Uttlesford District Council Water Cycle Study – Stage 1

Final Report

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Uttlesford District Council

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Revision History

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S3-P01 26/01/2022	Draft Report	Lois Bowser (UDC) John Rumble (Affinity Water) Darl Sweetland (Anglian Water) Nicky McHugh (Thames Water) Sue Hogarth (Environment Agency)
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Contract

This report describes work commissioned by Uttlesford District Council on 07 July 2021. Hannah Booth, James Fitton and Richard Pardoe of JBA Consulting carried out this work.

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Purpose

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JBA Consulting has no liability regarding the use of this report except to Uttlesford District Council.

Acknowledgements

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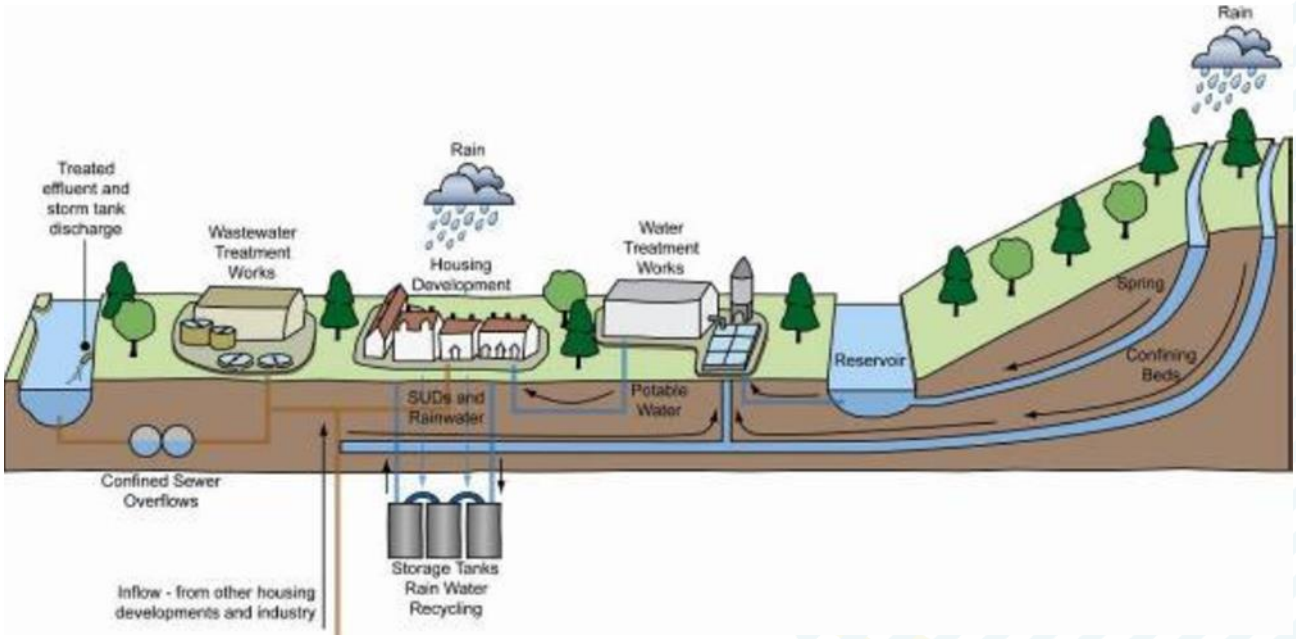
Executive summary

JBA Consulting was commissioned by Uttlesford District Council (UDC) to undertake a Water Cycle Study (WCS) for the Uttlesford District. The purpose of the WCS is to form part of a comprehensive and robust evidence base to inform the preparation of the new Local Plan, which will set out a vision and framework for development in the area up to 2040 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.

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 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 artificial processes and systems interact to collect, store or transport water in the environment.



Source: Environment Agency – Water Cycle Study Guidance

This Stage 1 Scoping Study will assist Uttlesford District 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, and the requirements of the environment (and the environmental legislative tests). Further work is recommended to be carried out within a Stage 2 Detailed Study.

The Water Cycle Study has been carried out in co-operation with the water companies, the Environment Agency (EA) whilst also using information from the neighbouring Local Planning Authorities (LPAs).

Uttlesford district council provided six spatial growth options for analysis in the scoping study. These are considered in each chapter of the WCS and a summary provided at the end.

Planned growth in and around Uttlesford is characterised in Section 2 of the report, before relevant environmental and water industry policy and legislation is presented in Section 3 to provide context for the following sections. The report is then divided into sections assessing the impact of growth on each topic in the water cycle. Finally, a summary is provided collating all of the information relating to the spatial growth options.

Mapping of each spatial growth options, and a summary of the known issues and constraints identified within each water framework directive catchment within Uttlesford is presented in Appendix A and B.

Water resources and supply

Uttlesford receives its water from Affinity Water (AfW), and the whole of Uttlesford is within its Stort Water Resource Zone (WRZ). The percentage growth rate allowed for in their Water Resource Management Plan (WRMP) for the Stort WRZ is less than the expected rate of growth within Uttlesford during the Local Plan period, however Affinity Water did not express any concerns with this higher level of growth. No constraints on water treatment, or the requirement for new strategic infrastructure were identified by AfW.

The Water Industry National Environment Programme (WINEP) is a set of actions that the EA have requested all 20 water companies operating in England to complete in a particular Asset Management Period (AMP) as part of their environmental commitments. A number of investigations are planned or underway to ensure that abstraction of water from both groundwater and rivers, is not leading to unsustainable reductions in flow, particularly in chalk streams. Development and population growth can increase abstraction, and so UDC have an opportunity to contribute to these actions indirectly by pursuing policies that promote water efficiency in new development.

It is widely recognised that the climate is changing and in response Uttlesford District Council declared a climate emergency in July 2019. Climate change is predicted to increase pressure on water resources, increasing the potential for a supply-demand deficit in the future, and making environmental damage from over abstraction of water resources more likely. Furthermore, the delivery of water and wastewater services and the heating of water in the home require high energy inputs, and therefore contribute directly to emissions of greenhouse gases. Water efficiency therefore reduces energy use and carbon emissions.

It is important therefore that new development does not result in an unsustainable increase in water abstraction. This can be done in a number of ways from reducing the water demand from new houses through to achieving "water neutrality" in a region by offsetting a new developments water demand by improving efficiency in existing buildings.

There is sufficient evidence to recommend the optional 110 litres per person per day design standard allowed under Building Regulations. However, within Uttlesford are two chalk stream catchments, the river Cam and River Stort and their tributaries. Both these rivers are failing to achieve Good Status under the Water Framework Directive, with one of the reasons cited being abstraction for public water supply which causes

low flows. It is important therefore that growth during the Local Plan period does not make this situation worse. A tighter water efficiency standard of 90 l/p/d is therefore recommended for all new build residential properties in order to minimise the new demand. It is recommended that all new non-residential properties achieve a score of "Outstanding" in the BREEAM New construction standard for water.

It is also recommended that the council explore policies that would achieve or approach water neutrality, and this will be explored further in the stage 2 WCS.

There is little different between the growth options from a water resources perspective, except that a new settlement may provide opportunities to maximise water efficiency to reduce overall water demand by provide strategic rainwater harvesting and greywater recycling infrastructure.

Wastewater network and treatment

Development in areas where there is limited wastewater network capacity will increase pressure on the network, increasing the risk of a detrimental impact on existing customers, and increasing the likelihood of storm overflow operation.

Anglian Water (AW) and Thames Water (TW) provide wastewater services for Uttlesford. Early engagement with developers, TW and AW is required, and further modelling of the network may be required in the Stage 2 WCS and at the planning application stage. Furthermore, in the TW and AW networks, there are areas where the current network is a combined sewer system, and further separation of foul and surface water may be required, as well as suitably designed SuDS.

Early engagement between Uttlesford District Council and TW/AW is also required to ensure that where strategic infrastructure is required, it can be planned in by TW/AW, and will not lead to any increase in discharges from sewer overflows.

There are 29 WwTW expected to serve growth in Uttlesford during the Local Plan period. Of these, six WwTWs may exceed their current maximum permitted dry weather flow as a result of growth in Uttlesford, with a further two very close to their permit. Many of these WwTW have planned upgrades which may alleviate some capacity issues. Early engagement between the Council and AW/TW is required to ensure that opportunities to accommodate this growth within existing upgrade schemes can be realised.

For smaller treatment works that may require upgrading to increase capacity, TW raised a concern that may not be room around the works to expand. This should be considered in Stage 2.

There are a number of poorly performing storm tank overflows at WwTWs in Uttlesford. Growth within these catchments could result in an increase in the operations of these overflows contributing to a worsening of water quality in the area. Action should be taken by the water companies to address these overflows prior to an increase in wastewater demand being generated by new development. TW and AW have confirmed the importance of the investigations into storm overflow performance.

Both AW and TW were provided with the spatial growth options and were asked to comment. In general, wastewater treatment capacity can be provided where it is required, however there is a carbon cost where wastewater must be pumped over longer distances, and a significant financial cost should a new WwTW be required (although this would be accommodated within the water company's business plan). There may also be timing constraints to providing new wastewater infrastructure at this scale which may impact the delivery schedule of development.

Anglian Water proposed Option 2b (Great Chesterford) as their preferred option and stated the following:

"In taking forward the next stages of the Plan, Anglian Water would want to work with the Council, Affinity Water and Thames Water and the Environment Agency to ensure that an agreed approach was taken to the development of the evidence base for the Local Plan. Based on the options presented there looks to be a hybrid option between option 1c, which would utilise the existing headroom at WRC (referred to elsewhere in report as WwTW) and one of the new community options. The evidence base and decisions taken by the Council in advancing the Local Plan to adoption would also serve to support Anglian Water's business plans and the agreement of regulators to investment and where necessary changes to WRC permits."

Water quality and environmental impact

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.

At this stage of the Local Plan process, a sensitivity analysis was appropriate, and carried out using the EA's SIMCAT water quality modelling tool. This modelled a 20% increase in the volume of treated wastewater discharged across every WwTW in the study area and investigated the response in water quality for Biochemical Oxygen demand (BOD), Ammonia and Phosphate.

Where water quality downstream of a WwTW in any given determinand deteriorates by 10% or more in response to a 20% increase in effluent flow, the sewer catchment can be said to be "more sensitive" to changes in effluent flow, and therefore growth. It can be seen that changes in the volume of treated wastewater in Uttlesford do not cause a significant response in the concentrations of ammonia within the study area in the north of Uttlesford with the exception of the River Pant. High sensitivity is observed for the River Chelmer as it passes Great Dunmow, which may be significant for the spatial growth options.

For BOD, more waterbodies are moderately sensitive with a 0 to 10% deterioration, again concentrated more in the south apart from the River Pant.

For phosphate the response is far more widespread, with many watercourses showing some sensitivity in particular the River Cam, Pincey Brook and the Stort. This is significant as the Cam and Stort are chalk streams and ecologically sensitive.

Detailed water quality modelling to test impact of proposed allocations is recommended in a Stage 2 WCS.

Thames Water indicated concerns about limits to certain chemicals such as Nickel that have been applied at some WwTWs. Consideration should also be given to these in Stage 2.

A screening exercise was undertaken to identify designated sites such as Sites of Special Scientific Interest (SSSIs) that could be impacted by a deterioration in water quality. These will be analysed further in Stage 2 as part of the detailed modelling study.

Development sites within the study area could be sources of diffuse pollution from surface runoff. SuDS are required on all development sites. Their design should consider both water quantity and water quality and site level investigations should be undertaken to define the most appropriate SuDS types for each specific development. Uttlesford District Council should be consulted at an early stage of development to ensure that SuDS are implemented and designed in response to site characteristics and policy factors.

Each growth option contains a high level of growth concentrated in a few locations. The additional volume of treated effluent this would generate has the potential to cause a deterioration in water quality if no mitigation is taken. Of particular concern is where this growth would be served by a WwTW discharging to a water course shown to be sensitive to changes in treated effluent volumes or is to an ecologically sensitive waterbody such as a chalk stream.

Modelling suggested that growth around Great Dunmow (utilised in all scenarios but particularly Option 2c) could cause a deterioration in the River Chelmer. It may be preferable for the new settlement to be served by Thames Water in this scenario.

Options 2a and 2b propose a lot of growth that would cause an increase in treated effluent in the River Stort and River Cam respectively (both Chalk Streams). Modelling showed Phosphate levels could be sensitive in these locations. And careful consideration should be given to whether this could be mitigated in these options.

Chalk Streams

A chalk stream is broadly defined as a river that derives most of its flow from chalk-fed groundwater, stores of underground water that are replenished when it rains. England is home to 85 per cent of the world's chalk streams. Chalk streams are an important and rare habitat and opportunities should be taken within the Local Plan to define policies to protect these river ecosystems.

In parallel to this WCS, a further report has been collated by JBA Consulting on the Chalk streams in Uttlesford. This made a number of policy recommendations which should be considered:

Measure type	Recommendation
Water efficiency	Recommendation 1 – Adopt CaBA strategy recommendation of 90l/p/d throughout Uttlesford Recommendation 2 – Require all new non-residential buildings achieve BREEAM "Outstanding" for water throughout Uttlesford
Water neutrality	Recommendation 3 – Explore the feasibility of achieving water neutrality in the Stage 2 Water Cycle Study
Riparian Buffer Zone	Recommendation 4 – Apply a riparian buffer zone in chalk stream areas to exclude all development within the natural flood plain or 15m of the bank, whichever is larger. Recommendation 5 – Apply a vegetated buffer strips on agricultural land within 15m of a chalk stream
Cattle fencing	Recommendation 6 – Encourage responsible land management such as cattle fencing through the Nature Recovery Strategy
Education	Recommendation 7 – Undertake a public engagement exercise to raise awareness of chalk

	streams and encourage responsible riparian ownership
Sustainable Drainage Systems (SuDS)	Recommendation 8 – Enforce the SuDS hierarchy as defined in the Essex SuDS guidance with a focus on encouraging infiltration SuDS and deep borehole SuDS where appropriate.
Neighbouring authority engagement	Recommendation 9 – Continue and strengthen existing partnerships with neighbouring authorities and other stakeholders to define coordinated policies for chalk stream protection

Contents

List of Figures

List of Tables

Abbreviations

AfW	Affinity Water
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
AW	Anglian Water
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
DLUHC	Department for Levelling Up, Housing & Communities
DWF	Dry Weather Flow
DWI	Drinking Water Inspectorate
DWMP	Drainage and Wastewater Management Plan
EA	Environment Agency
EC	European Community
ECA	European Communities Act
EFI	Ecological Flow Indicator
EP	Environmental Permit
EU	European Union
FEH	Flood Estimation Handbook
FFT	Flow to Full Treatment
FWMA	Flood and Water Management Act
FZ	Flood Zone
GIS	Geographic Information Systems
HOF	Hands-Off Flow
HOL	Hands-off Level
HRA	Habitats Regulations Assessment
JBA	Jeremy Benn Associates
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
l/p/d	Litres per person per day
Ml/d	Mega (Million) litres per day

MHCLG	Ministry of Housing Communities and Local Government (replaced by DLUHC)
NH_4	Ammonia
NMP	Nutrient Management Plan
NPPF	National Planning Policy Framework
OAN	Objectively Assessed Need
OfWAT	Water Service Regulation Authority
OPEX	Operational Expenditure
OS	Ordnance Survey
P	Phosphorous
RAG	Red / Amber / Green assessment
RBD	River Basin District
RBMP	River Basin Management Plan
ReFH	Revitalised Flood Hydrograph
RoFSW	Risk of Flooding from Surface Water (replaced uFMfSW)
RQP	River Quality Planning tool
RZ	Resource Zone
SA	Sustainability Appraisals
SAC	Special Area of Conservation
SBP	Strategic Business Plan
SEA	Strategic Environmental Assessment
SfA	Sewers for Adoption
SFRA	Strategic Flood Risk Assessment
SHELAA	Strategic Housing and Economic Land Availability Assessment
SHMA	Strategic Housing Market Assessment
SPA	Special Protection Area
SPD	Supplementary Planning Document
SPZ	Source Protection Zone
SS	Suspended Solids
SSSI	Site of Special Scientific Interest
SU	Sewerage Undertaker
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
TW	Thames Water
UDC	Uttlesford District Council
UWWTD	Urban Waste Water Treatment Directive
WaSC	Water and Sewerage Company
WCS	Water Cycle Study
WFD	Water Framework Directive
WINEP	Water Industry National Environment Programme
WRMP	Water Resource Management Plan
WRZ	Water Resource Zone
WTW	Water Treatment Works
WwTW	Wastewater Treatment Works

Glossary

Term	Description
Abstraction Point	The location where water is either taken or extracted from either a surface or groundwater waterbody.
Agricultural Management	The farming techniques and practices used to produce food and manage livestock.
Abstraction Licencing Strategy	The Abstraction Licencing Strategy sets out the Environment Agency's approach to managing new and existing abstraction and impoundments within their river management catchments.
Asset Management Plan (AMP) Period	Price limit periods in the water sector are sometimes known as Asset Management Plan (AMP) periods. The current period (2020-25) is commonly known as AMP 7 because it is the seventh price review period since privatisation of the water industry in 1989. AMP periods are five years in duration and begin on 1 April in the years ending in 0 or 5. Every five years the industry submits a Business Plan to OfWAT for a Price Review (PR). These plans set out the companies' operational expenditure (OPEX) and capital expenditure (CAPEX) required to maintain service standards, enhance service (for example where sewer flooding occurs), to accommodate growth and to meet environmental objectives defined by the Environment Agency. OfWAT assesses and compares the plans with the objective of ensuring what are effectively supply monopolies and operating efficiently.
Aquifer	An aquifer is a rock and/or sediment body that holds groundwater.
Chalk Stream	Chalk streams are rivers that flow across or are influenced by chalk bedrock. They are predominantly fed by underground chalk aquifers.
Dry Weather Flow	Dry weather flow is the average daily flow of wastewater to a waste water treatment works during a period without rain.
Effluent	Effluent discharge is the liquid waste produced from residential, commercial and industrial processes.

Environmental Flow Indicator	The Environmental Flow Indicator is the proportion of natural flows that are required to support the environment of a waterbody.
Groundwater Body	A Groundwater Body is the management unit under the Water Framework Directive which represents a distinct body of groundwater with its own hydrogeological characteristics.
Hands-off Flow	A condition attached to an abstraction licence which states that if a river flow falls below the level specified on the licence, the abstractor will be required to reduce or stop the abstraction.
Hands off Level	A river flow or borehole (groundwater) level below which an abstractor is required to reduce or stop abstraction.
Lead Local Flood Authority	A county council or unitary authority which leads in managing local flood risks (i.e., risks of flooding from surface water, ground water and ordinary (smaller) watercourses). Their duties are outlined in the Flood and Water Management Act.
Natural Flood Management	Natural flood management is the use of natural processes to reduce the risk of flooding and coastal erosion.
Per Capita Consumption	The per capita consumption is the average volume of water used by one person in a day. It is defined as the sum of the measured household consumption of clean water and unmeasured household consumption of clean water divided by the total household population. This is often expressed in litres per person per day (l/p/d)
Permitted Headroom	The difference between the volume of treated wastewater a treatment works is allowed to discharge under its environmental permit, and volume it currently discharges. It can be used to estimate the number of properties that could be connected to a WwTW catchment before a flow permit is exceeded.
Sustainable Urban Drainage Systems	Sustainable drainage systems are drainage solutions that provide a natural alternative to the direct channelling of surface water through an artificial networks of pipes and sewers to nearby watercourses.
Waterbodies	Water bodies constitute areas of water – both salt and fresh, large and small –

	which are distinct from one another in various ways. All surface waters (including rivers, lakes, estuaries and stretches of coastal water) and groundwaters have been divided up into discrete units called water bodies. Water bodies are the basic unit that are used to assess the quality of the water environment and to set targets for environmental improvements.
Water Framework Directive (WFD)	The Water Framework Directive is a river basin management planning system which was implemented to help protect and improve the ecological health of the UK's rivers, lakes, estuaries and coastal and groundwaters.
Water Framework Directive Classification Status	Rivers, lakes, estuaries and coastal waters can be awarded one of five WFD statuses: • High • Good • Moderate • Poor • Bad Groundwater can be awarded one of two statuses: • Good • Poor
Water Framework Directive – Reasons for not achieving good (RNAG)	Where a WFD element is classified as being at less than good status, a reason for the failure to meet the good status is attributed, including the sector deemed responsible or a pressure affecting a biological element.
Water Framework Directive objectives	The Water Framework Directive objectives are set out in Regulation 12 and Regulation 8 of the Water Environment Regulations 2017.
Water Industry National Environment Programme	The Water Industry National Environment Programme is the programme of work in which water companies in England must meet their obligations from environmental legislation and UK government policy.
Water Resource Management Plan (WRMP)	Water Resource Management Plans are statutory documents that all water companies must produce at least every five years. They set out how the water company intends to achieve a secure water supply for their customers while protecting and enhancing the environment.
Water Resource Zone (WRZ)	A Water Resource Zone is an area in which the abstraction and distribution of water is

	self-contained and is used to meet demand within that area.
Wastewater Treatment Works (WwTW)	A wastewater treatment works receive flows from the sewerage system and treats it so it can be discharged back into a river. They may also be called Sewage Treatment Works (STWs) or Water Recycling Centres (WRCs).

1 Introduction

1.1 Terms of reference

JBA Consulting was commissioned by Uttlesford District Council (UDC) to undertake a Water Cycle Study (WCS) for the Uttlesford District. The purpose of the WCS is to form part of a comprehensive and robust evidence base to inform the preparation of the new Local Plan, which will set out a vision and framework for development in the area up to 2040 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.

Parallel to the WCS, JBA Consulting were asked to provide an evidence base to identify and characterise chalk streams and the pressures they are under and make recommendations for policies to protect them. This report should be referred to for detailed information on chalk streams, and its recommendations are reproduced within the WCS where appropriate.

1.2 Structure of report

The requirements and objectives of the WCS are set out in the section below. Planned growth in and around Uttlesford is characterised in Section 2 of the report, before relevant environmental and water industry policy and legislation is presented in Section 3 to provide context for the following sections. The report is then divided into sections assessing the impact of growth on each topic in the water cycle study. Finally, a summary is provided collating all of the information relating to the spatial growth options.

Mapping of each spatial growth options, and a summary of the known issues and constraints identified within each water framework directive catchment within Uttlesford is presented in Appendix A and B.

1.3 The Water Cycle

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

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

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

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

- Stage 1: Scoping study, identifies if the water infrastructure capacity could constrain growth and if there are any gaps in the evidence you need to make this assessment. The scoping study will identify:
    - The area and amount of proposed development

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: 24/01/2022

2 Water Cycle Study Guidance, Environment Agency (2021). Accessed online at: https://www.gov.uk/guidance/water-cycle-studies on: 24/01/2022

- the existing evidence
- main partners to work with
- evidence gaps and constraints on growth

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

As a WCS is not a mandatory document, Local Planning Authorities are advised to prioritise the different stages of the WCS to integrate with their Local Plan programme. Figure 1.1 below shows the main elements that compromise the Water Cycle.

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

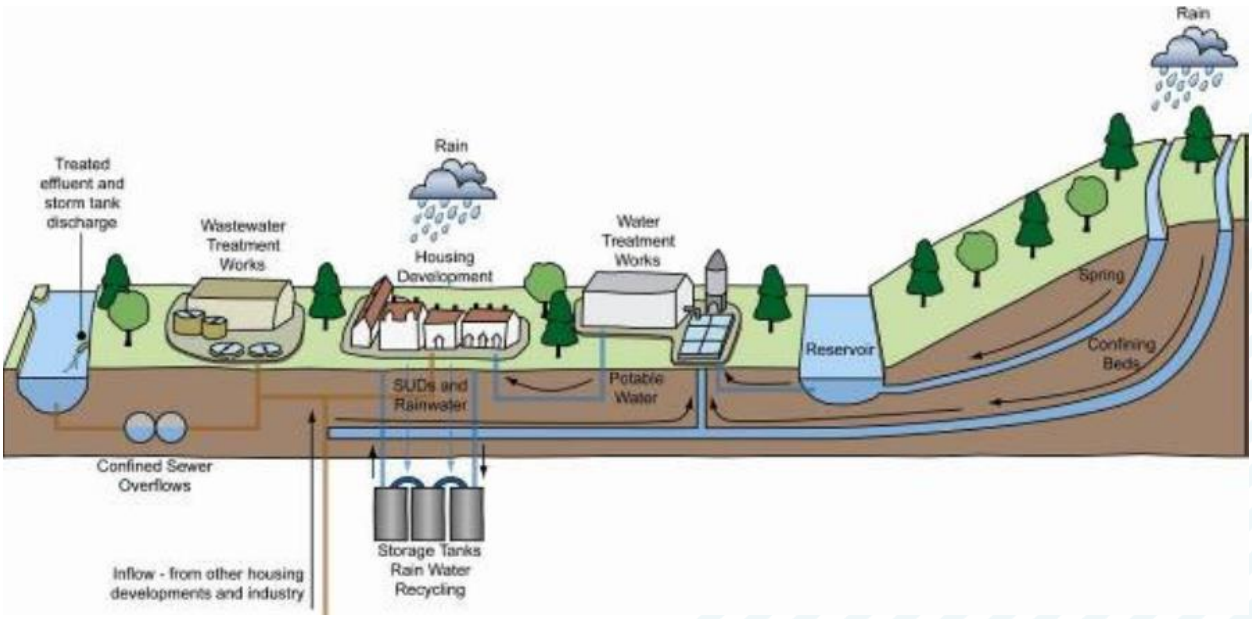


Figure 1.1 The Water Cycle

1.4 Impacts of Development on the Water Cycle

New homes require the provision of clean water, safe disposal of wastewater and limitation of flood risk. It is possible that allocating large numbers of new homes at some locations may result in the capacity of the existing available infrastructure being exceeded. This situation could potentially lead to service failures to water and wastewater customers, have 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. Development, when planned correctly, can also offer opportunities to reduce flood risk to existing properties and increase community resilience, contribute to nature recovery, and allow a collaborative approach to infrastructure.

1.5 Objectives

This Stage 1 scoping report is written to support the Uttlesford Local Plan Review. The WCS brief from Uttlesford District Council stated that the overall objective of the WCS is to understand the environmental and physical constraints of development and identify opportunities for more sustainable planning and improvements that may be required to achieve the required level of development.

Uttlesford District Council Members declared a climate emergency in late 2019 and set up a Climate Change Working Group with interim climate change guidance agreed by Council in early 2021. Climate change and the need to work towards net zero carbon is a fundamental driver to the new Local Plan and sets the context for the Local Plan policy as well as underlying the viability assessment of options for site allocation and the spatial strategy overall.

Of critical and regional importance is the protection of the chalk aquifer which partly underlies the district, along with the chalk streams fed by the aquifer. There is increasing concern from the Uttlesford District Council Members, the public and local environmental groups over low flows in these chalk streams and the impact of water supply and wastewater activities are having on these watercourses.

This WCS will therefore consider the following issues:

- Water resources, demand, and supply
- Wastewater infrastructure and treatment
- Water quality and environmental impact
- Flood risk and drainage
- Impact of water supply and wastewater on chalk streams
- The impact of climate change on water infrastructure.

1.6 Study Area

Uttlesford District Council covers an area of approximately 640 km^2 encompassing Saffron Walden, Great Dunmow, Stansted Mountfitchet and Thaxted and about 100 villages and hamlets in between. The district includes London Stansted Airport as well as major road and rail networks with links to London to the south and Cambridge to the north.

The district has a population of 89,179 (based on 2018 data) with the majority of residents living in Saffron Walden.

Several Environment Agency (EA) designated main rivers flow through Uttlesford. The borough contains the River Cam, Stort, Roding, Can, Chelmer, Ter, Pant and Pincey Brook.

Water supply services are provided by Affinity Water (AfW) and wastewater services are provided by Anglian Water (AW) and Thames Water (TW).

1.7 Authorities responsible for Water Resource and Wastewater Management in Uttlesford

Within the Uttlesford District there are a number of authorities and regulators responsible or involved in supplying, managing, and overseeing water supply, wastewater and the environment. The table below explains the responsibilities of various bodies within the district.

Table 1.1 Responsibilities of authorities within Uttlesford

Authority Name	Key Responsibilities of Different Authorities
Environment Agency	The EA are the environmental regulator in the UK with responsibilities for water quality, flood risk and administering licences for water abstraction. They are a statutory consultee for many development plan documents and for some planning applications. They advise on environmental and

	infrastructure capacity issues across the water cycle.
Natural England	Natural England are the Government's advisors on the natural environment, which they have a responsibility to protect and enhance. In a WCS they may provide information on the conservation objectives, and guidance on, the protection of designated sites.
Affinity Water	Affinity Water as the water supplier for the district has a statutory duty under the Water Industry Act to maintain an efficient and economical system of water supply within its area and supply households with a reliable and sufficient supply of water.
Anglian Water	Anglian Water is the sewerage undertaker for a large proportion of the district. Sewerage undertakers have a duty under the Water Industry Act to provide, improve and extend a system of public sewers (for both domestic and trade flows) so as to cleanse and maintain those sewers (and any lateral drain) to ensure that the area that they serve is effectually drained. There is also a duty to make provision for the emptying of those sewers, normally through sewage treatment works or where appropriate through discharges direct to watercourses.
Thames Water	Thames Water is the sewerage undertaker for a part of the district. As the sewerage undertaker for part of the District, Thames Water have the same responsibilities as Anglian Water to provide, improve and extend a system of public sewers (for both domestic and trade flows) and to make provision for the emptying of those sewers.

1.8 Record of Engagement

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.

1.8.1 Engagement

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

Inception meeting

Details	Scope of works and data collection requirements.

Neighbouring authorities

Engaged Parties	South Cambridgeshire District Council East Herts
Details	Request for water cycle studies conducted in their area, and housing growth that would be served by WwTW within or shared with Uttlesford District Council.

Collaboration with Water Companies

Engaged Parties	Thames Water

	Anglian Water Affinity Water
Details	Water company assessments of water and wastewater infrastructure and capacity constraints.

2 Future Growth in Uttlesford

2.1 Growth in Uttlesford

The current Local Plan dates from 2005. A replacement plan was submitted for examination but subsequently withdrawn in May 2020 in the light of the examining Inspectors' comments on the soundness of the plan. At the same time the Council resolved to commence a new Local Plan. The new plan must accommodate around 14,120 homes between 2020 and 2040. The council have opted to include a buffer of 20% to ensure sufficient growth can be delivered therefore a target of 16,944 houses are required to be delivered in the district.

2.2 Development sites in Uttlesford

2.2.1 Baseline growth

Some development is already planned either through sites allocated in the adopted local plan or sites with extant planning permission. These must be included in assessments of infrastructure capacity alongside proposed sites for adoptions in the new local plan. These sites were provided by UDC for use in the study.

2.2.2 Spatial growth options

Uttlesford District Council are at an early stage in their local plan process and have a number of spatial growth options to consider. The spatial growth options are different ways in which the overall housing need may be delivered, for example through growth in existing settlements or through the creation of a new settlement. These scenarios have been explained in further detail below in Table 2.1 and a summary of the issues and opportunities identified in the WCS is contained in Section 10. Mapping of each option can be found in Appendix A.

Table 2.1 Summary of spatial growth options

Settlement	Type	Option 1b- Increased growth at the Rural Centres and Local Rural Centres	Option 1c Increased growth at existing settlements with a train station	Option 2a- Ugley New Community	Option 2b- Great Chesterford New Community	Option 2c- Easton Park New Community	Option 2d- West of Hatfield Broad Oak New Community	Option 2e: East of Stebbing New Community
Saffron Walden	Rural Centre	2,159	2,127	697	697	697	697	697
Great Dunmow	Rural Centre	1,470	534	1,128	1,128	1,128	1,128	1,128
Stansted Mountfitchet	Rural Centre	2,215	3,185	815	815	815	815	815
Great Chesterford	Local Rural Centre	475	775	475	475	475	475	475
Elsenham	Local Rural Centre	150	350	150	150	150	150	150
Hatfield Heath	Local Rural Centre	0	0	0	0	0	0	0
Newport	Local Rural Centre	643	643	643	643	643	643	643
Takeley	Local Rural Centre	1,397	1,582	1,982	1,982	1,982	1,982	1,982
Thaxted	Local Rural Centre	602	312	602	602	602	602	602
Type A Villages	Other Villages	1,251	918	1,251	1,251	1,251	1,251	1,251
Type B Villages	Other Villages	327	384	987	987	987	987	987
New Settlement 1	New Settlement	N/A	N/A	2,000	2,000	2,000	2,000	2,000

2.3 Windfall

Windfall sites are sites that are not specifically allocated in the Local Plan. Local Plans usually provide an allowance to cover this circumstance, consistent with the National Planning Policy Framework (NPPF). For the purpose of the Stage 1 report windfall sites were distributed between WwTWs based on the proportion of the commitments at each WwTW. This will be revised in Stage 2. The windfall allowance of 1,710 homes was advised by Uttlesford District Council. This may change as a result of subsequent monitoring.

2.4 Growth outside Uttlesford

2.4.1 General approach

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

- 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 Uttlesford.

Where specific trajectory was not given by the neighbouring councils, committed development was assumed to be spread evenly over the next five years (2020/21 to 2024/25) and Local Plan development was spread evenly from 2020/21 to the end of the Local Plan period.

2.4.2 East Hertfordshire District

East Hertfordshire District Council has provided information on significant sites which have been granted permission since 2018. Some of these sites would be served by the Bishops Stortford WwTW which is shared with the Uttlesford District.

Table 2.2 Summary of growth in the East Hertfordshire District served by infrastructure shared with Uttlesford

WwTW	Proposed number of dwellings	Potential Employment Space (m2)	Period
Bishops Stortford	4,581	48,720	2016-2038

2.4.3 Greater Cambridge Planning Authority

The Greater Cambridge Shared Planning team is a shared service for South Cambridgeshire District Council and Cambridge City Council.

The Greater Cambridge Shared Planning team has provided information on allocated sites in the planning area which have been granted permission since 2011. Some of these sites would be served by the Great Chesterford WwTW and Linton WwTW which are shared with the Uttlesford District.

Table 2.3 Summary of growth in the Greater Cambridge Planning Authority area served by infrastructure shared with Uttlesford

WwTW	Proposed number of dwellings	Potential Employment Space (m^2)	Period
Great Chesterford	1,500	186,250	2019-2030
Linton	126	32,490	2019-2025

3 Legislative and Policy Framework

3.1 Introduction

The following sections introduce several national, regional and local policies that must be considered by the LPA, 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)[3] was published on 27th March 2012, as part of reforms to make the planning system less complex and more accessible, to protect the environment and to promote sustainable growth. A comprehensive revision was issued in July 2018. This was further revised in February 2019 and July 2021[4], but the changes were not significant from the July 2018 version for policy areas relevant to the WCS. The NPPF provides guidance to planning authorities to take account of flood risk and water and wastewater infrastructure delivery in their Local Plans. Key paragraphs include:

Paragraph 34:

> *"Plans should set out the contributions expected from development. This should include setting out the levels and types of affordable housing provision required, along with other infrastructure (such as that needed for education, health, transport, flood and water management, green and digital infrastructure). Such policies should not undermine the deliverability of the plan."*

Paragraph 153:

> *"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 174:

> *"…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. The DLUHC is in the process of updating the Guidance to consider the necessary 2018 and 2019 updates of the NPPF. Of the sections relevant to this study, only the Water Supply, Wastewater and Water Quality section has been updated.

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

3 National Planning Policy Framework, Department for Communities and Local Government (2012)
4 National Planning Policy Framework, Ministry of Housing, Communities and Local Government (2019). Accessed online at: https://www.gov.uk/government/publications/national-planning-policy-framework--2 on: 24/01/2022
5 Planning Practice Guidance: Flood Risk and Coastal Change, Department for Communities and Local Government (2014). Accessed online at: http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/ on: 24/01/2022.
6 Planning Practice Guidance: Water supply, wastewater and water quality, Department for Communities and Local Government (2014). Accessed online at: https://www.gov.uk/guidance/water-supply-wastewater-and-water-quality on: 24/01/2022

- Housing - Optional Technical Standards[7].

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.

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.

7 Planning Practice Guidance: Housing - Optional Technical Standards, Department for Communities and Local Government (2014). Accessed online at: https://www.gov.uk/guidance/housing-optional-technical-standards on: 24/01/2022

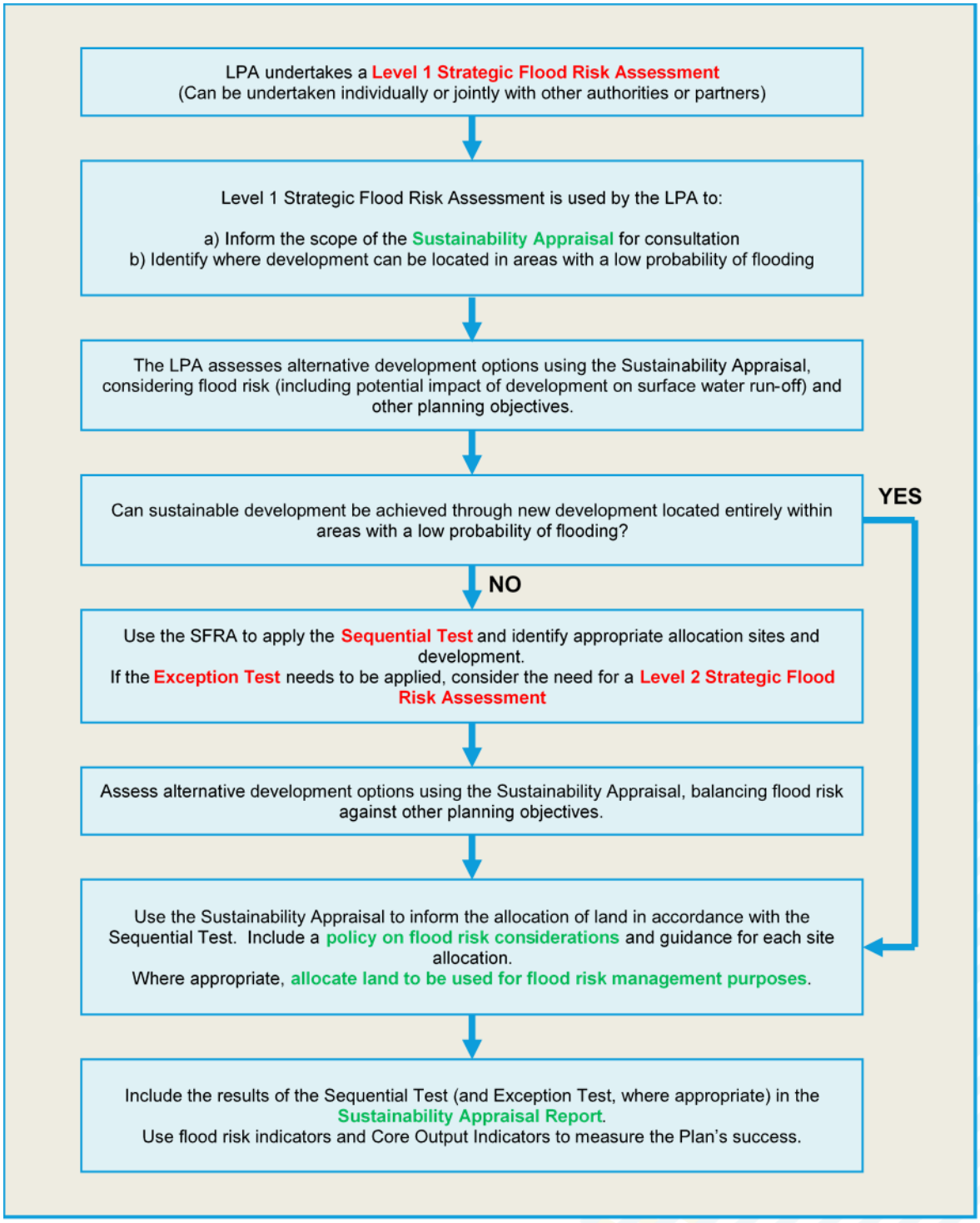


Figure 3.1 Flood Risk and the Preparation of Local Plans[8]

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

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

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

3.2.4 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[9] into the cost of implementing sustainability measures in housing found that meeting a standard of 110 litres per person per day would cost only £9 for a four-bedroom house. The evidence for adopting the optional requirements is outlined in section 4.3.1.

3.2.5 Building Regulations

The Building Regulations (2010) Part G[10] was amended in early 2015 to require that all new dwellings must ensure that the potential water consumption must not exceed 125 litres/person/day, or 110 litres/person/day where required under planning conditions.

3.2.6 BREEAM

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

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

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

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

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

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

3.2.7 Sustainable Drainage Systems (SuDS)

From April 2015, Local Planning Authorities (LPA) have been given the responsibility for ensuring that sustainable drainage is implemented on developments of 10 or more homes or other forms of major development through the planning system. Under the new

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9 Housing Standards Review: Cost Impacts, Department for Communities and Local Government (2014). Accessed online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/353387/021c_Cost_Report_11th_Sept_2014_FINAL.pdf on: 24/01/2022

10 The Building Regulations (2010) Part G - Sanitation, hot water safety and water efficiency, 2015 edition with 2016 amendments. HM Government (2016). Accessed online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/504207/BR_PDF_AD_G_2015_with_2016_amendments.pdf on: 24/01/2022

11 Home Quality Mark, BRE, (2018). Accessed online at: https://www.homequalitymark.com/professionals/standard/ on: 24/01/2022

12 2 BREEAM UK New Construction, BRE, (2018). Accessed online at: https://www.breeam.com/NC2018/ on: 24/01/2022

arrangements, the key policy and standards relating to the application of SuDS to new developments are:

- The National Planning Policy Framework, which requires that development in areas already at risk of flooding should give priority to sustainable drainage systems.
- The House of Commons written statement[13] setting out governments intentions that LPAs should "ensure that sustainable drainage systems for the management of run-off are put in place, unless demonstrated to be inappropriate" and "clear arrangements in place for ongoing maintenance over the lifetime of the development." This requirement is also now incorporated in the 2019 update of the NPPF (paragraph 165). In practice, this has been implemented by making Lead Local Flood Authorities (LLFAs) statutory consultees on the drainage arrangements of major developments.
- The Defra non-statutory technical standards for sustainable drainage systems[14]. These set out the government's high-level requirements for managing peak flows and runoff volumes, flood risk from drainage systems and the structural integrity and construction of SuDS. This very short document is not a design manual and makes no reference to the other benefits of SuDS, for example water quality, habitat and amenity.
- Essex County Council is the LLFA in the area 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. Essex County Council's "The Sustainable Drainage Systems Design Guide for Essex"[15] and contains guidance for the design and application of SuDS in Essex.
- An updated version of the CIRIA SuDS Manual[16] was published in 2015. The guidance covers the planning, design, construction and maintenance of SuDS for effective implementation within both new and existing developments. The guidance is relevant for a range of roles with the level of technical detail increasing throughout the manual. The guidance does not include detailed information on planning requirements, SuDS approval and adoption processes and standards, as these vary by region and should be checked early in the planning process.
- CIRIA also publish "Guidance on the Construction of SuDS" (C768)[17], which contains detailed guidance on all aspects of SuDS construction, with specific information on each SuDS component available as a downloadable chapter.
- Anglian Water provides guidance on their website in their Sustainable Drainage Systems[18]. Applications for SuDS adoptions should be made through their website.
- As of April 2020, the new Design and Construction Guidance (DCG)[19] came into force in England. This contains details of the water sector's approach to the adoption of SuDS, which meet the legal definition of a sewer. The guidance

13 Sustainable drainage systems: Written statement - HCWS161, UK Government (2014). Accessed online at: http://www.parliament.uk/business/publications/written-questions-answers-statements/written-statement/Commons/2014-12-18/HCWS161/ on: 24/01/2022
14 Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems, Defra (2015). Accessed online at: https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards on: 24/01/2022
15 The Sustainable Drainage Systems Design Guide for Essex (2021). Accessed online at: https://www.essexdesignguide.co.uk/suds on: 24/01/2022
16 The SuDS Manual (C753), CIRIA (2015).
17 Guidance on the Construction of SuDS (C768), CIRIA (2017), Accessed online at: https://www.ciria.org/ItemDetail?iProductcode=C768&Category=BOOK on: 24/01/2022
18 Towards Sustainable Water Stewardship. Anglian Water. Accessed online at: https://www.anglianwater.co.uk/siteassets/developers/aw_suds_manual_aw_fp_web.pdf on 24/01/2022
19 Water UK (2020) Sewerage Sector Guidance: Appendix C Design and Construction Guidance version 2. Accessed online at https://www.water.org.uk/sewerage-sector-guidance-approved-documents/ on 19/06/2020.

replaces the former, voluntary Sewers for Adoption guidance, as compliance by water companies in England is now mandatory.

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. The North Essex, Thames and Great Ouse CFMPs are the most relevant to Uttlesford.

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. Essex County Council has produced several around their LLFA area however none of these cover the study 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.

- 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 Affinity Water WRMP covers Uttlesford and is reviewed in section 4.3.

3.3.4 Regional water resource planning

Water resource planning is taking an increasingly regional focus, recognising the need for collaboration between water companies and sectors in order to address the challenges of climate change, increasing demand for water and protecting the water environment. Five regional groupings having been formed, including the Water Resources South East (WRSE) group which covers Uttlesford. WRSE is an alliance of the six water companies in the south east, including Affinity Water that supplies Uttlesford. An advisory group consisting of their regulators (Environment Agency and Ofwat) and Defra regularly attend meetings of WRSE. A stakeholder advisory group has also been formed consisting of major abstractors, environmental stakeholders and local authorities. Their aim is to provide strategic oversight and co-ordination of water resources matters across the river catchments of the South East of England. This will ensure the sustainability of water resources in these catchments. It will also support activity aimed at enabling water resource resilience across England and

Wales, including promoting the development of a long-term strategic plan for water transfers.

WRSE are preparing a regional water resource plan for publication in 2023, which in turn will inform the next round of company WRMPs to be published in 2024. As part of this process, they have published an initial water resource position statement which sets out the water resources challenges and opportunities within the region.

3.4 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"*[20].

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.

3.5 International Environmental Policy

3.5.1 Ramsar

The Convention on Wetlands of International Importance, more commonly known as the Ramsar convention after the city where it was signed in 1971, aims to protect important wetland sites. Under the treaty, member counties commit to:

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

"Wise use" of wetlands is defined under the convention as "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development". A handbook on the wise use of wetlands is available from the Ramsar Convention Secretariat[21].

Ramsar Sites are designated by the National Administrative Authority, responsible for the Ramsar Convention in each country. In the case of the UK this is the Joint Nature Conservation Committee (JNCC).

In general, the designation of UK Ramsar sites is underpinned through prior notification of these areas as Sites of Special Scientific Interest (SSSIs) and as such receive statutory protection under the Wildlife and Countryside Act 1981 (as amended). More recently, Paragraph 176 of the NPPF states that Ramsar sites should be given the same protection in the planning process as sites designated under the EU Habitats Directive.

3.6 European Environmental Policy

20 Localism Act 2011: Section 110, UK Government (2011). Accessed online at: http://www.legislation.gov.uk/ukpga/2011/20/section/110 on: 24/01/2022
21 Wise use of wetlands, Ramsar Convention Secretariat (2010). Accessed online at: https://www.ramsar.org/sites/default/files/documents/library/hbk4-01.pdf on: 24/01/2022

3.6.1 Urban Wastewater Treatment Directive (UWWTD)

The UWWTD[22] 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'.

3.6.2 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.

3.6.3 Bathing Water Directive

The Bathing Water Directive was first published in 2006 and has been transposed into English and Welsh law through enactment of the Bathing Water Regulations 2013 (supersedes the Bathing Water Regulations 2008). The aims of the directive are the protection of public health whilst bathing, standardisation of publicly available water quality information and to improve management practices at bathing waters.

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

Water quality standards are based on the incidence of potentially harmful bacteria, E. coli and intestinal enterococci and are categorised as 'excellent', 'good', 'sufficient' or 'poor' on the basis of bacteria levels. Sites are rated annually and on a short-term basis in response to any temporary pollution incidents. Blue flag designation is an international award given to beaches which meet stringent criteria on having excellent water quality and other facilities such as the provision of environmental information, lifeguards, toilets, and other facilities.

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

By law under the Bathing Water Regulations 2013, the local council must display clear information at Bathing Waters about water quality and sources of pollution throughout the Bathing Season, as well as information on any temporary pollution incidents and how long these are expected to last. If Bathing Water is classed as poor the local council is required

22 UWWTD. Accessed online at: https://ec.europa.eu/environment/water/water-urbanwaste/index_en.html On: 24/01/2022.

to put up an "advice against bathing" symbol, though this does not mean the site is closed to the public.

In contrast to some other European nations, the UK has not previously designated stretches of river as bathing waters, however the first freshwater river bathing water was designated on the River Wharf in North Yorkshire in 2021, and across England there are numerous campaigns by NGOs and members of the public to designate other stretches of river. It is anticipated that this could lead to a significant expansion of the number of inland bathing waters.

3.6.4 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. Uttlesford falls within the Anglian River Basin District (RBD)[23] and in the Thames RBD[24]. 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 Anglian and Thames River Basin Management Plan. Another equally important objective requires all water bodies to achieve good ecological status. Future development needs to be planned carefully so that it helps towards achieving the WFD and does not result in further pressure on the water environment and compromise WFD objectives. The WFD objectives as outlined in the updated RBMPs are summarised below:

- Prevent deterioration of the status of surface waters and groundwater
- Achieve objectives and standards for protected areas
- 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
- Reverse any significant and sustained upward trends in pollutant concentrations in groundwater
- Stop 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.

3.6.5 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

23 Anglian Basin District River Basin Management Plan: 2015, Environment Agency (2016). Accessed at: https://www.gov.uk/government/publications/anglian-river-basin-district-river-basin-management-plan on: 24/02/2022

24 River Thames River Basin Management Plan 2015-2021, Environment Agency, (2016). Accessed online at: https://www.gov.uk/government/publications/thames-river-basin-district-river-basin-management-plan on: 24/02/2022

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)
- 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
- 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)

- 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
- Prevent further such pollution

Nutrient Sensitive Areas (Urban Waste Water Treatment Directive)

- 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

3.6.6 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[25] sets out a series of position statements that detail how the Environment Agency delivers government policy on groundwater and protects the resources from contamination. The position statements that are relevant to this study with regard to discharges to groundwaters, include surface water drainage and the use of SuDS, discharges from contaminated surfaces (e.g., lorry parks) and from treated sewage effluent.

3.6.7 European Derived Legislation and Brexit

Much of the legislation behind the regulation of the water environment derives from the UK enactment of European Union (EU) directives. Following the departure of the United Kingdom from the European Union on 31st January 2020, this legislation remains in force during the transition period, until 31st December 2020. The UK government has signalled that "the UK will in future develop separate and independent policies in areas such as … the environment … maintaining high standards as we do so."[26]

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

3.7 UK Environmental Policy

3.7.1 Environment Act 2021

25 The Environment Agency's approach to groundwater protection, Environment Agency (2018). Accessed online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/598778/LIT_7660.pdf on: 24/01/2022

26 The Future Relationship between the UK and the EU (2020) Accessed online at: https://www.gov.uk/government/speeches/the-future-relationship-between-the-uk-and-the-eu on 24/01/2022

The Environment Act[27] came into UK law in November 2021 with the aim of protecting and enhancing the environment. The Act has objectives to improve air and water quality, biodiversity, waste reduction and resource efficiency. The implementation of the policies within the Environment Act has begun and legally binding environmental targets are being developed. This will be enforced by the newly created Office for Environmental Protection (OEP)[28].

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

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

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

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

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

The Conservation of Habitats and Species Regulations 2010 (commonly referred to as the Habitats Regulations) consolidated the Conservation (Natural Habitats, &c.) Regulations 1994, and transposed the EU Habitats Directive in England and Wales. This was further amended in 2017.

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

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

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

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

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

27 The Environment Act 2021, UK Government (2021). Accessed online at: https://www.legislation.gov.uk/ukpga/2021/30/part/5/enacted on: 25/01/2022
28 Office for Environmental Protection website: https://www.theoep.org.uk/office-environmental-protection

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

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

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

3.7.3 Wildlife and Countryside Act 1981

Sites of Special Scientific Interest (SSSI) are designated and legally protected under the Wildlife and Countryside Act 1981, Section 28G places a duty to take reasonable steps, consistent with the proper exercise of the authority's functions, to "further to the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which the site is of special scientific interest."[29]

The Government's 25-year Environment Plan[30] has a target of "restoring 75% of our one million hectares of terrestrial and freshwater protected sites to favourable condition, securing their wildlife value for the long term." In line with this, and the Wildlife and Countryside Act 1981, Local Authorities should look put forward options that contribute to conservation or restoration of favourable condition, and at the very least must not introduce policies that hinder the restoration of favourable condition by increasing existing issues.

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

3.7.4 The Natural Environment Rural Communities Act (NERC)

The Natural Environment and Rural Communities Act 2006 (commonly referred to the as the NERC Act), was intended to implement key aspects of the Government's Rural Strategy published in 2004 and established Natural England as a new independent body responsible for conserving, enhancing and managing England's natural environment.

Section 40 of the NERC Act places a duty to conserve biodiversity on public authorities, including Local Planning Authorities and water companies. "The public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity."[31]

Section 41 requires the Secretary of State to publish and maintain a list of species and types of habitat which in the Secretary of State's opinion (in consultation with Natural England) are of "principal importance for the purpose of conserving biodiversity."

3.8 Water Industry Policy

3.8.1 The Water Industry in England

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

29 Wildlife and Countryside Act 1981, HM Government (1981). Accessed online at: http://www.legislation.gov.uk/ukpga/1981/69/section/28G on: 24/01/2022
30 A Green Future: Our 25 Year Plan to Improve the Environment, HM Government (2018). Accessed online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf on: 24/01/2022
31 Natural Environment and Rural Communities Act 2006, HM Government (2006). Accessed online at: http://www.legislation.gov.uk/ukpga/2006/16/section/40 on: 24/01/2022

are able to obtain water and/or wastewater services from alternative suppliers - 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

3.8.2 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 companies' operational expenditure (OPEX) and capital expenditure (CAPEX) required to maintain service standards, enhance service (for example where sewer flooding occurs), to accommodate growth and to meet environmental objectives defined by the Environment Agency. OfWAT assesses and compares the plans with the objective of ensuring what are effectively supply monopolies and operating efficiently. The industry is currently in Asset Management Plan 7 (AMP7) which runs from 2020 to 2025.

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

3.8.3 Drainage and Wastewater Management Plans

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

The group recognised that great progress has been made by the water industry in its drainage and wastewater planning over the last few decades, but that, in the future, there needs to be greater transparency and consistency of long-term planning. The Drainage and Wastewater Management Plan (DWMP) framework[32] sets out how the industry intends to approach these goals, with the objective of the water companies publishing plans by the end of 2022, in order to inform their business plans for the 2024 Price Review.

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

32 A framework for the production of Drainage and Wastewater Management Plans, UK Water Industry Research (2018). Accessed online at: http://www.water.org.uk/wp-content/uploads/2018/12/Water-UK-DWMP-Framework-Report-Main-Document.pdf on: 24/01/2022.

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

DWMPs cannot inform this study, as the process is still at early stage. In the future, however, DWMPs will provide more transparent and consistent information on sewer flooding risks and the capacity of sewerage networks and treatment works, and this should be taken into account in SFRAs, Water Cycle Studies, as well as in site-specific FRAs and Drainage Strategies.

Whilst publication of Drainage and Wastewater Management Plans (DWMPs) is not scheduled until 2022/23, AW are currently developing their DWMP, which will be published in 2022. The latest information about the DWMP can be found on their website[33].

Thames Water are also currently developing their DWMP and will be consulting on proposals once draft plans have been developed. The latest information about the DWMP can be found on their website[34].

3.8.4 Developer Contributions and Utility Companies

Developments with planning permission have a right to connect to the public water and sewerage systems, however, there is no guarantee that the capacity exists to serve a development.

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

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

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.

3.8.5 Changes to Charging Rules for New Connections

OfWAT, the water industry's economic regulator, has published new rules covering how water and wastewater companies may charge customers for new connections[35]. These rules apply to all companies in England and will commence on 1st April 2018. The three relevant water companies for the study area have now published their charging arrangements which can be found in the footnotes[36,37,38]. The key changes include:

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33 Drainage and Wastewater Management Plan, Anglian Water. Accessed online at: https://www.anglianwater.co.uk/about-us/our-strategies-and-plans/drainage-and-wastewater-management-plan/ on: 24/01/2022
34 Drainage and Wastewater Management Plan, Thames Water. Accessed online at: https://www.thameswater.co.uk/about-us/regulation/drainage-and-wastewater-management on: 24/01/2022
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: 24/01/2022
36 Charging Arrangements for New Connections Services 2021/2022, Affinity Water Limited (2021). Accessed online at: https://www.affinitywater.co.uk/docs/developer/2021/NCCA-2021-22-Affinity-Water-04-02.pdf on: 24/01/2022
37 Developer Charging Arrangements, Anglian Water (2021)
Accessed online at: https://www.anglianwater.co.uk/siteassets/developers/help--advice/ds-charging-arrangements-2021-22-v2.pdf on: 24/01/2022
38 Charging arrangements for new connection services, Thames Water (2021) Accessed online at: https://www.thameswater.co.uk/media-library/home/developers/charges/2021/new-connection-charges-2021-22.pdf on: 24/01/2022

- More charges will be fixed and published on water company websites. This will provide greater transparency to developers and will also allow alternative connection providers to offer competitive quotations more easily
- There will be a fixed infrastructure charge for water and one for wastewater
- The costs of network reinforcement will no longer be charged directly to the developer in their connection charges. Instead, the combined costs of all of the works required on a company's networks, over a five-year rolling period, will be covered by the infrastructure charges paid for all new connections.
- The definition of network reinforcement has changed and will now apply only to works required as a direct consequence of the increased demand due to a development. Where the water company has not been notified of a specific development, for example when developing long-term strategic growth schemes, the expenditure cannot be recovered through infrastructure charges.

3.8.6 Design and Construction Guidance (DCG)

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

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

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

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

4 Water Resources and Water Supply

4.1 Introduction

4.1.1 Objectives

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

4.1.2 Surface Waters

Figure 4.1 shows the main watercourses within the study area, which are summarised below:

The **River Cam** rises to the north of Elsenham and flows in a northerly direction through Uttlesford before flowing out of the district to the north of Great Chesterford. The main tributaries are Debden Water, Wicken Water, Fulfen Slade and The Slade.

The **River Stort** flows through the western part of Uttlesford from its source to the north of Killem's Green before flowing out of the district to the west of Stansted Mountfitchet. Its tributaries include Stansted Brook and Bourne Brook.

Pincey Brook rises at Stansted Airport and flows south through the airport towards the southern boundary of the district.

The **River Roding** rises to the north of Molehill Green and flows in a southerly direction towards the southern boundary of the district.

The **River Can** is located in the southern part of the district and flows in a southerly direction towards the southern boundary. Parsonage Brook is a tributary of the River Can and flows into the river to the west of High Easter.

The **River Chelmer** rises at Debden Green and flows in a southerly direction towards the southern boundary of the district. The tributaries of the river include the Barnston Brook and the Stebbing Brook.

The **River Ter** flows through a small part of the south-eastern corner of the district.

The **River Pant** flows through the north-eastern part of the district. The river rises to the north of Rowney Corner and flows in an easterly direction towards the eastern boundary of the district.

4.1.3 Chalk Streams

Chalk streams are a globally rare habitat with 85% of the examples in the world found in England, two of which flow and rise in Uttlesford (River Stort and River Cam). The location of these rivers is shown in Figure 4.2 below. The chalk streams shown in this map have been identified by the recently published Natural England chalk stream mapping. Most of their flow derives from underground chalk aquifers rather than surface water runoff resulting in stable base flows. The chalk also has a filtering effect resulting in nutrient-poor and very clear water. Because their water sources are so pure, any agricultural or urban pollution can severely disrupt the ecology of a chalk stream, as can changes in flow.

The health of a chalk stream depends on three things - water quantity, water quality and physical habitat quality (has the stream been modified / constrained and are invasive species present).

Further information on chalk streams is found in the chalk Stream Evidence base prepared by JBA alongside this work.

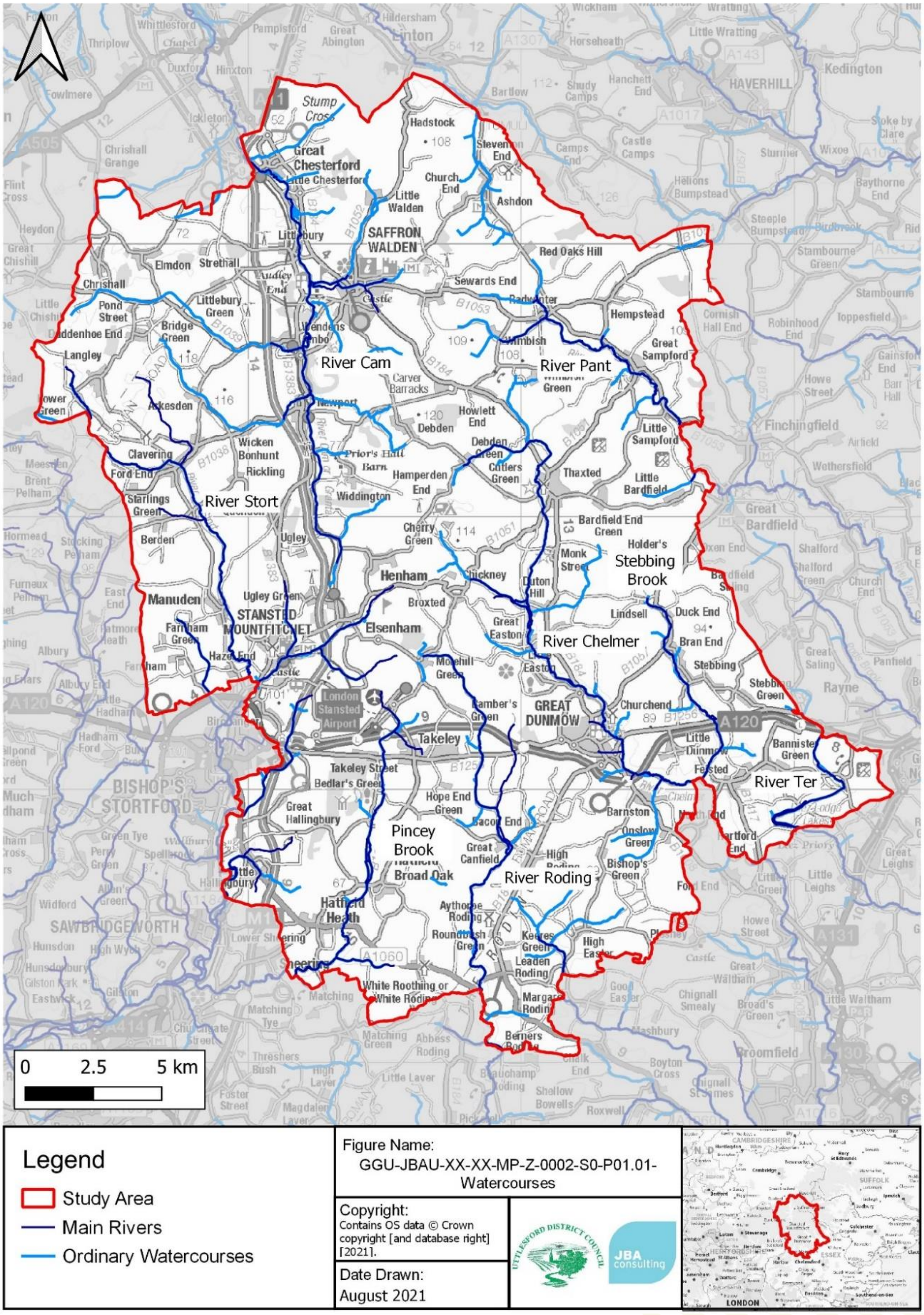

Figure 4.1 Significant watercourses within Uttlesford

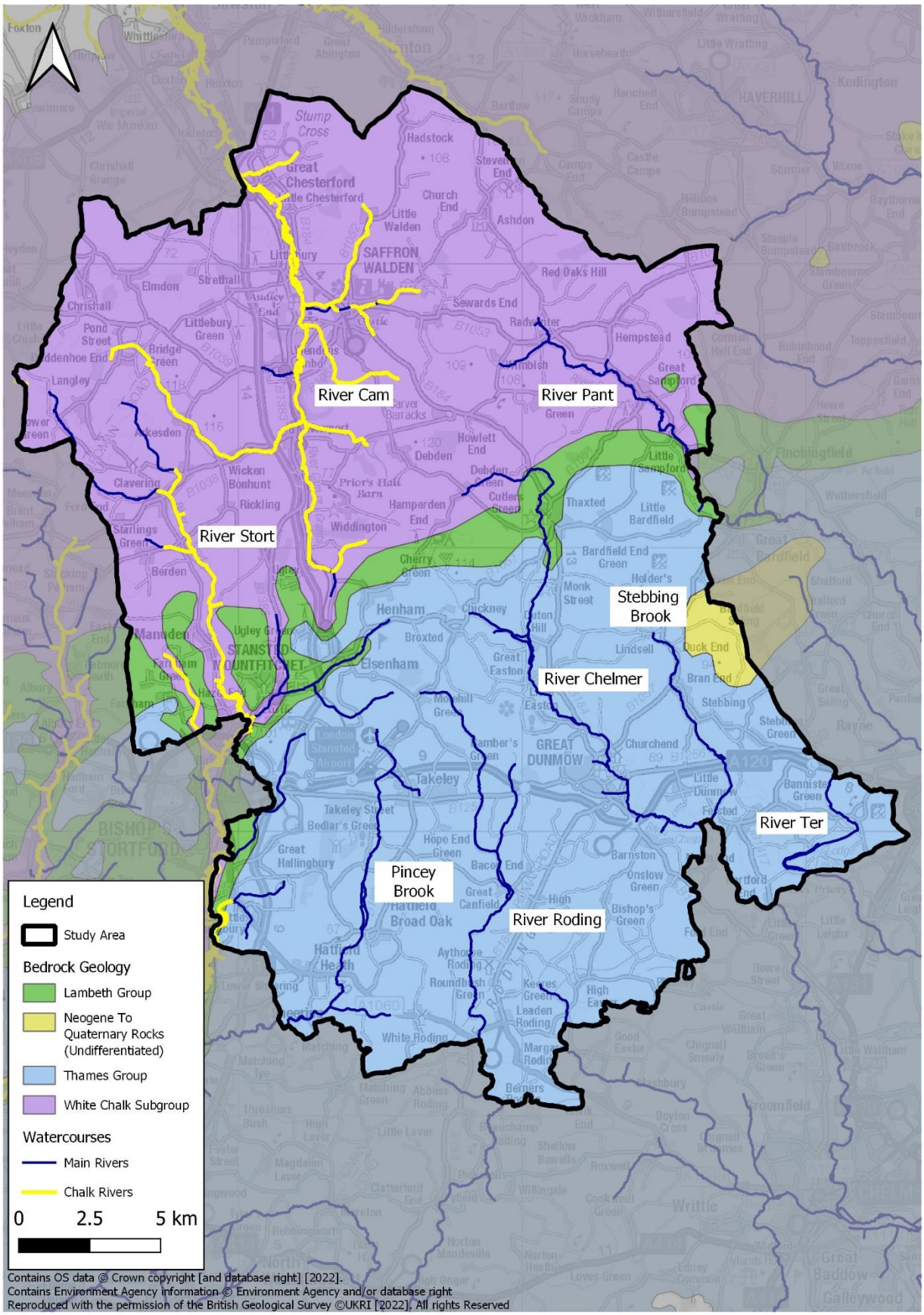

Figure 4.2 Chalk Streams in Uttlesford

4.1.4 Groundwaters

A WFD groundwater body represents a distinct body of groundwater flow with a coherent flow unit including recharge and discharge areas with little flow across the boundaries. There are seven groundwater bodies within the study area which are shown in Figure 4.3 and their corresponding WFD classification is summarised in Table 4.1 below. Most of these are found in the north of Uttlesford and are heavily influenced by the chalk geology. This has historically provided significant water resources for the region, however over-abstraction from these aquifers reduces flow in the chalk streams and their sensitive ecology that also relies on this flow. Several of the groundwater bodies in the study area have poor quantitative status, which in stated as being due to groundwater abstraction by the water industry and for agriculture. The effect of further abstraction in these areas could be a reduction in river flow in dependent surface waterbodies, or a deterioration in dependent water sensitive ecosystems.

Table 4.1 WFD status of groundwater bodies

Groundwater Body	Quantitative Status	Chemical Status	Overall Status - WFD Cycle 2 (2019)
Cam and Ely Ouse Chalk	Poor	Poor	Poor
Essex Gravels	Good	Poor	Poor
North Essex Chalk	Poor	Poor	Poor
North Essex Lower London Tertiaries	Poor	Good	Poor
North Mymms Tertiaries	Good	Good	Good
Upper Bedford Ouse Chalk	Poor	Poor	Poor
Upper Lee Chalk	Poor	Poor	Poor

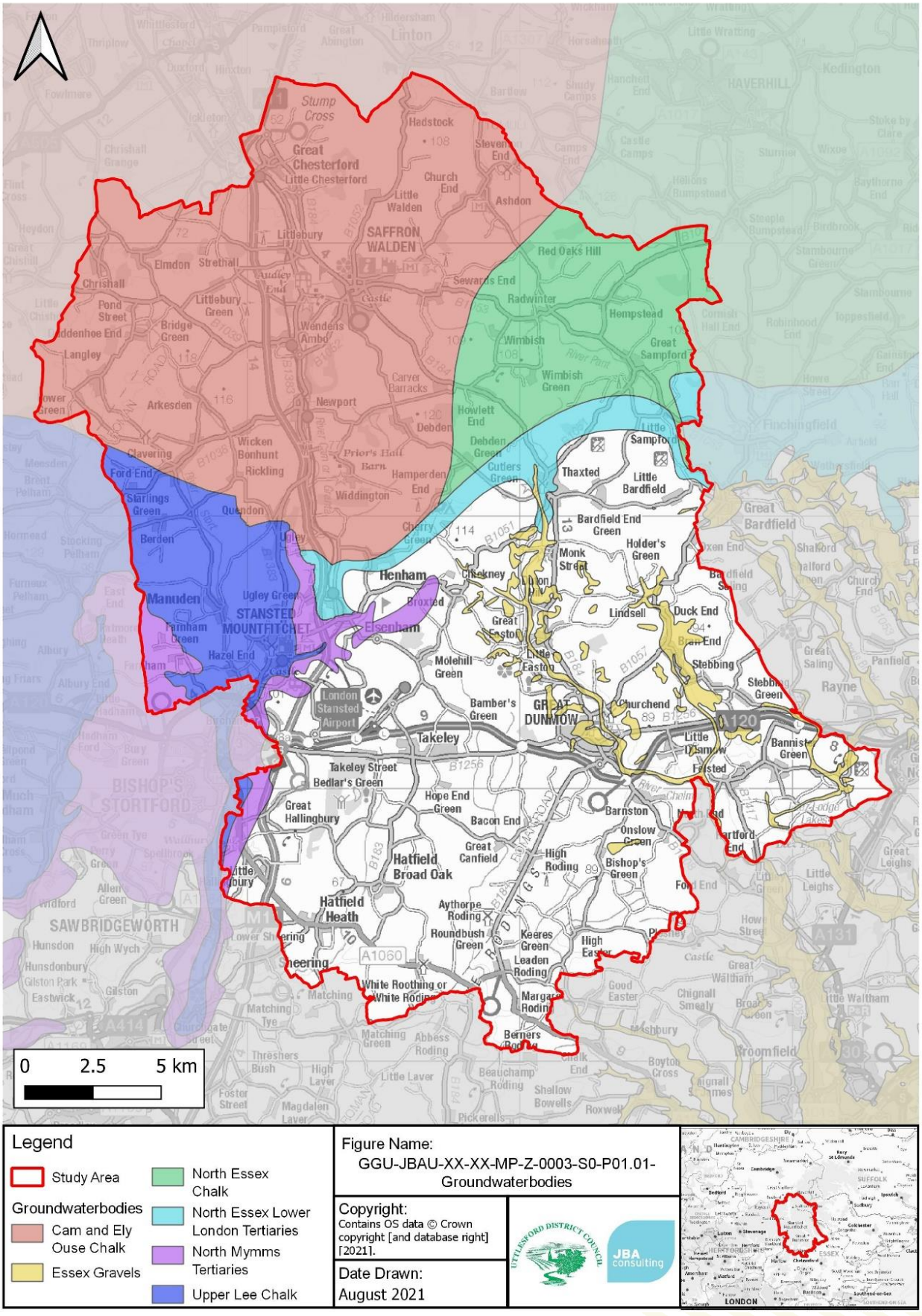

Figure 4.3 Groundwater bodies

4.1.5 Geology

The geology of the catchment can be an important influencing factor in the way that water runs off the ground surface, and also locally on the type of Sustainable Drainage System (SuDS) that is appropriate for development sites. This is primarily due to variations in the permeability of the surface material and bedrock stratigraphy.

Figure 4.4 shows the bedrock geology of the Uttlesford study area. The geology of Uttlesford is varied, and is predominantly divided into two main groups, Thames Group and White Chalk subgroup. The Thames Group is comprised of Clay, Silt, Sand and Gravel whereas the White Chalk subgroup is comprised of chalk. These groups are divided by an area of Lambeth Group which is comprised of Clay, Silt, Sand and Gravel.

Figure 4.5 shows superficial (at the surface) deposits of till in the majority of the district with small areas of sand and gravel overlaying a small part of the eastern and western parts of the district.

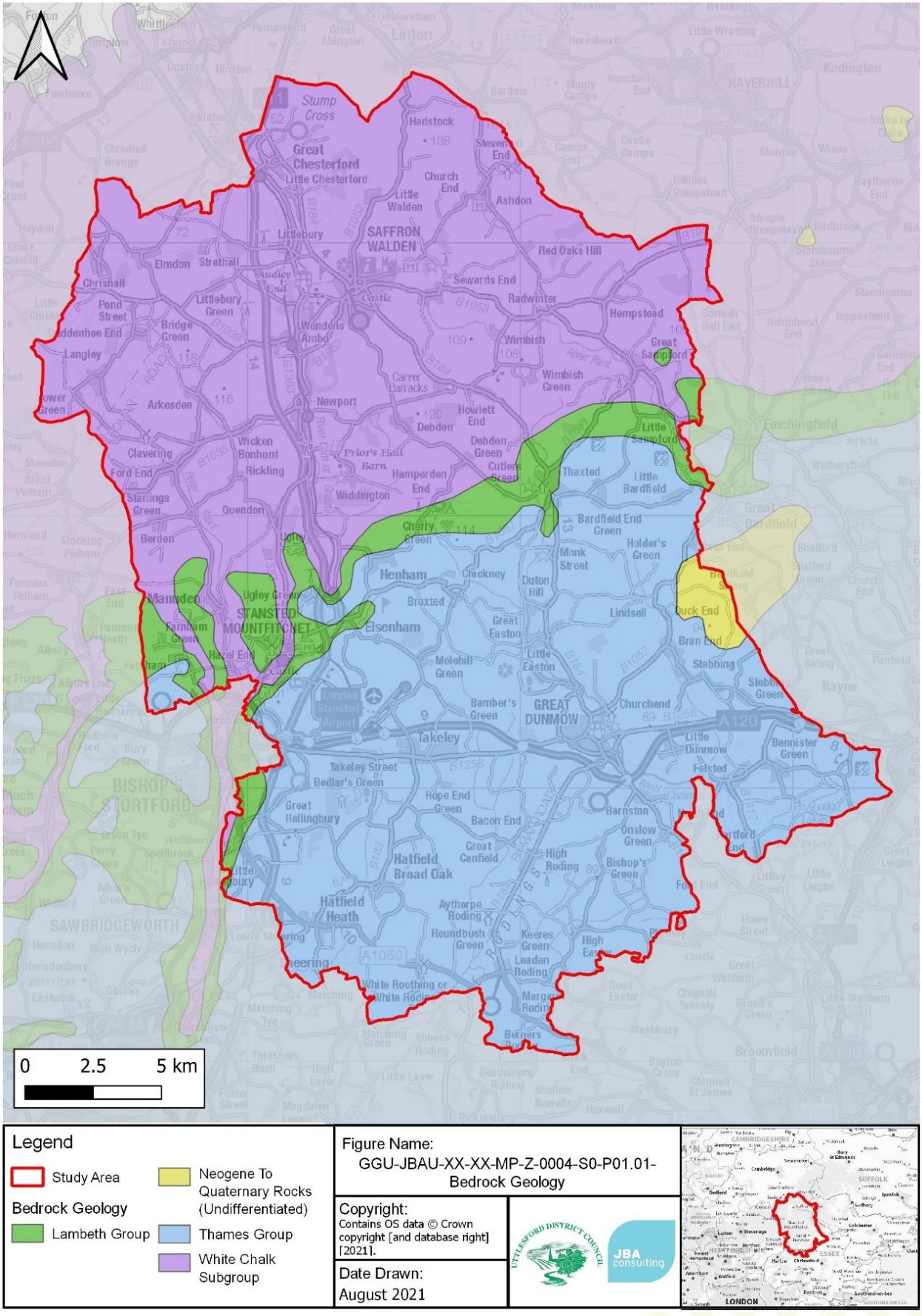

Figure 4.4 Bedrock geology of Uttlesford

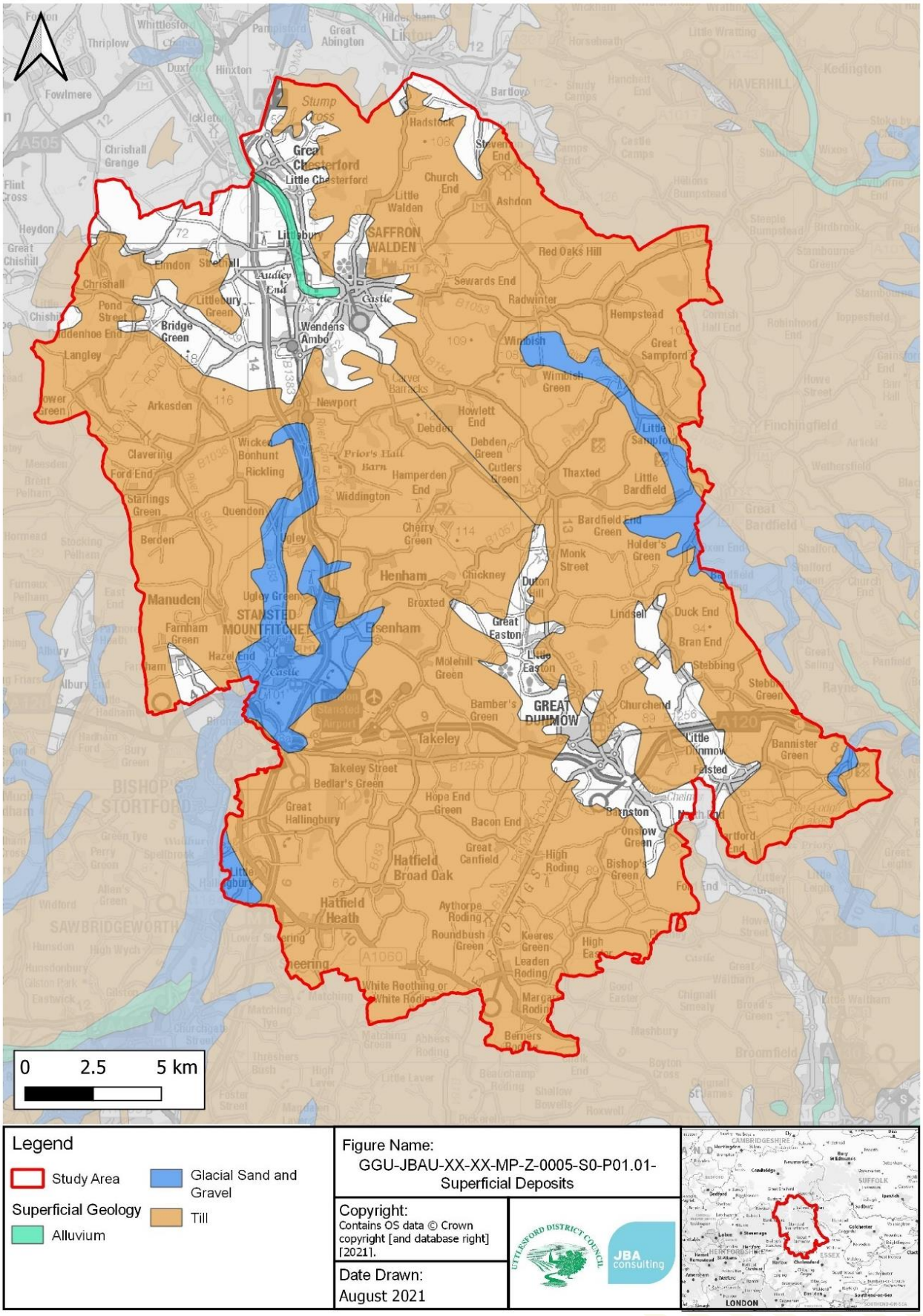

Figure 4.5 Superficial (at surface) geology of Uttlesford

4.2 Availability of Water Resources

4.2.1 Abstraction Licencing Strategy

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

All new licences, and some existing 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[39]. Uttlesford is covered by four ALS areas: Cam and Ely Ouse, Essex, Roding Beam and Ingrebourne, and the Upper Lee as shown in Figure 4.6 below.

39 Environment Agency (2021) Managing Water Abstraction. Accessed Online at: https://www.gov.uk/government/collections/water-abstraction-licensing-strategies-cams-process on: 24/01/2022

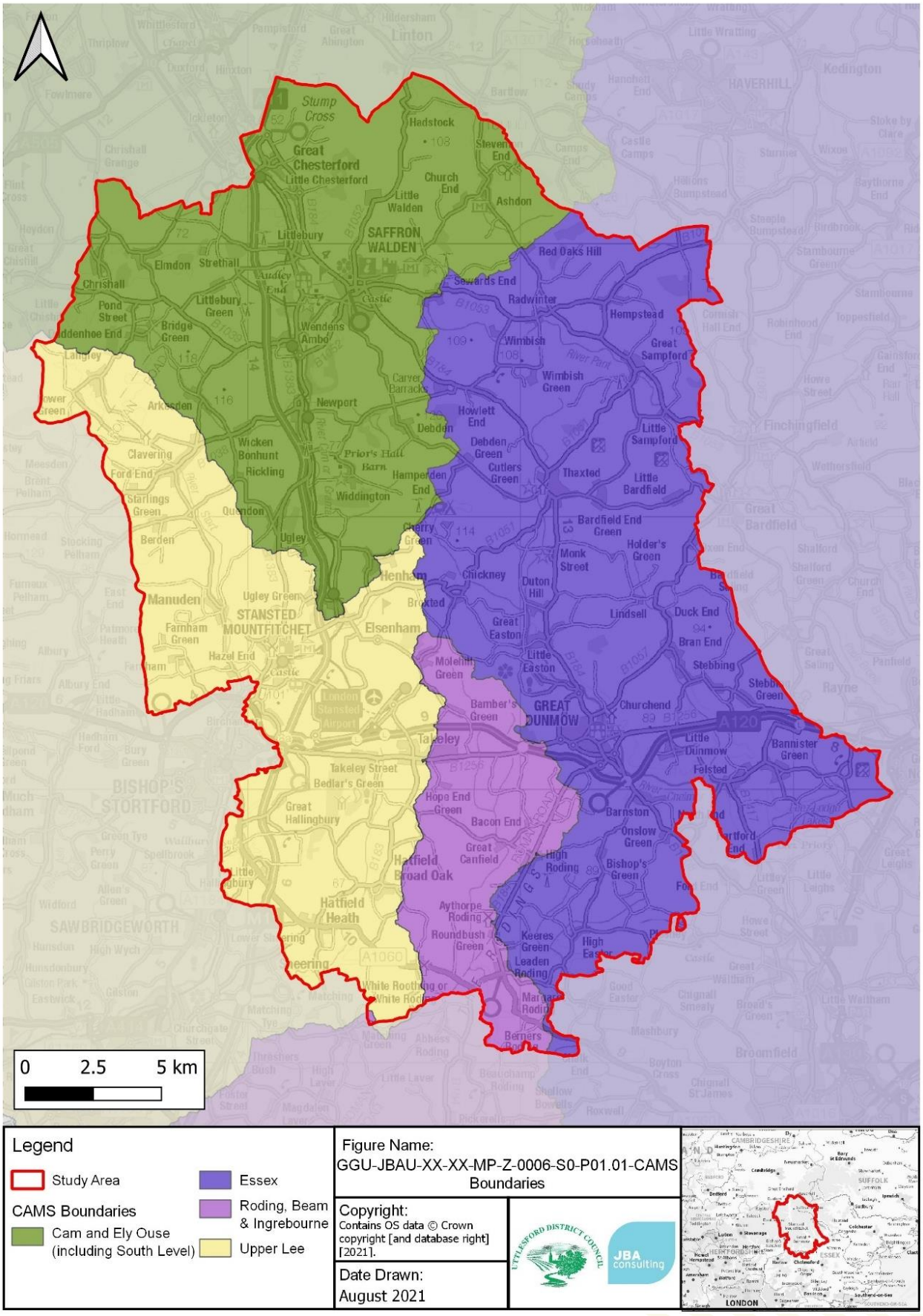

Figure 4.6 CAMS Boundaries covering Uttlesford

4.2.2 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 4.2. In some cases, water may be scarce at low flows, but available for abstraction at higher flows. Licences can be granted that protect low flows, this usually takes the form of a "Hands-off Flow" (HOF) or Hands-off Level (HOL) condition on a licence.

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 4.2 Implications of Surface Water Resource Availability Colours

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

Water resource availability is assessed under four different flow conditions:

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

In some catchments this assessment may show that there is limited or no water available for abstraction at Q50 or Q70 but show that there is water available at lower flows. This is likely to be because most abstraction licences are limited using a 'Hands off Flow' or 'Hands off Level', therefore within the catchment less water is being abstracted at very low flows and there is water available. This may not be the case across all catchments and, particularly in heavily modified catchments, there may be other artificial influences impacting on catchment flows. For example, if there are a large number of discharges within the catchment or the flow is artificially augmented then this would artificially elevate flow particularly at lower flows. In some cases, the EA doesn't include this water in the amount available for licensing because it isn't guaranteed but flow can potentially be more available.

A summary of the water resource availability for the ALS areas in Uttlesford is summarised in Figure 4.7.

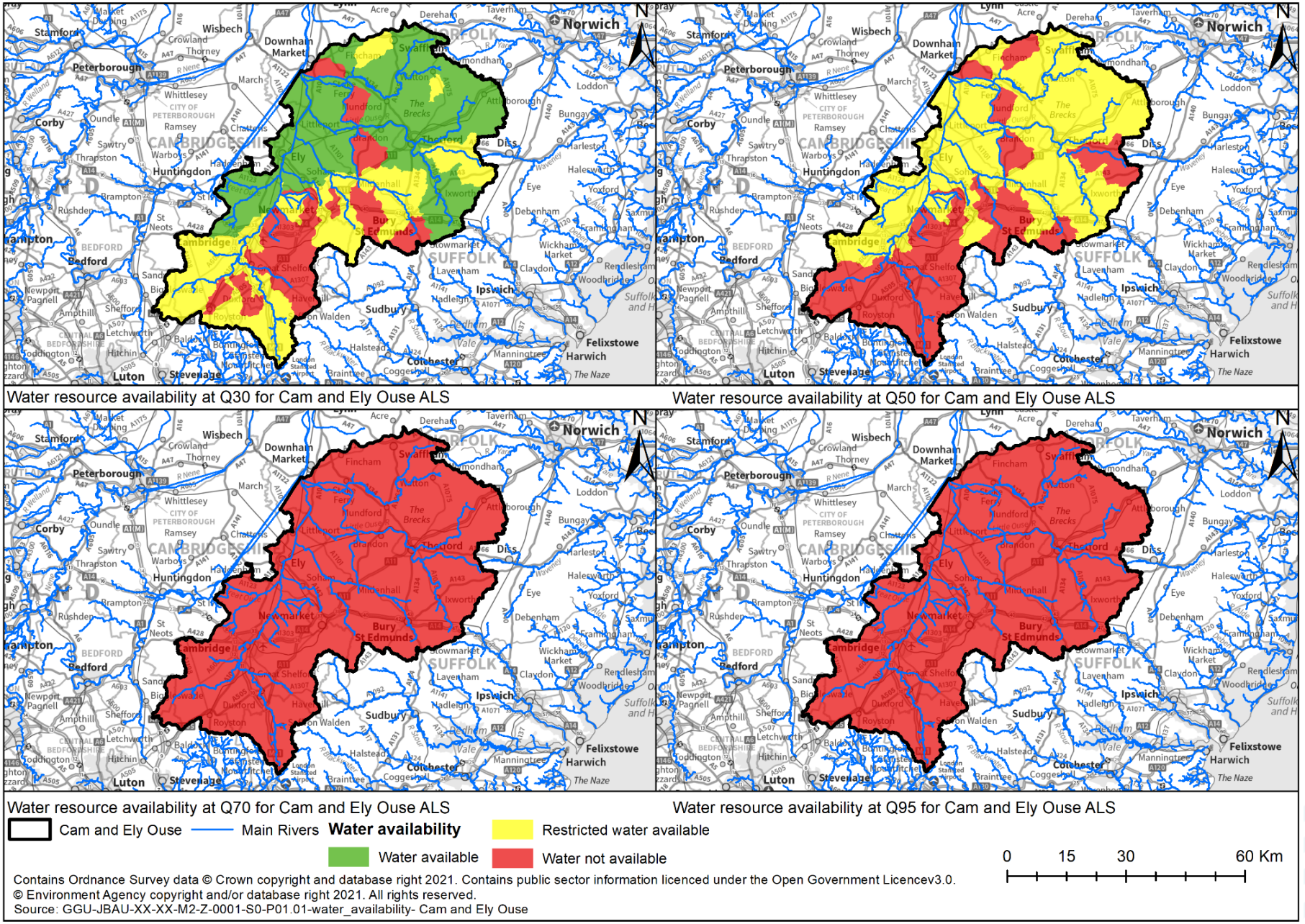

Figure 4.7 Water Resource Availability for the ALS areas in Uttlesford

4.2.3 Cam and Ely Ouse ALS

The Cam and Ely Ouse ALS[40], covers an area of approximately 3,664 km^2. It is characterised by the East Anglian Chalklands in the south, Brecklands in the north and South Level Fenland to the west. Land use is predominantly arable agriculture.

The catchment incorporates the following rivers and their tributaries:

- River Cam
- River Wissey
- Little Ouse
- River Lark

All of these rivers drain to the Ely Ouse that discharges to sea at Denver.

There are two important aquifers in the catchment:

- A larger Chalk aquifer underlies the eastern and central part of the ALS area.
- The Lower Greensand aquifer outcrops further west and is separated from the chalk by a layer of gault clay.

There are 17 APs within the Cam and Ely Ouse ALS, two of which fall within Uttlesford, AP2 and AP3. Currently there is restricted water available for licensing at these APs.

The groundwater availability in the Cam and Ely Ouse ALS region is guided by the surface water assessment unless specific information on principal 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.

Resource availability for the APs within Uttlesford are presented in Figure 4.8. During Q30 flow conditions, restricted water is available for licencing in AP3, and no water is available for licencing in AP2. In Q50, Q75 and Q95, water availability is not available across AP2 and AP3.

40 Cam and Ely Ouse abstraction licensing strategy, Environment Agency (2020). Accessed online at: https://www.gov.uk/government/publications/cam-and-ely-ouse-abstraction-licensing-strategy/cam-and-ely-ouse-abstraction-licensing-strategy on: 24/01/2022

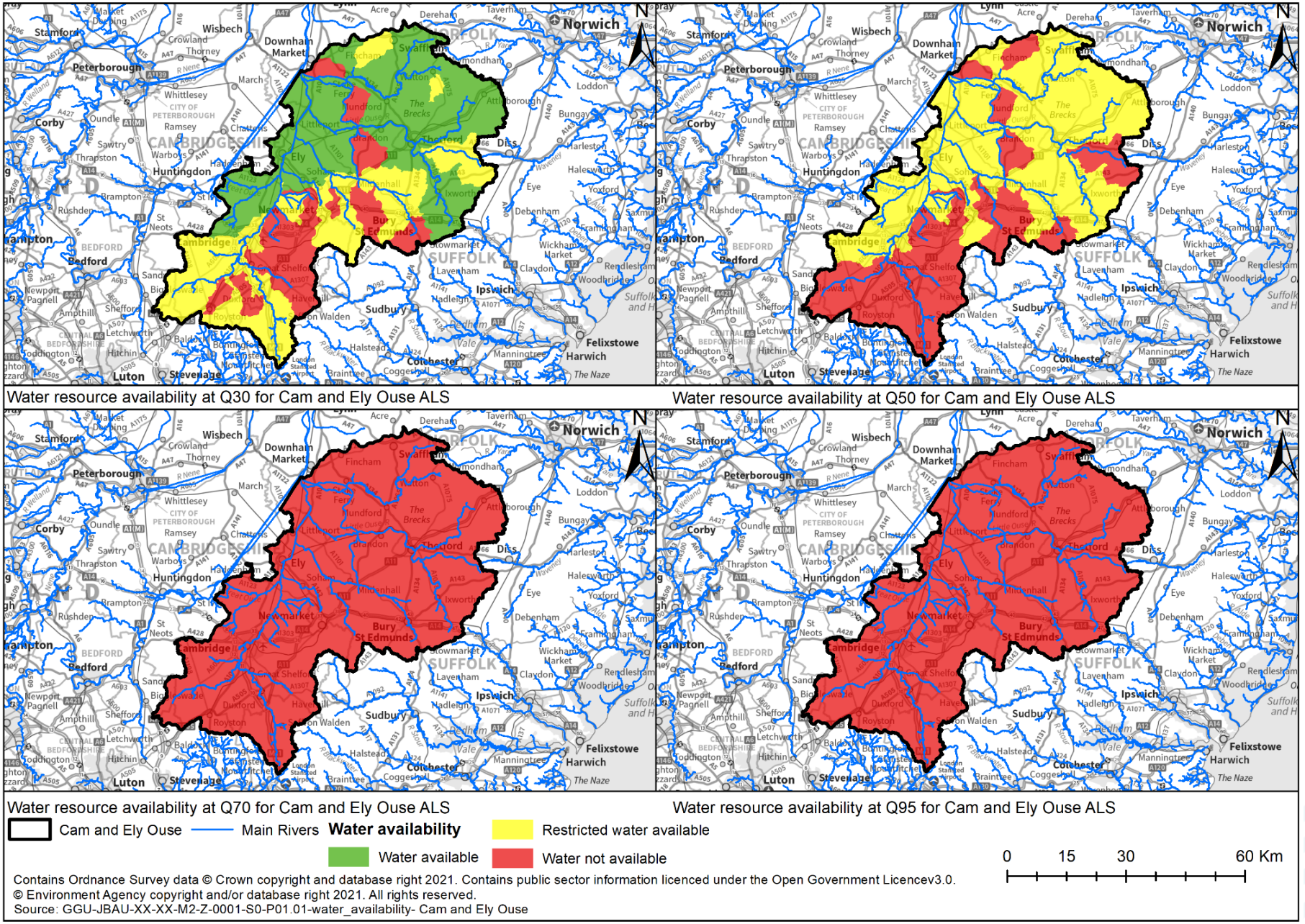

Figure 4.8 Water Resource Availability of the Cam and Ely Ouse ALS

4.2.4 Essex ALS

The Essex ALS[41], covers an area of approximately 2,920km^2 and incorporates a large part of Essex.

The catchment incorporates the following rivers and their tributaries:

- River Stour
- River Colne
- River Pant
- River Blackwater
- River Chelmer
- River Crouch
- Asheldham Brook
- River Roach

There are two important aquifers in the catchment:

- An area of shallow groundwater in the south of the Essex County.
- A confined chalk aquifer underlying the entire Essex County.

There are 19 APs within the Essex including 3 tidal AP's, two of which fall within Uttlesford, AP15, AP17 and AP19. Currently there is restricted water available for licensing at these APs.

The groundwater availability in the Essex ALS region is guided by the surface water assessment unless specific information on principal aquifers exists or local issues that need protecting overrule it.

The confined chalk groundwater in the Essex area is fully committed and no further consumptive abstraction can be considered.

Resource availability for the APs within Uttlesford are presented in Figure 4.9. In Q30, Q50, Q75 and Q95, water is not available across AP15, AP17 and AP19.

41 Essex abstraction licensing strategy, Environment Agency (2017). Accessed online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/636594/ALS_2017_Essex.pdf on: 24/01/2022

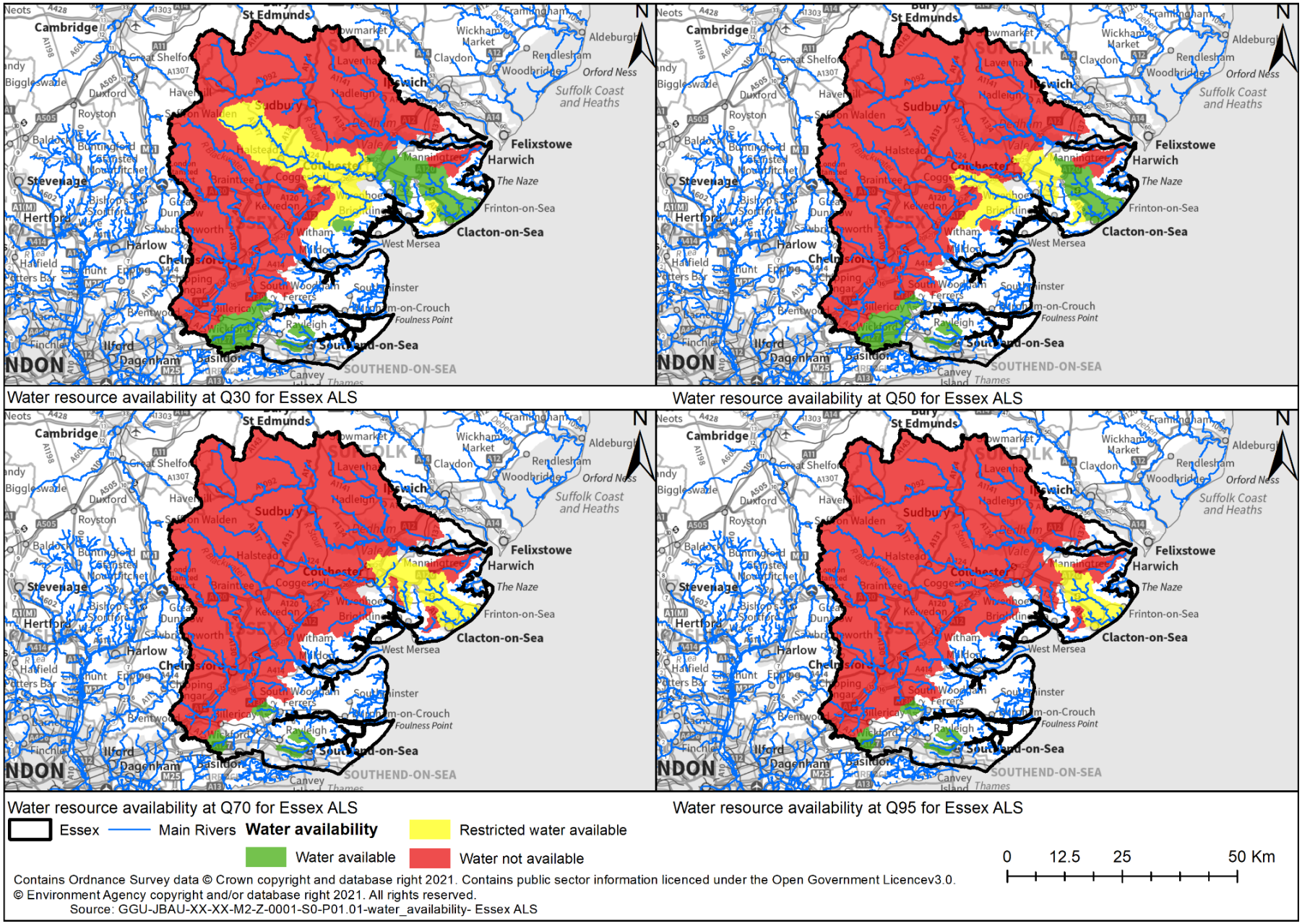

Figure 4.9 Water Resource Availability of the Essex ALS

4.2.5 Roding, Beam, Ingrebourne and Mardyke Abstraction Licensing Strategy ALS

The Roding, Beam, Ingrebourne, and Mardyke ALS[42], is in the Thames river basin district. The catchment is situated to the east of the River Thames basin and includes parts of Essex and east London. The southern boundary is the River Thames. The area extends from Barking to Canvey Island in the south, and to Takeley in the north.

The catchment incorporates the following rivers and their tributaries:

- Cripsey Brook
- River Roding
- River Beam
- River Ingrebourne
- River Mardyke
- Seven Kings River

There are 8 APs within the Roding, Beam, Ingrebourne and Mardyke ALS, one of which fall within Uttlesford, AP1. Currently there is restricted water available for licensing in this AP.

The groundwater availability in the northern part of the ALS (included in the study area) is covered under the Essex ALS region is guided by the surface water assessment unless specific information on principal aquifers exists or local issues that need protecting overrule it.

The confined chalk groundwater in the Essex area is fully committed and no further abstraction is possible.

Resource availability for the APs within Uttlesford are presented in Figure 4.10. In Q30, Q50, Q75 and Q95, water is not available across AP15, AP17 and AP19.

42 Roding, Beam, Ingrebourne and Mardyke abstraction licensing strategy, Environment Agency (2020). Accessed online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/792309/_Roding_Beam_Ingrebourne_and_Mardyke_Abstraction_Licensing_Strategy.pdf on: 24/01/2022

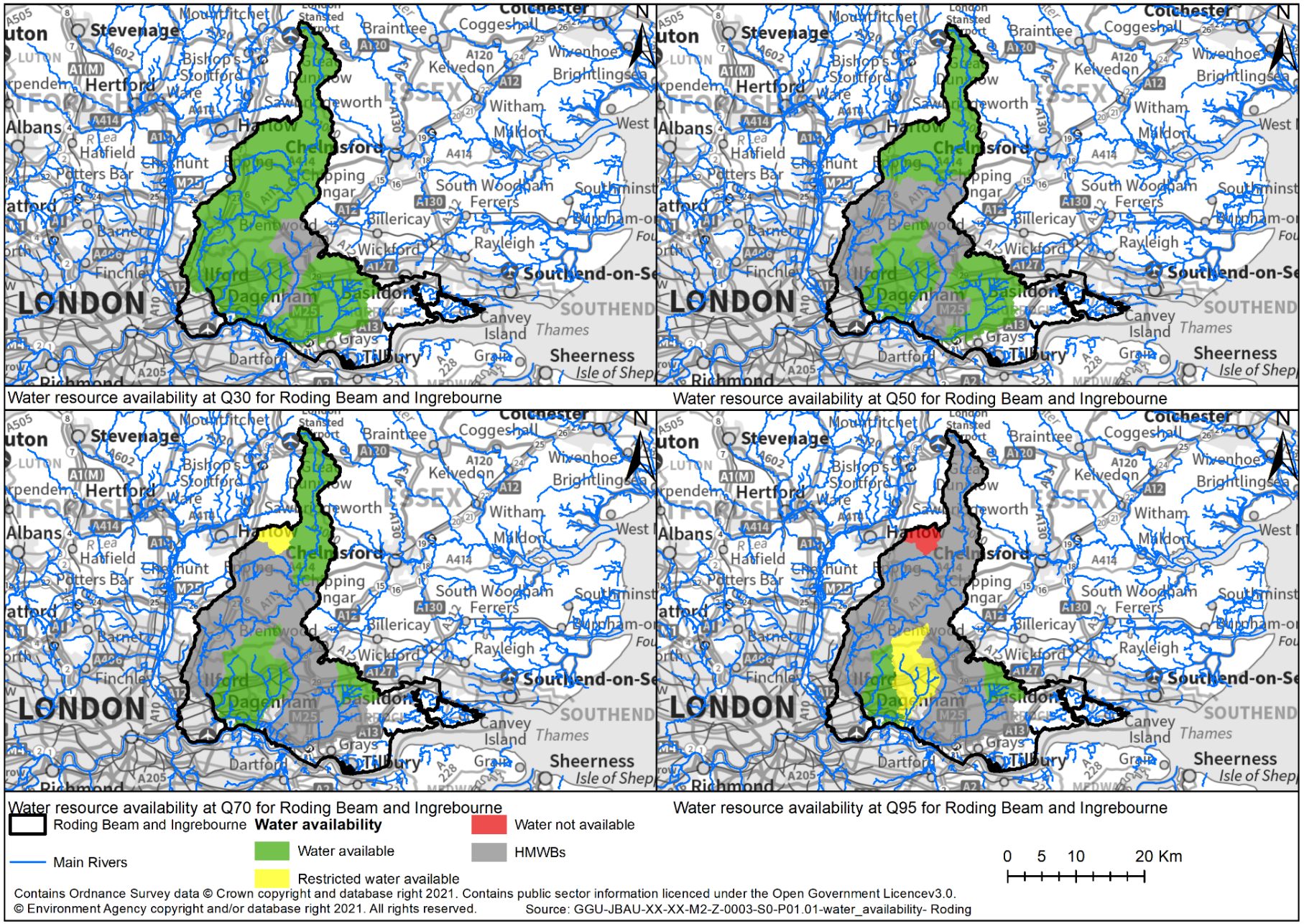

Figure 4.10 Water Resource Availability of the Roding, Beam, Ingrebourne and Mardyke ALS

4.2.6 Upper Lee ALS

The Upper Lee ALS[43] covers an area that drains into the River Lee from its source near Luton, downstream to Fieldes Weir to north-east of Hoddesdon, where the River Stort meets the Lee.

The catchment incorporates the following rivers and their tributaries:

- Upper Lee
- Mimram
- Beane
- Rib
- Ash
- Stort

There are 13 APs within the Upper Lee ALS, two of which fall within Uttlesford, AP2 and AP4. Currently there is restricted water available for licensing in these APs.

The catchment lies predominantly on unconfined Chalk, and as a result the River Lee and tributaries are mainly fed by the underlying groundwater aquifer. For this reason, in these areas the water availability for groundwater is considered the same as for surface water in the Upper Lee ALS.

Resource availability for the APs within Uttlesford are presented in Figure 4.11. In Q30, Q50, Q75 and Q95, water is not available across AP2 and AP4.

43 Upper Lee abstraction licensing strategy, Environment Agency (2019). Accessed online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/792373/Upper_Lee_Abstraction_Licensing_Strategy.pdf on: 24/01/2022

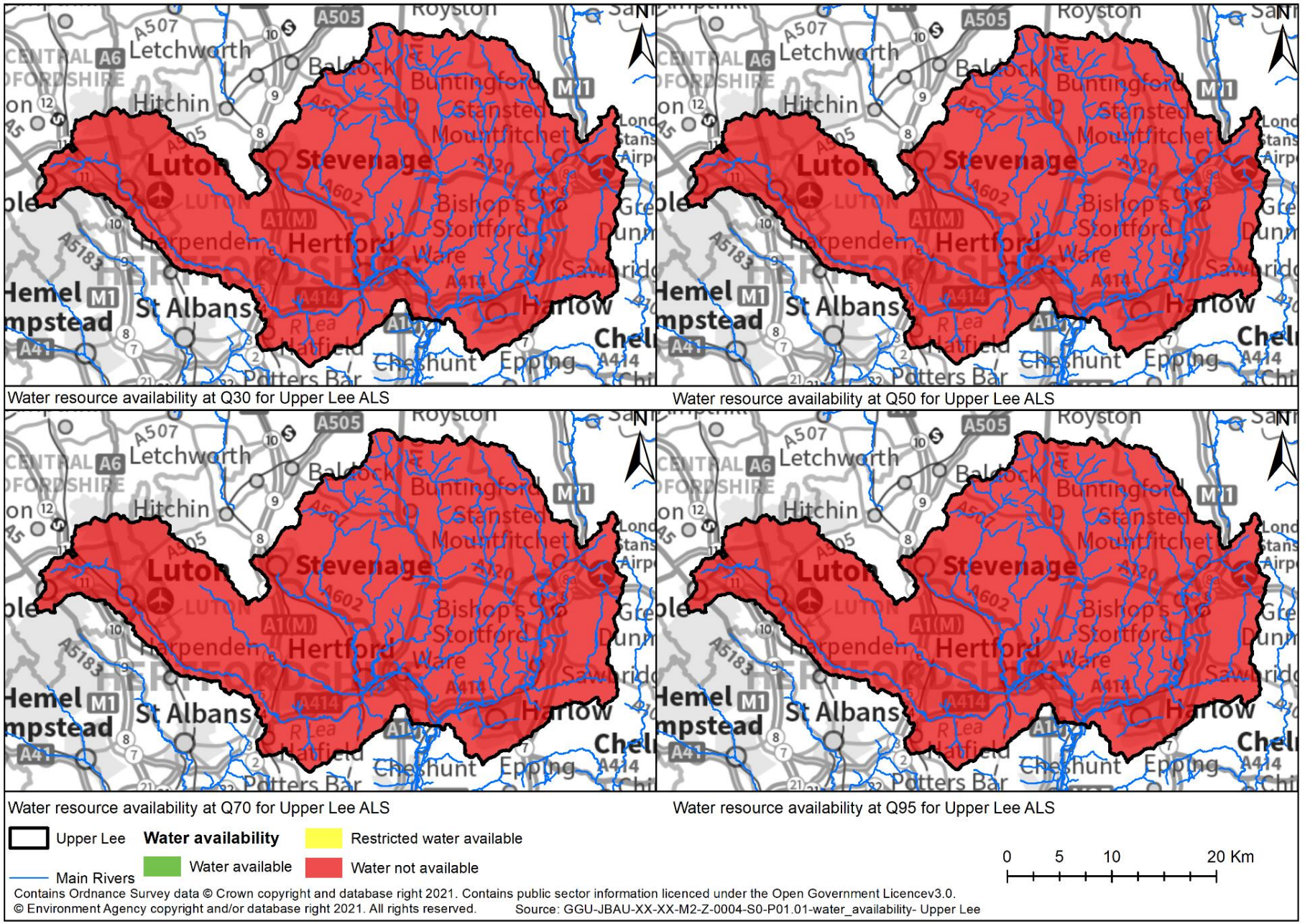

Figure 4.11 Water Resource Availability of the Upper Lee ALS

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 Affinity Water and in their Water Resource Management Plans.

The water resources assessment has been carried out utilising two approaches; initially by reviewing the Water Resource Management Plan (WRMP) and secondly by providing the water company with a growth estimate allowing them to assess the impact of planned growth on their water resource zone.

4.3.2 Affinity Water

Affinity Water (AfW) is responsible for supplying the Uttlesford with water (see Figure 4.12). For the purposes of water resources planning, the AfW supply area is divided into eight Water Resources Zones (WRZs) which vary greatly in scale and have unique water resource concerns. Uttlesford is covered by the Stort (WRZ5) WRZ which is located in the Central supply area.

Water Resource Planning

Affinity Water divide their supply area into eight water resource zones - which are defined by the EA as areas in which the management of supply and demand is largely self-contained and where the supply infrastructure is linked such that customers within the zone experience the same risk of supply failure. Uttlesford is covered by the Stort WRZ which sits in their Central region (consisting of six adjacent WRZs).

Within a WRZ a customer may receive their water from anywhere within the zone, and not necessarily from the nearest source.

Each water company must publish a Water Resources Management Plan (WRMP), a 25-year strategy (updated every five years), which assesses future demand, water availability, demand management measures and how the impact of climate change will be mitigated. Where necessary they also set out the requirements for developing additional water resources to meet growing demand and reductions in abstraction from other sources to meet

4.3.3 Anglian Water

Anglian Water were contacted during the WCS as the wastewater provider, but also provided useful comment on water resources in Uttlesford:

"Whilst Affinity Water supplies water to the whole of Uttlesford, Anglian Water has two water abstraction points to the east of the River Pant, within Uttlesford District and Anglian Water currently exports 85Ml/d to Affinity Water supplied from Grafham Water. Anglian Water, as part of the Water Resources East emerging regional plan is working with Affinity Water to bring forward new water supply options. These may include an Anglian to Affinity water transfer in part supplied by a new reservoir in South Lincolnshire in the 2030s. These new supply options may enable the transfer from Grafham Water to Affinity to be reduced, freeing up that water supply to serve expanding and new communities in Greater Cambridge, for example. In terms of the quantum and spatial distribution of growth in Uttlesford these strategic water resource options could come on stream in the mid- 2030s

and so could be a factor for growth including potential new settlements towards the end of the plan period."

"In the short to medium term all water companies are working with the Environment Agency to consider how to deliver sustainability reductions to reduce the abstraction of water from groundwater. Anglian Water's work to reduce abstraction from groundwater sources is set out in our 2019 Water Resource Management Plan. If further sustainability reductions are required ahead of the timescales we are currently planning for then Anglian Water and other water companies would need to consider bringing forward new supply options as well as measures to reduce demand including mandating within Local Plans much higher levels of water efficiency in new development."

4.3.4 Methodology

The Affinity Water – Water Resources Management Plan 2019[44] was reviewed. Attention was mainly focussed upon:

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

The Ministry for Housing, Communities and Local Government (MHCLG) 2018-based estimates of household growth up to 2041 has been used to estimate the present-day number of houses in Uttlesford.

44 Water Resources Management Plan 2019, Affinity Water (2019). Accessed online at: https://www.affinitywater.co.uk/corporate/plans/water-resources-plan on: 19/12/2021

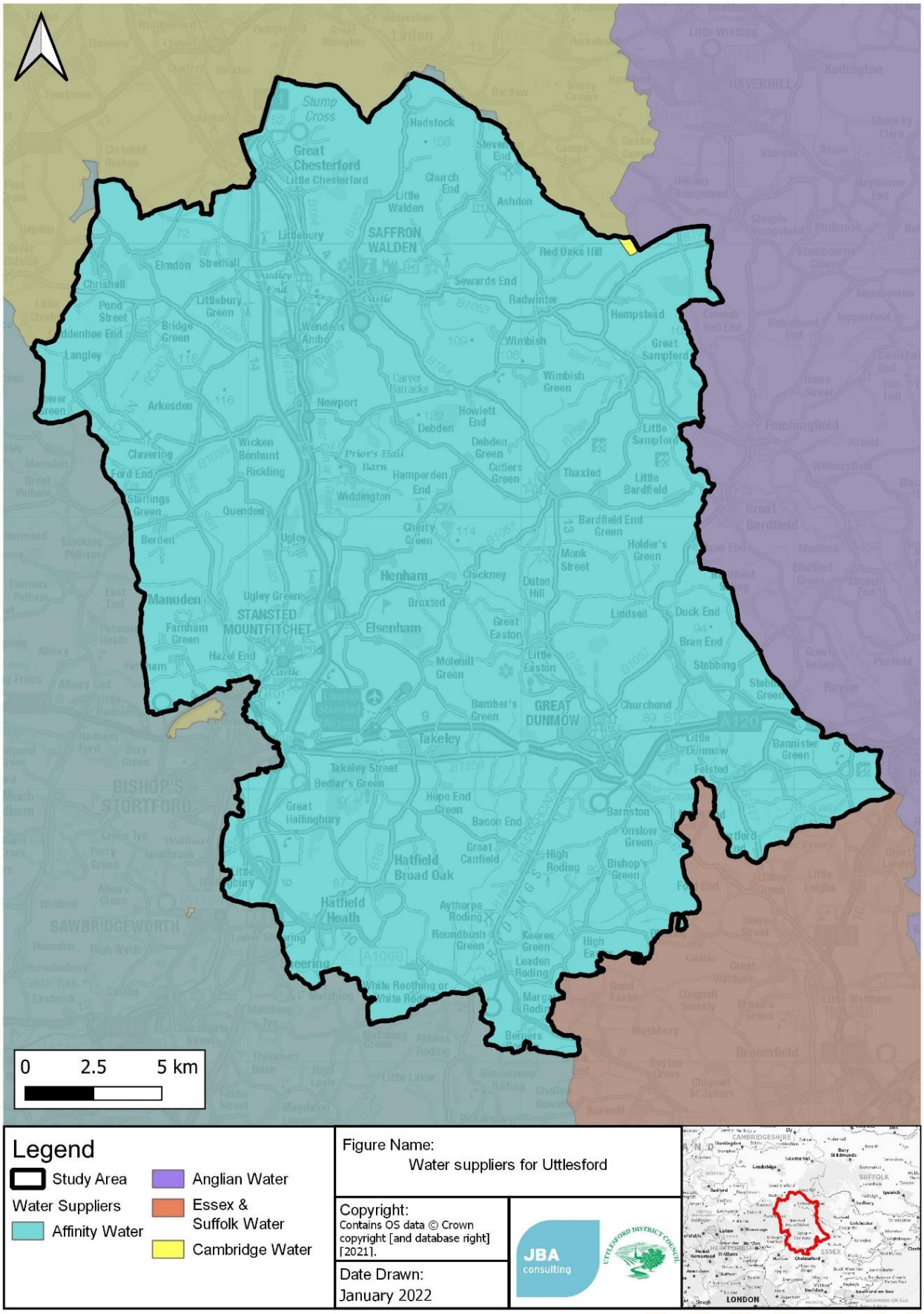

Figure 4.12 Water supply companies in Uttlesford

4.3.5 Stort WRZ present and future Water Supply-Demand Balance

Across the AfW Central region, around 60% of water supply comes from groundwater sources with the remaining 40% being abstracted from surface water sources on the River Thames or imported from neighbouring water companies.

AfW have implemented the strategic transfers across the Central region to made sure that they are able to fully share water between the individual zones that make up the Central region. This will help to help balance the supply and demand required in those zones in the future. Water is also shared between Anglian Water and Affinity Water to help both companies meet water supply shortfalls in their WRZs.

The AfW's WRMP identifies a shortfall in water supply in their central region under drought conditions of 43Ml/d by 2025 and 256Ml/d by 2080 if no action were taken. This is due in part to actions on AfW to reduce abstraction from chalk catchments as part of their environmental responsibilities, the impact of climate change, and population increase.

Alternative ways of meeting customer demand need to be found as current water sources become unreliable. The water company aims to do this by ensuring their plan:

- Is adaptive, flexible and supported by customers and stakeholders
- Improves drought resilience of water supplies for customers
- Contributes to the protection of rare Chalk stream habitats by reducing abstraction from Chalk sources
- Prioritises reducing demand
- Ensures timely delivery of the appropriate strategic supply infrastructure

To do this, AfW is proposing to implement the following demand management measures in their plan.

- Reduce network leakage
- Installing more water meters in homes and businesses
- Provide customers with more regular information on how much water they are using
- Provide customers and communities with water audits to encourage them to become more water efficient
- Support a national water efficiency campaign and work with Government to introduce new policies to reduce consumption
- Work with retailers to improve water efficiency of businesses.

AfW are also proposing to introduce the following measures to increase the supply in the Stort WRZ:

- Looking at strategic schemes to maintain a resilient supply including transfers of bulk water and the South East strategic Reservoir in Oxfordshire.
- Maximise use of existing sources of water, including full use of imports of water

AfW are aiming to help reduce the amount of water taken from existing Chalk sources and not develop any new Chalk groundwater sources in the Central region.

4.3.1 Population and household growth

Table 4.3 shows the household growth forecasts for the Stort WRZ which serves growth in Uttlesford.

The household projections (2018 ONS dataset) predict an increase in the number of households in Uttlesford of 23% during the plan period, however if growth occurs according to the housing need (16,944 houses including a 20% buffer), the percentage growth would be much higher at 46%. This is also significantly higher than the average growth expected in the WRMP19 plan for the water resource zone. The overall level of

growth within Uttlesford was communicated to Affinity Water, who did not identify any concerns about being able to supply that level of increase during the plan period. However, it should be ensured that the increased level of growth is factored into future updates of the WRMP so that it is taken into account in supply demand balance calculations.

Commercial or industrial development which has a particularly high water demand (for example paper production or food production) that is expected to be delivered during the plan period should be identified and discussed early with Affinity Water.

There has been a recent increase in per capita consumption (PCC) due to the impact of Covid-19, and it is not yet known if PCC will return to pre-pandemic levels or to the planned downward trend.

Table 4.3 Comparison of household growth forecasts (Affinity Water)

Forecast	2020	2040	% increase
MHCLG 2018-based forecast – Uttlesford	36,297	44,718	23%
Expected growth in Local Plan period	36,297	+ 16,944	46%
WRMP Forecast – Stort	141,970	178,800	26%

4.3.2 Summary

The whole of Uttlesford is within the Stort WRZ. AfW's WRMP highlights a deficit between supply and demand forecast and defines the actions required to achieve a supply demand balance to prevent the risk of future environmental deterioration.

The percentage growth rate in the WRMP for the Stort WRZ is less than the expected rate of growth within Uttlesford, however Affinity Water did not express any concerns with this level of growth.

Although AfW has not relied on new homes being more water-efficient than existing metered homes, the opportunity, through the planning system, to ensure that new homes do meet the higher standard of domestic water usage, at no significant additional cost to the developer, would be in line with general principals of sustainable development, and reducing energy consumed in the treatment and supply of water.

No constraints on treatment or strategic infrastructure requirements were identified.

4.4 Water Environment National Environment Programme Measures

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

Table 4.4 and Table 4.5 show WINEP actions relating to water resources in groundwater and surface waterbodies respectively. Actions relating to water quality are presented in section 8 (Water Quality).

A number of investigations are planned or underway to ensure that abstraction of water from both groundwater and rivers, is not leading to a reduction in flow, particularly in chalk streams. Development and population growth can increase abstraction, and so UDC have an opportunity to contribute to these actions indirectly by pursuing policies that promote water efficiency in new development.

Table 4.4 WINEP actions on Groundwater bodies in Uttlesford

Waterbody Name	WINEP ID	Unique ID	Scheme Name(s)	Type of scheme / notes
Cam and Ely Ouse Chalk	EAN00015, EAN00016, EAN00017, EAN00018, EAN00034	7AF100043	DEBDEN ROAD, SAFFRON WALDEN NEWPORT	Investigation and options appraisal This is an investigation to determine whether increased use of groundwater abstraction will cause deterioration of the status of the groundwater body. If it is shown that increased abstraction causes deterioration of status, then the investigation needs to look at the costs of options to provide alternative sources of public water supply. It is the opinion of EA that increased use of the licence beyond maximum peak use between 2005 and 2015 rounded up to nearest 1000 m^3 may cause deterioration.
Cam and Ely Ouse Chalk	EAN00453	7AF200012	Newport PS nitrate investigation	Investigation To investigate the current inputs of nitrate to groundwater and gain a more detailed understanding of the likely long-term trends in nitrate groundwater concentrations at the abstraction. The concentrations of nitrate at the abstraction show rising trend in nitrate concentrations, which has increased rapidly since 2016, posing a risk of exceeding the drinking water standard in the future.
North Essex Chalk	EAN02374 EAN00005 EAN02375 EAN00006	7AF100006	SPRINGWELL SOURCE UTTLESFORD BRIDGE SOURCE WENDEN	Investigation and options appraisal Investigate whether abstraction is causing a failure of the status of North Essex Chalk groundwater body. Ensure No deterioration due to planned abstraction

Table 4.5 WINEP actions on surface waterbodies in Uttlesford

Waterbody Name	WINEP ID	Unique ID	Scheme Name(s)	Type of scheme / notes
Chelmer (u/s Gt. Easton)	EAN00002 EAN00001	7AF100001	CHELMER - Armitage Bridge, Thaxted / Bolford Street, Thaxted and Mill Lane Gt Dunmow CHELMER - Hempstead	Investigation and options appraisal Affinity to establish what extent planned abstraction and changes in the use of licences 8/37/31/*G/0042 and 8/37/35/*G/0023 might cause deterioration of flow / ecological status of the waterbody and to identify suitable options to ensure risk is removed.
Cam (US Newport)	EAN00013 EAN00035	7AF100033	NEWPORT	Sustainability Change This is an implementation scheme to prevent deterioration of flows in these rivers. EA will seek to cap abstraction licences based on maximum peak use between 2005 and 2015 rounded up to nearest 1000 m^3.
Wicken Water	EAN00028 EAN00010 EAN00014	7AF100033	UTTLESFORD BRIDGE SOURCE WENDEN NEWPORT	Sustainability Change This is an implementation scheme to prevent deterioration of flows in these rivers. EA will seek to cap abstraction licences based on maximum peak use between 2005 and 2015 rounded up to nearest 1000 m^3.
Wendon Brook	EAN00024 EAN00030 EAN00012	7AF100033	DEBDEN ROAD, SAFFRON WALDEN UTTLESFORD BRIDGE SOURCE WENDEN	Sustainability Change This is an implementation scheme to prevent deterioration of flows in these rivers. EA will seek to cap abstraction licences based on maximum peak use between 2005 and 2015 rounded up to nearest 1000 m^3.
Cam (Newport to Audley End)	EAN00026 EAN00029 EAN02413 EAN00011 EAN00019	7AF100034	SPRINGWELL SOURCE UTTLESFORD BRIDGE SOURCE UTTLESFORD BRIDGE SOURCE WENDEN	Sustainability Change This Scheme for flow improvement for River Cam has three aspects. 1. EA to seek to cap the licence to prevent deterioration based on maximum peak use 2005 to 2015 rounded to nearest 1000 m3. 2. Carry out river restoration works (Options 19, 20 and 21 from options appraisal). 3. Change the flow trigger condition on Uttlesford/Springwell licence from 12.72 Ml/d to 15.64 Ml/d.

Waterbody Name	WINEP ID	Unique ID	Scheme Name(s)	Type of scheme / notes
			DEBDEN ROAD, SAFFRON WALDEN	
Cam (Audley End to Stapleford)	EAN00023 EAN00385 EAN00036 EAN00025 EAN00027 EAN02412 EAN00037	7AF100034	DEBDEN ROAD, SAFFRON WALDEN RIVER RESTORATION: IMPLEMENTATION SCHEME NEWPORT SPRINGWELL SOURCE UTTLESFORD BRIDGE SOURCE UTTLESFORD BRIDGE SOURCE WENDEN	Sustainability Change This Scheme for flow improvement for River Cam has three aspects. 1. EA to seek to cap the licence to prevent deterioration based on maximum peak use 2005 to 2015 rounded to nearest 1000 m^3. 2. Carry out river restoration works (Options 19, 20 and 21 from options appraisal). 3. Change the flow trigger condition on Uttlesford/Springwell licence from 12.72 Ml/d to 15.64 Ml/d.
Stort and Bourne Brook	HNL00026 HNL00023 HNL00028 HNL00022	7AF100075	NORTH STORTFORD PUMPING STATION STANSTED MOUNTFITCHET PUMPING STATION STANSTED PUMPING STATION THE CAUSEWAY BISHOPS STORTFORD	Investigation and Options Appraisal WFD Flow investigation – no details given
Stort (at Clavering)	HNL00025 HNL00030	7AF100078	STANSTED MOUNTFITCHET PUMPING STATION STANSTED PUMPING STATION	Investigation and Options Appraisal WFD Flow investigation – no details given
Chelmer (u/s Gt. Easton)	EAN00166 EAN00167	7AW100280	CHELMER / Bocking	Investigation and Options Appraisal To establish to what extent planned AWS abstraction might cause deterioration of flow / ecological status of

Waterbody Name	WINEP ID	Unique ID	Scheme Name(s)	Type of scheme / notes
			CHELMER / Codham Mill	the waterbody before 2027, and to identify suitable options to ensure this risk is removed.

4.5 Chalk Streams

4.5.1 Overview

UDC asked JBA to prepare a separate Chalk Stream evidence base alongside the WCS, and this should be referred to for more detailed information on the pressures on the chalk streams in Uttlesford and options to protect them.

A chalk stream is broadly defined as a river that derives most of its flow from chalk-fed groundwater. Chalk streams flow from chalk aquifers, stores of underground water that are replenished when it rains. England is home to 85 per cent of the world's chalk streams. These rivers, together with the chalk aquifer from which they spring, are crucial water resources providing millions of people with water as well as supporting unique ecosystems. Businesses and farms also rely on chalk streams as without a reliable water source they would not be able to operate.

During the summer months when temperatures are higher and plants are using water, rainfall is less effective at recharging the aquifer. This as well as the impacts of climate change results in many of the rivers and streams being dry for much of the year along long sections of their course.

Balancing the needs of people and the environment is a challenge and it is getting harder. Population growth, particularly in the southeast, means that more and more water is required at a time when climate change is reducing the amount of water that is available.

The Environment Agency's 'Reasons for Not Achieving Good' database indicates that one of the reasons for some of the watercourses in the district are not meeting 'Good' WFD standards can be related to groundwater and surface water abstractions.

As noted in Section 4.2, for the majority of flow periods for the rivers in Uttlesford, there is insufficient water to permit more to be abstracted. This has been enforced by the Environment Agency to protect and preserve these streams and to limit any additional damage as a result of abstraction. Further information on the work the Environment Agency and Affinity Water are doing to reduce the impact of abstraction on chalk streams and find alternative sources of water is explained below.

4.5.2 Environment Agency

The Environment Agency has been working to limit the damage dry weather can cause and to ensure that water supplies are sustainable for the future. This includes taking immediate action to restrict the amount of water taken, developing long-term plans to reduce reliance on chalk streams, working with partners on projects to improve water quality and stepping in to limit damage to wildlife and the environment when river levels are too low.

They have also been working to make sure that water abstractions are sustainable. The Environment Agency regulate water abstraction through their licensing system. By reviewing licences and reducing the amount of water people can take the Environment Agency have returned 16 billion litres of water back to chalk aquifers and streams since 2008 and removed the risk of another 14.9 billion litres being taken[45].

The Environment Agency have also been working with water companies to find long term solutions for water supply by finding alternative water supply sources and reducing demand such as new reservoirs and pipes to transfer water from other parts of the country.

4.5.3 Affinity Water

AW's supply area contains many chalk streams. These chalk streams have been historically modified e.g., straightened, deepened, widened, which can make their habitat less suitable. Affinity Water have been working to support customers to reduce their water usage as well as their own leakage. They have also been working to reduce the amount of water being

[45] Protecting our precious chalk streams, Environment Agency (2019) Accessed online at: https://environmentagency.blog.gov.uk/2019/10/02/protecting-our-precious-chalk-streams/ on: 24/01/2022

abstracted from Chalk Streams (see WINEP actions above). A reduction in abstraction means more water is left in the environment, contributing towards the protection of rare chalk streams.

AW confirmed that they cannot guarantee at this stage there won't be a requirement for a new source or new infrastructure. It would however be their responsibility to ensure that no adverse environmental impacts would arise from any new infrastructure or source of water.

4.6 Water demand reduction

4.6.1 Water efficiency

It is widely recognised that the climate is changing and in response Uttlesford District Council declared a climate emergency in July 2019,[46]. Climate change is predicted to increase pressure on water resources, increasing the potential for a supply-demand deficit in the future, and making environmental damage from over abstraction of water resources more likely. Furthermore, the delivery of water and wastewater services and the heating of water in the home require high energy inputs, and therefore contribute directly to emissions of greenhouse gases. Water efficiency therefore reduces energy use and carbon emissions.

It is important therefore that new development does not result in an unsustainable increase in water abstraction. This can be done in a number of ways from reducing the water demand from new houses through to achieving "water neutrality" in a region by offsetting a new developments water demand by improving efficiency in existing buildings.

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

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

4.6.2 Water Stress

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

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

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

46 Meeting of Council, 30th July 2019, Uttlesford District Council, 2019. Accessed online at: https://www.uttlesford.gov.uk/article/5768/The-council-and-climate-change on: 24/01/2022

In the Environment Agency assessment[47] the Affinity Water supply regions was classified as being an area of serious water stress.

4.6.3 River Basin Management Plans

One of the challenges identified in the River Basin Management Plan (RBMP) for the Anglian and Thames Basins are alterations to "natural flow levels of water". The management recommendations from both RBMP's are listed below:

- **Government and agencies (Environment Agency)** grant licences under the Water Resources Act 1991 to regulate how much water is taken from rivers, lakes estuaries and groundwater. The Environment Agency reviews the sustainability of time-limited abstraction licences as they expire, and the licence holders seek replacement licences.
- **All sectors** take up or encourage water efficiency measures, including water industry work on metering, leakage, audits, providing water efficient products, promoting water efficiency and education.
- **Local Government** sets out local plan policies requiring new homes to meet the tighter water efficiency standard of 110 litres per person per day as described in Part G of Schedule 1 to the Building Regulations 2010.
- **Industry manufacturing and other business** implement tighter levels of water efficiency, as proposed by changes to the Building Regulations.
- **Agriculture and rural land management** manage demand for water and use water more efficiently to have a sustainable water supply for the future.
- **Local government** commissions water cycle studies to inform spatial planning decisions around local water resources.

The RBMP goes on to state that "dealing with unsustainable abstraction and implementing water efficiency measures is essential to prepare and be able to adapt to climate change and increased water demand in the future."

4.6.4 Domestic and sectoral water use

Uttlesford is within the Water Resources South East (WRSE) regional water resources planning group. WRSE have published their Emerging Regional Plan for South East England[48], which contains information on the split of public and non-public water demand (Figure 4.13). In the southeast region overall, there is a very low percentage (3%) of water demand coming from non-public water supply, with the main component being agriculture, the paper industry and power generation.

47 Water Stressed Areas - Final Classification, Environment Agency and Natural Resources Wales (2021). Accessed online at: https://www.gov.uk/government/publications/water-stressed-areas-2021-classification on: 24/01/2022

48 Futureproofing our water supplies – A consultation on our emerging regional plan for south east England, WRSE (2022). Accessed online at: https://ehq-production-europe.s3.eu-west-1.amazonaws.com/a0f0a11747d3ad85fdda8dcc9d33d19eff03a90a/original/1642162818/9c27989a9ef054b5157625386340727a_WRSE_Regional_Plan_Jan_22_consultation_doc_FINAL%21.pdf?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAIBJCUKKD4ZO4WUUA%2F20220707%2Feu-west-1%2Fs3%2Faws4_request&X-Amz-Date=20220707T084622Z&X-Amz-Expires=300&X-Amz-SignedHeaders=host&X-Amz-Signature=e39c518707635cf8ad8b25a69b555fc279cf8492cd34707949a76c58f11ca606 on: 07/07/2022

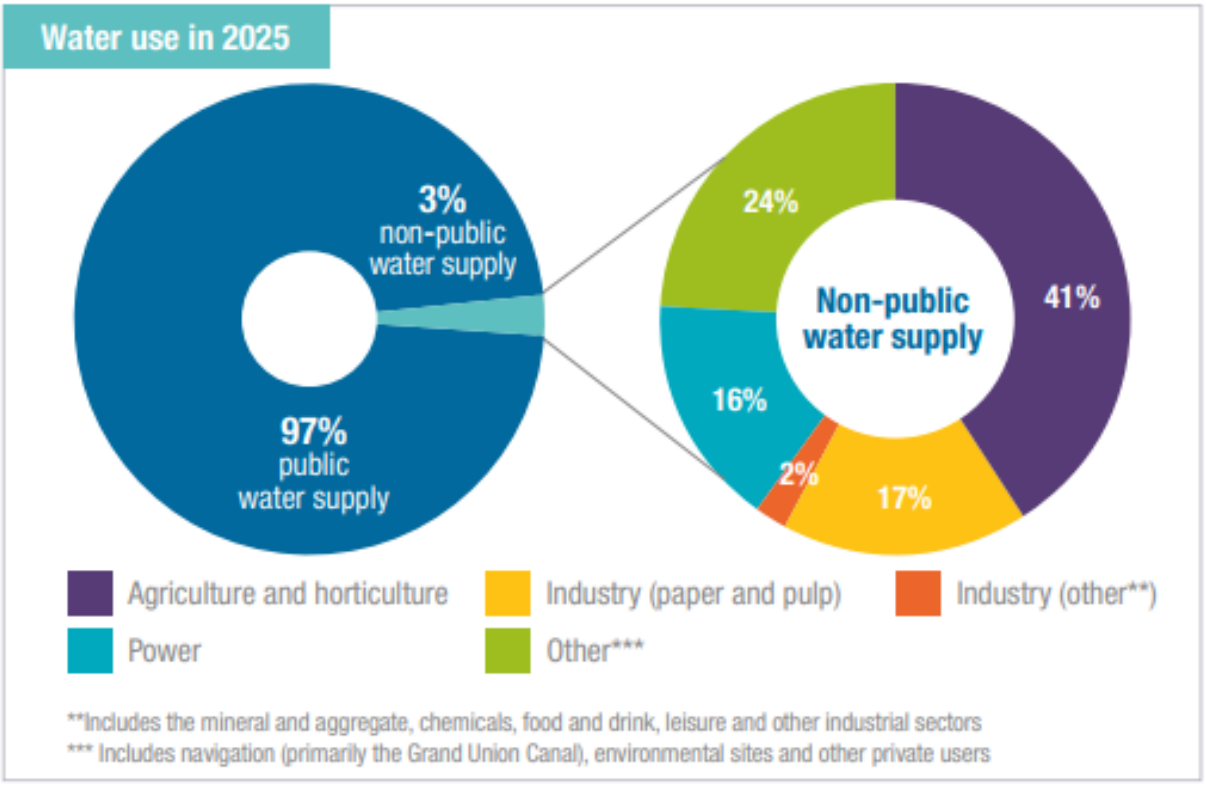

Figure 4.13 Water use by sector in the WRSE region

Uttlesford is on the north east extremity of the WRSE region, and the land use in this area is quite different to the rest of the region – which includes London. The Affinity Water WRMP shows a split of household to non-household demand for the Stort WRZ of 44.07 Ml/d for household to 14.46 Ml/d for non-household[49] reflecting the different mix of water demand in this area.

4.6.5 National Water Resources Framework

A new National Framework for Water Resources was published by the Government in March 2020[50]. This outlines the water resources challenges facing England and sets out the strategic direction for the work being carried out by regional water resource groups.

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

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

4.6.6 Impact on viability

As outlined in section 3.8, the cost of installing water-efficient fittings to target a per capita consumption of 110l/d has been estimated as a one-off cost of £9 for a four-bedroom house. Research undertaken for the devolved Scottish and Welsh governments indicated potential

49 Based on Water Resources Market Information tables for WRZ5 DYAA (28-05-2020)
50 National Water Resources Framework, Environment Agency (2020). Accessed online at: https://www.gov.uk/government/publications/meeting-our-future-water-needs-a-national-framework-for-water-resources on: 24/01/2022

annual savings on water and energy bills for householders of £24-£64 per year as a result of such water efficiency measures. Water efficiency is therefore not only viable but of positive economic benefit to both private homeowners and tenants.

4.6.7 Further analysis of the cost of going further than 110 l/p/d will be considered in the stage 2 WCS.Water neutrality concept

Water neutrality is a relatively new concept for managing water resources, but one that is receiving increased interest as deficits in future water supply/demand are identified. The definition adopted by the Government and the Environment Agency[51] is:

> ***"For every development, total water use in the wider area after the development must be equal to or less than total water use in the wider area before development".***

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

"For every new significant development, the predicted increase in total water demand in the region due to the development should be offset by reducing demand in the existing community, where practical to do so, and these water savings must be sustained over time" (V Ashton, 2014)[52]

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

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

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

Water neutrality can be achieved in a number of ways:

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

Suggestions for water-efficiency measures are listed in Figure 4.14 below.

4.6.8 Consumer water efficiency measures

Many interventions are designed to reduce water use if operated in a particular way, and so rely on the user being aware and engaged with their water use. The educational aspect is therefore important to ensure that homeowners are aware of their role in improving water efficiency. Figure 4.14 shows water efficiency measures that can be made by consumers.

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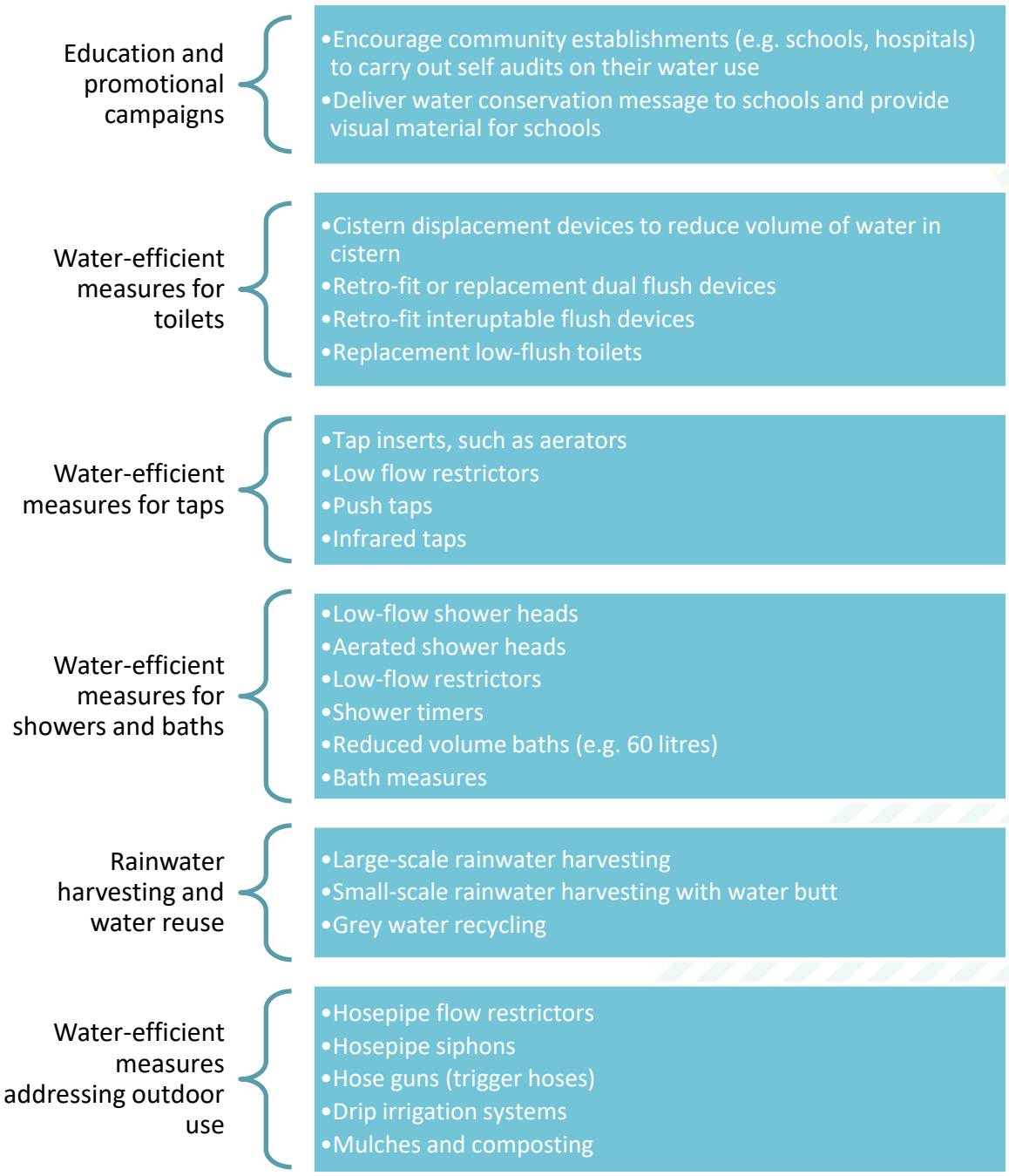
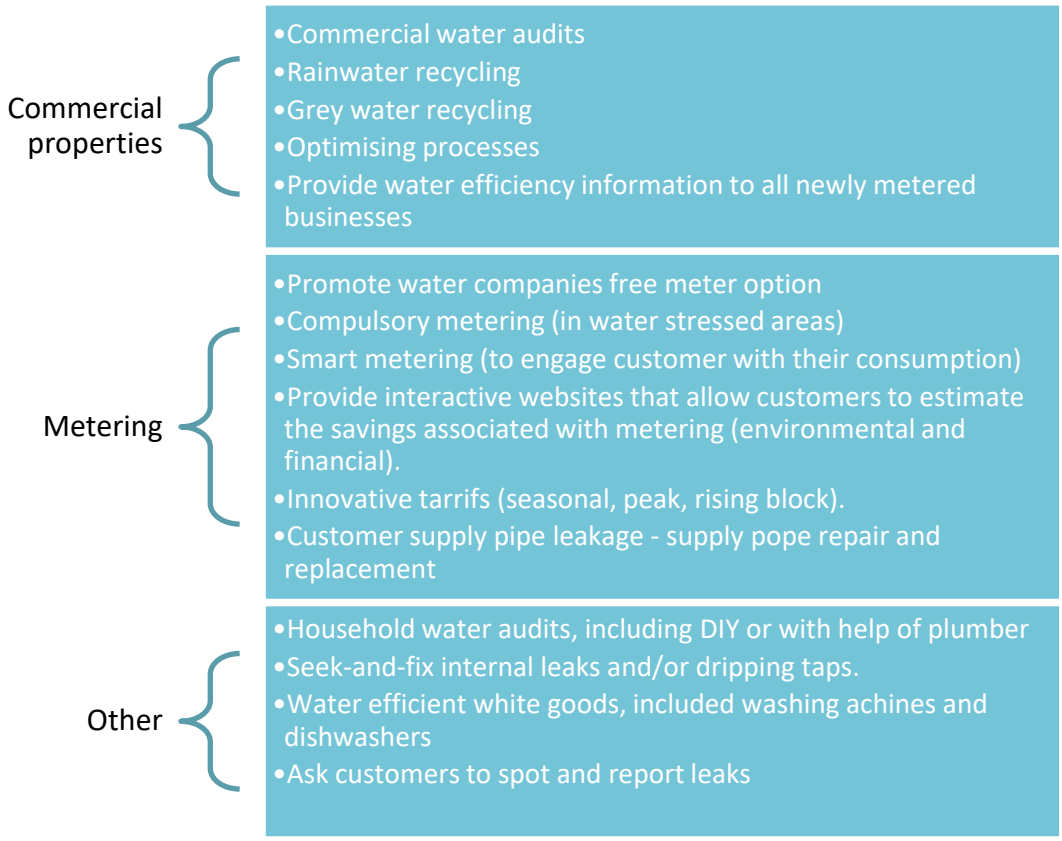
51 Water Neutrality: An improved and expanded water resources management definition (SC080033/SR1), Environment Agency, 2009. Accessed online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291675/scho1009bqzr-e-e.pdf on: 24/01/2022

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


Education and promotional campaigns
•Encourage community establishments (e.g. schools, hospitals) to carry out self audits on their water use
•Deliver water conservation message to schools and provide visual material for schools
Water-efficient measures for toilets
•Cistern displacement devices to reduce volume of water in cistern
•Retro-fit or replacement dual flush devices
•Retro-fit interuptable flush devices
•Replacement low-flush toilets
Water-efficient measures for taps
•Tap inserts, such as aerators
•Low flow restrictors
•Push taps
•Infrared taps
Water-efficient measures for showers and baths
•Low-flow shower heads
•Aerated shower heads
•Low-flow restrictors
•Shower timers
•Reduced volume baths (e.g. 60 litres)
•Bath measures
Rainwater harvesting and water reuse
•Large-scale rainwater harvesting
•Small-scale rainwater harvesting with water butt
•Grey water recycling
Water-efficient measures addressing outdoor use
•Hosepipe flow restrictors
•Hosepipe siphons
•Hose guns (trigger hoses)
•Drip irrigation systems
•Mulches and composting



Source: Adapted from Booth and Charleswell 2014

Figure 4.14 Consumer water-efficiency measures

4.6.9 Rainwater and Greywater Recycling

Rainwater harvesting

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

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

Benefits of RwH

- **RwH reduces the dependence on mains water supply – reducing bills for homeowners and businesses**
- **Less water needs to be abstracted from river, lakes and groundwater**
- **Stormwater is stored in a RwH system reducing the peak runoff leaving a site providing a flood risk benefit (for smaller storms)**
- **By reducing surface water flow, RwH can reduce the first flush effect whereby polluted materials adhering to pavement surfaces during dry periods are removed by the first flush of water from a storm and can cause pollution in receiving watercourses.**

Challenges of RwH

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

Greywater harvesting

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

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

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

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

4.6.10 Energy and Water use

According to EU statistics (Eurostat 2017), 17% of the UK's domestic energy usage is for water heating. If less water was being used within the home, for instance through more water efficient showers, less water would need to be heated, and overall domestic energy usage would be reduced.

In 2020-2021 the Government is consulted on a Future Homes Standard that will involve changes to Part L (conservation of fuel and power) of the Building Regulations for new dwellings[53]. Unfortunately, this fails to identify the role of water efficiency in the home in also reducing energy usage.

4.6.11 Funding for water neutrality

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

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

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

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

4.7 Spatial growth options

All of Uttlesford lies within the same water resource zone, water is provided from a number of sources in the WRZ and distributed around the study area. As the total amount of growth is similar in each of the spatial growth options, there is little difference between them from a water resources perspective based on location. The options were presented to Affinity Water who confirmed that each option could be accommodated within their existing plans.

However new settlements can offer opportunities to reduce the demand for water when compared to a strategy distributed growth throughout the study area. Policies can be implemented to require a higher level of water efficiency that is allowed for in building regulations, but greater gains can be made in strategic developments or new settlements where communal infrastructure, and largescale rainwater harvesting, or greywater recycling can be provided more efficiently and more cost effectively.

No specific preference is given to any of the five new settlement options from the perspective of water resources and efficiency.

4.8 Chalk streams

The chalk stream evidence base prepared in parallel with the WCS identified abstraction for public water supply as a significant issue for the chalk stream catchments. Further unmitigated growth could increase water demand – and therefore the volume that needs to be abstracted from chalk aquifers. Investigations are underway by AfW and the EA into

53 The Future Homes Standard: changes to Part L and Part F of the Building Regulations for new dwellings. Accessed online at: https://www.gov.uk/government/consultations/the-future-homes-standard-changes-to-part-l-and-part-f-of-the-building-regulations-for-new-dwellings on: 25/01/2022.

sustainable abstraction, however water demand from the local plan should be minimised where possible. The chalk stream evidence base recommends aligning with the Catchment Based Approach Chalk Stream Strategy target of 90 l/p/d in chalk stream catchments. As Uttlesford lies entirely within one water resource zone, this target should apply to the whole of Uttlesford.

In addition, water demand from non-household demand could be minimised by required all new build non-residential buildings to achieve "Outstanding" for water under the BREEAM New Construction standard.

4.9 Conclusions

Uttlesford receives its water from Affinity Water (AfW), and the whole of Uttlesford is within its Stort Water Resource Zone (WRZ). The percentage growth rate allowed for in their Water Resource Management Plan (WRMP) for the Stort WRZ is less than the expected rate of growth within Uttlesford during the Local Plan period, however Affinity Water did not express any concerns with this higher level of growth. No constraints on water treatment, or the requirement for new strategic infrastructure were identified by AfW.

The Water Industry National Environment Programme (WINEP) is a set of actions that the EA have requested all 20 water companies operating in England to complete in a particular Asset Management Period (AMP) as part of their environmental commitments. A number of investigations are planned or underway to ensure that abstraction of water from both groundwater and rivers, is not leading to unsustainable reductions in flow, particularly in chalk streams. Development and population growth can increase abstraction, and so UDC have an opportunity to contribute to these actions indirectly by pursuing policies that promote water efficiency in new development.

It is widely recognised that the climate is changing and in response Uttlesford District Council declared a climate emergency in July 2019. Climate change is predicted to increase pressure on water resources, increasing the potential for a supply-demand deficit in the future, and making environmental damage from over abstraction of water resources more likely. Furthermore, the delivery of water and wastewater services and the heating of water in the home require high energy inputs, and therefore contribute directly to emissions of greenhouse gases. Water efficiency therefore reduces energy use and carbon emissions.

It is important therefore that new development does not result in an unsustainable increase in water abstraction. This can be done in a number of ways from reducing the water demand from new houses through to achieving "water neutrality" in a region by offsetting a new developments water demand by improving efficiency in existing buildings.

There is sufficient evidence to recommend the optional 110 litres per person per day design standard allowed under Building Regulations. However, within Uttlesford are two chalk stream catchments, the river Cam and River Stort and their tributaries. Both these rivers are failing to achieve Good Status under the Water Framework Directive, with one of the reasons cited being abstraction for public water supply which causes low flows. It is important therefore that growth during the Local Plan period does not make this situation worse. A tighter water efficiency standard of 90 l/p/d is therefore recommended for all new build residential properties in order to minimise the new demand. It is recommended that all new non-residential properties achieve a score of "Outstanding" in the BREEAM New construction standard for water.

It is also recommended that the council explore policies that would achieve or approach water neutrality, and this will be explored further in the stage 2 WCS.

4.10 Recommendations

The recommendations for water resources are provided in Table 4.6 below.

Table 4.6: Recommendations for water resources

Action	Responsibility	Timescale
Continue to regularly review forecast and actual household growth across the supply region through WRMP Annual Update reports, and where significant change is predicted, engage with Local Planning Authorities.	AfW	Ongoing
Provide yearly profiles of projected housing growth to water companies to inform the WRMP update.	Uttlesford Council	Ongoing
Use planning policy to require a minimum water efficiency of 90 l/p/d for new build housing.	Uttlesford Council	In Uttlesford LP
Use planning policy to require new build non-residential development to achieve "Outstanding" for water in the BREEAM New Construction standard.	Uttlesford Council	In Uttlesford LP
The concept of water neutrality has the potential to provide a benefit in improving resilience to climate change and enabling all waterbodies to be brought up to Good status. Explore further with the water companies and the Environment Agency how the Council's planning and climate change policies can encourage this approach. This approach could have particular application in strategic sites and new settlements	Uttlesford Council, EA, AfW	In LP and Climate Change Action Plan
Larger residential developments (including new settlements), and commercial developments should consider incorporating greywater recycling and/or rainwater harvesting into development at the master planning stage in order to reduce water demand.	Uttlesford Council, AfW	In Uttlesford LP
Water companies should advise Uttlesford Council of any strategic water resource infrastructure developments within the study, where these may require safeguarding of land to prevent other type of development occurring.	AfW, Uttlesford Council	Part of Uttlesford LP process

5 Water Supply Infrastructure

5.1 Introduction

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

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

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

A cost-effective solution can be for local authorities to co-ordinate with water supply companies and "piggyback" on planned leakage or metering schemes, to survey and retrofit water efficient fittings into homes[54]. This is particularly feasible within property owned or managed by the local authorities, such as social housing.

5.2 Methodology

At Stage 1 the WCS identifies existing constraints and opportunities in the water supply network. The spatial growth options were shown to AfW who were asked to provide comments on the relative difficulty of accommodating each option.

A site-by-site assessment of the impact of the preferred spatial growth option on the water supply network will be conducted in Stage 2. AfW have provided guidance on the format required for growth information to be provided to them to allow this modelling to be conducted.

5.3 Impact of Spatial Growth Options

The spatial growth options were presented to AfW who confirmed that there were no "showstoppers" and the level of development in each case did not pose any concerns. In order to assess the impact of each option on their water supply network, each option would need to be modelled to determine the resulting drop in pressure in the network. This has not been performed in the Stage 1 WCS due to time constraints.

Development in areas where there is little existing network is likely to require new infrastructure or reinforcement of the network to maintain pressure, particularly at the periphery of the network. AfW has a statutory duty to provide a water supply to development sites, however if significant new infrastructure is required, some constraints may be placed on the phasing of development sites to ensure that infrastructure is in place prior to development being occupied.

54 Water Efficiency Retrofitting: A Best Practice Guide, Waterwise (2009). Accessed online at: http://www.waterwise.org.uk/wp-content/uploads/2018/01/Waterwise-2009_Water-efficiency-Retrofitting_Best-practice.pdf on: 24/01/2022

5.4 Recommendations

Table 5.1 Recommendations for water supply infrastructure

Action	Responsibility	Timescale
Undertake network modelling where appropriate as part of the planning application process to ensure adequate provision of water supply is feasible	AfW Uttlesford Council	As part of the planning process
Uttlesford Council and Developers should engage early with AfW to ensure infrastructure is in place prior to occupation.	Uttlesford Council AfW Developers	Ongoing

6 Wastewater Collection

6.1 Sewerage undertakers

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

Increased wastewater flows into collection systems due to growth in populations or per-capita consumption can lead to an overloading of the infrastructure, increasing the risk of sewer flooding and, where present, increasing the frequency of discharges from storm overflows. There has been a recent increase in per capita consumption (PCC) due to the impact of Covid-19, and it is not yet known if PCC will return to pre-pandemic levels or to the planned downward trend. In JBA's analysis, the average 2020 PCC values from AfW's WRMP have been used and no assumptions about long term trends have been used. This may result in an underestimate of water demand (and wastewater generation) in the short term as the Covid-19 effect isn't accounted for but is considered to be a conservative approach over the whole of the plan period.

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. Consents can also be tightened to prevent a deterioration in water quality due to growth, or to achieve environmental objectives.

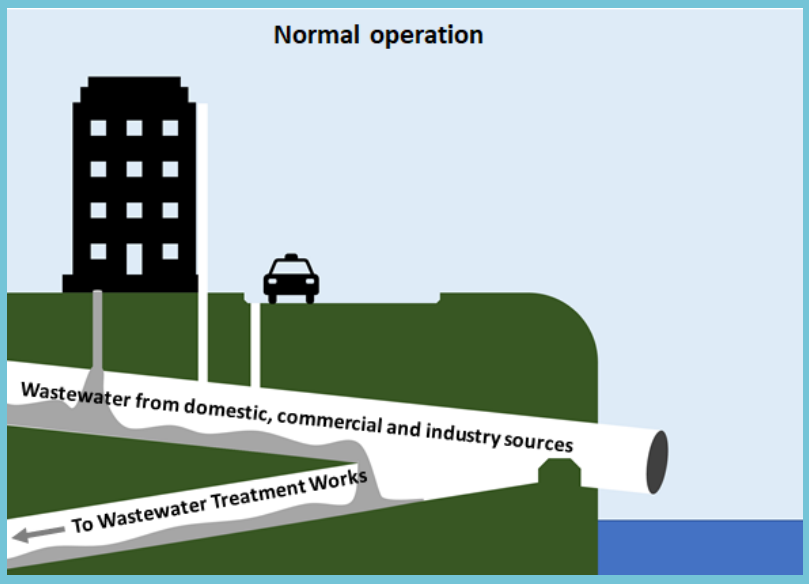
In combined sewerage systems, or foul systems with surface water misconnections, there is potential to create headroom in the system, thus enabling additional growth, by the removal of surface water connections. This can most readily be achieved during the redevelopment of brownfield sites which have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

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

Storm Overflows

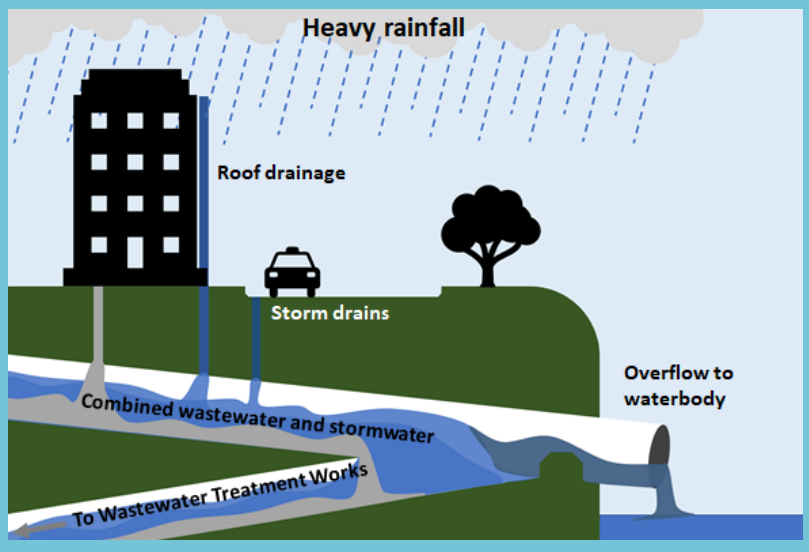
Storm overflows are an essential component in the sewer network – however when they operate frequently, they can cause environmental damage.

They occur on combined sewer systems where the sewer takes both foul flow (sewage from homes and offices) and rainwater runoff. In normal conditions all of this flow passed through the sewer network and is treated at a wastewater treatment works.



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

Storm overflows become problematic then they are operating in moderate or light rainfall – possibly in breach of their permit.



6.2 Methodology

6.2.1 Sewerage System Capacity Assessment

New residential developments and new employment land 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.

6.2.2 Storm overflow assessment

The Environment Act now requires water companies to report and monitor storm overflows as well as reduce the harm caused to the rivers they discharge to. There are 13 network storm overflows present in Uttlesford (more overflows exist at WwTWs), the location of these is shown in Figure 6.1 below which also includes storm overflows at WwTWs which are listed in section 7.6.

The Storm Overflow Taskforce[55] has agreed a long-term goal to end the damaging pollution caused by the operation of storm overflows. An important component of this is the monitoring of overflows, and a target has been set to monitor the frequency and duration of operation at all storm overflows by 2023[56]. This is called Event Duration Monitoring (EDM). The EDM dataset (based on the 12,000 storm overflows monitored in 2020) has been used to provide information on storm overflows in Uttlesford. Both Thames Water and Anglian Water have confirmed that work is currently underway to investigate storm overflows with the long-term aim of reducing the number of operations of the CSOs and rectifying issues at those treatment works.

In comparison to some urban areas or large cities, Uttlesford has relatively few storm overflows. The EA have threshold of 60 operations in a year (based on 1 years data, 40 if based on 3 years), above which a storm overflow should be investigated. No network storm overflows in Uttlesford have exceeded this figure as shown in Table 6.1. In this report storm overflows associated with WwTWs have been moved to the next section.

Further unmitigated development within Uttlesford could cause the frequency or duration of operation of storm overflows to increase.

There are opportunities through the planning system to ease pressure on the wastewater network by separating foul and storm flow in existing combined systems, and not allowing new surface water connections. Surface water can also be better managed by retrofitting

55 Made up of Defra, the EA, Ofwat, Consumer Council for Water, Blueprint for Water and Water UK
56 Event Duration Monitoring – lifting the lid on storm overflows, Environment Agency (2021). Accessed online at: https://environmentagency.blog.gov.uk/2021/03/31/event-duration-monitoring-lifting-the-lid-on-storm-overflows/ on: 24/01/2022

SuDS in existing residential areas, and in new development, ensuring SuDS are incorporated into designs at the master planning stage to maximise the potential benefits.

Table 6.1 Network storm overflow frequency of operation and duration

Overflow	Operator	Number of operations in 2020	Duration of operation in 2020 (hours)	Number of operations in 2021	Duration of operation in 2021 (hours)
Birchanger – Duck End	Thames Water	0	0	0	0
Cage End Sewage Pumping Station	Thames Water	11	47	22	131
Canfield End Sewage Pumping Station	Thames Water	1	3	7	23
Castle Street/High Street	Anglian Water	0	0	46	70
Garnets Sewage Pumping Station	Thames Water	5	11	4	30
Great Dunmow STW PS	Anglian Water	EDM to be installed by December 2023			
Gt Easton – Bridgefoot TPS	Anglian Water	Not monitored	Not monitored	9	83
Little Chesterford	Anglian Water	EDM to be installed by December 2023			
Saffron Walden-George Abbey OV	Anglian Water	EDM to be installed by December 2023			
Saffron Walden-Victoria Thx Ov	Anglian Water	3	1	1	1
SO Gasworks Crossroads	Anglian Water	EDM to be installed by December 2023			
Thaxted Park Street	Anglian Water	33	50	31	51
Wicken Bonhunt PS	Anglian Water	EDM to be installed by December 2023			

Anglian Water provided the following comment on storm overflows:

"The DWMP will include Anglian Water's proposed investments to tackle Combined Sewer Overflows (CSO). CSOs are a legacy asset and until replaced they act as a necessary safety valve in old sewerage systems, to protect homes and businesses from flooding during heavy rainfall. One of Anglian Water's four long-term ambitions is to improve the ecological condition of our catchments, and we've written into our constitution the requirement to act to create social and environmental prosperity in every decision we take. We have been addressing CSOs over many years, tackling those that pose an environmental risk first, then working through the rest."

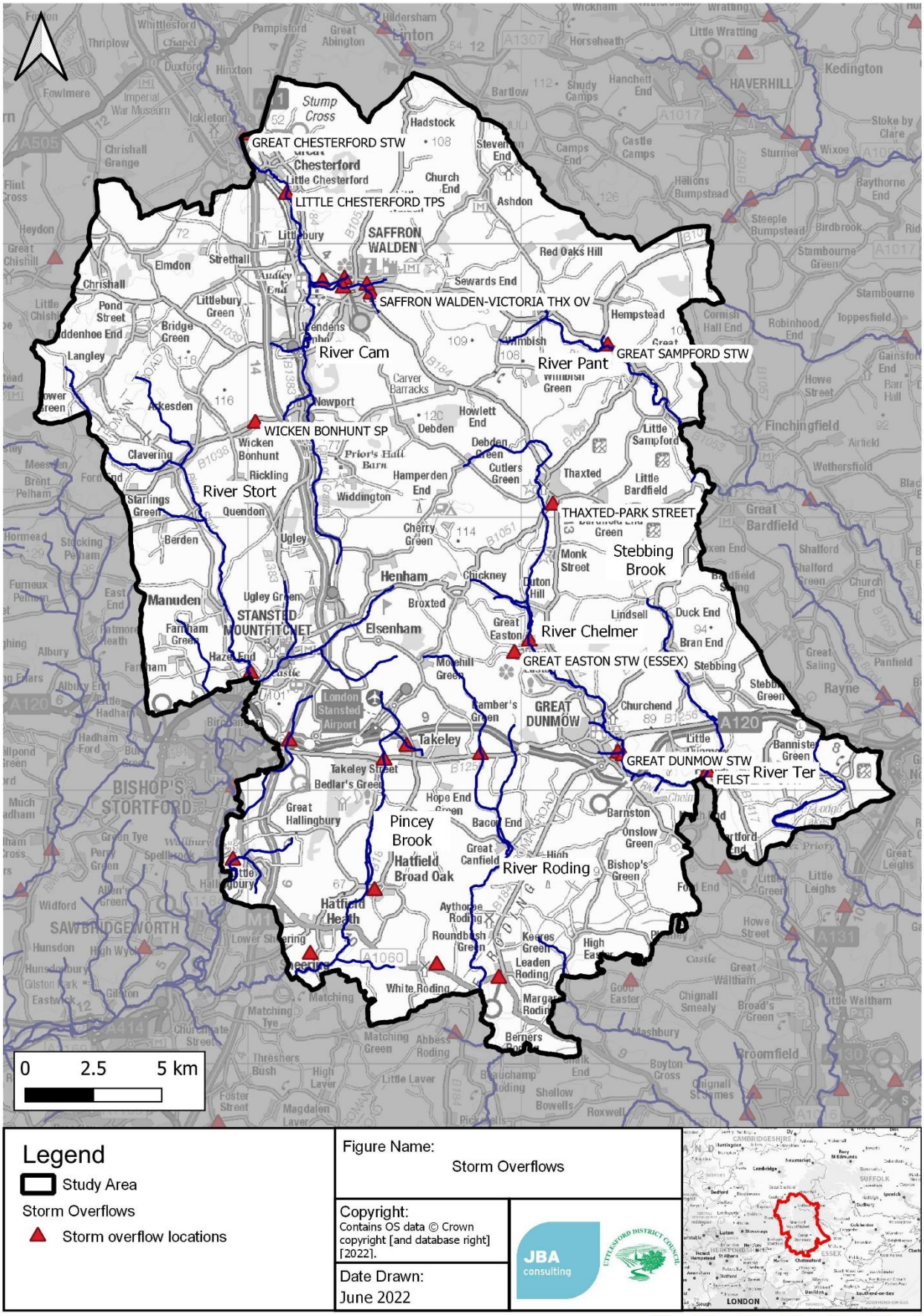


Figure 6.1 Storm Overflow locations

6.3 Spatial growth options

The spatial growth options were presented to both Thames Water and Anglian Water who provided comments on the impact on their networks.

In general, any development where there is none previously will require new sewer infrastructure. Spatial growth options concentrating growth in a new settlement would require the most extensive "new" infrastructure, but multiple developments on the periphery of an existing network may also require extensive reinforcement of the network. Network modelling was not carried out in Stage 1 due to time constraints but should be conducted by the wastewater providers in Stage 2.

No particular network constraints were identified associated with any of the spatial growth options; however, Thames Water made the general comment that network issues were likely around Uttlesford due to the small diameter pipes present. In particular they highlighted limited capacity around Bishops Stortford. The network in this area would be difficult to upgrade without significant disruption to residents. In Option 1b and 1c there is significant growth in this area that could utilise the existing network. This is slightly reduced in all the spatial growth options containing a new settlement, apart from Option 2c where the new settlement (Easton Park) may be served by Bishops Stortford. The Great Easton Park new settlement could be served by either Thames Water or Anglian Water, or a combination of the two. Should this option be taken forward, an early discussion between the water companies, taking into account the relative capacity in each company's network, and the environmental capacity of the receiving watercourse.

Anglian Water commented that growth should not be directed towards parts of the network where the frequency and/or duration of the operation of storm overflows is high until work to improve storm overflow performance is complete.

Further comments on wastewater treatment are contained in Section 7 and Section 10.

6.4 Conclusions

Development in areas where there is limited wastewater network capacity will increase pressure on the network, increasing the risk of a detrimental impact on existing customers, and increasing the likelihood of storm overflow operation. Early engagement with developers, TW and AW is required, and further modelling of the network may be required in the Stage 2 WCS and at the planning application stage. Furthermore, in the TW and AW networks, there are areas where the current network is a combined sewer system, and further separation of foul and surface water may be required, as well as suitably designed SuDS.

Early engagement between developers, Uttlesford District Council and TW and AW is recommended to allow time for the strategic infrastructure required to serve these developments to be planned.

6.5 Recommendations

Table 6.2 Recommendations from wastewater network assessment

Action	Responsibility	Timescale
Early engagement between Uttlesford District Council and TW/AW is required to ensure that where strategic infrastructure is required, it can be planned in by TW/AW, and will not lead to any increase in discharges from sewer overflows.	Uttlesford District Council and TW/AW	Ongoing
Take into account wastewater infrastructure constraints in phasing development in partnership with the sewerage undertaker	Uttlesford District Council and TW/AW	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.	Uttlesford District Council 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 Uttlesford

AW and TW provide wastewater services for development in Uttlesford. Thames Water refer to their wastewater processing plants as Wastewater Treatment Works (WwTW) whereas Anglian Water refer to theirs as Water Recycling Centres (WRCs). They may also be referred to as Sewage Treatment Works (STW) in some documents and date sources. For the purposes of this report, both Thames Water and Anglian Water's wastewater processing plants will be referred to as WwTWs.

Three WwTWs are located outside of the Uttlesford boundary which serve growth within the study area. These are Great Chesterford, Linton and Bishops Stortford WwTWs. The location of the WwTWs in and around Uttlesford are shown in Figure 7.1 below.

Sites already allocated in the adopted local plan, or already in the planning system (commitments) as well as an allowance for windfall, were assigned to a WwTW using the sewerage drainage area boundaries provided by each SU to set a baseline for WwTW capacity. Actual connection of a development site to a particular WwTW may be different and will depend on the capacity of the receiving works, and the local sewer network.

Some of the committed and completed sites did not fall within the catchment boundary of any WwTW. Many of these are small and widely distributed throughout the study area with a total of 93 houses resulting from these sites. Very small developments in rural areas may be suitable for on-site treatment and discharge, however the Environment Agency will not usually permit this where there is a public sewerage system within a distance calculated as 30m per dwelling. There is therefore a localised risk to water quality if all of these small developments were to be served by septic tanks, especially where there are clusters of small-scale new development. This is also the case for the potential allocations contained within the spatial growth options particularly where growth is assigned to smaller villages.

Opportunities should be sought to provide a public wastewater treatment solution where development could be clustered - particularly in the chalk stream areas in the north.

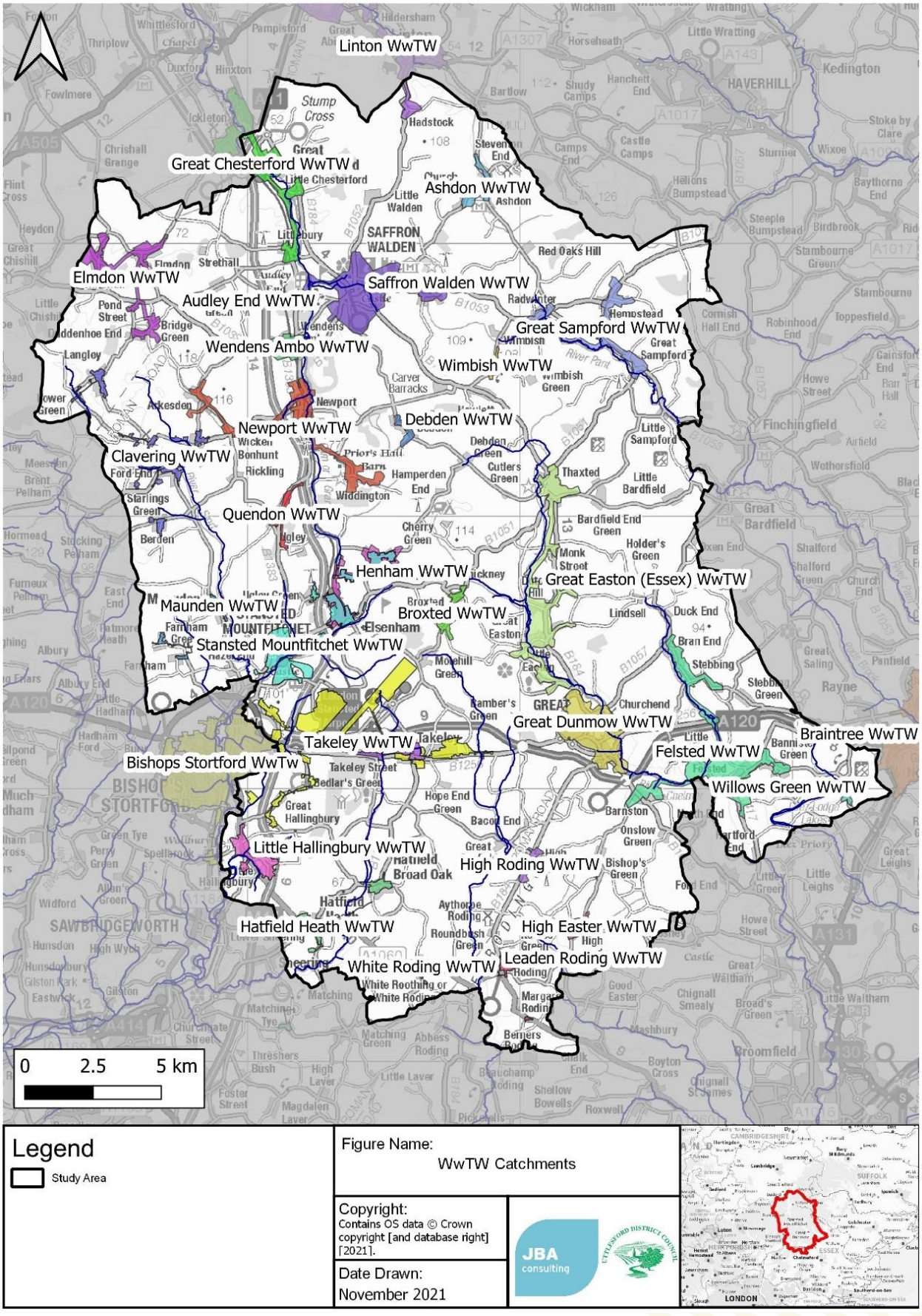


Figure 7.1 WwTW catchments serving Uttlesford

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 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.

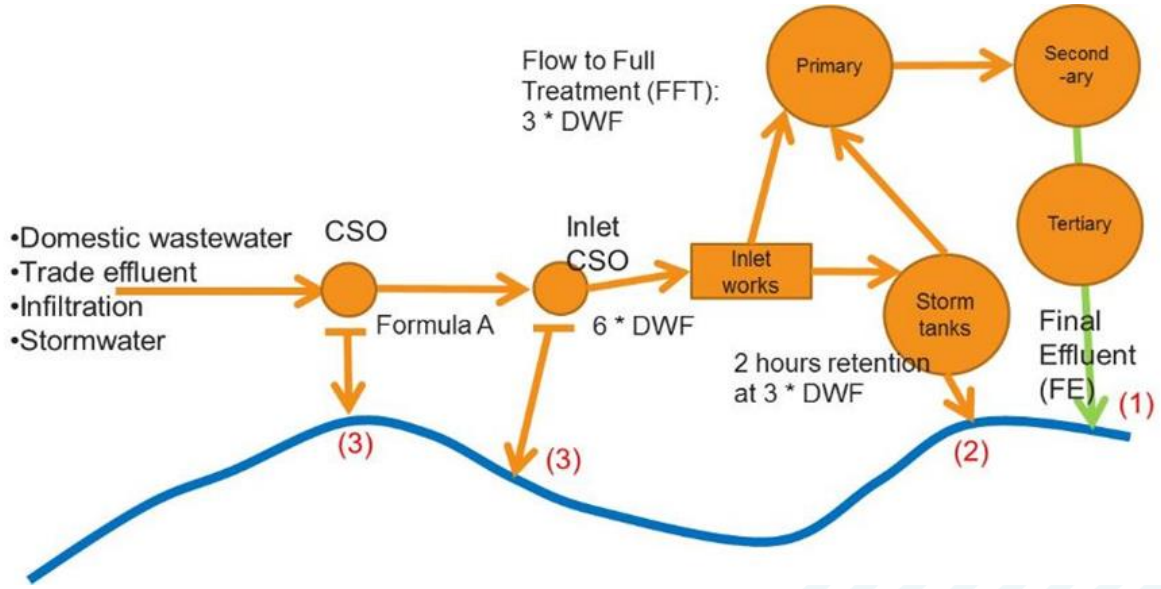


Figure 7.2 Overview of typical combined sewerage system and WwTW discharges

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^3/day in dry weather.

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

WwTW Environmental Permits also consent for maximum concentrations of pollutants, in most cases Suspended Solids (SS), Biochemical Oxygen Demand (BOD) and Ammonia (NH4). Some works (usually the larger works) also have permits for Phosphorous (P). These are determined by the Environment Agency with the objective of ensuring that the receiving watercourse is not prevented from meeting its environmental objectives, with specific regard to the Chemical Status element of the Water Framework Directive (WFD) classification.

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

7.3 Methodology

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

- AW and TW provided their calculated 80th percentile exceedance flow statistic for each WwTW.
- Sites already in the planning system, windfall and neighbouring authority growth was 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.
- For employment sites, wastewater was demand was estimated based on the predicted number of new employees. Floor space, employment use types, and employment densities were used to estimate the number of employees.

Table 7.1 Per capita consumption values used in water demand calculations

Water Company	Water Resource Zone	Occupancy rate (persons per dwelling)	Per capita residential consumption (m3/person/day)	Per capita employment consumption (m^3/person/day)
Affinity Water	Stort	2.6	0.128	0.1

7.4 Results

A map showing estimated capacity at each WwTW is shown in Figure 7.3 and in Table 7.2 below. It should be noted that this map represents the remaining capacity (number of houses) once all committed sites are built and does not take into account planned increases in treatment capacity.

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

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

Limited capacity for growth exists at WwTWs in Uttlesford once development already planned is taken into account. AW and TW currently have upgrades planned at many WwTWs already, it is important that both the current commitments in the planning system, neighbouring authority growth, and development sites allocated in the Uttlesford LP are taking into consideration when upgrades are planned.

Braintree was not originally included in the study as it was thought no growth from Uttlesford would be served by it. However, it may serve one of the spatial growth options and should be assessed in the Stage 2 study.

Where a WwTW is likely to exceed its permit, the permit would be reviewed by the EA and if a higher flow consent was agreed, a tighter permit limit for substance concentrations is very likely to be required. In some cases this may not be possible if that means concentrations tighter than the Technically Accepted Limit (TAL) which is 0.25 mg/l for P for example. This will be assessed in the Stage 2 study.

Table 7.2 Summary of WwTW flow assessment

WwTW	Proposed housing growth over Local Plan period – before allocations	Proposed employment growth over Local Plan period – before allocations (m^2)	Approximate remaining headroom (no. dwellings)	Does DWF flow exceed permitted flow over local plan period before allocations? (JBA assessment)
Ashdon	0	0	1,285	No
Audley End	0	0	Unknown	N/A- No flow meter at site - capacity could not be assessed. Site is unlikely to have significant capacity
Bishops Stortford	4,626	64,220	13,449	No
Braintree*	Unknown	Unknown	Unknown	Not assessed in this study
Broxted WwTW	10	0	Unknown	N/A- No flow meter at site - capacity could not be assessed. Site is unlikely to have significant capacity
Clavering WwTW	9	0	0	Yes
Debden WwTW	0	0	247	No
Elmdon WwTW	0	0	434	No
Felstead WwTW	156	0	0	Yes
Great Chesterford WwTW	1,566	189,985	0	Yes
Great Dunmow WwTW	2,310	706	0	Yes
Great Easton WwTW	101	0	68	No

WwTW	Proposed housing growth over Local Plan period – before allocations	Proposed employment growth over Local Plan period – before allocations (m^2)	Approximate remaining headroom (no. dwellings)	Does DWF flow exceed permitted flow over local plan period before allocations? (JBA assessment)
Great Sampford WwTW	5	0	0	Yes
Hatfield Heath WwTW	20	0	353	No
High Easter WwTW	0	0	172	No
High Roding WwTW	5	0	17	No
Leaden Roding WwTW	0	0	296	No
Linton WwTW	126	32,490	845	No
Little Hallingbury WwTW	0	0	924	No
Manuden WwTW	0	0	581	No
Newport WwTW	133	0	0	Yes
Quendon WwTW	28	0	135	No
Saffron Walden WwTW	587	6,884	3,390	No
Stansted Mountfitchet WwTW	357	1,264	2,140	No
Takeley WwTW	93	6,556	1,089	No
Wendens Ambo WwTW	23	0	Unknown	N/A- No flow meter at site - capacity could not be assessed. Site is unlikely to have significant capacity

WwTW	Proposed housing growth over Local Plan period – before allocations	Proposed employment growth over Local Plan period – before allocations (m^2)	Approximate remaining headroom (no. dwellings)	Does DWF flow exceed permitted flow over local plan period before allocations? (JBA assessment)
White Roding WwTW	17	0	425	No
Willows Green	0	0	Unknown	N/A- No flow meter at site - capacity could not be assessed. Site is unlikely to have significant capacity
Wimbish	0	0	Unknown	N/A- No flow meter at site - capacity could not be assessed. Site is unlikely to have significant capacity

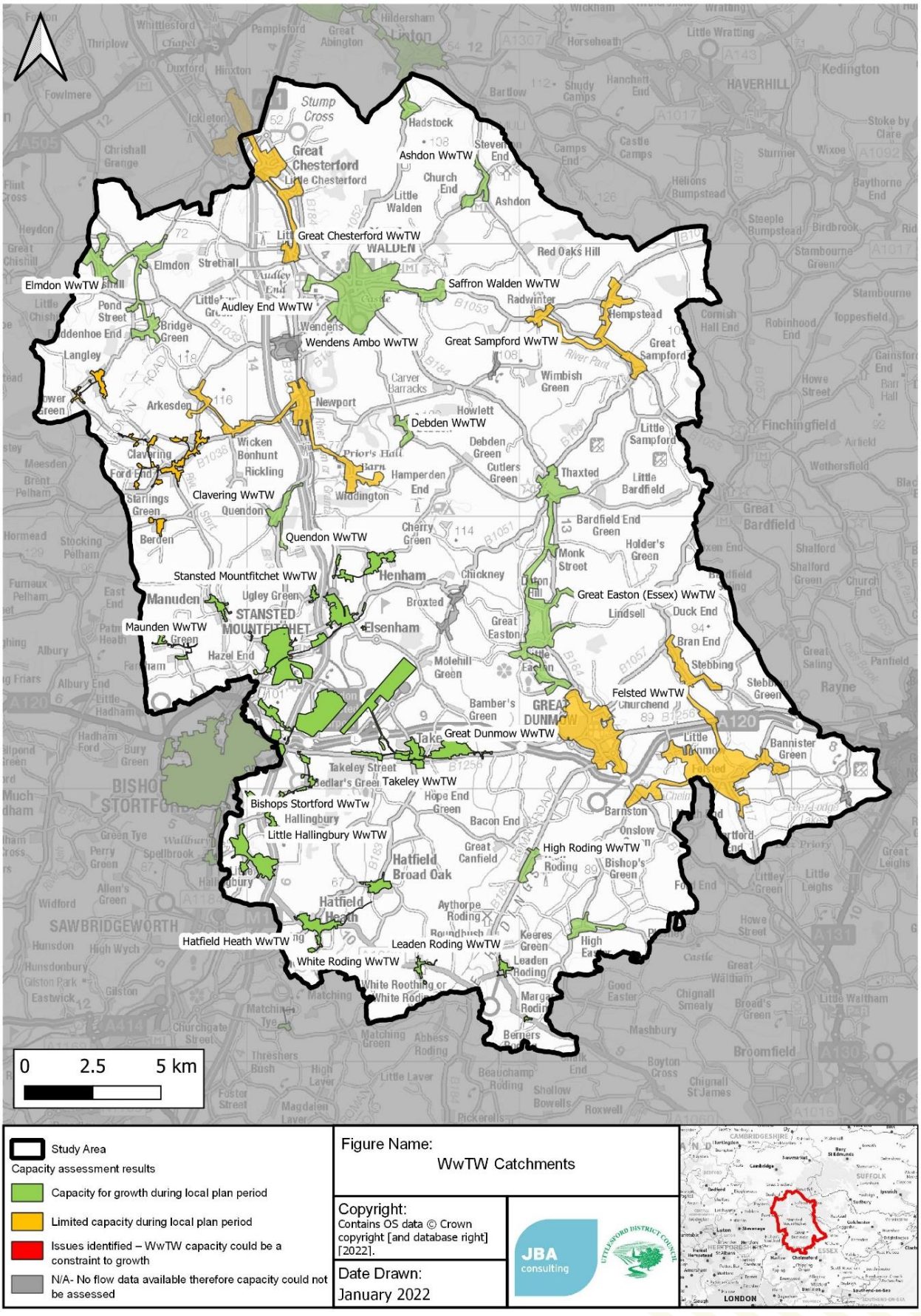


Figure 7.3 WwTW flow capacity RAG results

7.5 Chalk Streams

The Environment Agency's 'Reason for Not Achieving Good' database indicates that one of the reasons for many of the watercourses in the district are not meeting Good WFD status can be related to wastewater discharge. Because their water sources are so pure any agricultural or urban pollution can severely disrupt the ecology of chalk streams. The impact of wastewater discharges will be modelled both as a sensitivity test in Stage 1 and in detail in Stage 2.

7.6 Storm tank overflows

Table 7.3 presents performance of storm tank overflows at WwTWs in Uttlesford. Three of these were operating above the threshold for investigations in 2020 (which are underway), all of these are operated by Thames Water. Hatfield Heath and Takeley are particularly poorly performing operating for over 1,000 hours in 2020 and have deteriorated in 2021.

Four of the storm overflows discharge into chalk stream catchments. Three appear to be operating at a fairly low level (1 to 8 hours total duration in 2020). However, Stansted Mountfitchet WwTW which discharges to the, River Stort operated 39 times in 2020 for a total duration of 305 hours and 383 hours (approximately 4% of the year) in 2021. This level of operation is below the current threshold for investigation (60 operations in one year), but due to the sensitivity of the habitat it discharges to, this should be raised with Thames Water.

Where a storm tank overflow is operating in periods of moderate or light rainfall, or even in dry conditions it indicates either an infiltration problem within the network, or that the WwTW or its storm tanks are undersized for the population served. Further development within a catchment that has a poorly performing storm tank overflow is likely to exacerbate the issue.

The local plan can contribute to this by encouraging the use of SuDS to divert storm water away from the sewer network, reducing the volume that reaches the WwTW.

Table 7.3 WwTW storm overflow frequency of operation and duration

WwTW	Operator	Number of operations in 2020	Duration of operation in 2020 (hours)	Number of operations in 2021	Duration of operation in 2021 (hours)
Felsted WwTW	Anglian Water	Not monitored	Not monitored	43	548
Great Chesterford WwTW	Anglian Water	6	3	2	3
Great Dunmow WwTW	Anglian Water	Not monitored	Not monitored	34	214
Great Easton WwTW	Anglian Water	Not monitored	Not monitored	31	465
Great Sampford WwTW	Anglian Water	Not monitored	Not monitored	2	8
Hatfield Heath WwTW	Thames Water	113	2096	131	2603
Leaden Roding	Thames Water	61	482	0	0

WwTW					
Little Chesterford WwTW	Anglian Water	EDM to be installed by December 2023			
Little Hallingbury WwTW	Thames Water	59	876	59	970
Saffron Walden WwTW	Anglian Water	5	8	7	7
Saffron Walden WwTW (Inlet SO)	Anglian Water	Not monitored	Not monitored	13	19.25
Stansted Mountfitchet WwTW	Thames Water	39	305	30	383
Takeley WwTW	Thames Water	74	1062	90	1281
White Roding WwTW	Thames Water	Commissioned in 2020 - full year data expected			

7.7 Spatial growth options

The spatial growth options were presented to Thames Water and Anglian Water who were asked to comment on the impact on their WwTWs.

TW have expressed concern about increased growth served by Bishops Stortford and Stansted Mountfitchet WwTWs. Both these works have recently been given a new chemical permit (Nickel) and further growth in this area may make it harder to meet this permit. This would affect both rural centre growth in Options 1b and 1c, and the new settlement at Ugley in Option 2a and Easton Park in Option 2c. A growth scheme is already underway at Stansted Mountfitchet to accommodate planned growth in this area. The scheme is currently at the design phase and will be delivered by 2023. TW should ensure that there is sufficient headroom incorporated into the design to accommodate whichever spatial growth option is chosen, or that there is sufficient scope to provide this capacity at a later date if required.

Hatfield Heath is described as "poorly performing", with the storm overflow at the WwTWs a particular concern due to the current high frequency of spills. The new Settlement in Hatfield Broad Oak in Option 2d would result in a significant upgrade at this WwTW or a new treatment works to serve this growth. Should additional treatment capacity be provided, additional storm storage must also be provided to ensure that growth does not exacerbate the storm overflow issue.

Capacity constraints were identified at Takeley, and it is unlikely that growth in Option 2c could be served by this works without significant upgrades.

In general TW expressed the view that a new WwTW would be the least favourable option for TW.

Anglian Water provided a detailed assessment of each spatial growth option which is contained in 10.3.

For Option 1b and 1c Saffron Waldon WwTW has the capacity to serve the expected growth without requiring expansion. Great Dunmow WwTW is currently being upgraded to ensure

future compliance. Growth in this area should planned for the later stages of the local plan to enable investment by Anglian Water in the Great Dunmow WwTW from 2025 onwards.

AW suggest that Great Chesterford has the largest available headroom, and the growth proposed in Option 1b and 1c could be accommodated without expansion, with Option 2b requiring expansion much later in the plan period. However once existing commitments are taken into account, this headroom may be used up much earlier. This should be explored further with AW in Stage 2.

They commented that they have a preference for Option 1c over 1b as it utilises existing wastewater treatment capacity more effectively, has lower embedded operational carbon and enables investment in WwTWs that will need upgrading to be planned and funded in alignment with Anglian Water's regulated investment plans.

7.8 Conclusions

Great Chesterford, Great Dunmow, Felsted, Clavering, Great Sampford and Newport WwTWs may exceed their current maximum permitted DWF over the Local Plan period as a result of potential growth in Uttlesford, with Great Easton and High Roding WwTWs also predicted to be very close to capacity. Many of these WwTW have currently planned upgrades which may alleviate some capacity issues. Early engagement between the Council and AW/TW is required to ensure that opportunities to accommodate this growth within existing upgrade schemes can be realised.

For smaller treatment works that may require upgrading to increase capacity, TW raised a concern that may not be room around the works to expand. This should be considered in Stage 2.

There are a number of poorly performing storm tank overflows at WwTWs in Uttlesford. Growth within these catchments could result in an increase in the operations of these overflows contributing to a worsening of water quality in the area. Action should be taken by the water companies to address these overflows prior to an increase in wastewater demand being generated by new development. TW and AW have confirmed the importance of the investigations into storm overflow performance.

7.9 Recommendations

Table 7.4 Recommendations for wastewater treatment

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

8 Water Quality

8.1 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[57] (now withdrawn) set out a hierarchy for how the no-deterioration requirements of the WFD should be implemented on inland waters. The potential impact of development should be assessed in relation to the following objectives:

- **Could the development cause a greater than 10% deterioration in water quality?** This objective is to ensure that all the environmental capacity is not taken up by one stage of development and there is sufficient capacity for future growth.
- **Could the development cause a deterioration in WFD class of any element assessed?** This is a requirement of the Water Framework Directive to prevent a deterioration in class of individual contaminants. The "Weser Ruling"58 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.

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

8.2 Methodology

8.2.1 General approach

In the Stage 1 WCS, while the spatial growth options are still being developed, it was proposed to carry out a sensitivity analysis of the waterbodies in Uttlesford to changes in the volume of treated effluent rather than a detailed modelling study which will form part of Stage 2. This section presents the current WFD status of waterbodies in Uttlesford (Cycle 2 2016), any actions relating to water quality that are included in the WINEP, and a sensitivity analysis.

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57 Water Quality Planning: no deterioration and the Water Framework Directive, Environment Agency (2012). Accessed online at: http://www.fwr.org/WQreg/Appendices/No_deterioration_and_the_WFD_50_12.pdf on: 05/07/2021

58 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: 05/07/2021

8.2.2 Water quality sensitivity assessment

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

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

Once the distribution results have been produced, an assessment can be undertaken on the predicted mean and ninetieth percentile concentrations.

The study area is covered by three SIMCAT models:

- Thames model
- East Anglia model
- Wash model

Within SIMCAT, the determinands modelled were Biochemical Oxygen Demand (BOD), Ammonia (NH_4) and Phosphorus (P).

The following methodology was used:

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

Where water quality downstream of a WwTW in any given determinand deteriorates by 10% or more in response to a 20% increase in effluent flow, the sewer catchment can be said to be "more sensitive" to changes in effluent flow, and therefore growth. It should be noted that this assessment takes the existing SIMCAT model based on 2010-12 data and increases flow by a consistent figure across the whole model. In some cases, a WwTW may be able to accommodate a higher flow, in other cases, a 20% increase may not be likely or feasible. This assessment therefore just highlights the relative risk of deterioration.

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

8.3 Results

8.3.1 Water Framework Directive Overview

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

Figure 8.1 shows the overall WFD classification (2019) for waterbodies in Uttlesford. This is broken down in Table 8.1 into the determinants usually assessed in WCSs for each of the waterbodies that are predicted to receive additional effluent from growth during the plan period. Several of the WwTWs discharge to small watercourses which are not within the WFD classifications.

Within Uttlesford only one river (Wendon Brook - a tributary of the Cam) has an overall status of "good", the majority have moderate status, four have "poor" status and one (Stansted Brook) has a classification of "bad" - which is the lowest status possible.

The overall WFD status is made of Ecological and Chemical status, which are further broken down into sub-elements, the measurement of which is prioritised for each waterbody based on its characteristics and risk, hence not all elements are reported for each river. The WFD classification for invertebrates shows a wide variation across the study area with some waterbodies classed as "high" (the highest status possible) and one classified as Bad (Stansted Brook). Invertebrate status is an indicator of the overall health of the aquatic ecology.

Maps showing the WFD Ecological Status, Fish Status and Invertebrates status of the waterbodies in Uttlesford are also shown below in Figure 8.1 to Figure 8.4.

8.3.2 Chalk streams

Two Rivers within Uttlesford (Stort and Cam) are designated as chalk streams. A third (River Pant) although part of the catchment is underlain by chalk, there are also significant superficial deposits, and much of the catchment is underlain by London Clay. It does not therefore have the characteristics of a chalk stream. The Cam is considered to have "Poor" status under the Water Framework Directive, and the Stort is considered to be moderate. Both of the rivers cited pollution from wastewater treatment works (WwTW) as a reason for not achieving good status. Pollution from agricultural runoff is also a significant factor. In the River Cam, surface water abstraction (agriculture) and groundwater abstraction (both agriculture and water industry) are cited as reasons for not achieving good status, low river flow can exacerbate water quality issues as a reduction in reduction in river flow can increase the concentration of pollutants as less dilution is available.

A WCS can influence discharges from WwTWs, and abstraction by the water industry, and diffuse pollution from new development, but it has limited influence over existing industry and agriculture as these are not typically covered by local plan policy. However, given the rural nature of much of Uttlesford, the Stage 2 WCS will consider how the Local Plan, together with the emerging new regime for agricultural subsidies and the requirement of the Environment Act 2021 to prepare Local Nature Recovery Strategies, might promote an integrated approach to land use, spatial planning, and nature recovery planning.

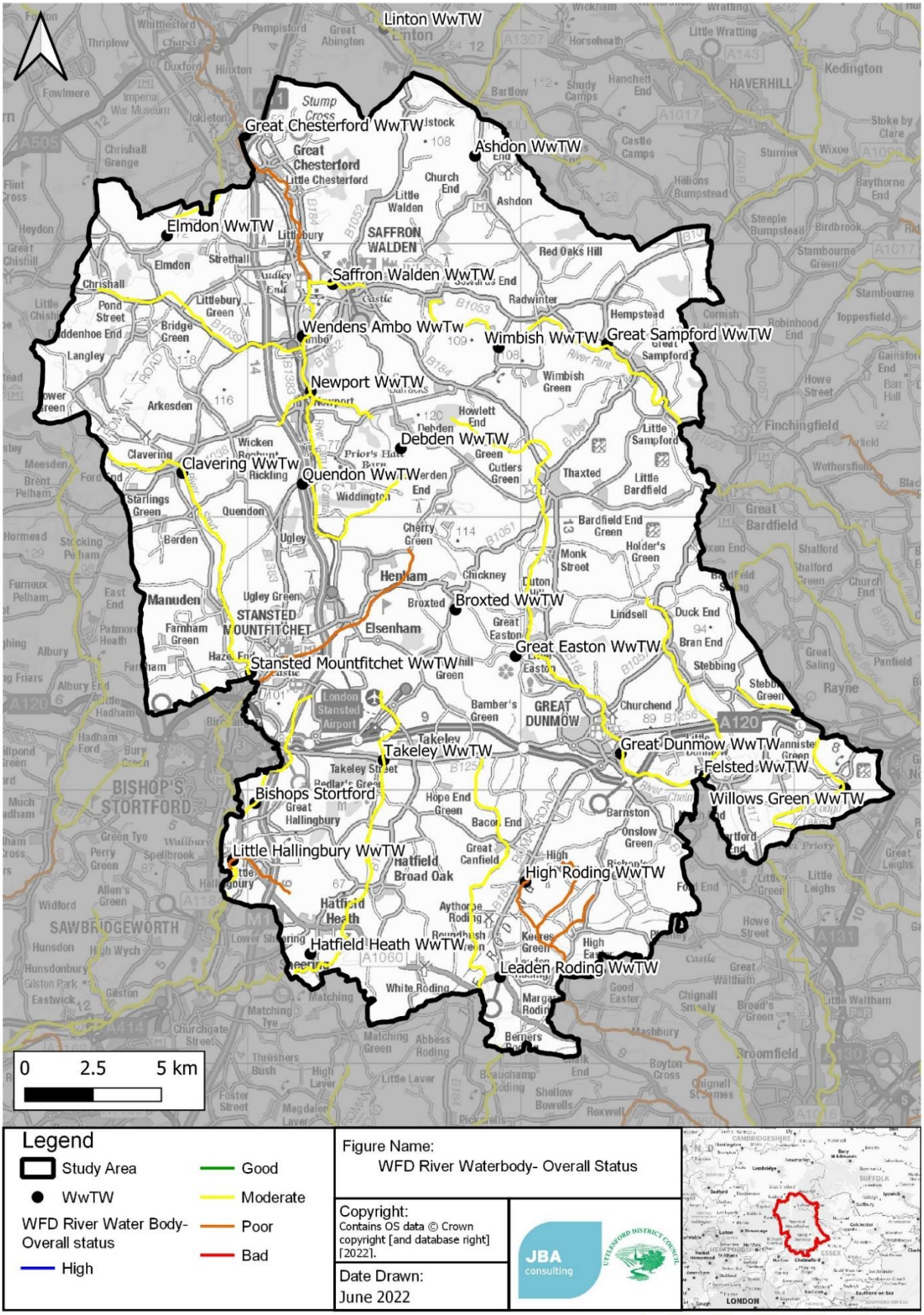


Figure 8.1 WFD Cycle 2 Classification (2019) status of waterbodies in Uttlesford

Table 8.1: 2019 WFD classifications for waterbodies acting as discharge point for WwTW within study area

WwTW	Receiving Waterbody	Overall Status	BOD	Ammonia	Phosphate
Ashdon	Granta	Moderate	N/A	High	Poor
Audley End	Cam (Newport to Audley End)	Moderate	N/A	High	Bad
Bishops Stortford	Great Hallingbury Brook	Moderate	N/A	High	Poor
Broxted	Chelmer (Gt. Easton - R. Can)	Moderate	High	High	Poor
Clavering	Stort (at Clavering)	Moderate	N/A	High	Moderate
Debden	Debden Water	Moderate	N/A	N/A	N/A
Elmdon	Tributary of Cam	Moderate	N/A	High	Moderate
Felsted	Stebbing Brook	Moderate	N/A	High	High
Great Chesterford	Cam (Audley End to Stapleford)	Poor	N/A	High	Poor
Great Dunmow	Chelmer (Gt. Easton - R. Can)	Moderate	High	High	Poor
Great Easton (Essex)	Chelmer (Gt. Easton - R. Can)	Moderate	High	High	Poor
Great Sampford	Pant	Moderate	N/A	High	Moderate
Hatfield Heath	Pincey Brook	Moderate	N/A	High	Poor
High Easter	Can	Poor	N/A	High	Moderate

WwTW	Receiving Waterbody	Overall Status	BOD	Ammonia	Phosphate
High Roding	Can	Poor	N/A	High	Moderate
Leaden Roding	Upper Roding (to Cripsey Brook)	Moderate	N/A	High	Poor
Linton	Granta	Moderate	N/A	High	Poor
Little Hallingbury	Little Hallingbury Brook	Poor	N/A	High	Moderate
Maunden	Stort (at Clavering)	Moderate	N/A	High	Moderate
Newport	Cam (Newport to Audley End)	Moderate	N/A	High	Bad
Quendon	Cam (US Newport)	Moderate	N/A	High	Moderate
Saffron Walden	Slade	Moderate	N/A	Good	Poor
Stansted Mountfitchet	Stort and Bourne Brook	Moderate	N/A	High	Moderate
Takeley	Pincey Brook	Moderate	N/A	High	Poor
Wendens Ambo	Cam (Newport to Audley End)	Moderate	N/A	High	Bad
Willows Green	Ter	Moderate	N/A	High	Poor
Wimbish	Pant	Moderate	N/A	High	Moderate

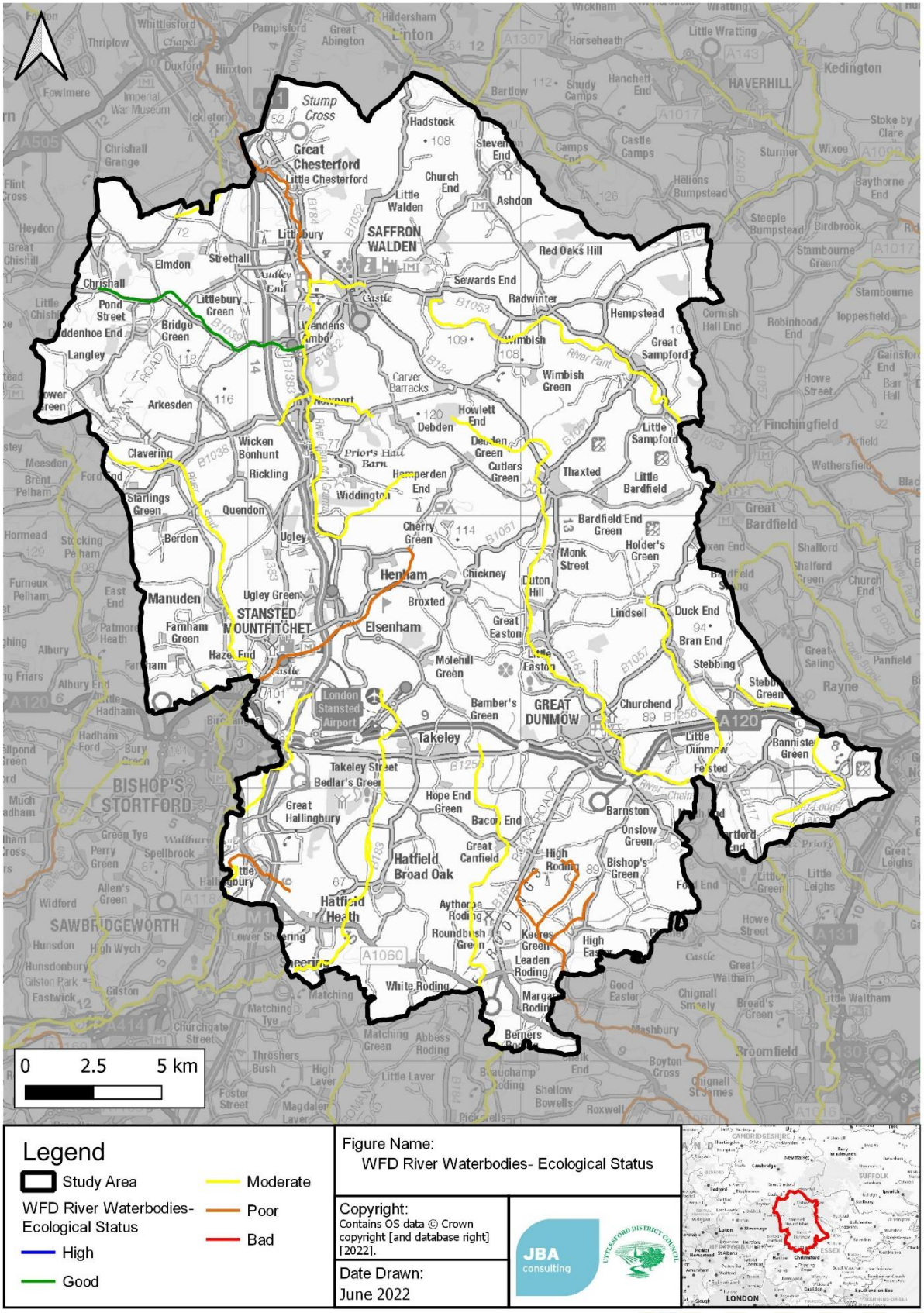


Figure 8.2 WFD Cycle 2 (2019) Ecological status of waterbodies in Uttlesford

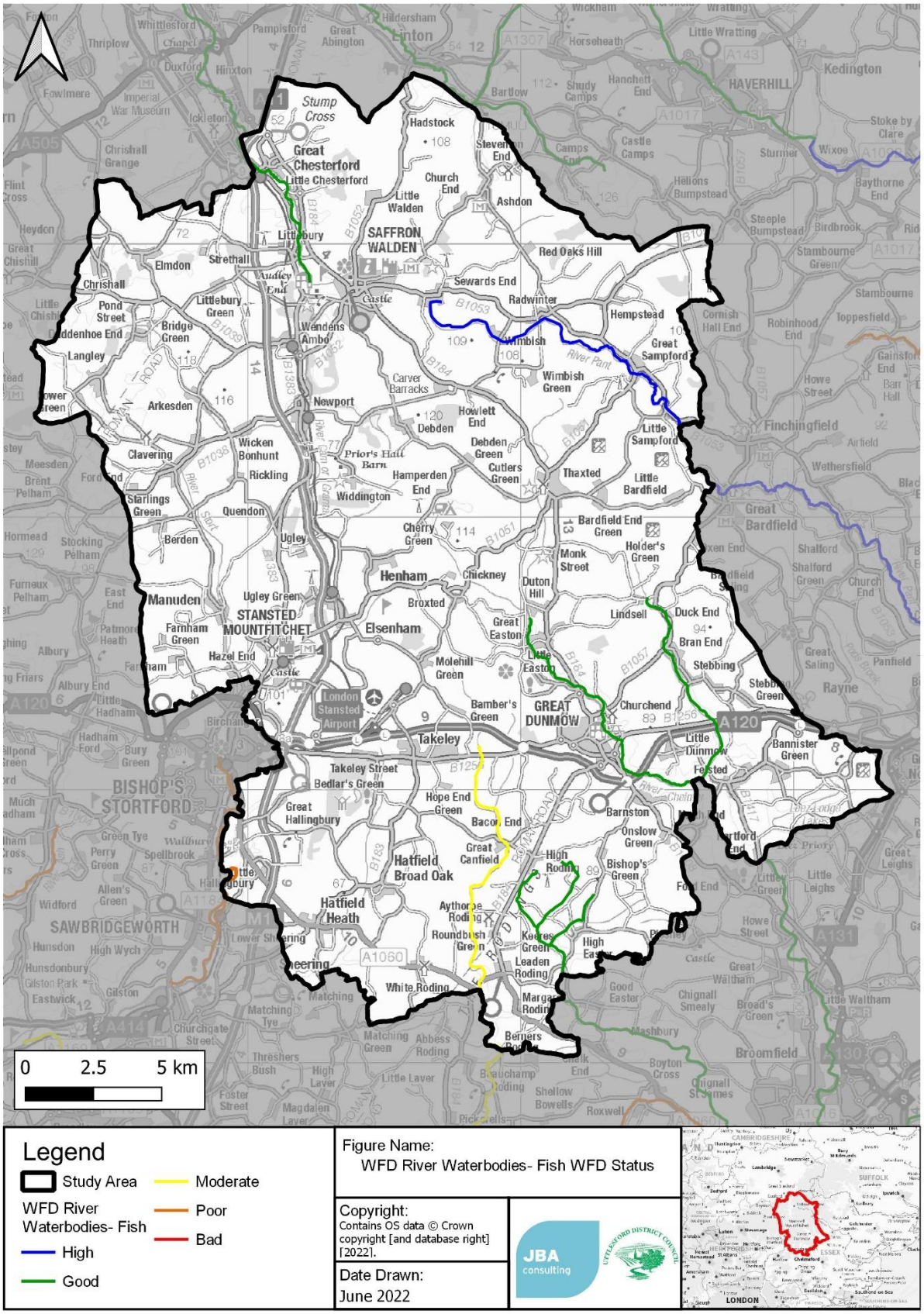


Figure 8.3 WFD Cycle 2 (2019) Fish status of waterbodies in Uttlesford

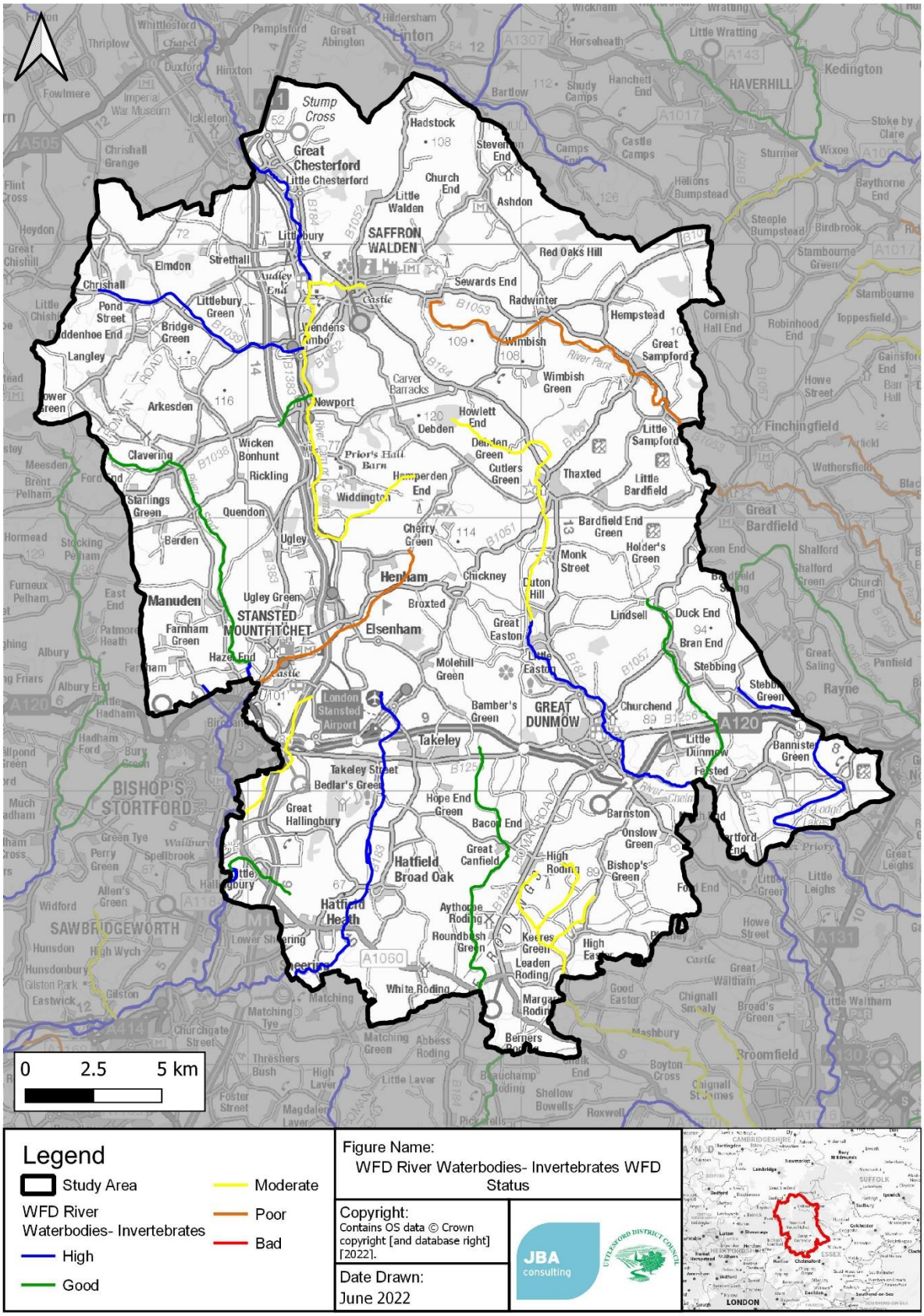


Figure 8.4 WFD Cycle 2 (2019) Invertebrates status of waterbodies in Uttlesford

8.3.3 Chemical Assessment

Thames Water identified that Nickel had been added onto the permit of some of their WwTWs. Further assessment will be completed at Stage 2 of the WCS using the EA's MPer (Metals Permitting) assessment tool to assess the likelihood of a deterioration in Nickel concentration in the receiving waterbody for specific WwTWs.

8.3.4 Priority substances

As well as the physico-chemical water quality elements (BOD, Ammonia, Phosphate etc.) addressed above, a watercourse can fail to achieve Good Ecological Status due to exceeding permissible concentrations of hazardous substances. Currently 33 substances are defined as hazardous or priority hazardous substances, with others under review. Such substances may pose risks both to humans (when contained in drinking water) and to aquatic life and animals feeding 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.

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

- Industrial sources – whilst this report covers potential employment sites, it doesn't consider the type of industry and therefore likely sources of priority substances are unknown. It is recommended that developers should discuss potential uses which may be sources of priority substances from planned industrial facilities at an early stage with the EA and, where they are seeking a trade effluent consent, with the sewerage undertaker.
- Agricultural sources - There is limited scope for the planning system to change or regulate agricultural practices. UK water companies are involved in a range of "Catchment-based Approach" schemes aimed at reducing diffuse sources of pollutants, including agricultural pesticides.
- Surface water runoff sources - some priority substances e.g. heavy metals, are present in urban surface water runoff. It is recommended that future developments would manage these sources by using SuDS that provide water quality treatment, designed following the CIRIA SuDS Manual. This is covered in more detail in section 9.5.2.
- Domestic wastewater sources - some priority substances are found in domestic wastewater as a result of domestic cleaning chemicals, detergents, pharmaceuticals, pesticides or materials used within the home. Whilst an increase in the population due to housing growth could increase the total volumes of such substances being discharged to the environment, it would be more appropriate to manage these substances through regulation at source, rather than through restricting housing growth through the planning system.

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

8.4 WINEP

The actions from the Water Industry National Environment Programme that relate to water quality are presented in Table 8.2 and show that most WwTWs in the study area have an action against them. In most cases these include monitoring of storm overflows and the volume of sewage being treated. In many a permit condition to limit the concentration of phosphate in the treated effluent is being applied in order to improve downstream water quality.

Table 8.2 WINEP Actions relating to water quality

Waterbody Name	WINEP ID	Unique ID	Scheme Name(s)	Type of scheme / notes
Cam (Newport to Audley End)	EAN00512	7AW200095	Newport STW	Continuous discharge Proposed Phosphate permit (1mg/l Annual average (AA))
Brookhouse Brook	HNL00213	7AF200012	Theydon Bois Sewage Treatment Works	Continuous discharge Proposed Phosphate permit (0.25mg/l AA)
Cam (Audley End to Stapleford)	EAN01290 EAN01291	7AW200866 7AW200867	Great Chesterford STW	EDM FFT Monitoring
Cam (Audley End to Stapleford)	EAN01890 EAN01891 EAN01892	7AW201466 7AW201467 7AW201468	Sawston STW	EDM FFT Monitoring Increase in FFT
Cam (Newport to Audley End)	EAN00512	7AW200095	Newport STW	Proposed Phosphate permit (1mg/l AA)
Cam (US Newport)	EAN00522	7AW200105	Quendon STW	Proposed Phosphate permit (1mg/l AA)
Chelmer	EDM00317	7AW300389	Great Dunmow STW	Intermittent Discharge U_MON2
Chelmer	EDM00227	7AW300299	Great Easton STW (Essex)	Intermittent Discharge U_MON2
Chelmer	EDM00114	7AW300186	Paxton STW	Intermittent Discharge U_MON2
Chelmer (Gt. Easton - R. Can)	EAN01302 EAN01303	7AW200878 7AW200879	Great Dunmow STW	EDM FFT Monitoring
Chelmer (Gt. Easton - R. Can)	EAN01306 EAN01307 EAN01309	7AW200882 7AW200883 7AW200885	Great Easton STW (Essex)	EDM FFT Monitoring Increase in Storm Storage

Waterbody Name	WINEP ID	Unique ID	Scheme Name(s)	Type of scheme / notes
Cripsey Brook	HNL00211	7TW200100	Epping (Fiddlers Hamlet) Sewage Treatment Works	Proposed Phosphate permit (0.25mg/l AA)
Cripsey Brook	HNL00210	7TW200099	Moreton Sewage Treatment Works	Proposed Phosphate permit (0.25mg/l AA)
Cripsey Brook	HNL00208	7TW200097	North Weald Sewage Treatment Works	Proposed Phosphate permit (0.25mg/l AA)
Cripsey Brook	HNL00209	7TW200098	Thornwood Common Sewage Treatment Works	Proposed Phosphate permit (0.25mg/l AA)
Great Hallingbury Brook	FLO01238 HNL00226 FLO01239	7TW300155 7TW200115 7TW300154	Bishops Stortford Sewage Treatment Works	EDM Proposed Phosphate permit (0.25mg/l AA) FFT monitoring
Little Hallingbury Brook	HNL00128 HNL00163 HNL00227	7TW200029 7TW200064 7TW200116	Little Hallingbury Sewage Treatment Works	EDM FFT monitoring Proposed Phosphate permit (0.25mg/l AA)
Lower Roding (Cripsey Bk to Loughton)	HNL00212	7TW200101	Stanford Rivers Sewage Treatment Works	Proposed Phosphate permit (0.25mg/l AA)
Pant	EAN01323 EAN01324	7AW200899 7AW200900	Great Sampford STW	EDM FFT Monitoring
Pant	EAN02239 EAN02240	7AW201815 7AW201816	Wethersfield STW	EDM FFT Monitoring
Pincey Brook	HNL00125 HNL00160 HNL00229	7TW200026 7TW200061 7TW200118	Hatfield Heath Sewage Treatment Works	EDM FFT monitoring Proposed Phosphate permit (0.9mg/l AA)
Pincey Brook	HNL00136 HNL00171 HNL00180 HNL00228 HNL00254	7TW200037 7TW200072 7TW200081a 7TW200117 7TW200081b	Takeley Sewage Treatment Works	EDM FFT monitoring Upper Tier BOD:50mg/l upper limit Proposed Phosphate permit (0.9mg/l AA) Upper Tier Ammonia 20mg/l

Waterbody Name	WINEP ID	Unique ID	Scheme Name(s)	Type of scheme / notes
River Cam	EDM00090	7AW300162	Lt Chesterford-TPS	Intermittent Discharge U_MON2
River Lymn / Steeping	EDM00161	7AW300233	Springfield-Uplands SP	Intermittent Discharge U_MON2
Slade	EAN01878 EAN01879 EAN01880	7AW201454 7AW201455 7AW201456	Saffron Walden STW	EDM FFT Monitoring Increase in FFT
Soham Lode	EDM00192	7AW300264	Wicken Bonhunt-SP	Intermittent Discharge U_MON2
Stebbing Brook	EAN01197 EAN01198 EAN01199	7AW200773 7AW200774 7AW200775	Felsted STW	EDM FFT Monitoring Increase in Storm Storage
Stort (at Clavering)	CHM00269	7TW300021	Clavering	Investigation Sewer catchment investigations to find sources of HBCDD and/or cypermethrin, and/or river investigations into PFOS sources
Stort (at Clavering)	HNL00223	7TW200112	Clavering Sewage Treatment Works	Proposed Phosphate permit (0.3mg/l AA)
Stort (at Clavering)	HNL00224	7TW200113	Manuden Sewage Treatment Works	Proposed Phosphate permit (0.3mg/l AA)
Stort and Bourne Brook	CHM00310 HNL00135 HNL00170 HNL00225	7TW300062 7TW200036 7TW200071 7TW200114	Stansted Mountfitchet Sewage Treatment Works	Proposed Nickel permit (5.7 ug/l (dissolved mean) EDM FFT monitoring Proposed Phosphate permit (0.25mg/l AA)
Stort and Navigation, B Stortford to Harlow	HNL00238	7TW200127	Hunsdon Mead - SSSI	Joint investigation with Thames Water and Natural England. Investigation to consider impact of phosphate loading on SSSI and how best TWUL might deliver the reduction in P needed to meet their fair share for CSMG targets for the SSSI
Ter	EAN00608	7AW200186	Great Leighs STW	UWWTD Conditions to be added to the permit

Waterbody Name	WINEP ID	Unique ID	Scheme Name(s)	Type of scheme / notes
Upper Roding (to Cripsey Brook)	HNL00110 HNL00145	7TW200011 7TW200046	Abbess Roding Sewage Treatment Works	EDM FFT monitoring
Upper Roding (to Cripsey Brook)	HNL00127 HNL00162	7TW200028 7TW200063	Leaden Roding Sewage Treatment Works	EDM FFT monitoring
Upper Roding (to Cripsey Brook)	FLO01299 HNL00141 HNL00176	7TW300194 7TW200042 7TW200077	White Roding Sewage Treatment Works	The WwTW storm tank capacity must be increased to 68 litres/head or to 2 hours at max flow through the tanks. EDM FFT monitoring
Upper Roding (to Cripsey Brook)	FLO01300 HNL00144 HNL00179	7TW300195 7TW200045 7TW200080	Willingale Sewage Treatment Works	The WwTW storm tank capacity must be increased to 68 litres/head or to 2 hours at max flow through the tanks. EDM FFT monitoring
Upper Witham	EDM00174	7AW300246	Saffron Walden-George Abbey Ov	Intermittent Discharge U_MON2

U_MON2 – Urban pollution monitoring

FFT monitoring – Monitoring of Flow to Full Treatment – the volume of wastewater that is treated

EDM – Event Duration Monitoring – monitoring of the operation of storm overflows

8.5 Water quality modelling

The sensitivity analysis was conducted using the EA's SIMCAT models and the results are shown in Figure 8.5 to Figure 8.7 below. Where water quality downstream of a WwTW in any given determinand deteriorates by 10% or more in response to a 20% increase in effluent flow, the sewer catchment can be said to be "more sensitive" to changes in effluent flow, and therefore growth. It can be seen that changes in the volume of treated wastewater in Uttlesford do not cause a significant response in the concentrations of ammonia within the study area in the north of Uttlesford with the exception of the River Pant. High sensitivity is observed for the River Chelmer as it passed Great Dunmow, which may be significant for the spatial growth options.

For BOD, more waterbodies are moderately sensitive with a 0 to 10% deterioration, again concentrated more in the south apart from the River Pant.

For phosphate the response is far more widespread, with many watercourses showing some sensitivity in particular the River Cam, Pincey Brook and the Stort. This is significant as the Cam and Stort are chalk streams and ecologically sensitive.

It should be noted that as reported in Table 8.2, an implementation or tightening of the environmental permit for phosphate is included as a WINEP action at many of the WwTWs in the area. It is therefore possible that the response to an increase in the discharge of treated effluent would be reduced in future more detailed modelling. However, there is a potential for growth served by WwTWs on the Cam and Storm to cause a deterioration in Phosphate and an impact on the aquatic ecology of those rivers that must be carefully considered.

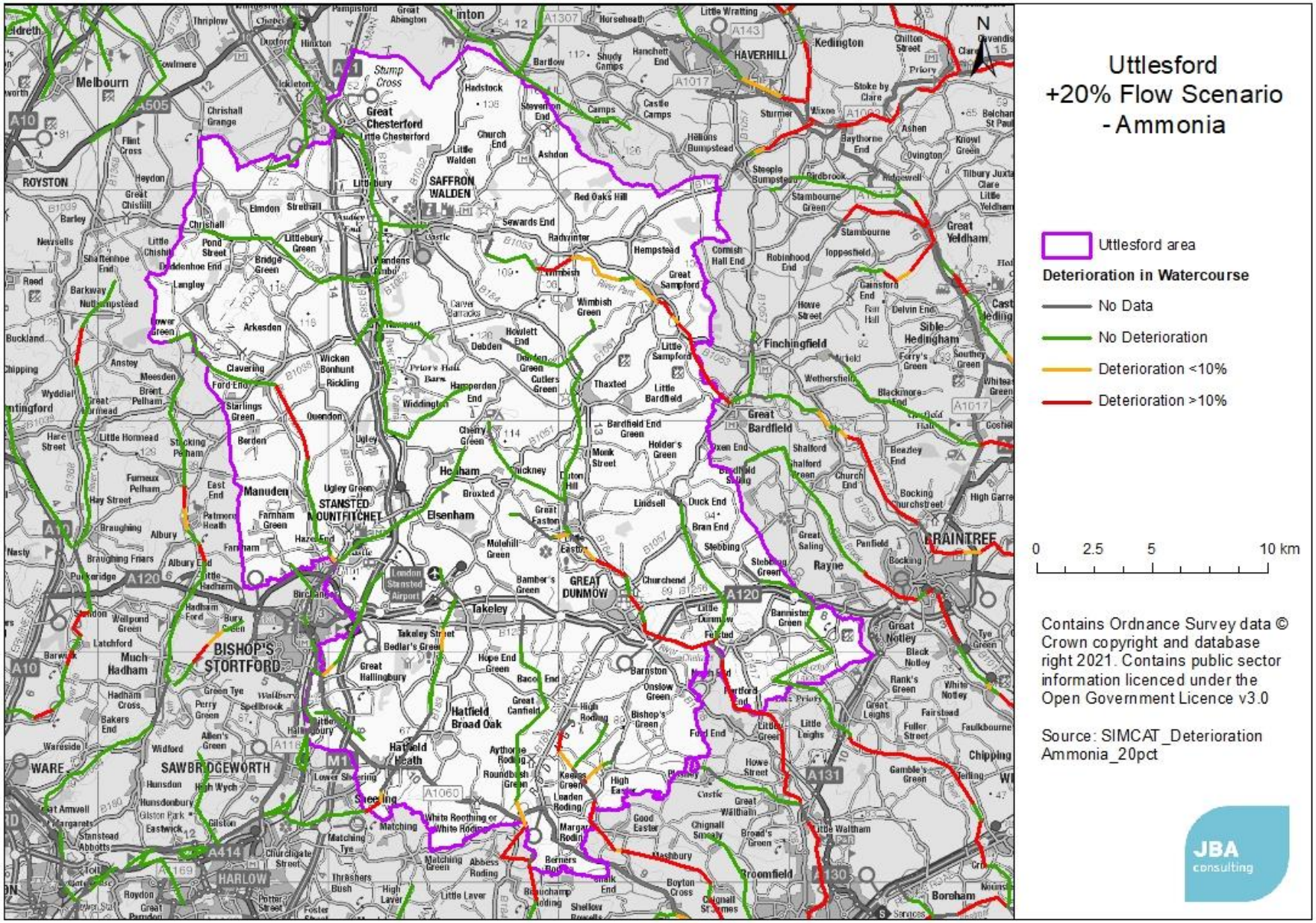


Figure 8.5 Sensitivity analysis for Ammonia

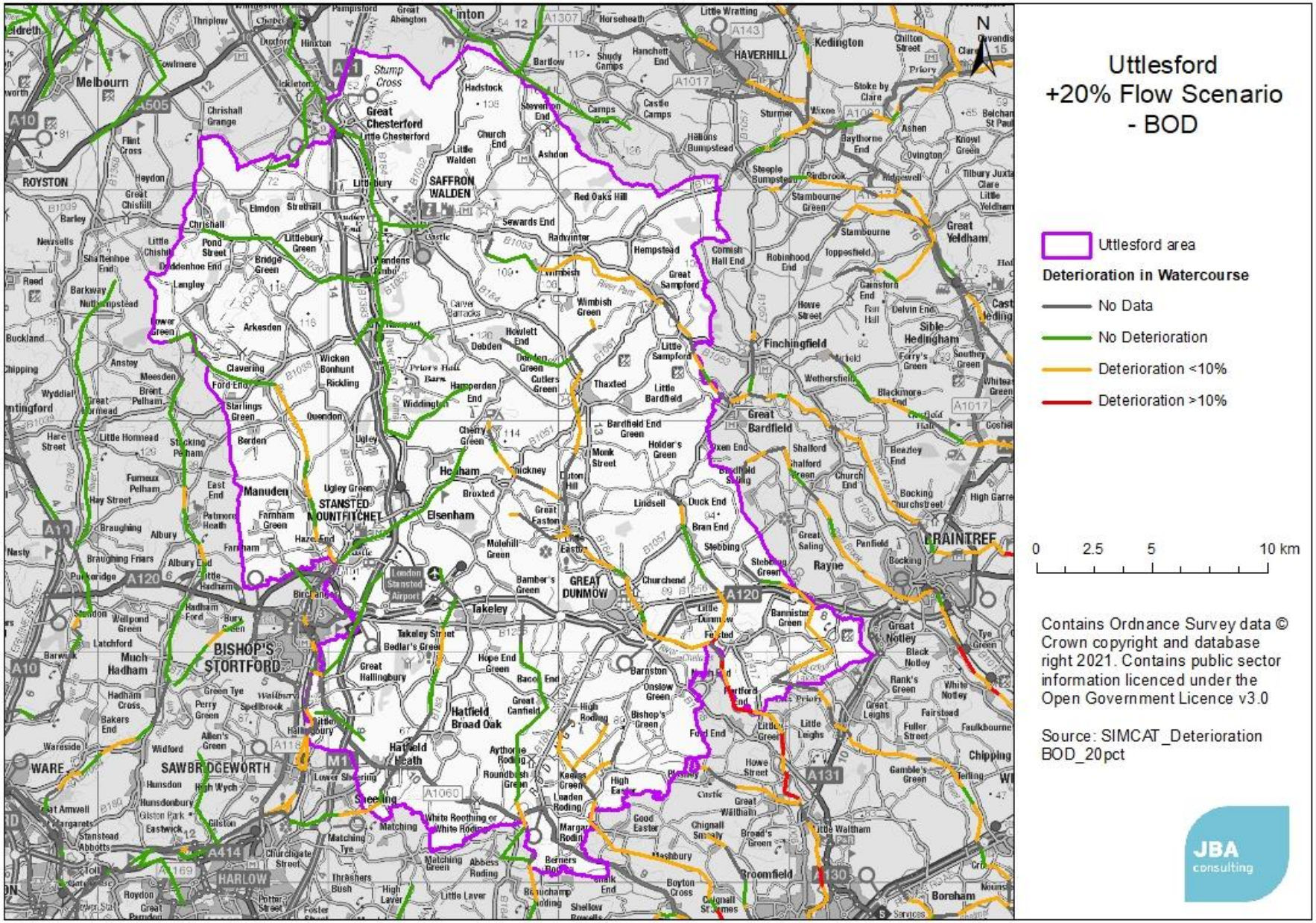


Figure 8.6 Sensitivity analysis for BOD

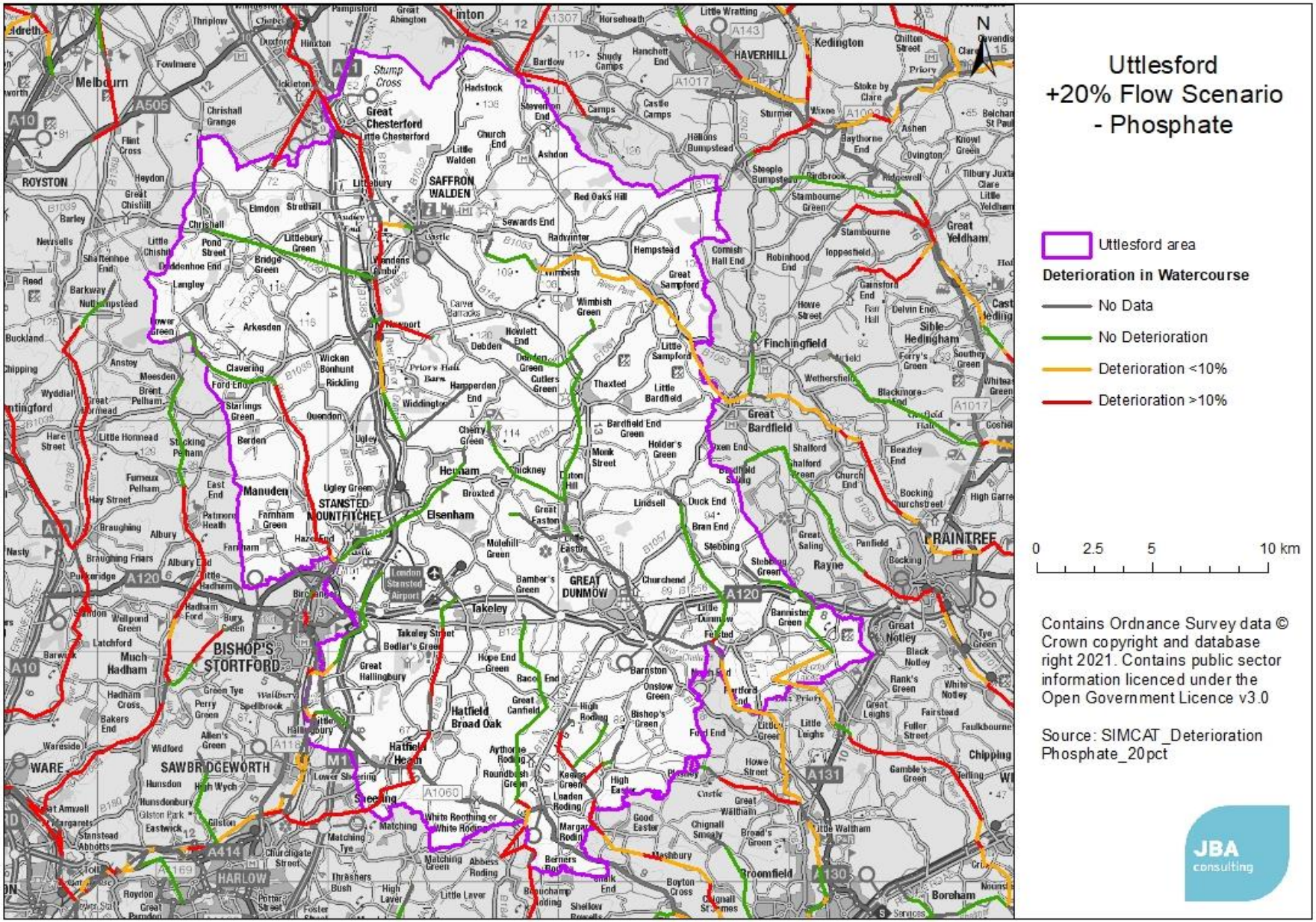


Figure 8.7 Sensitivity analysis for phosphate

8.6 Spatial growth options

The sensitivity analysis indicated which watercourses could be sensitive to an increase in treated effluent from growth. This was considered alongside the spatial growth options and a following observations made:

Ammonia and BOD

In all the spatial growth options a large amount of growth is focussed on Great Dunmow, albeit slightly less in option 1b. Additional wastewater flows in this area could cause a deterioration in ammonia in the River Chelmer. In each spatial growth option, a tightening of the ammonia permit at Great Dunmow, and other WwTWs upstream may need to be considered.

Option 2C includes a new settlement at Great Easton Park which may be served by Great Dunmow WwTW adding a further 2,000 houses into this catchment. Consideration should be given to whether this growth should be served by a Thames Water catchment to the east.

The results are similar for BOD in this area.

Option 2e includes a new settlement East of Stebbing that may be served by Braintree WwTW. The watercourses downstream of Braintree WwTW show a high sensitivity in the ammonia results to increases in wastewater and as in Option 2c, a tightening of the permit may be required.

Phosphate

All of the growth options contain significant growth around Stansted Airport, Saffron Waldon, Stansted Mountfitchet which are all in areas sensitive to changes in treated wastewater flow.

WINEP actions to implement or tighten the Phosphate consent in the environmental permit at the WwTWs serving these areas, may prevent a proportion of this deterioration which will be shown by modelling in Stage 2. However, where a WINEP action is aimed at achieving good ecological status – this outcome is still required, and so further improvement may be necessary to accommodate growth, and still achieve the environmental objective.

Options 2a and 2b which contain new settlements at Ugley and Great Chesterford have the potential to cause a deterioration downstream in the River Cam and Stort. This is of concern as both rivers are chalk streams and ecologically sensitive.

Option 2d would increase flows at Hatfield Takeley and Further modelling is required to produce a more accurate estimate of likely deterioration, but further catchment-based measures (outlined in 9.5) may be required alongside a tightening of WwTW permits in order to accommodate this growth.

8.7 Conclusions

Growth during the local plan period will increase the discharge of treated wastewater from WwTWs in Uttlesford. There is a potential for this to cause a deterioration in water quality in the receiving watercourses and this must be carefully considered. A significant deterioration in water quality is not acceptable under the Water Framework Directive.

Water quality modelling to test potential impacts is recommended in a Stage 2 WCS.

Thames Water indicated concerns about limits to certain chemicals such as Nickel that have been applied at some WwTWs. Consideration should also be given to these in Stage 2.

8.8 Recommendations

Table 8.3 Table of recommendations for water quality

Action	Responsibility	Timescale
Provide annual monitoring reports to TW and AW detailing projected housing growth in the Local Authority	Uttlesford	Ongoing
When preferred options for growth are identified, undertake water quality impact modelling as part of a Stage 2 WCS.	Uttlesford	Ongoing
Take into account the full volume of growth (from Uttlesford and neighbouring authorities) within the catchment when considering WINEP schemes or upgrades at WwTW	TW and AW	Ongoing

9 Environmental Opportunities and Constraints

9.1 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. In the context of a Water Cycle Study, the impact of development on the aquatic environment is under assessment.

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

9.2 Sources of pollution

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

The most likely sources of diffuse pollution from new developments include drainage from housing estates, runoff from roads and discharges from commercial and industrial premises. The pollution risk posed by a site will depend on the sensitivity of the receiving environment, the pathway between the source of the runoff and the receiving waters, and the level of dilution available. After or during heavy rainfall, the first flush of water carrying accumulated dust and dirt is often highly polluting.

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

Runoff from development sites should be managed by a suitably designed SuDS scheme, more information on SuDS can be found in section 9.5.2. Potential impacts on receiving surface waters include the blanketing of riverbeds with sediment, a reduction in light penetration from suspended solids, and a reduction in natural oxygen levels, all of which can lead to a loss in biodiversity.

9.3 Pathways

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

9.4 Receptors

A receptor in this case is a habitat or species that is adversely impacted by a pollutant. Both the rivers and groundwater as well as being pathways, can also be considered to be receptors. Groundwater bodies are also given a status under the WFD which is reported in Section 4.1.4 for the groundwater bodies across Uttlesford.

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

- Special Areas of Conservation (SAC)

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

A description of these, and the relevant legislation that defines and protects them, can be found in section 3.

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

Priority Habitats are available to view on the DEFRA Magic Map website[59].

The environmental designated sites which may be impacted by change in discharge from the WwTW upstream are listed below in Table 9.1 and sites within Uttlesford are shown in Figure 9.1. there are no SACs, SPA or Ramsar sites with in Uttlesford, however they are present downstream and adjacent to watercourses that could be affected by an increased in effluent flow from within Uttlesford.

Table 9.1 Protected sites which could be affected by a change in WwTW discharge

Site	Reference	Catchment	First Upstream WwTW
Ramsar (Wetlands of International Importance)			
The Wash	UK11072	Wash	GREAT CHESTERFORD STW
Wicken Fen	UK11077	Wash	GREAT CHESTERFORD STW
Lee Valley	UK11034	Thames	LITTLE HALLINGBURY STW
Dersingham Bog	UK11019	Wash	GREAT CHESTERFORD STW
Benfleet and Southend Marshes	UK11006	Thames	LITTLE HALLINGBURY STW
Blackwater Estuary (Mid-Essex Coast Phase 4)	UK11007	East Anglia	FELSTEAD STW
Dengie (Mid-Essex Coast Phase 1)	UK11018	East Anglia	FELSTEAD STW

59 DEFRA Magic Map- https://magic.defra.gov.uk/magicmap.aspx

Ouse Washes	UK11051	Wash	GREAT CHESTERFORD STW
Colne Estuary (Mid-Essex Coast Phase 2)	UK11015	East Anglia	FELSTEAD STW
Thames Estuary & Marshes	UK11069	Thames	LITTLE HALLINGBURY STW
Special Areas of Conservation (SAC)			
The Wash & North Norfolk Coast	UK0017075	Wash	GREAT CHESTERFORD STW
Essex Estuaries	UK0013690	East Anglia	FELSTEAD STW
Ouse Washes	UK0013011	Wash	GREAT CHESTERFORD STW
Special Protection Areas (SPA)			
Greater Wash	UK9020329	Wash	GREAT CHESTERFORD STW
Outer Thames Estuary	UK9020309	Thames	LITTLE HALLINGBURY STW
Benfleet and Southend Marshes	UK9009171	Thames	LITTLE HALLINGBURY STW
Blackwater Estuary (Mid-Essex Coast Phase 4)	UK9009245	East Anglia	FELSTEAD STW
Ouse Washes	UK9008041	Wash	GREAT CHESTERFORD STW
Lee Valley	UK9012111	Thames	LITTLE HALLINGBURY STW
The Wash	UK9008021	Wash	GREAT CHESTERFORD STW
Dengie (Mid-Essex Coast Phase 1)	UK9009242	East Anglia	FELSTEAD STW
Thames Estuary & Marshes	UK9012021	Thames	LITTLE HALLINGBURY STW
Sites of Special Scientific Interest (SSSI)			
Upware North Pit	TL544727	Wash	GREAT CHESTERFORD STW
Cam Washes	TL538728	Wash	GREAT CHESTERFORD STW
Shippea Hill	TL637850	Wash	GREAT CHESTERFORD STW
Rye Meads	TL387102	Thames	LITTLE HALLINGBURY STW

Stallode Wash, Lakenheath	TL675853	Wash	GREAT CHESTERFORD STW
Islington Heronry	TF568159	Wash	GREAT CHESTERFORD STW
Thorley Flood Pound	TL489181	Thames	BISHOP'S STORTFORD WWTW
Upware South Pit	TL539709	Wash	GREAT CHESTERFORD STW
Vange & Fobbing Marshes	TQ733839	Thames	LITTLE HALLINGBURY STW
Waltham Abbey	TL375019	Thames	LITTLE HALLINGBURY STW
Walthamstow Marshes	TQ351875	Thames	LITTLE HALLINGBURY STW
Chingford Reservoirs	TQ370953	Thames	LITTLE HALLINGBURY STW
Ely Pits and Meadows	TL558807	Wash	GREAT CHESTERFORD STW
Alder Carr	TL542489	Wash	ASHDON WATER RECYCLING CENTRE
Breckland Farmland	TL760783	Wash	GREAT CHESTERFORD STW
Walthamstow Reservoirs	TQ351891	Thames	LITTLE HALLINGBURY STW
Curtismill Green	TQ518963	Thames	LEADEN RODING STW
Wicken Fen	TL554701	Wash	GREAT CHESTERFORD STW
The Wash	TF537402	Wash	GREAT CHESTERFORD STW
Dengie	TM042032	East Anglia	FELSTEAD STW
Mucking Flats and Marshes	TQ698791	Thames	LITTLE HALLINGBURY STW
South Thames Estuary and Marshes	TQ805794	Thames	LITTLE HALLINGBURY STW
Turnford & Cheshunt Pits	TL370027	Thames	LITTLE HALLINGBURY STW

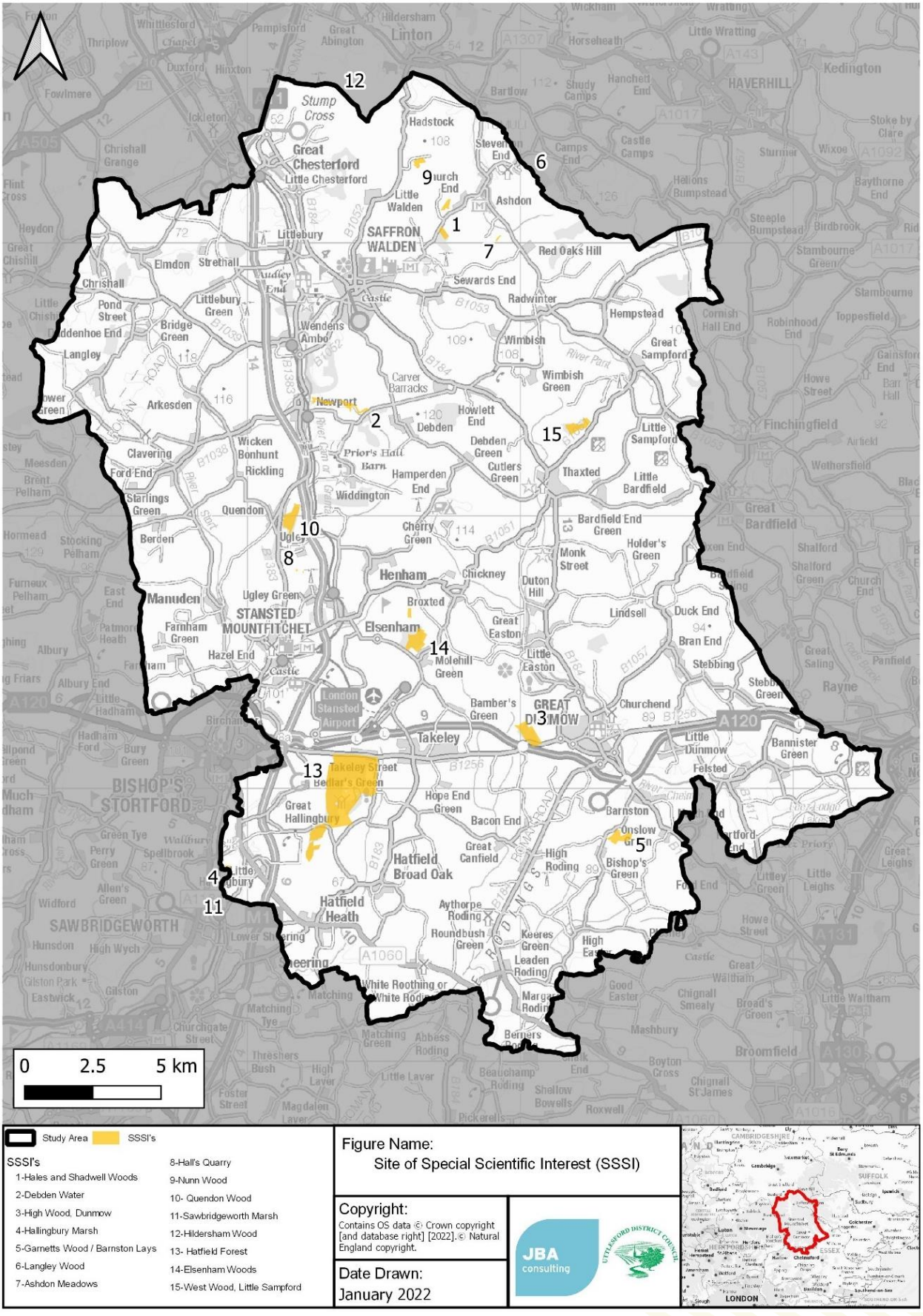


Figure 9.1 Sites of Special Scientific Interest (SSSI) in Uttlesford

9.5 Protection and mitigation

9.5.1 Groundwater Protection

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

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

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

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

The EA have published a position paper[60] outlining its approach to groundwater protection which includes direct discharges to groundwater, discharges of effluents to ground and surface water runoff. This is of relevance to this water cycle study where a development may manage surface water through SuDS.

Sewage and Trade Effluent

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

For treated sewage effluent discharges, the EA requires 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 EA would normally expect to only permit new private discharges where the distance to connect to the nearest public sewer exceeds the number of dwellings multiplied by 30m. So, for example, a development of 100 dwellings would need to be more than 3km from a public 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.

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/Envirnment-Agency-approach-to-groundwater-protection.pdf on: 24/01/2022

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

Discharge of Clean Water

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

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

- Be suitably designed;
- Meet Government non-statutory technical standards[61] for sustainable drainage systems – these should be used in conjunction with the NPPF and PPG; and
- Use a SuDS management treatment train

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 Uttlesford

Source protection zones (SPZs) form a key part of the Environment Agency's approach to controlling the risk to groundwater supplies from potentially polluting activities and accidental releases of pollutants.

The Source Protection Zones (SPZs) that are present in the Uttlesford area are shown in Figure 9.2.

The Environment Agency's Manual for the Production of Groundwater Source Protection Zones[62], details position statements which provide information about the Environment Agency's approach to managing and protecting groundwater.

Proposed development locations within or close to Source Protection Zones, should be assessed in relation to the relevant Environment Agency position statements.

61 Sustainable Drainage Systems: non-statutory technical standards, Department for Environment, Food & Rural Affairs (2015). Accessed online at: https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards on: 24/01/2022

62 Manual for the Production of Groundwater Source Protection Zones, Environment Agency (2019). Accessed online at: https://www.gov.uk/government/publications/groundwater-source-protection-zones-spz-production-manual on: 24/01/2022

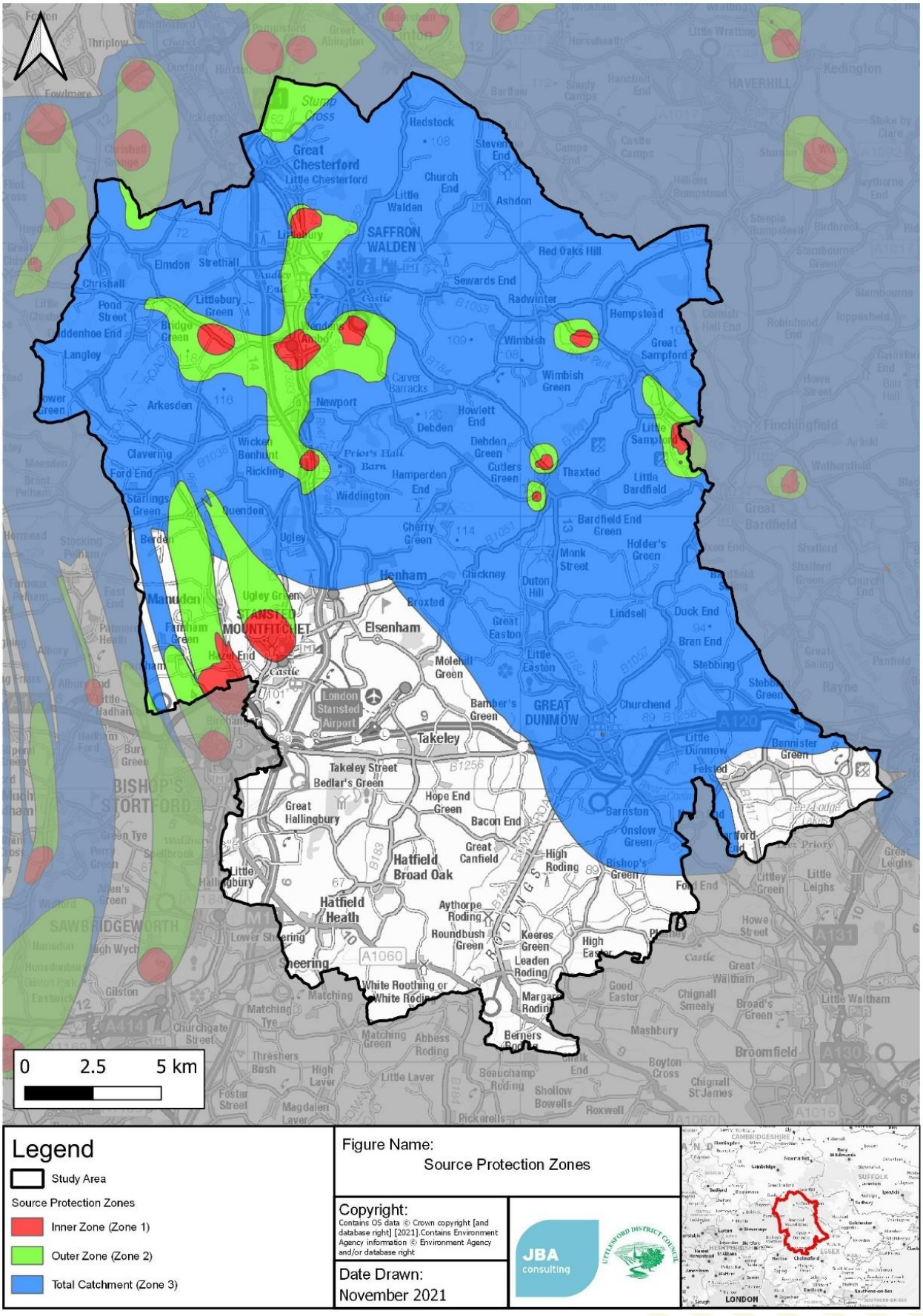


Figure 9.2 Source Protection Zones in the Study Area

9.5.2 Surface Water Drainage and SuDS

Since April 2015[63], 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).

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

- 10 or more dwellings
- a site larger than 0.5 hectares, where the number of dwellings is unknown
- 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. SuDS also have the advantage of providing effective Blue and Green infrastructure and ecological and public amenity benefits when designed and maintained properly.

National standards on the management of surface water are outlined within the Defra Non-statutory Standards for Sustainable Drainage Systems[64]. The CIRIA C753 SuDS Manual[65] and Guidance for the Construction of SuDS[66] provide the industry best practice guidance for design and management of SuDS

Local guidance, provided by the Lead Local Flood Authorities covering the study area, is detailed below:

- Essex County Council is a Lead Local Flood Authority. The Essex County Council sustainable drainage systems handbook[67] contains advice from the LLFA relating to surface water drainage and sets out the minimum operating requirements as required in the National Planning Policy Framework (NPPF). The SPD provides guidance on the approach that should be taken to SuDS in new developments in Uttlesford so as to manage and mitigate surface water flood risk.

9.5.3 Chalk Streams

Chalk streams are a unique habitat which support a range of rare ecosystems. In their healthy state, chalk streams provide a clean, well oxygenated and high in calcium environment which supports many aquatic creatures such as trout, salmon, invertebrates. The aquatic plants unique to chalk streams provide an in-stream habitat on which everything else depends. The chalk also acts as a buffer against floods and droughts, which means that they provide good refuge for flow vulnerable species such as water vole.

The majority of chalk streams have been modified to a degree, often many times. Chalk streams are very low-energy systems and are mostly incapable of erasing a modification once it has occurred. A chalk stream's geomorphology is essential to its biodiversity. A physically intact, natural and stable river is far more able to tolerate pollution and

63 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. Accessed online at: https://www.parliament.uk/documents/commons-vote-office/December%202014/18%20December/6.%20DCLG-sustainable-drainage-systems.pdf on: 24/01/2022

64 Sustainable Drainage Systems, Non-statutory technical standards for sustainable drainage systems, DEFRA (2015). Accessed online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/415773/sustainable-drainage-technical-standards.pdf on: 24/01/2022

65 CIRIA Report C753 The SuDS Manual, CIRIA (2015). Accessed online at: https://www.ciria.org/Memberships/The_SuDs_Manual_C753_Chapters.aspx on: 24/01/2022

66 Guidance on the Construction of SuDS (C768), CIRIA (2017), Accessed online at: https://www.ciria.org/ItemDetail?iProductcode=C768&Category=BOOK on: 24/01/2022

67 Sustainable Drainage Systems design guide, Essex County Council (2020). Accessed online at: https://www.essexdesignguide.co.uk/media/2404/suds_design_guide_2020.pdf on: 24/01/2022

abstraction than a heavily modified one. The confined, straightened, impounded chalk stream cannot cope with floods and droughts in the same way a natural river can. Pollutants can get trapped more easily into a modified system and tend to become trapped in a river that lacks its natural physical function (meandering and flooding). In-stream structures, such as weirs and sluices, also do damage as they prevent re-colonisation of wildlife after extreme events, and prevent inappropriate sediment being removed from the river. Connections with man-made waterways can also bring a problematic influx of warm, silty, nutrient-rich water.

The evidence base for chalk streams created in parallel to the WCS made the following recommendations to protect and enhance chalk streams:

Measure type	Recommendation
Water efficiency	Recommendation 1 – Adopt CaBA strategy recommendation of 90l/p/d throughout Uttlesford Recommendation 2 – Require all new non-residential buildings achieve BREEAM "Outstanding" for water throughout Uttlesford
Water neutrality	Recommendation 3 – Explore the feasibility of achieving water neutrality in the Stage 2 Water Cycle Study
Riparian Buffer Zone	Recommendation 4 – Apply a riparian buffer zone in chalk stream areas to exclude all development within the natural flood plain or 15m of the bank, whichever is larger. Recommendation 5 – Apply a vegetated buffer strips on agricultural land within 15m of a chalk stream
Cattle fencing	Recommendation 6 – Encourage responsible land management such as cattle fencing through the Nature Recovery Strategy
Education	Recommendation 7 – Undertake a public engagement exercise to raise awareness of chalk streams and encourage responsible riparian ownership
Sustainable Drainage Systems (SuDS)	Recommendation 8 – Enforce the SuDS hierarchy as defined in the Essex SuDS guidance with a focus on encouraging infiltration SuDS and deep borehole SuDS where appropriate.
Neighbouring authority engagement	Recommendation 9 – Continue and strengthen existing partnerships with neighbouring authorities and other stakeholders to define coordinated policies for chalk stream protection

More details of these recommendations can be found within the chalk stream evidence base.

9.5.4 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 9.3 below.

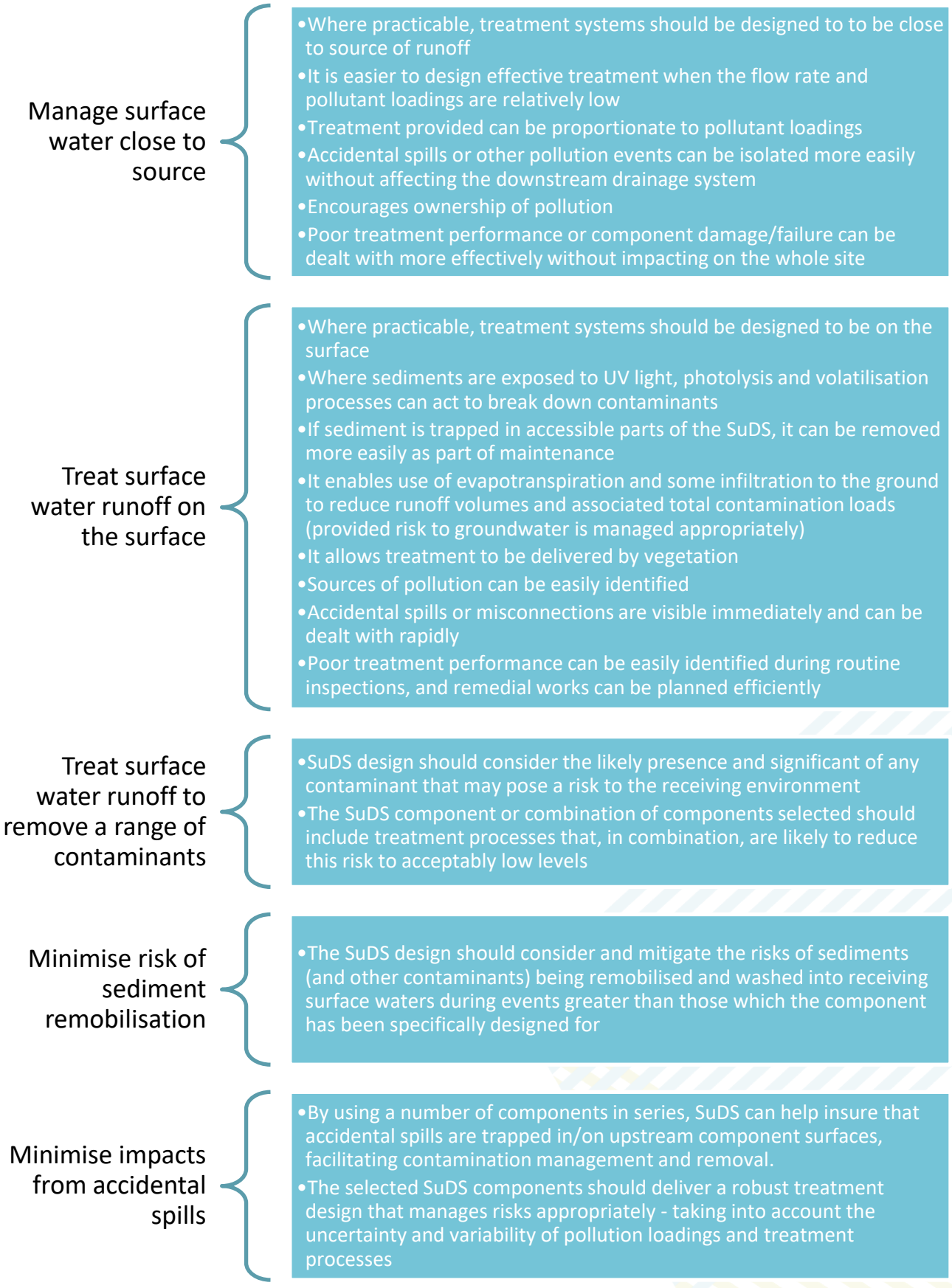


Figure 9.3 Considerations for SuDS Design for Water Quality

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 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.

9.5.5 Additional Benefits

Flood Risk

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

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

Water Resources

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

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

Climate Resilience

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

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

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

9.5.6 Suitable SuDS Techniques

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

Appropriate SuDS techniques have been categorised into five main groups, as shown in Table 9.2. Further site-specific investigation should be conducted to determine what SuDS techniques could be used on a particular development, informed by detailed ground investigations.

Table 9.2: Summary of SuDS Categories

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

9.5.7 Natural Flood Management

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

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

In 2017, the Environment Agency published on online evidence base[68] to support the implementation of NFM and with JBA produced maps showing locations with the potential for NFM measures[69]. These maps are intended to be used alongside the evidence directory to help practitioners think about the types of measure that may work in a catchment and the best places in which to locate them. There are limitations with the maps; however, it is a useful tool to help start dialogue with key partners.

9.5.8 Multiple Benefits of NFM

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

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

Suitable techniques may include:

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

68 Working with natural processes to reduce flood risk, Environment Agency (2018). Accessed online at: https://www.gov.uk/government/publications/working-with-natural-processes-to-reduce-flood-risk on: 24/01/2022
69 Mapping the potential for working with natural process, Environment Agency and JBA (2017). Accessed online at: https://www.arcgis.com/home/item.html?id=7315f943998847e2b3797a85665f5438 on: 24/01/2022

Case Study – Black Brook Slow the Flow

Four engineered log dams were installed on Black Brook at an estimated cost of £2,000, funded by Natural England and the Environment Agency to restore Stanley Bank SSSI. The scheme aimed to improve habitat and reduce the risk of flooding. However, the scheme also resulted in reduced levels of phosphate and nitrate in Black Brook, with phosphate concentrations falling by 3.6mg/l. By 2035, it is predicted that 792m^3 of sediment will be stored in three ponds retained by the jams.

Reproduced from Case Study 17. Black Brook Slow the Flow, St Helens, Norbury, Rogers and Brown, EA WwNP Evidence Base 2017. Photograph taken on 8 May 2015; courtesy of Matthew Catherall

9.5.9 Integrated Constructed Wetlands

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

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

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

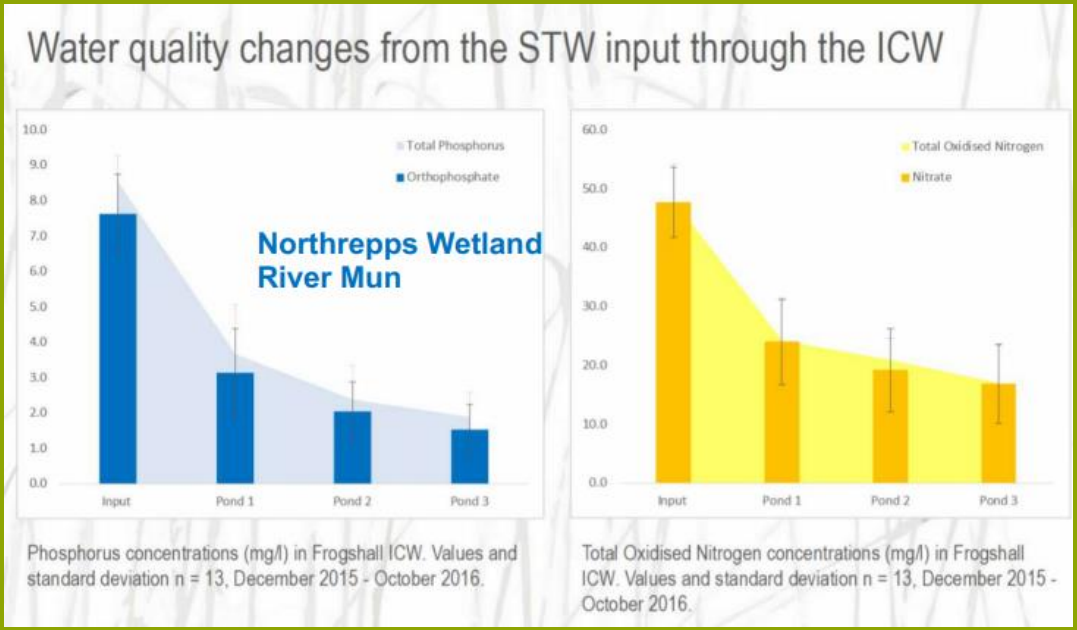
The mean reduction in Total Phosphorus across the evidence base was 78%.

Case Study – Frogshall ICW

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

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

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



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

9.5.10 Agricultural Management

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

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

Potential schemes could include:

- Buffer strips
- Cross slope tree planting
- Runoff retention basins

- Contour ploughing
- Cover crops

There is considerable overlap with NFM measures, and the challenges are also very similar. Exact impacts are difficult to measure, although modelling tools such as Farmscoper[70] exist to help with this. Once a scheme is implemented it relies on the landowner to continue to maintain it in order to maintain the mitigation benefit.

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

Case Study – Wessex Water - EnTrade

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

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

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

"Using EnTrade to create a market in measures to deliver reductions in nitrogen has delivered a 30% saving for Wessex Water compared to traditional catchment approaches."

Ruth Barden, Director of Environmental Strategy, Wessex Water

9.5.11 Barriers

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

9.5.12 Conclusions

- The potential impact of development on a number of protected sites such as SAC, SPAs, Ramsar sites and SSSIs within, or downstream of the study area

70 Farmscoper webpage, ADAS (2020). https://www.adas.uk/Service/farmscoper Accessed on 24/01/2022

should be carefully considered in future plan making. There are also a larger number of Priority Habitats and Priority Rivers.

- There are a number of Groundwater Source Protection Zones, primarily in central and eastern areas of the study area. The impact of future development on groundwater should be investigated fully.
- Development sites within the study area could be sources of diffuse pollution from surface runoff.
- SuDS are required on all development sites. Their design should consider both water quantity and water quality and site level investigations should be undertaken to define the most appropriate SuDS types for each specific development.
- Opportunities exist for these SuDS schemes to offer multiple benefits of flood risk reduction, amenity value and biodiversity.
- Uttlesford District Council should be consulted at an early stage of development to ensure that SuDS are implemented and designed in response to site characteristics and policy factors.
- In the wider area, opportunities exist to implement natural flood management techniques to achieve multiple benefits of flood risk, water quality and habitat creation.

9.6 Recommendations

The recommendations for managing environmental constraints and potential opportunities in Uttlesford is identified below in Table 9.3.

Table 9.3: Recommendations from Environmental Constraints and Opportunities Section

Action	Responsibility	Timescale
Consider the environmental impact of development on protected sites downstream of receiving wastewater treatment works in the Habitats Regulations Assessment	Uttlesford Council	Local Plan Development
The Local Plan should include policies that require all development proposals with the potential to impact on areas with environmental designations to be considered in line with the relevant legislation and where stated, in consultation with Natural England (for national and international designations and priority habitats).	Uttlesford Council	Ongoing
The Local Plan should include policies that require development sites to adopt SuDS to manage water quality of surface runoff.	Uttlesford Council	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.	Uttlesford Council, AW, TW, EA	Ongoing
Developers should include the design of SuDS at an early stage to maximise the benefits of the scheme	Developers	Ongoing

Action	Responsibility	Timescale
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.	Uttlesford Council Developers	Ongoing
Opportunities for Natural Flood Management that include schemes aimed at reducing / managing runoff should be considered to reduce nutrient and sediment pollution within Uttlesford.	Uttlesford Council EA and NE	Ongoing

10 Review of each development scenarios

10.1 Overview

Seven spatial growth options were provided for consideration by UDC. These include two options which focus growth on existing settlements, and five that focus growth in a new settlement. Every option is a combination of sites already in the planning system, growth in the rural centres of Saffron Waldon, Great Dunmow and Stansted Mountfitchet and growth in Local Rural Centres (Great Chesterford, Elsenham, Hatfield Heath, Newport, Takeley, and Thaxted). In options 2a to 2e, the amount of growth in the rural centres is reduced and a new settlement provided in its place. These have been mapped in Appendix A

These growth options were discussed with the water and wastewater companies and compared to the various assessments conducted in this WCS.

Anglian Water provided a general response on the spatial growth options for their area:

"In reviewing spatial options Anglian Water takes the view that there are no showstoppers to the options only that each option may require a higher level of investment which would need to be agreed by regulators and indeed a long lead in time in order for that investment to be undertaken. Consequently, Councils which have a five-year housing land supply and are looking at growth from year 5 onwards may conclude that growth identified in adopted Local Plans will be included within Anglian Water's next five- year plan. The December 2023 date for the new Local Plan will enable growth in Uttlesford to be planned for in Anglian Water's 2025-30 Plan (AMP8) which will also consider investment in water recycling capacity needed up to 2050."

Thames Water did not breakdown their comments by spatial growth option, but did provide some comments on individual treatment works that have been applied to the summary tables below.

10.2 Relative ranking of settlements by water company

"Anglian Water would rank option 1c above 1b as 1c utilises existing WRC treatment capacity more effectively, has lower embedded and operational carbon costs and enables investment in WRC that will need upgrading to be planned and funded in alignment with Anglian Water's regulated investment plans. Deferment of that investment to later in the Plan period also potentially enables emerging nature- based solutions to be tried and tested elsewhere and then applied in Uttlesford."

"Anglian Water's rank of Options 2a – 2e, on the basis of the limited information provided and the criteria of the deliverability of wastewater infrastructure and Climate Change objectives is set out below."

Rank	Option
1	2b
2	2c
3	2e

"We have not taken a view on options 2a and 2d as these sites are entirely within the area served by Thames Water. "

"Our experience in Cambridgeshire is that new communities are highly likely to expand further after reaching their original allocation size. This is because when the locations are selected to be accessible be road and rail and within a buoyant economy, they continue to a be a sustainable location which can efficiently grow with the addition of supporting social, economic, transport, blue-green and utility infrastructure. We have no set preferred size for a new community as the water infrastructure is often most economically and environmentally provided by linking to existing facilities. The case for new infrastructure

and to construct a lower carbon and potentially (part) nature-based solution would be strongest when supporting a larger allocation was to be delivered over a shorter timescale.

One observation on density is that higher density development can reduce the embedded carbon costs of utility infrastructure. Higher density development can also enable more land to be retained for green- blue infrastructure including Sustainable Drainage, which also then provides greater resilience for climate change and adaptation."

Thames Water did not provide a relative ranking of options served by them.

10.2.1 Overall Summary

The tables contained in Section 10.3 contain detailed information from the water companies on each of the spatial growth options. When combined with information from the various section of the WCS report, the following conclusions can be drawn.

Water resources and supply

There is a little difference between the options from a water resources perspective, except that a new settlement may provide opportunities to maximise water efficiency to reduce overall water demand by provide strategic rainwater harvesting and greywater recycling infrastructure.

Wastewater network and treatment

In general, wastewater treatment capacity can be provided where it is required, however there is a carbon cost where wastewater must be pumped over longer distances, and a significant financial cost should a new WwTW be required (although this would be accommodated within the water company's business plan). There may also be timing constraints to providing new wastewater infrastructure at this scale which may impact the delivery schedule of development.

Anglian Water proposed Option 2b (Great Chesterford) as their preferred option and stated the following:

"In taking forward the next stages of the Plan, Anglian Water would want to work with the Council, Affinity Water and Thames Water and the Environment Agency to ensure that an agreed approach was taken to the development of the evidence base for the Local Plan. Based on the options presented there looks to be a hybrid option between option 1c, which would utilise the existing headroom at WRC and one of the new community options. The evidence base and decisions taken by the Council in advancing the Local Plan to adoption would also serve to support Anglian Water's business plans and the agreement of regulators to investment and where necessary changes to WRC permits."

Water quality and environmental impact

Each growth option contains a high level of growth concentrated in a few locations. The additional volume of treated effluent this would generate has the potential to cause a deterioration in water quality if no mitigation is taken. Of particular concern is where this growth would be served by a WwTW discharging to a water course shown to be sensitive to changes in treated effluent volumes or is to an ecologically sensitive waterbody such as a chalk stream.

Modelling suggested that growth around Great Dunmow (utilised in all scenarios but particularly Option 2c) could cause a deterioration in the River Chelmer. It may be preferable for the new settlement to be served by Thames Water in this scenario.

Options 2a and 2b propose a lot of growth that would cause an increase in treated effluent in the River Stort and River Cam respectively (both Chalk Streams). Modelling showed Phosphate levels could be sensitive in these locations. And careful consideration should be given to whether this could be mitigated in these options.

10.3 Summary of Development scenarios

10.3.1 Option 1b Increased growth at the Rural Centres and Local Rural Centres

Growth Type	Settlement	Comments
Rural Centres	Saffron Waldon (Anglian Water)	Wastewater services are provided by Anglian Water: "Growth at most of the locations on the south east edge of Saffron Walden has previously been identified through approaches to Anglian Water. The sites' locations within or adjacent to the Saffron Walden sewer catchment area enables proximate connections to the existing network. Based on the average household size of 2.40 people in the OAN the allocation equates to 5,376 people. No investment is planned at the Saffron Walden WRC. The WRC has headroom to cater for a further 2,900 homes/ 6800 people being served from the Saffron Walden WRC catchment. The planned growth of 2159 homes to 2040 under option 1b can be accommodated without expansion of the WRC. The Saffron Waldon sites in option 1b are therefore a low carbon and low- cost growth option for Anglian Water customers. On the issue of CSOs at Saffron Walden measures Anglian Water is spending £0.435m in AMP7. A further £8.8m is being spent by Anglian Water to increase drainage capacity in Saffron Waldon which will reduce the risk of flooding and remove surface water which may end up in the public sewer network. This consequently further reduces the risk of flooding discharges from CSOs or increases the available capacity at the WRC."
Rural Centres	Great Dunmow (Anglian Water)	"Great Dunmow is east of the Anglian Water and Thames Water statutory wastewater service area boundary. As part of early engagement on the Drainage and wastewater management plan (DWMP) in 2021 Anglian Water identified that the WRC is over-capacity as its performance has been affected by previous development in the area. Anglian Water is undertaking works in AMP7 to make the WRC compliant. The planned growth of growth under option 1b would be 1470 homes/ 3660 people. If this level of growth is selected for Great Dunmow, then it should be planned for the later stages of the Local Plan to enable investment by Anglian Water in the Great Dunmow WRC from 2025 onwards. Decisions of growth and wastewater options can then be informed by Anglian Water's current programme of flow monitor installations assessing the impact of recently built and occupied new homes. The option to treat wastewater from Great Dunmow growth in the Thames area would be a high carbon solution involving new network, infrastructure, and pumping."
Rural Centres	Stansted Mountfitchet (Thames Water)	"New growth scheme in AMP7 to accommodate new permitted growth in and around Stansted Mountfitchet. The scheme is at design phase and will be delivered by 2023." The impact of this scheme on headroom is unknown so cannot be considered in this assessment.

Growth Type	Settlement	Comments
		JBA's headroom assessment indicates that the level of growth proposed in Option 1b would result in Stansted Mountfitchet WwTW being close to its capacity by the end of the plan period.
Local Rural Centres	Newport and Thaxted (Anglian Water)	"The Newport and Thaxted (Great Easton) WRCs are relatively small and have limited headroom. The planned levels of growth under option 1b would rapidly take up that headroom within a few years of the commencement of development. The distance of proposed sites from WRC means that growth at Thaxted will involve pumping sewage with potential need for new pumping capacity. This will have construction and operational carbon costs. If option1b is selected, then the level of growth – 643 homes at Newport and 602 at Thaxted should be phased for the later stages of the Plan and certainly after 2030 to enable Anglian Water to secure regulator agreement to expansion/ supplement provision to existing WRCs."
Local Rural Centres	Great Chesterford (Anglian Water)	"Of the three Local Rural Centres shown in option1b Great Chesterford has the largest available headroom. The 475 homes proposed up to 2040 could be serviced from the existing WRC without a need to expand. The sites shown in option b are sustainably located near to the WRC or within the sewer catchment being and expansion of existing sites. Purely based on wastewater capacity the Great Chesterford sites could be brought forward early in the Plan period and at a higher delivery rate should other locations/ sites have deliverability issues. Growth at the average rate and scale proposed in option 1b could also continue to 2060 should suitable sites come forward."
Local Rural Centres	Elsenham (Thames Water)	No comments were made by TW Growth here is likely to be served by Stansted Mountfitchet WwTW which, while it is likely to have capacity for this level of growth in Option 1b in isolation, in combination with growth from the Rural Centre this WwTW is likely to be at or close to exceeding its flow permit. Growth here needs to be considered alongside the Rural Centre.
Local Rural Centres	Hatfield Heath (Thames Water)	No comments were made by TW No growth is proposed in Option 1b at Hatfield Heather. Growth around the settlement of Hatfield Heath would likely to be served by Hatfield Heath WwTW which was identified as a high-risk spiller with capacity concerns by TW.
Local Rural Centres	Takeley (Thames Water)	Growth around Takeley could be served by Takeley WwTW or by the neighbouring Bishops Stortford WwTW. TW reported that Takeley "STW works well, however it is very small and major upgrades will be needed to accommodate proposed growth". JBA's analysis suggests that this WwTW has issues with its storm

Growth Type	Settlement	Comments
		overflow which should be considered should growth be served by this WwTW (overflow operated 76 times in 2020 for over 1000 hours in total). TW also noted that "There is an ongoing modelling study to assess impact of proposed growth at Takeley sewerage network." Growth may be better served by Bishops Stortford WwTW which has capacity in all scenarios.
Villages	Various	"The location of the sites to provide the 1578 homes under option 1b has not been provided. The headroom of smaller WRC varies considerably and so it is not possible to provide a generic position on the deliverability of wastewater infrastructure to support the growth."
New Settlements		N/A

10.3.2 Option 1c Increased growth at existing settlements with a train station

Growth Type	Settlement	Comments
Rural Centres	Saffron Waldon (Anglian Water)	"As the quantum of growth for option 1b and 1c (2159 v 2127 homes) is similar the comments for 1c mirror those for 1b."
	Great Dunmow (Anglian Water)	"Although the size of growth proposed reduces from 1470 to 534 homes from option 1b to 1c the current non availability of headroom at the Great Dunmow means that the comments remain the same. The reduction in the number sites, though not taking forward those in the north east quadrant of the town does on first analysis look to be an effective way to ensure that infrastructure investment by all service providers including utilities is efficiently focused reducing costs and carbon. An allocation of 534 homes would be more deliverable in the later stages of the Plan and enable Anglian Water to seek approval for and make investment in the WRC ahead of the planned growth."
	Stansted Mountfitchet (Thames Water)	"New growth scheme in AMP7 to accommodate new permitted growth in and around Stansted Mountfitchet. The scheme is at design phase and will be delivered by 2023." The impact of this scheme on headroom is unknown so cannot be considered in this assessment. JBA's headroom assessment indicates that the level of growth proposed in Option 1c would result in Stansted Mountfitchet WwTW exceeding its flow permit – requiring an increase in its permit and/or an upgrade to treatment capacity by the end of the plan period.
Local Rural Centres	Newport and Thaxted (Anglian Water)	"The removal of an allocation at Newport and the reduction to 312 new homes at Thaxted (Great Easton) WRCs through the increase in allocations elsewhere including at Stansted recognises that the

		Newport and Thaxted have existing constrained infrastructure. The quantum of development at Thaxted enables great flexibility on when it could be brought forward in the Plan period. Given the limited capacity at the Newport WRC, Anglian Water would still need to include the uplift in capacity in draft investment plans to be approved and constructed ahead of the sites being built out and occupied."
	Great Chesterford (Anglian Water)	"An increase to new 775 homes at Great Chesterford can be accommodated at the Great Chesterford WRC without further expansion in treatment capacity. As with other development locations the focus of development on a limited number of sites in close proximity is likely to require upgrades to the wastewater network and measures sought from developments to reduce the amount of surface water managed via the public sewers. That network upgrade and site locality specific drainage solution would be funded by developers."
	Elsenham (Thames Water)	No comments were made by TW Growth here is likely to be served by Stansted Mountfitchet WwTW which, while it is likely to have capacity for this level of growth in Option 1c in isolation, in combination with growth from the Rural Centre this WwTW is likely to exceed its flow permit. Growth here needs to be considered alongside the Rural Centre.
	Hatfield Heath (Thames Water)	As Option 1b
	Takeley (Thames Water)	As Option 1b
Villages	Various	"The location of the sites to provide the 1578 homes under option 1b has not been provided. The headroom of smaller WRC varies considerably and so it is not possible to provide a generic position on the deliverability of wastewater infrastructure to support the growth."
New Settlements		N/A

10.3.3 Option 2a Ugley New Community

Growth Type	Settlement	Comments
Rural Centres	Saffron Waldon (Anglian Water)	"The reduction in the quantum of growth through the increase in allocations at locations without wastewater treatment capacity (existing and new settlements) does not effectively utilise the existing infrastructure to support growth. Option 2a has higher capital costs and is more carbon intensive that option 1b and 1c."
	Great Dunmow (Anglian Water)	"Increasing growth to 1128 homes would require significant investment by Anglian Water and our customers early in the Plan period to ensure

		headroom was available to accommodate prolonged expansion."
	Stansted Mountfitchet (Thames Water)	Growth here is likely to be served by Stansted Mountfitchet WwTW. "New growth scheme in AMP7 to accommodate new permitted growth in and around Stansted Mountfitchet. The scheme is at design phase and will be delivered by 2023." The impact of this scheme on headroom is unknown so cannot be considered in this assessment. JBA's headroom assessment indicates that whilst the WwTW is likely to have capacity for growth from the Rural Centre in 2a, in combination with the Local Rural Centre and the new settlement at Ugley, the level of growth proposed in Option 2a would result in Stansted Mountfitchet exceeding its flow permit by the end of the plan period.
Local Rural Centres	Newport and Thaxted (Anglian Water)	"As the size of growth is the same in option 2a as 1b see comments above for 1b. In summary the allocation of more growth to Newport and Thaxted would require investment by Anglian Water and funded through customer's bills instead of using existing capacity at Great Chesterfield."
	Great Chesterford (Anglian Water)	As above
	Elsenham (Thames Water)	No comments were made by TW Growth here is likely to be served by Stansted Mountfitchet WwTW which, whilst it is likely to have capacity for this level of growth in Option 2a and from the Rural Centre in isolation, in combination with growth from the new settlement at Ugley, this WwTW is likely to exceed its flow permit. Growth here needs to be considered alongside the Rural Centre and new settlement.
	Hatfield Heath (Thames Water)	As Option 1b
	Takeley (Thames Water)	As Option 1b
Villages	Various	As option 1a and 1b
New Settlements	Ugley	"As the allocation is west of the M11 it is within Thames Water's service area. As set out above the cost to customers and in carbon is likely to be higher for a new community than using existing infrastructure. The scale of the allocation potentially enables a new facility to be built which would likely have lower operational carbon costs."

10.3.4 Option 2b Great Chesterford New Community

Growth Type	Settlement	Comments
Rural Centres	Saffron Waldon (Anglian Water)	"As the size of growth is the same in option 2b as 2a, see comments above for 2a."

	Great Dunmow (Anglian Water)	"As the size of growth is the same in option 2b as 2a, see comments above for 2a."
	Stansted Mountfitchet (Thames Water)	Growth here is likely to be served by Stansted Mountfitchet WwTW. "New growth scheme in AMP7 to accommodate new permitted growth in and around Stansted Mountfitchet. The scheme is at design phase and will be delivered by 2023." The impact of this scheme on headroom is unknown so cannot be considered in this assessment. JBA's headroom assessment indicates that the WwTW is likely to have capacity for growth from the Rural Centre in 2b, and the Local Rural Centre (Elsenham)
Local Rural Centres	Newport and Thaxted (Anglian Water)	As the size of growth is the same in option 2b as 2a, see comments above for 2a.
	Great Chesterford (Anglian Water)	"An increase to new 775 homes at Great Chesterford can be accommodated at the Great Chesterford WRC without further expansion in treatment capacity. As with other development locations the focus of development on a limited number of sites in close proximity is likely to require upgrades to the wastewater network and measures sought from developments to reduce the amount of surface water managed via the public sewers. That network upgrade and site locality specific drainage solution would be funded by developers."
	Elsenham (Thames Water)	No comments were made by TW Growth here is likely to be served by Stansted Mountfitchet WwTW. Growth in Option 2b from Elsenham and from the Rural Centre should be able to be accommodated within the flow permit of this WwTW. Growth here needs to be considered alongside the Rural Centre.
	Hatfield Heath (Thames Water)	As Option 1b
	Takeley (Thames Water)	As Option 1b
Villages	Various	"The location of the sites to provide the 1578 homes under option 2b has not been provided. The headroom of smaller WRC varies considerably and so it is not possible to provide a generic position on the deliverability of wastewater infrastructure to support the growth."
New Settlements	Great Chesterfield (Anglian Water)	"Option 2b proposes both 475 homes at incremental expansion sites and 2000 homes in a new community before 2040. Subsequent growth of between 3,000 and 7,000 homes is then proposed between 2040 and 2060. As a new community it is likely that the site would take between 5 and 10 years to commence. On the basis of a 2028 commencement for the new community and a steady build out of the 475 homes from other sites across the Plan period the existing headroom at the Great Chesterford WRC would be used up in 2032.

		The Great Chesterford new community would to the north east of the existing settlement on land south west of Linton in South Cambridgeshire. If we use an assumption that Linton will not expand before 2040 then the Linton WRC headroom could be utilised to serve the north east part of Great Chesterford. The combination of using Great Chesterford and Linton WRC would then require additional WRC capacity to be provided in or about 2038 to enable the continued expansion of the new community to 2040 and then to 2060 to serve the further three to seven thousand homes."

10.3.5 Option 2c Easton Park New Community

Growth Type	Settlement	Comments
Rural Centres	Saffron Waldon (Anglian Water)	"As the size of growth is the same in option 2c as 2a, see comments above for 2a."
	Great Dunmow (Anglian Water)	"As the size of growth is the same in option 2c as 2a, see comments above for 2a."
	Stansted Mountfitchet (Thames Water)	Growth here is likely to be served by Stansted Mountfitchet WwTW. "New growth scheme in AMP7 to accommodate new permitted growth in and around Stansted Mountfitchet. The scheme is at design phase and will be delivered by 2023." The impact of this scheme on headroom is unknown so cannot be considered in this assessment. JBA's headroom assessment indicates that the WwTW is likely to have capacity for growth from the Rural Centre in 2c, and the Local Rural Centre (Elsenham)
Local Rural Centres	Newport and Thaxted (Anglian Water)	"As the size of growth is the same in option 2c as 2a, see comments above for 2a."
	Great Chesterford (Anglian Water)	"As the size of growth is the same in option 2c as 2a, see comments above for 2a."
	Elsenham (Thames Water)	No comments were made by TW Growth here is likely to be served by Stansted Mountfitchet WwTW. Growth in Option 2c from Elsenham and from the Rural Centre should be able to be accommodated within the flow permit of this WwTW. Growth here needs to be considered alongside the Rural Centre.
	Hatfield Heath (Thames Water)	As Option 1b
	Takeley (Thames Water)	As Option 1b
Villages	Various	"The location of the sites to provide the 1578 homes under option 2c has not been provided. The headroom of smaller WRC varies considerably and so

		it is not possible to provide a generic position on the deliverability of wastewater infrastructure to support the growth."
New Settlements	Easton Park (Thames Water and Anglian Water)	"The majority allocation is within Thames Water's service area. As set out above the cost to customers and in carbon is likely to be higher for a new community than using existing infrastructure. The scale of the allocation potentially enables a new facility to be built which would likely have lower operational carbon costs. As the option 2c allocation is 2000 homes before 2040 and then three to seven thousand homes to 2060 the timing of the call on Anglian Water wastewater infrastructure is unknown. If the parts of the site closest to Great Dunmow came forward first, then the closest sewer catchment areas and WRCs would be Great Easton – which serves Thaxted and Great Dunmow. As set out above neither has current significant headroom. A 2028 start date for the new community if it were within the Anglian Water area would require the inclusion of funding for expansion of either WRC or a new facility in the next AMP (2025-30) which would be confirmed in 2023/24."

10.3.6 Option 2d West of Hatfield Broad Oak New Community

Growth Type	Settlement	Comments
Rural Centres	Saffron Waldon (Anglian Water)	"As the size of growth is the same in option 2d as 2a, see comments above for 2a."
	Great Dunmow (Anglian Water)	"As the size of growth is the same in option 2d as 2a, see comments above for 2a."
	Stansted Mountfitchet (Thames Water)	Growth here is likely to be served by Stansted Mountfitchet WwTW. "New growth scheme in AMP7 to accommodate new permitted growth in and around Stansted Mountfitchet. The scheme is at design phase and will be delivered by 2023." The impact of this scheme on headroom is unknown so cannot be considered in this assessment. JBA's headroom assessment indicates that the WwTW is likely to have capacity for growth from the Rural Centre in 2d, and the Local Rural Centre (Elsenham)
Local Rural Centres	Newport and Thaxted (Anglian Water)	"As the size of growth is the same in option 2d as 2a, see comments above for 2a."
	Great Chesterford (Anglian Water)	"As the size of growth is the same in option 2d as 2a, see comments above for 2a."
	Elsenham (Thames Water)	No comments were made by TW Growth here is likely to be served by Stansted Mountfitchet WwTW. Growth in Option 2d from Elsenham and from the Rural Centre should be able

		to be accommodated within the flow permit of this WwTW. Growth here needs to be considered alongside the Rural Centre.
	Hatfield Heath (Thames Water)	No comments were provided by TW No growth in the Local Rural Centre is proposed in this option. See new settlement below.
	Takeley (Thames Water)	As Option 1b
Villages	Various	"The location of the sites to provide the 1578 homes under option 2d has not been provided. The headroom of smaller WRC varies considerably and so it is not possible to provide a generic position on the deliverability of wastewater infrastructure to support the growth."
New Settlements	Hatfield Heath	Growth here would be served by either Hatfield Heath WwTW or Little Hallingbury or pumped north to Bishops Stortford WwTW. TW commented that Hatfield Heath is a high-risk WwTW and a high spiller (from its storm overflow). They also identified significant capacity concerns. The JBA headroom assessment indicated a capacity of approx. 350 houses. A significant upgrade to the WwTW would therefore be required. Little Hallingbury WwTW is headroom for approx. 900 houses so could accommodate a proportion of this growth (assuming environmental capacity in the receiving watercourse). Pumping to Bishops Stortford WwTW would be a solution from a capacity point of view but would come at an operational carbon cost. Anglian Water also commented on this option: "As the allocation is adjacent to M11 A1060 and it is within Thames Water's service area. As set out above the cost to customers and in carbon is likely to be higher for a new community than using existing infrastructure. The scale of the allocation including 3000 homes after 2060 potentially enables a new facility to be built which would likely have lower operational carbon costs." TW stated in discussions that a new WwTW would generally be a least preferred option.

10.3.7 Option 2e East of Stebbing New Community

Growth Type	Settlement	Comments
Rural Centres	Saffron Waldon (Anglian Water)	"As the size of growth is the same in option 2e as 2a, see comments above for 2a."

	Great Dunmow (Anglian Water)	"As the size of growth is the same in option 2e as 2a, see comments above for 2a."
	Stansted Mountfitchet (Thames Water)	Growth here is likely to be served by Stansted Mountfitchet WwTW. "New growth scheme in AMP7 to accommodate new permitted growth in and around Stansted Mountfitchet. The scheme is at design phase and will be delivered by 2023." The impact of this scheme on headroom is unknown so cannot be considered in this assessment. JBA's headroom assessment indicates that the WwTW is likely to have capacity for growth from the Rural Centre in 2e, and the Local Rural Centre (Elsenham)
Local Rural Centres	Newport and Thaxted (Anglian Water)	"As the size of growth is the same in option 2e as 2a, see comments above for 2a."
	Great Chesterford (Anglian Water)	"As the size of growth is the same in option 2e as 2a, see comments above for 2a."
	Elsenham (Thames Water)	No comments were made by TW Growth here is likely to be served by Stansted Mountfitchet WwTW. Growth in Option 2e from Elsenham and from the Rural Centre should be able to be accommodated within the flow permit of this WwTW. Growth here needs to be considered alongside the Rural Centre.
	Hatfield Heath (Thames Water)	As option 1b.
	Takeley (Thames Water)	As Option 1b
Villages	Various	"The location of the sites to provide the 1578 homes under option 2e has not been provided. The headroom of smaller WRC varies considerably and so it is not possible to provide a generic position on the deliverability of wastewater infrastructure to support the growth."
New Settlements	East of Stebbing	"The land identified for the new community at Stebbing is not served by any of the existing WRCs in Uttlesford district. There may be an option to connect into the Braintree network and WRC to the east. However, whilst Braintree WRC has current headroom the growth planned for Braintree would have first call on this capacity. This is on the basis of the relative costs and carbon impacts to serve the two growth locations. The comments above on the forward planning, funding approval, lead in times and carbon costs and opportunities for a new facility to serve the new community apply to Option 2e."

11 Summary and overall conclusions

11.1 Conclusions

Assessment	Conclusion
Water resources	• Both WRZs in the study area are classed as being under serious water stress – justifying the more stringent target of 110 l/p/d under building regulations. The strategic direction in the UK set out in the new National Water Resources Framework is to attain an average household water efficiency of 110 l/p/d by 2050. This also aligns with the recommendation in the River Basin Management Plan aimed at reducing the impact of abstraction. There would also be a positive economic impact for residents in terms of reduced energy and water bills. • There is sufficient evidence to recommend the optional 110 litres per person per day allowed under Building Regulations. However, within Uttlesford are two chalk stream catchments, the river Cam and River Stort and their tributaries. Both these rivers are failing to achieve Good Status under the Water Framework Directive, with one of the reasons cited being abstraction for public water supply which causes low flows. It is important therefore that growth during the local plan period does not make this situation worse. A tighter water efficiency standard of 90 l/p/d is therefore recommended for all new build residential properties in order to minimise the new demand. It is recommended that all new non-residential properties achieve a score of "Outstanding" in the BREEAM New construction standard for water. • It is also recommended that the council explore policies that would achieve or approach water neutrality, and this will be explored further in the stage 2 WCS.A comparison was carried out between the level of growth anticipated in the water resource management plan, and Uttlesford's housing need. The Uttlesford Local Plan review is expected to result in significantly higher growth than the average percentage growth in the rest of the WRZ. Future updates to the WRMP should include this higher growth rate.
Water supply infrastructure	• Modelling of the water supply network was not carried out in Stage 1 • Affinity Water did not identify any showstoppers and the level of growth proposed did not cause any concern. • AfW has a statutory duty to provide a water supply to development sites, however if significant new infrastructure is required, some constraints may be placed on the phasing of development sites to ensure that infrastructure is in place prior to development being occupied.
Wastewater collection	• Development in areas where there is limited wastewater network capacity will increase pressure on the network, increasing the risk of a detrimental impact on existing customers, and increasing the likelihood of storm overflow operation. Early engagement with developers, TW and AW is required, and further modelling of the network may be required in the Stage 2 WCS and at the planning application stage. Furthermore, in the TW and AW networks, there are areas where the current network is a combined sewer system, and further separation of foul and surface water may be required, as well as suitably designed SuDS. If there are areas where the current network is a combined sewer system, further

Assessment	Conclusion
	separation of foul and surface water may be required, as well as suitably designed SuDS. • Early engagement between developers, Uttlesford District Council and TW and AW is recommended to allow time for the strategic infrastructure required to serve these developments to be planned.
Wastewater Treatment assessment	• JBA performed a headroom assessment comparing the current dry weather flow (DWF) at each WwTW to the permitted flow and adding the additional effluent from committed growth in the local plan period. • Great Chesterford, Great Dunmow, Felsted, Clavering, Great Sampford and Newport WwTWs may exceed their current maximum permitted DWF over the Local Plan period as a result of potential growth in Uttlesford, with Great Easton and High Roding WwTWs also predicted to be very close to capacity. Many of these WwTW have currently planned upgrades which may alleviate some capacity issues. Early engagement between the Council and AW/TW is required to ensure that opportunities to accommodate this growth within existing upgrade schemes can be realised. • For smaller treatment works that may require upgrading to increase capacity, TW raised a concern that may not be room around the works to expand. This should be considered in Stage 2. • There are a number of poorly performing storm tank overflows at WwTWs in Uttlesford. Growth within these catchments could result in an increase in the operations of these overflows contributing to a worsening of water quality in the area. Action should be taken by the water companies to address these overflows prior to an increase in wastewater demand being generated by new development. TW and AW have confirmed the importance of the investigations into storm overflow performance.
Water Quality	• Growth during the local plan period will increase the discharge of treated wastewater from WwTWs in Uttlesford. There is a potential for this to cause a deterioration in water quality in the receiving watercourses and this must be carefully considered. • Modelling indicated a number of watercourses in the study area that may be sensitive to increases in treated effluent. Further modelling will be required in Stage 2. • Thames Water indicated concerns about limits to certain chemicals such as Nickel that have been applied at some WwTWs. Consideration should also be given to these in Stage 2.
Environmental Constraints and Opportunities	• The potential impacts of development on a number of protected sites such as SAC, SPAs, SSSIs and Ramsar sites within, or downstream of the study area should be carefully considered in future plan making. There are also a larger number of Priority Habitats and Priority Rivers. • There are a number of Groundwater Source Protection Zones, primarily in central and eastern areas of the study area. The impact of future development on groundwater should be investigated fully. • Development sites within the study area could be sources of diffuse pollution from surface runoff.

Assessment	Conclusion
	• SuDS are required on all development sites. Their design must consider both water quantity and water quality and site level investigations should be undertaken to define the most appropriate SuDS types for each specific development. • Opportunities exist for these SuDS schemes to offer multiple benefits of flood risk reduction, amenity value and biodiversity. • Uttlesford District Council should be consulted at an early stage of development to ensure that SuDS are implemented and designed in response to site characteristics and policy factors. • In the wider area, opportunities exist to implement natural flood management techniques to achieve multiple benefits of flood risk, water quality and habitat creation. • A chalk stream evidence base was prepared in parallel to the WCS. Several recommendations were made to protect and enhance chalk streams in Uttlesford which are listed in Section 9.5.3.

11.2 Recommendations

Aspect	Action	Responsibility	Timescale
Water Resources	Continue to regularly review forecast and actual household growth across the supply region through WRMP Annual Update reports, and where significant change is predicted, engage with Local Planning Authorities.	AfW	Ongoing
	Provide yearly profiles of projected housing growth to water companies to inform the WRMP.	UDC	Annually
	Use planning policy to require a minimum water efficiency of 90 l/p/d for new build housing.	Uttlesford Council	In Uttlesford LP
	Use planning policy to require new build non-residential development to achieve "Outstanding" for water in the BREEAM New Construction standard.	Uttlesford Council	In Uttlesford LP
	The concept of water neutrality has potentially a lot of benefit in terms of resilience to climate change and enabling all waterbodies to be brought up to Good status. Explore further with the water companies and the Environment Agency how the Council's planning and climate change policies can encourage this approach. This approach could have particular application in strategic sites and new settlements	UDC, EA, AfW	In LP and Climate Change Action Plan

Aspect	Action	Responsibility	Timescale
	Larger residential developments, including new settlements), and commercial developments should consider incorporating greywater recycling and/or rainwater harvesting into development at the master planning stage in order to reduce water demand.	UDC, AfW	In Uttlesford LP
	Water companies should advise Uttlesford Council of any strategic water resource infrastructure developments within the study, where these may require safeguarding of land to prevent other type of development occurring.	AfW, UDC	As part of Uttlesford LP process
Water Supply	Undertake network modelling where appropriate as part of the planning application process to ensure adequate provision of water supply is feasible	AfW, UDC	As part of planning process
	Development of sites indicated as requiring further modelling or upgrades to capacity should be aligned with provision of infrastructure. Early collaboration between UDC, developers and AfW is required.	UDC, AfW Developers	Ongoing
Wastewater Collection	Early engagement between Uttlesford District Council and TW/AW is required to ensure that where strategic infrastructure is required, it can be planned in by TW/AW, and will not lead to any increase in discharges from sewer overflows.	UDC, TW/AW	Ongoing
	Take into account wastewater infrastructure constraints in phasing development in partnership with the sewerage undertaker	UDC, AW/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	Developers, AW/TW, UDC	Ongoing

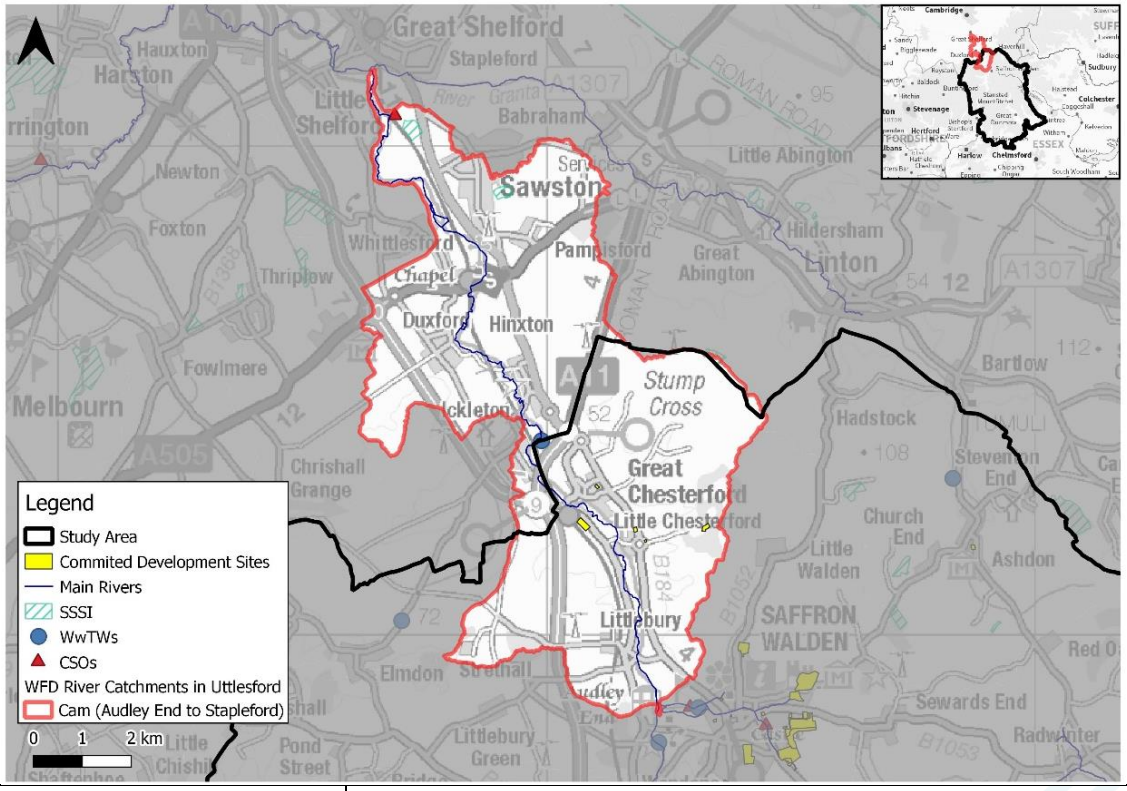
Aspect	Action	Responsibility	Timescale
	When – When are the assets to be delivered (phasing) Which – Which delivery route is the developer going to use, i.e., s104 s98 s106 etc. The Outline Drainage Strategy should be submitted as part of the planning application submission, and where required, used as a basis for a drainage planning condition to be set.		
	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
Wastewater Treatment	Early engagement with AW and TW is required to ensure that provision of WwTW capacity is aligned with delivery of development.	UDC	During Local Plan Review process
	Provide Annual Monitoring Reports to AW and TW detailing projected housing growth.	UDC, AW/TW, EA	Ongoing
	AW and TW to assess growth demands as part of their wastewater asset planning activities and feedback to the Council if concerns arise.	AW/TW	Ongoing
Water Quality	Provide annual monitoring reports to AW/TW detailing projected housing growth in UDC	UDC	Ongoing
	When preferred options for growth are identified, undertake water quality impact modelling as part of a Stage 2 WCS.	UDC	Stage 2 WCS
	Take into account the full volume of growth (from UDC and neighbouring authorities) within the catchment when considering WINEP schemes or upgrades at WwTW	AW / TW	Ongoing
Environment	Consider the environmental impact of development on protected sites downstream of receiving wastewater treatment works in the Habitats Regulations Assessment	UDC	Local Plan development

Aspect	Action	Responsibility	Timescale
	The recommendations within the Chalk Stream evidence base should be adopted.	UDC	Local Plan development
	The Local Plan should include policies that require all development proposals with the potential to impact on areas with environmental designations to be considered in line with the relevant legislation and where stated, in consultation with Natural England (for national and international designations and priority habitats).	UDC	Local Plan development
	The Local Plan Review should include policies that require development sites to adopt SuDS to manage water quality of surface runoff.	UDC	Local Plan development
	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.	UDC, AW / TW, EA	Ongoing
	Developers should include the design of SuDS at an early stage to maximise the benefits of the scheme	Developers	Ongoing
	Work with developers to discourage connection of new developments into existing surface water and combined sewer networks. Prevent connections into the foul network, as this is a significant cause of sewer flooding.	UDC Developers	Ongoing
	Opportunities for Natural Flood Management that include schemes aimed at reducing / managing runoff should be considered to reduce nutrient and sediment pollution within Uttlesford	UDC, EA, NE	Ongoing

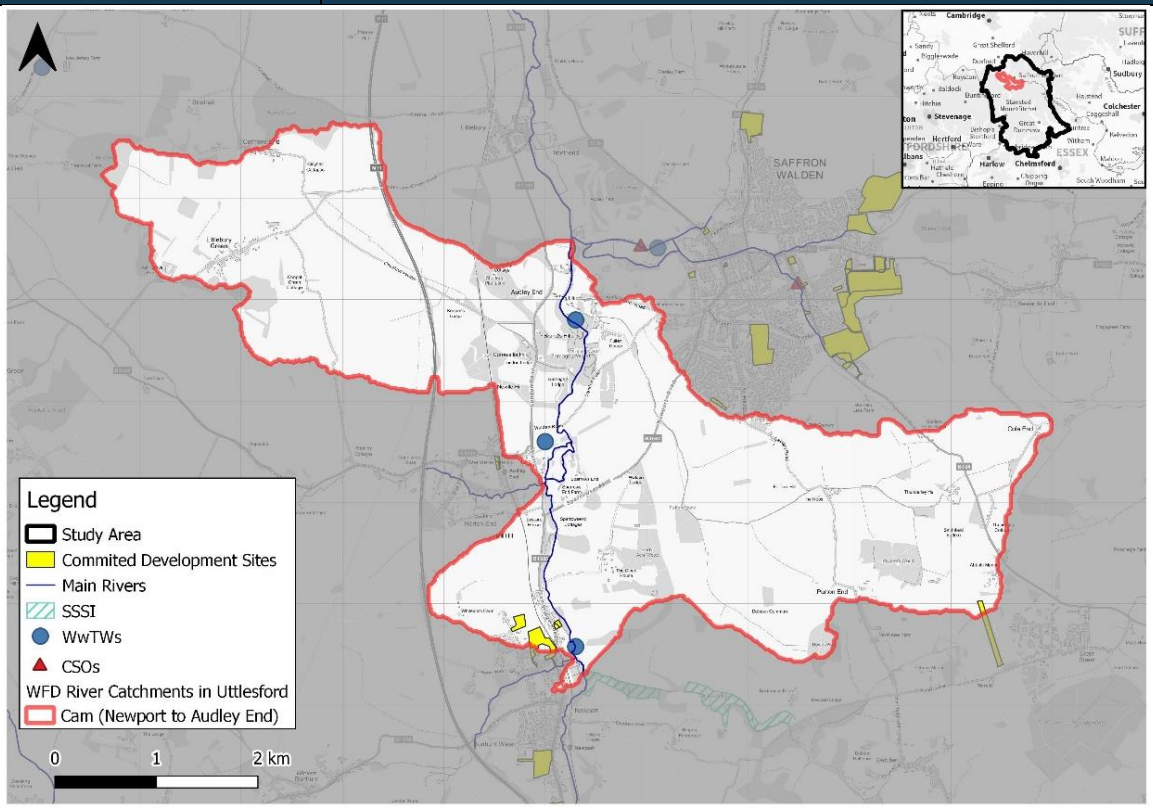
Appendices

A Spatial Development Option Sites mapping

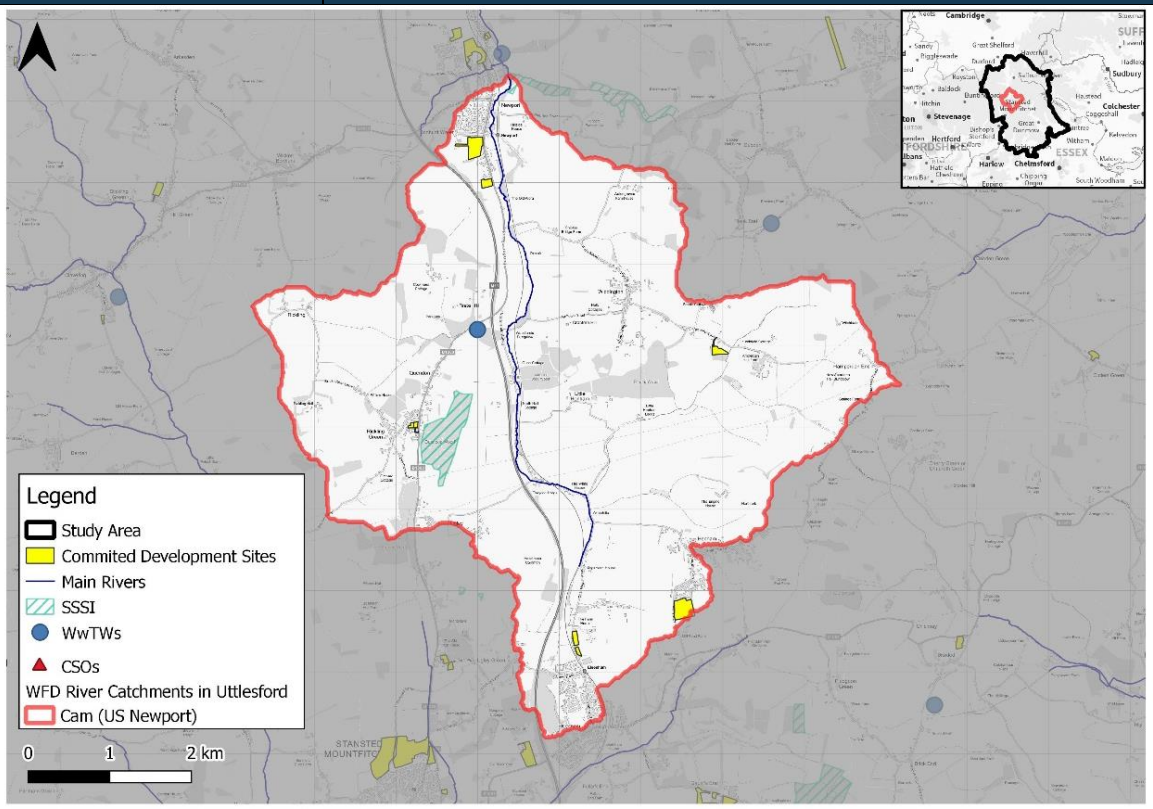
B WFD Catchment summaries

WFD Catchment name	Cam (Audleys End to Stapleford)
	
WwTWs	• Great Chesterford WwTW – Capacity likely to be used early in plan period based on just current commitments • One development site not within sewer catchment
Chalk Stream	• Yes - River Cam
Storm Overflows	• Great Chesterford WwTW and Sawston WwTW (outside district) storm overflows. Both of these are located downstream of the Uttlesford District. Operating below threshold for investigation.
How many development sites are located in the catchment?	• Commitments and Consents - 5 Sites- 19 houses and 3,735m^2 of employment land • New Settlement - Great Chesterford in Option 2b
WFD Status (2019)	• Overall Status - Poor • Ammonia - High • BOD - N/A • Phosphate - Poor • Reasons for not achieving good status: The water industry, industry, and agriculture and rural land management are impacting flow, physical modification and point sources, leading to increased levels of phosphate and changes in the hydrological regime.

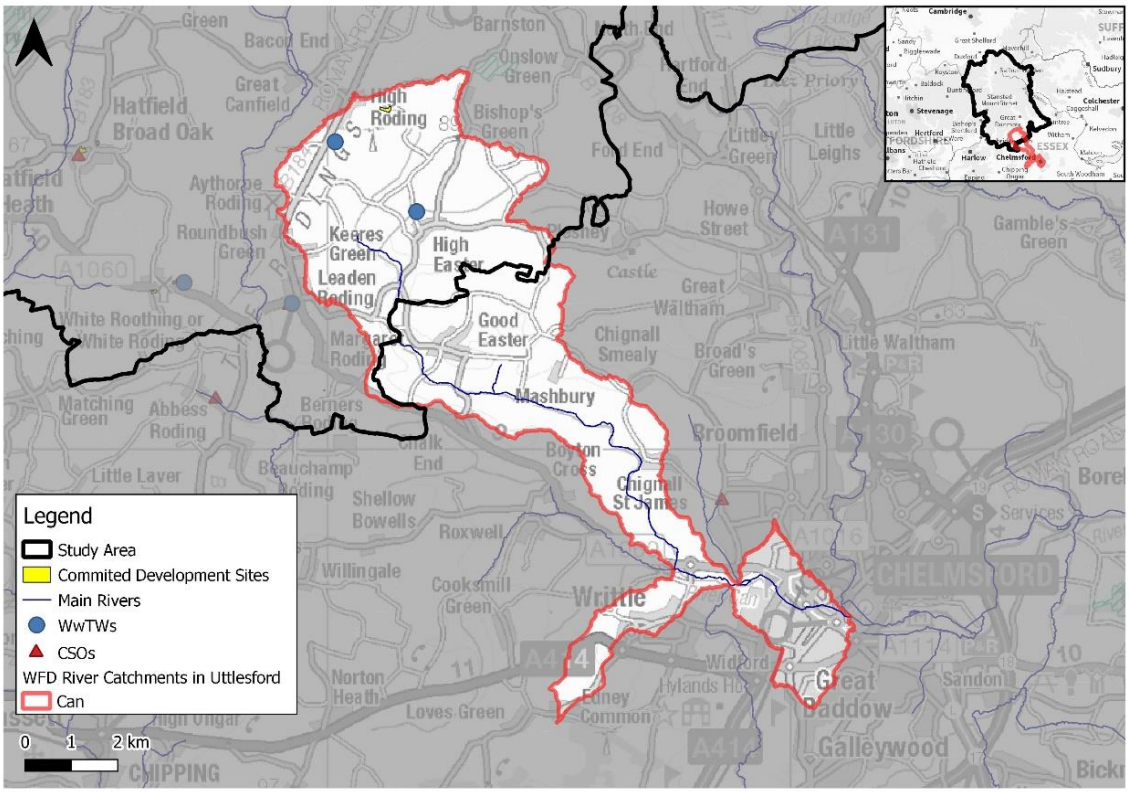
Potential issues in the catchment	• Chalk stream (Cam) present in catchment. • Discharge from industry and sewers has prevented the catchment from achieving good status. • Storm overflow present – but is performing ok • The Great Chesterford new settlement would be a significant development in this area and would likely put a strain on any wastewater infrastructure and on the quality of the river it was discharging to.

WFD Catchment name	Cam (Newport to Audley End)
	
WwTWs	• Newport WwTW – currently at DWF permit limit • Wendens Ambo WwTW – flow not monitored – small WwTW with limited capacity • Audleys End WwTW - flow not monitored – small WwTW with limited capacity
Chalk Stream	• Yes- River Cam
Storm Overflows	• None
How many development sites are located in the catchment?	• Commitments and Consents - 3 Sites- 43 houses • New Settlement - None
WFD Status (2019)	• Overall Status - Moderate • Ammonia - High • BOD - N/A • Phosphate - Bad • Reasons for not achieving good status:

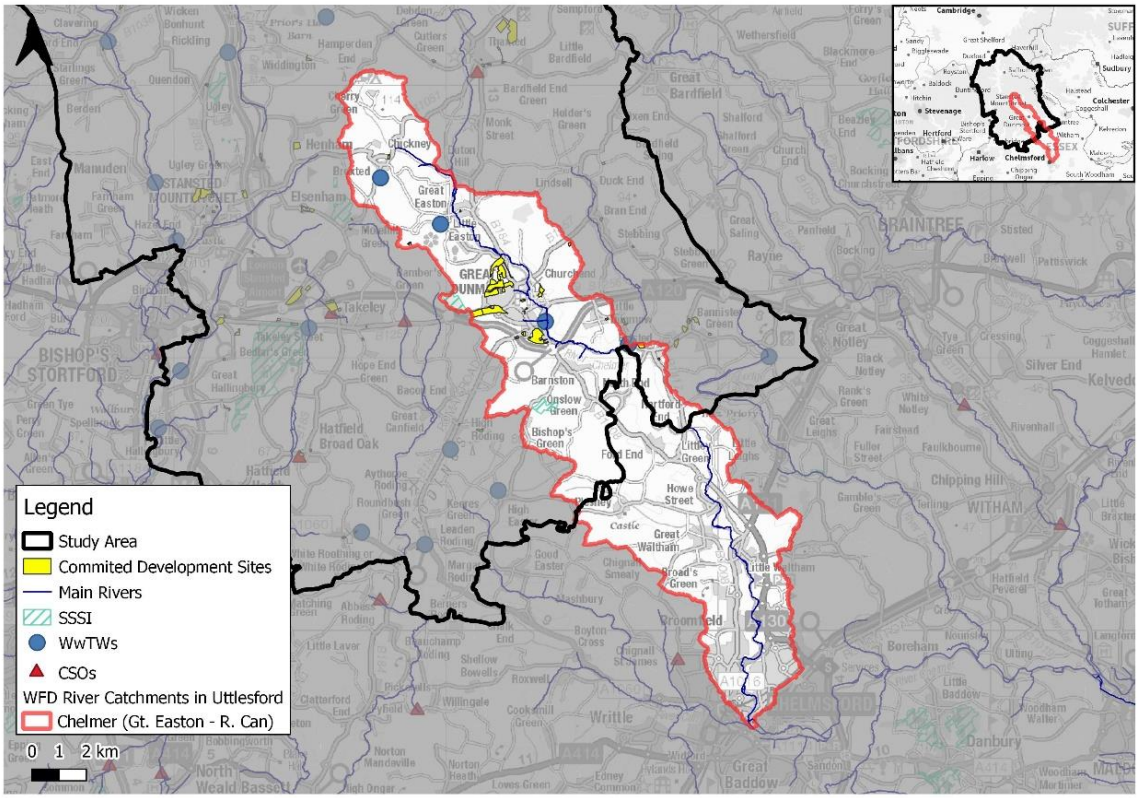
	The water industry, and agriculture and rural land management are impacting the flow and point sources, leading to increased levels of phosphate and changes in the hydrological regime.
Potential issues in the catchment	• Chalk stream present (Cam) • Discharge from industry and sewers has prevented the catchment from achieving good status. • Committed development in the WFD catchment falls into the Newport WwTW catchment.

WFD Catchment name	Cam (US Newport)
	
WwTWs	• Quendon WwTW – has capacity after commitments (135 dwellings) • One development site is located outside of the Quendon WwTW catchment.
Chalk Stream	• Yes- River Cam
Storm Overflows	• None
How many development sites are located in the catchment?	• Commitments and Consents - 8 Sites - 178 houses • New Settlement - None
WFD Status (2019)	• Overall Status - Moderate • Ammonia - High • BOD - N/A • Phosphate - Moderate

	• Reasons for not achieving good status: The water industry, and agriculture and rural land management are impacting point and diffuse sources, the flow and physical modification, leading to increased levels of phosphate, dissolved oxygen, and changes to the hydrological regime and invertebrates.
Potential issues in the catchment	• Discharge from sewage discharge, poor nutrient management, groundwater abstraction and land drainage has prevented the catchment from achieving good status. • Committed development in the WFD catchment falls into the Quendon and Stansted Mountfitchet WwTW catchments.

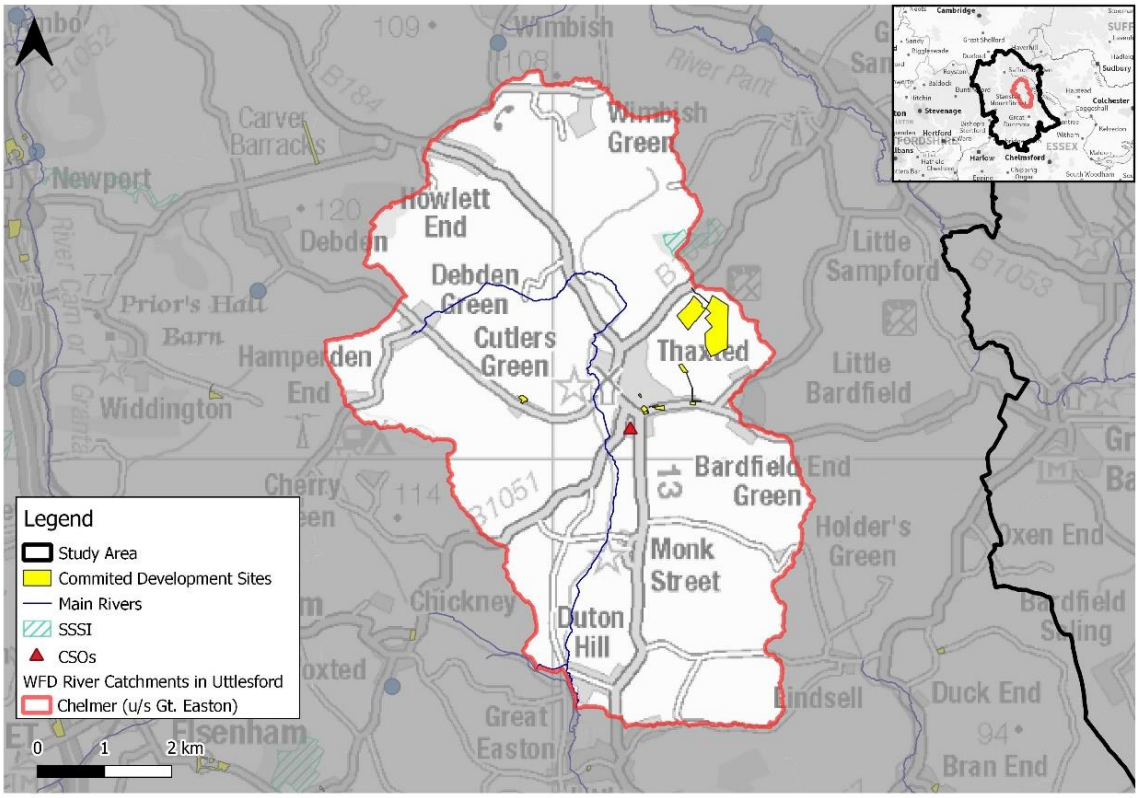
WFD Catchment name	Can
	
WwTWs	• High Roding WwTW – has capacity after commitments (17 houses) • High Easter WwTW – has capacity after commitments (172 houses) • One development site is located outside of the High Roding and High Easter WwTW catchments.
Chalk Stream	• No
Storm Overflows	• None
How many	• Commitments and Consents - 1 Site - 5 houses

development sites are located in the catchment?	• New Settlement - None
WFD Status (2019)	• Overall Status - Poor • Ammonia - High • BOD - N/A • Phosphate - Moderate • Reasons for not achieving good status: The water industry, agriculture and rural land management and industry are impacting point and diffuse sources and physical modification, leading to increased levels in phosphate and changes to levels of invertebrates and fish.
Potential issues in the catchment	• Discharge from sewage discharge, agriculture and trade discharge have prevented the catchment from achieving good status.

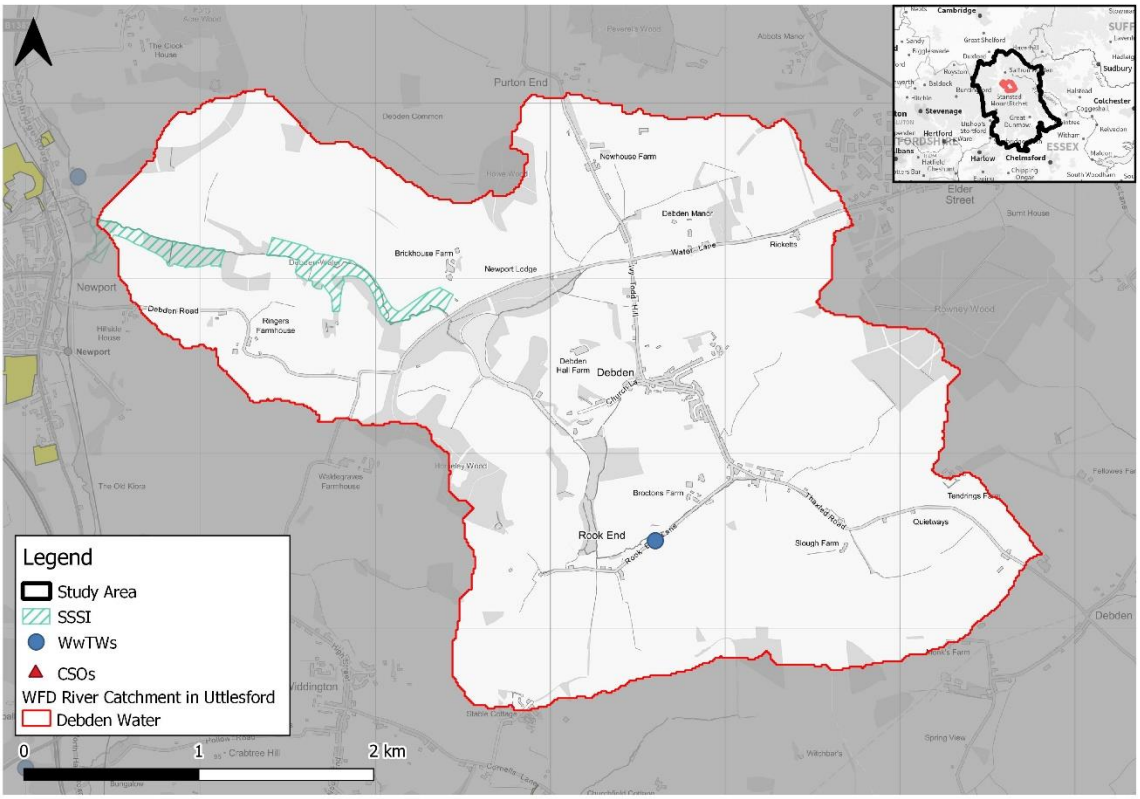
WFD Catchment name	Chelmer (Gt Easton- River Can)
	
WwTWs	• Broxted WwTW- flow not monitored – small WwTW with limited capacity • Great Easton WwTW – capacity available after commitments (68 houses) • Great Dunmow WwTW – currently over capacity – scheme in AMP7 to make works compliant • Felsted – currently over capacity

Chalk Stream	• No
Storm Overflows	• None
How many development sites are located in the catchment?	• Commitments and Consents - 25 Site- 2,249 houses and 705m^2 of employment land • New Settlement - Easton Park in Option 2c
WFD Status (2019)	• Overall Status - Moderate • Ammonia - High • BOD - High • Phosphate - Poor • Reasons for not achieving good status: The water industry, agriculture and rural land management, and urban and transport are impacting point and diffuse sources, and physical modification, leading to changes in the levels of phosphate, dissolved oxygen and fish.
Potential issues in the catchment	• Discharge from sewage discharge, agriculture and trade discharge have prevented the catchment from achieving good status. • Several of the WwTWs in the catchment are already shown to be exceeding their permit as a result of committed development. Additional capacity would need to be provided should further development be planned • A significant amount of new development is proposed in this catchment. The increase in flow into the Great Dunmow and Great Easton WwTWs could have a significant effect on water quality in the catchment and required modelling

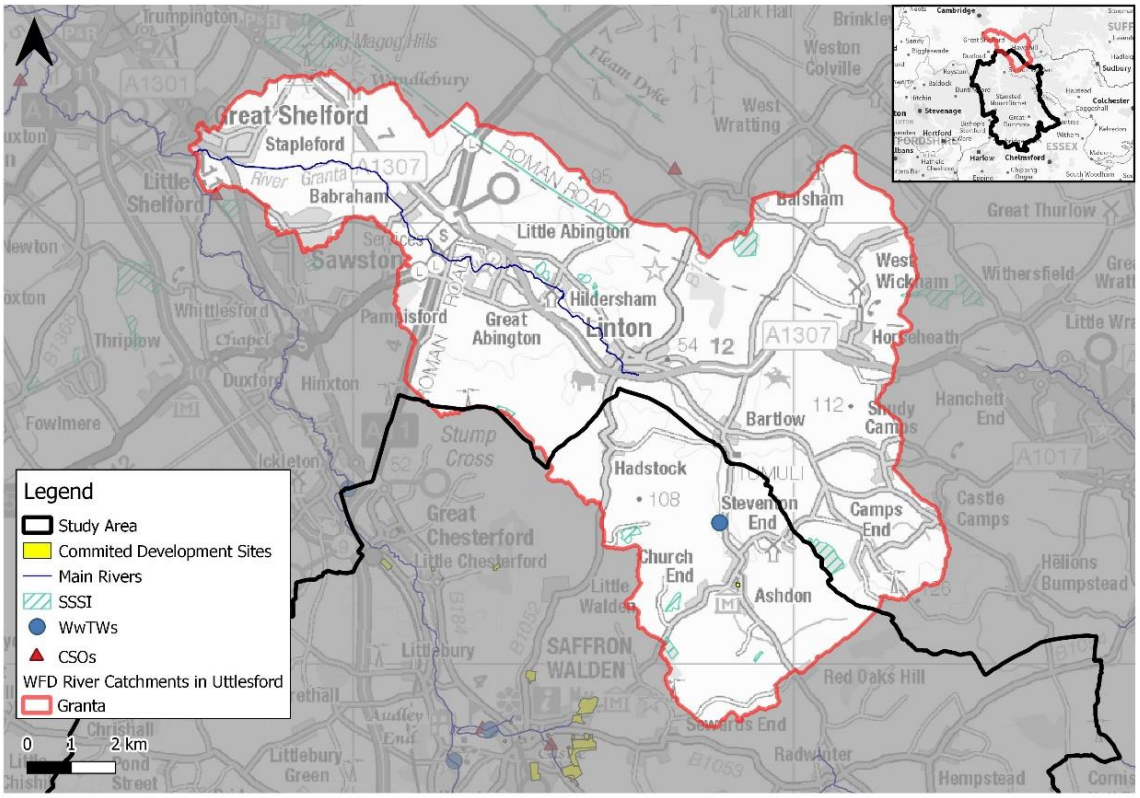
WFD Catchment name	Chelmer (u/s Gt Easton)



WwTWs	• None
Chalk Stream	• Partially - The upper parts of the watercourse are underlain by chalk
Storm Overflows	• Thaxted - Park Street
How many development sites are located in the catchment?	• Commitments and Consents - 10 Sites- 108 houses • New Settlement- None
WFD Status (2019)	• Overall Status - Moderate • Ammonia - High • BOD - N/A • Phosphate - Good • Reasons for not achieving good status: The agriculture and rural land management sector is impacting diffuse sources, leading to changes in levels of dissolved oxygen, phosphate and invertebrates.
Potential issues in the catchment	• The catchment is underlain by a chalk and the watercourse is therefore predominantly fed by the chalk aquifer. • Transport drainage and poor nutrient management have prevented catchment from achieving good status. • The Thaxted Park Street Storm Overflow operated 33 times in 2020 for a period of 49.5 hours. This is above the threshold of an investigation by the Environment Agency.

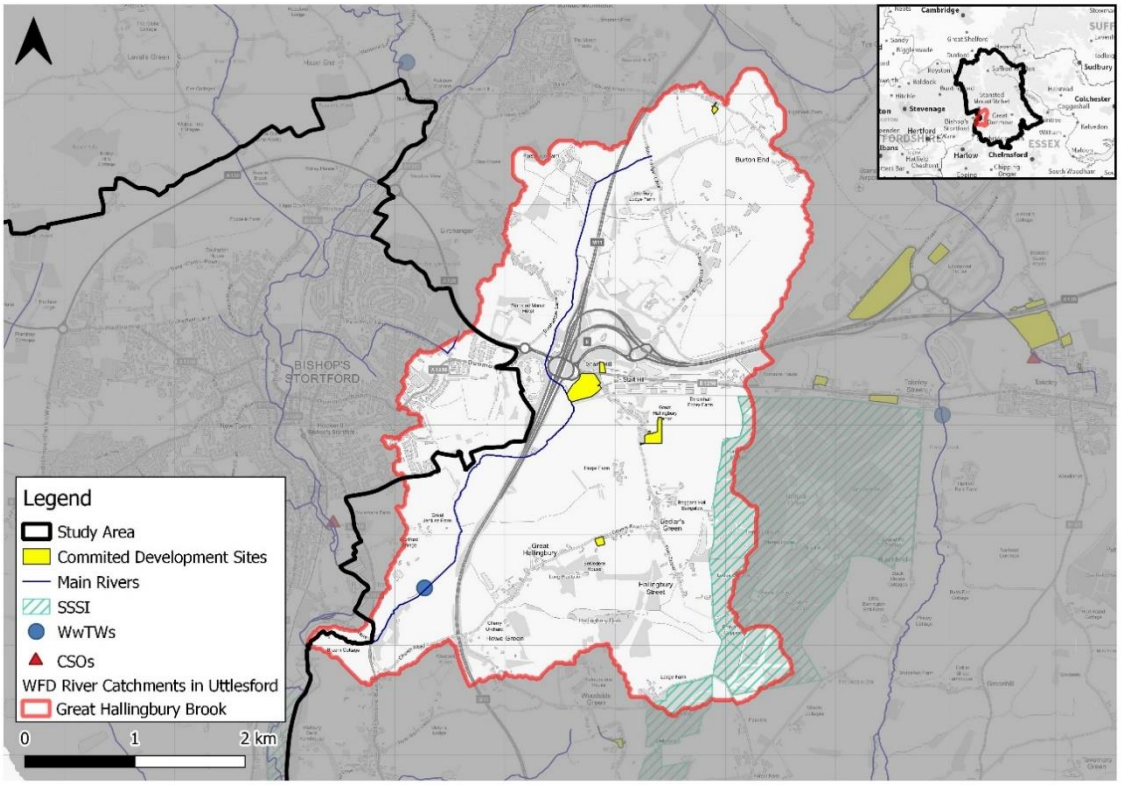
WFD Catchment name	Debden Water
	
WwTWs	• Debden WwTW – has capacity after commitments (247 houses)
Chalk Stream	• Yes - The catchment is underlain by chalk (headwaters of Cam)
Storm Overflows	• None
How many development sites are located in the catchment?	• Commitments and Consents - None • New Settlement - None
WFD Status (2019)	• Overall Status - Poor • Ammonia - N/A • BOD - N/A • Phosphate - N/A • Reasons for not achieving good status: The water industry is impacting physical modification leading to changes in mitigation measures assessments.
Potential issues in the catchment	• The catchment is underlain by a chalk and the watercourse is therefore predominantly fed by the chalk aquifer.

WFD Catchment name	Granta

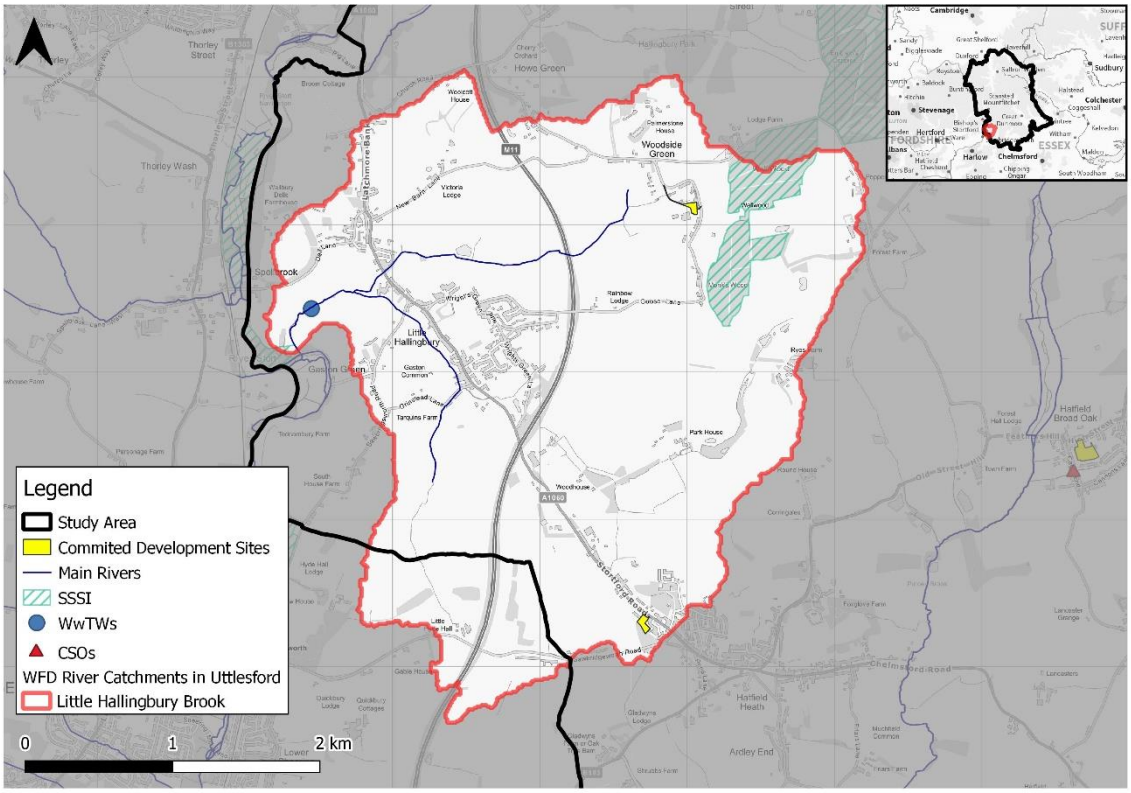


WwTWs	• Ashdon WwTW – has capacity (1,285 houses)
Chalk Stream	• Yes - The catchment is underlain by chalk.
Storm Overflows	• None
How many development sites are located in the catchment?	• Commitments and Consents – none • New Settlement - none
WFD Status (2019)	• Overall Status - Moderate • Ammonia - High • BOD – N/A • Phosphate - Poor • Reasons for not achieving good status: The water industry, and agriculture and rural land management are affecting the flow and point sources, leading to changes in the hydrological regime and phosphate levels.
Potential issues in the catchment	• The catchment is underlain by a chalk and the watercourse is therefore predominantly fed by the chalk aquifer. • Discharge from abstractions and sewage discharge has prevented the catchment from achieving good status.

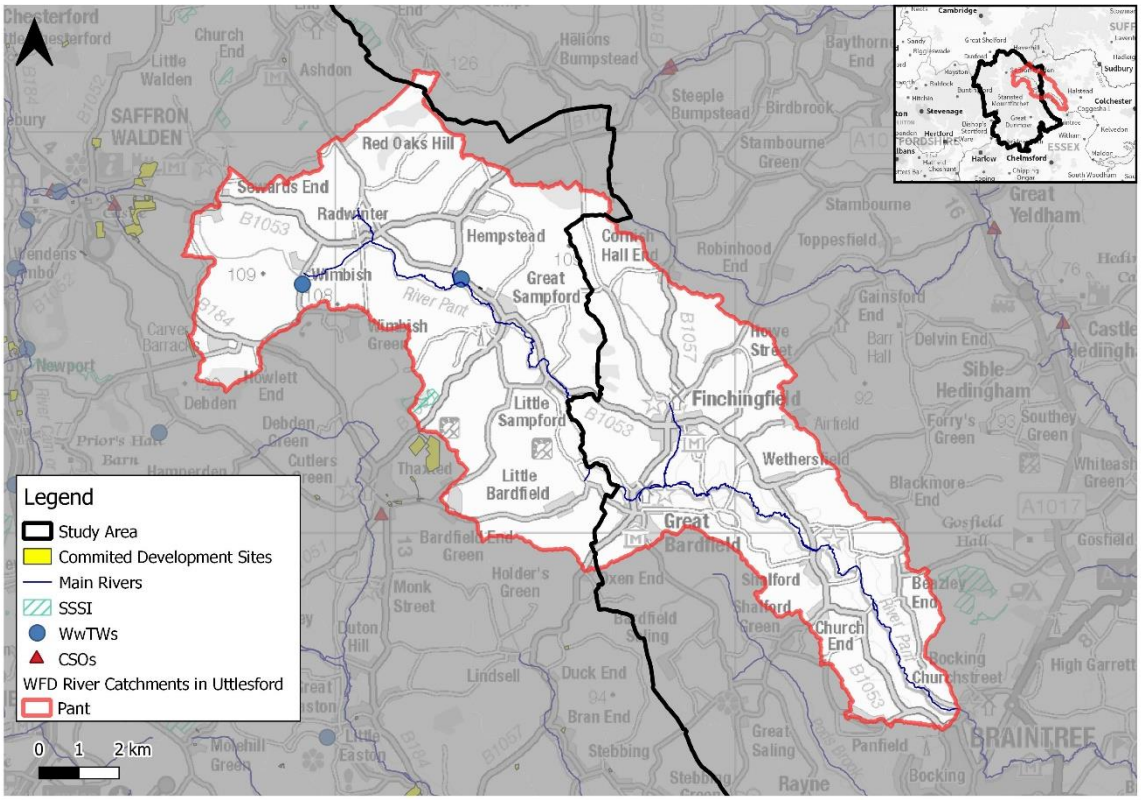
WFD Catchment name	Great Hallingbury Brook



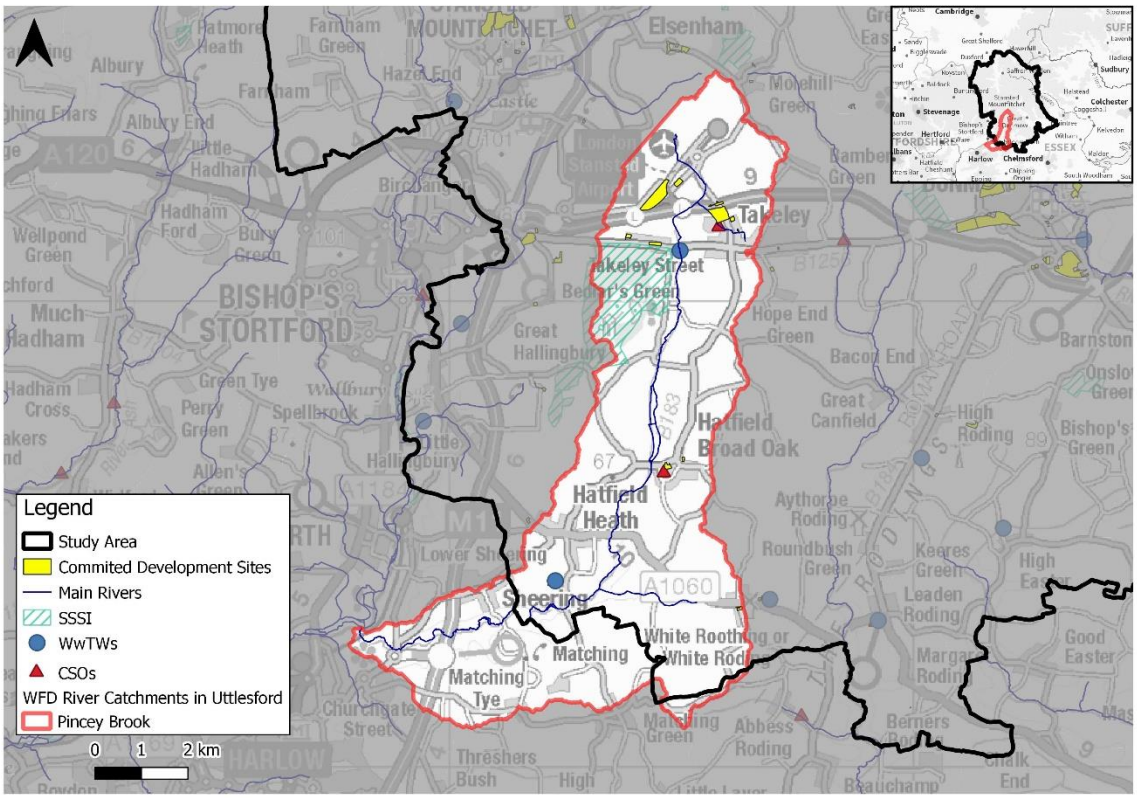
WwTWs	• Bishops Stortford WwTW – has capacity after commitments (13,449 houses) • One site is outside of the Bishops Stortford WwTW catchment.
Chalk Stream	• No
Storm Overflows	• None
How many development sites are located in the catchment?	• Commitments and Consents - 5 Sites- 39 houses • New Settlement- • None
WFD Status (2019)	• Overall Status - Moderate • Ammonia - High • BOD - N/A • Phosphate - Poor • Reasons for not achieving good status: The water industry and urban and transport sectors are impacting point and diffuse sources, leading to changes in phosphate, and macrophytes and phytobenthos combined levels.
Potential issues in the catchment	• The Bishops Stortford WwTW drains into the Great Hallingbury Brook • Discharge from WwTWs and the water industry have prevented the catchment from achieving good status. • An increase in growth which will be served by the Bishops Stortford WwTW is likely to put significant pressure onto the dilution potential of the Great Hallingbury Brook.

WFD Catchment name	Little Hallingbury Brook
	
WwTWs	• Little Hallingbury WwTW – has capacity after commitments (924 houses) • One development site is located outside of the Little Hallingbury WwTW catchment.
Chalk Stream	• No
Storm Overflows	• None
How many development sites are located in the catchment?	• Commitments and Consents - 2 Sites- 10 houses • New Settlement - West of Hatfield Broad Oak in Option 2d
WFD Status (2019)	• Overall Status - Poor • Ammonia - High • BOD - N/A • Phosphate - Moderate • Reasons for not achieving good status: The agriculture and rural land management, and urban and transport sectors are impacting diffuse and point sources, and physical modification, leading to increased levels of phosphate and macrophytes and phytobenthos combined.

Potential issues in the catchment	• The catchment is underlain by a chalk and the watercourse may therefore predominantly fed by the chalk aquifer. • Agriculture and transport drainage have prevented the catchment from achieving good status. • The West of Hatfield Broad Oak new settlement would be a significant development in this area and would likely put a strain on any wastewater infrastructure and on the quality of the river it was discharging to.

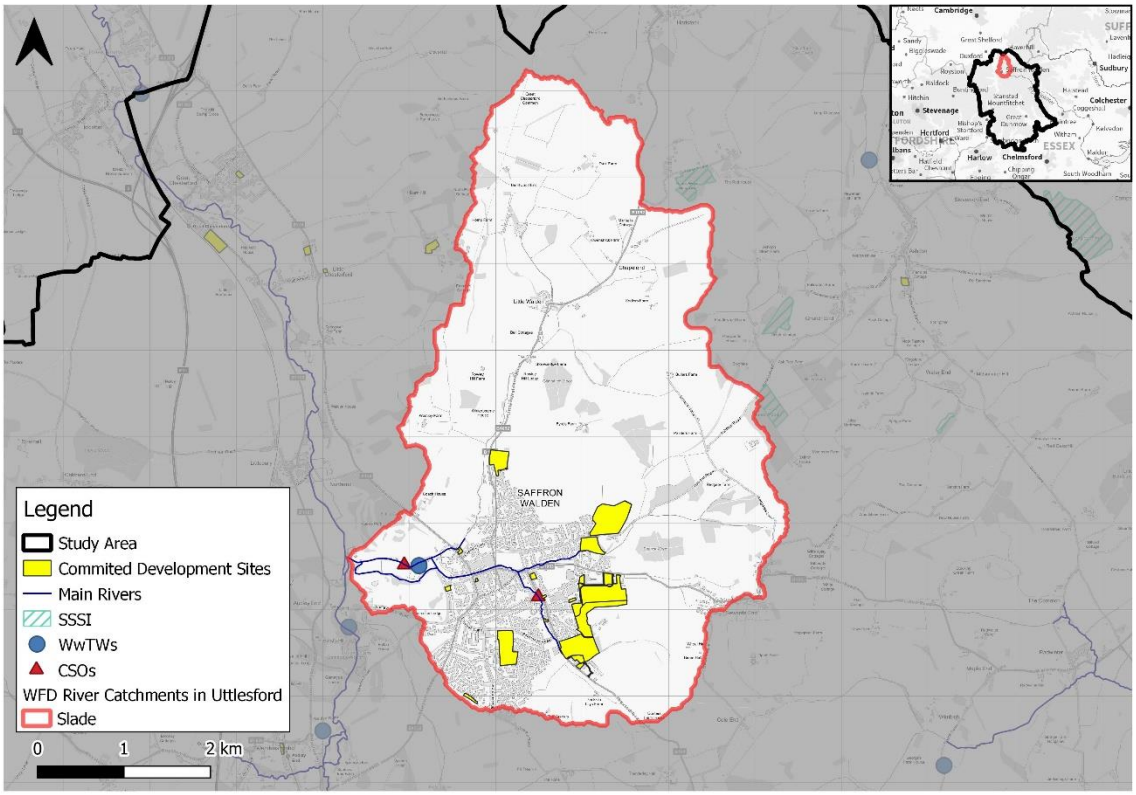
WFD Catchment name	Pant
	
WwTWs	• Wimbish WwTW – flow not monitored so unable to assess capacity – likely to be minimal • Great Sampford WwTW – currently • Treatment work capacity • Wimbish- Capacity not assessed as flow was not measured at the WwTW. • Great Sampford – likely to be close to or exceeding its DWF permit during the plan period after commitments • One development site is located outside of any public sewer catchment.
Chalk Stream	• No – although the bedrock in this region is partially chalk, the watercourse itself does not have the characteristics of a chalk stream, and is partially underlain by London Clay.

Storm Overflows	• None
How many development sites are located in the catchment?	• Commitments and Consents - 1 Site- 5 houses • New Settlement - None
WFD Status (2019)	• Overall Status - Moderate • Ammonia - High • BOD – N/A • Phosphate - Moderate • Reasons for not achieving good status: The water industry, agriculture and rural land management, and industry are impacting point and diffuse sources, and physical modification, leading to changes in levels of phosphates, dissolved oxygen and invertebrates.
Potential issues in the catchment	• Discharge from industrial and sewers has prevented the catchment from achieving good status.

WFD Catchment name	Pincey Brook
	
WwTWs	• Takeley WwTW – has capacity after commitments (1,089 houses) • Hatfield Heath WwTW – has capacity after development (353 houses)
Chalk Stream	• No
Storm Overflows	• Garnets SPS and the Cage End SPS. The

	Garnets SPS discharged five times for a total of 11 hours. The Cage End SPS discharged 11 times in 2020 for a total of 47 hours. • Storm overflows at Takeley WwTW and Hatfield Heath WwTW are poorly performing and under investigation (>40 spills per year and over 1000 hours duration in 2020)
How many development sites are located in the catchment?	• Commitments and Consents – Sites - 118 houses and 22,056m^2 of employment land • New Settlement - West of Hatfield Broad Oak
WFD Status (2019)	• Overall Status - Moderate • Ammonia - High • BOD - N/A • Phosphate - Poor • Reasons for not achieving good status: The water industry and agriculture and rural land management sectors are impacting diffuse and point sources, leading to changes in phosphate and dissolved oxygen levels.
Potential issues in the catchment	• Discharge from sewers and agriculture has prevented the catchment from achieving good status. • Storm overflows at Takeley and Hatfield Heath WwTW operated above the threshold to trigger an investigation. Unmitigated growth in this area is likely to exacerbate this issue and cause a deterioration in water quality • The West of Hatfield Broad Oak new settlement would be a significant development in this area and would likely put a strain on any wastewater infrastructure and on the quality of the river it was discharging to.

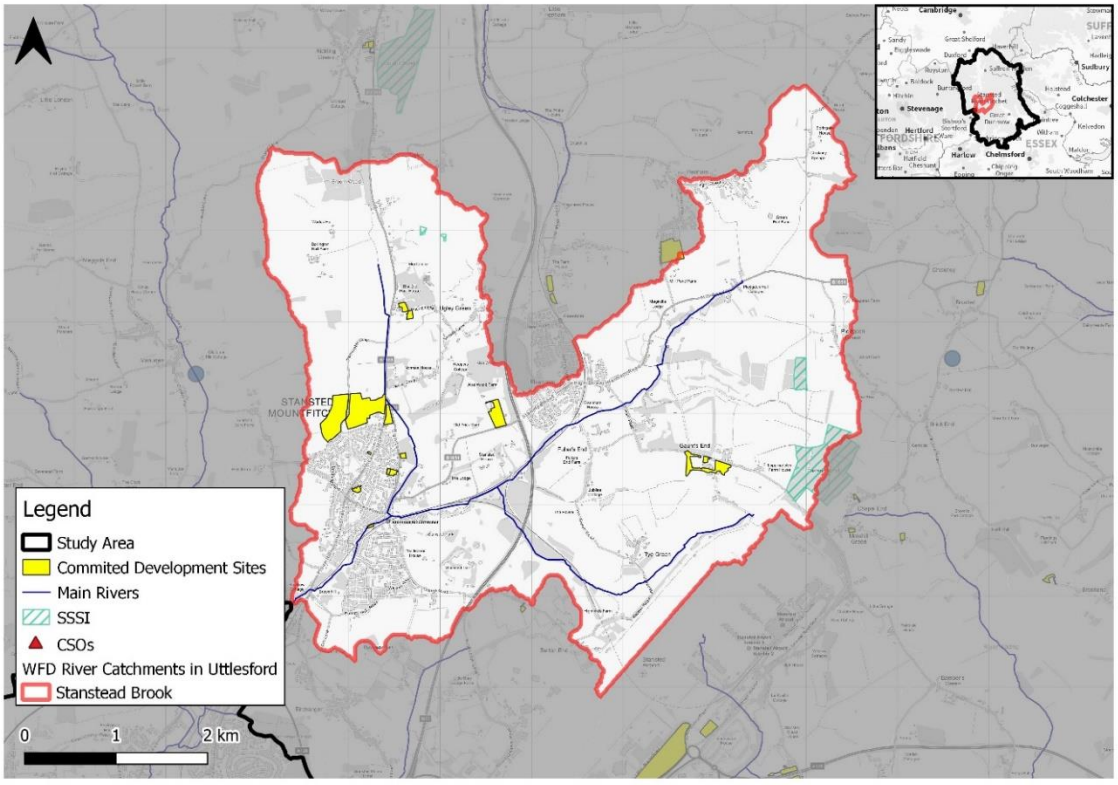
WFD Catchment name	Slade



WwTWs	• Saffron Walden WwTW – has capacity after commitments (3,390 houses)
Chalk Stream	• Yes - River Slade (tributary of Cam)
Storm Overflows	• Saffron Walden WwTW and Saffron Walden Victoria THX OV storm overflows. The Saffron Walden WwTW storm overflow discharged five times for a total of 7.75 hours. The Saffron Walden Victoria THX OV discharged 3 times in 2020 for a total of 1 hour.
How many development sites are located in the catchment?	• Commitments and Consents - 18 Sites - 424 houses and 6,884m^2 of employment land • New Settlement - Great Chesterford
WFD Status (2019)	• Overall Status - Moderate • Ammonia - Good • BOD - N/A • Phosphate - Poor • Reasons for not achieving good status: The water industry, agriculture and rural land management, and urban and transport sectors are impacting the flow, point sources and physical modification, leading to changes in phosphate, and macrophytes and phytobenthos combined levels and invertebrates.

Potential issues in the catchment	• The catchment is underlain by a chalk and the watercourse is therefore predominantly fed by the chalk aquifer. • Discharge from sewers, urbanisation and agriculture has prevented the catchment from achieving good status. • The Great Chesterford new settlement would be a significant development in this area and would likely put a strain on any wastewater infrastructure and on the quality of the river it was discharging to. Significant development is also proposed around Saffron Walden which would put further pressure on the watercourse – which is a tributary of the River Cam (chalk stream)

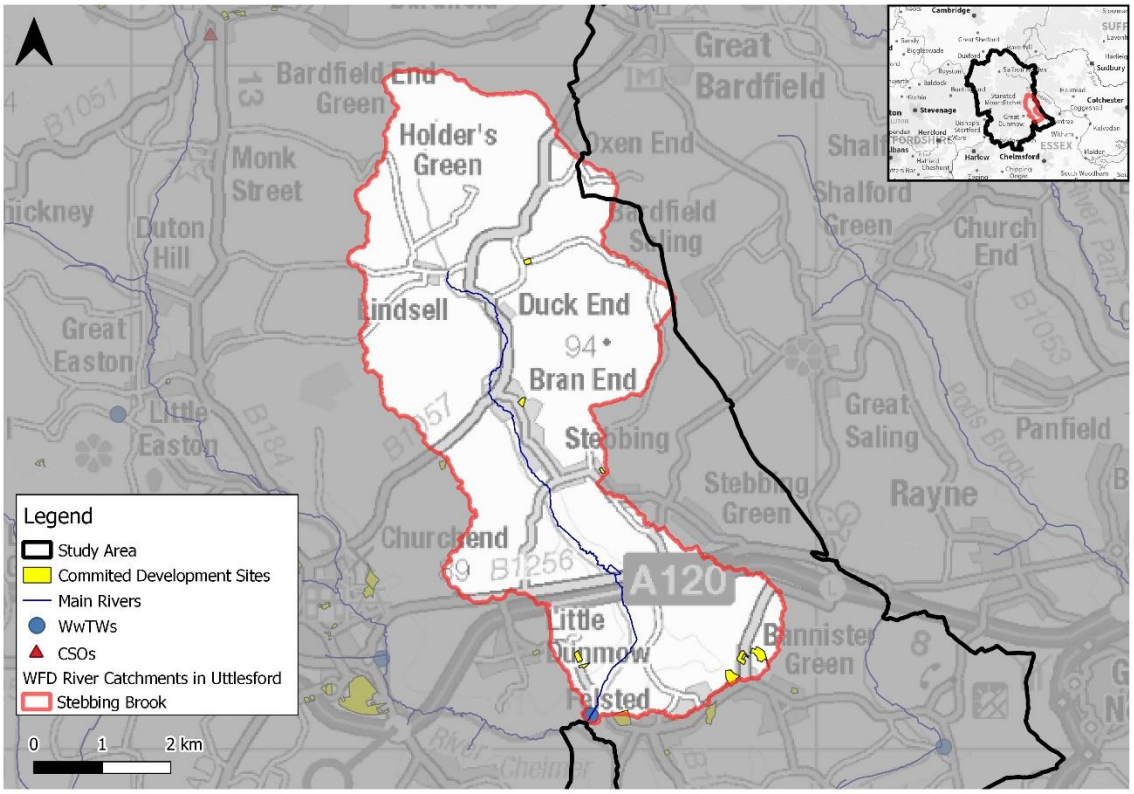
WFD Catchment name	Stanstead Brook



WwTWs	• None
Chalk Stream	• Partially - Part of the watercourse is underlain by chalk with parts of the catchment underlain by are underlain by Lambeth Group and Thames Group bedrock formations.
Storm Overflows	• None
How many development sites are located in the catchment	• Commitments and Consents – Sites - 349 houses and 8242m^2 of employment land • New Settlement - Ugley
WFD Status (2019)	• Overall Status - Poor

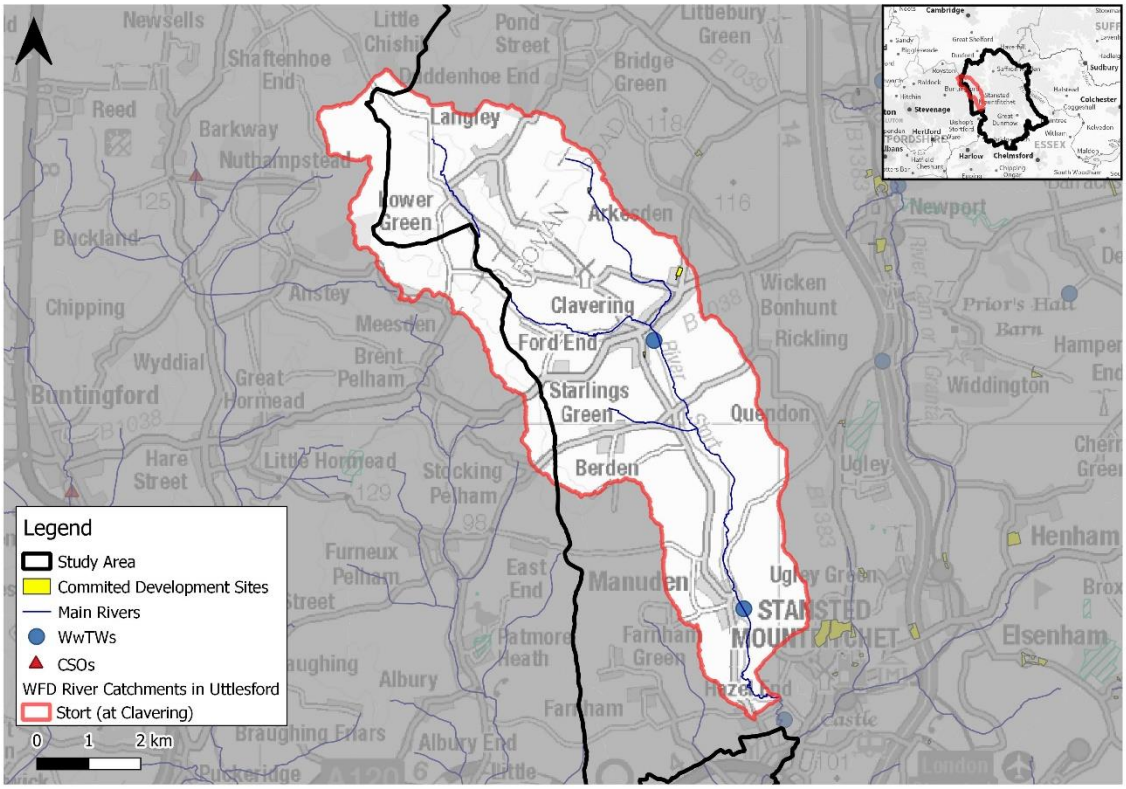
	• Ammonia - High • BOD - N/A • Phosphate - Good • Reasons for not achieving good status: Mining and quarrying are impacting point sources and flow, leading to changes in the hydrological regime and invertebrates.
Potential issues in the catchment	• Part of the catchment is underlain by a chalk and the watercourse is likely to be fed by the chalk aquifer. • Mining and quarrying activity is thought to be the cause of the watercourse not achieving good status due (ecological elements). • Further deterioration in a waterbody already classified as "Bad" would be unacceptable • The Ugley new settlement would be a significant development in this area and would likely put a strain on any wastewater infrastructure and on the quality of the river it was discharging to.

WFD Catchment name	Stebbing Brook

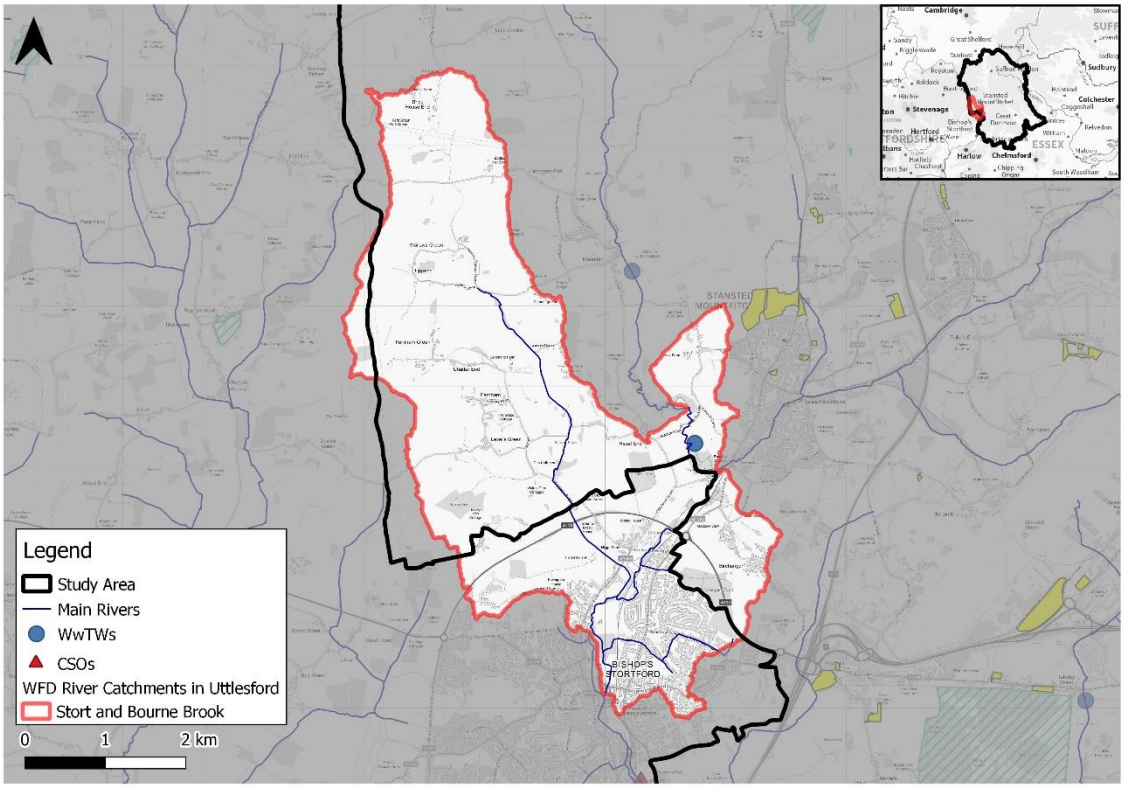


WwTWs	• Felsted WwTW – currently at or exceeding its DWF permit • One development site is located outside of a public sewer catchment
Chalk Stream	• No
Storm Overflows	• None
How many development sites are located in the catchment?	• Commitments and Consents - 10 Sites- 78 houses and 562m^2 of employment land • New Settlement - None
WFD Status (2019)	• Overall Status - Moderate • Ammonia - High • BOD - N/A • Phosphate - High • Reasons for not achieving good status: None provided.
Potential issues in the catchment	• A small amount of development is proposed around the urban areas in the catchment – however there is little wastewater capacity in this area.

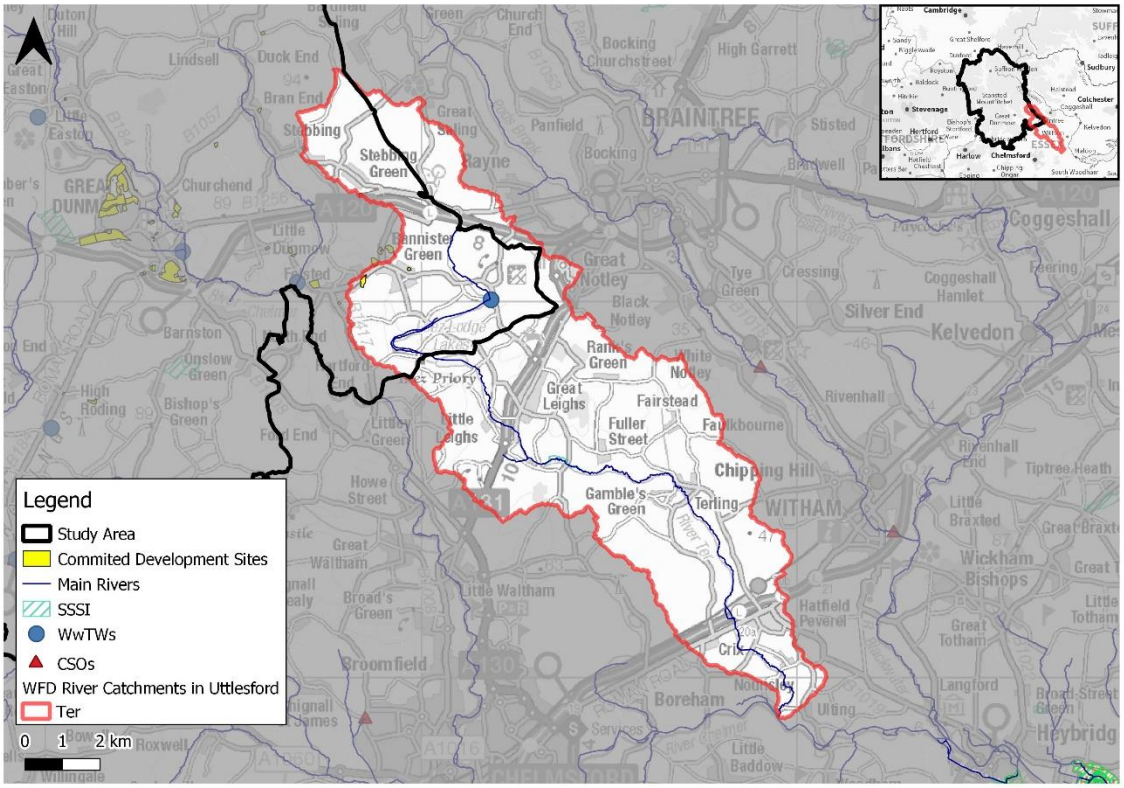
WFD Catchment name	Stort (at Clavering)



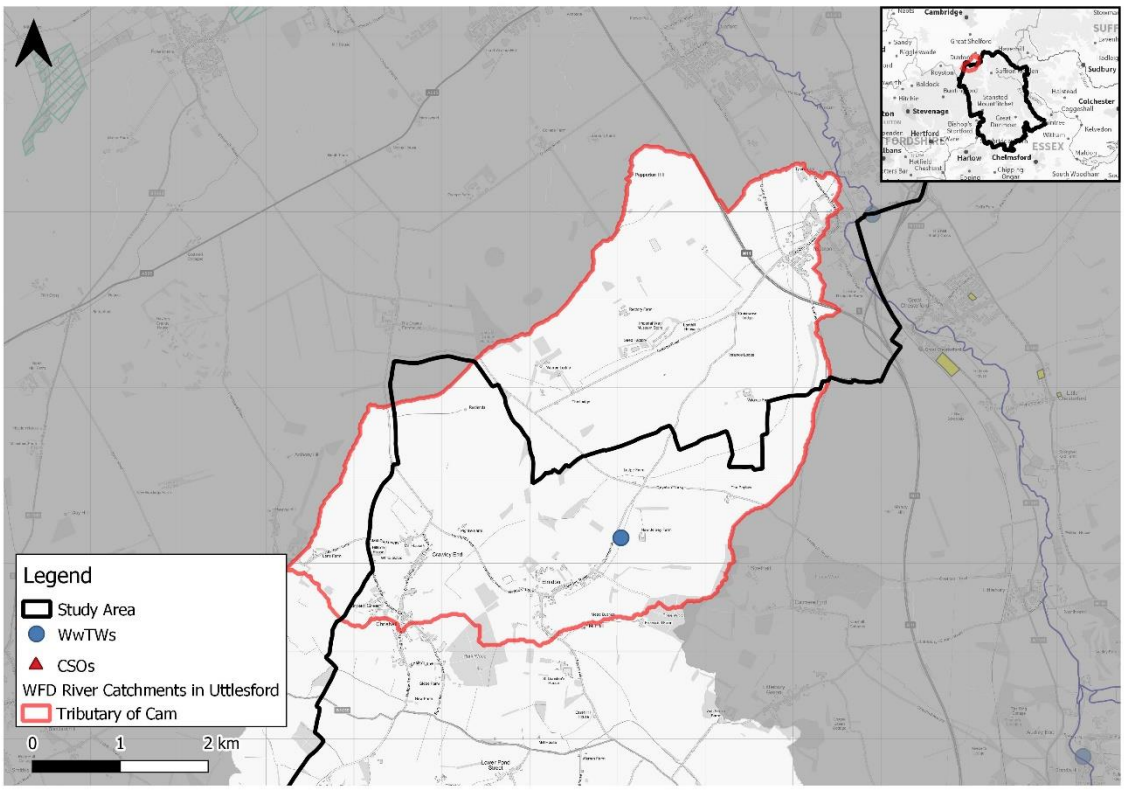
WwTWs	• Maunden WwTW – has capacity after commitments (581 houses) • Clavering WwTW – currently at or exceeding its DWF permit • One development site is located outside of a public sewer catchment.
Chalk Stream	• Yes - River Stort
Storm Overflows	• None
How many development sites are located in the catchment?	• Commitments and Consents - 3 Sites - 9 houses and 1,594m^2 of employment land • New Settlement - None
WFD Status (2019)	• Overall Status - Moderate • Ammonia - High • BOD - N/A • Phosphate - Moderate • Reasons for not achieving good status: The water industry and agriculture and rural land management sectors are impacting point and diffuse sources, and suspect data, leading to changes in phosphate and dissolved oxygen levels, and the hydrological regime.
Potential issues in the catchment	• The catchment is underlain by a chalk and the watercourse is therefore predominantly fed by the chalk aquifer. • Discharge from sewers and poor soil management has prevented the catchment from achieving good status.

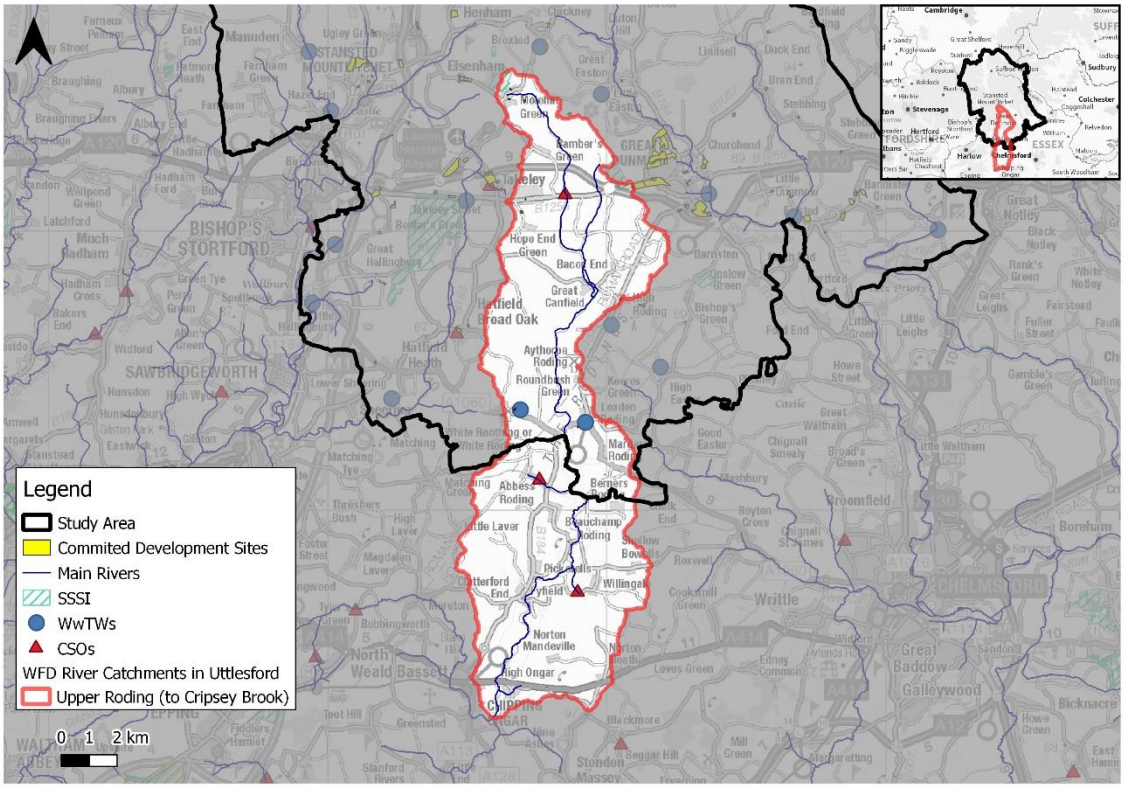
WFD Catchment name	Stort and Bourne Brook
	
WwTWs	• Stansted Mountfitchet WwTW – has capacity (2,140 houses) • New Nickel permit being applied and TW have expressed concerns about future growth preventing this being met
Chalk Stream	• Yes - River Stort and Bourne Brook
Storm Overflows	• The Stansted Mountfitchet WwTW storm overflow discharged 39 times in 2020 for a total of 305 hours – under threshold for investigation but this is into a chalk stream so should be addressed.
How many development sites are located in the catchment?	• Commitments and Consents - None • New Settlement - None
WFD Status (2019)	• Overall Status - Moderate • Ammonia - High • BOD - N/A • Phosphate - Moderate • Reasons for not achieving good status: The water industry is impacting point sources, leading to increased phosphate and dissolved oxygen levels.
Potential issues in the catchment	• The catchment is underlain by a chalk and the watercourse is therefore predominantly fed by the chalk aquifer.

	• Sewage discharge has prevented the catchment from achieving good status. • The Stansted Mountfitchet Storm Overflow discharges to a chalk stream and its impact should be addressed. Further unmitigated growth could exacerbate this

WFD Catchment name	Ter
	
WwTWs	• Willows Green WwTW – flow not monitored so unable to assess capacity – likely to be minimal • One development site is located outside of a public sewer catchment.
Chalk Stream	• No
Storm Overflows	• None
How many development sites are located in the catchment?	• Commitments and Consents - 3 Sites- 44 houses • New Settlement - East of Stebbing
WFD Status (2019)	• Overall Status - Moderate • Ammonia - High • BOD - N/A • Phosphate - Poor • Reasons for not achieving good status: The water industry, agriculture and rural land management, and urban and transport sectors are impacting diffuse and point sources, leading to increased levels of phosphate.

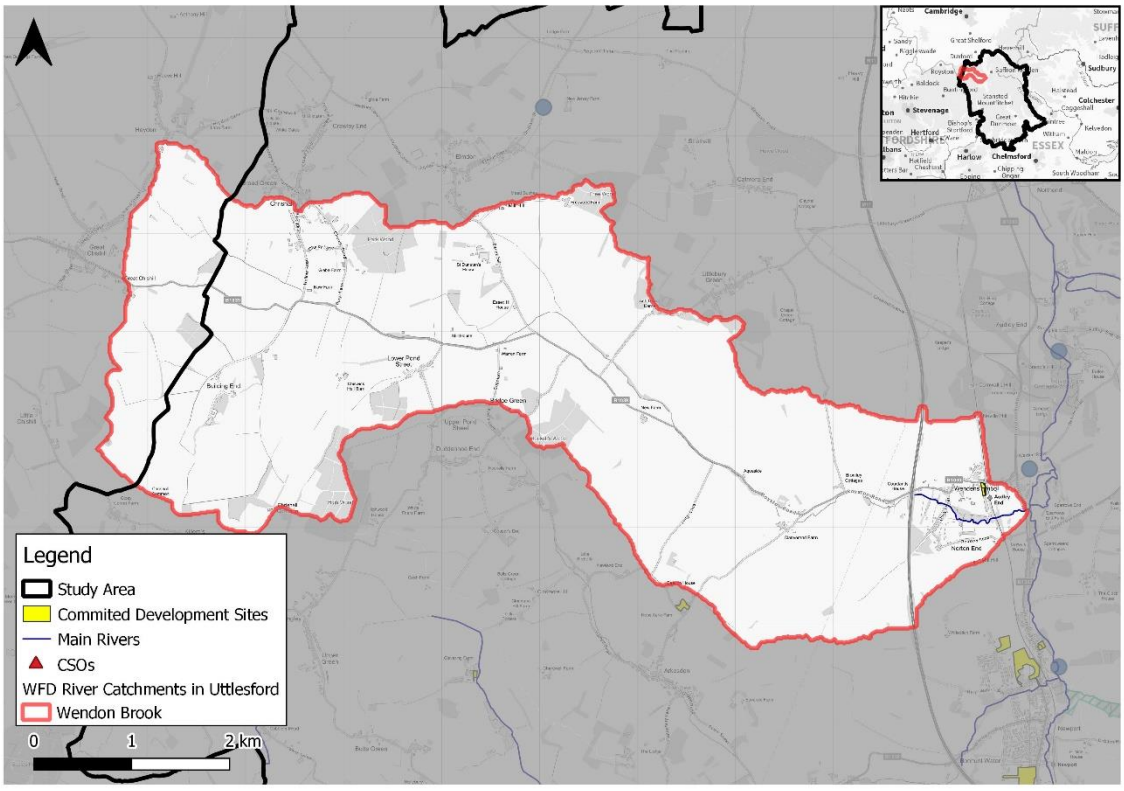
Potential issues in the catchment	• Discharge from industrial and sewers has prevented the catchment from achieving good status.

WFD Catchment name	Tributary of the Cam
	
WwTWs	• Elmdon WwTW – has capacity after commitments (434 houses)
Chalk Stream	• Yes - River Cam
Storm Overflows	• None
How many development sites are located in the catchment?	• Commitments and Consents - None • New Settlement - None
WFD Status (2019)	• Overall Status - Moderate • Ammonia - High • BOD - N/A • Phosphate - Moderate • Reasons for not achieving good status: The water industry is impacting point sources and flow, leading to changes in phosphate and dissolved oxygen levels, and invertebrates.
Potential issues in the catchment	• The catchment is underlain by a chalk and the watercourse is therefore predominantly fed by the chalk aquifer. • Sewage discharge and groundwater abstraction have prevented the catchment from achieving good status.

WFD Catchment name	Upper Roding (Cripsey Brook)
	
WwTWs	• White Roding WwTW – flow not monitored so unable to assess capacity – likely to be minimal • Leaden Roding WwTW – has capacity (296 houses) • Four development sites are located outside of a public sewer catchment.
Chalk Stream	• No
Storm Overflows	• Canfield End SPS, White Roding WwTW, Leaden WwTW, Abbess Roding (outside the district) and Willingdale WwTW (outside the district). The Canfield End SPS storm overflow discharged once for 3 hours in 2020. The White Roding WwTW storm overflow discharged 80 times in 2020 for a total of 710 hours. The Leaden Roding storm overflow discharged 61 times in 2020 for a total of 482 hours.
How many development sites are located in the catchment?	• Commitments and Consents - 7 Sites- 45 houses and 6m^2 of employment land • New Settlement - Easton Park
WFD Status (2019)	• Overall Status - Moderate • Ammonia - High • BOD - N/A • Phosphate - Poor • Reasons for not achieving good status: The agriculture and rural land management sector is impacting point and diffuse sources, and physical modification, leading to changes in levels

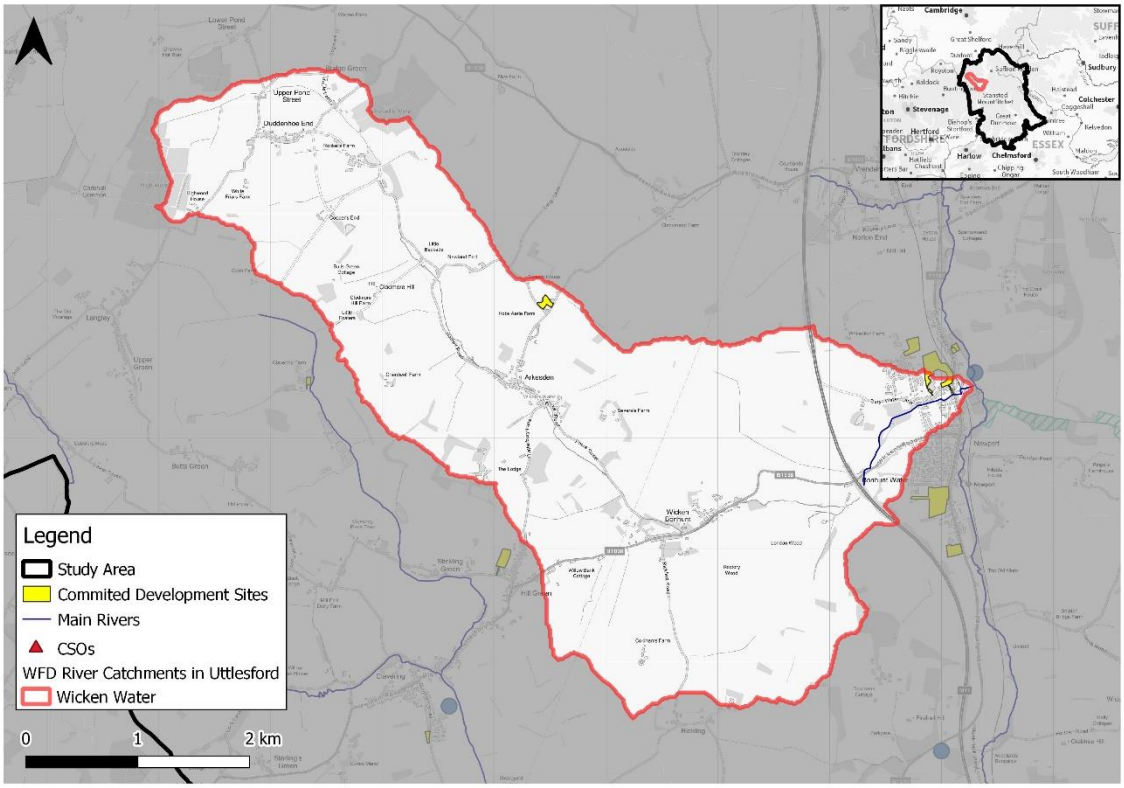
	of phosphate, fish, and macrophytes and phytobenthos combined.
Potential issues in the catchment	• Private sewage treatment is noted as a reason for not achieving good. Further growth outside of a public sewer catchment may exacerbate this • Agriculture and rural land management have also prevented the catchment from achieving good status. • The White Roding and Leaden Roding WwTW Storm Overflows operated above the threshold of an investigation by the Environment Agency. • Significant development is proposed within the catchment and would likely put a strain on any wastewater infrastructure and on the quality of the river it was discharging to.

WFD Catchment name	Wendon Brook



WwTWs	• None
Chalk Stream	• Yes - Wendon Brook
Storm Overflows	• None
How many development sites are located in the catchment?	• Commitments and Consents - 2 Sites- 23 houses • New Settlement - None
WFD Status (2019)	• Overall Status - Moderate • Ammonia - High • BOD - N/A

	• Phosphate - Good • Reasons for not achieving good status: The agriculture and rural land management, and water industry are impacting flow and diffuse sources, leading to changes in the hydrological regime and phosphate levels.
Potential issues in the catchment	• The catchment is underlain by a chalk and the watercourse is therefore predominantly fed by the chalk aquifer. • Surface and groundwater abstraction has caused some elements to not achieve good status.

WFD Catchment name	Wicken Water
	
WwTWs	• None
Chalk Stream	• Yes - Wicken Water (trib of Cam)
Storm Overflows	• None
How many development sites are located in the catchment?	• Commitments and Consents - 2 Sites- 24 houses • New Settlement - None
WFD Status (2019)	• Overall Status - Moderate • Ammonia - High • BOD - N/A • Phosphate - High • Reasons for not achieving good status: None provided.

Potential issues in the catchment	• The catchment is underlain by a chalk and the watercourse is therefore predominantly fed by the chalk aquifer.

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