within Wokingham Borough and represents a significant increase on current flows. Further assessment of the impact on water quality from the WwTW is recommended in a Phase 2 study.

**Table 9.2 Growth identified impacting Arborfield WwTW**

Housing Growth over Plan Period (housing units)			Employment Growth over Plan Period (floor space m <sup>2</sup> )		
Within Wokingham	Within Neighbouring LPAs	Total	Within Wokingham	Within Neighbouring LPAs	Total
9,918	0	9,918	15,080	0	15,080

### 9.3.3 Ash Ridge (Wokingham)

Ash Ridge WwTW is located to the north east of the town of Wokingham, and discharges to the Ash Ridge Stream, a tributary of the Emm Brook. This watercourse has been assessed as having a Poor overall waterbody classification in Cycle 2 of the Water Framework Directive (Table 9.3). The reasons for not achieving good status for Dissolved Oxygen (BOD) and Phosphate were given as "sewage discharge (continuous)". The Emm Brook is a small watercourse, indicating that there will be limited potential dilution.

**Table 9.3 WFD classifications for Emm Brook**

Emm Brook	Overall Water Body	Dissolved Oxygen	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Poor	Moderate	Good	Poor
Objectives	Moderate by 2027	Good by 2027	Good by 2015	Poor by 2015

Table 9.4 summarises the growth that may be served by Arborfield WwTW. All of this growth will come from within Wokingham Borough. Further assessment of the impact on water quality from the WwTW is recommended in a Phase 2 study.

**Table 9.4 Growth identified impacting Ash Ridge (Wokingham) WwTW**

Housing Growth over Plan Period (housing units)			Employment Growth over Plan Period (floor space m <sup>2</sup> )		
Within Wokingham	Within Neighbouring LPAs	Total	Within Wokingham	Within Neighbouring LPAs	Total
4,037	0	4,037	0	0	0

### 9.3.4 Bracknell

Bracknell WwTW is located in Bracknell Forest to the east and discharges into The Cut, located to the west of the treatment works. This watercourse has been assessed as having a Moderate Overall Waterbody Classification in Cycle 2 of the Water Framework Directive (Table 9.5). The Cut is a small watercourse, indicating that there will be limited potential dilution. The reasons for not achieving good status for Dissolved Oxygen (BOD), was given as "sewage discharge (continuous)" and for Phosphate the reasons given were "sewerage discharge (continuous)" and "transport drainage".

**Table 9.5 WFD classifications for the Cut (Binfield to River Thames confluence and Maidenhead Ditch)**

The Cut	Overall Water Body	Dissolved Oxygen	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Moderate	Moderate	High	Poor
Objectives	Moderate by 2015	Good by 2027	Good by 2015	Poor by 2015

The Warfield Neighbourhood Plan<sup>56</sup> also states that "we are advised by the Environment Agency that both these watercourses are currently failing to reach good ecological status/potential under the Water Framework Directive (WFD) and both are currently classified as having moderate potential. Developments within or adjacent to these watercourses should therefore not cause further deterioration and should seek to improve the water quality based on the recommendations of the Thames River Basin Management Plan. The policy has been amended to reflect this advice."

Table 9.6 summarises the growth that may be served by Bracknell WwTW over the plan period, the majority of this growth will come from Bracknell Forest Council.

**Table 9.6 Growth identified impacting Bracknell WwTW**

Housing Growth over Plan Period (housing units)			Employment Growth over Plan Period (floor space m <sup>2</sup> )		
Within Wokingham	Within Neighbouring LPAs	Total	Within Wokingham	Within Neighbouring LPAs	Total
1,627	6,542	8,079	12,840	54,013	66,493

Note: Growth in Wokingham represents scenario of 100% of development sites identified being adopted. Growth in Neighbouring LPAs is taken from the Bracknell Water Cycle Study – Phase 2 (2018) – Preferred sites scenario.

The Bracknell Forest Water Cycle Study Phase 2 (2018) assessed the impact of Bracknell WwTW on water quality in the River Cut. This assessment underestimated the level of growth from Wokingham, however the scenario tested included all of the Bracknell Forest sites identified in that catchment, representing a much higher

wastewater demand than is currently forecast. The Environment Agency's SIMCAT water quality modelling software was used to assess the impact of Bracknell and Ascot WwTW on the River Cut. The following conclusion was made:

*"At Bracknell WwTW, increased effluent discharges due to growth in the catchment are predicted to lead to a deterioration of 10% or more for BOD, Ammonia and Phosphate. This deterioration could be prevented by a tightening of permits and possible infrastructure improvements. Subject to both upstream water quality improvement and improvement of Phosphorous removal to BAT, The Cut could meet Good class for all determinands, both now and following planned growth."*

This conclusion from the 2018 WCS is still valid, and no further assessment of the impact on water quality of growth served by this WwTW is recommended.

### 9.3.5 Easthampstead Park

Easthampstead WwTW is located to the south of Bracknell Forest on the western boundary with Wokingham. The WwTW discharges via a small watercourse into the Emm Brook to the west. This waterbody was classified as having a Poor overall waterbody classification in Cycle 2 of the Water Framework Directive (Table 9.7). The Emm Brook is a small watercourse indicating that there will be limited dilution. The reasons for not achieving good status for Dissolved Oxygen (BOD) and Phosphate were given as "sewage discharge (continuous)".

**Table 9.7 WFD classifications for Emm Brook**

Emm Brook	Overall Water Body	Dissolved Oxygen	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Poor	Moderate	Good	Poor
Objectives	Moderate by 2027	Good by 2027	Good by 2015	Poor by 2015

Table 9.8 summarises the growth that may be served by Easthampstead Park WwTW over the plan period. As at Bracknell WwTW, the majority of the growth will come from Bracknell Forest Council.

**Table 9.8 Growth identified impacting Easthampstead Park WwTW**

Housing Growth over Plan Period (housing units)			Employment Growth over Plan Period (floor space m <sup>2</sup> )		
Within Wokingham	Within Neighbouring LPAs	Total	Within Wokingham	Within Neighbouring LPAs	Total
396	2,324	2,720	0	136	136

Note: Growth in Wokingham represents scenario of 100% of development sites identified being adopted. Growth in Neighbouring LPAs is taken from the Bracknell Water Cycle Study – Phase 2 (2018) – Preferred sites scenario.

The Bracknell Forest Water Cycle Study Phase 2 (2018), assessed the impact of growth on water quality in Emm Brook. This assessment overestimated the level of growth from Wokingham and represents a higher wastewater demand than is currently forecast. The Environment Agency's SIMCAT water quality modelling software was used to assess the impact of Easthampstead Park and Ash Ridge WwTWs on Emm Brook, although growth served by Ash Ridge was not investigated as it was outside the scope of the study. The following conclusion was drawn:

*"Increased effluent discharges due to growth in the catchment of Easthampstead Park WwTW are predicted to lead to a deterioration of 10% or more for BOD and Ammonia. This deterioration could be prevented by a tightening of permits and possible infrastructure improvements. Subject to both upstream water quality improvement and improvement of Phosphorous removal to BAT, the Emm Brook immediately downstream of the WwTW could meet Good class for all determinands, both now and*

following planned growth. The model indicates that Good class would not be reached at the next downstream sampling point (PLDR0015), however this is due to inflows from Ash Ridge WwTW. The impacts of growth and treatment improvements at Ash Ridge have not been investigated, as this treatment works does not serve any settlements within Bracknell Forest.”

Whilst this conclusion is still valid for Easthampstead Park in isolation, its cumulative impact in combination with growth at Ash Ridge WwTW (that was not previously considered), on water quality in Emm Brook, and in the Loddon catchment should be assessed as part of the Phase 2 study.

### 9.3.6 Reading

Reading WwTW is located to the west of the study area and south of the town of Reading. It discharges to Foudry Brook, a tributary of the River Kennet. This waterbody was classified as having a Poor overall waterbody classification in Cycle 2 of the Water Framework Directive (Table 9.9). Foudry Brook is a small watercourse indicating that there will be limited dilution. The reasons for not achieving good status for Phosphate was given as “sewage discharge (continuous and intermittent)”.

**Table 9.9 WFD classifications for Foudry Brook**

<b>Foudry Brook</b>	Overall Water Body	Dissolved Oxygen	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Poor	High	High	Poor
Objectives	Moderate by 2021	Good by 2015	Good by 2015	Poor by 2015

Table 9.10 summarises the growth that may be served by Reading Park WwTW over the plan period. The majority of the growth will come from Reading Borough Council, with additional growth from West Berkshire and South Oxfordshire Councils.

**Table 9.10 Growth identified impacting Reading WwTW**

<b>Housing Growth over Plan Period (housing units)</b>			<b>Employment Growth over Plan Period (floor space m<sup>2</sup>)</b>		
<b>Within Wokingham</b>	<b>Within Neighbouring LPAs</b>	<b>Total</b>	<b>Within Wokingham</b>	<b>Within Neighbouring LPAs</b>	<b>Total</b>
7,688	15,854	23,542	0	260,000	260,000

Note: Growth in Wokingham represents scenario of 100% of development sites identified being adopted. The proportion of employment floor space on mixed use sites in this catchment was not known so the sites were modelling as 100% residential which gave a conservative estimate of water demand. Growth in Neighbouring LPAs is taken from Duty to Cooperate responses from Reading Borough Council, West Berkshire Council and South Oxfordshire District Council.

A water quality assessment was undertaken by Reading Borough Council<sup>57</sup> in 2018 to support their Local Plan process. It investigates the impact of growth within Reading on volumetric capacity of Reading WwTW and the environmental capacity of the receiving waterbodies (Foudry Brook and River Kennet).

The study concluded that there was sufficient headroom at Reading WwTW to accommodate planned housing growth from within Reading Borough, and current discharge levels into Foudry Brook are well within limits set by the EA.

57 Water quality Assessment, Reading Borough Council (2018). Accessed online at: [http://www.reading.gov.uk/media/8689/EV029-Water-Quality-Assessment-March-2018/pdf/EV029\\_Water\\_Quality\\_Assessment\\_March\\_2018.pdf](http://www.reading.gov.uk/media/8689/EV029-Water-Quality-Assessment-March-2018/pdf/EV029_Water_Quality_Assessment_March_2018.pdf) on: 31/10/2018  
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This study did not take into account any growth from outside Reading Borough, and responses from Duty to Cooperate requests indicate that this would be approximate 400 homes from West Berkshire and South Oxfordshire.

As no modelling was carried out, and the growth forecast used to assess permit limits did not take into account all of the likely growth, it is recommended that a water quality assessment is undertaken on Reading WwTW.

### 9.3.7 Sandhurst

Sandhurst WwTW is located in the south east of Wokingham and discharges to the River Blackwater. This waterbody is classified as having Poor overall waterbody classification in Cycle 2 of the Water Framework Directive (Table 9.11). The reasons for not achieving good status for Phosphate was given as "sewage discharge (continuous)", and for Dissolved Oxygen the reason was given as "Incidents".

**Table 9.11 WFD classifications for the River Blackwater**

<b>River Blackwater (Hawley to Whitewater confluence)</b>	Overall Water Body	Dissolved Oxygen	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Moderate	Good	Good	Poor
Objectives	Moderate by 2015	Good by 2027	Good by 2027	Poor by 2015

Table 9.12 summarises the growth that may be served by Sandhurst WwTW over the plan period. The majority of the growth will come Bracknell Forest with only a small proportion from within Wokingham Borough.

**Table 9.12 Growth identified impacting Sandhurst WwTW**

<b>Housing Growth over Plan Period (housing units)</b>			<b>Employment Growth over Plan Period (floor space m<sup>2</sup>)</b>		
<b>Within Wokingham</b>	<b>Within Neighbouring LPAs</b>	<b>Total</b>	<b>Within Wokingham</b>	<b>Within Neighbouring LPAs</b>	<b>Total</b>
46	1,428	1,474	0	5,000	5,000

The Bracknell Forest Water Cycle Study Phase 2 (2018), assessed the impact of growth on water quality in Blackwater River. This assessment overestimated the level of growth from Wokingham. The Environment Agency's SIMCAT water quality modelling software was used to assess the impact of Sandhurst WwTW as well as WwTW upstream of Sandhurst on the River Blackwater. The following conclusion was drawn:

*"At Sandhurst WwTW, increased effluent discharges due to growth in the catchment are predicted to lead to a deterioration of 10% or more for Ammonia and Phosphorous. This deterioration could be prevented by a tightening of permits and possible infrastructure improvements. The Blackwater is not currently meeting Good class for Phosphorous, and Good class could not be achieved due to limitations of present-day Best Available Technology. The majority of development in the catchment is made up of completions and commitments during AMP6, principally 1,000 homes at Land at former TRL site, Nine Mile Ride (SALP policy SA5). Consequently, the predicted*

*deterioration may occur early during the plan period (although this has not been tested). "*

The conclusion from this study is still valid, however this WwTW would be in input to a wider catchment scale water quality model of the River Loddon.

### 9.3.8 Wargrave

Wargrave WwTW is located in the north of the study area and discharges to the River Loddon. This waterbody was classified as having a Poor overall waterbody classification in Cycle 2 of the Water Framework Directive (Table 9.13). The reasons for not achieving good status for Phosphate was given as "sewage discharge (continuous)".

**Table 9.13 WFD classifications for the River Loddon**

River Loddon (Swallowfield to River Thames confluence)	Overall Water Body	Dissolved Oxygen	Ammonia	Phosphate
2016 WFD Cycle 2 Classification	Poor	High	High	Moderate
Objectives	Moderate by 2015	Good by 2015	Good by 2015	Moderate by 2015

Table 9.14 summarises the growth that may be served by Wargrave WwTW over the plan period. The majority of the growth will come within Wokingham Borough, with a small proportion from neighbouring authorities. Although only a proportion of the total housing units shown in Table 9.14 are likely to be built, a large increase in the discharge from this WwTW is likely and should be assessed as part of the Phase 2 study.

**Table 9.14 Growth identified impacting Wargrave WwTW**

Housing Growth over Plan Period (housing units)			Employment Growth over Plan Period (floor space m <sup>2</sup> )		
Within Wokingham	Within Neighbouring LPAs	Total	Within Wokingham	Within Neighbouring LPAs	Total
18,956	76	19,032	359,810	0	359,810

Note: Growth in Wokingham represents scenario of 100% of development sites identified being adopted. Growth in Neighbouring LPAs is taken from Duty to Cooperate responses from Hart District Council and South Oxfordshire District Council.

### 9.3.9 Other WwTWs within Wokingham

New Mill and Longwater WwTW are located along the southern boundary of Wokingham, and discharge to the River Blackwater. Neither of these works are expected to serve growth within Wokingham but contribute to overall water quality in the River Blackwater (Table 9.11), and the River Loddon.

Remenham WwTW is a small works in the north of Wokingham and discharges to groundwater. It is not expected to serve any growth within Wokingham during the plan period.

## 9.4 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, 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.

We also consider 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 11.3.3 and 11.3.4.
- 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.

## 9.5 Conclusions

The increased wastewater discharges at the WwTWs serving growth in Wokingham have the potential to impact downstream water quality in the receiving watercourses.

In the case of Bracknell, Easthampstead Park and Sandhurst WwTWs an assessment has been completed as part of the Bracknell Forest Phase 2 WCS (2018) and concluded that the proposed growth could be accommodated with a tighter permit and treatment at the Technically Achievable Limit. This level of growth assessed was comparable or higher than currently forecast so this assessment does not need to be repeated. For Easthampstead Park and Sandhurst WwTWs they would be included in a catchment scale model of the River Loddon.

Water quality modelling has not been conducted at Arborfield or Wargrave, and not at the level of growth currently forecast at Reading and Ash Ridge WwTW. A water quality assessment is therefore required at these WwTW.

**Further assessment of water quality from possible increased wastewater discharges at Arborfield, Ash Ridge, Reading and Wargrave WwTW should be undertaken as part of a Phase 2 Water Cycle Study.**

## 9.6 Proposed methodology for Phase 2

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. The EA also confirmed that the latest available water quality model that they hold is the SIMCAT/SAGIS model for the Thames River Basin District, which is calibrated to a baseline of 2010-2012. No updates to this model are currently planned by the EA, and therefore an updated base model will need to be prepared as part of a Phase 2 study.

JBA Consulting have recently completed a Water Quality assessment for Bracknell Forest that updated the SIMCAT model for the River Cut, Emm Brook and River Blackwater (to Sandhurst wwTW). It is not considered necessary to re-run the River Cut part of the model as flows have not changed substantially.

The existing model will be updated to include:

- The River Blackwater previously updated for the Bracknell WCS as an input to this new updated model
- River Whitewater (including Mattingley, Harley Wintney and Crondall WwTWs)
- the River Blackwater from Sandhurst WwTW to its confluence with the River Loddon (New Mill and Longwater WwTW)
- the River Loddon (Sherfield-on-Loddon and Basingstoke WwTW in the upper catchment, and Wargrave WwTW close to the downstream extent of the model). For the purposes of this study, discharges from Basingstoke WwTW should be assumed to at their permit limit, unless further information is available from the Environment Agency or from Basingstoke and Deane Council.
- Barkham Brook (Arborfield WwTW)
- Emm Brook will be updated to include the latest growth forecast for Ash Ridge WwTW as well as Easthampstead Park WwTW.

Reading WwTW discharges to Foudry Brook, a tributary to the Thames. For this works, a single site assessment will be carried out using the EA's River Quality Planning (RQP) tool as including this WwTW in a SIMCAT assessment would require updating a large section of the River Thames.



## 10. Flood Risk Management

### 10.1 Assessment of additional flood risk from increased WwTW discharges

#### 10.1.1 Introduction

In catchments with a large planned growth in population and which discharge effluent to a small watercourse, the increase in the discharged effluent might have a negative effect on the risk of flooding. An assessment 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:

- Calculate the increase in DWF attributable to planned growth;
- Identify the point of discharge of these WwTWs;
- At each outfall point, use the FEH CD-ROM v3.0 to extract the catchment descriptors;
- Use FEH Statistical method to calculate peak 1 in 30 (Q30) and 1 in 100 (Q100) year fluvial flows;
- Calculate the additional foul flow as a percentage of the Q30 and Q100 flow

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

Additional flow $\leq 5\%$ of Q30. Low risk that increased discharges will increase fluvial flood risk	Additional flow $\geq 5\%$ of Q30. Moderate risk that increased discharges will increase fluvial flood risk	Additional flow $\geq 5\%$ of Q100. High risk that increased discharges will increase fluvial flood risk
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The following datasets were used to assess the risk of flooding:

- Current and predicted future DWF for each WwTW
- Location of WwTW outfalls
- Catchment descriptors from FEH CD-ROM v3.0<sup>58</sup>

To provide the most robust assessment, the 120% growth scenario was used, assuming that every site within each wastewater catchment was adopted with 20% high than expected provision of housing.

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 additional flow from each WwTW as a percentage of the Q30 and Q100 peak flow. This shows that additional flows from the WwTW post development would have a negligible effect on the predicted peak flow events with return periods of 30 and 100 years.

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

WwTW	FEH Stat Q30 (m <sup>3</sup> /s)	FEH Stat Q100 (m <sup>3</sup> /s)	Additional Average DWF (MI/d)	Additional Flow (m <sup>3</sup> /s)	Flow increase % Q30	Flow increase % Q100
Arborfield	5.33	6.93	1.28	0.015	0.80%	0.61%
Ash Ridge	3.27	4.48	1.20	0.014	0.51%	0.37%
Bracknell	20.19	25.03	2.92	0.034	0.18%	0.15%
Easthampstead	0.4	0.55	0.14	0.002	0.41%	0.30%
Reading	18.83	22.26	1.66	0.019	0.64%	0.54%
Sandhurst	18.84	23.19	0.52	0.006	0.03%	0.03%
Wargrave	86.97	111.15	2.07	0.024	0.10%	0.08%

## 10.4 Conclusions

- A detailed assessment of flood risk can be found within the Wokingham Level 1 Strategic Flood Risk Assessment (at the time of writing this was in the process of being updated).
- The impact of increased effluent flows is not predicted to have a significant impact upon flood risk in any of the receiving watercourses.

**Increases in discharges of treated wastewater effluent as a result of growth are not expected to significantly increase flood risk. No further assessment is recommended in a phase 2 WCS.**

## 10.5 Recommendations

**Table 10.2 Recommendations for flood risk management**

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), or a land drainage consent from the Lead Local Flood Authority (in the case of discharges to an Ordinary Watercourse).	TW	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 is 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)). Whilst there are no such designated sites within Wokingham, the Thames Basin Heath Special Protection Area is located to the south of Wokingham, and areas to the south of the study area are included within the 5 km mitigation area.

There is no hydrological pathway from WWTW or development sites within Wokingham to this SPA, so will not be assessed further in the WCS. Policies relating to the protection of this area can be found in the Impact Avoidance Strategy<sup>59</sup>.

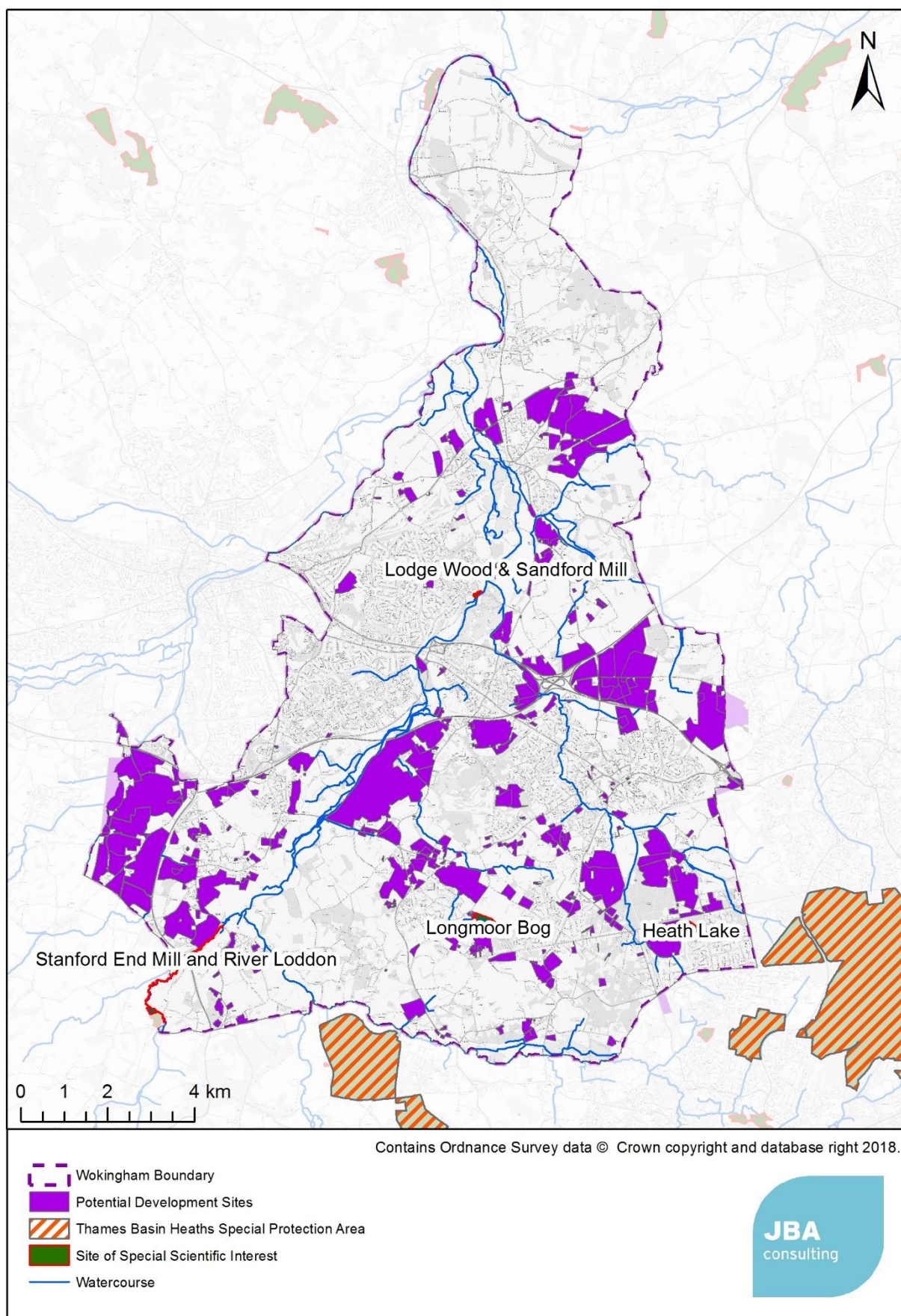
#### 11.2.2 Sites of Special Scientific Interest

SSSIs 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. Four SSSIs lie in or within 2km of Wokingham. These are shown in Figure 11.1 below.

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<sup>59</sup> Impact Avoidance Strategy (including local and strategic measures) for Residential Development upon the Thames Basin Heaths Special Protection Area, Wokingham Borough Council (2010). Accessed online at: <http://www.wokingham.gov.uk/EasySiteWeb/GatewayLink.aspx?alId=385986> on: 04/10/2018  
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**Figure 11.1 Sites with environmental designations****11.3 Point source pollution**

The main sources of point source pollution in Wokingham are the WwTWs. The effect of additional wastewater flows on water quality is assessed in section 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 a water quality assessment.

**Table 11.1 WwTW serving growth in Wokingham relative to sites with environmental designations**

Source	Pathway	Receptor	Distance downstream (km)	Potential Impact
Arborfield WwTW	Barkham Brook / River Loddon	Lodge Wood & Sandford Mill SSSI (SU785736)	8	Water quality deterioration. WQ Assessment required as part of Phase 2 Study
Ash Ridge WwTW	Emm Brook / River Loddon	Lodge Wood & Sandford Mill SSSI (SU785736)	6	Water quality deterioration. WQ Assessment required as part of Phase 2 Study
Bracknell WwTW	The Cut	Great Thrift Wood SSSI (SU871782)	7 km	Water quality deterioration. WQ Assessment required as part of Phase 2 Study. Assessed in Bracknell WCS as having a "Minor impact".
Easthampstead Park WwTW	Emm Brook / River Loddon	Lodge Wood & Sandford Mill SSSI (SU785736)	12	Water quality deterioration. WQ Assessment required as part of Phase 2 Study. Assessed in Bracknell WCS as having a "Minor impact".
Longwater WwTW	River Blackwater / River Loddon	Lodge Wood & Sandford Mill SSSI (SU785736)	20	Negligible impact. Small works which is not expected to serve growth during

Source	Pathway	Receptor	Distance downstream (km)	Potential Impact
				the Local Plan period.
New Mill WwTW	River Blackwater / River Loddon	Lodge Wood & Sandford Mill SSSI (SU785736)	16	Negligible impact. Small works which is not expected to serve growth during the Local Plan period.
Reading WwTW	Foudry Brook / River Thames	Temple Island Meadows SSSI (SU768846)	20	Water quality deterioration. WQ Assessment required as part of Phase 2 Study
Wargrave WwTW	River Loddon / River Thames	Temple Island Meadows SSSI (SU768846)	9	Water quality deterioration. WQ Assessment required as part of Phase 2 Study

### 11.3.1 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. Sites within Wokingham that could be considered as sources of additional runoff, and receptors in the form of sites with environmental designations are summarised Table 11.2 below. The pollution risk posed by a site will depend on the sensitivity of the receiving environment, the pathway between the source of the runoff and the receiving waters, and the level of dilution available. A probable impact score of low, medium or high was applied to each site to provide an indication of the likely impact prior to any mitigation being applied. It should be noted that this is a desk-based assessment to highlight risk and should not replace the appropriate level assessment on a site by site basis. Other development sites not identified in the table, may still contribute to a cumulative impact within the catchment and so management of water quality of surface runoff from these sites should still be considered.

**Table 11.2 Potential sources of diffuse pollution and receptors**

Source	Pathway	Receptor	Distance (km)	Potential Impact
5SW015 5SH013 5SW004 5SW008 5SW013	Surface water pathway to SSSI identified using	Stanford End Mill and River Loddon SSSI (SU711645)	Site (5SW004) is adjacent to SSSI	This SSSI is a series of traditionally-managed seasonally waterlogged hay meadows and a 4 km stretch of the River Loddon. The site is of interest particularly for nationally important populations of two rare plants.

Source	Pathway	Receptor	Distance (km)	Potential Impact
	RoFSW map			<p>The maintenance of good water and sediment quality are essential to maintaining a healthy river system. Management should minimise pollution of the river from point and diffuse sources, including discharges of domestic and trade effluent, and runoff from urban land.</p> <p><b>Impact possible – the inclusion of SuDS and appropriate management of runoff should limit pollution risk.</b></p>
5FI030 5FI032	Sites are adjacent to SSSI. Surface runoff possible to western edge of SSSI.	Longmoor Bog SSSI (SU781653)	0	<p>A rare example of a base-poor valley mire and area of wet heathland.</p> <p>NE advice on management of the SSSI states that “drainage schemes should be designed not to intercept the sources of ground and surface water to the valley mire. It is important for the watercourses of the valley mire not to receive runoff from fertilised land or surface water from farmyards.”</p> <p>Whilst this is general advice for managing runoff in valley mires, it is important to consider the effect of drainage schemes on nearby development sites on the SSSI and ensure untreated surface water is not allowed to flow to the mire.</p> <p><b>Impact possible – the inclusion of SuDS and appropriate management of runoff should limit pollution risk.</b></p>
5WW014	Possible surface water pathway to SSSI from southern part of site.	Heath Lake SSSI (SU828652)	100m	<p>SSSI is a small shallow lake with areas of relict heathland and some uncommon and rare aquatic plant species and is the only remaining site for Pillwort in Berkshire.</p> <p>NE advice for managing this type of SSSI advises “protection of appropriate water quality is important for maintaining aquatic habitats and the range of species associated with them. Increases in the amount of nutrients within the waterbody (as a result of pollution from direct discharges and also from diffuse sources resulting from land management practices within the wider catchment) can lead to a loss of aquatic plants in favour of algae and impact upon invertebrate species”. Management of the water level in the lake and flow in the inlet and outfall is also important.</p>

Source	Pathway	Receptor	Distance (km)	Potential Impact
				As this lake is on high ground in relation to potential development sites nearby it is unlikely to receive any surface runoff. <b>Probable impact – LOW</b>
5HU037 5HU044 5HU001 5WI004 5WI006 5WI010 5WI009 5WK013 5WK022 5WK002 5WK009 5SH009 5HU010 5HU012 5HU015 5HU020 5HU021	Surface runoff to Emm Brook	Lodge Wood & Sandford Mill (SU785736)	1 – 5 km	This SSSI consists of two small wet woodlands bordering the River Loddon, notable for large populations of rare Loddon Lily. Both woodlands occur on relatively flat ground which is affected by groundwater and susceptible to flooding from the Loddon. No development site has a direct surface water pathway, however multiple development in the Emm Brook and River Loddon catchments could contribute to a worsening of water quality if not adequately managed. <b>Impact possible – the inclusion of SuDS and appropriate management of runoff should limit pollution risk</b>
5WO002 5WI005 5WI008 5AR011 5AR014 5AR015 5WI002 5BA016 5WI015 5WI001 5AR020 5WI011	Surface runoff to River Loddon	Lodge Wood & Sandford Mill (SU785736)	1 to 5 km	Other sites not on this list but within the Emm Brook or Loddon catchments may also contribute to a lesser degree.

### 11.3.2 Groundwater Protection

Groundwater is an important source of water in England and Wales, and much of Wokingham's water supply is derived from groundwater sources.

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

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

- areas where it would be objected 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<sup>60</sup> 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<sup>3</sup> 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.

### **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

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60 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](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/692989/Environment-Agency-approach-to-groundwater-protection.pdf) on: 02/11/2018

- meet Government non-statutory technical standards<sup>61</sup> for sustainable drainage systems – these should be used in conjunction with the NPPF and PPG
- and use a SuDS management treatment train (see sections 11.3.3 to 11.3.5)

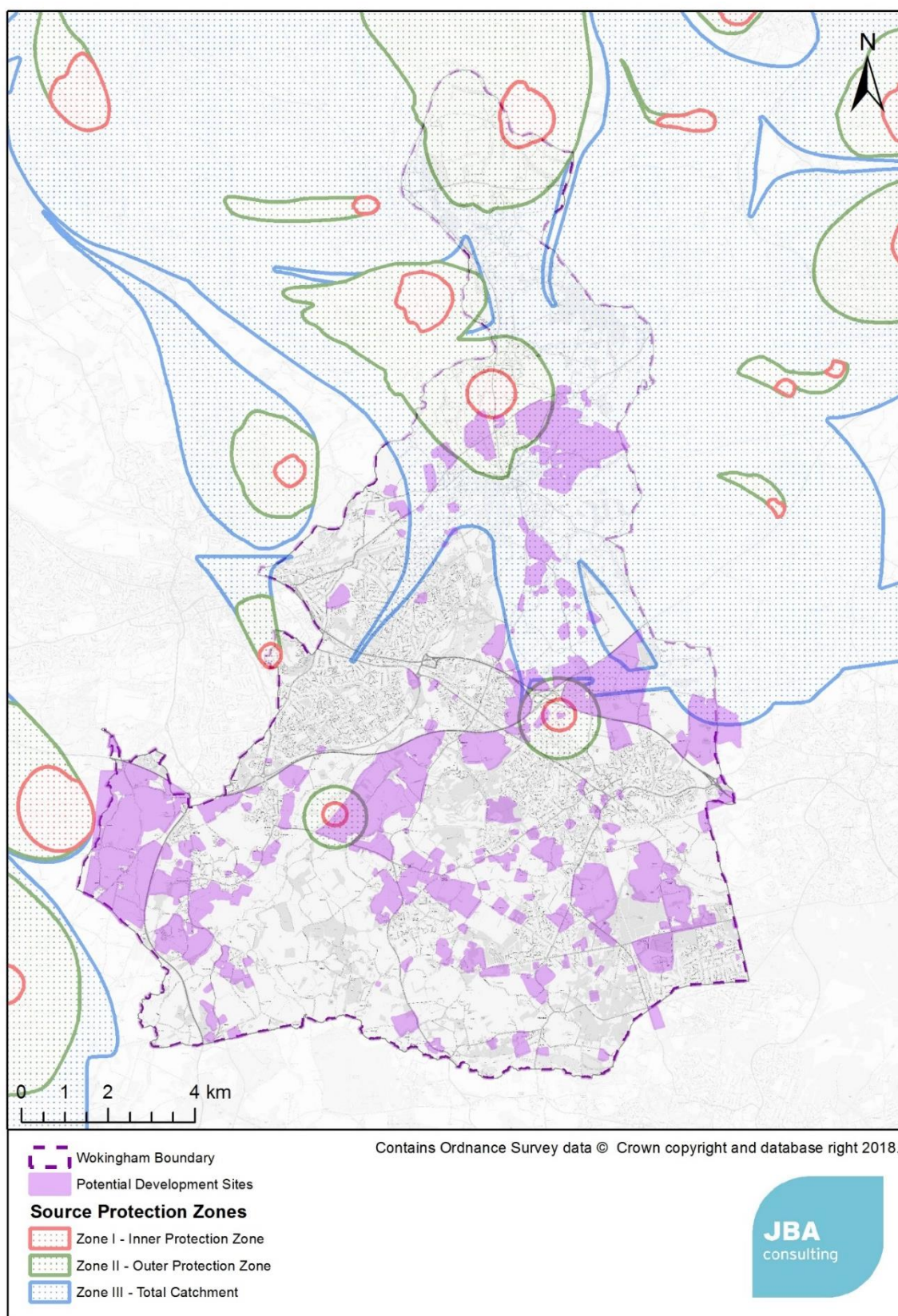
A hydrogeological risk assessment is required where infiltration SuDS is proposed for anything other than clean roof drainage in a SPZ1.

### **Source Protection Zones in Wokingham**

The Source Protection Zones (SPZs) that are present in the study are shown in Figure 11.2. They cover much of the north and east of Wokingham, as well as a smaller area close to Arborfield.

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<sup>61</sup> Reference for non-stat tech standard here  
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**Figure 11.2 Source Protection Zones in Wokingham**



**Table 11.3 Development sites within Source Protection Zones**

Source Protection Zone	Sites	Management advice / EA position statement
<b>Zone 1 – Inner Protection Zone</b>	5TW011, 5TW007, 5WI009, 5WK013, 5HU011	<p>G2 – Inside SPZ1 all sewage effluent discharges to ground must have an environmental permit.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>SuDS schemes must be suitably designed.</p>
<b>Zone 2 – Outer Protection Zone</b>	5AR001, 5AR003, 5AR015, 5HU010, 5HU020, 5HU021, 5HU022, 5WI004, 5WI006, 5WK025, 5HU034, 5WI013, 5WI010, 5CV001, 5RU001, 5WA007, 5TW005, 5WA003, 5TW008, 5WA005, 5TW009, 5TW010, 5RU005	<p>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.</p>



Source Protection Zone	Sites	Management advice / EA position statement
<b>Zone 3 – Total Catchment</b>	5CV002, 5VC003, 5CV004, 5CV005, 5HU002, 5HU003, 5HU004, 5HU005, 5HU006, 5HU007, 5HU008, 5HU009, 5HU010, 5HU012, 5HU013, 5HU014, 5HU015, 5HU016, 5HU017, 5HU018, 5HU019, 5HU023, 5HU024, 5HU025, 5HU027, 5HU028, 5HU029, 5HU030, 5HU031, 5HU032, 5HU033, 5HU035, 5HU038, 5HU039, 5HU040, 5HU041, 5HU042, 5HU045, 5RU002, 5RU003, 5RU004, 5RU006, 5RU007, 5RU008, 5SO004, 5SO007, 5TW006, 5TW011, 5WA002, 5WA004, 5WA006, 5WA008, 5WA009	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.

### 11.3.3 Surface Water Drainage and SuDS

Since April 2015<sup>62</sup>, 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).

Wokingham Borough Council, as Lead Local Flood Authority (LLFA), is a statutory consultee 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
- 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<sup>63</sup>, with local guidance

62 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: 29/10/2018

63 Sustainable Drainage Systems, Non-statutory technical standards for sustainable drainage systems, DEFRA (2015).

specified by Wokingham Borough Council<sup>64</sup>. The CIRIA C753 SuDS Manual<sup>65</sup> and Guidance for the Construction of SuDS<sup>66</sup> provide the industry best practice guidance for design and management of SuDS.

#### 11.3.4 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.

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Accessed online at:

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/415773/sustainable-drainage-technical-standards.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/415773/sustainable-drainage-technical-standards.pdf) on: 29/05/2018

64 Wokingham SuDS Strategy, Wokingham Borough Council (2016). Accessed online at:

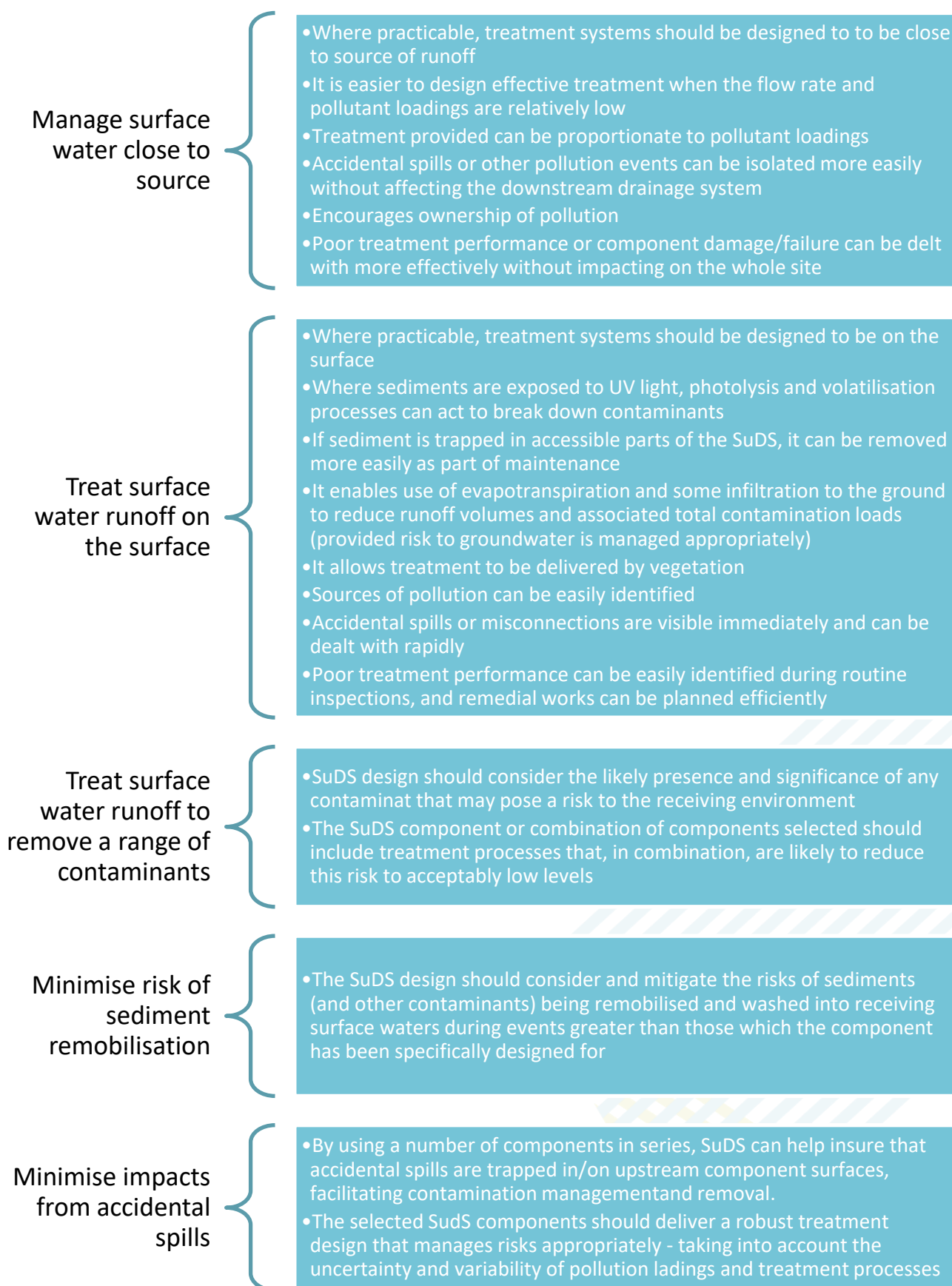
[http://www.wokingham.gov.uk/\\_resources/assets/attachment/full/0/399029.pdf](http://www.wokingham.gov.uk/_resources/assets/attachment/full/0/399029.pdf) on: 29/10/2018

65 CIRIA Report C753 The SuDS Manual, CIRIA (2015). Accessed online at:

[https://www.ciria.org/Resources/Free\\_publications/SuDS\\_manual\\_C753.aspx](https://www.ciria.org/Resources/Free_publications/SuDS_manual_C753.aspx) on: 29/05/2018

66 Guidance on the Construction of SuDS (C768), CIRIA (2017), Accessed online at:

[https://www.ciria.org/Resources/Free\\_publications/Guidance\\_on\\_the\\_construction\\_of\\_SuDS\\_-\\_C768.aspx](https://www.ciria.org/Resources/Free_publications/Guidance_on_the_construction_of_SuDS_-_C768.aspx) on: 19/11/2018



**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.

### 11.3.5 Additional benefits

#### **Flood Risk**

The Wokingham Level 1 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 scarce under future drier climates.

#### **Biodiversity**

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



connectivity. With careful design, SuDS can provide shelter, food, foraging and breeding opportunities for a variety of species including plants, amphibians, invertebrates, birds, bats and other animals.

### Amenity

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

## 11.4 Conclusions

- A number of SSSIs exist within Wokingham that should be carefully considered in future plan making.
- WwTW serving growth within Wokingham 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 9). A water quality impact assessment is required in the Phase 2 water cycle study to understand this further.
- Development sites within Wokingham could be sources of diffuse pollution from surface runoff.
- Several of the proposed development sites could have a direct surface water pathway to a SSSI.
- Runoff from these sites should be managed through implementation of a SuDS scheme with a focus on treating water quality of surface runoff from roads and development sites
- Opportunities exist for these SuDS schemes to offer multiple benefits of flood risk reduction, amenity value and biodiversity.
- 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.

**No further assessment of environmental constraints and opportunities is recommended in a phase 2 WCS.**

## 11.5 Recommendations

**Table 11.4 Recommendations from the environmental constraints and opportunities section**

Action	Responsibility	Timescale
The Local 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.	WBC	Ongoing

The local 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.	WBC	Ongoing
Encourage the use of rainwater harvesting to manage surface water in new developments in order to reduce water demand.	WBC	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.	WBC SEW TW EA NE	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.	WBC TW 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 done 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 WBC area wide basis; the available climate models are generally insufficiently refined to draw different conclusions for different parts of Wokingham 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 Water company risk assessments

Both Thames Water and South East Water have published a risk assessment<sup>67,68</sup> for both 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 each company'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. Thames Water rated the Henley WRZ as "low vulnerability" to climate change and

67 Thames Water's progress in planning for climate change, Thames Water (2016). Accessed online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/519218/climate-adrep-thames-water.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/519218/climate-adrep-thames-water.pdf) on: 25/01/18

68 Climate Change Adaptation Report, South East Water (2016). Accessed online at: <https://corporate.southeastwater.co.uk/media/1629/sew-climate-change-adaptation-report-2015-final-public-standalone.pdf> on: 31/10/2018

Kennet Valley WRZ as “medium vulnerability. SEW’s WRZs were assessed as medium/high vulnerability and so a more complex climate change methodology was adopted for their WRMP.

**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 (Phase 1)?	RAG
Water resources	High (1) and (2)	Yes - quantitative within WRMP and RMBP. Climate change impacts on consumption have been calculated in accordance with UKWIR report “Impact of Climate Change on Water Demand” (2013).	
Water supply infrastructure	Medium - some increased demand in hot weather	Yes - qualitative consideration within WRMP	
Wastewater Collection	High - Intense summer rainfall and higher winter rainfall increases flood risk	Yes - Qualitative consideration in Thames Water’s climate change adaptation report, and South East Water’s annual report. This has not been considered in site by site assessments.	
Wastewater treatment	Medium - Increased winter flows and more extreme weather events reduces flow headroom	Yes - Qualitative consideration in Thames Water and South East Water’s climate change adaptation report. This has not been considered in site by site assessments.	
WwTW odour	Low	No - not considered	
Water quality	Nutrients: High (1) Sanitary determinands: Medium to High	Not considered in Phase 1. Water quality impact modelling in phase 2 should include sensitivity to reductions in river flow.	
Flooding from increased WwTW discharge	Low	No - not considered	

(1) River Basin Management Plan

(2) TW and SEW WRMPs

### 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 Thames Water or South East 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, SEW, TW, WBC	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.	WBC, Developers	As required
Water quality modelling in Phase 2 should include sensitivity testing to a reduction in river flow.	JBA Consulting	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

The phase 1 scoping water cycle study has been carried out with cooperation with South East Water and Thames Water. Table 13.1 summarises the conclusions of the individual assessments and outlines the requirement for a phase 2 outline study. The overall assessment is that no strategic scale water or wastewater constraints on growth have been identified within Wokingham.

A site by site summary of the results of the assessments undertaken is included in Appendix A.

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

Assessment	Conclusion	Requirement for Phase 2 Study
Water resources	<ul style="list-style-type: none"> <li>Whilst there is sufficient water resource to supply all of the development within Wokingham identified in the call for sites process constraints exist at the reservoir storage and bulk transfer level in Henley and Kennet Valley WRZs.</li> <li>Large scale development in Arborfield, Barkham, Farley Hill within Kennet Valley WRZ, and Woodley, Twyford and Wargrave areas in Henley WRZ may require additional storage and/or additional bulk transfer capacity. Growth in these areas should be carefully planned with Thames Water to ensure that sufficient infrastructure is in place prior to developments being occupied.</li> <li>A water supply surplus is identified in WRZ4 until 2050, and no constraints at the reservoir storage level have been identified by South East Water.</li> </ul>	<b>On the basis that there is a water supply surplus predicted across all three water resource zones until 2050 and there is sufficient time to adapt the long-term plan to include emerging trends in population, no further assessment of water resources is recommended in a phase 2 outline study.</b>
Water supply infrastructure	<ul style="list-style-type: none"> <li>In the Thames Water supply area, sites smaller than 50 houses can in general be accommodated without significant water supply infrastructure upgrades. Sites larger than 50, but smaller than 250 houses may require network reinforcement in order to be accommodated, and sites larger than 250 houses are likely to require significant network reinforcement.</li> <li>In the South East Water supply area, the conclusion above applies in general, however SEW noted specific network constraints in the area between the A329(M) and the M4 (east of the junction) and to the south of Wokingham.</li> </ul>	<b>Early developer engagement with SEW and TW is essential to ensure that, where necessary, network reinforcement is delivered prior to developments becoming occupied. No further assessment is recommended in a phase 2 WCS.</b>

Assessment	Conclusion	Requirement for Phase 2 Study
	<p>Development in these area may require more extensive water supply infrastructure.</p> <ul style="list-style-type: none"> <li>Thames Water and South East Water did not identify any significant constraints to providing additional water supply infrastructure.</li> </ul>	
Wastewater collection	<ul style="list-style-type: none"> <li>Upgrades to the wastewater sewerage network will be required in order to serve sites larger than 250 houses and may be required on sites between 50 and 250 houses.</li> <li>Sites smaller than 50 houses where no sewerage network constraints have been identified by Thames Water are likely to be able to be accommodated without significant network reinforcement.</li> <li>No significant constraints to the provision of this infrastructure have been identified.</li> <li>Growth in Grazeley / Shinfield requires further analysis to understand risk of detriment to existing sewerage system.</li> <li>Arborfield sewerage network requires further assessment as this catchment is approaching capacity.</li> <li>Any strategic scale development at Twyford requires further assessment as the development represents a significant increase in flow from this part of the Wargrave catchment.</li> </ul>	<b>Development in areas where there is limited wastewater network capacity will increase pressure on the network. Early engagement with Thames Water is required, and further modelling of the network may be required once a preferred options list of sites is defined.</b>
Wastewater Treatment Works Flow Permit assessment	<ul style="list-style-type: none"> <li>Ash Ridge, Bracknell, Reading and Sandhurst WwTW have sufficient capacity to accommodate all of the potential sites identified.</li> <li>Easthampstead Park WwTW has capacity to serve all of the sites identified, but is very close to its DWF permit, and could exceed this is additional sites are identified.</li> <li>Wargrave WwTW can accommodate 80% of the growth from the sites identified but would require an increase in its DWF permit and/or capacity upgrades in order to serve 100% of the growth.</li> <li>Arborfield WwTW can accommodate the 20% growth scenario but will require an increase to its permit and/or capacity upgrades in order to accommodate the</li> </ul>	<b>No further assessment of wastewater treatment infrastructure is required as part of a phase 2 study; however, the flow permit assessment should be re-visited once a preferred options list of sites is defined.</b>

Assessment	Conclusion	Requirement for Phase 2 Study
	higher growth scenarios. No upgrades are included in Thames Water's 2020-25 plan so this could be a constraint to growth in the short term.	
Water quality impact assessment	<ul style="list-style-type: none"> <li>Increased wastewater discharges at WwTW serving growth in Wokingham have the potential to impact downstream water quality in the receiving water courses.</li> <li>In the case of Bracknell, Easthampstead Park and Sandhurst WwTWs, a WQ assessment has been completed as part of the Bracknell Forest WCS and concluded that the proposed growth could be accommodated with a tighter permit and treatment at the Technically Achievable Limit.</li> <li>Water quality modelling has not been conducted at Arborfield or Wargrave, and not at the level of growth currently forecast at Reading and Ash Ridge. A water quality assessment is therefore required at these works.</li> </ul>	<b>Further assessment of water quality from increased wastewater discharges at Arborfield, Ash Ridge, Reading and Wargrave WwTW should be undertaken as part of a Phase 2 Water Cycle Study.</b>
Odour Assessment	<ul style="list-style-type: none"> <li>36 of the sites identified are within 800m of a WwTW and may be at risk of nuisance odour.</li> <li>An odour assessment is recommended as part of the planning process, the cost of which should be borne by the developer.</li> </ul>	<b>No further assessment of odour is recommended as part of a phase 2 WCS. Any future assessment should be carried out as part of the planning process.</b>
Flood risk from additional WwTW flow	<ul style="list-style-type: none"> <li>A detailed assessment of flood risk can be found within the Wokingham Level 1 Strategic Flood Risk Assessment.</li> <li>The impact of increased effluent flows is not predicted to have a significant impact upon flood risk in any of the receiving watercourses.</li> </ul>	<b>Increases in discharges of treated wastewater effluent as a result of growth are not expected to significantly increase flood risk. No further assessment is recommended in a phase 2 WCS.</b>



Assessment	Conclusion	Requirement for Phase 2 Study
Environmental Constraints and Opportunities	<ul style="list-style-type: none"> <li>A number of SSSIs exist within Wokingham</li> <li>Increasing wastewater effluent volumes discharged as a result of growth are one of the most significant potential point-sources which could cause a deterioration in water quality.</li> <li>Additional discharge from WwTW is unlikely to impact sites with environmental designations. (see Section 9). Further water quality modelling is required.</li> <li>Development sites within Wokingham could be sources of diffuse pollution from surface runoff.</li> <li>Several of the proposed development sites could have a direct surface water pathway to a SSSI.</li> <li>Runoff from these sites could be managed through implementation of a SuDS scheme with a focus on treating water quality of surface runoff from roads and development sites</li> <li>Opportunities exist for these SuDS schemes to offer multiple benefits of flood risk reduction, amenity value and biodiversity.</li> <li>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.</li> </ul>	<b>No further assessment of environmental constraints and opportunities is recommended in a phase 2 WCS.</b>

## 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,	SEW / TW	Ongoing

Aspect	Action	Responsibility	Timescale
	engage with Local Planning Authorities. Take the latest growth forecasts into account in the emerging 2019 WRMP.		
	Provide yearly profiles of projected housing growth to water companies to inform the WRMP.	WBC	Ongoing
	Use planning policy to require the 110l/person/day water consumption target permitted by National Planning Policy Guidance in water-stressed areas and use the BREEAM standard to require percentage improvement over baseline building water consumption of at least 12.5%.	WBC	In Local Plan
Water supply	Undertake network modelling to ensure adequate provision of water supply is feasible once a preferred option has been developed.	SEW TW WBC	Once preferred option is defined.
	WBC and Developers should engage early with SEW and TW to ensure infrastructure is in place prior to occupation.	WBC SEW TW Developers	In local plan
Wastewater collection	Take into account wastewater infrastructure constraints in phasing development in partnership with the sewerage undertaker	WBC TW	Ongoing
	Developers will be expected to work with the sewerage undertaker closely and early in the planning promotion process to develop an outline Drainage Strategy for sites. The Outline Drainage strategy should 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.	TW 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	Developers LLFA	Ongoing

Aspect	Action	Responsibility	Timescale
	surface water to foul sewers will be resisted by the LLFA.		
Wastewater treatment	Consider the available WwTW capacity when phasing development going to the same WwTW. This is particularly the case for developments to be served by Wargrave and Arborfield WwTWs, until such time as there is sufficient available evidence that headroom capacity is not an issue.	WBC	Ongoing
	Provide Annual Monitoring Reports to Thames Water and Thames Water detailing projected housing growth in the Local Authority.	WBC	Ongoing
	Thames Water to assess growth demands as part of their wastewater asset planning activities and feedback to WBC if concerns arise.	TW WBC	Ongoing
Odour	Consider odour risk in the sites identified to be potentially at risk from nuisance odour	WBC	Ongoing
	Carry out an odour assessment for 'amber' assessed sites.	Site Developers	Ongoing
Water Quality	Carry out a Water Quality assessment as part of a Phase 2 Study	WBC JBA Consulting	Phase 2 WCS
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).	TW	During design of WwTW upgrades
Environment	The Local 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.	WBC	Ongoing
	The local 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.	WBC	Ongoing
	Encourage the use of rainwater harvesting to manage surface water in new developments in order to reduce water demand.	WBC	Ongoing

Aspect	Action	Responsibility	Timescale
	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.	WBC SEW TW EA NE	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.	WBC TW Developers	Ongoing



## **Appendices**

### **A      Site Tracker Spreadsheet**

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Offices at

Coleshill  
Doncaster  
Dublin  
Edinburgh  
Exeter  
Glasgow  
Haywards Heath  
Isle of Man  
Limerick  
Newcastle upon Tyne  
Newport  
Peterborough  
Saltaire  
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