# Uttlesford Water Cycle Study - Addendum to Stage 1

## Draft Report

**13 October 2023**

**Prepared for:**
**Uttlesford District Council**

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This report is an addendum to the Stage 1 Water Cycle Study commissioned by Uttlesford District Council in July 2021. Richard Pardoe of JBA Consulting carried out this work.

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## Abbreviations

AMP ..... Asset Management Plan

AONB ..... Area of Outstanding Natural Beauty

AW ..... Anglian Water

BOD ..... Biochemical Oxygen Demand

BREEAM ..... Building Research Establishment Environmental Assessment Methodology

CAPEX ..... Capital Expenditure

CFMP ..... Catchment Flood Management Plan

CfSH ..... Code for Sustainable Homes

CSO ..... Combined Sewer Overflow

DLUHC ..... Department for Levelling Up, Housing & Communities

DWF ..... Dry Weather Flow

DWI ..... Drinking Water Inspectorate

DWMP ..... Drainage and Wastewater Management Plan

EA ..... Environment Agency

EFI ..... Ecological Flow Indicator

EP ..... Environmental Permit

EU ..... European Union

FEH ..... Flood Estimation Handbook

FFT ..... Flow to Full Treatment

FWMA ..... Flood and Water Management Act

FZ ..... Flood Zone

GIS ..... Geographic Information Systems

HRA ..... Habitats Regulations Assessment

JBA ..... Jeremy Benn Associates

LLFA ..... Lead Local Flood Authority

LPA ..... Local Planning Authority

l/p/d ..... Litres per person per day

Ml/d ..... Mega (Million) litres per day

MHCLG ..... Ministry of Housing Communities and Local Government (replaced by DLUHC)

NAV ..... New Appointment and Variations suppliers

NH4 ..... Ammonia

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

WRMP.....Water Resource Management Plan

WRZ.....Water Resource Zone

WTW.....Water Treatment Works

WwTW.....Wastewater Treatment Works

# Executive Summary

JBA Consulting was commissioned by Uttlesford District Council (UDC) to undertake a Water Cycle Study (WCS) for the Uttlesford District. The purpose of the WCS is to form part of a comprehensive and robust evidence base to inform the preparation of the new Local Plan, which will set out a vision and framework for development in the area up to 2041 and will be used to inform decisions on the location of future development. A Stage 1 Scoping Study was completed in 2022 assessing seven spatial growth options. Since this report, UDC have developed a preferred option which will be consulted on in the Regulation 18 consultation in Autumn 2023.

This addendum report uses the analysis presented in Stage 1 to provide an assessment of the preferred option to inform this consultation. Further detailed analysis will be provided in a Stage 2 WCS to inform the Regulation 19 consultation. This report should be read alongside the Stage 1 WCS and the Chalk Stream evidence base.

**Chalk stream protection:**

As part of the Stage 1 study, JBA produced a Chalk Stream evidence base to assess pressures on the Chalk Streams in Uttlesford, and propose options to protect and enhance these important habitats. Six of the of the preferred option sites are within chalk stream catchments (sites in Newport, Saffron Walden, Stansted Mountfitchet) and as such these recommendations should be followed in order to minimise their impact, in particular the tighter water efficiency standard of 90l/p/d which aligns with the Catchment Based Approach (CaBA) Chalk Stream Strategy.

Recommendation 4 of the chalk stream evidence base proposed a riparian buffer excluding development close to chalk streams and protecting the natural flood plain. Two of the preferred options would have part of the site boundary within this buffer zone. There is an opportunity at the master planning stage to incorporate this buffer within the site as green space offering biodiversity and amenity value.

**Water resources and supply:**

The preferred option contains a lower growth estimate than the spatial growth options assessed in Stage 1. As such there is less of an impact on water resources. Although Affinity Water have stated that they could accommodate the higher level of growth detailed in Stage 1 without concern, water resources in the region are heavily constrained and so to reduce the additional pressure of new development, water demand should be minimised on the preferred option sites where possible, by adopting more ambitious targets for water efficiency. As Uttlesford is within one water resource zone, the chalk stream evidence base proposes the tighter water efficiency target for the whole of Uttlesford.

**Wastewater network and treatment:**

No particular network constraints were identified associated with any of the spatial growth options analysed in stage 1; however, Thames Water made the general comment that network issues were likely around Uttlesford due to the small diameter pipes present. In particular they highlighted limited capacity around Bishops Stortford. The network in this area would be difficult to upgrade without significant disruption to residents. This would affect North East Takeley. Development in this area should be discussed with Thames Water to resolve the concerns they have raised. It should be noted that Sewerage Undertakers (in this case Thames Water) have a duty under Section 94 of the Water Industry Act 1991 to provide sewerage and treat wastewater arising from new domestic development.

Anglian Water commented in stage 1 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.

Preferred option sites around Takeley, Saffron Walden and Great Dunmow are in the vicinity of storm overflows. Unmitigated development within Uttlesford could cause the frequency or duration of operation of storm overflows to increase. However, 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. Early engagement with the water company and suitable design of SuDS could mitigate the impact.

A capacity assessment was performed on the 18 WwTW in Uttlesford. Of these, four WwTW (Clavering, Felstead, Great Dunmow and Great Sampford) are already close to their permit limit (based on 80th exceedance percentile - the EA use the 90th exceedance percentile for permit compliance). By the end of the plan period, Great Chesterford, Great Easton and Newport are also expected to be at or exceeding their permit limit if no action were taken. In practice, as the WwTWs approach their permit limit, it is likely to be reviewed by the EA and the water company to ensure compliance, and an increase in the permit limit and / or upgrades to capacity are likely.

**Water quality**

A sensitivity analysis was conducted in Stage 1 using the EA's SIMCAT models and the results are shown in the Stage 1 report. It can be seen that changes in the volume of treated wastewater in Uttlesford do not cause a significant response in the concentrations of ammonia within the study area in the north of Uttlesford with the exception of the River Pant. High sensitivity is observed for the River Chelmer as it passed Great Dunmow, which may be significant for the preferred options in that area.

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

For phosphate the response is far more widespread, with many watercourses showing some sensitivity in particular the River Cam, Pincey Brook and the Stort. This is significant as the Cam and Stort are chalk streams and ecologically sensitive. The stage 2 study will model the increased discharge of treated wastewater in these catchments to assess the impact**.**

# 1 Introduction

## 1.1 Terms of reference

JBA Consulting was commissioned by Uttlesford District Council (UDC) to undertake a Water Cycle Study (WCS) to support their draft Local Plan. The Stage 1 WCS report assessed a range of spatial growth options and their impact on the water cycle. Since publication of his report, UDC have chosen a preferred option, and an assessment of this is required to support the Regulation 18 consultation. This will take the form of an addendum to the original study. More detailed assessments will be carried out in the Stage 2 WCS.

This should be read alongside the Stage 1 Scoping study which contains more detailed information on the study area, and a review of relevant policy and legislation.

The purpose of the WCS is to form part of a comprehensive and robust evidence base to inform the preparation of the new Local Plan, which will set out where and how development will take place during the plan period, which is expected to be at least 15 years in length and will be used to inform decisions on the location of future development.

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

## 1.2 Structure of report

Planned growth in and around Uttlesford that was assessed during the Stage 1 study has been updated to include the preferred option. The neighbouring authority growth forecast has not been updated in this addendum and will be updated in Stage 2.

The impact of the preferred option on each topic of the WCS is then assessed, updating the original study or restating conclusions from the Stage 1 study where appropriate.

# 2 Future Growth in Uttlesford

## 2.1 Baseline growth

Some development is already planned either through sites allocated in the adopted local plan or sites with extant planning permission. These must be included in assessments of infrastructure capacity alongside the proposed preferred option sites. These sites were provided in the Stage 1 study and have not been updated in the addendum. This forecast should be updated as part of the stage 2 WCS.

## 2.2 Preferred option

Ten preferred option residential sites were provided by UDC for use in the study. These are listed below in Table 2.1, with their potential number of dwellings. Where a higher figure was suggested for transport modelling, this was also adopted as a precautionary figure for infrastructure testing.

Table 2.1 Preferred option sites

| Settlement | Sites | Emerging Strategy Figures (number of dwellings) |
|---|---|---|
| Great Dunmow | Church End | 869 |
| Newport | North of Wicken Road / West of School Lane | 74 |
| Newport | South of Wicken Road / West of Frambury Lane | 338 |
| Saffron Walden | Land South of Radwinter Road, North of Thaxted Road | 845 |
| Saffron Walden | Land South of Thaxted Road | 435 |
| Stansted Mountfitchet | Walpole Meadows North, East of Pennington Lane | 250 |
| Stansted Mountfitchet | East of High Lane North | 140 |
| Takeley | Local rural centre | 1,636 |
| Thaxted | Land to the North of Holst Lane | 339 |
| Thaxted | Land to the North-Est of Barnards Field | 150 |

## 2.3 Windfall

Windfall sites are sites that are not specifically allocated in the Local Plan. Local Plans usually provide an allowance to cover this circumstance, consistent with the National Planning Policy Framework (NPPF). For the purpose of the Stage 1 report windfall sites were distributed between WwTWs based on the proportion of the commitments at each WwTW. This was

retained for the addendum and will be revised in Stage 2. The windfall allowance of 1,650 homes was advised by Uttlesford District Council. This may change as a result of subsequent monitoring.

## 2.4 Growth outside Uttlesford

### 2.4.1 General approach

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

- The latest growth forecast (housing and employment) for the district
- Details of future growth within the catchments of WwTW which serve part of their council area and Uttlesford.

Where specific trajectory was not given by the neighbouring councils, committed development was assumed to be spread evenly over the next five years (2020/21 to 2024/25) and Local Plan development was spread evenly from 2020/21 to the end of the Local Plan period. Water demand from employment sites has been included in the capacity assessment (based on the draft Local Plan employment sites), however these have not been specifically assessed in this study.

### 2.4.2 East Hertfordshire District

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

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

| WwTW | Proposed number of dwellings | Potential Employment Space ($m^2$) | Period |
|---|---|---|---|
| Bishops Stortford | 4,581 | 48,720 | 2016-2038 |

### 2.4.3 Greater Cambridge Planning Authority

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

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

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

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

# 3 Chalk stream protection

## 3.1 Chalk stream evidence base

Chalk streams are a globally rare habitat with 85% of the examples in the world found in England, two of which flow and rise in Uttlesford (River Stort and River Cam). In 2022, JBA produced a Chalk Stream evidence base alongside the Stage 1 WCS to investigate the issues relating to chalk streams in the study area and propose recommendations for their protection and enhancement. The recommendations of this report are stated in Table 3.1.

Table 3.1 Recommendations from Chalk Stream evidence base

| Recommendation |
|---|
| 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. |
| Recommendation 3 – Explore the feasibility of achieving water neutrality in the Stage 2 Water Cycle Study. |
| Recommendation 4 – Apply a riparian buffer zone in chalk stream areas to exclude all development within the natural flood plain or 15m of the bank, whichever is larger. |
| Recommendation 5 – Apply a vegetated buffer strips on agricultural land within 15m of a chalk stream. |
| Recommendation 6 – Encourage responsible land management such as cattle fencing through the Nature Recovery Strategy. |
| Recommendation 7 – Undertake a public engagement exercise to raise awareness of chalk streams and encourage responsible riparian ownership. |
| 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. |
| Recommendation 9 – Continue and strengthen existing partnerships with neighbouring authorities and other stakeholders to define coordinated policies for chalk stream protection. |

## 3.2 Preferred option sites

Preferred options at Newport, Saffron Walden, and Stansted Mountfitchet are within chalk stream catchments. These are shown in Figure 3.1 below. Preferred options at Takeley, Thaxted and Great Dunmow are outside of chalk stream catchments.

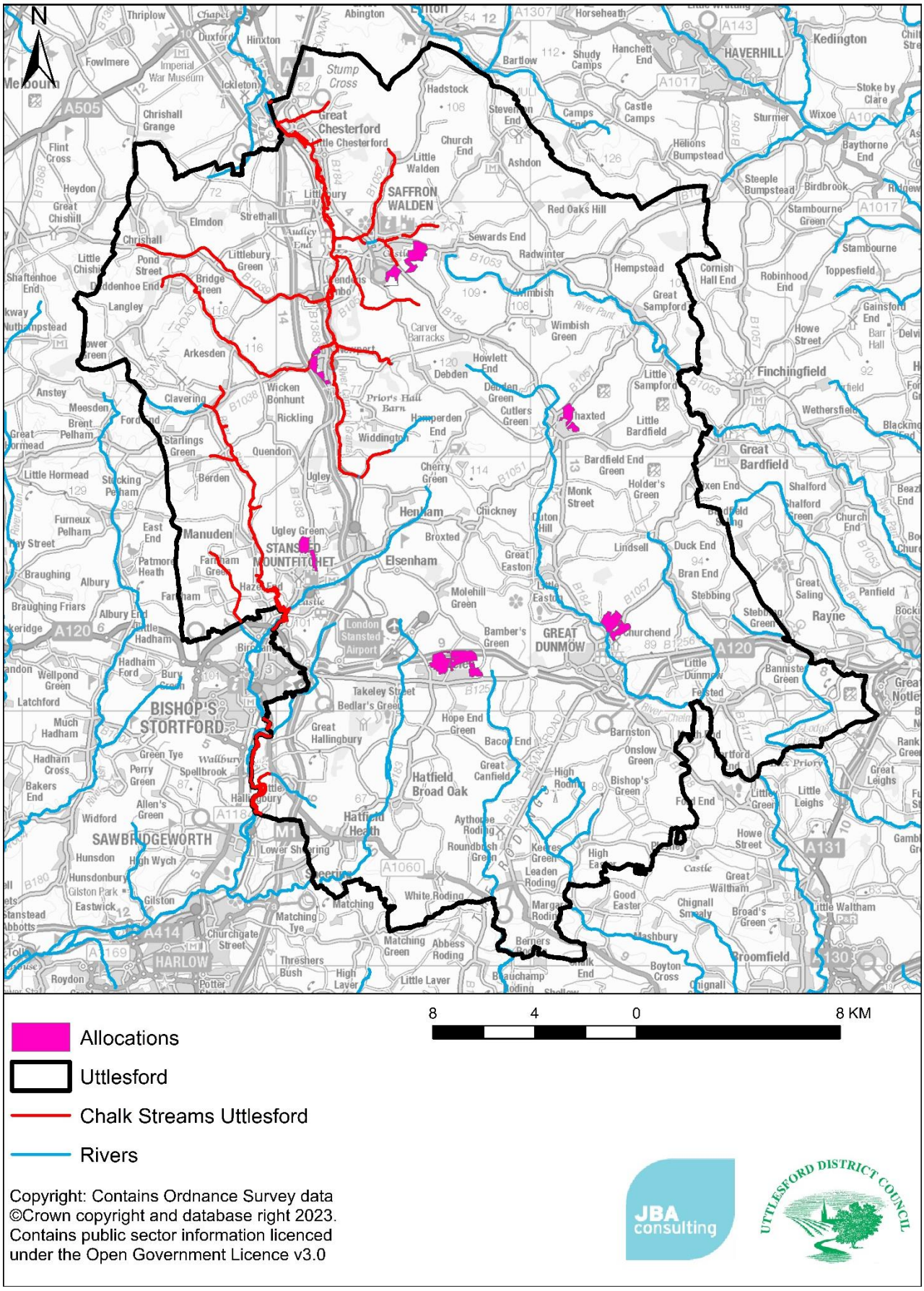


Figure 3.1 Location of preferred options relative to chalk streams

The chalk stream evidence base prepared in parallel with the WCS identified abstraction for public water supply as a significant issue for the chalk stream catchments. Further unmitigated growth could increase water demand – and therefore the volume that needs to be abstracted from chalk aquifers. Investigations are underway by AfW and the EA into sustainable abstraction, however water demand from the local plan should be minimised where possible. The chalk stream evidence base recommends aligning with the Catchment Based Approach Chalk Stream Strategy target of 90 l/p/d in chalk stream catchments. As Uttlesford lies entirely within one water resource zone, this target should apply to the whole of Uttlesford.

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

Recommendation 4 was to apply a riparian buffer zone in chalk stream areas to exclude all development within the natural flood plan or within 15m of the bank (whichever is larger). Intersection of the ten preferred options sites with the buffer zone (Figure 3.2) shows that two of these sites (both Newport preferred options) are overlapping the proposed buffer zone:

- North of Wicken Road / West of School Lane
- South of Wicken Road / West of Frambury Lane

The size of the overlap is relatively small, and with appropriate master planning, the preferred option sites could be designed such that only green space or amenity uses are within the buffer.

The buffer zone approach was also recommended by the Catchment Based Approach (CaBA) chalk stream strategy (p128). This also noted that, where a proposed development is partly within a proposed buffer zone, it is recommended that the red-line boundary of the development is drawn to the site boundaries, including to the river centreline where the site includes river ownership. Trimming site boundaries to exclude buffer zones can result in strips of inaccessible and unmaintained land beside rivers. Rather, the buffer zone should be integrated into the site masterplan and utilised for biodiversity and amenity benefits.

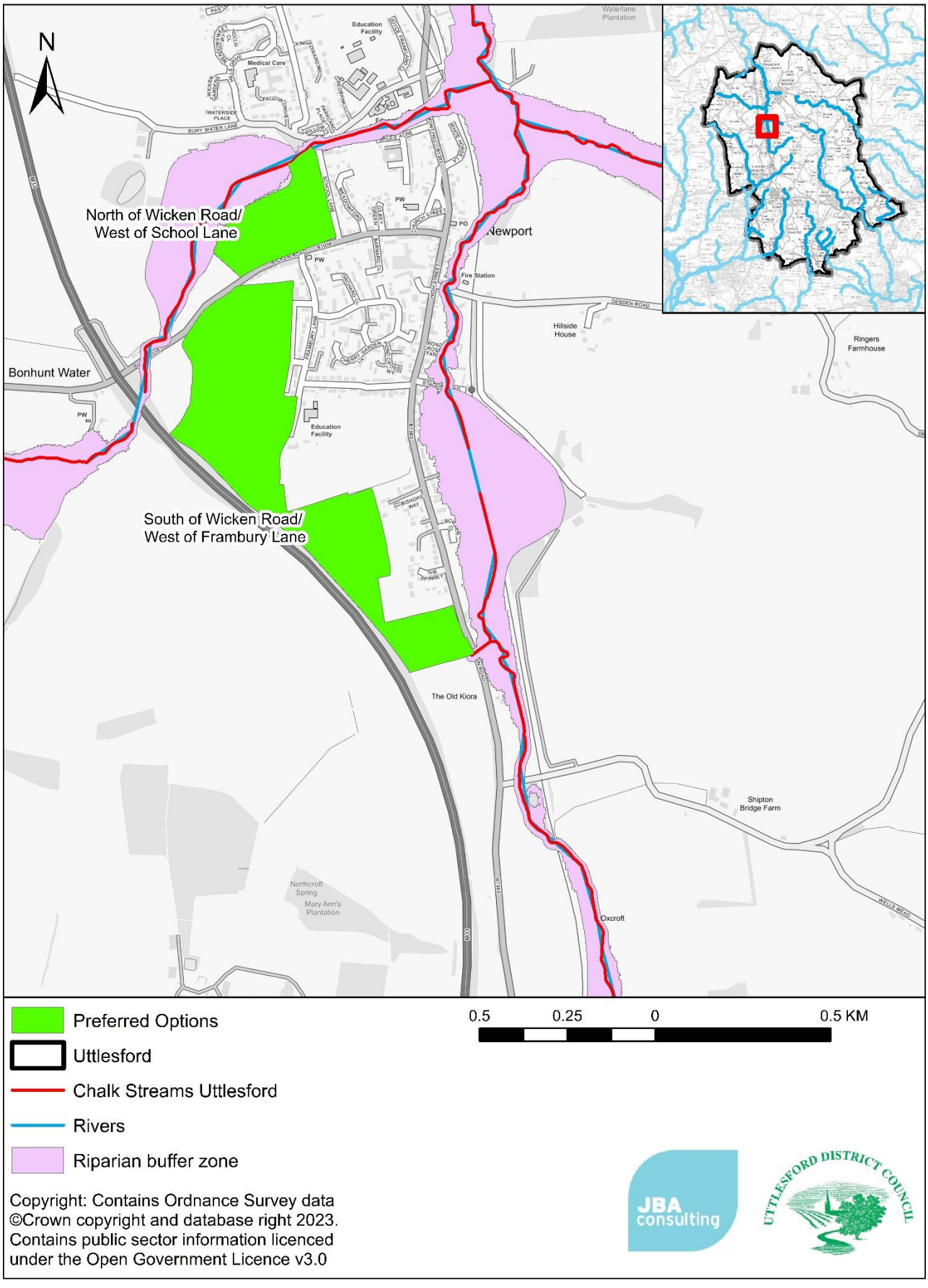


Figure 3.2 Preferred option sites close to chalk streams in Newport

# 4 Water Resources and Water Supply

## 4.1 Introduction

The aim of the water resources assessment is to ensure that sufficient water is available in the region to serve the proposed level of growth, and that it can be abstracted without a detrimental impact on the environment, both during the plan period and into the future. The Stage 1 report characterised the study area, identifying the key surface water and groundwater bodies, and local geology. It highlighted the pressures on water resources in the region, identifying existing constraints on abstraction and provided evidence for adopting tighter water efficiency targets. Unless otherwise stated the information and conclusions contained in the Stage 1 report remain valid.

## 4.2 WRMP assessment

The household projections (2018 ONS dataset) predict an increase in the number of households in Uttlesford of 23% during the plan period. In the stage 1 study the growth forecast assessed assumed 16,944 new households resulting in an increase of 46% in the number of households in Uttlesford. This is significantly higher than the average growth expected across the water resource zone (WRZ) in Anglian Water's Water Resource Management Plan (2019).

The draft Local Plan now proposes 14,377 homes (which includes a 5% buffer on top of the housing need of 13,680). This is an increase in the number of households of approximately 39%.

In Stage 1 Affinity Water did not identify any concerns about being able to supply the level of growth predicted at stage 1 (based on the 46% increase). Given that the preferred option contains a lower level of growth, it is expected that this is still the case. No constraints on treatment or strategic infrastructure requirements were identified in stage 1.

Table 4.1 Comparison of household growth forecasts

| Forecast | 2020 | 2040 | % Increase |
|---|---|---|---|
| DLUHC 2018 based forecast (Uttlesford) | 36,297 | 44,718 | 23% |
| Stage 1 Growth forecast | 36,297 | + 16,944 | 46% |
| Draft Local Plan growth forecast | 36,297 | + 14,377 | 39% |
| WRMP19 Forecast - Stort WRZ | 141,970 | 178,800 | 26% |

## 4.3 Water supply

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, the spatial growth options were presented to AfW who confirmed that there were no “showstoppers” and the level of development in each case did not pose any concerns. The level of growth proposed in the preferred option is within the spatial growth options presented to AfW. Their conclusion that the level of growth did not pose any concerns for water supply is therefore still valid.

It should be noted that the impact of the preferred option on the water supply network has not been modelled by AfW at this stage.

Development in areas where there is little existing network is likely to require new infrastructure or reinforcement of the network to maintain pressure, particularly at the periphery of the network. However, the preferred options are centred around existing urban areas.

AfW has a statutory duty to provide a water supply to development sites, however if significant new infrastructure is required, some constraints may be placed on the phasing of development sites to ensure that infrastructure is in place prior to development being occupied.

# 5 Wastewater Collection

## 5.1 Overview

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

## 5.2 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 14 monitored network storm overflows and 13 WwTW storm tank overflow present in Uttlesford, the location of these are shown in Figure 5.1. Storm tank overflows at WwTWs are assessed in Section6.4.

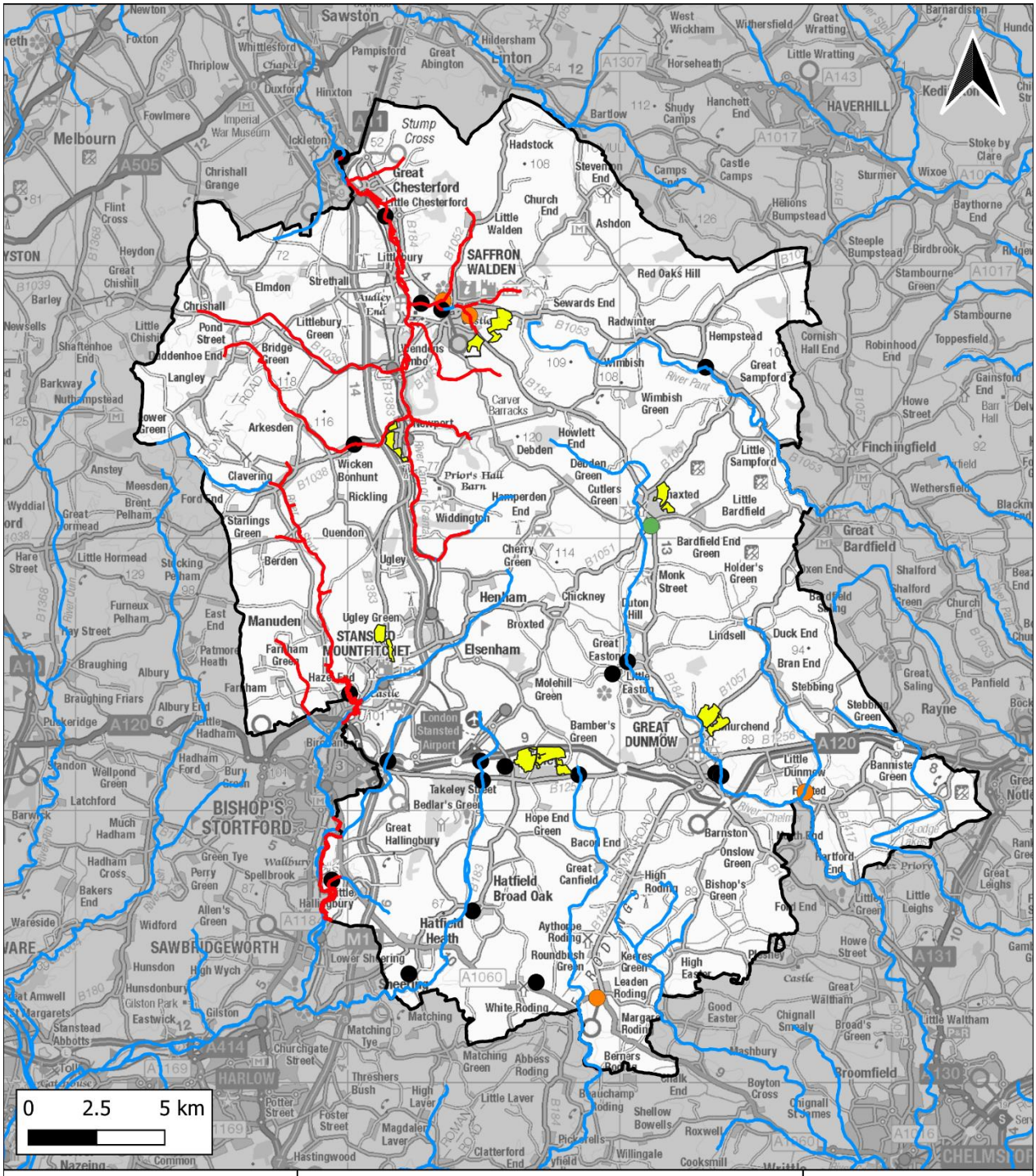


Figure 5.1 Location of storm overflows in Uttlesford

The Storm Overflow Taskforce[1] has agreed a long-term goal to end the damaging pollution caused by the operation of storm overflows. An important component of this is the monitoring of overflows, and a target has been set to monitor the frequency and duration of operation at all storm overflows by 2023[2]. This is called Event Duration Modelling (EDM). The EDM dataset (which contains performance data on the 16,791 storm overflows monitored in 2022) 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 5.2, none of the monitored storm overflows were operating above this threshold between 2020 and 2022. The Storm Overflow Reduction Plan[3] 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". 5 of the 14 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 5.1.

In this report storm overflows associated with WwTWs have been moved to the section on wastewater treatment.

Some of the preferred option sites are in the vicinity of storm overflows as shown in Figure 5.2 and Figure 5.3. 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.

1 Made up of Defra, the EA, Ofwat, Consumer Council for Water, Blueprint for Water and Water UK

2 Event Duration Monitoring – lifting the lid on storm overflows, Environment Agency (2021). Accessed online at: https://environmentagency.blog.gov.uk/2021/03/31/event-duration-monitoring-lifting-the-lid-on-storm-overflows/ on: 20/06/2023.

3 Storm overflow reduction plan, Environment Agency (2022). Accessed online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1101686/Storm_Overflows_Discharge_Reduction_Plan.pdf on: 20/06/2023.

Table 5.1 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. |
| 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. |

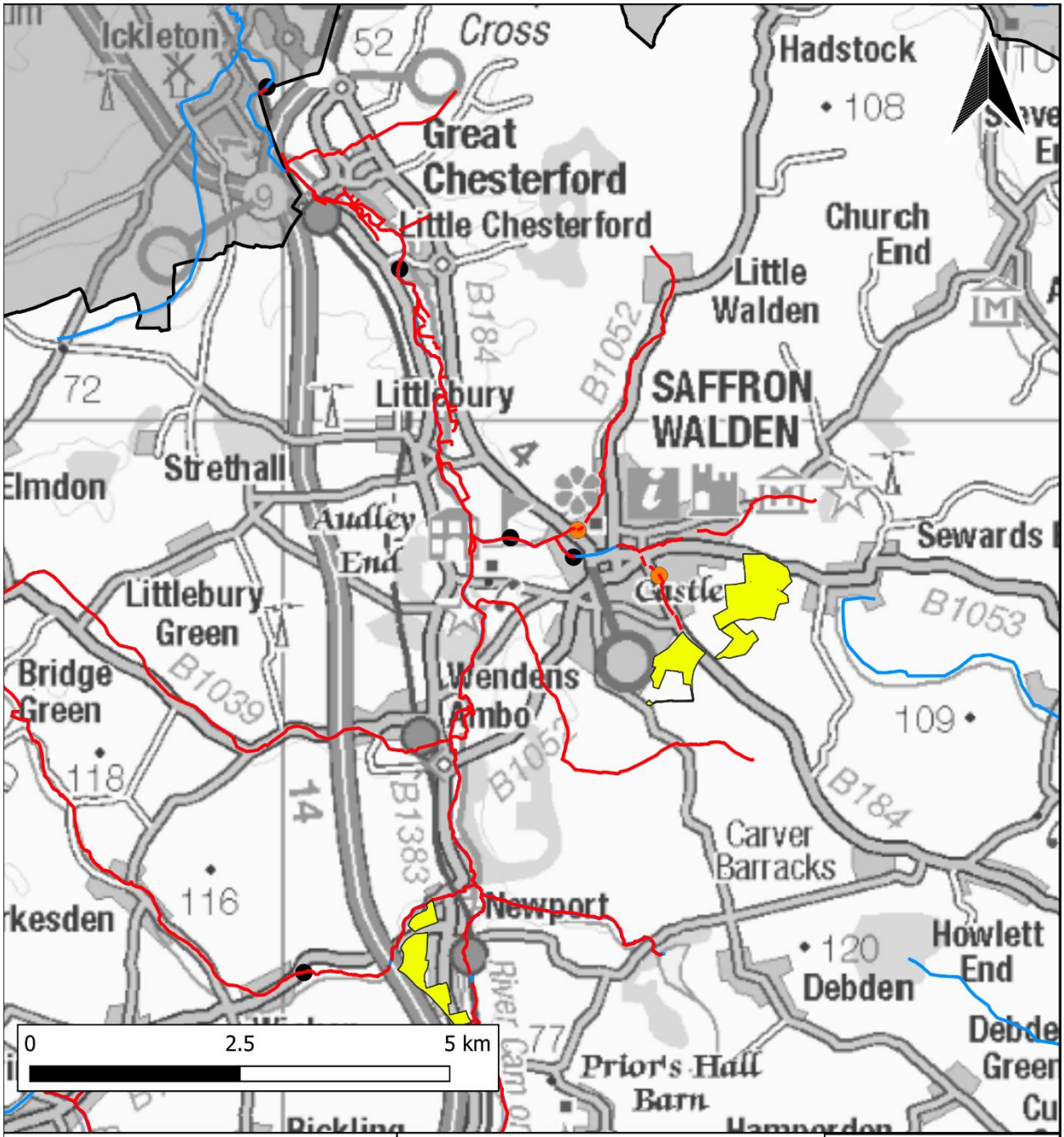


Figure 5.2 Preferred option sites in proximity to storm overflows (Saffron Walden)

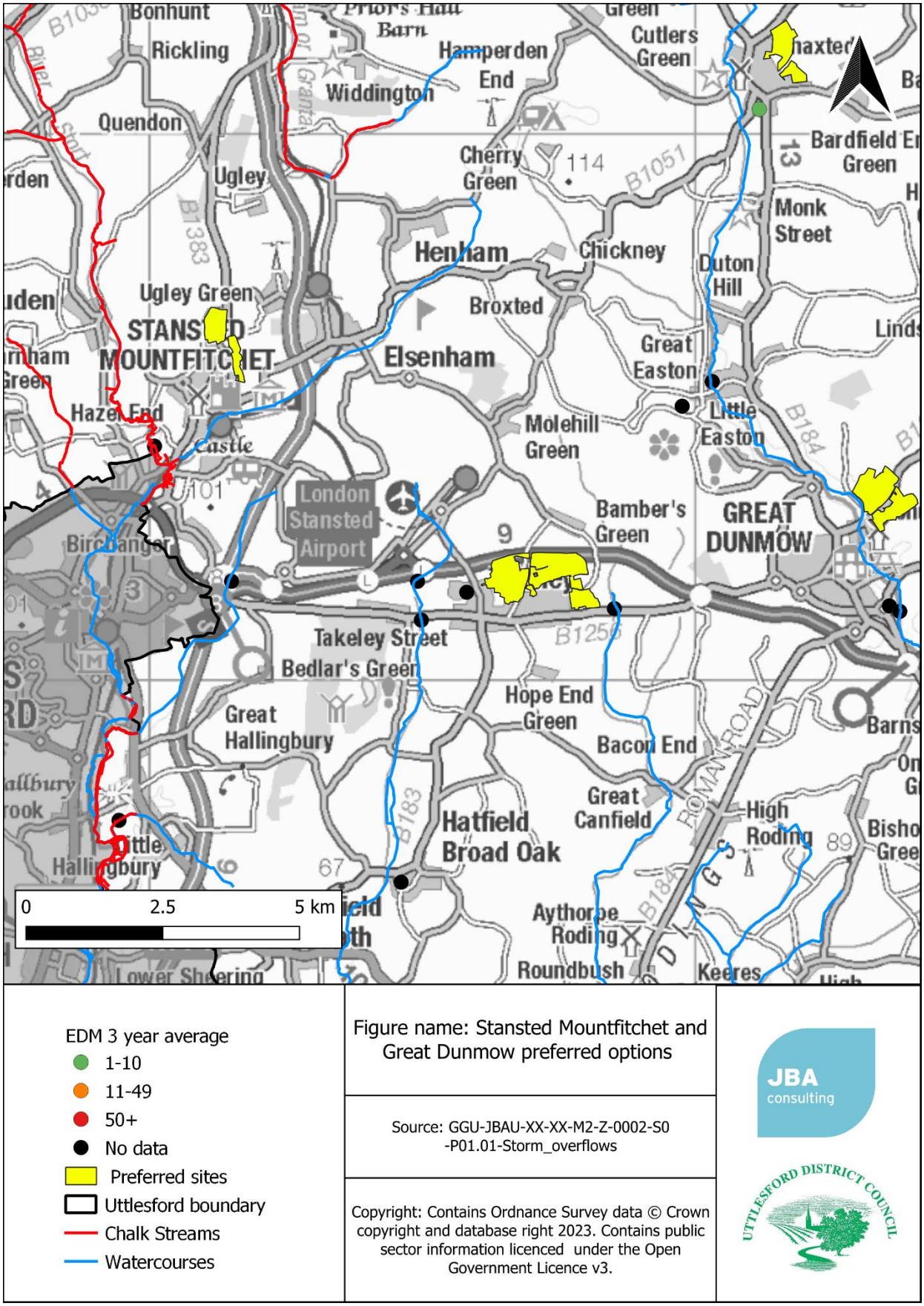


Figure 5.3 Preferred option sites in proximity to storm overflows (Stansted, Great Dunmow and Takeley)

Table 5.2 Network storm overflow frequency of operation and duration

| Overflow | Number of operations in 2020 | Duration of operation in 2020 (hours) | Number of operations in 2021 | Duration of operation in 2021 (hours) | Number of operations in 2022 | Duration of operation in 2022 (hours) | Above threshold for investigation? (Y/N) |
|---|---|---|---|---|---|---|---|
| Birchanger- DUCK END SPS/ TEMP.0455 | No data | No data | No data | No data | No data | No data | No data |
| CAGE END PUMPING STATION, CAGE END/ TEMP.1114 | 4 | 15.85 | No data | No data | No data | 0 | N |
| CANFIELD END SPS/ TEMP.0596 | 3 | 35.49 | 7 | 22.58916662 | 1 | 3.15 | N |
| Castle street/ SAFFRON WALDEN CASTLE STREET MH5506 FDT/ EPRRB3894EG | 28 | 14.5 | 46 | 69.75 | 0 | 0 | N |
| GT EASTON-BRIDGEFOOT TPS/ ASENF10513 | 6 | 37.25 | 9 | 82.5 | No data | No data | N |
| LEADEN RODING STW INLET PS/ CSSC.1400 | 4 | 7.48 | 0 | 0 | 61 | 2095.9 | N |
| LITTLE CHESTERFORD TPS/ ASCNF2425 | No data | No data | No data | No data | No data | No data | No data |

| Overflow | Number of operations in 2020 | Duration of operation in 2020 (hours) | Number of operations in 2021 | Duration of operation in 2021 (hours) | Number of operations in 2022 | Duration of operation in 2022 (hours) | Above threshold for investigation? (Y/N) |
|---|---|---|---|---|---|---|---|
| SAFFRON WALDEN-GEORGE ABBEY OV/ ASCNF2319 | No data | No data | No data | No data | No data | No data | No data |
| SO GASWORKS CROSSROADS/ ASCNF10057 | No data | No data | No data | No data | No data | No data | No data |
| Takeley- GARNETS SPS/ TEMP.2042 | 6 | 30.97 | No data | No data | No data | No data | No data |
| Thaxted road/SAFFRON WALDEN-VICTORIA THX OV/ EPRNB3691VH | 0 | 0 | 1 | 1 | 3 | 1 | N |
| THAXTED-PARK STREET/ AW2NFE03679/ V001 | 24 | 38.5 | 31 | 51.25 | 33 | 49.5 | N |
| White Roding/ CSSC.1455 | No data | No data | No data | No data | No data | No data | No data |
| WICKEN BONHUNT SP/ ASCNF11524 | No data | No data | No data | No data | No data | No data | No data |

## 5.3 Wastewater network

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

No particular network constraints were identified associated with any of the spatial growth options analysed in stage 1; however, Thames Water made the general comment that network issues were likely around Uttlesford due to the small diameter pipes present. In particular they highlighted limited capacity around Bishops Stortford. The network in this area would be difficult to upgrade without significant disruption to residents. This would affect North East Takeley. This site should be discussed with Thames Water to resolve any concerns they have raised. It should be noted that Sewerage Undertakers (in this case Thames Water) have a duty under Section 94 of the Water Industry Act 1991 to provide sewerage and treat wastewater arising from new domestic development.

Anglian Water commented in stage 1 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.

# 6 Wastewater Treatment

## 6.1 Wastewater Treatment Works in Uttlesford

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

The location of the WwTWs in and around Uttlesford are shown in Figure 6.1 below.

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

Some of the committed and completed sites did not fall within the catchment boundary of any WwTW. 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.

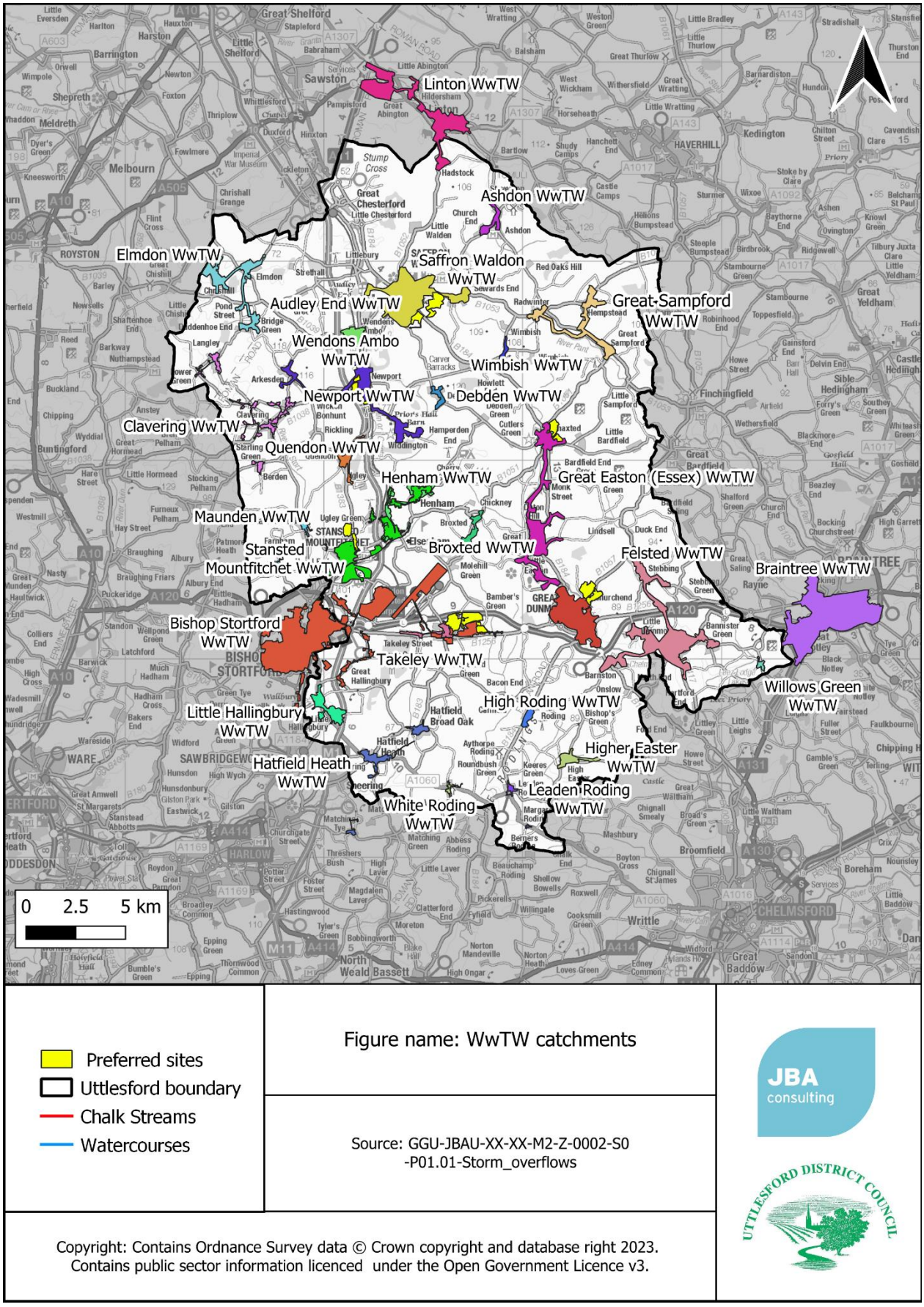


Figure 6.1 WwTW serving Uttlesford

## 6.2 Wastewater Treatment Works Flow Permit Assessment

An assessment of WwTW capacity was carried out by JBA in stage 1 using measured flow data supplied by the water companies. The process was as follows:

- Anglian Water and Thames Water provided their calculated 80th percentile exceedance flow statistic for each WwTW.
- Sites already in the planning system, windfall and neighbouring authority growth was assigned to a WwTW using the sewerage drainage area boundaries.
- For each site, the future DWF was calculated using the occupancy rates and per-capita consumption values obtained from the Water Resource Management Plans (Table 6.1), and the assumption that 95% of water used is returned to sewer. Permitted headroom was used as a substitute for actual designed hydraulic capacity for each WwTW being assessed.
- For employment sites, wastewater was demand was estimated based on the predicted number of new employees. Floor space, employment use types, and employment densities were used to estimate the number of employees.

In this addendum, the preferred option sites were allocated to a WwTW and added to the existing assessment.

Table 6.1 Per capita consumption values used in water demand calculations

| Water Company | Occupancy rate (persons per dwelling) | Per capita residential consumption ($m^3$/person/day) | Per capita employment consumption ($m^3$/person/day) |
|---|---|---|---|
| Affinity Water | Stort WRZ | 2.6 | 0.128 |

## 6.3 Results

The results of the capacity assessment are shown in Table 6.2. 18 WwTWs are expected to serve growth in the preferred options scenario. Of these, four WwTW (Clavering, Felstead, Great Dunmow and Great Sampford) are already close to their permit limit (based on 80th exceedance percentile - the EA use the 90th exceedance percentile for permit compliance). By the end of the plan period, Great Chesterford, Great Easton and Newport are also expected to be at or exceeding their permit limit if no action were taken.

An increase to the flow permit, and/or upgrades to treatment capacity will be required at these WwTWs.

Where a WwTW is likely to exceed its permit, the permit would be reviewed by the EA and if a higher flow consent was agreed, a tighter permit limit for substance concentrations is very likely to be required. In some cases, this may not be possible if that means concentrations tighter than the Technically Accepted Limit (TAL) which is 0.25 mg/l for P for example. In these cases, alternative solutions such as pumping wastewater to an alternative WwTW, moving the outfall to a different river reach, or providing a new treatment works may be required. This will be assessed in the Stage 2 study.

At the remainder of the WwTWs, there is some capacity within the permit to serve additional growth during the plan period.

Table 6.2 WwTW capacity assessment

| WwTW | Proposed growth over Local Plan period (dwellings / employment floorspace) | Approximate remaining capacity (no. dwellings) | Does DWF flow exceed permitted flow over Local Plan period? |
|---|---|---|---|
| Bishops Stortford | 1,945 / 147,500m$^2$ | 14,704 | NO - Sufficient headroom to accommodate growth |
| Broxted | 12 | N/A | N/A- No flow meter at site - capacity could not be assessed. Site is unlikely to have significant capacity |
| Clavering | 11 | -32 | YES - likely to exceed permit during Local Plan period. Upgrade to WwTW may be required |
| Felstead | 185 | -516 | YES - likely to exceed permit during Local Plan period. Upgrade to WwTW may be required |
| Great Chsterford | 22 / 76,935m$^2$ | -2,819 | YES - likely to exceed permit during Local Plan period. Upgrade to WwTW may be required |
| Great Dunmow | 3,762 / 706m$^2$ | -3,618 | YES - likely to exceed permit during Local Plan period. Upgrade to WwTW may be required |
| Great Easton (Essex) | 698 | -389 | YES - likely to exceed permit during Local Plan period. Upgrade to WwTW may be required |
| Great Sampford | 6 | -15 | YES - likely to exceed permit during Local Plan period. Upgrade to WwTW may be required |
| Hatfield Heath | 24 | 298 | NO - Sufficient headroom to accommodate growth |
| High Roding | 6 | 13 | NO - Sufficient headroom to accommodate growth |
| Newport | 645 | -431 | YES - likely to exceed permit |

| WwTW | Proposed growth over Local Plan period (dwellings / employment floorspace) | Approximate remaining capacity (no. dwellings) | Does DWF flow exceed permitted flow over Local Plan period? |
|---|---|---|---|
| | | | during Local Plan period. Upgrade to WwTW may be required |
| Quendon | 33 | 112 | NO - Sufficient headroom to accommodate growth |
| Saffron Walden | 2210 / 18,884m$^2$ | 1,726 | NO - Sufficient headroom to accommodate growth |
| Stansted Mountfitchet | 884 / 1,264m$^2$ | 1,454 | NO - Sufficient headroom to accommodate growth |
| Takeley | 110 / 6556.6m$^2$ | 1,043 | NO - Sufficient headroom to accommodate growth |
| Wendens Ambo | 27 | N/A | N/A- No flow meter at site - capacity could not be assessed. Site is unlikely to have significant capacity |
| White Roding | 20 | 360 | NO - Sufficient headroom to accommodate growth |

TW have expressed concern about increased growth served by Bishops Stortford and Stansted Mountfitchet WwTWs. Both these works have recently been given a new chemical permit (Nickel) and further growth in this area may make it harder to meet this permit.

A growth scheme is already underway at Stansted Mountfitchet to accommodate planned growth in this area. The scheme is currently at the design phase and will be delivered by 2023. TW should ensure that there is sufficient headroom incorporated into the design to accommodate whichever spatial growth option is chosen, or that there is sufficient scope to provide this capacity at a later date if required.

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

## 6.4 Storm tank overflows

Table 6.3 shows the performance of storm tank overflows at WwTWs in Uttlesford. Three of these were operating above the threshold for investigations based on the average of data between 2020 and 2022. All of these are operated by Thames Water. Hatfield Heath and Takeley are particularly poorly performing operating for over 1,000 hours in 2022 and have not improved significantly during the period covered by the monitoring data. Hatfield Heath and Little Hallingbury WwTWs are unlikely to serve significant growth based on the preferred option, however there are some sites that would be served by Takeley WwTW. Thames Water should demonstrate how growth can be accommodated while meeting their commitments to reduce the frequency of storm overflow operation.

Where a storm tank overflow is operating in periods of moderate or light rainfall, or even in dry conditions it indicates either an infiltration problem within the network, or that the WwTW or its storm tanks are undersized for the population served. Further development within a catchment that has a poorly performing storm tank overflow is likely to exacerbate the issue. The local plan can contribute to this by encouraging the use of SuDS to divert storm water away from the sewer network, reducing the volume that reaches the WwTW. This opportunity is greatest at brownfield sites connected to existing combined sewerage systems.

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

Table 6.3 Performance of storm overflows at WwTWs

| Overflow | Number of operations in 2020 | Duration of operations in 2020 (hours) | Number of operations in 2021 | Duration of operations in 2021 (hours) | Number of operations in 2022 | Duration of operations in 2022 (hours) | Above threshold for investigation? (Y/N) |
|---|---|---|---|---|---|---|---|
| FELSTEAD-STW/ AW2NF911 | 0 | 0 | 43 | 548.25 | 0 | 0 | N |
| GREAT CHESTERFORD STW/ AWCNF11340 | 4 | 2 | 2 | 3 | No data | No data | N |
| GREAT DUNMOW / STWASENF15793 | No data | No data | No data | No data | No data | No data | No data |
| GREAT DUNMOW STW/ASENF12255 | 15 | 87.75 | 34 | 214.47 | No data | No data | N |
| GREAT EASTON STW (ESSEX)/ASENF10268 | 33 | 268.26 | 31 | 464.5 | No data | No data | N |
| GREAT SAMPFORD STW/ASENF1084 | 1 | 0.25 | 2 | 8 | No data | No data | N |
| HATFIELD HEATH STW/CSSC.0261 | 70 | 1234.65 | 131 | 2602.86 | 113 | 2095.9 | Y |
| LITTLE HALLINGBURY STW/CSSC.0263 | 31 | 404.9 | 59 | 969.55 | 59 | 875.56 | Y |
| SAFFRON WALDEN STW/ASCNF1184 | 8 | 6.75 | 7 | 7 | No data | No data | N |
| SAFFRON WALDEN STW/ASCNF1184/ V001 | 17 | 13 | 13 | 19.25 | 5 | 7.75 | N |

| Overflow | Number of operations in 2020 | Duration of operations in 2020 (hours) | Number of operations in 2021 | Duration of operations in 2021 (hours) | Number of operations in 2022 | Duration of operations in 2022 (hours) | Above threshold for investigation? (Y/N) |
|---|---|---|---|---|---|---|---|
| Stansted Airport/TEMP.1976 | No data | No data | No data | No data | No data | No data | No data |
| STANSTED MOUNTFITCHET STW/TEMP.2910 | 17 | 146.47 | No data | No data | 39 | 305.29 | N |
| TAKELEY STW/TEMP.2948 | 50 | 701.28 | No data | No data | 74 | 1061.68 | Y |

# 7 Water quality

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

A sensitivity analysis was conducted using the EA's SIMCAT models and the results are shown in the Stage 1 report. Where water quality downstream of a WwTW in any given determinand deteriorates by 10% or more in response to a 20% increase in effluent flow, the sewer catchment can be said to be "more sensitive" to changes in effluent flow, and therefore growth. It can be seen that changes in the volume of treated wastewater in Uttlesford do not cause a significant response in the concentrations of ammonia within the study area in the north of Uttlesford with the exception of the River Pant. High sensitivity is observed for the River Chelmer as it passed Great Dunmow, which may be significant for the preferred options in that area.

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

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

It should be noted that an implementation or tightening of the environmental permit for phosphate is included as a WINEP action at many of the WwTWs in the area. It is therefore possible that the response to an increase in the discharge of treated effluent would be reduced in future more detailed modelling. However, there is a potential for growth served by WwTWs on the Cam and Stort to cause a deterioration in Phosphate and an impact on the aquatic ecology of those rivers that must be carefully considered. The stage 2 study will model the increased discharge of treated wastewater in these catchments to assess the impact.

# 8 Conclusion

**Chalk stream protection**:

As part of the Stage 1 study, JBA produced a Chalk Stream evidence base to assess pressures on the Chalk Streams in Uttlesford, and propose options to protect and enhance these important habitats. Six of the of the preferred option sites are within chalk stream catchments (sites in Newport, Saffron Walden, Stansted Mountfitchet) and as such these recommendations should be followed in order to minimise their impact, in particular the tighter water efficiency standard of 90l/p/d which aligns with the Catchment Based Approach (CaBA) Chalk Stream Strategy.

Recommendation 4 of the chalk stream evidence base proposed a riparian buffer excluding development close to chalk streams and protecting the natural flood plain. Two of the preferred options would have part of the site boundary within this buffer zone. There is an opportunity at the master planning stage to incorporate this buffer within the site as green space offering biodiversity and amenity value.

**Water resources and supply:**

The preferred option contains a lower growth estimate than the spatial growth options assessed in Stage 1. As such there is less of an impact on water resources. Although Affinity Water have stated that they could accommodate the higher level of growth detailed in Stage 1 without concern, water resources in the region are heavily constrained and so to reduce the additional pressure of new development, water demand should be minimised on the preferred option sites where possible, by adopting more ambitious targets for water efficiency. As Uttlesford is within one water resource zone, the chalk stream evidence base proposes the tighter water efficiency target for the whole of Uttlesford.

**Wastewater network and treatment:**

No particular network constraints were identified associated with any of the spatial growth options analysed in stage 1; however, Thames Water made the general comment that network issues were likely around Uttlesford due to the small diameter pipes present. In particular they highlighted limited capacity around Bishops Stortford. The network in this area would be difficult to upgrade without significant disruption to residents. This would affect North East Takeley. Development in this area should be discussed with Thames Water to resolve the concerns they have raised. It should be noted that Sewerage Undertakers (in this case Thames Water) have a duty under Section 94 of the Water Industry Act 1991 to provide sewerage and treat wastewater arising from new domestic development.

Anglian Water commented in stage 1 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.

Preferred option sites around Takeley, Saffron Walden and Great Dunmow are in the vicinity of storm overflows. Unmitigated development within Uttlesford could cause the frequency or duration of operation of storm overflows to increase. However, 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. Early engagement with the water company and suitable design of SuDS could mitigate the impact.

A capacity assessment was performed on the 18 WwTW in Uttlesford. Of these, four WwTW (Clavering, Felstead, Great Dunmow and Great Sampford) are already close to their permit limit (based on 80th exceedance percentile - the EA use the 90th exceedance percentile for permit compliance). By the end of the plan period, Great Chesterford, Great Easton and Newport are also expected to be at or exceeding their permit limit if no action were taken. In practice, as the WwTWs approach their permit limit, it is likely to be reviewed by the EA and the water company to ensure compliance, and an increase in the permit limit and / or upgrades to capacity are likely.

**Water quality:**

A sensitivity analysis was conducted in Stage 1 using the EA's SIMCAT models and the results are shown in the Stage 1 report. It can be seen that changes in the volume of treated wastewater in Uttlesford do not cause a significant response in the concentrations of ammonia within the study area in the north of Uttlesford with the exception of the River Pant. High sensitivity is observed for the River Chelmer as it passed Great Dunmow, which may be significant for the preferred options in that area.

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