Uttlesford District Council Water Cycle Study - Stage 2

Final

A1-C03

Date:
July 2024

Prepared for:
Uttlesford District Council

www.jbaconsulting.com

Document Status

Issue date	05 July 2024
Issued to	Tim Fearn
BIM reference	GGU-JBAU-XX-XX-RP-EN-0009
Revision	A1-C03
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This report describes work commissioned by Uttlesford District Council, by an instruction dated 16 February 2024. The Client's representative for the contract was Tim Fearn of Uttlesford District Council. Richard Pardoe and Sue Jones of JBA Consulting carried out this work.

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Contents

List of Figures

List of Tables

Abbreviations

AfW	Affinity Water
ALS	Abstraction Licencing Strategy
AMP	Asset Management Plan
AMP7	Seventh Asset Management Plan period (runs 2020-2025)
AW	Anglian Water
BNG	Biodiversity Net Gain
BRE	Building Research Establishment
CaBA	Catchment Based Approach
CAMS	Catchment Abstraction Management Strategy
CAPEX	Capital Expenditure
CFMP	Catchment Flood Management Plan
CIRIA	Company providing research and training in the construction industry
CIWEM	Chartered Institution of Water and Environmental Management
CSO	Combined Sewer Overflow (usually referred to as storm overflows)
DCG	Design and Construction Guidance
DEFRA	Department of the Environment, Food and Rural Affairs
DrWPA	Drinking Water Protected Areas
DWMP	Drainage and Wastewater Management Plan
DYAA	Dry Year Annual Average
EA	Environment Agency
EC	European Community
FCT	Favourable Condition Targets
FRA	Flood Risk Assessment
FWMA	Flood and Water Management Act
GEP	Good Ecological Potential
GES	Good Ecological Status
GIS	Geographical Information System
GWMU	Groundwater Management Unit
GWDTE	Groundwater Dependent Terrestrial Ecosystem
HoF	Hands-off Flow
HoL	Hands-off Level
ID	Identifier
IWM	Integrated Water Management
JNCC	Joint Nature Conservation Committee

LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LNRS	Local Nature Recovery Strategy
LPA	Local Planning Authority
l/p/d	Litres per person per day
NBS	Nature Based Solutions
NE	Natural England
NFM	Natural Flood Management
NPPF	National Planning Policy Framework
OEP	Office for Environmental Protection
OfWAT	Water Services Regulation Authority
PPG	Planning Practice Guidance
PTP	Package Treatment Plant
RBD	River Basin District
RBMP	River Basin Management Plan
rdWRMP	Revised Draft Water Resources Management Plan
REUL	Retained European Union Law
SABs	SuDS Approval Bodies
SAC	Special Area of Conservation
SFRA	Strategic Flood Risk Assessment
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
STW	Sewage Treatment Works
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
TW	Thames Water
UDC	Uttlesford District Council
UKWIR	UK Water Industry Research
uPBT	Ubiquitous, Persistent, Bioaccumulative or Toxic
UWWTD	Urban Wastewater Treatment Directive
WaSC	Water and Sewerage Company
WCS	Water Cycle Study
WFD	Water Framework Directive

WINEP	Water Industry National Environment Programme
WRC	Water Recycling Centre
WRE	Water Resources East
WRSE	Water Resources South East
WRMP	Water Resources Management Plan
WRZ	Water Resources Zone
WwTW	Wastewater Treatment Works

Definitions

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.

Term	Description
Aquifer	An aquifer is a rock and/or sediment body that holds groundwater.
Dry Weather Flow	Dry weather flow is the average daily flow of wastewater to a 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 (EFI) 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.
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.

Term	Description
Sustainable Drainage Systems (SuDS)	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 or Bad Groundwater can be awarded one of two statuses: Good or 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	Water Resource Management Plans are

Term	Description
(WRMP)	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 receives flows from the sewerage system and treats it so it can be discharged back into a river. They may also be called Sewage Treatment Works (STWs) or Water Recycling Centres (WRCs).

Executive Summary

JBA Consulting was commissioned by Uttlesford District Council to undertake a Stage 2 Water Cycle Study (WCS) as part of the evidence base for their local Plan. This builds on the Stage 1 Scoping study completed in 2022. It should be read alongside the Chalk Stream Evidence Base.

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.

A forecast of growth during the Local Plan period was collated based on information provided by UDC. This included:

- Preferred allocations
- Commitments (sites already within the planning system)
- Recent completions
- Windfall

Neighbouring authorities that share infrastructure with Uttlesford were also contacted for information on their growth forecasts. From this an estimate of water and wastewater demand at the site and Local Authority level was created for use within the WCS assessments.

The focus in the report is on the nine preferred allocations. These were shared with Affinity Water (AfW) in their role as water supplier for the region, and Anglian Water (AW) and Thames Water (TW) as the sewerage undertakers, for them to assess the impact of the sites on their networks and wastewater treatment works (WwTW).

Water resources

Water resources in the UK are under considerable pressure. The Environment Agency have stated that "the scale of the challenge we face increases with time and, by 2050, we are looking at a shortfall of nearly 5 billion litres of water per day between the sustainable water supplied available and the expected demand.". The National Water Resources

Framework sets the objective to reduce the average per capita consumption in the UK to 110l/p/d by 2050. This is now part of the Environmental Improvement Plan (EIP) and water companies Water Resource Management Plans (WRMPs). Within Defra's Plan for Water is the commitment to review Building Regulations and a target of 100l/p/d in water stressed areas is suggested.

The Future Homes Hub, who are supporting Defra to produce a roadmap to greater water efficiency propose a staged reduction in PCC, with a target of 100l/p/d in water stressed areas in place from 2025, and a reduced target of 90l/p/d in place by 2030 (depending on market conditions and customer acceptance). The Catchment Based Approach (CaBA) Chalk Stream Strategy recommends a target of 90l/p/d in chalk stream catchments, and the Government's EIP states that the Chalk Stream Strategy should be supported.

This study recommends that as a minimum the proposed new Building Regulations target of 100l/p/d outlined in Defra's Plan for Water be adopted across Uttlesford. This should be achieved using a fittings-based approach. This should be supported by the requirement for non-household development to achieve three credits in the assessment category WAT01 of the BREEAM UK New Construction Standard. The Local Plan should allow for a future reduction in the Building Regulations target to 90l/p/d in 2030. Developers should be encouraged to achieve 90l/p/d or lower, especially on larger strategic sites aligning with the Chalk Stream Strategy.

Water supply

It is likely that upgrades to the water supply network will be required in order to serve the preferred allocations without a detriment to existing customers. Modelling by AfW may be required to define the extent of these upgrades. Early engagement between developers. UDC and AfW is needed to ensure that these upgrades are in place prior to occupation of the developments.

Wastewater network

AW and TW provided an assessment of the preferred allocations. This was split into foul network and surface water network. In the foul network assessment, four sites were given a "green" assessment confirming there was sufficient capacity within the network to incorporate these sites and no further infrastructure was likely to be required. Two sites (Land east of Shire Hill Farm and south of Radwinter Road, and Land south of A120/North of Stortford Road) were given an "amber" assessment, reflecting the need for some additional infrastructure. The Land at Warrens Farm and Land at Warish Hall Farm was given a "red" assessment by Thames Water along with the comment that the "scale of development is likely to require upgrades to the wastewater network". No particular constraints were identified by Thames Water. One further site was not assessed by Thames Water (Gaunts End, Elsenham) as it is not in an area currently served by a public sewer. Thames Water were contacted for clarification on these two sites but had not responded at the time of writing. Further investigation may be required in order to understand any implications for Uttlesford.

In the surface water assessment, two sites were given a "green" assessment confirming there was sufficient capacity within the network to incorporate these sites and no further infrastructure was likely to be required. Four sites were given an "amber" assessment reflecting the limited surface water network in some areas, and some local flood risk. A further three sites were not assessed as two were in an area without public sewerage (one of these sites has private sewerage). No reason was given for the third site.

Early engagement is required with Anglian Water and Thames Water to ensure that the required infrastructure is in place prior to occupation, and a wastewater solution defined where one does not currently exist.

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 28 storm overflows in Uttlesford, 18 on the network, and 10 at WwTWs. In comparison to some urban areas or large cities, Uttlesford has relatively few storm overflows on the sewer network. The Storm Overflow Assessment Framework (SOAF) set a threshold of 60 operations in a year (based on 1 years' data, 50 if based on 2 years data, and 40 if based on 3 years), above which a storm overflow should be investigated. One of the storm overflows (White Roding) was operating above this threshold between 2021 and 2023.

The Storm Overflow Reduction Plan which was published in 2022 sets an objective that "storm overflows will not be permitted to discharge above an average of ten rainfall events per year by 2050". Six of the 18 monitored storm overflows are operating on average above ten times per year so may require action to meet the long-term target.

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

Wastewater treatment

A capacity assessment was undertaken by JBA comparing the future flow from each WwTW (the current actual flow and the forecast additional flow from growth), with the permit limit. Eight of the WwTWs in the study area are expected to be close to or exceeding their permit during the Local Plan period. An increase in the permit limit, and / or upgrades to treatment capacity may be required at these WwTWs in order to accommodate planned growth.

It is important that when planning upgrades at WwTW that the full quantum of growth, including from neighbouring LPAs is taken into account. Population estimates within Anglian Water's Drainage and Wastewater Management Plan suggest that they may have underestimated growth within the catchments of Great Dunmow and Saffron Walden WwTWs.

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.

Water quality

Water quality modelling was performed using the Environment Agency's SIMCAT modelling tool. A baseline scenario was run, updating the existing EA model to the latest flow from WwTW to account for growth since the model was created. A future scenario was then run using the growth forecast for the end of the Local Plan period and the results compared to check for deterioration in water quality. A further test then investigated whether deterioration could be prevented by improvements in upstream treatment. The modelling indicates the growth during the Local Plan period could result in a significant deterioration (10% or over or deterioration in class) in water quality at five WwTWs (Takeley, Great Easton, Great Dunmow, Debden and Great Chesterford). In all cases, this deterioration could be prevented by improvements in treatment.

The modelling also looks at whether growth during the Local Plan period could prevent good ecological status being achieved in the future. The results showed that growth alone will not prevent good ecological status being prevented in the future should improvements in upstream water quality be made, except for Takeley, where environmental capacity could be a constraint to growth.

An additional modelling scenario was run where the additional demand from growth expected to be served by Takeley WwTW was applied to Bishops Stortford WwTW rather than Takeley WwTW. This represents either the new developments being connected to Bishops Stortford, or an equivalent flow being diverted into Bishops Stortford via an adjustment to the sewer network where the two catchments are adjacent.

The feasibility of connecting new developments to Bishops Stortford WwTW or diverting flow has not been assessed and should be discussed with Thames Water.

Transfer of additional flow from commitments and allocations around Takeley and Great Dunmow to Bishops Stortford may be possible providing agreement from Thames Water that there is sufficient capacity at the WwTW to receive additional flow.

Where a WwTW is shared with a neighbouring authority, coordination of growth plans in collaboration with Thames Water and Anglian Water is essential to ensure that infrastructure is in place prior to development to prevent a breach of the environmental permit.

Environmental impact

The potential impact of development on a protected sites within and downstream of Uttlesford should be considered in future plan making. This applies to both the impact of abstraction and of additional wastewater discharge as well as the impact of surface water runoff.

Water quality modelling has predicted a significant deterioration in the river adjacent to four SSSIs within Uttlesford. At two of these sites, deterioration could be prevented by improvements in treatment upstream. At Little Hallingbury Marsh SSSI and Thorley Flood

Pound SSSI, deterioration in the adjacent river could not be prevented, and the predicted deterioration in BOD remains at 11%. The actual concentration remains within High class and returns to less than 10% further downstream.

Further investigation may be required on these sites, in consultation with NE to ensure that the status of these sites is not affected (in line with the requirements of the Wildlife and Countryside Act). This is a cumulative impact of growth in both Uttlesford and East Hertfordshire with 90% of the growth coming from East Hertfordshire. Engagement between the two councils is required to understand and mitigate this cumulative impact.

Four Preferred Allocations are located within groundwater Source Protection Zones. The EA has published management advice for development within these zones (outlined in 9.5.4).

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 SuDS to offer multiple benefits of flood risk reduction, amenity value and biodiversity. Consideration should be given to infiltration and deep borehole SuDS within chalk stream catchments to aid replenishment of the chalk aquifer. 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.

1 Introduction

1.1 Terms of reference

JBA Consulting was commissioned by Uttlesford District Council to undertake a Stage 2 Water Cycle Study (WCS) as part of the evidence base for their local Plan. This builds on the Stage 1 Scoping study completed in 2022. It should be read alongside the Chalk Stream Evidence Base.

1.2 Structure of report

The requirements and objectives of the WCS are set out in the section below. Environmental, planning and water industry policy and legislation relevant to development and water is summarised in Section 2. This is a full update to the chapter contained in Stage 1, and contains new policy published since the Stage 1. Growth within and sharing infrastructure with Uttlesford is summarised in Section 3. This provides an outline of the Preferred Allocations and is the basis for the assessments throughout the study. Sections 4 to 9 assess the impact of the growth forecast on each element of the water cycle. A summary of the conclusions and recommendations is contained in section 10.

1.3 The Water Cycle

Planning Practice Guidance on Water Supply, Wastewater and Water Quality (Department for Levelling Up, Housing and Communities, 2019) describes a water cycle study as:

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

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

The Environment Agency's guidance on WCS (Environment Agency, 2021a) 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
  - 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.

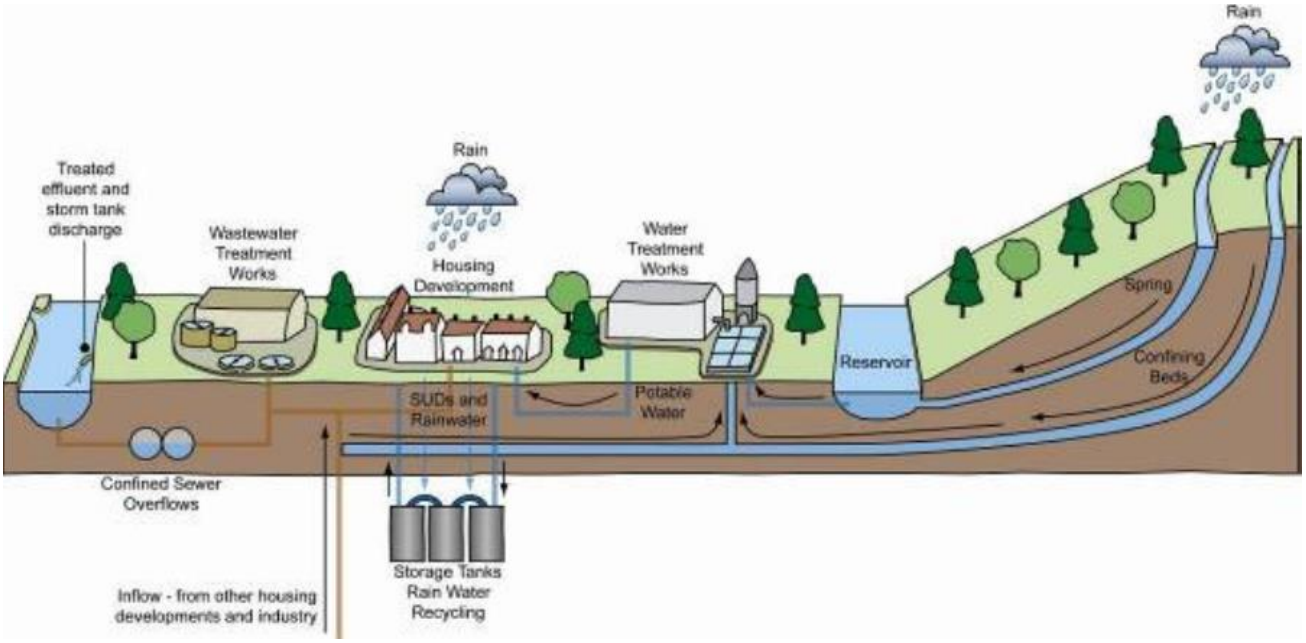

Figure 1.1 The Water Cycle

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 2 Detailed WCS report has been prepared 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 2019 and set up a Climate Change Working Group with interim climate change guidance agreed by Council in 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
- Impact of water supply and wastewater on chalk streams
- The impact of climate change on water infrastructure

2 Policy and legislation

2.1 Introduction

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

References contained within this section (and elsewhere in the report) can be found at the back of this report.

2.2 Plan-making

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

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

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

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

2.3 Water and the Planning System

2.3.1 National Planning Policy Framework and water

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

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

2.3.2 Planning Practice Guidance overview

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

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

2.3.3 PPG - Water Supply, Wastewater and Water Quality

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

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

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

A summary of the advice for plan-makers and for planning applications is contained below but it is recommended that the full text is reviewed.

Plan-making considerations - Infrastructure (Para 005)

- Identification of suitable sites for new or enhanced infrastructure, including the location of existing and proposed development.
- Consider whether new development is appropriate near to water and wastewater infrastructure (for example due to odour concerns).
- Phasing new development so that water and wastewater infrastructure will be in place when needed. Infrastructure should also be in place before any environmental effects occur on designated sites of importance for biodiversity.

Plan-making considerations - Water quality (Para 006)

- How to help protect and enhance local surface water and groundwater in ways that allow new development to proceed and avoids costly assessment at the planning application stage.
- The type or location of new development where an assessment of the potential impacts on water bodies may be required.
- Whether measures to improve water quality, (e.g., SuDS schemes) can be used to address water quality in addition to flood risk.

Plan-making considerations - Wastewater (Para 007)

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

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

Considerations for planning applications - Water supply (Para 016)

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

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

Considerations for planning applications - Water quality (Para 016)

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

- Involve physical modifications to a water body such as flood storage areas, channel diversions and dredging, removing natural barriers, construction of new

locks, new culverts, major bridges, new barrages or dams, new weirs, and removal of existing weirs; and/or

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

2.3.4 PPG - 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 must 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.

The evidence for adopting the optional requirements is outlined in section 4.5. Viability is reviewed in section 2.4.4.

2.3.5 PPG - Climate Change

This guidance (Department for Levelling Up, Housing and Communities, 2019) advises how to identify suitable mitigation and adaptation measures in the planning process to address the impacts of climate change. Planning can help increase resilience to climate change impact through the location, mix and design of development. There is a statutory duty on local planning authorities to include policies in their Local Plan to tackle climate change and its impact.

2.3.6 Levelling-up and Regeneration Act 2023

The Levelling-up and Regeneration Act (HM Government, 2023) aims to support the Government's commitment to reducing geographical disparities between different parts of the UK. Within the Act are several parts relating to the water environment.

Part 7 relates to nutrient pollution standards. Where the Secretary of State considers that a habitats site that is wholly or partly in England is in an unfavourable condition by virtue of pollution from nutrients in water comprising phosphorus or compounds, or nitrogen or compounds, the Secretary of State may designate the catchment area for the habitats site as a phosphorus or nitrogen sensitive area.

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

A phosphorus or nitrogen significant plant is defined as one that discharges treated effluent into a sensitive catchment area and is not exempt in relation to the pollution standard. Unless otherwise defined, the treatment standard for phosphorous is 0.25mg/l, and for nitrogen is 10mg/l.

2.4 Water and design

2.4.1 Building Regulations

The Building Regulations (2010) Part G was amended in early 2015 to require that all new dwellings must ensure that the potential water consumption must not exceed 125 litres/person/day, or 110 litres/person/day where required under planning conditions (HM Government, 2015b) (see 2.3.4).

The Environmental Improvement Plan (discussed in 2.7.2) contains a commitment to consider a new standard for new homes in England of 105 litres per person per day (l/p/d) and 100 l/p/d where there is a clear local need, such as in areas of serious water stress. Whilst this new standard is only under consideration, it demonstrates the direction of travel for water efficiency standards, and it is highly likely that this or a similar standard will be adopted.

2.4.2 Building Research Establishment

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 (BRE, 2023a), and commercial, leisure, educational facilities and mixed-use buildings by the Building Research Establishment Environmental Assessment Methodology (BREEAM) UK New Construction Standard (BRE, 2018b).

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”.

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

2.4.3 Energy and Water

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

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

2.4.4 Viability

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

- A 2014 study into the cost of implementing sustainability measures in housing found that meeting a standard of 110 litres per person per day would cost only £12 (at 2023 prices) for a four-bedroom house (EC Harris, 2014).

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

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

2.5 The Water Industry

2.5.1 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 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 are able to switch their water supplier and/or sewerage undertaker;
- new businesses will be able to enter the market to supply these services;
- measures to promote a national water supply network; and
- enabling developers to make connections to water and sewerage systems.

The water industry is primarily regulated by three regulatory bodies:

- **Economic regulation:** Office of Water Services (Ofwat) are the economic regulator. They have a statutory duty to protect the interests of consumers, ensuring water companies carry out their functions (customer service standards, environmental rules, drinking water standards etc) and can finance them. Part of this role is setting the limits on pricing of water and sewerage services.
- **Environmental regulation:** The Environment Agency are the environmental regulator. They are responsible for monitoring the impact of the water industry (as

well as others) on the environment and issuing permits for abstraction of water and discharge of wastewater.

- **Drinking water regulation:** Finally, the Drinking Water Inspectorate (DWI) implement standards for drinking water and can take enforcement measures against water companies if those standards are not met.

2.5.2 Planning and funding of the water industry

The water industry works on a five-year cycle called the Asset Management Plan period or AMP periods. Every five years a water company submits a Business Plan to Ofwat for a Price Review. These plans set out the companies' operational expenditure (OPEX) and capital expenditure (CAPEX) required to maintain service standards, enhance service (for example where sewer flooding occurs), to accommodate growth and to meet environmental objectives defined by the Environment Agency. Ofwat assesses and compares the plans with the objective of ensuring what are effectively supply monopolies are operating efficiently, and that the company is meeting its obligations. It then sets the allowable price increase for consumers based on the retail prices index, the business plan, and taking into consideration affordability for consumers. The current AMP period is AMP 7 (2020-2025), and the price of water for this period was set by Ofwat late in 2019 in a process referred to as Price Review 19 (PR19). The new price came into effect in April 2020. The next price review will be 2024 (PR24) and will set prices from 2025 to 2030. This system gives stability in pricing. Within this price review process there may also be incentives and penalties on the water company for exceeding or failing to meet targets.

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 Water Resource Management Plans (WRMPs).

The Water Industry National Environment Programme (WINEP) is a set of actions that are defined by the EA and given to all water companies operating in England for completion during a particular AMP period. The aim of the programme is to support the objectives in the Environment Act, Water Framework regulations, Habitats regulations and other environmental objectives. Examples of typical actions could include investigations into the sustainability of an abstraction, a reduction in an abstraction to support river flows, or new permit limits at a wastewater treatment works.

Water and wastewater infrastructure requires significant lead-times to plan, obtain planning and other permissions, finance and construct. The time required to provide new or upgraded infrastructure to serve a development or a larger spatial plan is highly locally specific. The following is provided as an indicative guide to lead-times.

Table 2.1: Indicative lead-times (years) for new infrastructure to serve development

Scale of development	Water supply	Water resources	Wastewater network	Wastewater treatment
Minor	1	N/A	1	N/A
Major	1-3	5-10	1-5	3-5
Strategic / Plan	3-5	10-20	5-10	5-10

2.5.3 Planning for Water

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.

Affinity Water's revised draft WRMP for 2024 is published here and is reviewed in detail for the study area in section 4.3.

Drought Plan

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

- Drought triggers - these are points where a water company will take action to manage supply and demand. They are based on monitoring of rainfall levels, river flows, groundwater levels and reservoir stocks.
- Demand management actions - how a water company will reduce demand for water during a drought. Actions that save water before taking more water from the environment must be prioritised. These could include:

    - reducing leakage;
    - carrying out water efficiency campaigns with customers;
    - reducing mains pressure; and
    - restricting water use, for example through temporary use bans which limit hosepipe and sprinkler use.
- Supply management actions - how a water company will maintain water supply during a drought. Actions that have the least effect on the environment must be prioritised. This could include:
    - carrying out engineering work to improve its supply;
    - transferring water in bulk from other water companies;
    - using drought permits and drought orders to abstract more water;
    - using desalination - permanent or temporary plants; and
    - using tankers to supply customers with water directly.
- Extreme drought management actions - the actions it could take in an extreme drought. These could delay the need to use emergency restrictions standpipes and rota cuts.
- Communicating during a drought - a water company must set out how it will communicate in a clear and timely way during a drought with customers, partners or other stakeholders.
- Environmental assessment, monitoring and mitigation. A drought plan must include:
    - an environmental assessment;
    - an environmental monitoring plan for each supply management action; and
    - details of mitigation measures the company plans to take for each supply management action.
- End of a drought - a water company must explain how it will identify when a drought is over or ending and the actions it will take during this stage, communicate this information to customers, and review its performance.

Regional water resource planning

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 District Council. An advisory group consisting of their regulators (Environment Agency and Ofwat) and Defra regularly attend meetings of WRSE.

WRSE published a revised draft Regional Water Resources Plan in 2023 (WRSE, 2023). Their planning process informed the next round of company WRMPs to be published in 2024. The final version of the regional plan will be published later in 2024 once the Southern Water WRMP is complete.

2.5.4 Planning for Wastewater

21st Century Drainage

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 (Water UK, 2018) sets out how the industry intends to approach these goals. Companies were required to published finalised DWMPs in 2023 to inform their business plans for the 2024 Price Review.

Drainage and Wastewater Management Plans (DWMPs)

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

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

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

Anglian Water's final DWMP is published here.

Thames Water's final DWMP is published here. Both plans have been taken into account in Sections 6 and 7. Interactive mapping for both plans is also available via the links to allow readers to view the status of individual WwTWs.

2.5.5 Developer Contributions and connection charges

A significant part of water company business is the interface with developers to facilitate connection to the public water supply and sewerage systems, through their developer services functions. Developments with planning permission have a right to connect to the public water and sewerage systems, (where this is for domestic use), 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.

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.

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

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

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

- A discount of £18 per plot when an approved Plumber or Groundworker is used for external pipework;
    - The discount is only applicable to the customer side pipework that is external to the property/premises;
    - The approved contractor must be certified for ‘underground pipework’ activities;
    - A Water Industry Approved Plumbers Scheme (WIAPS) certificate must be provided for each plot whereby the discount has been applied;
    - Affinity Water reserve the right to carry out Water Regulations inspections to ensure the certified work meets the requirements under the Water Supply (Water Fittings) Regulations 1991;
    - This discount applies where call off connection requests occur within the relevant charging year and will not be retrospectively levied.
- A discount to the infrastructure charge for new homes where there is evidence of water efficiency design to a standard of 110 litres (or less) per person per day. The discount was -£589 per infrastructure charge in 2024/25.

Anglian Water publish their charging arrangements here.

- They offer an environmental incentive including a reduction in the sewerage infrastructure charge if a sustainable surface water discharge method is used as an alternative.

Thames Water publish their charging arrangements here.

- They offer a wastewater incentive for reducing run-off leaving the development into their sewerage network. There are two options for achieving this discount:
  - Reduction of surface water run-off discharged to the Thames Water network: the development utilises SuDS which reduces the overall volume discharged to their network by 95% or more, based on a 1-year return period.
  - Removal of all surface water run-off discharged to the Thames Water network: the development has no surface water connection to their network or utilises SuDS so that all surface water flows outfall to ground/watercourse and ultimately the development discharges zero flows to their network.
- The discount is £30 per property in the 2023-24 charging arrangements, and applicants must provide evidence that the development's planning consent and associated drainage strategy meet the requirements above.

2.5.6 Water companies and the planning system

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

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.

Defra has issued National Policy Statements (NPSs) on Nationally Significant Infrastructure Projects (NSIPs) for wastewater (Department of Environment, Food & Rural Affairs, 2012) and water (Department of Environment, Food & Rural Affairs, 2023), to be used as the primary basis when considering applications for Development Consent Orders (DCOs).

2.6 Flood Risk and Surface Water

2.6.1 Flood and Water Management Act 2010

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

The FWMA has created clearer roles and responsibilities and helped to define a more risk-based approach to dealing with flooding. This included the creation of a lead role for LAs,

as LLFAs, designed to manage local flood risk (from surface water, ground water and ordinary watercourses) and to provide a strategic overview role of all flood risk for the EA.

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

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

- Designation of local authorities as SuDS Approval Bodies (SAB) which have a duty to adopt new drainage systems.
- The cessation of the automatic right for new developments to connect to the existing sewer system.
- Developers must ensure that drainage systems are built as per the approved drainage plan that complied with mandatory national standards as outlined in the NPPF and the PPG.

2.6.2 Local Flood Risk Management Strategy (LFRMS)

Local Flood Risk Management Strategies set out how Lead Local Flood Authorities (LLFA) will manage local flood risk from surface water runoff, groundwater and ordinary watercourses, for which they have a responsibility as LLFA. They also set out the work that other Risk Management Authorities are doing to manage flood risk within the area.

The Essex County Council (ECC) Local Flood Risk Management Strategy (Essex County Council, 2018) sets out the following objectives:

- To provide a clear explanation of everyone's responsibilities.
- To make sure people understand their risk of flooding and think about how this is communicated.
- To explain how flood risk in Essex is assessed and how work is prioritised.
- To clearly set out ECC's work so that communities and businesses can make decisions about how they manage flood risk.
- To ensure that planning decisions properly consider flooding and the future impact of any development.
- To state how information is shared and how EEC work with other authorities.
- To ensure that emergency plans and responses to flood incidents are effective and that communities are prepared for flooding.
- To encourage innovative new thinking, considering community needs, while working with the existing natural and built environment.
- To highlight where further detailed information and legislation regarding flooding can be found.

2.6.3 Strategic Flood Risk Assessment (SFRA)

All LPAs are required, under NPPF, to prepare a SFRA, which forms a key part of the evidence base for their Local Plan. The SFRA must consider flood risks from all sources, collating up-to-date flood risk data and in some cases developing new flood risk modelling. The SFRA is used to inform the Sequential Test, by which Local Plan allocations should be sequentially selected to direct development towards areas of lower flood risk, taking into consideration the vulnerability to flooding of the proposed land use. Uttlesford District Council's current SFRA was published in 2021 (JBA Consulting, 2021) and is currently being updated. A level 2 SFRA is currently being prepared to support the Reg. 19 consultation.

2.6.4 Surface Water Management Plan

Surface Water Management Plans (SWMPs) outline the preferred surface water management strategy in a given location and establish a long-term action plan to manage surface water. SWMPs are undertaken, when required, by LLFAs in consultation with key local partners who are responsible for surface water management and drainage in their area. Essex County Council has published SWMPs for 10 locations across the county. One location, the Lower Sheering SWMP, intersects the Uttlesford study area to the east of Hatfield Heath (ECC, 2022).

2.6.5 Sustainable Drainage Systems

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

- The National Planning Policy Framework, which requires that development in areas already at risk of flooding should give priority to sustainable drainage systems.
- The House of Commons written statement (Pickles, 2014) setting out governments intentions that LPAs should “ensure that sustainable drainage systems for the management of run-off are put in place, unless demonstrated to be inappropriate” and “clear arrangements in place for ongoing maintenance over the lifetime of the development.” This requirement 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 (HM Government, 2015c). These set out the government’s high-level requirements for managing peak flows and runoff volumes, flood risk from drainage systems and the structural integrity and construction of SuDS. This very

short document is not a design manual and makes no reference to the other benefits of SuDS, for example water quality, habitat, and amenity.

Essex County Council are the LLFA and play a key role in ensuring that the proposed drainage schemes for all new developments comply with technical standards and policies in relation to SuDS. Further information on surface water drainage can be found here.

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

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

Affinity Water provides guidance in their Affinity Water Design Construction Specification Document available here. Applications for projects should be made through their website.

Anglian Water provides guidance for developers here, and a SuDS Adoption Manual is also available online.

Thames Water do not publish any SuDS guidance themselves, but refer instead to the CIRIA SuDS Manual referred to above.

2.6.6 Design and Construction Guidance

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

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

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.

2.7 Environmental Protection and Biodiversity

2.7.1 The Environment Act 2021

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

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

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

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

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

2.7.2 25-year Environment Plan

The Environmental Improvement Plan (EIP) is the first revision of the 25-year environment plan (25YEP) published in 2018. It contains ten goals which are shown in Figure 2.1. The full text of the EIP can be found here. Government must review and revise the plan, if needed, every five years to ensure continued progress against the ten 25YEP goals.

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

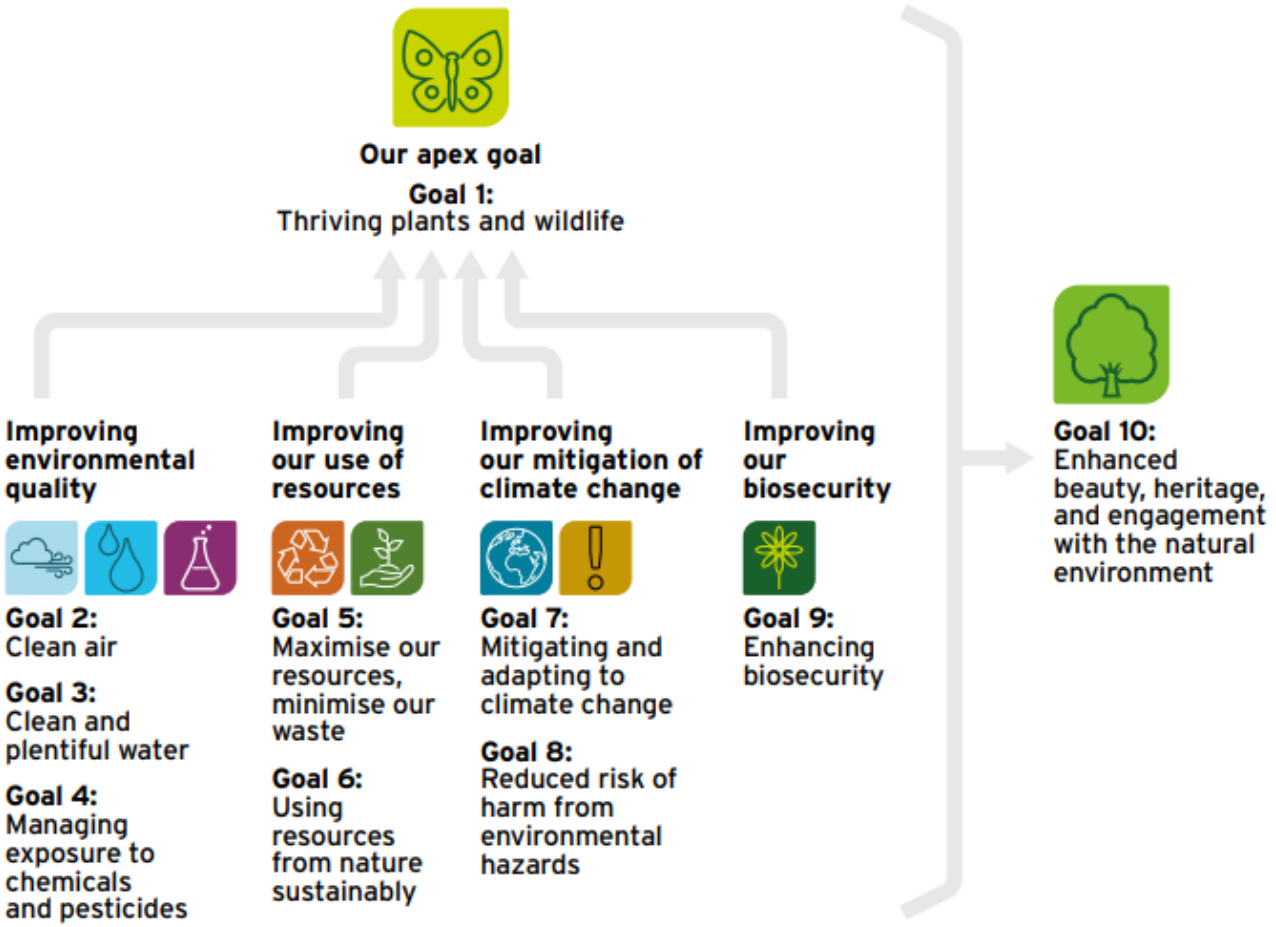

Figure 2.1 The 10 Environmental Improvement Plan goals

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

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

- Target a level of resilience to drought so that emergency measures are needed only once in 500-years."

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

- Ensure water companies are delivering on our targets and commitments through enhanced transparency and monitoring mechanisms in the Environment act, targeted enforcement from regulators and increasing the maximum fines.
- Direct water company fines relating to environmental breaches to improving the water environment.
- Crack down on sewage pollution by holding water companies to account for delivering the targets set out in the Storm Overflows Discharge Reduction Plan.
- Require water companies to upgrade 160 of their wastewater treatment works to meet the strictest phosphorus limits by 2028, and upgrade a further 400 by 2038, to reduce harmful nutrient pollution from wastewater.
- Reduce agricultural pollution across England by paying farmers to protect and enhance watercourses through new farming schemes and investing in improved slurry storage and management through our grants, providing advice to farmers to improve their practices through the expanded Catchment Sensitive Farming partnership scheme, and ensuring farmers are meeting legal standards of responsible farming through our expanded and targeted farm visits programme.
- Increase our resilience to drought by working with regulators and water companies to reduce household and non-household water use, and ensuring water companies are delivering a 50% reduction in leakage by 2050.
- Roll out new water efficiency labelling and deliver our ten actions in the Roadmap to Water Efficiency in new developments.
- Deliver a ten-fold increase in the Water and Abandoned Metal Mines programme, upscaling the existing three treatment schemes with 40 more by 2038, to tackle harmful pollutants from abandoned metal mines.
- Protect our chalk streams by supporting the Chalk Stream Strategy.
- Make Sustainable Drainage Systems mandatory in new developments subject to final decisions, following consultation, on scope, threshold and process.

Progress towards delivering the EIP will be monitored annually.

2.7.3 Defra Plan for Water

Defra's Plan for Water (Department for Environment, Food & Rural Affairs, 2023) provides further detail on the actions towards achieving Goal 3 of the EIP23. It promotes an integrated approach to water management as the foundation of the plan. Whilst many of the actions contained within the Plan for Water are outside of the responsibilities of areas of influence of the LPAs, the following summarises those actions that LPAs should have regard to:

- Require standardised sustainable drainage systems (SuDS) in new housing developments in 2024, subject to final decisions on scope, threshold, and process following consultation in 2023.

- Designate all chalk catchments as water stressed and high priority under the sewer overflows reduction plan, driving action to improve water management.
- The plan reflects the predicted 4 billion litre per day (4,000 ml/d) gap between supply and demand across England and contains measures to both boost supply and reduce demand. Of interest to LPAs is the plan to reduce demand which will address half of the gap.
- A key component in reducing demand for water is improving water efficiency and there is a target under the Environment Act to reduce the use of public water supply in England per head of population by 20% by 2038.A road map on water efficiency in new developments and retrofits has been developed with ten actions to improve water efficiency:
    - Action 1 - Implement schedule 3 to the Flood and Water Management Act 2010. The 2024 consultation will consider rainwater harvesting in developing the statutory SuDS National Technical Standards.
    - Action 2 - Review the Water Supply (Water Fittings) Regulations 1999, the Water Supply (Water Quality) Regulations 2016 and/or any other relevant legislation to address wasteful product issues with toilets and enable new water efficient technologies.
    - Action 3 – Develop clear guidance on ‘water positive’ or ’net zero water’ developments and roles for developers and water companies.
    - Action 4 – Review water efficiency options in planning, building regulations and through voluntary schemes for non-household buildings.
    - Action 5 – Work with Ofwat to ensure the water industry can play a central role in retrofitting water efficient products in households, businesses, charities and the public sector.
    - Action 6 – Work across government to integrate water efficiency into energy efficiency advice and retrofit programmes.
    - Action 7 - Review the Building Regulations 2010, and the water efficiency, water reuse and drainage standards including considering a new standard for new homes in England of 105l/p/d and 100 l/p/d where there is a clear local need.
    - Action 8 –Mandatory water efficiency labelling scheme.
    - Action 9 – Investigate dual pipe systems (rainwater harvesting) and water reuse options for new housing development as part of the review of the planning framework.
    - Action 10 – Enable innovative water efficiency approaches in buildings, including technologies and approaches to funding and maintenance.

2.7.4 Biodiversity Net Gain

Biodiversity net gain (BNG) is designed to contribute to the recovery of nature while developing land. The principle is that the natural environment is in measurably better state after development than it was before. The Environment Act 2021 requires all planning

permissions granted in England (except for small sites) to achieve 10% BNG since January 2024. This was also required on small sites since April 2024.

Defra publishes a biodiversity metric tool, the latest version of which must be used for calculating the BNG deriving from a proposed development.

2.7.5 Local Nature Recovery Strategy

The Environment Act (HM Government, 2021) also established a duty to prepare, by March 2025, Local Nature Recovery Strategies (LNRS), recognising that England is one of the most nature-depleted countries in the world. Essex County Council are the authority responsible for preparing the LNRS In the study area. They are tasked with working with local partners to agree priorities for nature recover and identify "practical, achievable proposals" (Department for Environment Food & Rural Affairs, 2023) to address these priorities. The LNRS should also co-ordinate with neighbouring strategies to form a national Nature Recovery Network.

There is a close linkage with BNG, as developments proposing to create, enhance or recover habitat in locations mapped by the LNRS receive a higher value in the biodiversity metric calculator than in other locations.

2.7.6 Storm Overflow Reduction Plan

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

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

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

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

Introduction

The European Union Water Framework Directive (WFD) 2000 is currently transposed into English and Welsh law by the Water Environment Regulations (HM Government, 2017). They apply to all waterbodies (watercourses, canals, lakes, estuaries and coastal waters), with the objective of meeting Good Ecological Status (GES) or, where heavily modified, Good Ecological Potential (GEP) To meet GES or GEP, a water body must achieve a good or high score for all elements - in the case of surface water, these are biological, physico-chemical, specific pollutants and hydromorphology (Figure 2.2). UK policy remains to meet GES or GEP for all waterbodies by 2027.

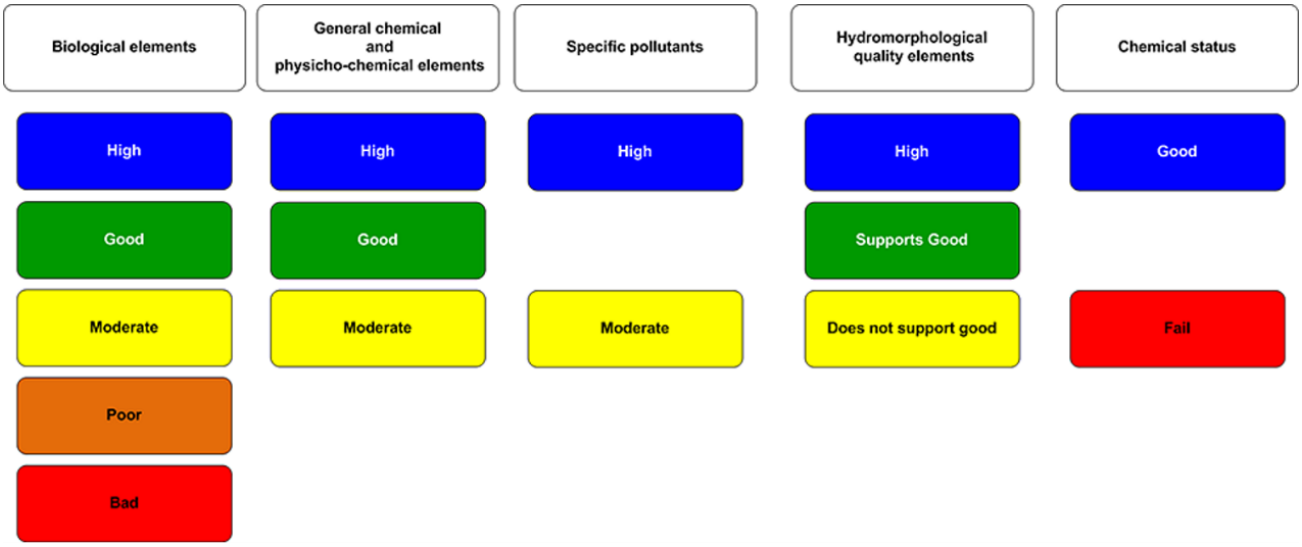

Figure 2.2: Status classification for surface water

(Environment Agency, 2023a)

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

River Basin Management Plans

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 both the Anglian (Environment Agency, 2022) and Thames RBDs (Environment Agency, 2024). The third cycle RBMPs were published in 2022. A primary WFD objective is to ensure 'no deterioration' in environmental status, therefore all water bodies must meet the class limits for their status class as declared in the 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:

- Preventing deterioration of the status of surface waters and groundwater.
- Achieving objectives and standards for protected areas.
- Aiming to achieve good status for all water bodies.
- Reversing any significant and sustained upward trends in pollutant concentrations in groundwater.
- Cessation of discharges, emissions and losses of priority hazardous substances into surface waters.

- Progressively reducing the pollution of groundwater and preventing or limiting the entry of pollutants.
- Local Planning Authorities (LPAs) must have regard to the Water Framework Directive as implemented in the RBMPs. It is of primary importance when assessing the impact of additional wastewater flows on local river quality.
- Alongside the RBMP documents, the data behind them can be explored further using the Catchment Data Explorer (Environment Agency, 2023a) and map viewer (Environment Agency, 2023b).

Protected Area Objectives

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

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

The types of protected areas are:

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

2.7.8 Conservation of Habitats 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 which was aimed at protecting plants, animals and habitats that make up the natural environment. The regulations were 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) or candidate SAC.
- A Site of Community Importance (SCI).
- 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) or potential SPA.
- Ramsar sites.

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.

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 ruled out, and where there are no alternative solutions, the plan or project can only proceed if there are imperative reasons of over-riding public interest and if the necessary compensatory measures can be secured.

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.

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

- Nutrient Neutrality. Natural England (NE) has identified a number of catchment areas where Habitats Sites are in unfavourable condition due to eutrophication (an excess of the nutrients phosphorous and/or nitrogen in water). NE have

advised that developments in these catchments must demonstrate that they do not cause harm, and that one way to do this is to introduce mitigation measures in the catchment area which offset the additional nutrients emitted as a result of the development, an approach known as nutrient neutrality. There are no parts of the study area which are currently within a nutrient neutrality catchment area, however NE may designate additional areas in the future.

- Water Neutrality. Natural England (NE) has issued a position statement that it cannot be concluded with sufficient certainty that groundwater abstractions in the Arun Valley, West Sussex are causing no adverse effect on Habitats Sites. NE have advised that developments in Sussex North Water Resource Zone must demonstrate that they do not cause harm, and that one way to do this is to introduce mitigation measures in the zone which offset the additional water consumed as a result of the development, an approach known as water neutrality. There are no parts of the study area which are currently within a water neutrality zone, however NE may designate additional areas in the future.
- Both nutrient and water neutrality designations have resulted in significant impacts on the granting of planning permission in the designated areas.

2.7.9 Wildlife and Countryside Act

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

The Government's 25-year Environment Plan has a target of "restoring 75% of our one million hectares of terrestrial and freshwater protected sites to favourable condition, securing their wildlife value for the long term." In line with this, and the Wildlife and Countryside Act 1981, Local Authorities should 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).

2.7.10 Ramsar

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

- Wise use of all their wetlands.
- Designating sites for the Ramsar list of "Wetlands of International Importance" (Ramsar Sites) and their conservation.

- Cooperating on transboundary wetlands and other shared interests.
- “Wise use” of wetlands is defined under the convention as “the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development” (Ramsar Convention Secretariat, 2010).
- In the UK, Ramsar Sites are designated by 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). Additionally, the NPPF states that Ramsar sites should be given the same protection in the planning process as sites designated under the EU Habitats Directive.

2.7.11 Bathing Water Regulations

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

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

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.

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.

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

2.7.12 Environmental Permitting Regulations

Environmental permitting is a process used to manage and regulate activities which may cause harm to the environment. The Environmental Permitting Regulations (HM

Government, 2016) were introduced in order to streamline a wide-ranging number of environmental permitting laws under one set of regulations. These include permits for emissions to air, water and land, and cover a range of industrial sectors and waste management streams.

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

- The regulations are used to permit discharges from water company and private wastewater treatment works, and for sewer overflows.
- The Environment Agency will usually object to applications for a new private Package Treatment Plan (PTP) or septic tank where it is feasible to connect the development to a public sewerage system. A general rule of 30m per dwelling is used to define a reasonable distance from the site boundary to a public sewer. Hence a development of 10 homes should connect to a public sewer within 300m of the boundary, unless there are significant barriers, such as a river or motorway. A similar rule of thumb applies to non-household development where the maximum discharge volume in cubic metres is divided by 0.75 and the result multiplied by 30 metres to obtain the distance over which a connection would typically be made.
- Where an existing or new development treats its own wastewater, a PTP must be installed if the discharge is directly to surface water. Where the discharge is to ground, a PTP or septic tank may be used, but must be connected to a suitably designed drainage field.

2.7.13 Groundwater protection

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

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

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

area, whichever area is the largest. This is the minimum length of time the Environment Agency think pollutants need to become diluted or reduce in strength by the time they reach the borehole.

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

2.8 Summary of key new and emerging policy and legislation

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

- Schedule 3 of the Flood and Water Management Act is expected to be enacted in England in 2024. This will designate Lead Local Flood Authorities as SuDS Approval Bodies (SABs) with a duty to adopt new SuDS and removing the automatic right to connect to public sewers.
- Defra have signalled their intention, with the Plan for Water, to review the water efficiency standards for new homes, including consideration of a new national 105l/p/d standard and 100l/p/d where there is a clear local need.
- All development sites will be expected to demonstrate at least a 10% net-gain in biodiversity from 2024.
- The designation of specific catchments in England as requiring to demonstrate Nutrient Neutrality under the Conservation of Habitats Regulations has led to significant limitations to development in these areas, as well as the development of offsetting schemes to enable nutrient-neutral development. The government (Defra, 2024) has instructed competent authorities (including LPAs) undertaking HRAs for development draining via a sewer to a wastewater treatment works in nutrient sensitive areas to consider that the nutrient pollution standard will be met by 2030. At the time of writing, this notice was the subject of a legal challenge.
- Similarly, the availability of water resources, and the impact of new water demand on the environment, has led to restrictions on granting planning permission in Sussex North WRZ and a requirement to demonstrate water-neutral development in Cambridge Water WRZ. It is anticipated that LPAs will be increasingly required to demonstrate that there will be sufficient water resources to supply development without causing further harm to the environment through the life of their Local Plans.

3 Future Growth in Uttlesford

3.1 Introduction

The following section summarises how Uttlesford is expected to grow during the Local Plan period and allows a forecast to be created that can be used to predict the volume of water and wastewater required in the future and the resulting pressure on water infrastructure. This forecast consists of:

- Preferred allocations - sites planned to be allocated in the Local Plan (shown in Figure 3.1).
- Commitments - sites with extant planning permission.
- Recent completions - sites completed in the last year that may not yet appear in flow data provided by the water companies - for this study 2022/23 data was used.
- Windfall - sites that have not been specifically identified in the Local Plan.
- Neighbouring authority growth - growth served by infrastructure within or shared with Uttlesford.

Information on potential sites and expected growth during the plan period was provided by UDC and collated into a forecast for housing and employment floor space. East Hertfordshire and Greater Cambridge were also contacted for their growth forecasts.

3.2 Growth in Uttlesford

3.2.1 Preferred options allocations

UDC have identified nine preferred allocations for inclusion in the draft Local Plan which are shown in Table 3.1 below. The location of these is shown in Figure 3.1.

Table 3.1 Preferred allocations

Site name	Map Ref.	Number of dwellings	Employment floorspace
Land east of Station Road, Elsenham	6	150	-
Land east of High Lane and Land at Walpole Meadows, Stansted Mountfitchet	4	390	-
Land off The Broadway and Land east of B1008, Great Dunmow	9	884	-
Land east of Shire Hill Farm and south of Radwinter Road, Saffron Walden	5	879	8,000m^2 Mixed B
Land at Warrens Farm and Land at Warish Hall Farm, Little Canfield and Takeley	3	1,546	-
Land at Gaunts End, Elsenham	1	-	1,950m^2 B1a

Site name	Map Ref.	Number of dwellings	Employment floorspace
Land north of Takeley Street, Takeley	7	-	8,500m^2 E(g)iii/B2 and B8
Land at Little Chesterford Research Park	2	-	3,450m^2 B1c
Land south of A120/North of Stortford Road, Great Dunmow	8	-	9,500m^2 E(g)iii/B2 and B8
Total	-	3,849	31,400m^2

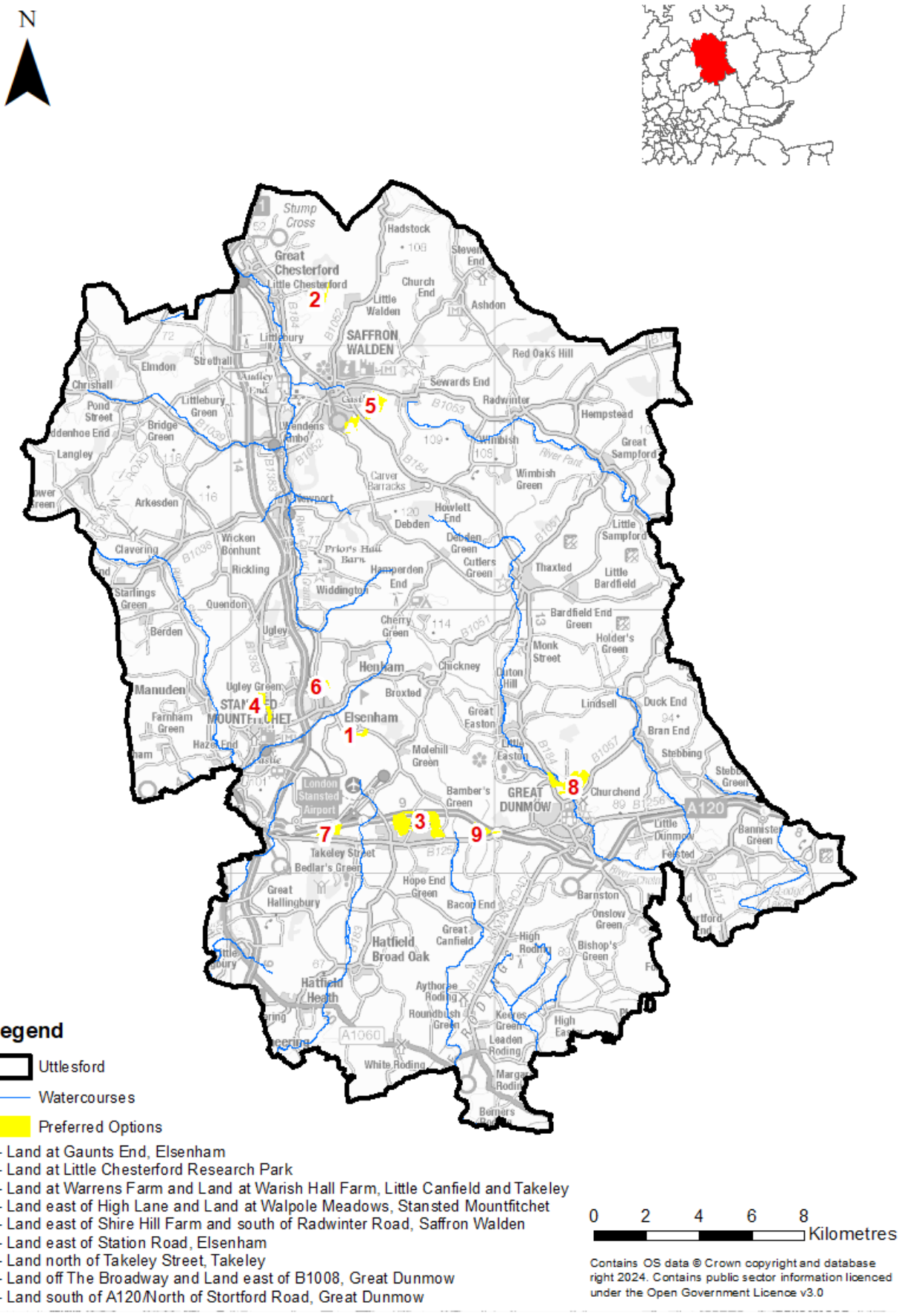

Figure 3.1 Preferred allocations

3.2.2 Commitments and completions

Existing commitments and recent completions were provided by UDC showing the position on 30 November 2023. This consists of 609 residential sites, providing 8,508 dwellings, and 59 employment sites providing 238,200m^2 of employment floorspace.

3.2.3 Windfall

Windfall sites are sites that have not been specifically identified in the Local Plan. They often comprise previously developed sites that have unexpectedly become available. UDC provided an estimate of 1,650 dwellings during the Local Plan period to account for windfall growth. By its nature, it is not known where windfall growth will occur, however in general, windfall growth often occurs in built-up areas where other growth is planned. Windfall growth has therefore been distributed between WwTW in the study area based on the distribution of existing commitments and allocations. Table 3.2 shows this distribution.

Table 3.2 Distribution of windfall growth

WwTW	Assumed number of dwellings during plan period
Ashdon WwTW	1
Bishops Stortford WwTW	221
Broxted WwTW	1
Clavering WwTW	9
Debden WwTW	4
Elmdon WwTW	1
Felsted WwTW	57
Great Chesterford WwTW	28
Great Dunmow WwTW	481
Great Easton (Essex) WwTW	175
Great Sampford WwTW	0
Hatfield Heath WwTW	5
High Easter WwTW	0
High Roding WwTW	1
Leaden Roding WwTW	0
Little Hallingbury WwTW	2
Manuden WwTW	9
Newport WwTW	26
No public sewer	71
Saffron Walden WwTW	277
Stansted Mountfitchet WwTW	222
Takeley WwTW	57
Wendens Ambo WwTW	1

WwTW	Assumed number of dwellings during plan period
Willows Green WwTW	0
Wimbish WwTW	1
Total	1,650

3.3 Growth outside Uttlesford

3.3.1 General approach

Where growth within a neighbouring Local Authority area may be served by infrastructure within or shared with Uttlesford, it is important to take this into account when considering infrastructure capacity or environmental impact. The wastewater catchments provided by AW and TW were used to identify where infrastructure could be shared across boundaries. Neighbouring authorities to Uttlesford are shown in Figure 3.2. East Hertfordshire and Greater Cambridge share wastewater catchments with Uttlesford. Bishops Stortford WwTW serves the town of Bishops Stortford in East Herts as well as areas around Stansted Airport, and Great Chesterford WwTW and Linton WwTW are shared with Greater Cambridge in the North. Both neighbouring authorities were contacted in order to obtain their forecast for growth during the plan period, and a summary of this information is provided in the sections below.

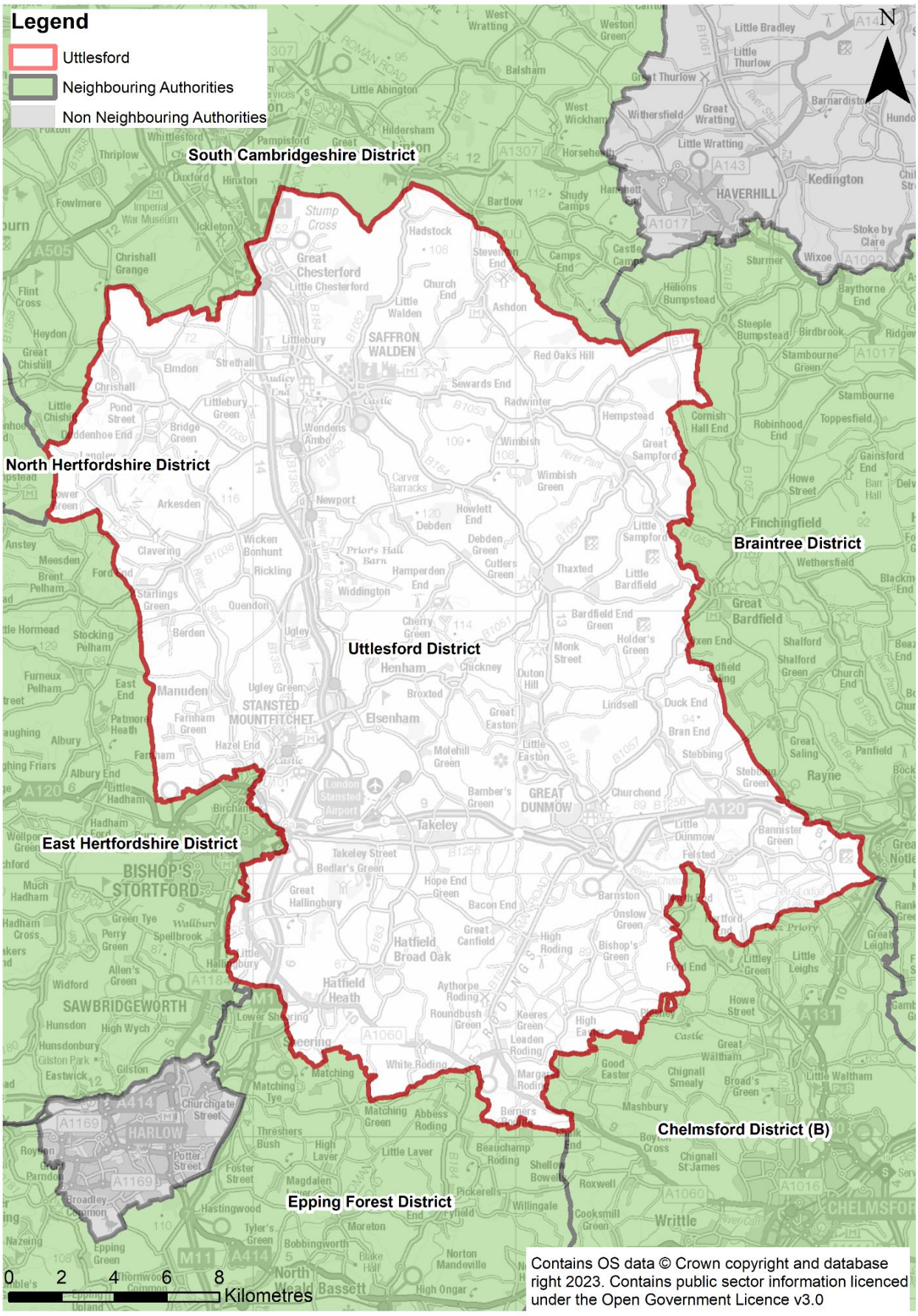

Figure 3.2 Neighbouring authorities to Uttlesford

3.3.2 East Hertfordshire District Council

Growth in around the town of Bishops Stortford is expected to be served by Bishops Stortford WwTW, a summary of this growth is shown in Table 3.3. The level of growth within this catchment is much higher than the level of growth from Uttlesford, and higher than the growth forecast provided for Stage 1. It is therefore important for UDC to engage with East Herts and TW to ensure the full forecast of growth from both LPAs when capacity upgrades at this WwTW are considered.

Table 3.3 Growth from East Hertfordshire

WwTW	Residential	Employment
Bishops Stortford	17,377 dwellings on 22 sites	78,686m^2 on 10 sites

3.3.3 Greater Cambridge Planning Authority

Two catchments in the north of the study area serve growth in both Uttlesford and Greater Cambridge. A summary of this growth is shown in Table 3.4

Table 3.4 Growth from Greater Cambridge

WwTW	Residential	Employment
Great Chesterford	1,500 dwellings on 1 site	508m^2 on 1 site One further site did not have a floorspace estimate but was expected to result in 4,000 additional employees.
Linton	None identified	47,269m^2 on 5 sites

4 Water resources

4.1 Status of water resources in Uttlesford

4.1.1 Water resources in the UK

It is important to set water resources in Uttlesford within the context of the overall national picture.

The Environment Agency (Environment Agency, 2024) have published a summary of the revised draft regional and Water Resources Management Plans which includes their view on the overall state of water resources in the UK and the challenges the country faces. They state that:

- "In England, our climate is changing, our population is growing, and as a nation we want an improved environment along with a thriving economy, enabled by resilient water supplied. Action is required now to meet these objectives".
- "The scale of the challenge we face increases with time and, by 2050, we are looking at a shortfall of nearly 5 billion litres of water per day between the sustainable water supplied available and the expected demand."
- "Demand reductions are crucial, particularly in the short term. The Environment Act 2021 sets a target to reduce the use of public water supply in England, per head of population, by 20% by 2037-38 from the 2019-20 baseline."
- "Government will be looking to water companies to act quickly and take significant steps forward on installing smart meters and delivering on their wider water efficiency commitments and reducing leakage. This will happen alongside the introduction of a mandatory water label which will enable water efficient decisions across the country. The government has also committed to review water efficiency requirements of building regulations which will be a key action to ensure new homes are water efficient."

There have been several important documents published in recent years, all highlighting the growing awareness and concern about this issue. The National Water Resources Framework led to the creation of the regional water resources planning groups and defined the objective to achieve an average household water efficiency of 110l/p/d by 2050 (including existing housing).

The Government's Environmental Improvement Plan published in January 2023 contains a roadmap for improving water efficiency in new developments and retrofits. This contains an action to review Building Regulations (2010) and consider a new standard for new homes in England of 105 l/p/d and 100 l/p/d where there is a clear local need, such as in areas of serious water stress. Whilst this is not current policy, it is likely that a tighter standard than the 110 l/p/d will be adopted in Building Regulations early in the Local Plan period.

4.1.2 Water Resource Zone in Uttlesford

Affinity Water provide the water supply to Uttlesford and to neighbouring areas to the south and west. They 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). The extent of this WRZ is shown in Figure 4.1.

Within a WRZ a customer may receive their water from anywhere within the zone, or from water transferred from other zones, and not necessarily from the nearest source. For this reason, it is not possible to say that an individual development site will increase abstraction from a particular water source. It is for the water company to balance the water sources they have to provide a sufficient supply for the WRZ, while meeting their environmental obligations.

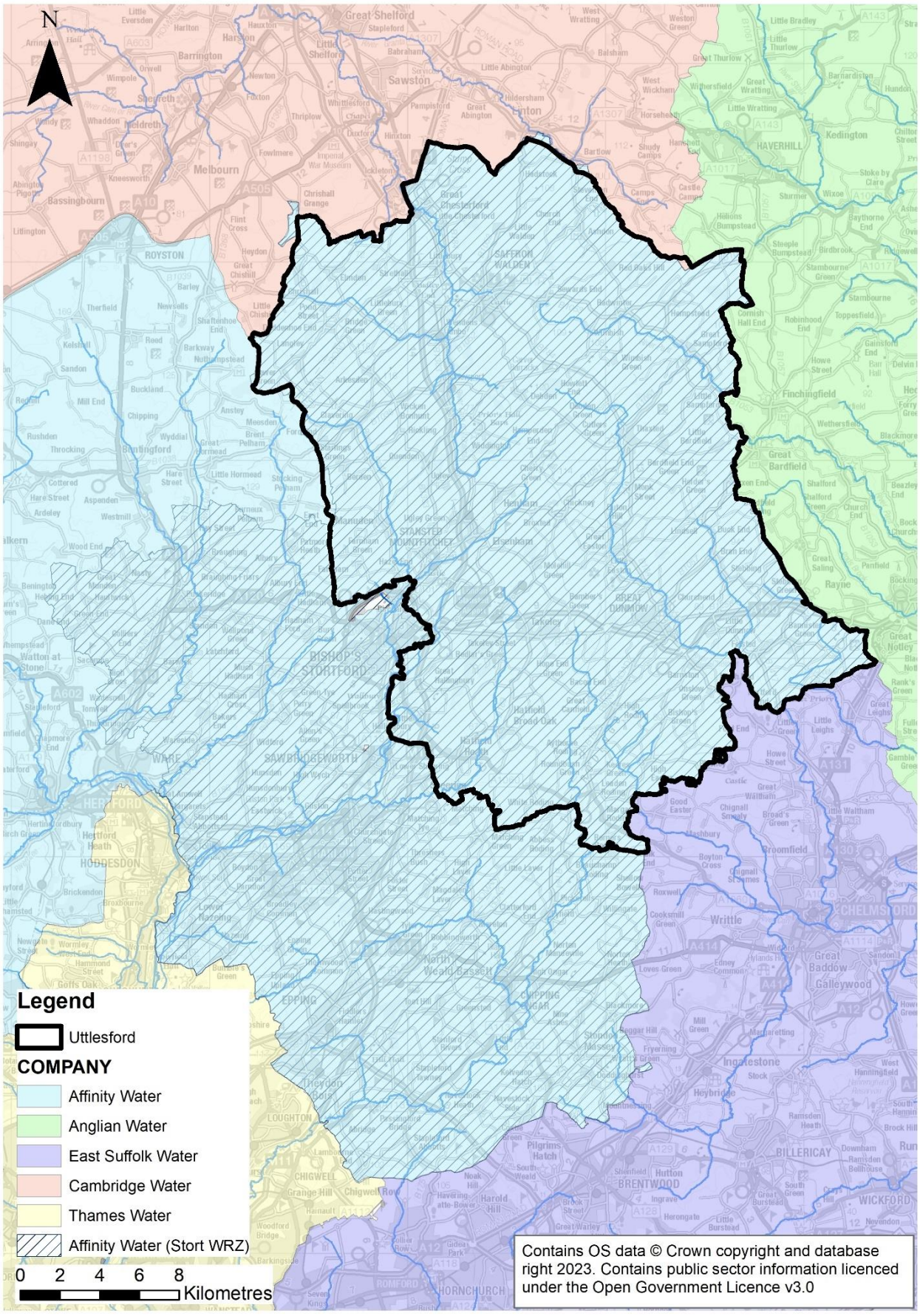

Figure 4.1 Water Resource Zone supplying Uttlesford

4.1.3 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 Water Framework Directive.

- The Environment Agency has undertaken an assessment of water stress across the UK. This defines a water stressed area as where:
- "The current household demand for water is a high proportion of the current effective rainfall which is available to meet that demand; or
- The future household demand for water is likely to be a high proportion of the effective rainfall available to meet that demand.

In the Environment Agency assessment (Environment Agency, 2021b) the Affinity Water supply region was classified as being an area of serious water stress.

4.1.4 Chalk streams

The north-western part of Uttlesford District is drained by two chalk streams, the River Stort and River Cam, and their tributaries. 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 by rainfall. 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. In many cases, this can cause sections of chalk streams to be dry for much of the year. This natural hydrological variation – which can vary from year to year, is separate to the artificial impact of over-abstraction.

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

England's chalk streams are therefore under considerable pressure. 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' Water Framework directive (WFD) standards can be related to groundwater and surface water abstractions. Other pressures on chalk streams include pollution from wastewater discharges and agriculture, encroachment by development.

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. The Chalk Stream report

prepared by JBA alongside the WCS (June 2024) provides an evidence base to identify and characterise the chalk rivers in Uttlesford and recommends policies to protect them.

Figure 4.2 shows the location of the chalk streams in Uttlesford, a brief description of these is contained in Section 2.3 of the chalk Stream report. The River Bourne is labelled in Figure 4.2 as a possible chalk stream. It is a tributary of the River Granta (and eventually the River Cam) but it is not included in the Natural England mapping, however it is listed in Appendix H of the CaBA chalk Stream Strategy as a chalk stream. The river flows south to north through the village of Ashdon. North of Ashdon the geology mapping does not show any superficial geology overlaying the chalk bedrock suggesting the river may be directly connected to the chalk. South of Ashdon, a superficial layer of Til is present which may prevent this connectivity, so chalk may have less influence on the river. Further investigation may be required into the flow regime of this river in order to define whether the whole or part of the River Bourne should be classified as a chalk stream.

Should the River Bourne not be classified as a true chalk stream along part of its length, it should be noted that it is a tributary to a chalk stream and so development, agriculture and other activities may still have an influence on chalk streams downstream.

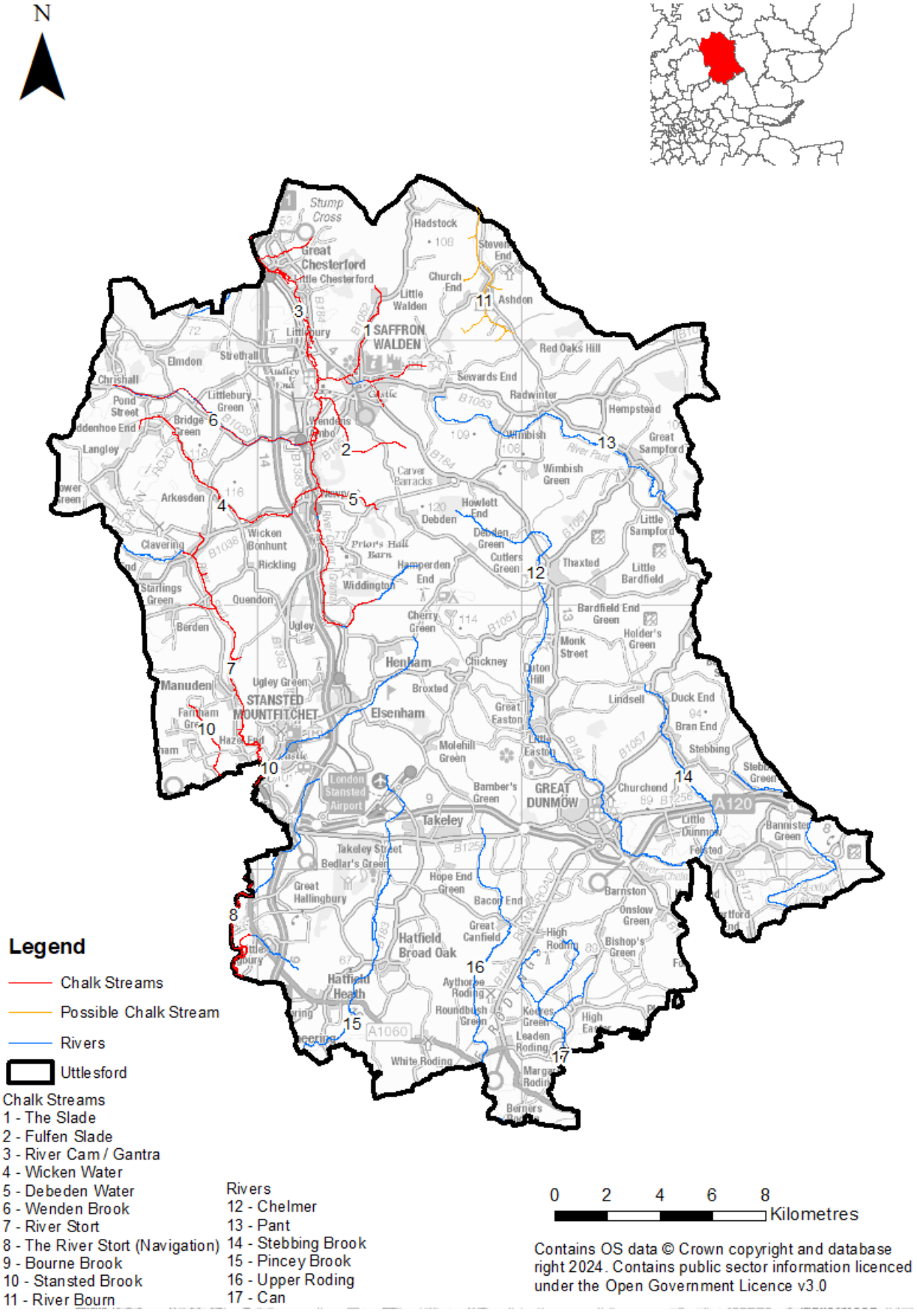

Figure 4.2 Chalk Streams in Uttlesford

4.2 Water resources - regional planning

The Water Resources South East (WRSE) plan covers a period out to 2075 and seeks to:

- Ensure there is enough water for a growing population and to support economic growth.
- Improve the environment by leaving more water in the region's rivers, streams and underground sources.
- Increase the region's resilience to severe drought and other extreme shocks and stresses.
- Addresses the impacts of climate change on demand for water and how much is available.

The regional plan is aligned to the National Water Resources Framework and is also used in the individual water company WRMPs. As stated in Stage 1, Uttlesford is on the very edge of the WRSE area and water use in Uttlesford may not be representative of the WRSE region as a whole, with a greater focus on agriculture and irrigation shown by water use in the Stort WRZ.

The majority of the total water needed in the first 15 years of the regional plan period will come from reducing how much water is used (demand management), and how much is wasted through leakage. The plan also outlines longer term water resource options including transfers of water into the southeast and between water companies, new reservoirs, water recycling schemes and desalination plants and additional storage.

By 2035 the regional plan proposes to:

- Complete the construction of one new reservoir in Hampshire and start to build one new reservoir in Oxfordshire (SESRO) and one in Kent.
- Develop an inter-regional water transfer scheme using the Grand Union Canal to transfer water from the midlands to the southeast.
- Develop six water recycling schemes in London, Kent, West Sussex, Hampshire and the Isle of Wight.
- Develop six groundwater schemes across the region to store extra water in these sources.

Between 2035 and 2075 the plan proposes to:

- Complete the construction of the new reservoirs in Oxfordshire and Kent and construct new reservoirs in West Sussex and East Sussex.
- Build six desalination plants in Kent and West Sussex.
- Develop eleven groundwater schemes across the region.
- Develop three more water recycling schemes in Kent, West Sussex and East Sussex.
- Develop new transfers from new strategic sources of water (such as reservoirs) to move more water around the southeast.

The regional plan outlines the "environmental ambition" for the southeast region, including both the Water Industry National Environmental Programme (WINEP) (which takes a

relatively short term view to be compliant with environmental legislation and is summarised in section 4.4), and a longer term view accounting for climate change and longer term water availability.

Affinity Water's Stort WRZ has one of the largest reductions in deployable output (DO) in the WRSE area in the "High environmental ambition scenario".

4.3 Water Resources Management Plan

4.3.1 Overview

Water Resource Management Plans (WRMPs) are 50-year strategies that water companies are required to prepare, with full updates every five years. 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 next 50 years.
- 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.

Affinity Water (AFW) is responsible for supplying the whole of Uttlesford with water. The AW supply area is divided into eight WRZs. Uttlesford is covered by the Stort WRZ.

Across the Affinity Water region as a whole, approximately 65% of water supply comes from groundwater sources, and the remainder is from surface water, principally the River Thames.

4.3.2 Best Value Plan

Affinity Water's revised draft plan (rdWRMP24) contains their "best value" plan consisting of four main elements:

- "Demand management: an integrated demand management strategy that encompasses households, non-households (commercial properties) and leakage. Our demand management strategy also includes potential government initiatives relating to water use in appliances and water consumption in new properties.
- Strategic level supply schemes: these schemes represent the best value for development in the near term.

- Supply network modifications and smaller supply schemes: these represent the best value to manage needs in the short term and to support the strategic supply schemes in the longer term.
- Adaptive Strategy: our strategy, derived from regional level assessments is adaptive. This means that it allows us to monitor supply and demand conditions and modify our investments accordingly to deliver the best value for our customers."

Sustainability reductions are planned reductions in the amount of water than is abstracted from the environment, in particular from the chalk aquifers. Affinity Water have a programme of sustainability reductions planned in response to Environment Agency requirements. To achieve these, alternative sources of water (or reduced demand) are needed.

Additional to sustainability reductions, AfW have included catchment and nature-based solutions which complement the proposed reductions in abstraction and will provide additional environmental resilience in the Chalk catchments. These types of solutions also contribute towards natural capital and biodiversity net gain.

In line with Ofwat requirements, AfW have taken an adaptive planning approach to the WRMP. This acknowledges the uncertainties in supply and demand and future environmental policy as well as allowing future advances in technology to be taken into account in the long-term plan. The plan contains "trigger points" where a decision can be taken to switch to a different "pathway" in the plan, for example if climate change is having more of an impact than expected, the plan can be adapted to take this intro account and a different set of actions adopted.

4.3.3 Demand management

As outlined the WRSE draft regional plan, demand management forms 50% of the strategy to achieve their Environmental Ambitions whilst managing pressure on water resources from growth. This consists of a mix of household and non-household measures, alongside leakage reduction.

Household demand:

Measures include:

- Smart metering
- Home water efficiency checks
- Flow restrictors
- Reducing waste and plumbing losses

AfW have also included Government supported demand management reductions such as Water labelling (similar to energy labelling on electrical appliances) and changes to building regulations within their calculations in order to achieve the national target of 110l/p/d (average across whole country) by 2050. They state that this has been done due to the challenges unique to their supply area which has one of the highest per capita consumption

of any water company area (161 l/p/d compared with the UK average of 146l/p/d between 2020 and 2023) (Discover Water, 2024).

The Governments EIP states that every water company must reduce household water use to 122l/p/d by 31st March 2038 and achieve 110l/p/d dry year annual average household water use by 2050.

AfW state that without Government support, PCC could only be reduced to 133.3l/p/d in their area. This means that in their preferred plan, by 2050 there are 83Ml/d of company led savings and 117Ml/d of Government led savings. The rdWRMP therefore contains an element of risk as this part of the plan is outside their control, but without it AfW will not meet the national target.

Non-household demand:

The regulator (OfWAT) has signalled that they expect non-household demand management to contribute meaningfully to WRMPs. AfW's preferred strategy is to roll out smart metering to non-household properties and use the data to share usage patterns and eventually set up a market where retailers, service providers and customers can use the data to implement cost-effective interventions. This also includes Business Water Efficiency Checks.

Leakage reduction:

AfW are committed to a 50% reduction in leakage by 2050. This includes fixing leaks in the network as well as a programme of mains renewals to prevent leakage recurrence.

4.3.4 Supply schemes

Up to 2030 water supply schemes in the Affinity Water area include transfers between WRZs (with enabling mains reinforcement), and enhancement to treatment capacities. None of these schemes are In the Stort WRZ.

Beyond 2030, the plan consists of linkages to connect the Grand Union Canal scheme into WRZ3 and on to WRZ5 (the Stort WRZ supplying Uttlesford) as well as benefits from the new reservoir in Oxfordshire via a transfer from Thames Water.

The Grand Union Canal scheme utilises the existing canal and a new pipeline to convey recycled wastewater from Minworth Advanced Water Treatment Works on the edge of Birmingham in the Severn Trent Water area to areas of water deficit in Affinity Water's supply area. Water will then be abstracted and treated prior to distribution to customers. This will provide up to 50Ml/d by 2031/32 with potential for a further 50Ml/d by 2040-2050 if required.

4.4 Water Industry National Environment Programme

WINEP actions relating to water resources were presented in Stage 1. The updated WINEP programme for AMP (2025-2030) is due to be launched in April 2025. A draft version is currently being used by water companies in the creation of their business plans but was not available within the timescale of this WCS.

4.5 Water efficiency in Uttlesford

4.5.1 Baseline water demand

Table 4.1 shows the water demand from residential and employment sites in a business-as-usual scenario. This uses the mean PCC for a metered property contained in Affinity Water's WRMP for 2023/24. The majority of additional water demand during the plan period comes from residential sites, and for both residential and employment sites, the majority of water demand is expected to come from existing commitments.

Table 4.1 Baseline water demand from residential and employment sites

Type	Dwellings	Residential demand (Ml/d)	Employment floorspace (m^2)	Employment demand (Ml/d)	Total demand (Ml/d)
Commitments	8,508	2.74	238,200	0.83	3.57
Allocations	3,889	1.25	31,400	0.11	1.36
Windfall	1,650	0.53	-	-	0.53
Total	14,047	4.52	269,600	0.94	5.46

4.5.2 Water efficiency standards

Household

The average household PCC in the Stort WRZ that supplies Uttlesford is 128l/p/d, less than the average for the wider Affinity Water area.

Building regulations currently state that new build housing should achieve a minimum of 125 l/p/d. A tighter target of 110l/p/d is allowed if the local authority can establish a clear need based on available evidence (such as in an area of water stress). New build housing in the study area is currently built to the optional target in Building Regulations of 110l/p/d.

Water resources are under significant pressure in the UK, and the direction of travel in water resources planning is to reduce per capita consumption in new build development below the optional building regulations standard of 110 l/p/d. The Defra Plan for Water proposes changes to building regulations to include a target of 105l/p/d and 100l/p/d in water stressed areas.

Within Part G of the Building Regulations, the water efficiency target of 110l/p/d can be achieved either through the calculation method or the fittings approach. It is strongly recommended that the fittings-based approach is required. This approach provides clear flowrate and volume metrics for each fitting or appliance. This provides a greater confidence that the 110l/p/d target will be met once constructed. Insight gained from a recent Thames Water study of customers with smart meters (unpublished) showed that where the calculation method was applied, households did not achieve the intended performance level. Table 4.2 below reproduces Table 2.2 of Part G which defined the maximum consumption for the following fittings:

Table 4.2 Maximum fittings consumption level (110l/p/d standard)

Water fitting	Maximum consumptions
WC	4/2.6 litres dual flush
Shower	8 l/min
Bath	170 litres
Basin taps	5 l/min
Sink taps	6 l/min
Dishwasher	1.25 l/place setting
Washing machine	8.17 l/kilogram

Some LPAs are now going further than building regulations and adopting Local Plan policies requiring tighter water efficiency standards where there is a clear local need, including:

- Southern Water have committed in their Water Resource Management Plan to a water efficiency policy that aims to achieve a PCC of 100 l/p/d across the whole of their supply area by 2040. Southern Water advises Councils that a target of 100 l/p/d should be adopted in policy for new build properties, and 80l/p/d for strategic developments where master planning and community level schemes can provide greater benefits. Concerns over the impact of abstraction on an SAC and Ramsar site have led to the Sussex North WRZ being designated as a water neutrality area and a target of 85l/p/d across all residential development in the WRZ has been recommended (JBA Consulting, 2022). This has been successfully adopted in Crawley Borough Council's Local Plan.
- Within Greater Cambridge, the Environment Agency are objecting to planning applications due to concerns over future water resource availability. A target of 80l/p/d is being explored by the planning authority.

Ofwat published a study in 2018 into the long-term potential for reductions in household water demand (Artesia Consulting, 2018). In this report, different scenarios for future water use were created based on a range of drivers, public acceptance, policy ambition, and factors such as climate change, resulting in different levels of ambition in terms of the scope for PCC reduction in 50 years' time.

Their research showed that a demand as low as 49l/p/d was possible with high tech solutions such as waterless toilets, integration of "smart" devices, innovative tariffs and "pay-per-use" services. As this study requires the development and adoption of new technology, and a significant shift in behaviour, we consider it to be too ambitious for application across all new housing at present. However, it provides a useful indication for what might be achieved in the future.

An ambitious but more realistic scenario was modelled where water scarcity is widely recognised as an important issue, markets in water resources and water services results in widespread competition and local providers delivering integrated services. It includes extensive use of RwH and GwR as well as some smart devices. This scenario resulted in a PCC of 62 l/p/d.

The Ofwat report also presents a scenario based on the installation of water efficient fittings, changing behaviours (less baths, minimising running taps etc.), maximising use of eco settings on appliances such as washing machines and dishwashers, and the use of water butts in the garden. In this scenario, a water use of 86 l/p/d was achieved.

This is supported by research conducted by the Energy Saving Trust (EST) that showed that the best commercially available domestic technology could achieve 95 l/p/d, and the best commercially available technology (including non-domestic technology) could achieve 85 l/p/d.

The Future Homes Hub was established to "facilitate the collaboration needed within and beyond the new homes sector to help meet the climate and environmental challenges ahead" (Future Homes Hub, 2024). It consists of representatives from the building industry, regulators, water companies, and environmental groups. Defra asked them to support them in the creation of the roadmap towards greater water efficiency. They have proposed a road map for water efficient homes in England and sets out a framework for the homebuilding sector to work in partnership with other stakeholders such as the water sector, local authorities and regulators to deliver it. The proposed roadmap is shown in Figure 4.3 below and outlines a staged approach to reducing per capita consumption. It also allows for a tighter figure of 90l/p/d by 2025 in seriously water stressed areas to enable sustainable growth.

Figure 4.3 Future Homes Hub proposed water efficiency roadmap

Non-household

As outlined in section 2.4.2, the council has the opportunity to use the BREEAM UK New Construction Standard to require a higher standard of water efficiency from non-household buildings. Under the assessment category WAT01, credits are offered corresponding to different levels in improvement over the baseline for that type of building.

Table 4.3 BREEAM New Construction Standard outline

Number of credits	% Improvement required over baseline
1	12.5
2	25
3	40
4	50
5	55
5 + 1 exemplary performance credit	65

4.5.3 Impact of different standards

Table 4.1 shows that the majority of water demand during the Local Plan period is from commitments, i.e., sites that already have planning permission in some form. It may not be possible for a new water efficiency policy to influence those sites if full planning permission has been granted. It is assumed in the analysis below that a tighter efficiency standard can only be applied to the preferred allocations and windfall sites. Opportunities may exist on sites with outline permission for a tighter standard to be required which may result in a higher demand saving.

Four scenarios are presented in Table 4.4 with their resulting water demand saving by the end of the plan period.

Table 4.4 Water demand reduction by efficiency scenarios

Scenario	Residential demand (Ml/d)	Employment demand (Ml/d)	Total demand (Ml/d)	Demand saving by 2041	Percentage reduction
Business as usual - 110/l/p/d	3.86	0.95	4.82	-	-
100l/p/d and BREEAM WAT01 (3 credits)	3.72	0.91	4.63	0.18	4%
90l/p/d and BREEAM	3.59	0.91	4.50	0.32	7%

Scenario	Residential demand (Ml/d)	Employment demand (Ml/d)	Total demand (Ml/d)	Demand saving by 2041	Percentage reduction
WAT01 (3 credits)					
80l/p/d and BREEAM WAT01 (4 credits)	3.45	0.90	4.35	0.47	11%

4.5.4 Water neutrality

The concept of water neutrality is receiving more attention. Water neutrality is defined as:

“For every new development, total water use in the region after the development must be equal to or less than the total water-use in the region before the new development.” (Booth & Charlesworth, 2014).

It can be achieved at different levels from individual dwellings to Local Authority areas.

Achieving water neutrality involves a twin track approach. First the demand for water from the new development must be reduced as far as is practicable, then this remaining demand should be "offset" within the region (this could be done by reducing water demand in existing buildings by the same volume as the increase in demand from new buildings).

In following this approach, the volume that requires offsetting can be reduced, reducing the cost of the overall scheme. This is noted in the Waterwise neutrality definition, and they define three steps to achieve water neutrality in their recent review:

- Reduce water demand in the new development through improvements in efficiency.
- Re-use water where possible.
- And finally offset the remaining water demand from new development.

Reducing demand as far as practicable can be achieved by new build housing; employment and schools being built to higher standards of water efficiency. For residential properties, this would mean going further than current building regulations (which contain an optional standard of 110 l/p/d), and for new non-household development this would mean achieving a high score within the water (Wat 01 Water Consumption) issue category for BREEAM New Construction Standard, leading to a percentage reduction compared to baseline standards.

Building to tighter water efficiency standards will reduce the work required to offset the remaining demand, but it does come at an additional financial cost. This cost must be balanced with the cost of offsetting, as well as the certainty of delivering the desired impact overall. Less stringent water efficiency standards for new development would commensurately increase the need for offsetting elsewhere. Therefore, the potential to

achieve greater water efficiency in new build, and the scope to offset the water demand impacts from development, is a delicate balance that also needs to be considered.

The remaining demand once tighter water efficiency standards have been applied, must be offset by reducing water demand elsewhere in the WRZ. This could include measures such as household and non-household visits, flow restrictors, retrofitting of rainwater harvesting (RwH) or greywater recycling (GwR) systems, extending the coverage of water metering and leakage reduction.

The delivery of offsetting measures could take several forms, including:

- individual developers arranging their own offsets;
- market-led schemes; and
- Local Authority-led scheme(s).

If water neutrality at the Local Authority level were to be attempted., it is important that the benefits of demand reduction, or offsetting measures are not double counted as there may be significant overlap with water company actions in their WRMP.

4.5.5 Financial viability of water efficiency

As outlined in Section 2.4.4, the cost of installing water-efficient fittings to target a per capita consumption of 110l/d has been estimated as a one-off cost of £9 for a four-bedroom house. Engagement with developers and information from Defra that emerged as part of the Sussex North Water Neutrality Strategy (JBA Consulting, 2022) indicated that a target of 100l/p/d could be achieved with "minimal additional cost". Research undertaken for the devolved Scottish and Welsh governments indicated potential annual savings on water and energy bills for householders of £24-£64 per year as a result of such water efficiency measures. Water efficiency is therefore not only viable but of positive economic benefit to both private homeowners and tenants. In addition, financial incentives are available from the water companies to developers to encourage water-efficient design.

Research published by BRE (BRE, 2018) on the delivery of sustainable buildings reports that the cost of achieving lower BREEAM ratings incurs little or no additional cost and targeting higher BREEAM ratings incurs a typical cost of less than 2% above the baseline. The same study reports that the cost of achieving 3 credits in WAT01 (a 40% reduction in water consumption for baseline) would be £13,361 and payback could be achieved between 1 and 2.5 years depending on the price of water.

Affinity Water offer a discount to the infrastructure charge of £589 where evidence of the intention to install water efficient fittings to achieve a water efficiency of 110l/p/d or less can be provided as part of the planning application. 110l/p/d is the current building regulations target so this incentive will not drive water efficiency beyond a business-as-usual approach. Affinity Water should consider modifying the requirement to 90l/p/d or less or offering a tiered approach to their incentives in order to encourage more water efficient designs.

4.6 Conclusions and recommendations

Water resources in the UK are under considerable pressure. The Environment Agency have stated that "the scale of the challenge we face increases with time and, by 2050, we are looking at a shortfall of nearly 5 billion litres of water per day between the sustainable water supplied available and the expected demand."

The National Water Resources Framework sets the objective to reduce the average per capita consumption in the UK to 110l/p/d by 2050. This is now part of the Environmental Improvement Plan and water companies WRMPs. Within Defra's Plan for Water is the commitment to review Building Regulations and a target of 100l/p/d in water stress areas is suggested.

The Future Homes Hub, who are supporting Defra to produce a roadmap to greater water efficiency propose a stages reduction in PCC, with a target of 100l/p/d in water stressed areas in place from 2025, and a reduced target of 90l/p/d in place by 2030 (depending on market conditions and customer acceptance).

The Catchment Based Approach (CaBA) Chalk Stream Strategy recommends a target of 90l/p/d in chalk stream catchments. The Government's EIP states that the Chalk Stream Strategy should be supported.

The analysis contained in the WCS shows that a 0.18Ml/d reduction in water demand (approximately 4%) would be achieved if the target of 100l/p/d were adopted immediately, accompanies by an equivalent non-household target. A greater saving could be made if some of the dwellings already in the planning system could also be built to a higher standard. If the target of 90l/p/d were adopted, the reduction in water demand is estimated to be 0.32Ml/d (7%).

Affinity Water's rdWRMP outlines how the challenges of an increasing population and climate change will be met alongside their environmental obligations. Within the Stort WRZ this includes reductions in abstraction from chalk stream catchments. In order to achieve the long-term goal of reducing PCC to 110l/p/d, a significant demand management programme is planned. This includes Government backed activities that are outside the control of Affinity Water. A tighter water efficiency target for new build housing has not been included in Affinity Water's plan, however, any reduction in PCC would provide additional headroom in the WRMP and help manage uncertainty in their demand management plan.

This study recommends that as a minimum the proposed new Building Regulations target of 100l/p/d outlined in Defra's Plan for Water be adopted across Uttlesford. This should be achieved using a fittings-based approach.

This should be supported by the requirement for non-household development to achieve three credits in the assessment category WAT01 of the BREEAM UK New Construction Standard.

The Local Plan should allow for a future reduction in the Building Regulations target to 90l/p/d in 2030.

Developers should be encouraged to achieve 90l/p/d or lower, especially on larger strategic sites aligning with the Chalk Stream Strategy.

Table 4.5 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.	Affinity Water	Ongoing
Provide yearly updates of projected housing growth to water companies to inform WRMP updates.	Uttlesford District Council	Ongoing
Use planning policy to require a water efficiency standard of 100l/p/d to be achieved using the fittings-based approach. The policy should allow for a future reduction in the water efficiency target.	Uttlesford District Council	In Local Plan
Developers should be encouraged to achieve 90l/p/d or lower, especially on larger strategic sites aligning with the Chalk Stream Strategy	Uttlesford District Council	In Local Plan
This should be supported by the requirement for non-household development to achieve three credits in the assessment category WAT01 of the BREEAM UK New Construction Standard.	Uttlesford District Council	In Local Plan

Action	Responsibility	Timescale
Larger residential developments 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 District Council	Ongoing
Affinity Water should consider modifying their water efficiency incentive scheme to include an incentive for development achieving 90l/p/d or less, or a tiered approach to encourage water efficient design.	Affinity Water	In next iteration of the New Connection Charging Arrangements.

5 Water supply

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.

In Stage 1 a high-level overview of the impact of the spatial growth options was presented and comments sought from Affinity Water who supply water to the whole of Uttlesford.

5.2 Methodology

A list of potential allocations was provided to AfW as part of the Regulation 18 consultation in December 2023. This has been used to inform the Stage 2 assessment.

5.3 Results

5.3.1 Location of existing supply network

No development is permitted within a specified distance of water mains. For example, there should be no building, planting or other heavy earth works within a minimum of 4m of trunk and raw water trunk mains. For other mains there is a minimum of 2-3m no dig exclusion zone, unless mains are to be diverted. The costs of diverting mains would need to be met by the developer.

A guide to working near AfW's assets can be found here:

https://www.affinitywater.co,uk/docs.developer/Building-Near_Pipes-Apparatus-Guide-17-04-2019.pdf

Local Authorities can obtain free infrastructure maps from AfW as well as supplying infrastructure information under a non-disclosure agreement.

It is recommended that developers engage with AfW early in the planning process to ensure that any direct impacts on the water supply network are addressed early.

5.3.2 Impact on supply network

AfW modelled the impact of the growth scenario provided to them by UDC for the Regulation 18 consultation. A total additional demand of 5.99Ml/d was estimated by AfW, slightly higher than the current estimate based on the preferred allocations.

In their Regulation 18 representation they noted that "the pressures at the critical points in the network due to the new developments are such that major reinforcements in the

network in the Uttlesford District Council area will be required. This normally means new pipelines although in some cases new pumping stations will also be required. There is sufficient water supply in the region."

"All the proposed reinforcement will aim to recover the current level of service and the loss of capacity in the network due to the additional load imposed by all projected development."

"All projections of infrastructure capacity are subject to developers and customers reducing their PCC (Per Capita Consumption) in accordance with our WRMP (Water Resources Management Plan) through the development of water-efficient buildings; and encouraging customers to save water."

"We continually monitor the performance of our distribution system and put in place measures to ensure high quality water supply and pressures are maintained. We will continue to work with the local planning authority and developers to ensure that infrastructure is in place in line with the pace of development and that realistic forecasts of development phasing are used to plan the infrastructure needs. Water companies have a duty to supply water for domestic purposes to customers under Section 52 of the Water Industry Act 1991 and are hence obliged to connect developments to the network once planning permission has been received. Any localised upgrades to existing supply networks are likely to be funded from the usual water developer requisitions and investment processes."

5.4 Conclusions and recommendations

5.4.1 Conclusions

It is likely that upgrades to the water supply network will be required in order to serve the preferred allocations without a detriment to existing customers. Modelling by AfW may be required to define the extent of these upgrades. Early engagement between developers. UDC and AfW is needed to ensure that these upgrades are in place prior to occupation of the developments.

5.4.2 Recommendations

Table 5.1 Recommendations for water supply infrastructure

Action	Responsibility	Timescale
Undertake network modelling where appropriate to ensure adequate provision of water supply to new sites without detriment to existing customers and feedback to UDC on implications for phasing of sites.	Affinity Water	Early in Local Plan period
Early engagement is required with AfW to ensure infrastructure is in place prior to occupation.	Developers and UDC	Early in Local Plan period
UDC should obtain infrastructure maps from AfW to ensure existing water supply infrastructure is taken into account in site layout.	UDC and Developers	At master planning stage

6 Wastewater network

6.1 Introduction

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 drain building curtilages, including highway drainage and land drainage systems.

At Stage 1 AW and TW provided high level comments on each of the spatial growth options. No particular network constraints were identified associated with any of the options apart from a general comment from TW that network issues were likely around Uttlesford due to the small diameter pipes present. AW also 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.

An assessment of the preferred allocations is required in the Stage 2 study.

Since the Stage 1 report, an additional two years of storm overflow data is available, and the requirement for all storm overflows to be monitored came into force in December 2023. The storm overflow assessment can now show a more complete picture of performance in the study area.

6.2 Sewerage system capacity assessment

6.2.1 Methodology

AW and TW were provided details of the preferred allocations and asked to assess the impact of these sites on the wastewater network. The following red/amber/green definition was used by the water companies to score each site:

GREEN	AMBER	RED
Network improvements unlikely to be required	Network improvements may be required	Network improvements likely to be required

The assessment was divided into foul sewer network and surface water sewer assessments.

A red assessment does not mean that a site cannot or should not be developed (unless stated in the comments), and instead reflects the requirement for extensive new infrastructure to order to accommodate the site. It should be remembered that the water companies have a statutory duty to serve new development under the Water Industry Act 1991.

6.2.2 Results

Figure 6.1 and Figure 6.2 show the results of the foul sewer and surface water network assessments. These are also summarised in Table 6.1.

Land east of Station Road, Elsenham (Anglian Water)

This site has been given a "green" assessment and is likely to be accommodated without significant additional infrastructure.

Land east of High Lane and Land at Walpole Meadows, Stansted Mountfitchet (Thames Water)

This site has been given a green rating for foul sewerage, and an amber rating for surface water network reflecting the limited surface water sewers in that area. Consideration should be given to how surface water will be disposed of on this site, following the drainage hierarchy. As this site is within an area of chalk geology, consideration should be given to disposing of surface water via infiltration to aid recharge of the chalk aquifer.

Land off The Broadway and Land east of B1008, Great Dunmow (Anglian Water)

Anglian Water gave this site an amber rating for both foul and surface water reflecting the existing flood risk on the site. The site should be sequentially planned to avoid this flood risk, and a drainage strategy should demonstrate that the foul network will not be exposed to flooding from the River Chelmer.

Land east of Shire Hill Farm and south of Radwinter Road, Saffron Walden (Anglian Water)

An amber rating for foul sewerage has been given to this site. Anglian Water note that there is no acute risk, but the cumulative loading on the storm overflow should be planned for and the network will be vulnerable to creep.

Opportunities should be taken within the catchment for the storm overflow to separate foul and surface water to relieve pressure on the overflow. No surface water assessment was provided by AW, however due to its location within the River Cam catchment, care should be taken to ensure surface water is managed using a SuDS treatment train to prevent a deterioration in water quality in the sensitive chalk catchment. Infiltration SuDS may be appropriate to contribute to recharge of the chalk aquifer.

Land at Warrens Farm and Land at Warish Hall Farm, Little Canfield and Takeley Thames Water)

A red assessment has been given to this site by TW for foul sewerage with the comment "The scale of development is likely to require upgrades to the wastewater network infrastructure". No particular constraints have been identified by Thames Water. An amber assessment was given for surface water but was not accompanied by any comments. Thames Water have been asked to clarify this rating and any implications for UDC but had not responded at the time of writing. Further investigation is therefore required in order to understand any implications for the phasing of this site.

Land at Gaunts End, Elsenham

Thames Water have commented that the land at Gaunts End, Elsenham is in an area not currently served by a public sewer system and no further assessment or comment was provided. This site is 650m from the sewer catchment for Bishops Stortford WwTW (operated by TW) and this study has assumed that a connection would be made into this WwTW. Anglian Water's Stansted Mountfitchet WwTW is also 950m to the north. Early engagement with TW to agree a wastewater solution for this site is required. This could be either a connection into Bishops Stortford WwTW or a package treatment plant.

Based on the predicted number of employees for a site of this size, the volume of wastewater generated would be approximately 23 cubic metres per day. Using the rule of thumb outlined in 2.7.12, a connection to the public sewer would be expected up to 920m from this site. A connection to Bishops Stortford WwTW is therefore likely.

Land north of Takeley Street, Takeley

This site has been given a "green" assessment and is likely to be accommodated without significant additional infrastructure.

Land at Little Chesterford Research Park (no public sewer)

Little Chesterford Research Park is not served by a public sewer system and has its own private WwTW. A representative for the Research Park has confirmed that a new Moving Bed Biofilm Reactor (MBBR) unit is being installed in addition to the existing Submerged Aerated Filter (SAF) WwTW to address issues with non-compliance of their discharge and provide capacity for the next five years. Beyond this, further installation works are being considered. Surface water is managed on the site using balancing ponds which outfall to local watercourses.

Land south of A120/North of Stortford Road, Great Dunmow (Anglian Water)

This site has been given a green rating for foul sewerage, and an amber rating for surface water network reflecting the limited surface water sewers in that area. Consideration should be given to how surface water will be disposed of on this site, following the drainage hierarchy.

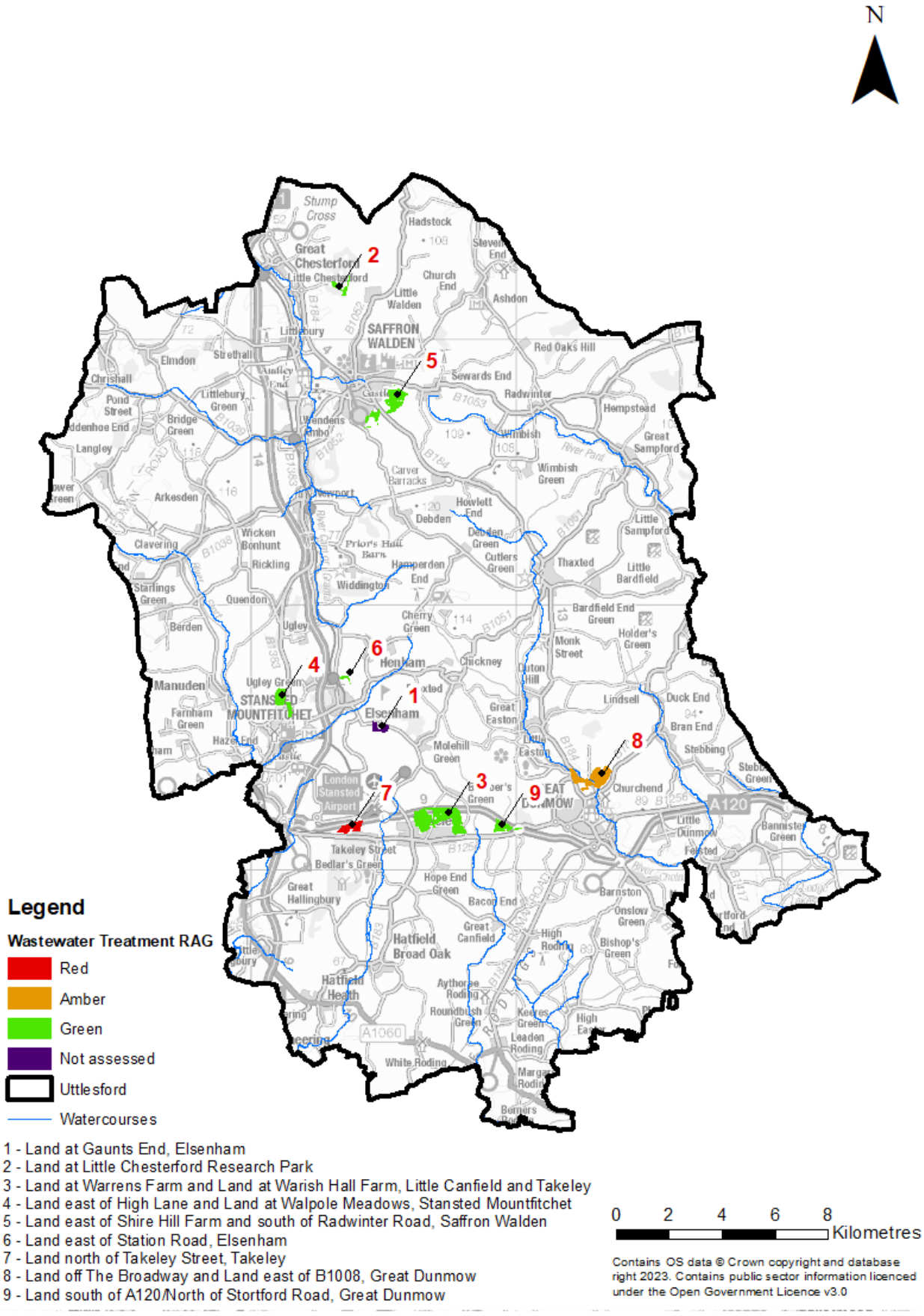

Figure 6.1 Foul network assessment

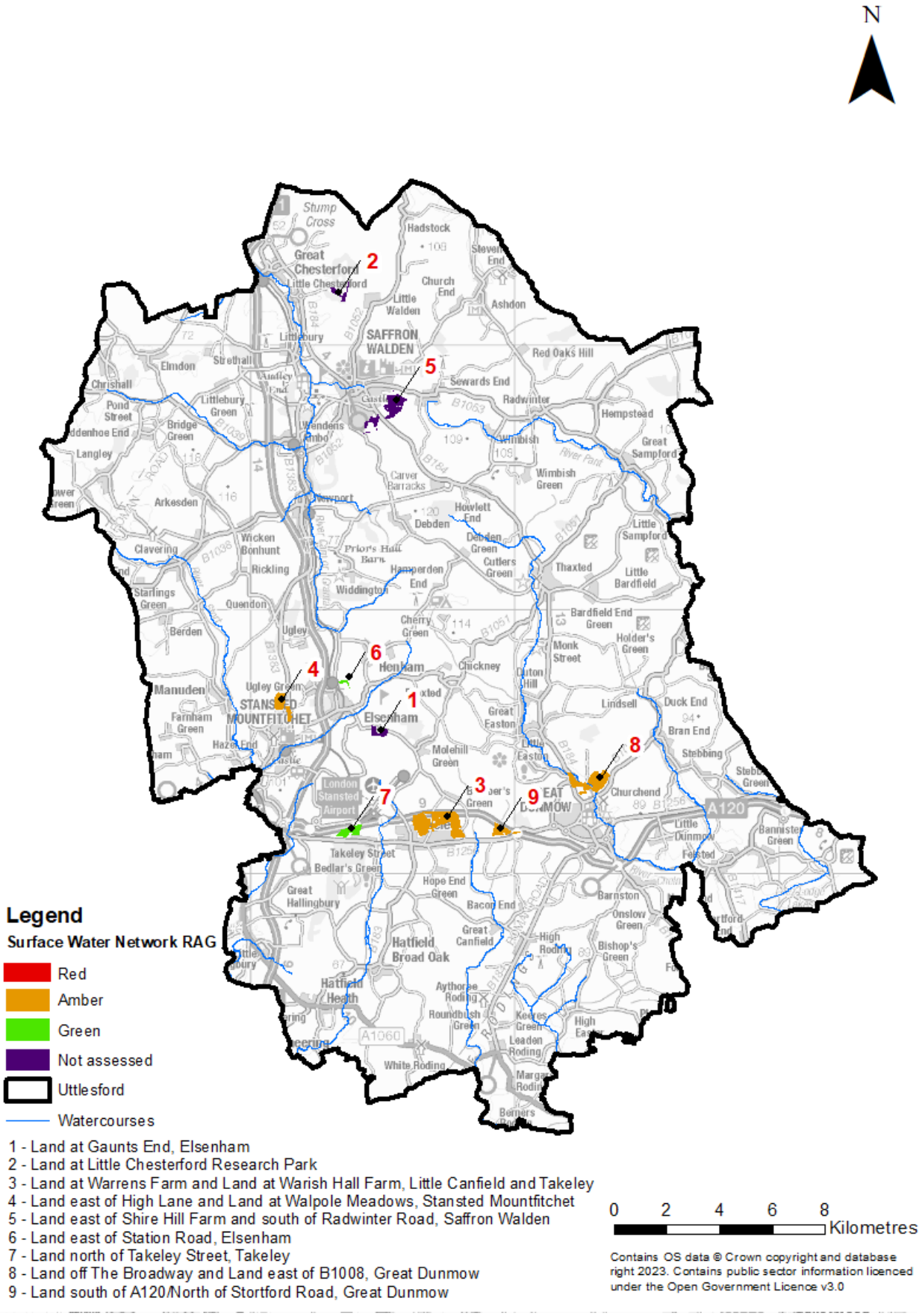

Figure 6.2 Surface water network assessment

Table 6.1 Water company assessment of wastewater infrastructure

Site	Expected growth	Foul sewer network assessment	Comments	Surface water sewer assessment	Comments
Land east of Station Road, Elsenham		Green	N/A	Green	N/A
Land east of High Lane and Land at Walpole Meadows, Stansted Mountfitchet	390 dwellings	Green	N/A	Amber	Limited SW public sewers
Land off The Broadway and Land east of B1008, Great Dunmow	884 dwellings	Amber	Existing flood risk in some parts of the network; potentially related to river flooding	Amber	Undeveloped land on the northeast of the town includes zone 3 flood risk area. Ensuring new FW network is not exposed to this river flooding potential is complex
Land east of Shire Hill Farm and south of Radwinter Road, Saffron Walden	879 dwellings / 8,000sqm	Amber	No significant acute risk but cumulative loading on CSO will need to be planned for. Network will be vulnerable to creep	Not assessed	
Land at Warrens Farm and Land at Warish Hall Farm, Little Canfield and Takeley	1,546 dwellings	Red	The scale of development/s is likely to require upgrades to the wastewater network infrastructure. (TW have been asked	Amber	No comments provided by TW

Site	Expected growth	Foul sewer network assessment	Comments	Surface water sewer assessment	Comments
			to clarify these comments but have not responded).		
Land at Gaunts End, Elsenham	1950sqm	Not assessed	Area not currently served by a public sewer system	Not assessed	Area not currently served by a public sewer system
Land north of Takeley Street, Takeley	8,500sqm	Green		Green	
Land at Little Chesterford Research Park	3,450sqm	Not assessed		Not assessed	
Land south of A120/North of Stortford Road, Great Dunmow	9,500sqm	Green		Amber	Limited SW public sewers

6.3 Storm overflows

Storm overflows are an essential component in the sewer network – however when they operate, 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 when they operate frequently in moderate or light rainfall, or for long periods as a result of groundwater infiltration in the sewerage system – possibly in breach of their permit.

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 18 network storm overflows and 10 WwTW storm tank overflow present in Uttlesford, the location of these is shown in Figure 6.3. Storm tank overflows at WwTWs are assessed in Section 6.4.

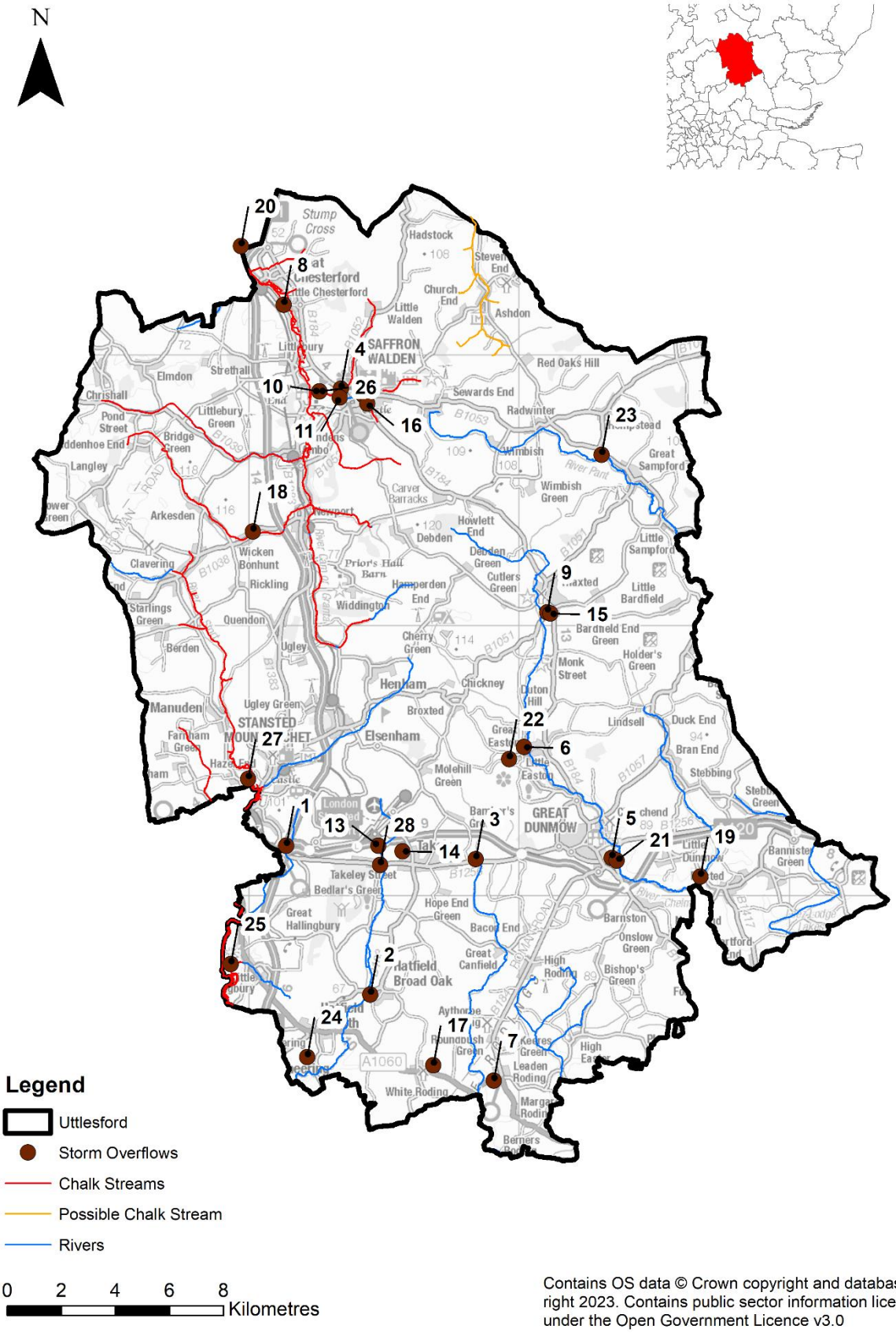

Figure 6.3 Location of storm overflows in Uttlesford

*Refer to Table 6.3 and Table 7.4 for Details of each storm overflows

The Storm Overflow Taskforce (made up of Defra, the EA, Ofwat, Consumer Council for Water, Blueprint for Water and Water UK) 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 was set to monitor the frequency and duration of operation at all storm overflows by 2023 (Environment Agency, 2021). This is called Event Duration Modelling (EDM). The EDM dataset (which contains performance data on the 16,710 storm overflows monitored in 2023) 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 storm overflows.

In comparison to some urban areas or large cities, Uttlesford has relatively few storm overflows on the sewer network. The SOAF set a threshold of 60 operations in a year (based on 1 years' data, 50 if based on 2 years data, and 40 if based on 3 years), above which a storm overflow should be investigated. As shown in Table 6.3, one of the monitored storm overflows (White Roding) was operating above this threshold between 2021 and 2023. The Storm Overflow Reduction Plan (Defra, 2022) which was published in August 2022 sets an objective that "storm overflows will not be permitted to discharge above an average of 10 rainfall events per year by 2050". 6 of the 18 monitored storm overflows are operating on average above 10 times per year so may require action to meet the long-term target. A red/amber/green assessment was applied to the storm overflows in Uttlesford. The criteria applied is shown in Table 6.2.

In this report storm overflows associated with WwTWs are contained in section 7.3.

Some of the preferred option sites are in the vicinity of storm overflows as shown in Figure 6.6 and Figure 6.7. 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 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.

According to Water UK, there are 26 storm overflows in Uttlesford (Water UK, 2024) (which includes overflows on the network and at WwTW). Analysis in this report shows 28, which may be because there are additional overflows now monitored since the Water UK data was published. Of these 14 have improvement planned aimed at reducing the number of spills. Six of these are expected to be improved by a method involving nature-based solutions, which could include retrofitted sustainable drainage systems (SuDS) and wetland treatment systems. The plan is expected to prevent 85 spills by 2030 and 405 spills by 2050, a 14% and 69% reduction respectively, relative to a 2020 baseline.

The new minimum requirement for all overflows is that they meet a ‘rainfall target’ of 10 spills per year. Figure 6.4 shows the percentage of storm overflows in Uttlesford meeting this target now and (forecast) in the period up to 2050 as improvements are made. Other improvements may occur at the same time, as necessary, to further reduce spills. Present-

day statistics are based on EDM coverage in 2022 when 90% of storm overflows had monitoring. Coverage by monitoring in 2022 varied by water company. At the end of 2023 there was 100% coverage. Figure 6.5 shows the corresponding number of spills as improvements are made.

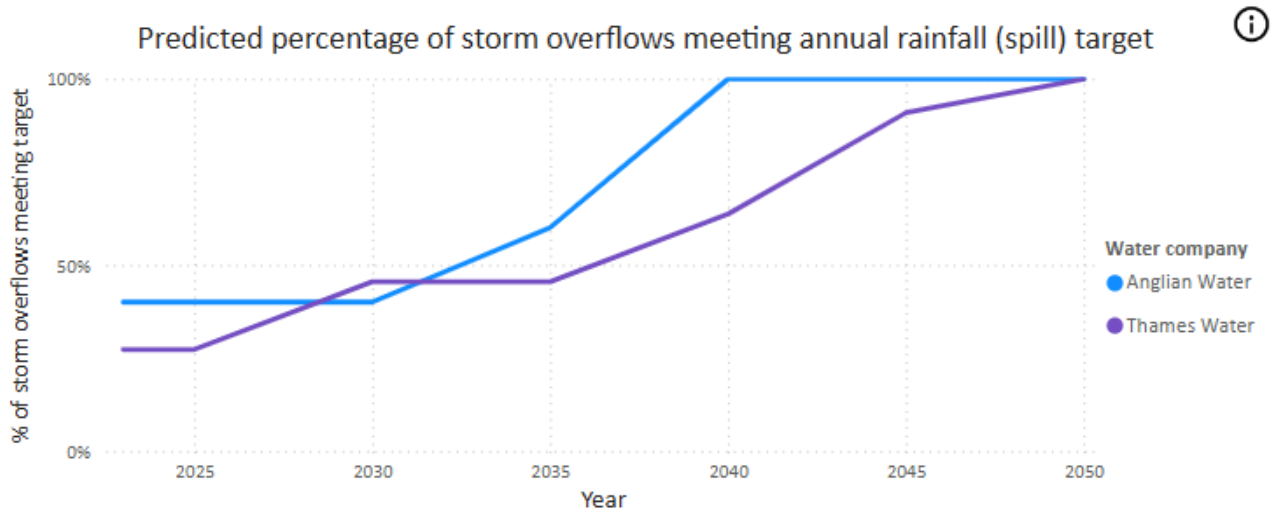

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Figure 6.4: Percentage of storm overflows in Uttlesford meeting annual spill targets

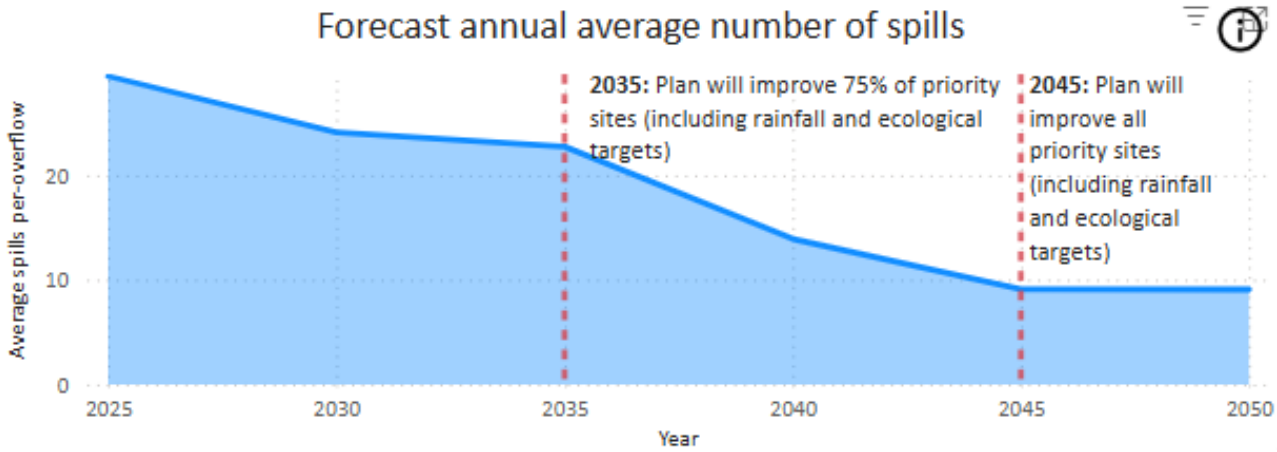

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Figure 6.5: Forecast number of spills

Table 6.2 Storm overflow assessment criteria

Sewer Overflows RAG Score	Number of operations per year (average of available data)	Commentary
Green	0-10	Overflow is currently operating within the long-term (2050) target. Need to ensure that this is maintained in the long-term considering upstream development, climate change and urban creep.

Sewer Overflows RAG Score	Number of operations per year (average of available data)	Commentary
Amber	11-49	An investigation is not required at present, but improvements will need to be made in the network and/or catchment to meet the long-term target.
Red	50+	The overflow may already be operating beyond the threshold which would trigger an investigation. Upstream development could further increase the discharge frequency, so mitigation should be required prior to significant development.

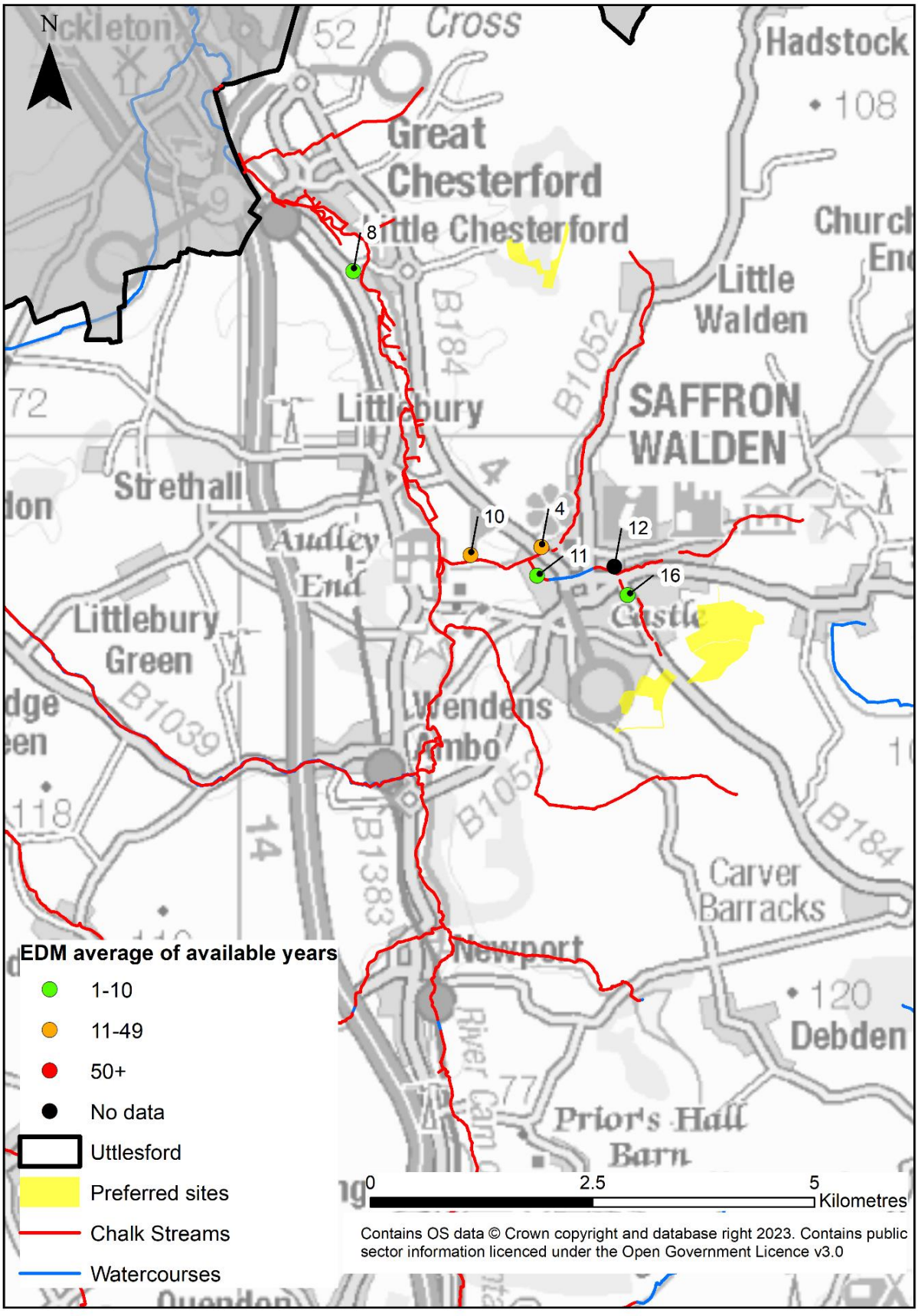


Figure 6.6 Preferred option sites in proximity to storm overflows (Saffron Walden)

*Refer to Table 6.3 for details of each storm overflow

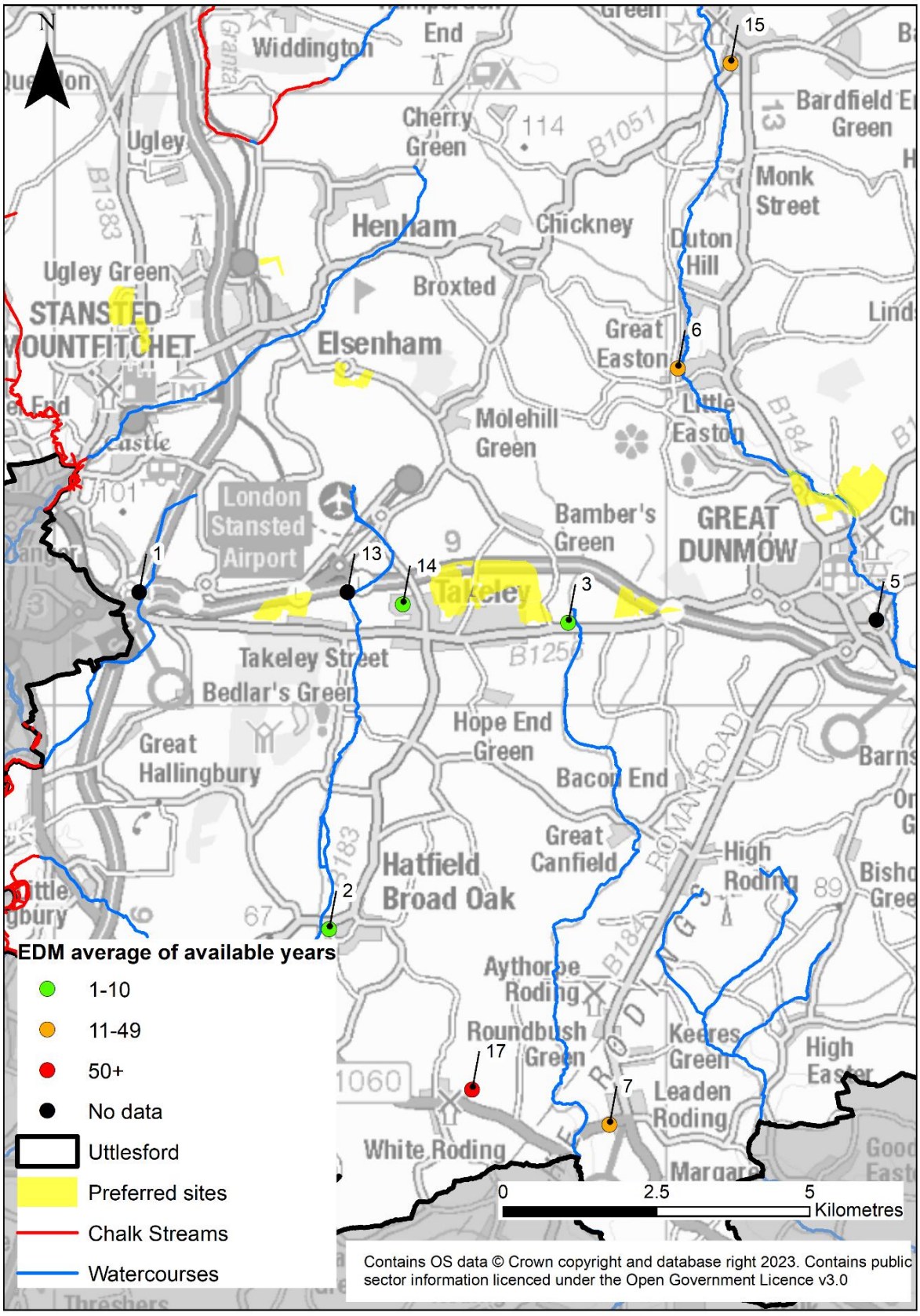


Figure 6.7 Preferred option sites in proximity to storm overflows (Stansted, Great Dunmow and Takeley)

*Refer to Table 6.3 for details of each storm overflow

Table 6.3: Network storm overflow assessment

Overflow	Storm Overflow Number	Number of operations in 2021	Duration of operations in 2021 (hours)	Number of operations in 2022	Duration of operations in 2022 (hours)	Number of operations in 2023	Duration of operations in 2023 (hours)	Above threshold for investigation ? (Y/N)
Birchanger - Duck End/ TEMP.0455	1	No data	No data	No data	No data	No data	No data	No data
CAGE END PUMPING STATION, CAGE END/ Hatfield Broad Oak Cage End/ CLCP.0111/ TEMP.1114	2	22	130.72	4	15.85	5	24	N
Canfield End, Little Canfield/ TEMP.0596	3	7	22.59	3	35.49	0	0	N
CASTLE STREET/HIGH STREET/ EPRRB3894EG	4	46	69.75	28	14.5	17	6	N
GREAT DUNMOW STW/ ASENF15793	5	No data	No data	No data	No data	No data	No data	No data
GT EASTON - BRIDGEFOOT TPS/ ASENF10513	6	9	82.5	6	37.25	29	292	N
Leaden Roding WWTW/ CSSC.1400	7	No data	No data	No data	No data	14	93	N

Overflow	Storm Overflow Number	Number of operations in 2021	Duration of operations in 2021 (hours)	Number of operations in 2022	Duration of operations in 2022 (hours)	Number of operations in 2023	Duration of operations in 2023 (hours)	Above threshold for investigation ? (Y/N)
LITTLE CHESTERFORD/ ASCNF2425	8	No data	No data	No data	No data	3	5.25	N
Park Street CSO/ AW2NF/E03779/1/1	9	No data	No data	No data	No data	No data	No data	No data
SAFFRON WALDEN WRC/ ASCNF1184	10	13	19.25	17	13	26	15.5	N
SAFFRON WALDEN-GEORGE ABBEY OV/ ASCNF2319	11	No data	No data	No data	No data	4	1.5	N
SO GASWORKS CROSSROADS/ ASCNF10057	12	No data	No data	No data	No data	No data	No data	No data
Stansted Airport SPS/ TEMP.1976	13	No data	No data	No data	No data	No data	No data	No data
Takeley - Garnets/ TEMP.2042	14	4	29.96	6	30.97	0	0	N
THAXTED - PARK STREET CSO/ AW2NFE03679	15	31	51.25	24	38.5	38	52	N

Overflow	Storm Overflow Number	Number of operations in 2021	Duration of operations in 2021 (hours)	Number of operations in 2022	Duration of operations in 2022 (hours)	Number of operations in 2023	Duration of operations in 2023 (hours)	Above threshold for investigation ? (Y/N)
THAXTED ROAD/VICTORIA AVE CSO/ EPRNB3691VH	16	1	1	0	0	2	0.5	N
White Roding WWTW/ CSSC.1455	17					93	398.75	Y
WICKEN BONHUNT PS/ ASCNF11524	18	No data	No data	No data	No data	2	9.75	N

6.4 Conclusions and recommendations

AW and TW provided an assessment of the preferred allocations. This was split into foul network and surface water network.

In the foul network assessment, four sites were given a "green" assessment confirming there was sufficient capacity within the network to incorporate these sites and no further infrastructure was likely to be required. Two sites (Land east of Shire Hill Farm and south of Radwinter Road, and Land south of A120/North of Stortford Road) were given an "amber" assessment, reflecting the need for some additional infrastructure. The Land at Warrens Farm and Land at Warish Hall Farm was given a "red" assessment by Thames Water along with the comment that the "scale of development is likely to require upgrades to the wastewater network". No particular constraints were identified by Thames Water. One further site was not assessed by Thames Water (Gaunts End, Elsenham) as it is not in an area currently served by a public sewer.

Clarifications were sought from Thames Water on their assessments including any implications for the phasing of the site at Warrens Farm. No response was received at the time writing. Further discussions with TW are therefore required. It should be remembered that no constraints have been identified by TW, and the water companies have a statutory duty to serve new development under the Water Industry Act 1991.

In the surface water assessment, two sites were given a "green" assessment confirming there was sufficient capacity within the network to incorporate these sites and no further infrastructure was likely to be required. Four sites were given an "amber" assessment reflecting the limited surface water network in some areas, and some local flood risk. A further three sites were not assessed as two were in an area without public sewerage (one of these sites has private sewerage). No reason was given for the third site.

Early engagement is required with Anglian Water and Thames Water to ensure that the required infrastructure is in place prior to occupation, and where a wastewater solution defined where one does not currently exist.

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 28 storm overflows in Uttlesford, 18 on the network, and 10 at WwTWs.

In comparison to some urban areas or large cities, Uttlesford has relatively few storm overflows on the sewer network. The SOAF set a threshold of 60 operations in a year (based on 1 years' data, 50 if based on 2 years data, and 40 if based on 3 years), above which a storm overflow should be investigated. One of the storm overflows (White Roding) was operating above this threshold between 2021 and 2023. The Storm Overflow Reduction Plan which was published in 2022 sets an objective that "storm overflows will not be permitted to discharge above an average of 10 rainfall events per year by 2050". Six of the 18 monitored storm overflows are operating on average above 10 times per year so may require action to meet the long-term target.

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

Table 6.4 Recommendations for wastewater network

Action	Responsibility	Timeframe
Early engagement between UDC and AW/TW is required to ensure that where strategic infrastructure is required, it can be planned in by AW/TW, and will not lead to any increase in discharges from sewer overflows.	UDC, Developers, AW/TW	Early in the LP process
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 demonstrate the wastewater assets required, their locations including points of connection to the public foul sewerage, whether the site drainage will be adopted by the water company and if any sewer requisitions will be required.	UDC, AW/TW and developers	Ongoing
Drainage strategy for "Land off the Broadway and Land east of B1008, Great Dunmow" site should demonstrate that the foul network will not be exposed to flooding from the River Chelmer.	Developer	During planning process
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, Anglian Water and Thames Water	LLFA and developers	Ongoing
A wastewater solution for the "Land at Gaunts End, Elsenham" is required. It is recommended that UDC / Developers engage with Thames Water early in LP period to ensure provision of any additional infrastructure can be aligned with development of this site.	UDC, Developers, TW	Early in LP period

7 Wastewater treatment

7.1 Introduction

Uttlesford has 31 Wastewater Treatment Works (WwTW) within or serving population within Uttlesford which are shown in Figure 7.1 below. Of these 24 are expected to serve growth within the Local Plan period. 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 data sources. For the purposes of this report, both Thames Water and Anglian Water's wastewater processing plants will be referred to as WwTWs.

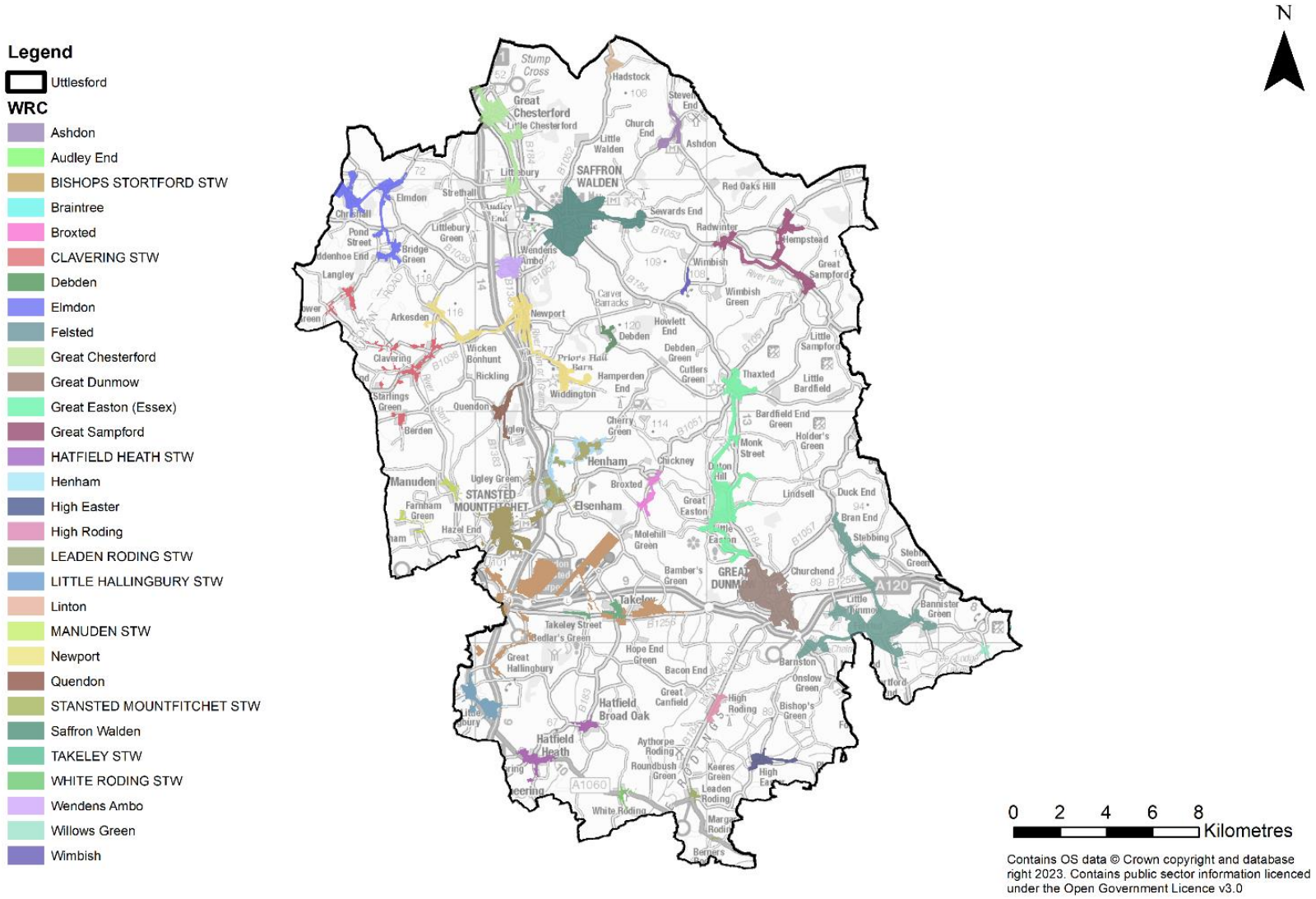


Figure 7.1 WwTW catchments serving Uttlesford

There are also 605 dwellings and 25,850m^2 of employment land planned that is not served by a public sewerage system. These are mostly small sites and widely distributed throughout the study area. 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.

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.

7.2 Capacity assessment

7.2.1 Introduction

New residential developments and new employment land add pressure to the existing treatment works. An assessment is required to identify the available capacity within the existing WwTWs, 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.

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 as soon as reasonably possible, freeing their capacity for the next rainfall event.

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

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

undergo full treatment, and above which additional flow is permitted to pass to the storm tanks (Figure 7.2).

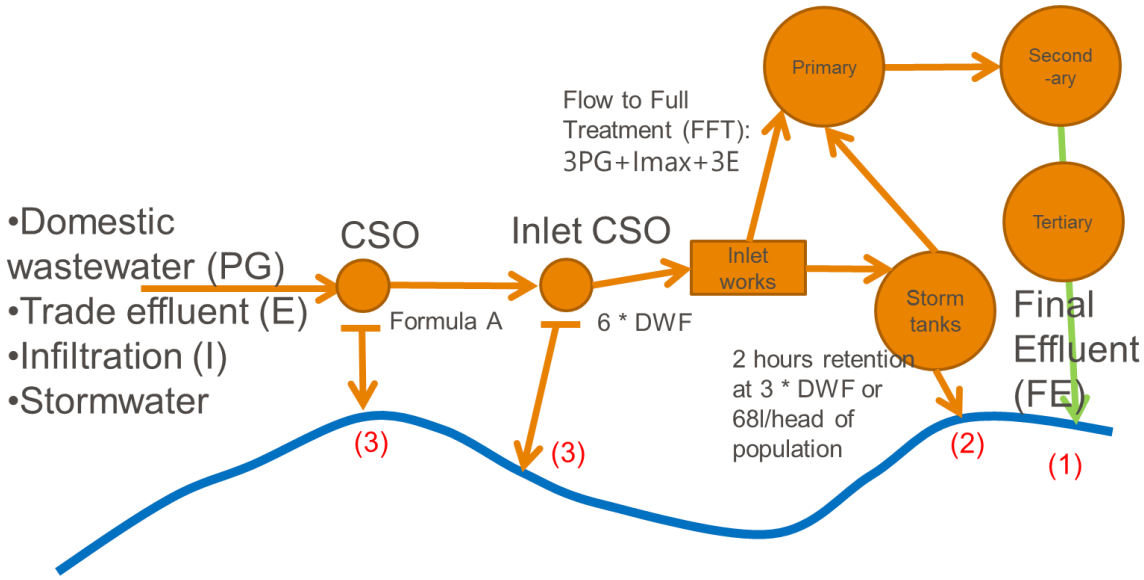


Figure 7.2 Overview of typical combined sewerage system and WwTW discharges

7.2.2 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 Dry Weather Flow (DWF) statistics, and from this the 20th percentile (80% exceedance flow) for 2021-2023 was calculated. The flow data was processed to remove zero values and low outlier values which would artificially reduce the measured DWF.
- Preferred allocations, windfall and existing commitments were assigned to a WwTW using the sewerage drainage area boundaries provided by AW and TW.
- For each residential site, the future DWF was calculated using the occupancy rates and per-capita consumption values obtained from the Water Resource Management Plans, 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, the net floorspace provided by UDC was used to estimate the number of employees using the employment use class, and standard densities from the Employment Density Guide 3rd Edition (Homes & Communities Agency, 2015). A standard figure of 0.1m^3/employee/day was then used to estimate water demand on each site.
- The current and estimated future flow was then compared to the permitted flow obtained from the Environment Agency “Consented Discharges to Controlled Waters with Conditions” database.
- Headroom (expressed the number of homes that could be accommodated before the permit is exceeded) was estimated by calculating the difference between the

current and permitted flow and using the occupancy and per capita consumption for the WRZ the sewer catchment is in to provide an estimate for the number of houses.

- A red/amber/green score was then assigned to each WwTW based on whether it was likely to exceed its permitted flow.
- The following red/amber/green traffic light definition was used to score each WwTW:

GREEN Sufficient capacity to accommodate growth	AMBER Likely to be close to or exceed permit during plan period. Upgrades and / or a change to permit limit may be required. No significant constraints have been identified. (Based on less than 10% headroom remaining)	RED WwTW Capacity may be a constraint to growth (defined by Water Company)

The preferred option sites were also provided to AW and TW for them to assess the impact on their WwTW using the RAG criteria with comments were appropriate.

7.2.3 Results

Table 7.1 shows the results of the WwTW capacity assessment. 13 WwTWs are expected to have capacity for the growth planned throughout the plan period. 12 WwTWs likely to be close to or exceed their permit during the plan period. An increase in flow permit, and/or upgrades to treatment capacity will be required at these WwTW.

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 technically feasibly possible if that means concentrations tighter than the Technically Accepted Limit (TAL) which is 0.25 mg/l for phosphate for example.

AW and TW provided an assessment of the preferred allocations. The results of this assessment are shown in Table 7.1 and graphically in Figure 7.3.

Saffron Walden WwTW (Anglian Water)

AW state that Saffron Walden WwTW has "Sufficient headroom available at the WRC - dependent on existing commitments. WRC proposed to go to TAL (technically achievable limits) for phosphorus in AMP8 as part of WINEP obligations." JBA's analysis suggests that Saffron Walden WwTW is likely to be close to or exceeding its flow permit by the end of AMP9 (2035) once all planned growth is taken into account. Engagement between AW and UDC should ensure that the entire quantum of growth is taken into account in any AMP9 upgrade plans. The Level 3 catchment summary for Saffron Walden in AW's DWMP shows

a 2021 population of 18,273 increasing to 19,599 by 2035 and 21,106 by 2050. Growth within the Local Plan period is predicted to produce 2,361 dwellings suggesting AW may have underestimated growth within this catchment.

Great Dunmow WwTW (Anglian Water)

"Insufficient headroom available - proposed growth scheme for delivery in early AMP8 for additional treatment capacity due to growth which will also require a new DWF permit. WRC also proposed to go to TAL for phosphorus in AMP8 as part of WINEP obligations"

This is confirmed by JBA's analysis showing that Great Dunmow WwTW is currently at its permit limit (based on the 80th exceedance percentile - compliance is measured against the 90th percentile).

The Level 3 catchment summary within AW's DWMP shows the population within the Great Dunmow WwTW catchment is expected to grow from 9,654 in 2021 to 10,409 by 2035 and 11,267 by 2050. Growth within the Local Plan period is expected to produce 4,097 dwellings, of which 2,732 dwellings are from sites already in the planning system. This suggests Anglian Water have significantly underestimated growth within this catchment. It is important that AW ensure that the full quantum of growth has been taken into account in the AMP8 upgrade scheme (or subsequent future upgrades).

Stansted Mountfitchet WwTW (Thames Water)

JBA's analysis suggests that Stansted Mountfitchet WwTW is likely to be close to or exceeding its flow permit by the end of AMP9 (2035). TW have stated that a growth upgrade is currently planned for AMP8 (2025-2030). TW should ensure that the full quantum of growth (including both current commitments and preferred option allocations) is taken into account in the AMP8 growth upgrade scheme.

Bishops Stortford (Thames Water)

JBA's analysis suggests that Bishops Stortford WwTW is likely to be close to or exceeding its flow permit by the end of AMP9 (2035) once all planned growth - particularly from neighbouring authorities is taken into account. TW have given this WwTW a "green" assessment noting that it has good headroom available. TW should ensure that capacity is monitored during AMP8 and a growth scheme planned early AMP9 in order to accommodate longer term growth.

The water quality assessment (section 8.2.3) shows that growth during the Local Plan period could prevent good ecological status being achieved in the future at Takeley WwTW (should improvements be made upstream that would enable this). Diverting growth from Takeley into Bishops Stortford WwTW would prevent this issue and would not significantly impact the assessment at Bishops Stortford WwTW. If this were pursued as an option, future capacity upgrades would need to take this into account.

Takeley WwTW (Thames Water)

JBA's analysis suggests that there is sufficient headroom at Takeley WwTW to accommodate all planned growth within this catchment during the LP period (water quality concerns are noted in Section 8). TW have given the site at North Takeley Street a "red" assessment stating that the WwTW is not scoped for growth specific enhancements in AMP8 and that they were unable to determine the size of the site. It should be noted that TW were provided a shapefile of the site and accompanying information stating the employment floorspace and the employment type proposed.

Upgrades are planned for this site to ensure permit compliance and to reduce storm overflow discharges - these two schemes are forecasted AMP8 delivery.

In Stage 1 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 overflow which should be considered should growth be served by this WwTW (overflow operated 76 times in 2020 for over 1,000 hours in total). TW also noted that “There is an ongoing modelling study to assess impact of proposed growth at Takeley sewerage network.”

Table 7.1 WwTW capacity assessment

WwTW name	Predicted housing during LP period (no. dwellings)	Predicted employment during LP period (sqm)	Estimated remaining capacity at end of Local Plan period (dwellings)	JBA Capacity Assessment
Ashdon WwTW	6	-	173	GREEN - Sufficient capacity to accommodate growth
Bishops Stortford WwTW	19,262	27,8887	-10,067	AMBER - Likely to be close to or exceed permit during plan period. Upgrades and / or a change to permit limit may be required. No significant constraints have been identified.
Broxted WwTW	5	432.2	Unable to calculate	AMBER - No flow monitoring at this WwTW. Unlikely to be significant capacity for growth
Clavering WwTW	75	1767	19	GREEN - Sufficient capacity to accommodate growth
Debden WwTW	32		296	GREEN - Sufficient capacity to accommodate growth
Elmdon WwTW	7		388	GREEN - Sufficient capacity to accommodate growth
Felsted WwTW	483	1,983	813	GREEN - Sufficient capacity to accommodate growth
Great Chesterford WwTW	1,740	5,494	-2,729	AMBER - Likely to be close to or exceed permit during plan period. Upgrades and / or a change to permit limit may be required. No significant constraints have been identified.

WwTW name	Predicted housing during LP period (no. dwellings)	Predicted employment during LP period (sqm)	Estimated remaining capacity at end of Local Plan period (dwellings)	JBA Capacity Assessment
Great Dunmow WwTW	4,097	2,990	-6,634	AMBER - Likely to be close to or exceed permit during plan period. Upgrades and / or a change to permit limit may be required. No significant constraints have been identified.
Great Easton (Essex) WwTW	1,493	6,918.9	-1,936	AMBER - Likely to be close to or exceed permit during plan period. Upgrades and / or a change to permit limit may be required. No significant constraints have been identified.
Great Sampford WwTW	2		-88	AMBER - Likely to be close to or exceed permit during plan period. Upgrades and / or a change to permit limit may be required. No significant constraints have been identified.
Hatfield Heath WwTW	46		676	GREEN - Sufficient capacity to accommodate growth
High Easter WwTW	0	120	186	GREEN - Sufficient capacity to accommodate growth
High Roding WwTW	9		177	GREEN - Sufficient capacity to accommodate growth
Leaden Roding WwTW	3		300	GREEN - Sufficient capacity to accommodate growth

WwTW name	Predicted housing during LP period (no. dwellings)	Predicted employment during LP period (sqm)	Estimated remaining capacity at end of Local Plan period (dwellings)	JBA Capacity Assessment
Linton WwTW		47269	1,452	GREEN - Sufficient capacity to accommodate growth
Little Hallingbury WwTW	16		1,113	GREEN - Sufficient capacity to accommodate growth
Manuden WwTW	73	188	608	GREEN - Sufficient capacity to accommodate growth
Newport WwTW	219	10.2	-389	AMBER - Likely to be close to or exceed permit during plan period. Upgrades and / or a change to permit limit may be required. No significant constraints have been identified.
No public sewer	605	25,856.1	N/A	AMBER - Wastewater solution required for these sites
Saffron Walden WwTW	2,361	12,800	-816	AMBER - Likely to be close to or exceed permit during plan period. Upgrades and / or a change to permit limit may be required. No significant constraints have been identified.
Stansted Mountfitchet WwTW	1,889	2,614	-331	AMBER - Likely to be close to or exceed permit during plan period. Upgrades and / or a change to permit limit may be required. No significant constraints have been identified.

WwTW name	Predicted housing during LP period (no. dwellings)	Predicted employment during LP period (sqm)	Estimated remaining capacity at end of Local Plan period (dwellings)	JBA Capacity Assessment
Takeley WwTW	486	8,500	739	GREEN - Sufficient capacity to accommodate growth
Wendens Ambo WwTW	5	235	Unable to calculate	AMBER - No flow monitoring at this WwTW. Unlikely to be significant capacity for growth
Willows Green WwTW	3	20	Unable to calculate	AMBER - No flow monitoring at this WwTW. Unlikely to be significant capacity for growth
Wimbish WwTW	7		Unable to calculate	AMBER - Descriptive permit with no flow monitoring at this WwTW. Unlikely to be significant capacity for growth

Note: this includes growth from neighbouring LPAs

Table 7.2 Water company assessment of WwTWs

Site	WwTW	Proposed growth	Water company assessment	Comments
Land east of Station Road, Elsenham	Stansted Mountfitchet WwTW	150 dwellings	GREEN	Growth Upgrade for AMP8 (subject to Ofwat's final determination of our PR24 business plan)
Land east of High Lane and Land at Walpole Meadows, Stansted Mountfitchet	Stansted Mountfitchet WwTW	390 dwellings	GREEN	Growth Upgrade for AMP8 (subject to Ofwat's final determination of our PR24 business plan)
Land off The Broadway and Land east of B1008, Great Dunmow	Great Dunmow WwTW	884 dwellings	AMBER	Insufficient headroom available - proposed growth scheme for delivery in early AMP8 for additional treatment capacity due to growth which will also require a new DWF permit. WwTW also proposed to go to TAL for phosphorus in AMP8 as part of WINEP obligations
Land east of Shire Hill Farm and south of Radwinter Road, Saffron Walden	Saffron Walden WwTW	879 dwellings, 8,000sqm	GREEN	Sufficient headroom available at the WwTW - dependent on existing commitments. WwTW proposed to go to TAL (technically achievable limits) for phosphorus in AMP8 as part of WINEP obligations.
Land at Warrens Farm and Land at Warish Hall Farm, Little Canfield and Takeley	Bishops Stortford WwTW	1,546 dwellings	GREEN	"WINEP Programme Delivery forecasted for AMP8. The site manages flow well & has good headroom with regards to its permit's quality limits"
Land at Gaunts End, Elsenham	Bishops Stortford WwTW probable	1,950sqm	AMBER	Area not currently served by public sewer system

Site	WwTW	Proposed growth	Water company assessment	Comments
Land north of Takeley Street, Takeley	Takeley WwTW	8,500sqm	RED	"Takeley STW WINEP programme currently forecasted for 2027 delivery. Other upgrades are planned for this site to ensure permit compliance and to reduce storm overflow discharges - these two schemes are forecasted AMP8 delivery. This site is currently not scoped for growth specific enhancements in AMP8"
Land at Little Chesterford Research Park	Private WwTW	3,450sqm	AMBER	
Land south of A120/North of Stortford Road, Great Dunmow	Bishops Stortford WwTW	9,500qm	GREEN	"WINEP Programme Delivery forecasted for AMP8. The site manages flow well & has good headroom with regards to its permit's quality limits"

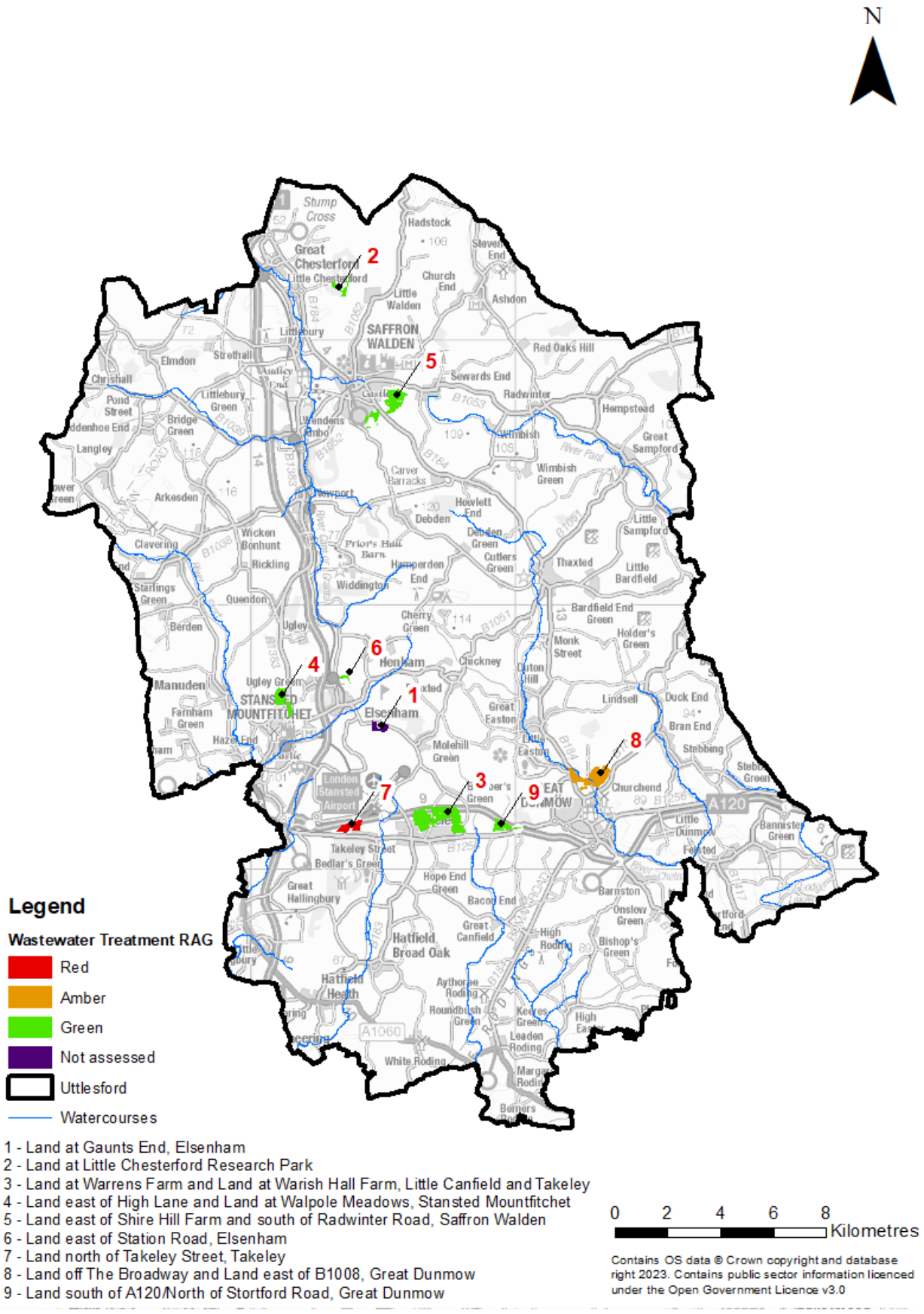


Figure 7.3 WwTW capacity assessment

7.3 Storm overflows at wastewater treatment works

Table 7.4 presents performance of storm tank overflows at WwTWs in Uttlesford. Ten overflows are present and of these, four are operating above the threshold for an investigation and these are shown in Table 7.3 with the stated reason for the poor performance.

Table 7.3 Overflows above threshold for investigation

Overflow name / permit reference	Comments
Hatfield Heath WwTW / CSSC.0261	Asset maintenance issue
Great Easton (Essex) STW / ASENF10268	Confirmed exceptional weather - remaining spills not above SOAF threshold.
Little Hallingbury WwTW / CSSC.0263	Hydraulic capacity issue
Takeley STW / TEMP.2948	Hydraulic capacity issue

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, the WwTW or its storm tanks are undersized for the population served, or that there are potential operational issues at the WwTW. 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. This opportunity is greatest at brownfield sites connected to existing combined sewerage systems.

Table 7.4 Storm tank overflow assessment

Overflow	Storm Overflow Number	Number of operations in 2021	Duration of operations in 2021 (hours)	Number of operations in 2022	Duration of operations in 2022 (hours)	Number of operations in 2023	Duration of operations in 2023 (hours)	Above threshold for investigation? (Y/N)
Felsted (LR Chelmer) STW/ AW2NF911	19	43	548.25	0	0	0	0	N
Great Chesterford WRC/ AWCNF11340	20	2	3	4	2	1	0.25	N
Great Dunmow STW/ ASENF12255	21	34	214.47	15	87.75	42	392.42	N
Great Easton (Essex) STW/ ASENF10268	22	31	464.5	33	268.26	106	1341.15	Y
Great Sampford STW/ ASENF1084	23	2	8	1	0.25	2	2.73	N
Hatfield Heath WwTW/ CSSC.0261	24	131	2602.86	70	1234.65	120	2289.75	Y
Little	25	59	969.55	31	404.9	61	846.75	Y

Overflow	Storm Overflow Number	Number of operations in 2021	Duration of operations in 2021 (hours)	Number of operations in 2022	Duration of operations in 2022 (hours)	Number of operations in 2023	Duration of operations in 2023 (hours)	Above threshold for investigation? (Y/N)
Hallingbury WwTW/ CSSC.0263								
Saffron Walden WRC/ ASCNF1184	26	7	7	8	6.75	1	0.5	N
Stansted Mountfitchet WwTW/ CLCR.0165	27	30	383.07	17	146.47	35	352.25	N
Takeley STW/ TEMP.2948	28	90	1281.03	50	701.28	81	1207.75	Y

7.4 Conclusions and recommendations

A capacity assessment was undertaken by JBA comparing the future flow from each WwTW (the current actual flow and the forecast additional flow from growth), with the permit limit. Eight of the WwTWs (listed in Table 7.1) in the study area are expected to be close to or exceeding their permit during the Local Plan period. An increase in the permit limit, and / or upgrades to treatment capacity may be required at these WwTWs in order to accommodate the planned growth. It is important that when planning upgrades at WwTW that the full quantum of growth, including from neighbouring LPAs is taken into account. Population estimates within Anglian Water's Drainage and Wastewater Management Plan suggest that they may have underestimated growth within the catchments of Great Dunmow and Saffron Walden WwTWs. Equivalent data is not published within Thames Water's DWMP, so it was not possible to assess this.

Where new infrastructure or upgrades to existing infrastructure may be required, engagement between UDC and the water company is required to ensure that delivery of this infrastructure is aligned with delivery of development sites. Grampian conditions may be sought by the water company should development be in advance of the necessary infrastructure.

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.

Table 7.5 Recommendations for wastewater treatment

Action	Responsibility	Timescale
Early engagement with Anglian Water and Thames Water is required to ensure that provision of WwTW capacity is aligned with delivery of development.	UDC	Ongoing
AW should ensure that the growth forecasts used for planning upgrades at Great Dunmow and Saffron Walden WwTW take into account a sufficient level of growth.	AW	Ongoing
Provide Annual Monitoring Reports to Anglian Water and Thames Water detailing projected housing growth.	UDC	Ongoing
Anglian Water and Thames Water to assess growth demands as part of their wastewater asset planning activities and feedback to the Council if concerns arise.	UDC	Ongoing

8 Water quality

8.1 Introduction

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

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 (Environment Agency, 2012) (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 ensures 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" (European Union, 2015) 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 as set out in the EA guidance (Environment Agency, 2014).

BOD – Biochemical Oxygen Demand

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

Ammonia

Nitrogen is an essential nutrient required by all plants and animals for the formation of amino acids. In its molecular form nitrogen cannot be used by most aquatic plants, and so it is converted into other forms. One such form is ammonia (NH_3). This may then be oxidized by bacteria into nitrate (NO_3) or nitrite (NO2). Ammonia may be present in water in either the unionized form NH_3 or the ionized form NH_4. Taken together these forms are called Total Ammonia Nitrogen.

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

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

Phosphate

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

Phosphorus (P) occurs in rivers mainly as Phosphate (PO_4), which are divided into Orthophosphates (reactive phosphates), and organic Phosphates.

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

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

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

8.2 Water quality modelling

8.2.1 General approach

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 model which represents inputs from both point-source effluent discharges and diffuse sources, and the behaviour of solutes in the river.

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

Once the distribution results have been produced, an assessment can be undertaken on the predicted mean and ninetieth percentile concentrations or loads compared to the Environmental Quality Standards.

The study area is covered by the Thames, Wash and East Anglia SIMCAT models.

Within SIMCAT, the determinands modelled were Biochemical Oxygen Demand (BOD), Ammonia (NH4) and Phosphorus (P). In fresh waterbodies, phosphate is usually the limiting nutrient for algal growth. However, in marine environments, nitrogen is considered to be the limiting nutrient.

The methodology followed is summarised in Figure 8.1 below. In this flow chart, all of the questions in the top row must be answered.

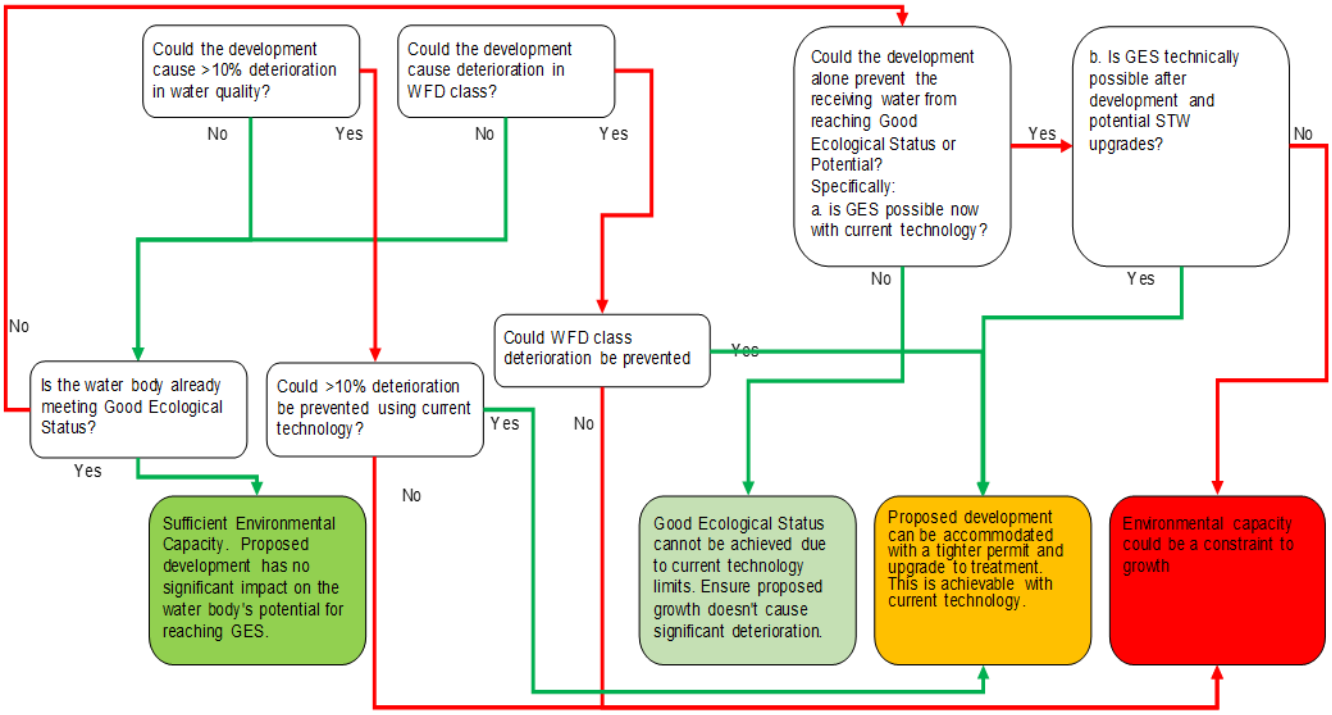


Figure 8.1 Water quality impact assessment following EA guidance

Where modelling indicated growth may lead to a deterioration in the watercourse, or where the watercourse is not currently meeting at least a 'Good' class for each determinant, the models were used to test whether this could be addressed by applying stricter discharge limits. In such cases, a Technically Achievable Limit (TAL) was considered.

The EA advised that the following permit values are achievable using treatment at TAL, and that these values should be used for modelling all WwTW potential capacity irrespective of the existing treatment technology and size of the works:

- Ammonia (90%ile): 1 mg/l
- BOD (90%ile): 5 mg/l
- Phosphorus (mean): 0.25 mg/l

This assessment did not take into consideration whether it is feasible to upgrade each existing WwTW to TAL due to constraints of costs, timing, space, carbon costs etc.

8.2.2 Methodology

The study area is covered by the Thames, Wash and East Anglia SIMCAT models developed by the Environment Agency. The models have been largely based on observed flow and quality data for the period 2014-2020. A widespread update of the models, and the resultant recalibration were not within scope of this project. It was therefore agreed with the EA to update just the effluent flow at WwTWs receiving growth in the study area. Consequently, the modelling work presented should be used to identify areas at risk of water quality deterioration, but not for permit setting.

Flow data from the last three years for each WwTW in the study area was supplied by Thames Water and Anglian Water and used to update the model. Several of the WwTWs in the study area already had upgrades completed in AMP6 or planned in AMP7, which would be expected to improve water quality at those locations. These were therefore factored into the model by applying the updated permit limit where it was less than the current discharge in the model. The model was then run in its updated form to set a 2024 baseline. It is expected that further upgrades to WwTWs will be planned in AMP8 (2025-30) which will be defined in the AMP8 WINEP and the business plans for AW and TW. As these documents have not yet been published, AMP8 schemes have not been factored into the modelling.

Additional effluent flow from growth during the Local Plan Update period was added to current flow at WwTWs receiving growth and the model re-run as a future scenario.

Some smaller WwTWs within the model have descriptive permits which do not set specific numerical limits for DWF and effluent quality, and do not have flow monitoring in place. The models are calibrated to observed water quality measurements and represent the overall water quality in the catchment well, however at a local scale some of these smaller WwTWs are not well represented and do not have discharge data or have pollutant discharges modelled as a load in kilograms rather than an effluent flow and concentration. Broxted and Willows Green WwTWs have descriptive permits.

No deterioration test

The results from the baseline and future versions of the model were compared to assess the predicted percentage deterioration for each of the modelled determinands. WFD targets for each river reach were provided by the EA and used to determine if there was a risk of a class deterioration.

Where a deterioration of 10% or greater was predicted or a change in class (considered to be a significant deterioration under WFD) a further test was conducted to see if this deterioration could be prevented by upgrades to treatment processes. This used another version of the model with each WwTW set to operate at their Technically Achievable Limit (TAL).

Good ecological status assessment

Where treatment at TAL and reductions in diffuse sources in the present day could improve water quality to achieve Good Ecological Status (GES), it is important to understand whether this could be compromised as a result of future growth within the catchment.

Guidance from the EA suggests breaking this down in to two questions:

a) Is GES possible now with current technology?

b) Is GES technically possible after development and any potential WwTW upgrades?

If the answer to questions a) and b) are both ‘Yes’ or both ‘No’ then the development can be assessed as having no significant impact on the water bodies potential for reaching GES, i.e., the development alone is not preventing GES from being achieved.

If the answer to a) is 'Yes' and the answer for b) is 'No' then development is having a significant impact, i.e., before development GES could be achieved with upstream improvements, and after growth the additional effluent from growth prevents GES being achieved.

The possible answers are summarised in Table 8.1.

Run type 9 within SIMCAT was used which assumes that upstream flow at each treatment works is at good ecological status. This simulates improvements being made in upstream water quality. The water quality of the discharge from each WwTW in order to maintain GES is then calculated by the model.

Table 8.1 Possible GES assessment results

Predicted to achieve GES after growth	Could achieve GES today with improvements in upstream water quality? (a)	Could achieve GES in the future with improvements in upstream water quality? (b)	Assessment Result
YES	N/A	N/A	GREEN - Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.
NO	YES	YES	AMBER - Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology.
NO	NO	NO	YELLOW - Good ecological status cannot be achieved due to current technology limits. Ensure proposed growth doesn't cause significant deterioration.
NO	YES	NO	RED - Environmental capacity could be a constraint to growth.

8.2.3 Results

The first test applied compares the future scenario to the baseline and assesses whether a significant deterioration in water quality occurs – either a 10% deterioration in water quality or a deterioration in WFD class. Where, a significant deterioration is predicted, the TAL

scenario then assesses whether this deterioration could be prevented by improvements in treatment processes.

Table 8.2 below summarises the results of the water quality assessments. Where a “green” score is given, deterioration was less than 10% for each determinand, and no change in WFD class is predicted. Where an “amber assessment is given, a 10% deterioration or change in WFD class is predicted, but this could be prevented by improvements in treatment technology. In these cases, upgrades may therefore be required at that WwTW or at WwTW upstream.

A “red” assessment would be given where a significant deterioration in water quality is predicted, and it cannot be prevented by improvements in treatment processes.

Five of the twenty-four WwTWs serving growth during the plan period are predicted to experience a significant deterioration, with a greater than 10% deterioration in BOD predicted at Takeley, Great Dunmow and Great Easton WwTWs, which in the case of Great Easton WwTW may be accompanied by a deterioration in WFD class from Moderate to Poor. At Great Dunmow WwTW a deterioration in phosphate of greater than 3% is also predicted. As this watercourse is already within the Bad class, this is considered to be a significant deterioration. A greater than 10% deterioration in ammonia is predicted at Great Easton and Debden WwTW, and in Phosphate at Great Chesterford WwTW. All of the above deteriorations can be prevented by improvements in treatment.

In the initial modelling, it was predicted that a 24% deterioration in ammonia may occur downstream of Gret Dunmow WwTW. The modelling showed that this could not be prevented by improvements in treatment. Further investigation of the current performance of Great Dunmow using the EA Water Quality Data Archive showed that the WwTW was operating at a higher standard than suggested by the SIMCAT model (which is based on 2014-2020 data). The modelling was re-run using data from the last three years for ammonia, and whilst a significant deterioration in ammonia was still predicted, it could now be prevented by improvements in treatment.

In this assessment, improvements in treatment processes have been modelled by assuming the WwTW is operating TAL. It has not investigated the feasibility of upgrading individual WwTWs. This should be performed by Thames Water and Anglian Water who have the detailed knowledge of their assets, and the Environment Agency who are responsible for setting permit limits at WwTW. AW in their response to the draft Stage 2 WCS stated that permit limits at Great Dunmow and Saffron Walden WwTWs will be tightened to TAL for Phosphate during AMP8. Permit limit changes at other WwTWs may already be planned in AMP8.

Appendix A maps the predicted deterioration in water quality visually for Ammonia, BOD and Phosphate in the future, and the predicted deterioration if WwTWs were performing at the technically achievable limit.

The first set of maps in Appendix A.1 shows the modelled results if wastewater discharges increased by the volume predicted during the Local Plan period. They show a result at the

point of mixing (i.e., where the WwTW discharges) and the results downstream in the river. These are colour coded based on whether deterioration is greater (red) or less than (amber) 10%. Areas where no deterioration is predicted are coloured green.

The second set of maps in Appendix A.2 shows the modelled results in the TAL scenario, where each WwTW has been upgraded to the technically achievable limit. This shows areas where deterioration could not be prevented. In each case this is less than 10%.

The growth stated in Table 8.2 includes recent completions and neighbouring authority growth as well as growth from within Uttlesford District.

Table 8.2 WFD assessment results

WwTW	Could the development cause a greater than 10% deterioration in water quality for one or more of Ammonia, BOD, or Phosphate?	Could the development cause a deterioration in WFD class of any element?	Can a deterioration of >10% or in class be prevented by treatment at TAL
ASHDON STW	No	No	Yes
BISHOPS STORTFORD STW	No	No	Yes
BROXTED STW	No	No	Yes
CLAVERING STW	No	No	Yes
DEBDEN STW	Yes – 14% deterioration in Ammonia	No	Yes
ELMDON STW	No	No	Yes
FELSTED(LR CHELMER)	No	No	Yes
GREAT CHESTERFORD STW	Yes – 29% deterioration in Phosphate	No	Yes
GREAT DUNMOW STW	Yes – 20% deterioration in Ammonia, 11% deterioration in BOD, and 18% deterioration in Phosphate	No	Yes

WwTW	Could the development cause a greater than 10% deterioration in water quality for one or more of Ammonia, BOD, or Phosphate?	Could the development cause a deterioration in WFD class of any element?	Can a deterioration of >10% or in class be prevented by treatment at TAL
GREAT EASTON(ESSEX)	Yes – 23% deterioration in Ammonia, 13% deterioration in BOD, and 21% deterioration in Phosphate which is at Bad WFD status	Yes – (BOD deteriorates from Moderate status to Poor)	Yes
GREAT SAMPFORD STW	No	No	Yes
HATFIELD HEATH STW	No	No	Yes
HIGH EASTER STW	No	No	Yes
HIGH RODING STW	No	No	Yes
LEADEN RODING STW	No	No	Yes
LINTON STW	No	No	Yes
LITTLE HALLINGBURY STW	No	No	Yes
MANUDEN STW	No	No	Yes
NEWPORT STW	No	No	Yes
SAFFRON WALDEN STW	No	No	Yes
STANSTED MOUNTFITCHET STW	No	No	Yes
TAKELEY STW	Yes – 15% deterioration in BOD	No	Yes
WENDENS AMBO STW	No	No	Yes
WILLOWS GREEN STW	No	No	Yes

Table 8.3 summarises the results of the GES assessment outlined in section 8.2.2. Four different assessments are possible which are shown in Table 8.1 above.

- If good ecological status is predicted to be achieved within the receiving waterbody following growth during the plan period, a green assessment is given. In this case, it can be said that there is environmental capacity to accommodate growth.
- Where GES is not currently being achieved but could be achieved if upstream water quality were improved, then an amber score is given – growth could be accommodated without preventing a waterbody achieving GES in the future.
- Where GES cannot be achieved either today or in the future, despite upgrades in treatment processes, and improvements in upstream water quality, then a yellow assessment is given – and it can be said that GES cannot be achieved due to the limits of current technology. Growth alone is not predicted to prevent GES being achieved in the future.
- Should GES be achievable today, but not in the future due to growth, a red assessment would be given, and it can be said that environmental capacity could be a constraint to growth, i.e., growth alone could prevent good ecological status being achieved in the future.

Table 8.3 GES assessment results

WwTW	Ammonia assessment	Biochemical Oxygen Demand (BOD) assessment	Phosphate assessment
ASHDON STW	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER-Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology
BISHOPS STORTFORD STW	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	YELLOW-Good ecological status cannot be achieved due to current technology limits. Ensure proposed growth doesn't cause significant deterioration
BROXTED STW	N/A	N/A	N/A
CLAVERING STW	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	YELLOW-Good ecological status cannot be achieved due to current technology limits. Ensure proposed growth doesn't cause significant deterioration
DEBDEN STW	GREEN-Sufficient environmental capacity. Proposed	GREEN-Sufficient environmental capacity. Proposed	AMBER-Proposed development can be accommodated

WwTW	Ammonia assessment	Biochemical Oxygen Demand (BOD) assessment	Phosphate assessment
	development has no significant impact on the water body's potential for meeting GES.	development has no significant impact on the water body's potential for meeting GES.	with a tighter permit and upgrade to treatment. This is achievable with current technology
ELMDON STW	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER- Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology	AMBER- Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology
FELSTED (LR CHELMER)	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER- Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology
GREAT CHESTERFORD ST	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER- Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology

WwTW	Ammonia assessment	Biochemical Oxygen Demand (BOD) assessment	Phosphate assessment
GREAT DUNMOW STW	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER-Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology
GREAT EASTON(ESSEX)	AMBER-Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology	AMBER-Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology	YELLOW-Good ecological status cannot be achieved due to current technology limits. Ensure proposed growth doesn't cause significant deterioration
GREAT SAMPFORD STW	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER-Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology

WwTW	Ammonia assessment	Biochemical Oxygen Demand (BOD) assessment	Phosphate assessment
HATFIELD HEATH STW	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER- Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology
HIGH EASTER STW	AMBER- Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER- Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology
HIGH RODING STW	AMBER- Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER- Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology
LEADEN RODING STW	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the	GREEN- Sufficient environmental capacity. Proposed development has no significant	AMBER- Proposed development can be accommodated with a tighter permit and upgrade to

WwTW	Ammonia assessment	Biochemical Oxygen Demand (BOD) assessment	Phosphate assessment
	water body's potential for meeting GES.	impact on the water body's potential for meeting GES.	treatment. This is achievable with current technology
LINTON STW	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER- Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology
LITTLE HALINGBURY STW	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER- Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology
MANUDEN STW	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER- Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology
NEWPORT STW	GREEN- Sufficient environmental	GREEN- Sufficient environmental	AMBER- Proposed development can

WwTW	Ammonia assessment	Biochemical Oxygen Demand (BOD) assessment	Phosphate assessment
	capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology
SAFFRON WALDEN STW	YELLOW-Good ecological status cannot be achieved due to current technology limits. Ensure proposed growth doesn't cause significant deterioration	AMBER-Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology	YELLOW-Good ecological status cannot be achieved due to current technology limits. Ensure proposed growth doesn't cause significant deterioration
STANSTED MOUNTFITCHET STW	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN-Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	YELLOW-Good ecological status cannot be achieved due to current technology limits. Ensure proposed growth doesn't cause significant deterioration

WwTW	Ammonia assessment	Biochemical Oxygen Demand (BOD) assessment	Phosphate assessment
TAKELEY STW	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	RED- Environmental capacity could be a constraint to growth
WENDENS AMBO STW	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	GREEN- Sufficient environmental capacity. Proposed development has no significant impact on the water body's potential for meeting GES.	AMBER- Proposed development can be accommodated with a tighter permit and upgrade to treatment. This is achievable with current technology
WILLOWS GREEN STW	N/A	N/A	N/A

At Takeley, the modelling predicts that Good Ecological status cannot be achieved due to future growth, a situation that would not be allowed under the WFD.

As such an additional future scenario has been run with the additional demand from commitments, allocations and windfall expected to be served by Takeley during the Local Plan period applied to Bishops Stortford WwTW. This represents a future scenario where either the new developments are connected to Bishops Stortford rather than Takeley, or an equivalent flow is diverted into Bishops Stortford via an adjustment to the sewer network where the two catchments are adjacent. Bishops Stortford WwTW is a larger treatment works, the catchment of which is adjacent to the sewer catchment for Takeley WwTW.

Results show that the additional flow does not significantly impact the deterioration at Bishops Stortford which remains <10%. Diversion of this flow allows GES for Phosphate to be achieved at Takeley.

Whilst this assessment shows that deterioration would be prevented, Thames Water have not confirmed whether this additional growth can be accommodated at Bishops Stortford.

The feasibility of connecting new developments to Bishops Stortford or diverting flow have also not been assessed.

8.3 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.

We also consider 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 the Stage 1 report (Section 9).
- 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 Conclusions and recommendations

8.4.1 Conclusions

The modelling indicates the growth during the Local Plan period could result in a significant deterioration (10% or over or deterioration in class) in water quality at five WwTWs (Takeley, Great Easton, Great Dunmow, Debden and Great Chesterford). In all cases, this deterioration could be prevented by improvements in treatment. Some tightening of permit limits may already be planned in AMP8 but details have not yet been published.

Growth alone will not prevent good ecological status being prevented in the future should improvements in upstream water quality be made with the exception of Takeley, where environmental capacity could be a constraint to growth.

An additional modelling scenario was run where the additional demand from growth expected to be served by Takeley WwTW was applied to Bishops Stortford rather than Takeley. This represents either the new developments being connected to Bishops Stortford, or an equivalent flow being diverted into Bishops Stortford via an adjustment to the sewer network where the two catchments are adjacent.

The feasibility of connecting new developments to Bishops Stortford WwTW or diverting flow has not been assessed and should be discussed with Thames Water.

Where a WwTW is shared with a neighbouring authority, coordination of growth plans in collaboration with Thames Water and Anglian Water is essential to ensure that infrastructure is in place prior to development to prevent a breach of the environmental permit.

8.4.2 Recommendations

Table 8.4 Recommendations for water quality

Actions	Responsibility	Timescale
Provide annual monitoring reports to TW and AW detailing projected housing growth in the Local Authority	UDC	Ongoing
Take into account the full volume of growth (From UDC and neighbouring authorities) within the catchment	TW and AW	Ongoing
Identify the feasibility of new development expected to connect to Takeley WwTW being connected to Bishops Stortford, or an equivalent	TW and the site promoters	Early in Local Plan period

Actions	Responsibility	Timescale
flow diverted.		

9 Environmental impact

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 assessed. This chapter considered both water quantity (impact of abstraction) and water quality (impact of wastewater discharge and runoff) on protected sites.

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

In Stage 1, a screening exercise was conducted to identify protected sites (such as SSSIs) that could be impacted by changes in Water Quality. The Stage 2 analysis will build on this and link it to the water quality results presented in section 8, as well as identifying protected sites that could be impacted by increases in abstraction.

Section 9.5 of the Stage 1 report also outlined the benefits of SuDS and Natural Flood Management which offer opportunities to manage surface water to achieve multiple benefits. The recommendations from that section have been reproduced in Stage 2.

9.2 Impact of abstraction

9.2.1 Overview

Abstraction of water within a catchment, either from groundwater or surface water sources, is necessary to provide a public water supply, for industrial processes and for agriculture. When the volume of water being abstracted becomes too high, it can cause environmental damage by reducing river flow, or lowering the water table.

Changes in river flow can impact sensitive ecosystems, for example Trout require a clean gravel bed to lay their eggs. A reduction in river flow can cause sediment to build up, blocking the spaces the fish require to lay their eggs impacting their reproductive cycle. Changes in groundwater levels can also affect the flow regime in rivers and can cause drying of wetland sites.

Chalk stream catchments are particularly sensitive to changes in groundwater levels.

The precise location of abstraction points for public water supply in England is not available for reasons of national security. Furthermore, water demand within a WRZ can be met by anywhere within that WRZ, or from a neighbouring WRZ if the transfer between WRZs is used to provide some of the water available for use. It is therefore not possible to trace an

impact of an individual development site back to a particular water abstraction and therefore to an environmental impact. The assessments in this report therefore rely on information in the public domain.

9.2.2 Methodology

Uttlesford is served by Affinity Water via its Stort WRZ. Abstraction either from surface water sources or from groundwater sources can occur anywhere within this zone. However, the impact of the abstraction could be felt outside of the WRZ within the same groundwater body, or downstream in surface waterbodies. In both cases this could be well outside the LPA boundary.

Groundwater dependent terrestrial ecosystems (GWDTEs)

Figure 9.1 shows a schematic of how GWDTEs were identified. The LPA boundary is within a WRZ. Water abstracted anywhere within that WRZ could be used to serve growth within the LPA. In the diagram below, there are two abstraction points. Abstraction 1 could impact an area outside of the both the LPA boundary and the WRZ. However, there are no protected sites within that groundwater body. Abstraction 2 also impacts an area both within and outside of the LPA boundary. Protected site A is within the WRZ but may not be impacted directly by an abstraction. Protected site B is outside of the WRZ and outside of the groundwater body containing an abstraction and is therefore unlikely to be impacted by growth. Protected site 3 is within a groundwater body containing an abstraction. There is a risk that an increase in abstraction could impact the protected site.

The location of abstraction points within the study area is not known, and so the approach must be taken that GWDTE anywhere within the combined extent of the WRZ and groundwater bodies overlapping the WRZ could be impacted by an increase in abstraction.

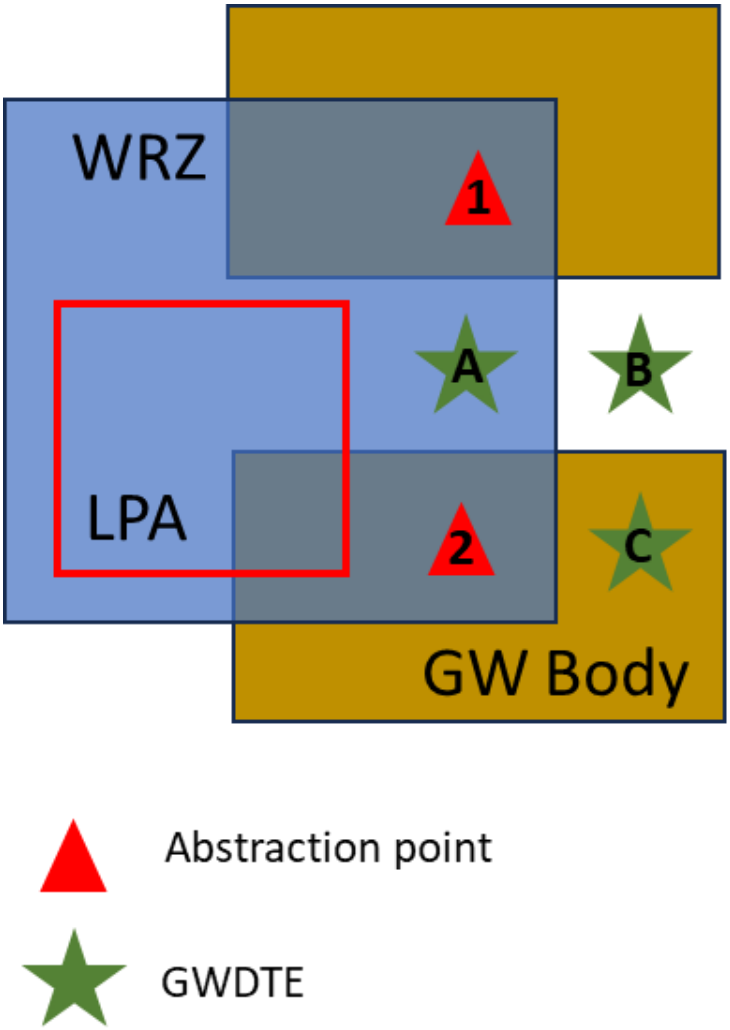


Figure 9.1 Definition of groundwater study area

The following procedure was followed:

- Define study area - based on extent of WRZ and WFD Groundwater bodies that overlap with the WRZs.
- Identify Groundwater Dependent Terrestrial Ecosystems (GWDTE) within the study area using the EA's GWDTE dataset.
- Identify GWDTEs that are within groundwater bodies with flow identified as a Significant Water Management Issue (SWMI).

Surface water-based ecosystems

Figure 9.2 shows a schematic of how protected sites on surface waterbodies were identified. As in the groundwater example, water could be abstracted from anywhere within the WRZ. Protected site A is downstream of an abstraction and so could be impacted by changes in river flow resulting from the abstraction. Protected site B whilst further downstream in the river basin, it is on a tributary not connected with the WRZ, abstraction is unlikely to have an impact. Protected site C is upstream of the abstraction so would not be impacted.

As with the groundwater abstractions, their location was not available as part of this study. The approach is therefore taken that any protected site directly on a waterbody that flows through or is downstream of the WRZ could be impacted by abstraction. Protected sites upstream or on tributaries that have not flowed through the WRZ are ignored.

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.

The following procedure was followed:

- Define study area - based on extent of WRZ and WFD Surface water bodies that overlap with the WRZs.
- Identify protected sites within the study area.
- Filter these based on their proximity to waterbodies within the study area defined using flood zone 2 as a proxy.
- Identify the protected sites within a catchment where flow is recorded as a significant water management issue.

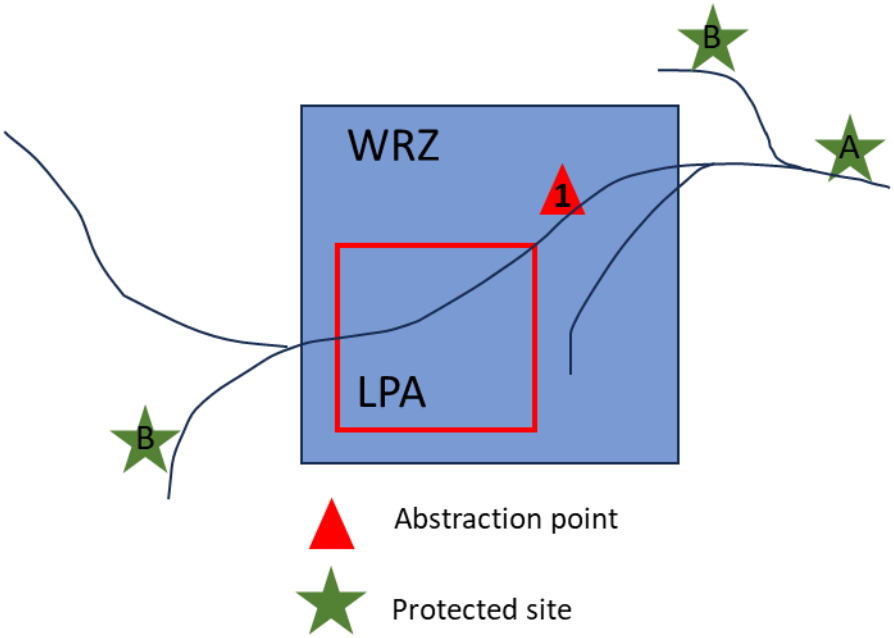


Figure 9.2 Definition of surface water study area

9.2.3 Results

There are 99 Groundwater Dependent Terrestrial Ecosystems (GWTDEs) that are within a groundwater body that overlaps with the Stort WRZ. These are shown in Figure 9.3 and presented in Appendix C. 15 of these are in groundwater bodies where flow is noted as a significant water management issue (SWMI) - either due to groundwater or surface water abstraction.

There are 84 SSSIs that are adjacent to waterbodies within the Stort WRZ and downstream of Uttlesford. There are also 19 SPAs, 11 SACs, and 14 Ramsar sites. These are shown in

Figure 9.4 and presented in Appendix D. 34 of these have flow abstraction from surface water) identified as a significant water management issue.

Some of the SSSIs are also designated as Ramsar sites, SACs or SPAs and are also included in Appendix D.

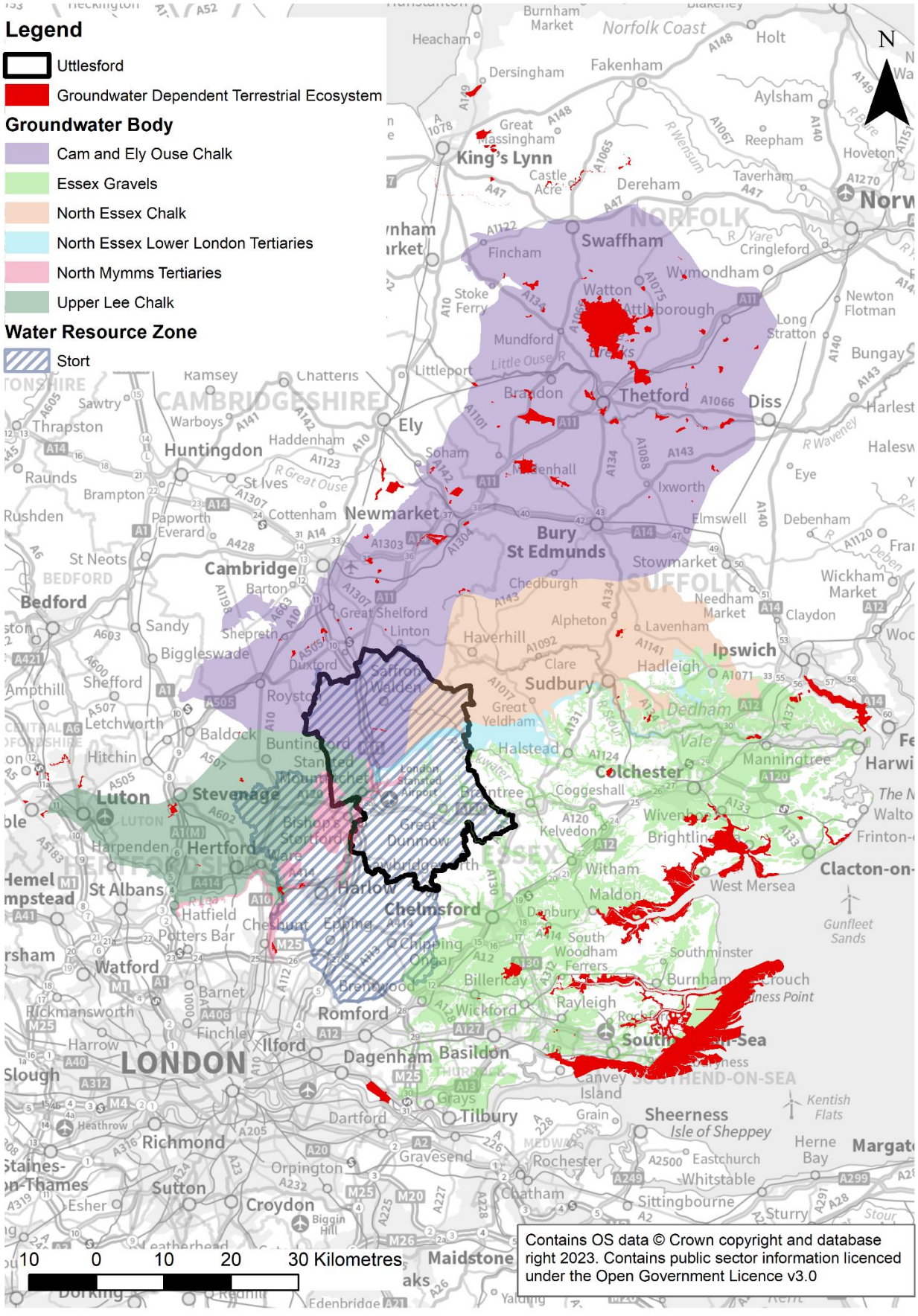


Figure 9.3: GWDTE within and downstream of the Stort WRZ and Uttlesford

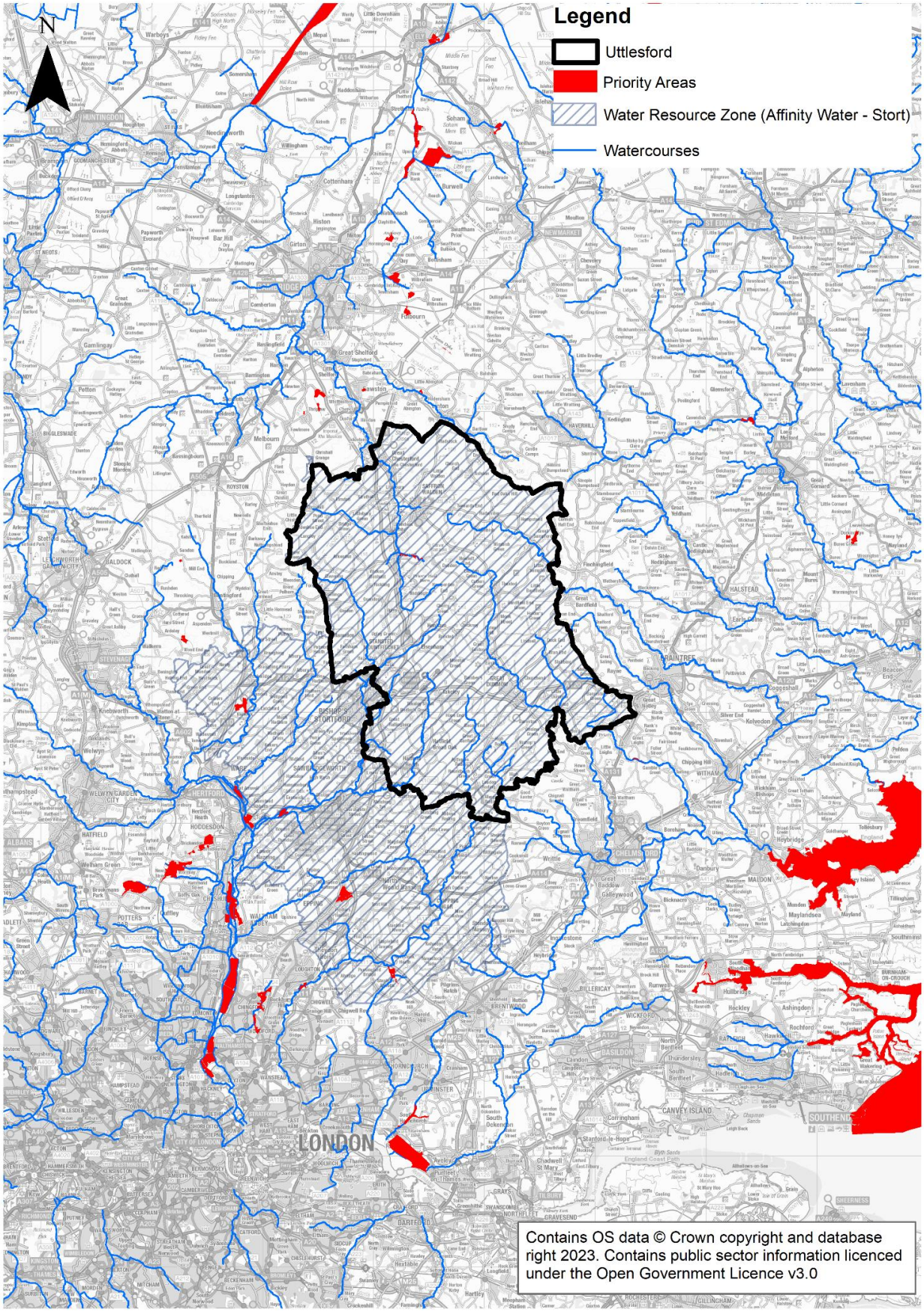


Figure 9.4: Protected areas within and downstream of the Stort WRZ and Uttlesford

9.3 Impact of wastewater discharges

9.3.1 Sites with environmental designations

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 of the Stage 1 report 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

Protected sites within Uttlesford can be seen in Section 9.2.3.

9.3.2 Methodology

The Stage 1 WCS identified protected sites that may be at risk following a source-pathway-receptor approach. Sites within Uttlesford and downstream of each WwTW serving growth to the tidal limit were noted.

In order to identify which of the protected sites 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 beside a river or could be reasonable expected to receive surface water from a river during times of flood. Where a WwTW serving growth in the plan period was present in the catchment upstream of the protected site, this site was taken forward for further assessment.

Where there were no WwTW serving growth upstream, these protected sites were discounted as no deterioration would be predicted in a water quality model, and the impact would be expected to be minimal. 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.

Whilst deterioration in water quality may not always lead to a significant impact at a protected site such as a SSSI, modelled deterioration can be used to highlight areas of risk for further analysis in the Habitats Regulations Assessment.

9.3.3 Results

At four protected sites downstream of WwTWs serving growth during the Local Plan period a significant deterioration in water quality is predicted. These are shown in Table 9.1. At two of these (Debden Water SSSI and Sawbridgeworth Marsh) that deterioration could be prevented by improvements in upstream treatment. However, in two locations (Little Hallingbury Marsh SSSI and Thorley Flood Pound SSSI) deterioration could not be prevented, and the predicted deterioration in BOD remains at 11%. The concentration of BOD in the river at these sites remains at "High" class (which is the highest / best classification in the Water Framework Directive).

Both Little Hallingbury Marsh and Thorley Flood Pound are areas of lowland Fen, Marsh and Swamp and are currently in favourable condition (Natural England, 2016). This site may be sensitive to changes in water quality in the river, however it is not certain whether a deterioration within the High class could have an impact on the condition of the SSSI. Further investigation may be required in consultation with NE to ensure that the condition status of these sites is not affected, in-line with the requirements of the Wildlife and Countryside Act.

The majority of growth within the catchment of Bishops Stortford WwTW is from the East Hertfordshire District Council (1885 dwellings from Uttlesford and 17,377 dwellings from East Herts), and the water quality modelling has taken both growth forecasts into account. Engagement with East Hertfordshire District Council is therefore required in order to understand and mitigation the cumulative impact of their combined growth.

Table 9.1 Water quality impact on protected sites

SSSI name	% deterioration Ammonia	% deterioration BOD	% deterioration Phosphate	Can deterioration be prevented by treatment at TAL?
Debden Water	15%	0%	3%	Yes
Little Hallingbury Marsh	8%	13%	6%	No – BOD deterioration remains at 11%
Sawbridgeworth Marsh	2%	12%	6%	Yes
Thorley Flood Pound	9%	13%	6%	No – BOD deterioration remains at 11%

9.4 Chalk stream protection

Alongside the Water Cycle Study, a Chalk Stream Evidence Base was prepared. This identified the pressures chalk streams are under, and recommended policies to protect

them. The north and west part of Uttlesford District is drained by two chalk streams, the River Stort and River Cam, and their tributaries. These are shown in Figure 9.5. A further river in the north-east (River Bourn) is identified within the index of chalk streams which forms part of the CaBA Chalk Stream Strategy. However, it may not be acting as a chalk stream along its entire length. North of Ashdon, the geology mapping shows that river may be well connected to the underlying chalk bedrock, however within and south of Ashdon there is a superficial layer that may prevent this interaction. Further investigation is required to confirm its status.

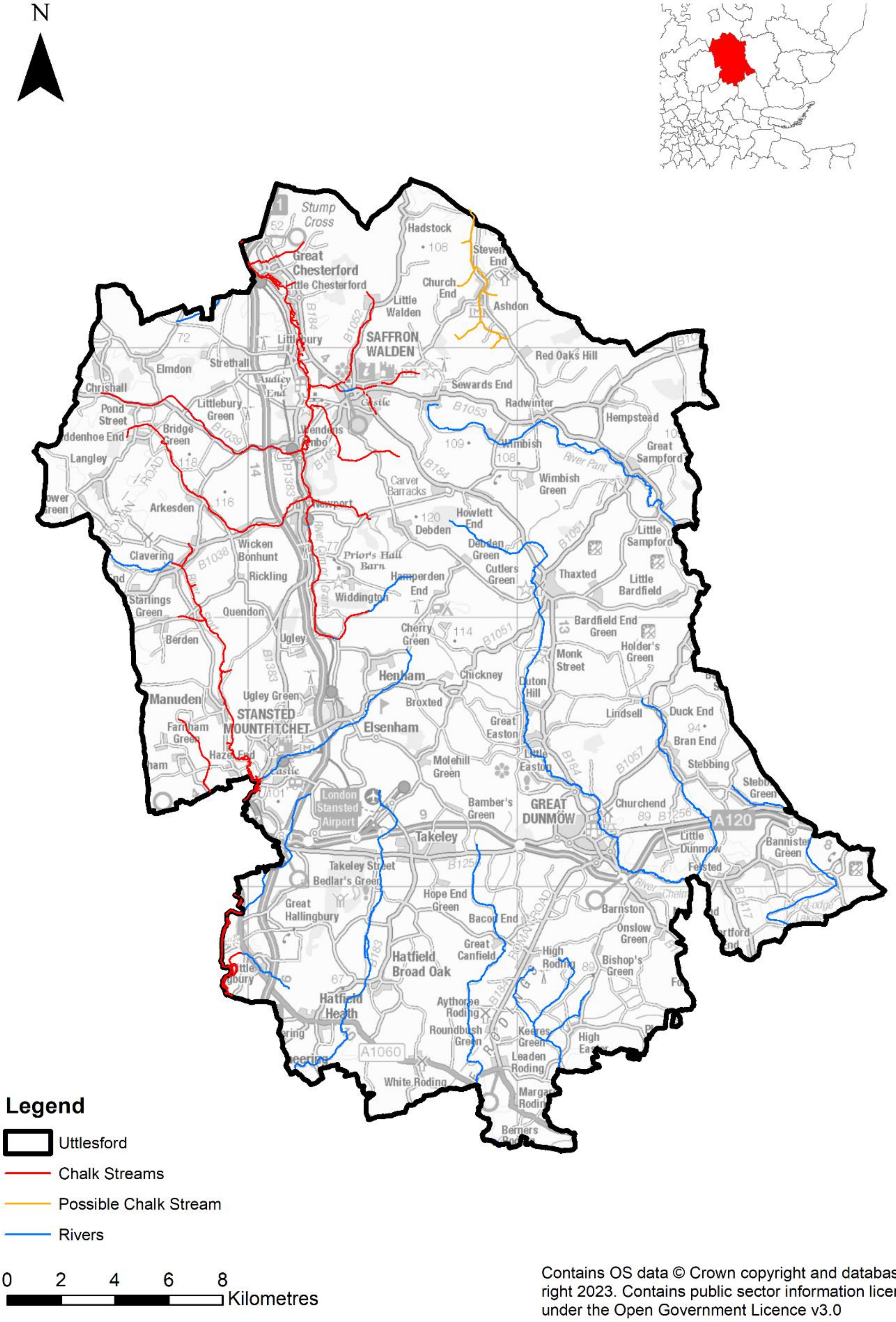


Figure 9.5 Location of Chalk Streams in Uttlesford

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 from rainfall. 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.

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

England's chalk streams are therefore under considerable pressure. The Environment Agency's 'Reasons for Not Achieving Good' database indicates that one of the reasons for some of the watercourses in the district not meeting 'Good' Water Framework directive (WFD) standards can be related to groundwater and surface water abstractions. Other pressures on chalk streams include pollution from wastewater discharges and agriculture, encroachment by development.

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. The Chalk Stream Evidence Base makes the following recommendations that can be adopted by Uttlesford District Council to provide greater protection for chalk streams and mitigate the impacts of development during the Local Plan period:

Table 9.2 Recommendations from Chalk Stream Evidence Base

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. A buffer of 10m should be applied to ditches that feed chalk streams. Recommendation 5 – Apply a vegetated buffer strip on agricultural land within 15m of a chalk stream and 10m from a ditch feeding a chalk stream.
Cattle fencing	Recommendation 6 – Encourage responsible land management such as cattle fencing through the Nature Recovery Strategy.

Measure type	Recommendation
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

9.5 Groundwater protection

9.5.1 Overview

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 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. This paper can be found here.

9.5.2 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.

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.

9.5.3 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 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.

9.5.4 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 9.6.

The Environment Agency's Manual for the Production of Groundwater Source Protection Zones, 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.

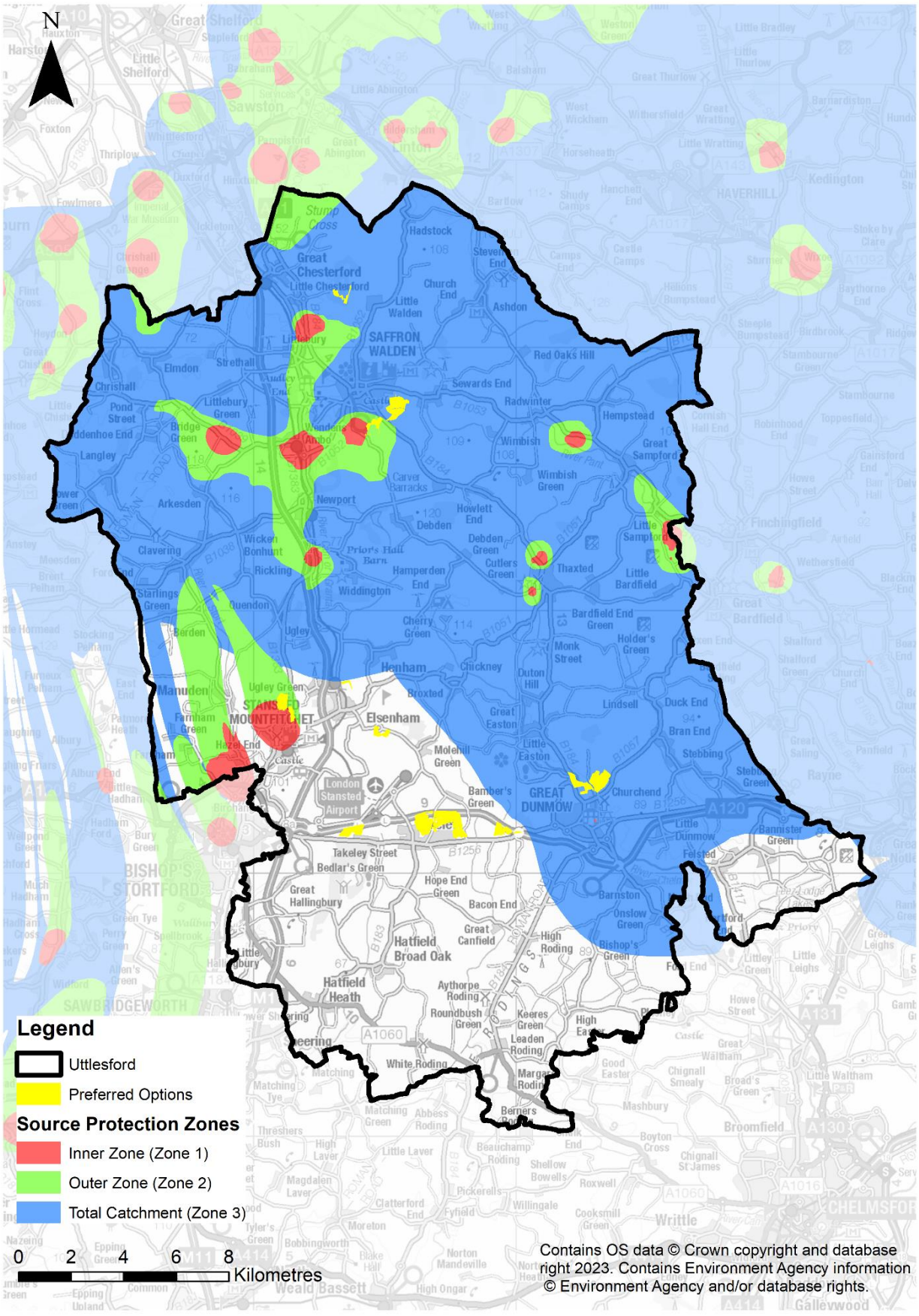


Figure 9.6: Source Protection Zones (SPZs) in Uttlesford

Table 9.3 Preferred allocations within SPZs

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

Source Protection Zone	Sites	Management advice / EA position statement
	- Land off The Broadway and Land east of B1008, Great Dunmow - Land east of Shire Hill Farm and south of Radwinter Road, Saffron Walden - Land at Little Chesterford Research Park	practice guidance in the CIRIA SuDS Design Manual.

9.6 Conclusions and recommendations

- The potential impact of development on a protected sites within and downstream of Uttlesford should be considered in future plan making. This applies to both the impact of abstraction and of additional wastewater discharge as well as the impact of surface water runoff.
- Water quality modelling has predicted a significant deterioration in the river adjacent to four SSSIs within Uttlesford. At two of these sites, deterioration could be prevented by improvements in treatment upstream. At Little Hallingbury Marsh SSSI and Thorley Flood Pound SSSI, deterioration could not be prevented, and the predicted deterioration in BOD remains at 11%. Further investigation may be required on these sites, in consultation with NE to ensure that the status of these sites is not affected (in line with the requirements of the Wildlife and Countryside Act). This is a cumulative impact of growth in both Uttlesford and East Hertfordshire with 90% of the growth coming from East Hertfordshire. Engagement between the two councils is required to understand and mitigate this cumulative impact.
- Four Preferred Allocations are located within groundwater Source Protection Zones. The EA has published management advice for development within these zones. This can be accessed here.
- 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 SuDS to offer multiple benefits of flood risk reduction, amenity value and biodiversity.
- Consideration should be given to infiltration and deep borehole SuDS within chalk stream catchments to aid replenishment of the chalk aquifer.

- 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.

Table 9.4 Recommendations for environmental protection

Action	Responsibility	Timescale
Consider the environmental impact of development on protected sites downstream of receiving wastewater treatment works in the Habitats Regulations Assessment	Uttlesford District 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 District Council	Local Plan development
The Local Plan should include policies that require development sites to adopt SuDS to manage water quality of surface runoff.	Uttlesford District Council	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.	Uttlesford District Council, Developers, Anglian Water, Thames Water, Environment Agency.	Ongoing
Developers should include the design of SuDS at an early stage to maximise	Developers	Ongoing

Action	Responsibility	Timescale
the benefits of the scheme.		
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 District Council, Environment Agency, Natural England.	Ongoing
Have regard to the Chalk Stream recommendations from the Chalk Stream Evidence Base when preparing Local Plan policies.	Uttlesford District Council	Local Plan development

10 Summary and overall conclusions

10.1 Conclusions

Table 10.1 Summary of conclusions

Assessment	Conclusion
Water resources	• Water resources in the UK are under considerable pressure. The Environment Agency have stated that "the scale of the challenge we face increases with time and, by 2050, we are looking at a shortfall of nearly 5 billion litres of water per day between the sustainable water supplied available and the expected demand." • The National Water Resources Framework sets the objective to reduce the average per capita consumption in the UK to 110l/p/d by 2050. This is now part of the Environmental Improvement Plan and water companies WRMPs. Within Defra's Plan for Water is the commitment to review Building Regulations and a target of 100l/p/d in water stress areas is suggested. • The Future Homes Hub, who are supporting Defra to produce a roadmap to greater water efficiency propose a stages reduction in PCC, with a target of 100l/p/d in water stressed areas in place from 2025, and a reduced target of 90l/p/d in place by 2030 (depending on market conditions and customer acceptance). • The Catchment Based Approach (CaBA) Chalk Stream Strategy recommends a target of 90l/p/d in chalk stream catchments. The Government's EIP states that the Chalk Stream Strategy should be supported. • The analysis contained in the WCS shows that a 0.18Ml/d reduction in water demand (approximately 4%) would be achieved if the target of 100l/p/d were adopted immediately, accompanied by an equivalent non-household target. A greater saving could be made if some of the dwellings already in the planning system could also be built to a higher standard. If the target of 90l/p/d were adopted, the reduction in water demand is estimated to be 0.32Ml/d (7%). • Affinity Water's rdWRMP outlines how the challenges of an increasing population and climate change will be met alongside their environmental obligations. Within the Stort WRZ this includes reductions in abstraction from chalk stream catchments. In order to achieve the long-term goal of

Assessment	Conclusion
	reducing PCC to 110l/p/d, a significant demand management programme is planned. This includes Government backed activities that are outside the control of Affinity Water. A tighter water efficiency target for new build housing has not been included in Affinity Water's plan, however, any reduction in PCC would provide additional headroom in the WRMP and help manage uncertainty in their demand management plan. • This study recommends that as a minimum the proposed new Building Regulations target of 100l/p/d outlined in Defra's Plan for Water be adopted across Uttlesford. This should be achieved using a fittings-based approach. • This should be supported by the requirement for non-household development to achieve three credits in the assessment category WAT01 of the BREEAM UK New Construction Standard. • The Local Plan should allow for a future reduction in the Building Regulations target to 90l/p/d in 2030. • Developers should be encouraged to achieve 90l/p/d or lower, especially on larger strategic sites aligning with the Chalk Stream Strategy.
Water supply	• It is likely that upgrades to the water supply network will be required in order to serve the preferred allocations without a detriment to existing customers. • Modelling by AfW may be required to define the extent of these upgrades. • Early engagement between developers. UDC and AfW is needed to ensure that these upgrades are in place prior to occupation of the developments.
Wastewater network	• AW and TW provided an assessment of the preferred allocations. This was split into foul network and surface water network. • In the foul network assessment, four sites were given a "green" assessment confirming there was sufficient capacity within the network to incorporate these sites and no further infrastructure was likely to be required. Two sites (Land east of Shire Hill Farm and south of Radwinter Road, and Land south of A120/North of Stortford Road) were given an "amber" assessment, reflecting the need for some additional infrastructure. The Land at Warrens Farm and Land at Warish Hall Farm was given a "red" assessment by Thames Water along with the comment that the "scale of development is

Assessment	Conclusion
	likely to require upgrades to the wastewater network". No particular constraints were identified by Thames Water, who have not responded to requests for clarification. One further site was not assessed by Thames Water (Gaunts End, Elsenham) as it is not in an area currently served by a public sewer. It is expected that a connect would be made to Bishops Stortford WwTW. • In the surface water assessment, two sites were given a "green" assessment confirming there was sufficient capacity within the network to incorporate these sites and no further infrastructure was likely to be required. Four sites were given an "amber" assessment reflecting the limited surface water network in some areas, and some local flood risk. A further three sites were not assessed as two were in an area without public sewerage (one of these sites has private sewerage). No reason was given for the third site. • Early engagement is required with Anglian Water and Thames Water to ensure that the required infrastructure is in place prior to occupation, and where a wastewater solution defined where one does not currently exist. • 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 28 storm overflows in Uttlesford, 18 on the network, and 10 at WwTWs. • In comparison to some urban areas or large cities, Uttlesford has relatively few storm overflows on the sewer network. • The SOAF set a threshold of 60 operations in a year (based on 1 years' data, 50 if based on 2 years data, and 40 if based on 3 years), above which a storm overflow should be investigated. One of the storm overflows (White Roding) was operating above this threshold between 2021 and 2023. • The Storm Overflow Reduction Plan which was published in 2022 sets an objective that "storm overflows will not be permitted to discharge above an average of 10 rainfall events per year by 2050". Six of the 18 monitored storm overflows are operating on average above 10 times per year so may require action to meet the long-term target. • 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

Assessment	Conclusion
	better managed by retrofitting SuDS in existing residential areas, and in new development, ensuring SuDS are incorporated into designs at the master planning stage to maximise the potential benefits.
Wastewater treatment	• A capacity assessment was undertaken by JBA comparing the future flow from each WwTW (the current actual flow and the forecast additional flow from growth), with the permit limit. Eight of the WwTWs (listed in Table 7.1) in the study area are expected to be close to or exceeding their permit during the Local Plan period. An increase in the permit limit, and / or upgrades to treatment capacity may be required at these WwTWs in order to accommodate the planned growth. • It is important that when planning upgrades at WwTW that the full quantum of growth, including from neighbouring LPAs is taken into account. • Population estimates within Anglian Water's Drainage and Wastewater Management Plan suggest that they may have underestimated growth within the catchments of Great Dunmow and Saffron Walden WwTWs. Equivalent data is not published within Thames Water's DWMP, so it was not possible to assess this. • 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.
Water quality	• The modelling indicates the growth during the Local Plan period could result in a significant deterioration (10% or over or deterioration in class) in water quality at five WwTWs (Takeley, Great Easton, Great Dunmow, Debden and Great Chesterford). In call cases, this deterioration could be prevented by improvements in treatment. Some tightening of permit limits may already be planned in AMP8 but details have not yet been published. • Growth alone will not prevent good ecological status being prevented in the future should improvements in upstream water quality be made with the exception of Takeley, where environmental capacity could be a constraint to growth.

Assessment	Conclusion
	• An additional modelling scenario was run where the additional demand from growth expected to be served by Takeley WwTW was applied to Bishops Stortford rather than Takeley. This represents either the new developments being connected to Bishops Stortford, or an equivalent flow being diverted into Bishops Stortford via an adjustment to the sewer network where the two catchments are adjacent. • The feasibility of connecting new developments to Bishops Stortford WwTW or diverting flow has not been assessed and should be discussed with Thames Water. • Transfer of additional flow from commitments and allocations around Takeley and Great Dunmow to Bishops Stortford may be possible providing agreement from Thames Water that there is sufficient capacity at the WwTW to receive additional flow. • Where a WwTW is shared with a neighbouring authority, coordination of growth plans in collaboration with Thames Water and Anglian Water is essential to ensure that infrastructure is in place prior to development to prevent a breach of the environmental permit

Assessment	Conclusion
Environmental impact	• The potential impact of development on a protected sites within and downstream of Uttlesford should be considered in future plan making. This applies to both the impact of abstraction and of additional wastewater discharge as well as the impact of surface water runoff. • Water quality modelling has predicted a significant deterioration in the river adjacent to four SSSIs within Uttlesford. At two of these sites, deterioration could be prevented by improvements in treatment upstream. At Little Hallingbury Marsh SSSI and Thorley Flood Pound SSSI, deterioration could not be prevented, and the predicted deterioration in BOD remains at 11%. • Further investigation may be required on these sites, in consultation with NE to ensure that the status of these sites is not affected (in line with the requirements of the Wildlife and Countryside Act). This is a cumulative impact of growth in both Uttlesford and East Hertfordshire with 90% of the growth coming from East Hertfordshire. Engagement between the two councils is required to understand and mitigate this cumulative impact. • Four Preferred Allocations are located within groundwater Source Protection Zones. The EA has published management advice for development within these zones. • 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 SuDS to offer multiple benefits of flood risk reduction, amenity value and biodiversity. • Consideration should be given to infiltration and deep borehole SuDS within chalk stream catchments to aid replenishment of the chalk aquifer. • 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.

10.1.1 Recommendations

Table 10.2 Summary of recommendations

Aspect	Action	Responsibility	Timescale
Water resources	Continue to regularly review forecast and actual household growth across the supply region through WRMP Annual Update reports, and where significant change is predicted, engage with Local Planning Authorities.	Affinity Water	Ongoing
Water resources	Provide yearly updates of projected housing growth to water companies to inform WRMP updates.	Uttlesford District Council	Ongoing
Water resources	Use planning policy to require a water efficiency standard of 100l/p/d to be achieved using the fittings-based approach. The policy should allow for a future reduction in the water efficiency target.	Uttlesford District Council	In Local Plan
Water resources	Developers should be encouraged to achieve 90l/p/d or lower, especially on larger strategic sites aligning with the Chalk Stream Strategy	Uttlesford District Council	In Local Plan
Water resources	This should be supported by the requirement for non-household development to achieve three credits in the assessment category WAT01 of the BREEAM UK New Construction Standard.	Uttlesford District Council	In Local Plan
Water resources	Larger residential developments 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 District Council	Ongoing
Water resources	Affinity Water should consider modifying their water efficiency incentive scheme to include an incentive for development	Affinity Water	In next iteration of the New Connection Charging

Aspect	Action	Responsibility	Timescale
	achieving 90l/p/d or less, or a tiered approach to encourage water efficient design.		Arrangements.
Water supply	Undertake network modelling where appropriate to ensure adequate provision of water supply to new sites without detriment to existing customers and feedback to UDC on implications for phasing of sites.	Affinity Water	Early in Local Plan period
Water supply	Early engagement is required with AfW to ensure infrastructure is in place prior to occupation.	Developers and UDC	Early in Local Plan period
Water supply	UDC should obtain infrastructure maps from AfW to ensure existing water supply infrastructure is taken into account in site layout.	UDC and Developers	At master planning stage
Wastewater network	Early engagement between UDC and AW/TW is required to ensure that where strategic infrastructure is required, it can be planned in by AW/TW, and will not lead to any increase in discharges from sewer overflows.	UDC, Developers, AW/TW	Early in the LP process
Wastewater network	Take into account wastewater infrastructure constraints in phasing development in partnership with the sewerage undertaker	UDC, AW/TW	Ongoing
Wastewater network	Developers will be expected to work with the sewerage undertaker closely and early in the planning promotion process to develop an Outline Drainage Strategy for sites. The Outline Drainage strategy should demonstrate the wastewater assets required, their locations including points of connection to the public foul sewerage, whether the site drainage will be adopted by	UDC, AW/TW and developers	Ongoing

Aspect	Action	Responsibility	Timescale
	the water company and if any sewer requisitions will be required.		
Wastewater network	Drainage strategy for "Land off the Broadway and Land east of B1008, Great Dunmow" site should demonstrate that the foul network will not be exposed to flooding from the River Chelmer.	Developer	During planning process
Wastewater network	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.	LLFA and developers	Ongoing
Wastewater network	A wastewater solution for the "Land at Gaunts End, Elsenham" is required. It is recommended that UDC / Developers engage with Thames Water early in LP period to ensure provision of any additional infrastructure can be aligned with development of this site.	UDC, Developers, TW	Early in LP period
Wastewater treatment	Early engagement with Anglian Water and Thames Water is required to ensure that provision of WwTW capacity is aligned with delivery of development.	UDC	Ongoing
Wastewater treatment	AW should ensure that the growth forecasts used for planning upgrades at Great Dunmow and Saffron Walden WwTW take into account a sufficient level of growth.	AW	Ongoing
Wastewater treatment	Provide Annual Monitoring Reports to Anglian Water and	UDC	Ongoing

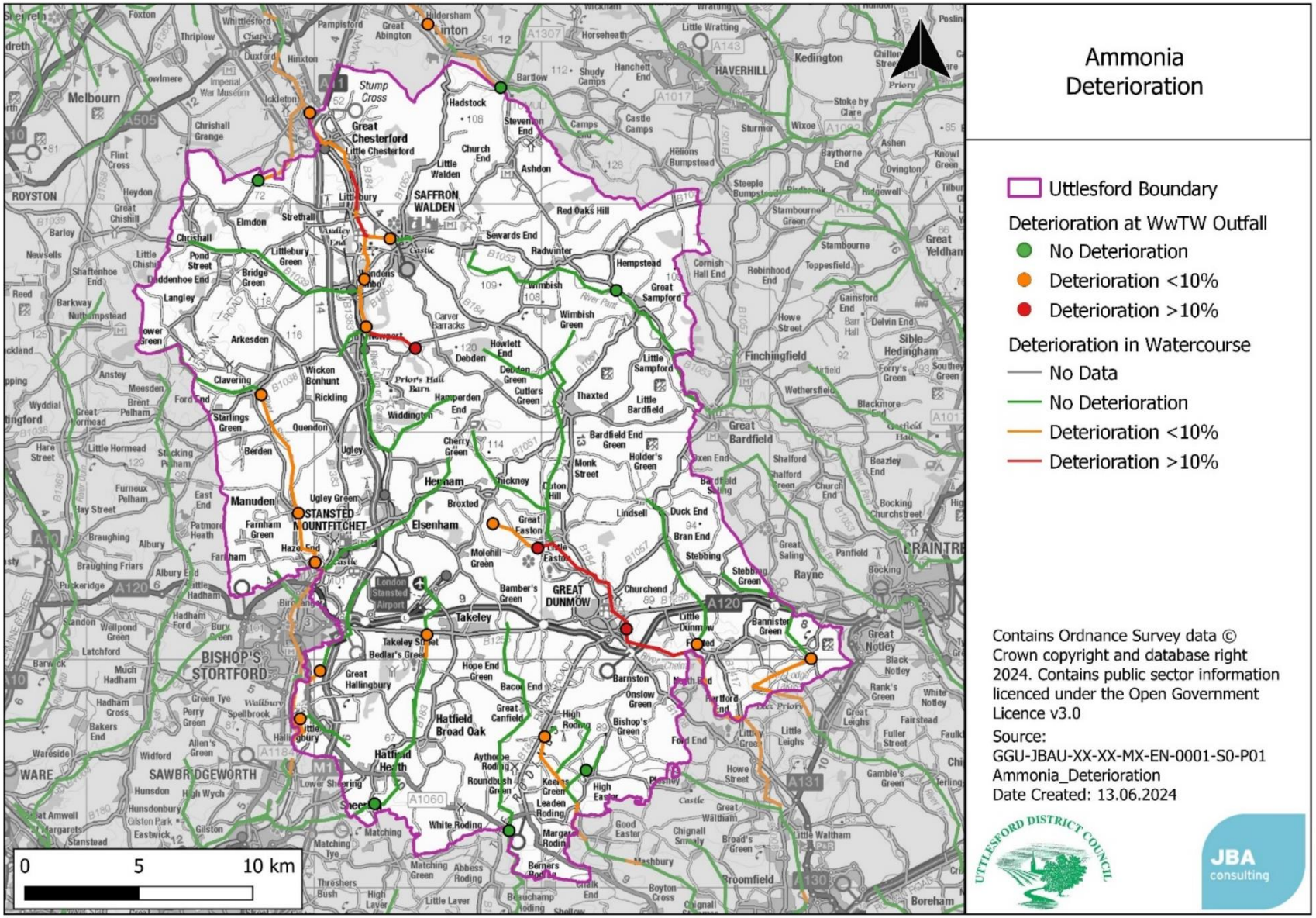
Aspect	Action	Responsibility	Timescale
	Thames Water detailing projected housing growth.		
Wastewater treatment	Anglian Water and Thames Water to assess growth demands as part of their wastewater asset planning activities and feedback to the Council if concerns arise.	UDC	Ongoing
Water quality	Provide annual monitoring reports to TW and AW detailing projected housing growth in the Local Authority	UDC	Ongoing
Water quality	Take into account the full volume of growth (From UDC and neighbouring authorities) within the catchment	TW and AW	Ongoing
Water quality	Identify the feasibility of new development expected to connect to Takeley WwTW being connected to Bishops Stortford, or an equivalent flow diverted.	TW and the site promoters	Early in Local Plan period
Environmental impact	Consider the environmental impact of development on protected sites downstream of receiving wastewater treatment works in the Habitats Regulations Assessment	Uttlesford District Council	Local Plan development
Environmental impact	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 District Council	Local Plan development

Aspect	Action	Responsibility	Timescale
Environmental impact	The Local Plan should include policies that require development sites to adopt SuDS to manage water quality of surface runoff.	Uttlesford District Council	Local Plan development
Environmental impact	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 District Council, Developers, Anglian Water, Thames Water, Environment Agency.	Ongoing
Environmental impact	Developers should include the design of SuDS at an early stage to maximise the benefits of the scheme.	Developers	Ongoing
Environmental impact	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 District Council, Environment Agency, Natural England.	Ongoing
Environmental impact	Have regard to the Chalk Stream recommendations from the Chalk Stream Evidence Base when preparing Local Plan policies.	Uttlesford District Council	Local Plan development

A Appendix A - Water quality mapping

A.1 Future scenario

The set of maps below show the modelled results if wastewater discharges increased by the volume predicted during the Local Plan period. They show a result at the point of mixing (i.e., where the WwTW discharges) and the results downstream in the river. These are colour coded based on whether deterioration is greater (red) or less than (amber) 10%. Areas where no deterioration is predicted are coloured green.


Ammonia
Deterioration
Uttlesford Boundary
Deterioration at WwTW Outfall
No Deterioration
Deterioration <10%
Deterioration >10%
Deterioration in Watercourse
No Data
No Deterioration
Deterioration <10%
Deterioration >10%
0
5
10 km
Contains Ordnance Survey data © Crown copyright and database right 2024. Contains public sector information licenced under the Open Government Licence v3.0
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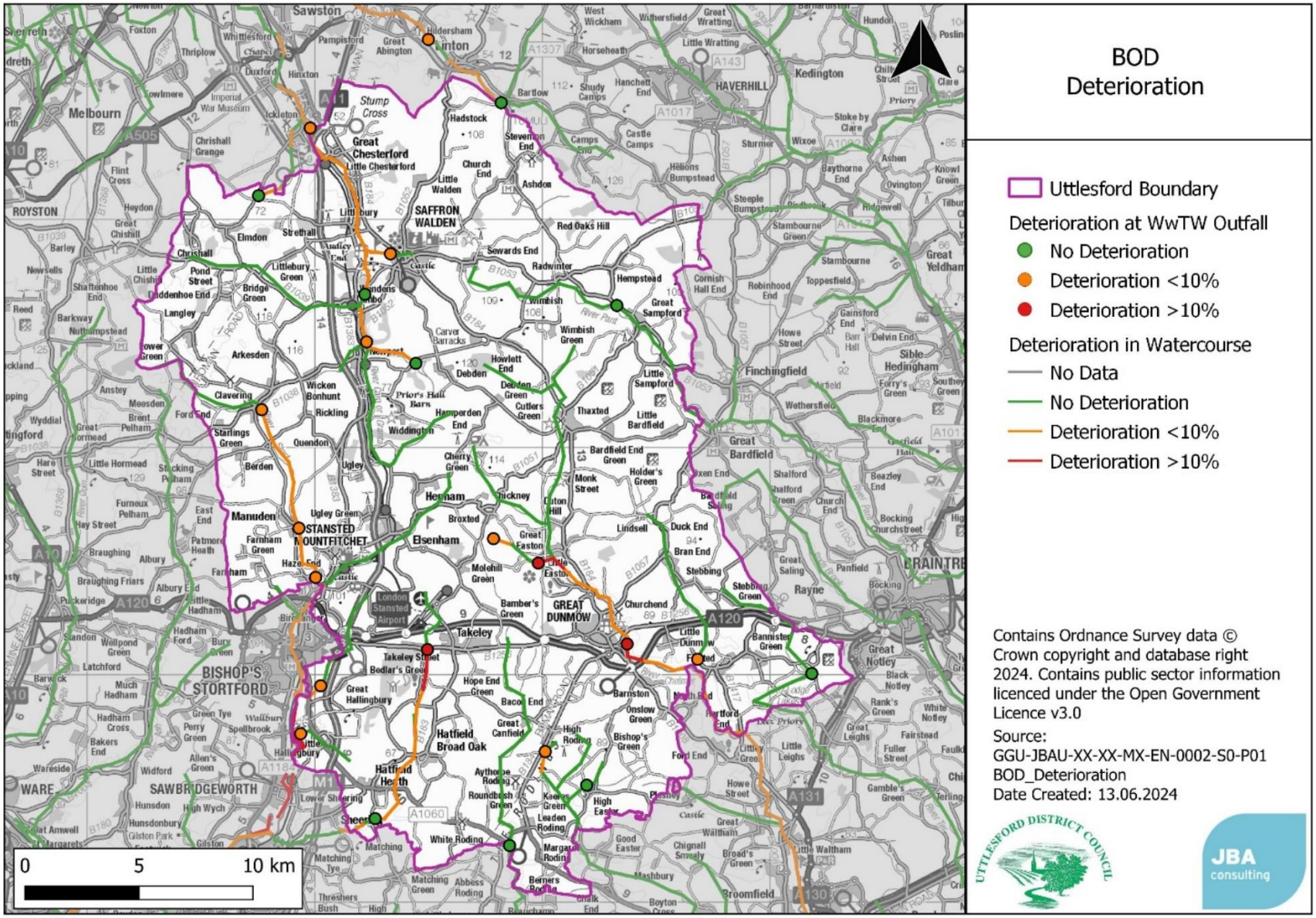
UTTLESFORD DISTRICT COUNCIL
JBA consulting


BOD
Deterioration
Uttlesford Boundary
Deterioration at WwTW Outfall
No Deterioration
Deterioration <10%
Deterioration >10%
Deterioration in Watercourse
No Data
No Deterioration
Deterioration <10%
Deterioration >10%
Contains Ordnance Survey data © Crown copyright and database right 2024. Contains public sector information licenced under the Open Government Licence v3.0
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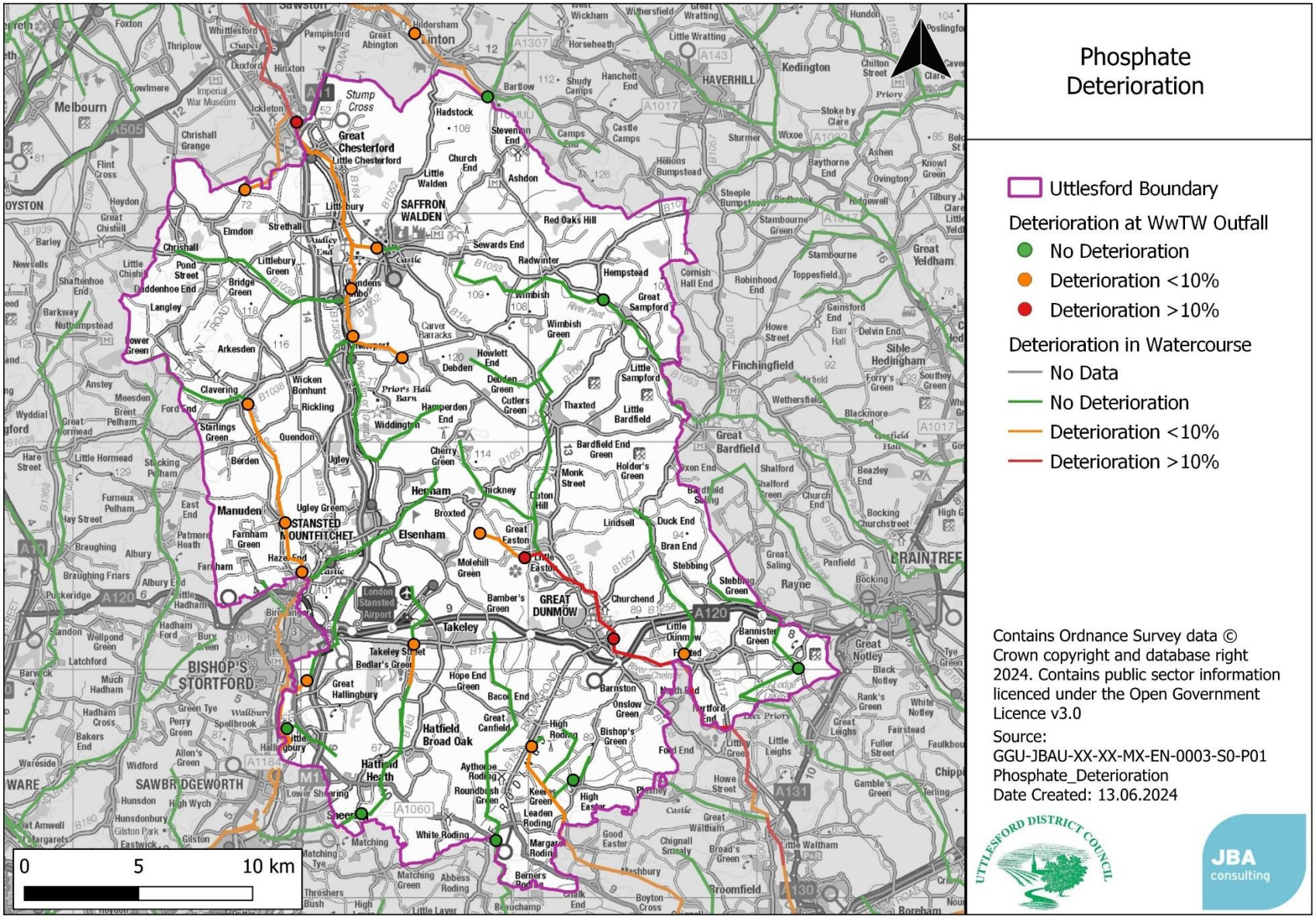
Phosphate Deterioration
Uttlesford Boundary
Deterioration at WwTW Outfall
No Deterioration
Deterioration <10%
Deterioration >10%
Deterioration in Watercourse
No Data
No Deterioration
Deterioration <10%
Deterioration >10%
0
5
10 km
Contains Ordnance Survey data © Crown copyright and database right 2024. Contains public sector information licenced under the Open Government Licence v3.0
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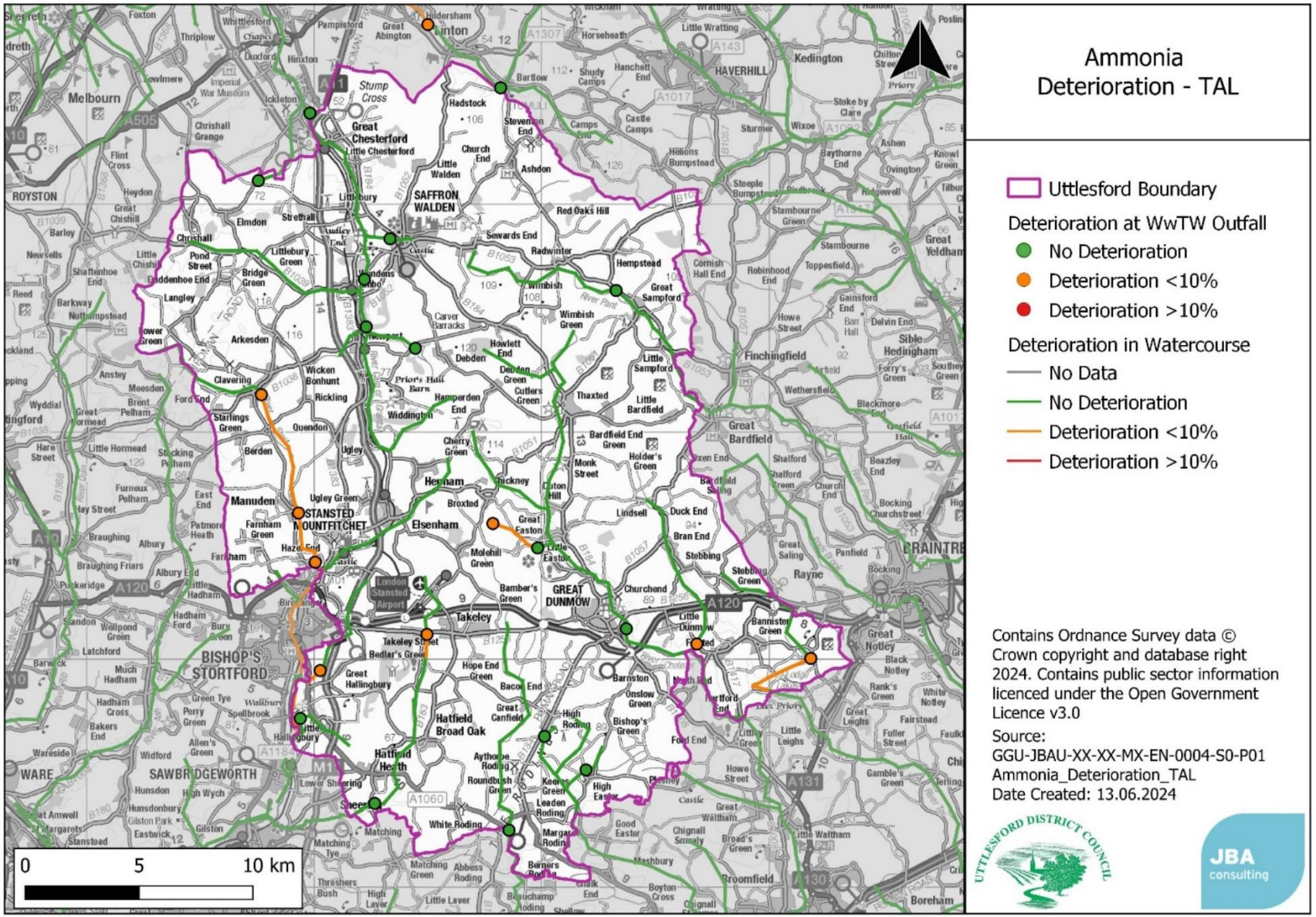
Date Created: 13.06.2024
UTTLESFORD DISTRICT COUNCIL
JBA consulting

A.2 TAL scenario

This second set of maps show the modelled results in the TAL scenario, where each WwTW has been upgraded to the technically achievable limit (TAL). This shows areas where deterioration could not be prevented. In each case this is less than 10%.


Ammonia
Deterioration - TAL
Uttlesford Boundary
Deterioration at WwTW Outfall
No Deterioration
Deterioration <10%
Deterioration >10%
Deterioration in Watercourse
No Data
No Deterioration
Deterioration <10%
Deterioration >10%
0
5
10 km
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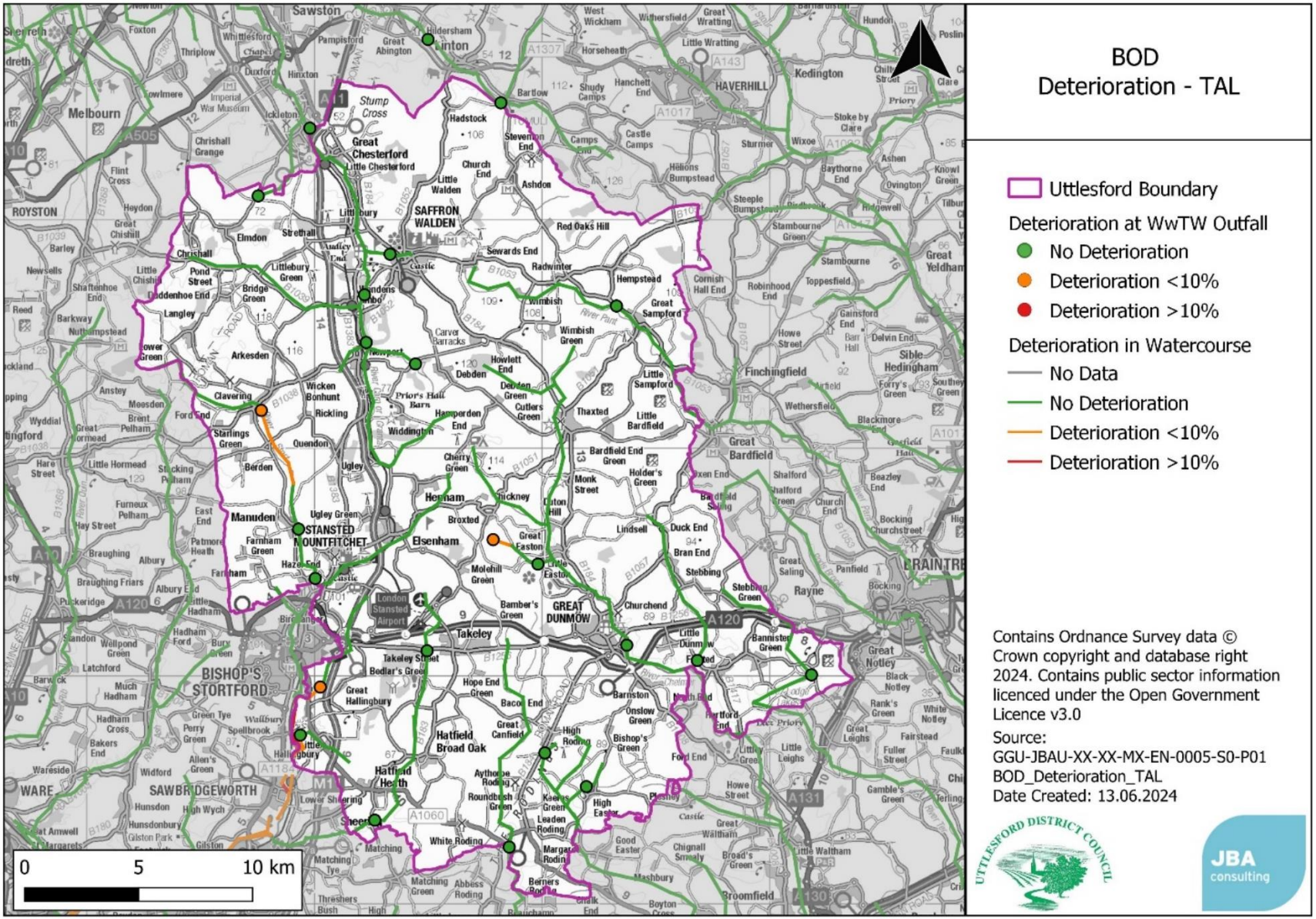
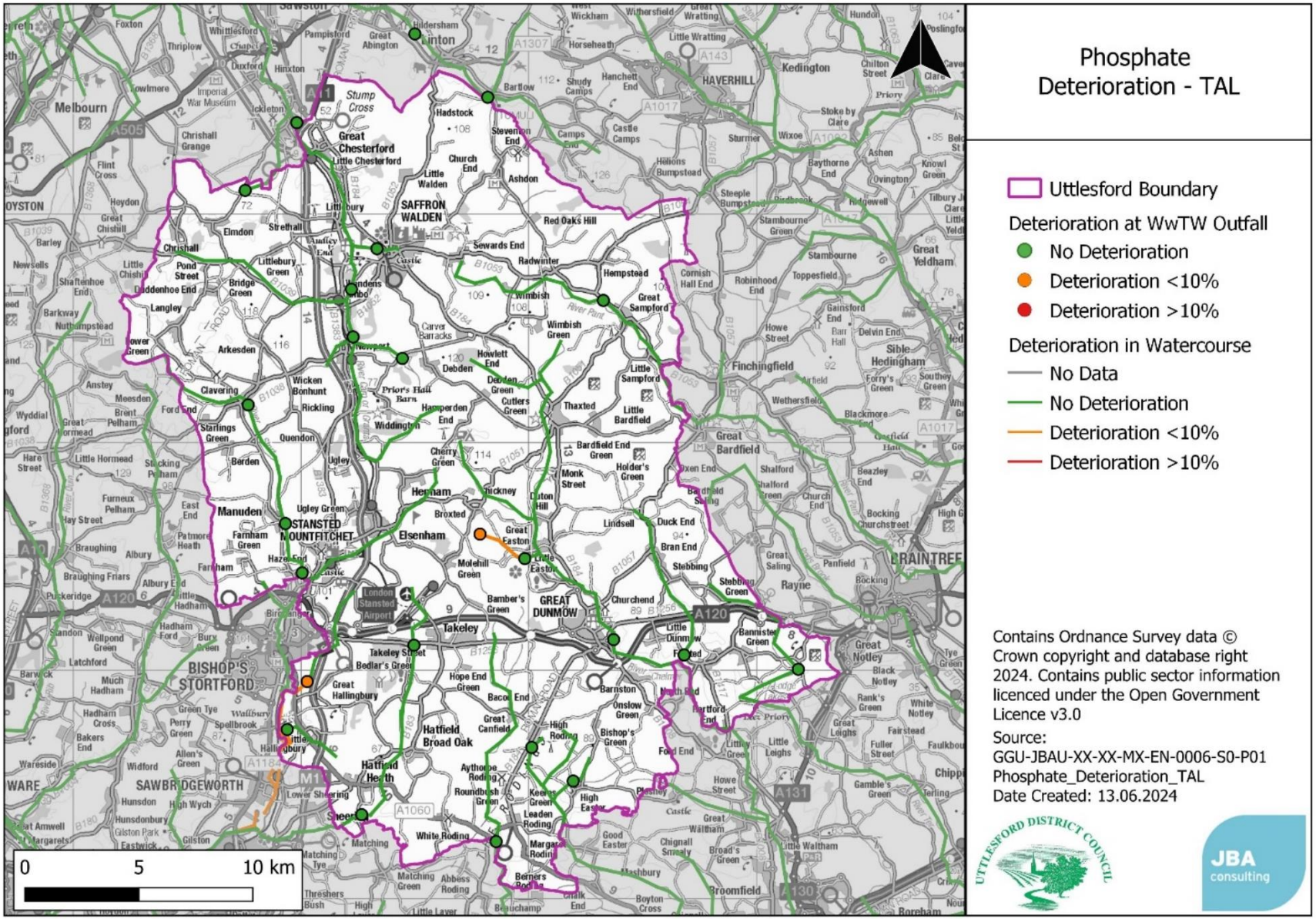
Source:
GGU-JBAU-XX-XX-MX-EN-0004-S0-P01 Ammonia_Deterioration_TAL
Date Created: 13.06.2024
UTTLESFORD DISTRICT COUNCIL
JBA consulting
SAFFRON WALDEN
GREAT DUNMOW
STANSTED MOUNTFITCHET
BISHOP'S STORTFORD
SAWBRIDGEWORTH
HAVERHILL
Great Chesterford
Elsenham
Takeley
Hatfield Broad Oak
Great Bardfield
Finchingfield
Great Notley
BRAINTREE


BOD
Deterioration - TAL
Uttlesford Boundary
Deterioration at WwTW Outfall
No Deterioration
Deterioration <10%
Deterioration >10%
Deterioration in Watercourse
No Data
No Deterioration
Deterioration <10%
Deterioration >10%
0
5
10 km
Contains Ordnance Survey data © Crown copyright and database right 2024. Contains public sector information licenced under the Open Government Licence v3.0
Source:
GGU-JBAU-XX-XX-MX-EN-0005-S0-P01
BOD_Deterioration_TAL
Date Created: 13.06.2024
UTTLESFORD DISTRICT COUNCIL
JBA consulting


Phosphate
Deterioration - TAL
Uttlesford Boundary
Deterioration at WwTW Outfall
No Deterioration
Deterioration <10%
Deterioration >10%
Deterioration in Watercourse
No Data
No Deterioration
Deterioration <10%
Deterioration >10%
Contains Ordnance Survey data © Crown copyright and database right 2024. Contains public sector information licenced under the Open Government Licence v3.0
Source:
GGU-JBAU-XX-XX-MX-EN-0006-S0-P01 Phosphate_Deterioration_TAL
Date Created: 13.06.2024
0
5
10 km
STANSTED MOUNTFITCHET
GREAT DUNMOW
BISHOP'S STORTFORD
SAFFRON WALDEN
HAVERHILL
BRAINTREE
Great Chesterford
Elsenham
Takeley
Hatfield Broad Oak
Hatfield Heath
SAWBRIDGEWORTH

B Appendix B - Water Quality results

B.1 Ammonia

WwTW (SIMCAT name)	Baseline concentration (mg/l)	Future concentration (mg/l)	Percentage deterioration (%)	TAL concentration (mg/l)	Percentage deterioration (%)	Baseline Class	Future Class	TAL Class
ASHDON STW	0.0773	0.0773	0%	3%	-60%	HIGH	HIGH	HIGH
Bishops Stortford STW	0.266	0.278	5%	28%	5%	HIGH	HIGH	HIGH
BROXTED STW	1.3257	1.3831	4%	138%	4%	POOR	POOR	POOR
Clavering STW	0.251	0.259	3%	26%	3%	HIGH	HIGH	HIGH
DEBDEN STW	0.174	0.199	14%	4%	-77%	HIGH	HIGH	HIGH
ELMDON STW	0.223	0.224	0%	17%	-24%	HIGH	HIGH	HIGH
FELSTED(LR CHELMER)	0.098792	0.10226	4%	10%	4%	HIGH	HIGH	HIGH
GREAT CHESTERFORD STW	0.115	0.12	4%	0.107	-0.06957	HIGH	HIGH	HIGH
GREAT DUNMOW STW	0.062665	0.075113	20%	6%	-4%	HIGH	HIGH	HIGH

WwTW (SIMCAT name)	Baseline concentration (mg/l)	Future concentration (mg/l)	Percentage deterioration (%)	TAL concentration (mg/l)	Percentage deterioration (%)	Baseline Class	Future Class	TAL Class
GREAT EASTON(ESSEX)	1.4562	1.7912	23%	53%	-63%	POOR	POOR	GOOD
GREAT SAMPFORD STW	0.16169	0.1619	0%	10%	-38%	HIGH	HIGH	HIGH
Hatfield Heath STW	0.208	0.205	-1%	21%	-1%	HIGH	HIGH	HIGH
HIGH EASTER STW	1.9959	1.9991	0%	0.30741	-0.84598	POOR	POOR	GOOD
HIGH RODING STW	1.1032	1.14	3%	0.26668	-0.75827	POOR	POOR	HIGH
Leaden Roding STW	0.126	0.126	0%	12%	-5%	HIGH	HIGH	HIGH
LINTON STW	0.19	0.2	5%	20%	4%	HIGH	HIGH	HIGH
Little Hallingbury STW	0.441	0.445	1%	25%	-43%	GOOD	GOOD	HIGH
Manuden STW	0.139	0.142	2%	14%	2%	HIGH	HIGH	HIGH
NEWPORT STW	0.254	0.27	6%	15%	-42%	HIGH	HIGH	HIGH

WwTW (SIMCAT name)	Baseline concentration (mg/l)	Future concentration (mg/l)	Percentage deterioration (%)	TAL concentration (mg/l)	Percentage deterioration (%)	Baseline Class	Future Class	TAL Class
SAFFRON WALDEN STW	0.848	0.904	7%	55%	-35%	MODERATE	MODERATE	GOOD
Stansted Mountfitchet STW	0.236	0.252	7%	25%	7%	HIGH	HIGH	HIGH
Takeley STW	0.156	0.159	2%	16%	2%	HIGH	HIGH	HIGH
Wendens Ambo	0.157	0.164	4%	10%	-38%	HIGH	HIGH	HIGH
WILLOWS GREEN STW	0.1338	0.13658	2%	14%	2%	HIGH	HIGH	HIGH

B.2 BOD

WwTW (SIMCAT name)	Baseline concentration (mg/l)	Future concentration (mg/l)	Percentage deterioration (%)	TAL concentration (mg/l)	Percentage deterioration (%)	Baseline Class	Future Class	TAL Class
ASHDON STW	2.46	2.46	0%	2.42	-2%	HIGH	HIGH	HIGH
Bishops Stortford STW	4.41	4.63	5%	4.63	5%	GOOD	GOOD	GOOD
BROXTED STW	6.0217	6.1414	2%	6.14	2%	MODERATE	MODERATE	MODERATE

WwTW (SIMCAT name)	Baseline concentration (mg/l)	Future concentration (mg/l)	Percentage deterioration (%)	TAL concentration (mg/l)	Percentage deterioration (%)	Baseline Class	Future Class	TAL Class
Clavering STW	1.81	1.84	2%	1.85	2%	HIGH	HIGH	HIGH
DEBDEN STW	2.76	2.77	0%	2.76	0%	HIGH	HIGH	HIGH
ELMDON STW	9.48	9.48	0%	9.39	-1%	BAD	BAD	BAD
FELSTED(LR CHELMER)	1.4764	1.537	4%	1.11	-25%	HIGH	HIGH	HIGH
GREAT CHESTERFORD STW	2.38	2.41	1%	2.12	-11%	HIGH	HIGH	HIGH
GREAT DUNMOW STW	2.2169	2.4695	11%	2.09	-6%	HIGH	HIGH	HIGH
GREAT EASTON(ESSEX)	5.7741	6.5035	13%	3.76	-35%	MODERATE	POOR	HIGH
GREAT SAMPFORD STW	3.1438	3.1466	0%	2.75	-12%	HIGH	HIGH	HIGH
Hatfield Heath STW	1.84	1.83	-1%	1.49	-19%	HIGH	HIGH	HIGH
HIGH EASTER STW	4.843	4.8482	0%	2.93	-40%	GOOD	GOOD	HIGH

WwTW (SIMCAT name)	Baseline concentration (mg/l)	Future concentration (mg/l)	Percentage deterioration (%)	TAL concentration (mg/l)	Percentage deterioration (%)	Baseline Class	Future Class	TAL Class
HIGH RODING STW	3.4263	3.4667	1%	2.97	-13%	HIGH	HIGH	HIGH
Leaden Roding STW	1.31	1.31	0%	1.26	-4%	HIGH	HIGH	HIGH
LINTON STW	2.49	2.52	1%	2.32	-7%	HIGH	HIGH	HIGH
Little Hallingbury STW	2.73	2.75	1%	1.65	-40%	HIGH	HIGH	HIGH
Manuden STW	1.3	1.33	2%	1.29	-1%	HIGH	HIGH	HIGH
NEWPORT STW	2.54	2.55	0%	2.44	-4%	HIGH	HIGH	HIGH
SAFFRON WALDEN STW	5.63	5.9	5%	3.67	-35%	MODERATE	MODERATE	HIGH
Stansted Mountfitchet STW	2.76	3	9%	2.51	-9%	HIGH	HIGH	HIGH
Takeley STW	2.39	2.74	15%	2.05	-14%	HIGH	HIGH	HIGH
Wendens Ambo	2.39	2.39	0%	2.28	-5%	HIGH	HIGH	HIGH
WILLOWS GREEN STW	2.6845	2.685	0%	2.69	0%	HIGH	HIGH	HIGH

B.3 Phosphate

WwTW (SIMCAT name)	Baseline concentration (mg/l)	Future concentration (mg/l)	Percentage deterioration (%)	TAL concentration (mg/l)	Percentage deterioration (%)	Baseline Class	Future Class	TAL Class
ASHDON STW	0.181	0.181	0%	0.0147	-92%	MODERATE	MODERATE	HIGH
Bishops Stortford STW	0.226	0.233	3%	0.233	3%	POOR	POOR	POOR
BROXTED STW	0.54855	0.59999	9%	0.59999	9%	POOR	POOR	POOR
Clavering STW	0.25	0.256	2%	0.141	-44%	POOR	POOR	MODERATE
DEBDEN STW	0.457	0.47	3%	0.37	-19%	POOR	POOR	POOR
ELMDON STW	0.354	0.356	1%	0.0307	-91%	POOR	POOR	HIGH
FELSTED(LR CHELMER)	0.60813	0.61282	1%	0.50112	-18%	POOR	POOR	POOR
GREAT CHESTERFORD STW	0.427	0.549	29%	0.158	-63%	POOR	POOR	MODERATE
GREAT DUNMOW STW	0.59763	0.70724	18%	0.2563	-57%	POOR	POOR	POOR

WwTW (SIMCAT name)	Baseline concentration (mg/l)	Future concentration (mg/l)	Percentage deterioration (%)	TAL concentration (mg/l)	Percentage deterioration (%)	Baseline Class	Future Class	TAL Class
GREAT EASTON(ESSEX)	2.0047	2.417	21%	0.38759	-81%	BAD	BAD	POOR
GREAT SAMPFORD STW	1.4246	1.4248	0%	1.0251	-28%	BAD	BAD	POOR
Hatfield Heath STW	0.37	0.37	0%	0.26	-30%	POOR	POOR	POOR
HIGH EASTER STW	1.0414	1.0432	0%	0.078956	-92%	POOR	POOR	GOOD
HIGH RODING STW	0.74958	0.78526	5%	0.077701	-90%	POOR	POOR	GOOD
Leaden Roding STW	0.684	0.686	0%	0.246	-64%	POOR	POOR	POOR
LINTON STW	0.235	0.239	2%	0.0552	-77%	MODERATE	MODERATE	GOOD
Little Hallingbury STW	0.146	0.146	0%	0.146	0%	MODERATE	MODERATE	MODERATE
Manuden STW	0.149	0.152	2%	0.107	-28%	MODERATE	MODERATE	MODERATE

WwTW (SIMCAT name)	Baseline concentration (mg/l)	Future concentration (mg/l)	Percentage deterioration (%)	TAL concentration (mg/l)	Percentage deterioration (%)	Baseline Class	Future Class	TAL Class
NEWPORT STW	0.267	0.272	2%	0.172	-36%	POOR	POOR	MODERATE
SAFFRON WALDEN STW	0.587	0.622	6%	0.207	-65%	POOR	POOR	MODERATE
Stansted Mountfitchet STW	0.172	0.179	4%	0.162	-6%	MODERATE	MODERATE	MODERATE
Takeley STW	0.467	0.476	2%	0.334	-28%	POOR	POOR	POOR
Wendens Ambo	0.283	0.287	1%	0.217	-23%	POOR	POOR	MODERATE
WILLOWS GREEN STW	0.54602	0.54801	0%	0.54801	0%	POOR	POOR	POOR

C Appendix C - Groundwater Dependent Terrestrial Ecosystems

SSSI Code	GWTDE Name	WB Name	SWMI for flow
1002236	Snailwell Meadows (SSSI)	Cam and Ely Ouse Chalk	No
1001079	Fowlmere Watercress Beds (SSSI)	Cam and Ely Ouse Chalk	No
1002144	Wretham Park Meres (SSSI)	Cam and Ely Ouse Chalk	No
1002160	Crouch & Roach Estuaries (SSSI)	Essex Gravels	No
1003726	Redgrave & Lopham Fens (SSSI)	Cam and Ely Ouse Chalk	No
1004291	Waltham Abbey (SSSI)	North Mymms Tertiaries	Yes
1004467	Lakenheath Warren (SSSI)	Cam and Ely Ouse Chalk	No
1002960	Houghton Regis Marl Lakes (SSSI)	Upper Bedford Ouse Chalk	Yes
1003307	Cornard Mere, Little Cornard (SSSI)	North Essex Chalk	Yes
1002450	Foulden Common (SSSI)	Cam and Ely Ouse Chalk	No
1001329	L-moor, Shepreth (SSSI)	Cam and Ely Ouse Chalk	No
1002433	Thriplow Peat Holes (SSSI)	Cam and Ely Ouse Chalk	No
1002984	Foulness (SSSI)	Essex Gravels	No
1000696	Middle Harling Fen (SSSI)	Cam and Ely Ouse Chalk	No
1000167	Brackland Rough (SSSI)	Cam and Ely Ouse Chalk	No
1000192	Thetford Golf Course & Marsh (SSSI)	Cam and Ely Ouse Chalk	No
1005772	The Gardens, Great Ashfield (SSSI)	Cam and Ely Ouse Chalk	No

SSSI Code	GWTDE Name	WB Name	SWMI for flow
1001093	Fulbourn Fen (SSSI)	Cam and Ely Ouse Chalk	No
1000575	Sawbridgeworth Marsh (SSSI)	North Mymms Tertiaries	Yes
1000899	Pashford Poors Fen, Lakenheath (SSSI)	Cam and Ely Ouse Chalk	No
1000547	Barnhamcross Common (SSSI)	Cam and Ely Ouse Chalk	No
1002282	Thundersley Great Common (SSSI)	Essex Gravels	No
1000583	Kenninghall & Banham Fens with Quidenham Mere (SSSI)	Cam and Ely Ouse Chalk	No
1003780	East Harling Common (SSSI)	Cam and Ely Ouse Chalk	No
1000633	Blo' Norton & Thelnetham Fens (SSSI)	Cam and Ely Ouse Chalk	No
1003253	Hanningfield Reservoir (SSSI)	Essex Gravels	No
1000877	Whittlesford-Thriplow Hummocky Fields (SSSI)	Cam and Ely Ouse Chalk	No
1005849	Pakenham Meadows (SSSI)	Cam and Ely Ouse Chalk	No
1004157	Freston & Cutler's Woods (SSSI)	Essex Gravels	No
1003787	Roydon Common (SSSI)	North west Norfolk Sandringham Sands	No
1003495	Cornmill Stream & Old River Lea (SSSI)	North Mymms Tertiaries	Yes
1002271	Great Wilbraham Common (SSSI)	Cam and Ely Ouse Chalk	No
1000005	Stanford Training Area (SSSI)	Cam and Ely Ouse Chalk	No
1003517	Bugg's Hole, Thelnetham (SSSI)	Cam and Ely Ouse Chalk	No
1001871	Wangford Warren & Carr (SSSI)	Cam and Ely Ouse Chalk	No

SSSI Code	GWTDE Name	WB Name	SWMI for flow
1002331	Barnham Heath (SSSI)	Cam and Ely Ouse Chalk	No
1003284	Wilbraham Fens (SSSI)	Cam and Ely Ouse Chalk	No
1002332	Stow cum Quy Fen (SSSI)	Cam and Ely Ouse Chalk	No
1000134	Swangey Fen, Attleborough (SSSI)	Cam and Ely Ouse Chalk	No
1002950	Roman River (SSSI)	Essex Gravels	No
1000350	Wayland Wood (SSSI)	Cam and Ely Ouse Chalk	No
1003172	Garrold's Meadow (SSSI)	Essex Gravels	No
1002256	Sawston Hall Meadows (SSSI)	Cam and Ely Ouse Chalk	No
1001867	Thorley Flood Pound (SSSI)	Upper Lee Chalk	Yes
1002072	Blake's Wood & Lingwood Common (SSSI)	Essex Gravels	No
1000249	Thompson Water, Carr & Common (SSSI)	Cam and Ely Ouse Chalk	No
1006650	Newmarket Heath (SSSI)	Cam and Ely Ouse Chalk	No
1002194	Cattawade Marshes (SSSI)	Essex Gravels	No
1006373	Upper Colne Marshes (SSSI)	Essex Gravels	No
1003809	Wilde Street Meadow, Mildenhall (SSSI)	Cam and Ely Ouse Chalk	No
1005495	Blow's Down (SSSI)	Upper Lee Chalk	Yes
2000068	Lackford Lakes (SSSI)	Cam and Ely Ouse Chalk	No
1004495	Lineage Wood & Railway Track, Long Melford (SSSI)	North Essex Chalk	Yes

SSSI Code	GWTDE Name	WB Name	SWMI for flow
1002925	Debden Water (SSSI)	Cam and Ely Ouse Chalk	No
1002559	Knettishall Heath (SSSI)	Cam and Ely Ouse Chalk	No
2000085	Elm Road Field, Thetford (SSSI)	Cam and Ely Ouse Chalk	No
1002204	Chalkney Wood (SSSI)	Essex Gravels	No
1000663	Boughton Fen (SSSI)	Cam and Ely Ouse Chalk	No
2000025	The Brinks, Northwold (SSSI)	Cam and Ely Ouse Chalk	No
1000561	Great Cressingham Fen (SSSI)	Cam and Ely Ouse Chalk	No
1005773	Westhall Wood & Meadow (SSSI)	Cam and Ely Ouse Chalk	No
1006349	Holland Haven Marshes (SSSI)	Essex Gravels	No
1001619	Chippenham Fen & Snailwell Poor's Fen (SSSI)	Cam and Ely Ouse Chalk	No
1002262	Arger Fen (SSSI)	North Essex Chalk	Yes
1004452	Lakenheath Poors Fen (SSSI)	Cam and Ely Ouse Chalk	No
1003677	Potter's Carr, Cranworth (SSSI)	Cam and Ely Ouse Chalk	No
1000593	Ashwell Springs (SSSI)	Cam and Ely Ouse Chalk	No
1000993	Stallode Wash, Lakenheath (SSSI)	Cam and Ely Ouse Chalk	No
1000388	Dernford Fen (SSSI)	Cam and Ely Ouse Chalk	No
1002294	Soham Wet Horse Fen (SSSI)	Cam and Ely Ouse Chalk	No
1002410	Thriplow Meadows (SSSI)	Cam and Ely Ouse Chalk	No
1000666	Colne Estuary (SSSI)	Essex Gravels	No

SSSI Code	GWTDE Name	WB Name	SWMI for flow
1001341	Out & Plunder Woods (SSSI)	Cam and Ely Ouse Chalk	No
1000992	Cavenham-Icklingham Heaths (SSSI)	Cam and Ely Ouse Chalk	No
1004395	Hopton Fen (SSSI)	Cam and Ely Ouse Chalk	No
1001708	East Winch Common (SSSI)	North west Norfolk Sandringham Sands	No
1001678	Didlington Park Lakes (SSSI)	Cam and Ely Ouse Chalk	No
1003828	Scoulton Mere (SSSI)	Cam and Ely Ouse Chalk	No
1002523	Moor Hall Meadows (SSSI)	Upper Lee Chalk	Yes
1003600	Old Buckenham Fen (SSSI)	Cam and Ely Ouse Chalk	No
1001149	Hooks Well Meadows, Great Cressingham (SSSI)	Cam and Ely Ouse Chalk	No
1003078	Bridgham & Brettenham Heaths (SSSI)	Cam and Ely Ouse Chalk	No
1004192	Weeleyhall Wood (SSSI)	Essex Gravels	No
1003217	Cherry Hill & The Gallops, Barton Mills (SSSI)	Cam and Ely Ouse Chalk	No
1002899	Danbury Common (SSSI)	Essex Gravels	No
1001827	Tewinbury (SSSI)	Upper Lee Chalk	Yes
1004142	New Buckenham Common (SSSI)	Cam and Ely Ouse Chalk	No
1003973	Alder Carr (SSSI)	Cam and Ely Ouse Chalk	No
1002000	Basildon Meadows (SSSI)	Essex Gravels	No
1001965	Ashdon Meadows (SSSI)	Cam and Ely Ouse Chalk	No
1001506	Knebworth Woods (SSSI)	Upper Lee Chalk	Yes

SSSI Code	GWTDE Name	WB Name	SWMI for flow
1001552	Cranberry Rough, Hockham (SSSI)	Cam and Ely Ouse Chalk	No
1004426	Blackwater Estuary (SSSI)	Essex Gravels	No
1005851	Little Hallingbury Marsh (SSSI)	Upper Lee Chalk	Yes
1002511	Orwell Estuary (SSSI)	Essex Gravels	No
1003531	Hunsdon Mead (SSSI)	North Mymms Tertiaries	Yes
1001970	West Stow Heath (SSSI)	Cam and Ely Ouse Chalk	No
1005499	Delph Bridge Drain (SSSI)	Cam and Ely Ouse Woburn Sands	No
1001738	East Wretham Heath (SSSI)	Cam and Ely Ouse Chalk	No
2000373	Mill Meadows, Billericay (SSSI)	Essex Gravels	No
1004414	Benfleet & Southend Marshes (SSSI)	Essex Gravels	No
1005497	Rye Meads (SSSI)	Upper Lee Chalk	Yes
1001985	Weston Fen (SSSI)	Cam and Ely Ouse Chalk	No

D Appendix D - Protected sites adjacent to rivers within WRZs serving UDC

D.1 SSSIs

Name	Code	Waterbody ID	Waterbody Name	SWMI for flow
Arger Fen	TL932357	GB105036040942	Stour (Lamarsh - R. Brett)	No
Arger Fen	TL932357	GB105036040942	Stour (Lamarsh - R. Brett)	No
Amwell Quarry	TL377128	GB106038033240	Lee Navigation (Hertford to Fieldes Weir)	Yes
Amwell Quarry	TL377128	GB106038033240	Lee Navigation (Hertford to Fieldes Weir)	Yes
Thriplow Peat Holes	TL450475	GB105033038120	Hoffer Brook	No
Blackwater Estuary	TL975098	GB105037033530	Chelmer (d/s confluence with Can)	Yes
Blagrove Common	TL325336	GB106038040140	Rib (upper stretches, above confluence with the Quin)	No
The Brinks, Northwold	TL757955	GB205033000040	Cut-off Channel	No
Cornmill Stream and Old River Lea	TL379012	GB106038077851	Lea Navigation (Fieldes Weir to Enfield Lock)	No
Cattawade Marshes	TM090329	GB105036041000	Stour (d/s R. Brett)	No
Fulbourn Fen	TL530561	GB105033042700	Bottisham Lode - Quy Water	No
Debden Water	TL536340	GB105033037490	Debden Water	No
Debden Water	TL536340	GB105033037480	Cam (US Newport)	No

Name	Code	Waterbody ID	Waterbody Name	SWMI for flow
Great Wilbraham Common	TL533576	GB105033042700	Bottisham Lode - Quy Water	No
Stow-cum-Quy Fen	TL514627	GB105033042700	Bottisham Lode - Quy Water	No
Wangford Warren and Carr	TL755839	GB205033000040	Cut-off Channel	No
Glemsford Pits	TL838463	GB105036040941	Stour (Wixoe - Lamarsh)	No
Little Hallingbury Marsh	TL491171	GB106038033250	Little Hallingbury Brook	No
Lakenheath Poors Fen	TL701827	GB205033000070	Ely Ouse (South Level)	No
Hunsdon Mead	TL418109	GB106038033282	Stort and Navigation, Harlow to Lee	No
Hunsdon Mead	TL418109	GB106038033220	Cannons Brook	No
Ingrebourne Marshes	TQ535835	GB106037028130	Ingrebourne	No
Ingrebourne Marshes	TQ535835	GB106037028130	Ingrebourne	No
Ingrebourne Marshes	TQ535835	GB106037028130	Ingrebourne	No
Inner Thames Marshes	TQ531802	GB106037028090	Southall Sewer and Runningwater Brook	No
Moor Hall Meadows	TL329265	GB106038033310	Beane (from confluence with Stevenage Brook to Lee)	No
Delph Bridge Drain	TL567768	GB205033000070	Ely Ouse (South Level)	No
Plashes Wood	TL381205	GB106038033360	Rib (from confluence with Quin to Lee Navigation)	No
Roding Valley Meadows	TQ436953	GB106037028181	Lower Roding (Loughton to Thames)	No
Sawbridgeworth Marsh	TL492158	GB106038033281	Stort and Navigation, B Stortford to Harlow	No

Name	Code	Waterbody ID	Waterbody Name	SWMI for flow
Upware North Pit	TL544727	GB205033000070	Ely Ouse (South Level)	No
Cam Washes	TL538728	GB105033042750	Cam	No
Cam Washes	TL538728	GB105033042720	Burwell Lode	No
Cam Washes	TL538728	GB105033042750	Cam	No
Shippea Hill	TL637850	GB205033000070	Ely Ouse (South Level)	No
Rye Meads	TL387102	GB106038033240	Lee Navigation (Hertford to Fieldes Weir)	Yes
Rye Meads	TL387102	GB106038033282	Stort and Navigation, Harlow to Lee	No
River Ter	TL735158	GB105037033940	Ter	No
Thriplow Meadows	TL437469	GB105033038120	Hoffer Brook	No
Stallode Wash, Lakenheath	TL675853	GB205033000070	Ely Ouse (South Level)	No
Thorley Flood Pound	TL489181	GB106038033281	Stort and Navigation, B Stortford to Harlow	No
Wilbraham Fens	TL519591	GB105033042700	Bottisham Lode - Quy Water	No
Fleam Dyke	TL542548	GB105033042700	Bottisham Lode - Quy Water	No
Upware South Pit	TL539709	GB105033042750	Cam	No
Waltham Abbey	TL375019	GB106038077851	Lea Navigation (Fieldes Weir to Enfield Lock)	Yes
Walthamstow Marshes	TQ351875	GB106038077852	Lee (Tottenham Locks to Bow Locks/Three Mills Locks)	Yes
Wretton	TL684992	GB205033000040	Cut-off Channel	No

Name	Code	Waterbody ID	Waterbody Name	SWMI for flow
Sawston Hall Meadows	TL491490	GB105033037590	Cam (Audley End to Stapleford)	Yes
Chingford Reservoirs	TQ370953	GB106038027950	Lea Navigation Enfield Lock to Tottenham Locks	Yes
Chingford Reservoirs	TQ370953	GB106038027950	Lea Navigation Enfield Lock to Tottenham Locks	Yes
Hilgay Heronry	TL635992	GB205033000070	Ely Ouse (South Level)	No
Ouse Washes	TL490879	GB205033000070	Ely Ouse (South Level)	No
Northaw Great Wood	TL282040	GB106038033180	Turkey Brook and Cuffley Brook	No
Wormley-Hoddesdonpark Wood South	TL321059	GB106038033180	Turkey Brook and Cuffley Brook	No
Breckland Forest	TL819835	GB205033000040	Cut-off Channel	No
Breckland Forest	TL819835	GB205033000040	Cut-off Channel	No
Breckland Forest	TL819835	GB205033000040	Cut-off Channel	No
Ely Pits and Meadows	TL558807	GB205033000070	Ely Ouse (South Level)	No
Ely Pits and Meadows	TL558807	GB205033000070	Ely Ouse (South Level)	No
Ely Pits and Meadows	TL558807	GB205033000070	Ely Ouse (South Level)	No
Alder Carr	TL542489	GB105033037810	Granta	Yes
Breckland Farmland	TL760783	GB205033000040	Cut-off Channel	No
Breckland Farmland	TL760783	GB205033000040	Cut-off Channel	No
Breckland Farmland	TL760783	GB205033000040	Cut-off Channel	No

Name	Code	Waterbody ID	Waterbody Name	SWMI for flow
Walthamstow Reservoirs	TQ351891	GB106038077852	Lee (Tottenham Locks to Bow Locks/Three Mills Locks)	Yes
Walthamstow Reservoirs	TQ351891	GB106038027950	Lea Navigation Enfield Lock to Tottenham Locks	Yes
Walthamstow Reservoirs	TQ351891	GB106038077852	Lee (Tottenham Locks to Bow Locks/Three Mills Locks)	Yes
Soham Wet Horse Fen	TL612725	GB205033000070	Ely Ouse (South Level)	No
Soham Wet Horse Fen	TL612725	GB205033000070	Ely Ouse (South Level)	No
Curtismill Green	TQ518963	GB106037028120	Rom (Bourne Brook to Ravensbourne)	No
Wicken Fen	TL554701	GB105033042720	Burwell Lode	No
Whittlesford - Thriplow Hummocky Fields	TL447484	GB105033037600	Cam (Stapleford to Hauxton Junction)	No
Wormley-Hoddesdonpark Woods North	TL343080	GB106038033200	Small River Lee (and tributaries)	No
Wormley-Hoddesdonpark Woods North	TL343080	GB106038077851	Lea Navigation (Fieldes Weir to Enfield Lock)	Yes
Epping Forest	TQ418971	GB106037033481	Cripsey Brook	No
Epping Forest	TQ418971	GB106038027930	Ching Brook	No
Epping Forest	TQ418971	GB106038027930	Ching Brook	No
Epping Forest	TQ418971	GB106037028181	Lower Roding (Loughton to Thames)	No
Epping Forest	TQ418971	GB106038027930	Ching Brook	No

Name	Code	Waterbody ID	Waterbody Name	SWMI for flow
Epping Forest	TQ418971	GB106037033481	Cripsey Brook	No
Epping Forest	TQ418971	GB106037033481	Cripsey Brook	No
Turnford & Cheshunt Pits	TL370027	GB106038077851	Lea Navigation (Fieldes Weir to Enfield Lock)	Yes
Turnford & Cheshunt Pits	TL370027	GB106038033200	Small River Lee (and tributaries)	No
Turnford & Cheshunt Pits	TL370027	GB106038033200	Small River Lee (and tributaries)	No

D.2 SACs

Name	Code	Waterbody ID	Waterbody Name	SWMI for flow
Fenland	UK0014782	GB105033042720	Burwell Lode	No
Wormley-Hoddesdonpark Woods	UK0013696	GB106038033180	Turkey Brook and Cuffley Brook	No
Wormley-Hoddesdonpark Woods	UK0013696	GB106038033200	Small River Lee (and tributaries)	No
Wormley-Hoddesdonpark Woods	UK0013696	GB106038077851	Lea Navigation (Fieldes Weir to Enfield Lock)	Yes
Epping Forest	UK0012720	GB106038027930	Ching Brook	No
Epping Forest	UK0012720	GB106038027930	Ching Brook	No
Epping Forest	UK0012720	GB106037028181	Lower Roding (Loughton to Thames)	No
Epping Forest	UK0012720	GB106038027930	Ching Brook	No

Name	Code	Waterbody ID	Waterbody Name	SWMI for flow
Essex Estuaries	UK0013690	GB105037033530	Chelmer (d/s confluence with Can)	Yes
Breckland	UK0019865	GB205033000040	Cut-off Channel	No
Ouse Washes	UK0013011	GB205033000070	Ely Ouse (South Level)	No

D.3 SPAs

Name	Code	Waterbody ID	Waterbody Name	SWMI for flow
Blackwater Estuary (Mid-Essex Coast Phase 4)	UK9009245	GB105037033530	Chelmer (d/s confluence with Can)	Yes
Lee Valley	UK9012111	GB106038077852	Lee (Tottenham Locks to Bow Locks/Three Mills Locks)	Yes
Lee Valley	UK9012111	GB106038077851	Lea Navigation (Fieldes Weir to Enfield Lock)	Yes
Lee Valley	UK9012111	GB106038027950	Lea Navigation Enfield Lock to Tottenham Locks	Yes
Lee Valley	UK9012111	GB106038033200	Small River Lee (and tributaries)	No
Lee Valley	UK9012111	GB106038033240	Lee Navigation (Hertford to Fieldes Weir)	Yes
Lee Valley	UK9012111	GB106038033200	Small River Lee (and tributaries)	No
Lee Valley	UK9012111	GB106038033240	Lee Navigation (Hertford to Fieldes Weir)	Yes
Lee Valley	UK9012111	GB106038077852	Lee (Tottenham Locks to Bow Locks/Three Mills Locks)	Yes

Name	Code	Waterbody ID	Waterbody Name	SWMI for flow
Lee Valley	UK9012111	GB106038033282	Stort and Navigation, Harlow to Lee	No
Lee Valley	UK9012111	GB106038033240	Lee Navigation (Hertford to Fieldes Weir)	Yes
Stour and Orwell Estuaries	UK9009121	GB105036041000	Stour (d/s R. Brett)	No
Breckland	UK9009201	GB205033000040	Cut-off Channel	No
Breckland	UK9009201	GB205033000040	Cut-off Channel	No
Breckland	UK9009201	GB205033000040	Cut-off Channel	No
Breckland	UK9009201	GB205033000040	Cut-off Channel	No
Breckland	UK9009201	GB205033000040	Cut-off Channel	No
Breckland	UK9009201	GB205033000040	Cut-off Channel	No

D.4 Ramsar sites

Name	Code	Waterbody ID	Waterbody Name	SWMI for flow
Blackwater Estuary (Mid-Essex Coast Phase 4)	UK11007	GB105037033530	Chelmer (d/s confluence with Can)	Yes
Lee Valley	UK11034	GB106038077852	Lee (Tottenham Locks to Bow Locks/Three Mills Locks)	Yes
Lee Valley	UK11034	GB106038077851	Lea Navigation (Fieldes Weir to Enfield Lock)	Yes
Lee Valley	UK11034	GB106038027950	Lea Navigation Enfield Lock to Tottenham Locks	Yes

Name	Code	Waterbody ID	Waterbody Name	SWMI for flow
Lee Valley	UK11034	GB106038033200	Small River Lee (and tributaries)	Yes
Lee Valley	UK11034	GB106038033240	Lee Navigation (Hertford to Fieldes Weir)	Yes
Lee Valley	UK11034	GB106038033200	Small River Lee (and tributaries)	No
Lee Valley	UK11034	GB106038033240	Lee Navigation (Hertford to Fieldes Weir)	Yes
Lee Valley	UK11034	GB106038077852	Lee (Tottenham Locks to Bow Locks/Three Mills Locks)	Yes
Lee Valley	UK11034	GB106038033282	Stort and Navigation, Harlow to Lee	No
Lee Valley	UK11034	GB106038033240	Lee Navigation (Hertford to Fieldes Weir)	Yes
Ouse Washes	UK11051	GB205033000070	Ely Ouse (South Level)	No
Wicken Fen	UK11077	GB105033042720	Burwell Lode	No
Stour and Orwell Estuaries	UK11067	GB105036041000	Stour (d/s R. Brett)	No

E Appendix E - Environmental sites water quality impact

E.1 SSSIs

The tables within this appendix detail the predicted deterioration in water quality in the river adjacent to each SSSI, SAC and SPA downstream of WwTWs serving growth in the Local Plan period. It includes the protected site name, reference and the point in the SIMCAT model used to obtain the result. The first three results show the predicted deterioration at the end of the plan period if all planned growth were delivered. The final three columns show the result of the TAL scenario where all WwTWs are upgraded to their technically achievable limit. A negative number indicates an improvement in water quality compared to the future scenario, i.e. deterioration can be prevented.

SSSI name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Alder Carr	TL542489	WQ 28M04	6%	1%	2%	4%	-5%	-76%
Blackwater Estuary	TL975098	GB105037033530 Boundary	-1%	0%	0%	-73%	-47%	-83%
Cam Washes	TL538728	Extra Plot Point - Reach 295 No 2	0%	0%	2%	-9%	-11%	-55%
Cam Washes	TL538728	WQ 34M15	-1%	-1%	3%	-12%	-18%	-56%
Cam Washes	TL538728	Start Of Reach 295	0%	0%	3%	-12%	-12%	-55%
Chingford Reservoirs	TQ370953	CSO 105	-1%	1%	-1%	-4%	-2%	-34%

SSSI name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Cornmill Stream and Old River Lea	TL379012	Extra Plot Point - Reach 1115 No 1	-1%	0%	-1%	-4%	-2%	-36%
Curtismill Green	TQ518963	Extra Plot Point - Reach 998 No 9	0%	0%	0%	-44%	-8%	-18%
Debden Water	TL536340	DEBDEN STW	14%	0%	3%	-77%	0%	-19%
Debden Water	TL536340	Extra Plot Point - Reach 254 No 1	15%	0%	2%	-76%	0%	-13%
Delph Bridge Drain	TL567768	Start Of Reach 297	0%	0%	2%	-11%	-10%	-53%
Dersingham Bog	TF673288	Extra Plot Point - Reach 421 No 3	0%	0%	0%	-21%	-3%	-45%
Ely Pits and Meadows	TL558807	STORM_Ely STW "	0%	0%	2%	-10%	-9%	-53%
Ely Pits and Meadows	TL558807	WQ 36M03	0%	0%	2%	-15%	-11%	-56%
Hilgay Heronry	TL635992	Start Of Reach 351	0%	0%	2%	-10%	-4%	-56%
Hunsdon Mead	TL418109	Extra Plot Point - Reach 1048 No 1	-3%	8%	2%	-4%	5%	-3%

SSSI name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Hunstanton Cliffs	TF675420	Extra Plot Point - Reach 421 No 3	0%	0%	0%	-21%	-3%	-45%
Inner Thames Marshes	TQ531802	CSO 512	0%	0%	0%	-1%	-7%	-28%
Islington Heronry	TF568159	Extra Plot Point - Reach 409 No 2	0%	0%	0%	-11%	-1%	-48%
Lakenheath Poors Fen	TL701827	Extra Plot Point - Reach 316 No 1	0%	0%	2%	-11%	-4%	-58%
Little Hallingbury Marsh	TL491171	WQ PLER0152	8%	13%	6%	8%	11%	5%
Ouse Washes	TL490879	LITTLEPORT (PLAINS LANE) STW	0%	0%	2%	-11%	-4%	-58%
River Ter	TL735158	WQ TE0152	0%	0%	0%	-4%	-5%	-47%
Roding Valley Meadows	TQ436953	FS Roding Loughton	0%	0%	0%	-28%	-17%	-43%
Rye Meads	TL387102	CSO 288	-2%	4%	-2%	-3%	2%	-5%
Sawbridgeworth Marsh	TL492158	Start Of Reach 1029	2%	12%	6%	-2%	8%	5%

SSSI name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Setchey	TF632131	Extra Plot Point - Reach 398 No 6	0%	0%	0%	-5%	-3%	-74%
Shippea Hill	TL637850	Extra Plot Point - Reach 316 No 1	0%	0%	2%	-11%	-4%	-58%
Stallode Wash, Lakenheath	TL675853	Extra Plot Point - Reach 316 No 4	0%	0%	2%	-10%	-4%	-58%
The Wash	TF537402	Extra Plot Point - Reach 421 No 3	0%	0%	0%	-21%	-3%	-45%
Thorley Flood Pound	TL489181	Start Of Reach 1020	9%	13%	6%	9%	11%	5%
Turnford & Cheshunt Pits	TL370027	Extra Plot Point - Reach 1111 No 2	-1%	0%	-1%	-3%	-3%	-39%
Turnford & Cheshunt Pits	TL370027	Extra Plot Point - Reach 1090 No 4	-1%	0%	-1%	-3%	-3%	-40%
Turnford & Cheshunt Pits	TL370027	Extra Plot Point - Reach 1091 No 3	-1%	0%	-1%	-3%	-2%	-40%
Upware North Pit	TL544727	WQ 34M02	0%	0%	2%	-9%	-11%	-55%
Upware South Pit	TL539709	Start Of Reach 295	0%	0%	3%	-12%	-12%	-55%

SSSI name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Waltham Abbey	TL375019	Start Of Reach 1115	-1%	0%	-1%	-4%	-2%	-36%
Walthamstow Marshes	TQ351875	CSO 393	-1%	-1%	-1%	-1%	-1%	-29%
Walthamstow Reservoirs	TQ351891	Start Of Reach 1107	0%	0%	0%	-1%	0%	-35%
Walthamstow Reservoirs	TQ351891	Extra Plot Point - Reach 1118 No 1	-1%	1%	0%	-4%	-1%	-26%
Walthamstow Reservoirs	TQ351891	CSO 509	-2%	-1%	-1%	-2%	-1%	-29%
Wicken Fen	TL554701	Extra Plot Point - Reach 294 No 2	0%	-1%	2%	-14%	-17%	-56%
Wiggenhall St. Germans	TF588138	CSO 156	0%	0%	1%	-24%	-3%	-49%

E.2 SACs

SAC name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Essex Estuaries	UK0013690	GB105037033530 Boundary	-1%	0%	0%	-73%	-47%	-83%
Fenland	UK0014782	Extra Plot Point - Reach 294 No 2	0%	-1%	2%	-14%	-17%	-56%
Inner Dowsing, Race Bank and North Ridge	UK0030370	Extra Plot Point - Reach 421 No 3	0%	0%	0%	-21%	-3%	-45%
Margate and Long Sands	UK0030371	GB105037033530 Boundary	-1%	0%	0%	-73%	-47%	-83%
Ouse Washes	UK0013011	LITTLEPORT (PLAINS LANE) STW	0%	0%	2%	-11%	-4%	-58%
Roydon Common & Dersingham Bog	UK0012801	Extra Plot Point - Reach 421 No 3	0%	0%	0%	-21%	-3%	-45%
Southern North Sea	UK0030395	GB105037033530 Boundary	-1%	0%	0%	-73%	-47%	-83%

SAC name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
The Wash & North Norfolk Coast	UK0017075	Extra Plot Point - Reach 421 No 3	0%	0%	0%	-21%	-3%	-45%

E.3 SPAs

SPA name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Blackwater Estuary (Mid-Essex Coast Phase 4)	UK9009245	X_Totham Lodge nursing home	-1%	-1%	0%	-74%	-49%	-84%
Greater Wash	UK9020329	Extra Plot Point - Reach 421 No 3	0%	0%	0%	-21%	-3%	-45%
Lee Valley	UK9012111	Start Of Reach 1119	-1%	-1%	-1%	-1%	-1%	-30%

SPA name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Lee Valley	UK9012111	Extra Plot Point - Reach 1111 No 2	-1%	0%	-1%	-3%	-3%	-39%
Lee Valley	UK9012111	Extra Plot Point - Reach 1118 No 1	-1%	1%	0%	-4%	-1%	-26%
Lee Valley	UK9012111	Extra Plot Point - Reach 1090 No 4	-1%	0%	-1%	-3%	-3%	-40%
Lee Valley	UK9012111	CSO 288	-2%	4%	-2%	-3%	2%	-5%
Lee Valley	UK9012111	Extra Plot Point - Reach 1091 No 3	-1%	0%	-1%	-3%	-2%	-40%
Lee Valley	UK9012111	CSO 509	-2%	-1%	-1%	-2%	-1%	-29%
Ouse Washes	UK9008041	LITTLEPORT (PLAINS LANE) STW	0%	0%	2%	-11%	-4%	-58%

SPA name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Outer Thames Estuary	UK9020309	Extra Plot Point - Reach 82 No 11	0%	0%	0%	-73%	-27%	-92%
The Wash	UK9008021	Extra Plot Point - Reach 421 No 3	0%	0%	0%	-21%	-3%	-45%

E.4 Ramsar sites

Ramsar name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Blackwater Estuary (Mid-Essex Coast Phase 4)	UK11007	GB105037033530 Boundary	-1%	0%	0%	-73%	-47%	-83%
Colne Estuary (Mid-Essex Coast Phase 2)	UK11015	GB105037033530 Boundary	-1%	0%	0%	-73%	-47%	-83%
Gibraltar Point	UK11027	Extra Plot Point - Reach 421 No 3	0%	0%	0%	-21%	-3%	-45%
Lee Valley	UK11034	Start Of Reach 1119	-1%	-1%	-1%	-1%	-1%	-30%
Lee Valley	UK11034	Extra Plot Point - Reach 1111 No 2	-1%	0%	-1%	-3%	-3%	-39%
Lee Valley	UK11034	Extra Plot Point - Reach 1118 No 1	-1%	1%	0%	-4%	-1%	-26%
Lee Valley	UK11034	Extra Plot Point - Reach 1090 No 4	-1%	0%	-1%	-3%	-3%	-40%

Ramsar name	Reference ID	SIMCAT Model Point	Ammonia Deterioration	BOD Deterioration	Phosphate Deterioration	Ammonia Deterioration TAL	BOD Deterioration TAL	Phosphate Deterioration TAL
Lee Valley	UK11034	CSO 288	-2%	4%	-2%	-3%	2%	-5%
Lee Valley	UK11034	Extra Plot Point - Reach 1091 No 3	-1%	0%	-1%	-3%	-2%	-40%
Lee Valley	UK11034	CSO 509	-2%	-1%	-1%	-2%	-1%	-29%
Ouse Washes	UK11051	LITTLEPORT (PLAINS LANE) STW	0%	0%	2%	-11%	-4%	-58%
The Wash	UK11072	Extra Plot Point - Reach 421 No 3	0%	0%	0%	-21%	-3%	-45%
Wicken Fen	UK11077	Extra Plot Point - Reach 294 No 2	0%	-1%	2%	-14%	-17%	-56%

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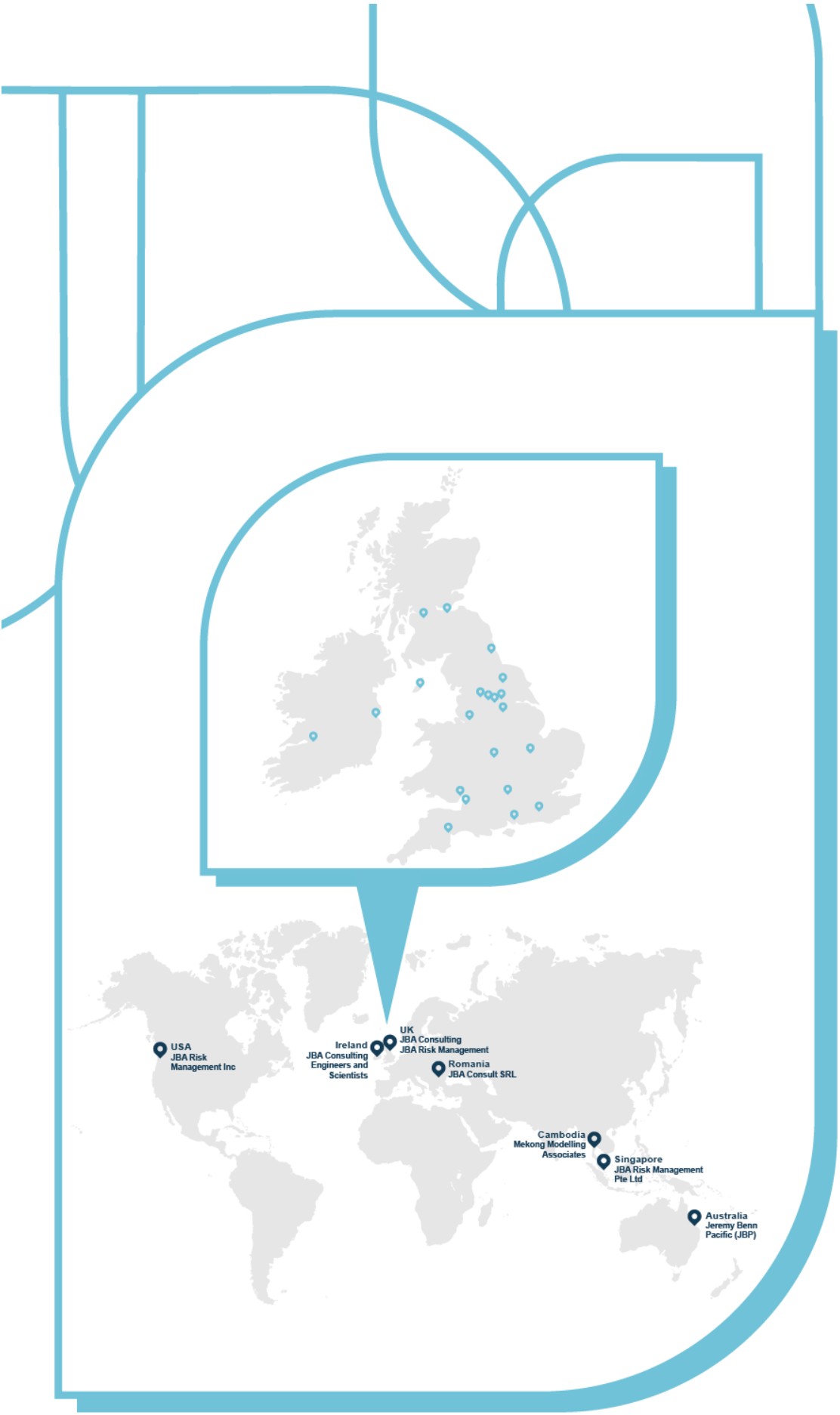

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