CC002

Chelmsford City Council Water Cycle Study

Stage 1 – Scoping Water Cycle Study

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Chelmsford City Council Water Cycle Study

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Chelmsford Water Cycle Study - Flood Risk Multi Criteria Assessment Site Scoring

List of Abbreviations

ALS	Abstraction Licensing Strategy
AMP	Asset Management Plan
AP	Assessment Points
APR	Annual Performance Report
AWS	Anglian Water Services
BP	Baseline Plan
CAMS	Catchment Abstraction Management Strategy
CCC	Chelmsford City Council
CFMP	Catchment Flood Management Plans
CRAG	Chalk Rivers Action Group
DO	Deployable Output
DRC	Daily rainfall collected
DWF	Dry weather flow
DWMP	Drainage and wastewater management plan
DYAA	Dry Year Annual Average
EFI	Environmental Flow Indicator
EP	Environmental Permits
GEP	Good Ecological Potential
GES	Good Ecological Status
LLFA	Lead Local Flood Authority
LPA	Local Planning Authorities (LPA)
Ml	Mega litre
Ml/d	Mega litre per day
NAV	New Appointees and Variations
NPPF	National Planning Policy Framework
ONS	Office for National Statistics
P	Phosphorus
PCC	Per Capita Consumption
PP	Preferred Plan
PPG	Planning Policy Guidance documents
PPS	Planning Policy Statements
RBMP	River Basin Management Plan
RQP	River Quality Planning
RWH	Rainwater Harvesting

SAC	Special Area of Conservation
SFRA	Strategic Flood Risk assessment
SHELAA	Strategic Housing and Economic Availability Assessment
SIP	Site Improvement plans
SPA	Special Protection Area
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plans
TAL	Technical achievable limits
UWWTD	Urban Wastewater Directive
WAFU	Water available for use
WCS	Water Cycle Study
WFD	Water Framework Directive
WRC	Water Recycling Centre
WRE	Water Resources East
WRLTP	Water Recycling Long Term Plan
WRMP	Water Resources Management Plan
WRPG	Water resources planning guidance
WRZ	Water Resource Zone

Non-Technical Summary

A Water Cycle Study (WCS) has been commissioned by Chelmsford City Council (CCC) to provide evidence that the development proposed within the emerging Chelmsford Local Plan (CLP) for the plan period up to 2041 (to supersede the existing Adopted Local Plan up to 2036) can be accommodated by the water and wastewater infrastructure, and wider water environment.

This Scoping WCS provides a preliminary assessment of the baseline conditions and the three emerging spatial strategies for the plan period up to 2041 and supports CCC in developing the final Preferred Options Spatial Strategy to take forward for the Regulation 18 Preferred Options Consultation. A Detailed WCS will then follow, which will provide further evidence and recommendations for the preparation of the CLP regarding how the final Spatial Strategy for the plan period up to 2041 can be accommodated.

Baseline data collected has been assessed along with current and emerging legislation. A large portion of the three emerging spatial strategies of proposed development up to 2041 includes the development still to be delivered, as per CCC's Adopted Local Plan for the period up to 2036. The potential impact of the current development proposals has been analysed in terms of water resources, the current water and wastewater infrastructure, and the water environment. It is considered that the capacity of the Water Recycling Centres (WRCs) and the associated impact on the water environment are the greatest potential issues in relation to the currently proposed development aspirations within Chelmsford.

A summary is provided for the main chapters of the WCS below.

Spatial Strategies for Plan Period

This Scoping WCS is intended to inform CCC of the possible constraints and opportunities to various development options (spatial strategies), which will inform the Regulation 18 Preferred Options Consultation (2024) for the CLP consolidating the three strategies into one preferred Spatial Strategy.

Based on the available information and assessment results within this WCS, the proposed Spatial Strategy 2 for the plan period, is the preferred Spatial Strategy as all the proposed development is located within the Chelmsford WRC catchment, which has sufficient headroom capacity.

Water Resources and Supply

Water within the study area is supplied by Essex and Suffolk Water. The initial demand calculations show an overall increase in potable water demand in Chelmsford of

between 6,415m^3/day and 6,737m^3/day between 2023 and 2041 from the proposed development in the plan period up to 2041.

As outlined in the revised draft Water Resources Management Plan (WRMP24), without new interventions Essex and Suffolk Water do not have the capacity to supply the Essex Water Resource Zone (WRZ), where Chelmsford is located. Essex and Suffolk Water will achieve the required capacity for the WRZ through several supply and demand options, which include leakage reduction and metering water re-use. With interventions in place, Essex and Suffolk Water estimate that they will have an approximate 3.46Ml/d surplus in 2025/26, rising to approximately 61.6Ml/d by 2040/41.

Currently Essex and Suffolk Water uses published Local Plans to determine the growth within each WRZ. For Chelmsford, Essex and Suffolk Water is using data from CCC's 2022 housing trajectory and Issues and Options Housing Topic Paper. Currently a surplus of homes is being predicted from 2022/23 until 2025/26 when compared with the adopted CLP latest housing trajectory. However, from 2025/26 a deficit in the number of planned homes requiring supply is predicted, with a total deficit of approximately 2,100 homes by 2030/31. Due to the surplus in water supply predicted by Essex and Suffolk Water in the final plan of the revised draft WRMP24 along with additional potential future water efficiency policies by CCC, this will not have a significant impact on accommodating new homes. During the next WRMP planning period, an updated housing trajectory will be used and so the deficit in housing numbers can also be adjusted. The Detailed WCS will further explore how the latest development proposals will impact the water supply infrastructure Essex and Suffolk Water have.

Essex and Suffolk Water promote water efficiency within homes to help reduce demand. Recommendations will be explored further within the Detailed WCS as to how new developments could be delivered in line with water efficiency recommendations from Essex and Suffolk Water.

The Essex and Suffolk Water supply area is classified by the Environment Agency (EA) as being under 'serious water stress'. Coupled with sustainability reductions on supply, water demand measures and how they are managed across Chelmsford is critical for all new developments. This will help to maintain a sustainable water environment.

Sustainable Drainage Systems (SuDS) are promoted by Essex County Council and CCC to reduce flood risk, and these measures can work with and compliment water efficiency measures to reduce demand on water use within communities.

Water Recycling Centres and Sewerage

The Scoping WCS indicates that the proposed development set out in the plan period up to 2041 (including each Spatial Strategy in turn) can be accommodated at the majority of WRCs.

However, the scale of growth in the settlements within the WRC catchments is predicted to substantially exceed the existing Dry Weather Flow (DWF) consents at Great Leighs, South Woodham Ferrers and Wickford WRCs. The existing DWF at these WRCs are already exceeding the existing DWF consents creating an existing restriction to any growth, which is exacerbated by the additional growth.

The assessments and consultations to date have identified there could be significant wastewater treatment and sewerage capacity issues to the proposed growth plans at these WRCs. The Anglian Water Services (AWS) Drainage Wastewater Management Plan (DWMP) 2023 supported by focused consultations with AWS, has identified some solutions to increase compliance at the failing WRCs to possibly support additional development. This should however be confirmed by detailed water quality permit assessments and capacity assessments and through consultations with AWS and the EA to determine potential solutions to accommodate growth within the Detailed WCS.

Local Environment (Water Quality)

The Natura 2000 sites which could be impacted by development proposed within the CLP are Essex Estuaries (SAC), Outer Thames Estuary (SPA), Crouch & Roach Estuaries (Mid-Essex Coast Phase 3) (SPA) and Foulness (Mid-Essex Coast Phase 5) (SPA).

Mitigation measures explored in the Scoping WCS to ensure that proposed development does not negatively impact on the Natura 2000 sites include delivering effective surface water and flood management, tightening WRC consent standards, phasing of development to ensure the timely implementation of infrastructure upgrades and encouraging holistic water management.

A review of water quality compliance at the failing WRCs and discharging WFD waterbodies should be carried out in the Detailed WCS and in consultation with the EA, to confirm that the proposed development will not adversely affect water quality and does not hinder the ability of a waterbody to meet the WFD objectives.

Flood Risk

A high-level assessment has been undertaken for each of the WRCs within Chelmsford to determine if an increase in homes and population poses an increased flood risk from discharges into the receiving watercourses. The assessment produces a risk score based on likely increase in river flow, infrastructure crossing the river and urban

infrastructure near the river. All WRCs discharges into the receiving watercourse are classed as a low risk for flooding impact due to the extra DWF.

Several of the proposed developments will be located within Flood Zone 2 or 3; it is not the main purpose of the WCS to address the Sequential Test, however the Detailed WCS will review the outcomes of the emerging SFRA Level 1 (2024) update and preferred Spatial Strategy. Whilst detailed flood risk considerations will be a matter for the SFRA Level 2 (2024), supplementary information and recommendations on furthering an integrated water management approach will be supplied where possible within the Detailed WCS, incorporating suitable SUDS opportunities and guidance.

1Introduction

1.1 Study Area

Chelmsford City Council (Figure 1.1) is a local authority in the county of Essex, in the east of England. The area covered by the local authority is predominantly rural in nature made up of a number of smaller villages. Chelmsford and South Woodham Ferrers are the major towns/cities. Key service settlements include: Bicknacre, Boreham, Broomfield, Danbury, Galleywood, Great Leighs, Stock, Runwell and Writtle. Within the WCS, the terminology Chelmsford City Council administrative area and Chelmsford City Council Boundary will be used interchangeably and to describe the area in which Chelmsford City Council are responsible for.

According to the Office for National Statistics (ONS) the population of Chelmsford was approximately 181,500 in 2021. Chelmsford's population is continuing to grow and is predicted to increase by 20,800 to 202,300 by 2041.

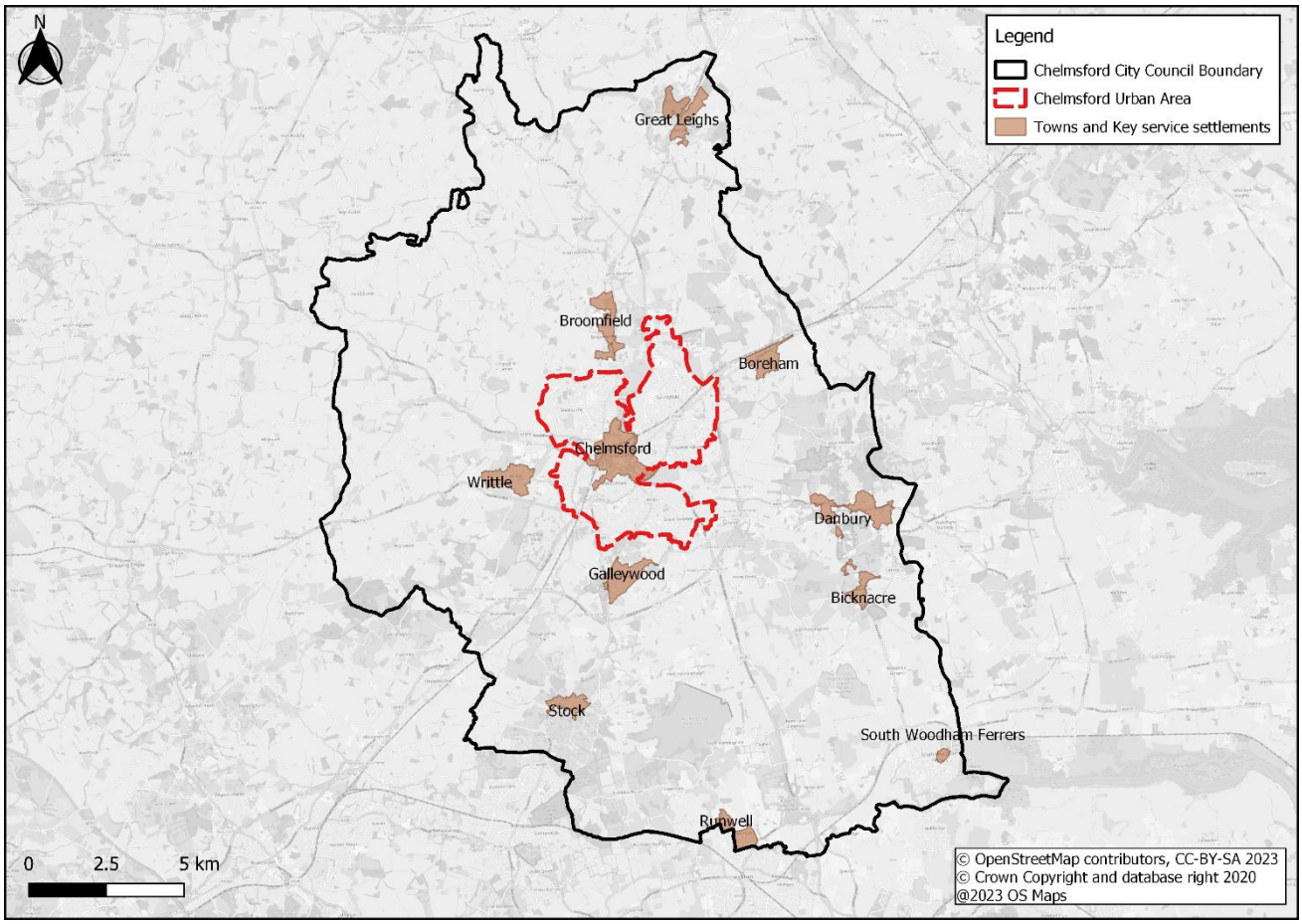


Figure 1.1: Chelmsford City Council Administrative Area and Chelmsford urban area.

The hydrological setting for Chelmsford is illustrated in Figure 1.2. The map shows the main rivers, ordinary watercourses and drainage channels managed by Essex County Council as the Lead Local Flood Authority covering Chelmsford.

Hydrologically, Chelmsford is drained to the east by the River Chelmer, which is a tributary of the River Blackwater, and the River Crouch. These rivers ultimately reach the coast at Maldon and South Woodham Ferrers respectively.

The majority of the area is underlain by London Clay Formation and Claygate Member bedrock. London Clay is classified as unproductive, which has negligible impact for water supply. The Bagshot and Claygate Member deposits are classified as Secondary A aquifers which have the potential to provide water for supply. These aquifers can also support base flow in rivers.

Essex and Suffolk Water is the sole statutory supplier of potable water to the CCC study area. The entirety of the study area is located within the Essex water resource zone (WRZ) of Essex and Suffolk Water WRMP. More information is included in Section 4.

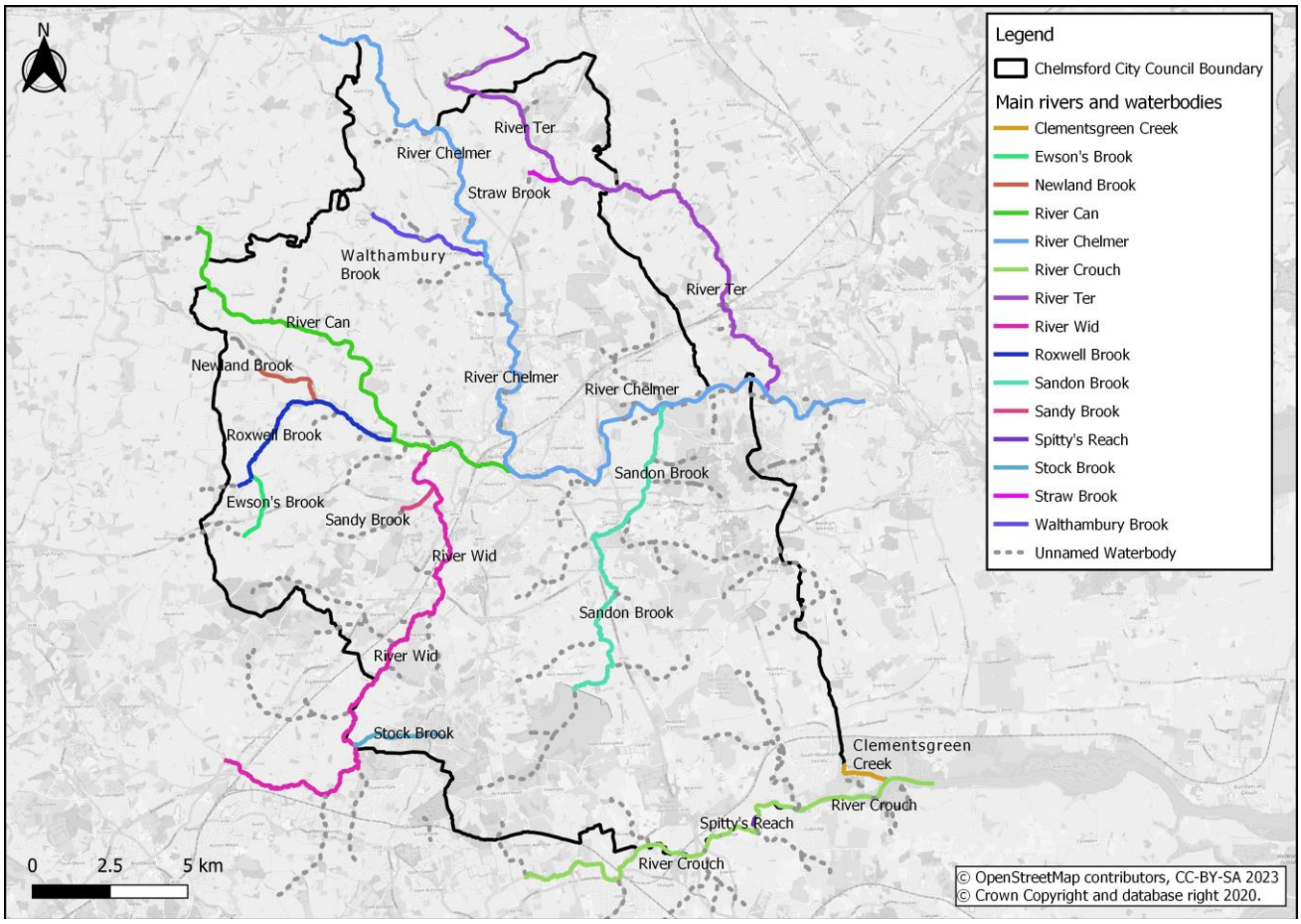


Figure 1.2: Chelmsford hydrological setting

The water company for collecting and treating wastewater within the Chelmsford administrative area is Anglian Water Services (AWS). A total of nine WRCs serve Chelmsford. More information is included in Section 5.

Sources of flood risk were identified in the Chelmsford Strategic Flood Risk Assessment (SFRA) and key messages from this report, and other relevant flood risk policies, are highlighted and built upon in Section 7.

1.2 Local Plan and WCS Timescale

The Chelmsford Local Plan (CLP) is currently being reviewed and updated (the previous Local Plan was adopted in May 2020) and is expected to be adopted in 2025 – 2026. The Issues and Options Consultation stage took place between August and October 2022.

Therefore, a WCS has been commissioned to ensure that water supply, water quality, sewerage and flood risk management issues can be addressed to enable the delivery of sustainable growth to 2041, in a way that preserves and enhances the existing water environment. The WCS is a key evidence base for the CLP, which will be undertaken in

two main stages (Stage 1: Scoping WCS and Stage 2: Detailed WCS) in line with the EA WCS guidance.

CCC appointed Arcadis in August 2023 to prepare this Scoping WCS. This Scoping WCS is intended to inform CCC of the possible constraints and opportunities to various development options, which will inform selection of the Preferred Options for the CLP. The Detailed WCS will assess the Spatial Strategy in the Preferred Options Plan which is expected to be consulted on in 2024.

It is expected that prospective developers and promoters will liaise with the local water and sewerage companies, Environment Agency (EA), ECC, Natural England (NE) and CCC during and following the Preferred Options Consultation, prior to the Pre-Submission stage (planned for 2025). Furthermore, the WCS should be used as key reference documents during the CLP preparation and subsequent planning application stages to guide making the key development decisions. Table 1.1 illustrates the current timescale within the context of the current schedule for delivering the CLP as per the programme published by CCC.

Table 1.1: WCS timescale within the context of the current schedule for delivering the CLP.

Chelmsford LP timescale		**WCS component**
August – October 2022	Issues and options consultation	Scoping WCS
Q4 2023	New local development scheme approved	
Q2 2024	Preferred options local plan (reg 18) – Consultation on Draft Local Plan	
Q1 2024	Preferred Spatial Strategy in the Preferred Options Plan.	Detailed WCS
Q2 – Q4 2024	Review comments and revise local plan	
Q1 2025	Pre-Submission of the Local Plan (Reg 19) – Consultation on Pre-Submission Local Plan	
Q2 2025	Submission of the Local plan – Submission to Secretary of State (Reg 20, 22 and 35)	
Q3 & Q4 2025	Independent examination – Examination in Public (Reg 24)	
Q4 2025 – Q1 2026	Inspectors report and Adoption of the Local Plan (2023 – 2041) (Reg 20 and 35)	

It should be noted that this Scoping WCS was commissioned at a time when CCC had not yet decided upon a preferred Spatial Strategy based on the option and issues consultation for development for the plan period (2023 – 2041). Therefore, this Scoping WCS is intended to inform CCC of the possible constraints and opportunities to the emerging spatial strategies for growth and development and to provide guidance on what strategy is most feasible and sustainable in terms of water management.

As such, additional work will be required (within the Detailed WCS) once CCC have decided on a preferred Spatial Strategy (based on the recommendations of this Scoping WCS) for locating development and the growth quantum to take forward to the preferred options stage of the CLP (regulation 18), to provide the evidence needed to fully support the strategy. Table 1.1 illustrates the likely timeframe for the CCC Local Plan, and how this relates to the additional information required.

1.3 WCS Approach and Objectives

The WCS will use a two-staged approach that will ensure:

- Water infrastructure is timely provided to support the housing and employment growth planned for the Chelmsford area.
- There is a strategic and integrated approach to the management and usage of water so that the new Local Plan is compliant with relevant legal and policy requirements.

The Scoping WCS will:

- Clarify the key stakeholders and the area of influence the proposed development may have as well as identify the current evidence gaps and constraints on growth.
- Undertake a preliminary assessment of the water and wastewater infrastructure required to support the housing and employment growth planned for Chelmsford, along with any constraints that may prevent this, so that this can be further investigated at the Detailed WCS stage.

Key objectives of the WCS will be to:

- Identify any water infrastructure services provision and usage constraints based on natural or anthropogenic changes, whilst testing the potential impact of Chelmsford plans on the water environment.
- Develop a sustainable framework that enables the phased delivery of the key infrastructure needs and adaptation of future developments, in line with the aspirations and environmental demands of the local area.
- Inform the planning process to mitigate for any negative effects whilst maximising environmental gains through positive planning approaches.
- Promote a reduction in the risk of flooding from all sources, fluvial, surface water and groundwater etc, and incorporate within designs ideas such as Sustainable Drainage Systems (SuDS) to help reduce this threat and further manage the water cycle.
- Provide an evidence base for infrastructure requirements to inform the business plans of the water companies.

- Provide a basis to implement effective solutions to reduce the water demand within the area, helping to reduce the environmental impact of over-abstraction and ease the stress on the infrastructure demands.
- Consider any biodiversity issues and how the water cycle impacts upon designated sites, both now and into the future, including the capacity of watercourses and ecosystems to absorb additional discharge from new developments.

1.4 Previous Water Cycle Studies

In 2010 CCC published a Phase 1 WCS, with a Phase 2 Water Cycle Study published in 2011 (completed by Halcrow). These studies were used to support the Local Development Framework period up until 2021.

The 2010 phase 1 and 2011 phase 2 water cycle studies, with reference to wastewater, found that:

- Development to the north of Chelmsford will require a dedicated sewer direct to Chelmsford WRC to avoid increasing the risk of sewer flooding within the centre of the city.
- Chelmsford WRC is operating close to the limit of conventional treatment capacity and will require an extension, requiring investment to accommodate flows from additional housing developments proposed.
- Upgrades would be required on the existing wastewater system in Chelmsford to accommodate proposed development and prevent the risk of surface water flooding.
- Growth to the level (16,000 dwellings) proposed by 2021 would not make it more difficult for the River Chelmer to achieve good ecological status.
- At Wickford WRC, consent tightening is recommended to ensure 'no deterioration' specifically for the Biological Oxygen Demand (BOD) indicator.

In 2018 a WCS Update was produced by AECOM, to help support the development of a new Local plan for the plan period between 2021 to 2036. The 2018 updated WCS, with reference to wastewater and water resources, found that:

- Great Leighs WRC does not have sufficient capacity to accept future development proposed. Solutions (treatment upgrades) are required in order to accommodate growth to not impact the discharging watercourse.
- Both Chelmsford WRC and South Woodham Ferrers WRC have flow and treatment capacity for growth under all growth scenarios with some capacity available for further growth. Careful phasing is required of development and growth which should be agreed between AWS and CCC.
- Essex and Suffolk Water would have adequate water supply to cater for growth over the plan period (2021 – 2036).
- According to the EA water stressed areas final classification (2013), the Essex and Suffolk Water supply area is an area of 'serious water stress'. Water demand should thus be managed across the area for all new development.

Overall, the 2018 WCS update did not highlight any significant constraints with regards to water supply, wastewater capacity and environmental capacity of receiving watercourses (except the one WRC as noted above).

The 2018 WCS is now outdated and this Scoping WCS and the following Detailed WCS are an important part of the evidence base that will help to identify suitable sites and their development quantum within the New Local Plan period from 2022 to 2041.

The WCS also needs to be updated due to changes in the technical understanding of the pressures on the water environment and from a change in regulatory perspective with the introduction of environmental destination, River Basin Management Plans (Water Framework Directive) and updates to the Water Framework Directive (WFD).

1.5 Key Stakeholders

Stakeholder engagement is key to informing and providing an evidence base for the WCS in terms of the wastewater treatment capacity and water environment capacity constraints. The following key stakeholders have been engaged in the preparation of this Scoping WCS:

- Essex County Council – Lead Local Flood Authority (flood risk and drainage)
- Anglian Water Services - Sewerage and Wastewater
- Essex and Suffolk Water – Water Supply and Resources
- EA - Water Resources and Water Environment

Consultations have been undertaken through meetings, emails, and representation provided to CCC.

It is recommended that Natural England is also consulted as the Scoping WCS is progressed to the Detailed WCS.

1.6 The Water Cycle

The natural water cycle (Figure 1.3) is the process by which water is transported throughout a region. The process commences with precipitation (rainfall, snow, sleet or hail). This is then intercepted by the ground and either travels overland through the process of surface runoff to rivers or lakes, or percolates through the surface and into underground water aquifers.

The presence of vegetation can also intercept this precipitation through the natural processes that plants carry out, such as transpiration and evapotranspiration. The water will eventually travel through the catchment and will either evaporate back into the atmosphere or will enter the sea, where a large portion will be evaporated from the surface. This evaporated water vapour then forms into clouds and falls as precipitation again to complete the cycle.

Urbanisation affects the natural water cycle in a number of ways. Traditionally permeable surfaces become impermeable due to urbanisation leading to an increase in surface water runoff. This can lead to flooding and increased peak discharges into the rivers if surface water is not managed appropriately.

Abstraction of water, from both surface water and groundwater sources for potable use by the local population, interacts with the water cycle by reducing the amount of water that is naturally held within the aquifers. Abstractions from the environment require an abstraction licence granted by the EA. Current technical understanding is such that over abstraction of water within the water cycle is occurring which is leading to a deterioration in the environment. Following processing at a water treatment plant (WTP) this water is now potable and is transported via trunk mains and distribution pipes to the local population in the area. The potable water is then used by the population for household, industrial and employment uses which creates large volumes of wastewater.

The wastewater created from developments is then transported via the sewerage network to a WRC, where the wastewater is screened, treated, and then discharged back into the rivers or groundwater. Discharges from WRC require consent from the EA. This consent sets out the maximum volume of treated wastewater that can be discharged, and the quality standards that this discharge must meet. Typically, the consent will set limits on the concentrations of the following physiochemical determinants: Ammoniacal Nitrogen (N), Biochemical Oxygen Demand (BOD) and suspended solids in the discharge. In addition, the consent can stipulate a Phosphorous (P) concentration, along with limits on the concentrations of other chemicals such as iron used in the phosphorous stripping process.

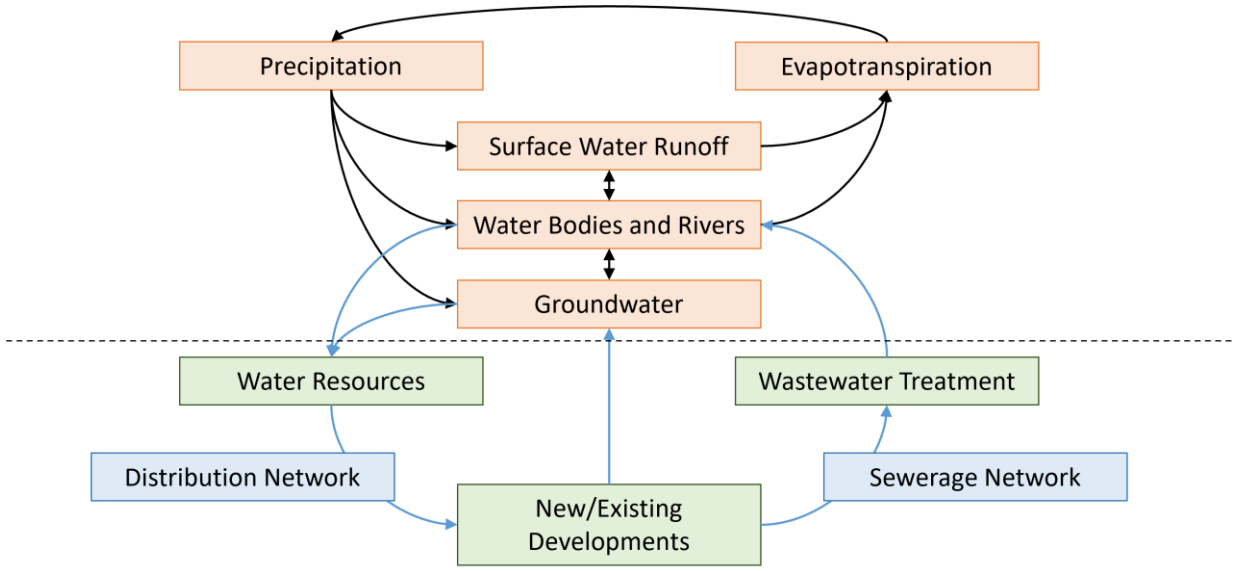


Figure 1.3: The wider water cycle

In the context of Chelmsford, specifically relating to the proposed growth and developments, the key elements relevant to the water cycle explored within the Scoping WCS are:

- Water environment policy and evidence base (Section 2)
- Proposed growth and development (Section 3)
- Water resources, supply, and efficiency (Section 4)
- Wastewater treatment and sewerage (Section 5)
- Local environmental capacity (Section 6)
- Flood risk and surface water (Section 7)
- Constraints, solutions and opportunity summary (Section 8)
- Conclusions and recommendations (Section 9)

2Water Environment Policy and Evidence Base

2.1 Policy Context

This section introduces a number of national, regional and local policies that must be considered by CCC, water companies and developers within Chelmsford. Key extracts from these policies relating to water consumption targets and mitigating the impacts on the water environment from new development are summarised below.

It should be noted that further information on legislation, policy and guidance are given in individual sections of the report covering water resources, WRCs, local environment capacity, flood risk and climate change.

2.2 National Policy

2.2.1 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) was published in February 2019 and revised in July 2023. Planning practice guidance (PPG) documents are published and updated to support the NPPF. The water supply, wastewater and water quality PPG was published in 2015 and updated in July 2019. The flood risk and coastal change PPG was published in 2014 and most recently updated in August 2022.

The Housing: optional technical standards guidance was published in 2015. Planning Policy Guidance documents (PPG) and Planning Policy Statements (PPS), whilst now withdrawn, are used to support the NPPF.

The NPPF relies on the fact that specific details of the requirements previously obtained from national planning policy will be set out in local plans. These plans will be founded on a locally developed evidence base, including relevant technical studies, such as a WCS. By emphasising the importance of local plans, local communities will feel empowered to decide the look and feel of the local area. Local authorities should ensure that planning documents consider these policies, and they can use some of the policies contained within NPPF to make decisions on individual planning applications.

The key themes in the NPPF that are most relevant to the WCS are:

- Delivering sustainable development and climate change
- Housing
- Biodiversity and geological conservation
- Planning and pollution control
- Development and flood risk

Relevant topics that consistently occur within the NPPF are:

- Resilience to climate change
- Conservation or biodiversity
- Sustainable use of resources
- Mitigation of flood risk and the use of sustainable drainage systems (SuDS)
- Suitable infrastructure capacity
- Protection of groundwater and freshwater

2.2.2 Flood and Water Management Act 2010

The Flood and Water Management Act passed into statue in April 2010. It sets out a number of changes to the way that new development and water infrastructure will interact, including the proposed future mechanism for using sustainable drainage systems (SuDS) where practical. SuDS assist in reducing the rates (and potentially volumes) of surface water arising from new developments and therefore reduce the impacts on the existing water cycle. This is important in ensuring that existing flood risks do not increase as a consequence of new developments and can reduce (or even eliminate) the need to use existing sewerage systems to convey surface water.

This reduces unnecessary expenditure in the uprating of existing sewers and WRC, reduces the probability of untreated discharges of wastewater during flood events, and can delay the requirement to consent increased flows from WRCs. SuDS also provide water quality improvements by reducing sediment and contaminants from runoff either through settlement or biological breakdown of pollutants as well as other environmental and social benefits.

2.3 Local Policy

2.3.1 Chelmsford Adopted Local Plan Policies

As informed by the NPPF, CCC have set out 13 strategic policies in the current adopted Local Plan. These policies address priorities for developments and key issues of housing needs. Of these 13 policies, four are relevant for the WCS:

- SPS1 - Spatial Principles
- SPS2 - Addressing climate change and flood risk
- SPS4 - Conserving and enhancing the natural environment
- SPS9 - Infrastructure requirements
- SPS10 – Securing infrastructure and impact mitigation

In addition to the strategic policies, CCC has also set out 30 non-strategic local policies in the current adopted Local Plan. Of these 30 policies, four are relevant for the WCS:

- DM16 – Ecology and biodiversity
- DM18 – Flooding / SuDS
- DM19 - Renewable and low carbon energy
- DM25 - Sustainable buildings

These policies are informed by the NPPF 2023, and the recommendations within this WCS will provide advice and strategies to help deliver and shape these policies.

3Proposed Growth and Development

A local plan provides a vision for the growth and development of an area, and policies which set out the way that the plan aims to meet the housing, employment, social and community needs of an area while at the same time protecting and enhancing the natural, built and historic environment.

The future volume of water abstraction and wastewater discharge requirements will be determined based on these growth plans and an assessment of the impact on the existing infrastructure and environment to meet potential future requirements made. All growth plans between 2022 and 2041 used in the capacity assessment are described in the following sections.

3.1 Local Plan Proposed Development Considered

This section summarises the proposed development as defined in the current adopted local plan and CCC's development trajectories (employment, education and residential) up to 2036, but also the development defined in the three hybrid spatial strategies for the remainder of the plan period up to 2041 (employment and residential).

As discussed in Section 1.2, the CLP is currently being reviewed and prepared for the 2022 – 2041 plan period and is expected to be adopted in 2025 - 2026. The CLP will provide strategic and local policies that will enable and guide the delivery of sustainable growth to 2041. The previous Chelmsford Local Plan was adopted in May 2020 and spans the plan period of 2013 - 2036.

Since the local plan was adopted, to support the update of the CLP, the Issues and Options Consultation stage took place between August and October 2022. This stage resulted in the development of five spatial approaches:

- Approach A: Growing existing strategy
- Approach B: Growth in urban areas
- Approach C: Wider strategy
- Approach D: Growth along transport corridors
- Approach E: New settlement

CCC has subsequently combined the five spatial approaches into three hybrid spatial strategies. The three hybrid spatial strategies are described in section 3.3.

This Scoping WCS is intended to inform CCC of the possible constraints and opportunities to various development options (spatial strategies), which will inform the Regulation 18 Preferred Options Consultation (2024) for the CLP, consolidating the three hybrid strategies into one preferred Spatial Strategy.

The development trajectories used are derived from the data provided by CCC in October 2023. Any subsequent changes to growth numbers have not been considered in this assessment. The considerations for the residential, educational and economic developments are summarised below.

3.2 CCC Development Trajectories and Adopted Local Plan (2023 - 2036)

3.2.1 Residential

CCC provided information on the expected housing growth and development trajectories up to 2036. The forecast provided by the council consisted of:

- **Committed/ Permitted Sites:** Sites which are not allocated in the adopted local plan but have full, outline or hybrid planning permission but where construction has not yet started. These includes large sites, small sites and mixed use contributions taken from the latest Housing Site Schedule April 2023 provided by CCC in December 2023.
- **Allocations:** Housing sites allocated in the three growth areas described in the adopted local plan.
- **Traveller Sites:** Gypsy and traveller sites allocated within the adopted local plan.
- **Windfall Allowance:** Potential dwellings within Chelmsford not allocated which may come forward within the plan period taken from the latest Chelmsford Housing Windfall Allowance 2023. Windfall allowance spans past the 2036 period up to 2041.

Table 3.1 provides a summary of the proposed residential growth and development trajectory up to 2036.

Residential developments are referred to as housing or houses, dwellings or residential concurrently within this report.

3.2.2 Employment

CCC provided information on the expected economic growth and development trajectories up to 2036. The forecast provided consisted of:

- **Permitted/ Committed Sites:** Sites which are not allocated in the adopted local plan but have full, outline or hybrid planning permission but where construction has not yet started.
- **Allocations**: Employment sites allocated within the adopted local plan.

Table 3.2 provides a summary of the proposed employment growth and development trajectory up to 2036 in relation to employment floorspace.

3.2.3 Education

Within the adopted local plan, several education sites have been allocated up to 2036 where construction has not yet started. Table 3.3 provides a summary of the trajectory for the proposed educational facilities up to 2036.

CCC provided GIS and spatial information of the proposed housing, employment and educational developments. These are shown in Figure 3.1.

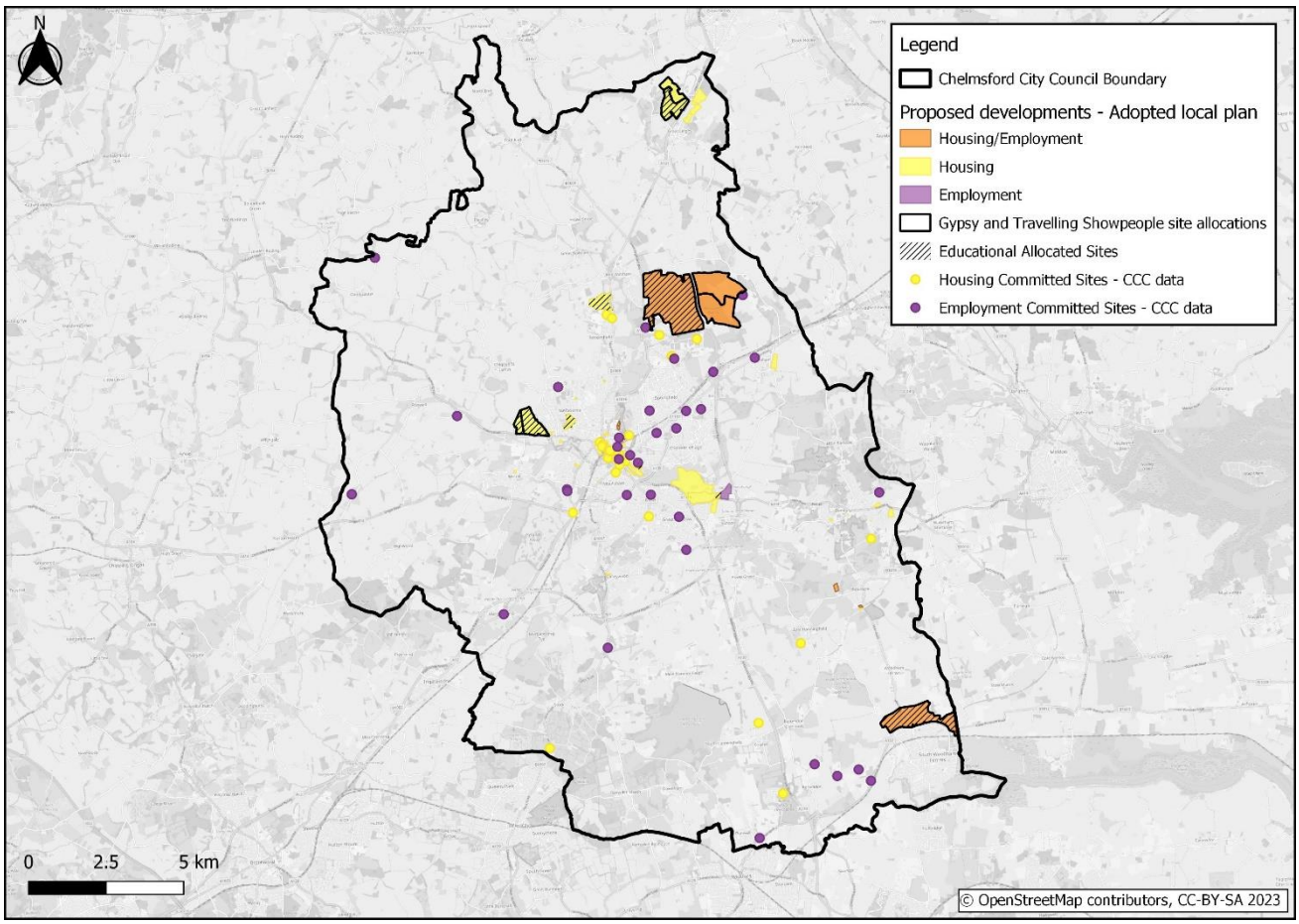


Figure 3.1: Proposed developments - CCC development trajectories and Adopted Local Plan (2023 - 2036)

Table 3.1: Housing growth and development (Up to 2036)

Housing	Total Outstanding Capacity	Year 1 23/24	Year 2 24/25	Year 3 25/26	Year 4 26/27	Year 5 27/28	Year 6 28/29	Year 7 29/30	Year 8 30/31	Year 9 31/32	Year 10 32/33	Year 11 33/34	Year 12 34/35	Year 13 35/36	Year 14 36/37	Year 15 37/38	Year 16 38/39	Year 17 39/40	Year 18 40/41
1.1 Town Centre Area Action Plan Allocations	112	0	112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.2 North Chelmsford Area Action Plan	2345	534	374	181	245	172	177	132	132	132	132	134	0	0	0	0	0	0	0
1.3 Site Allocations Development Plan Document Allocations	248	107	141	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.4 Large Sites (Unallocated)	619	234	23	142	118	24	18	12	12	12	12	12	0	0	0	0	0	0	0
1.5 Small Sites (Unallocated)	421	213	146	47	6	9	0	0	0	0	0	0	0	0	0	0	0	0	0
1.6 Growth Area 1 - Central and Urban Chelmsford	3333	0	145	588	579	563	233	180	180	180	181	179	164	161	0	0	0	0	0
1.7 Growth Area 2 - North Chelmsford	7802	0	100	425	780	760	685	632	632	632	633	633	945	945	0	0	0	0	0
1.8 Growth Area 3 - South and East Chelmsford	1394	42	0	36	95	175	180	163	163	163	164	163	25	25	0	0	0	0	0
1.9 Windfall allowance	1461	0	0	0	73	166	82	40	100	100	100	100	100	100	100	100	100	100	100
1.10 GT sites (Excludes completed site GT1)	24	0	15	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0
Total	**17759**	**1130**	**1056**	**1419**	**1896**	**1869**	**1375**	**1168**	**1219**	**1219**	**1222**	**1221**	**1234**	**1231**	**100**	**100**	**100**	**100**	**100**

Table 3.2: Employment growth and development (Up to 2036)

	Total Outstanding Capacity	Year 1 23/24	Year 2 24/25	Year 3 25/26	Year 4 26/27	Year 5 27/28	Year 6 28/29	Year 7 29/30	Year 8 30/31	Year 9 31/32	Year 10 32/33	Year 11 33/34	Year 12 34/35	Year 13 35/36	Year 14 36/37	Year 15 37/38	Year 16 38/39	Year 17 39/40	Year 18 40/41
2.1 Local Development Framework Existing Commitments	62300	0	0	0	62300	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2 Local Plan Allocations (includes unconfirmed sites GSP1u and GSP1v)	65000	10000	0	0	0	0	4900	4900	4900	4900	4900	7625	7625	7625	7625	0	0	0	0
2.3 All other Permissions	16526	4194	10903	1258	15	0	31.2	31.2	31.2	31.2	31.2	0	0	0	0	0	0	0	0
Total (m^2 floorspace)	**143826**	**14194**	**10903**	**1258**	**62315**	**0**	**4931.2**	**4931.2**	**4931.2**	**4931.2**	**4931.2**	**7625**	**7625**	**7625**	**7625**	**0**	**0**	**0**	**0**

Table 3.3: Educational growth and development (Up to 2036)

	Year 1 23/24	Year 2 24/25	Year 3 25/26	Year 4 26/27	Year 5 27/28	Year 6 28/29	Year 7 29/30	Year 8 30/31	Year 9 31/32	Year 10 32/33	Year 11 33/34	Year 12 34/35	Year 13 35/36	Year 14 36/37	Year 15 37/38	Year 16 38/39	Year 17 39/40	Year 18 40/41
Local Plan Allocations	2 Primary schools 2 SEN schools 5 Nurseries (incl. within primary school)		1 Primary school 2 Nurseries (including within primary school)				1 Secondary school						1 Nursery		1 Primary school 2 Nurseries (incl. within primary school)		1 Nursery	1 Primary school 1 Nursery within Primary school

3.3 Spatial strategies remainder of plan period up to 2041

Since the local plan was adopted, to inform the update of the Chelmsford Local Plan, the Issues and Options Consultation stage took place between August and October 2022. This stage resulted in the development of five spatial approaches:

- Approach A: Growing existing strategy
- Approach B: Growth in urban areas
- Approach C: Wider strategy
- Approach D: Growth along transport corridors
- Approach E: New settlement

CCC has subsequently reduced the five spatial approaches into three hybrid spatial strategies:

- Spatial Strategy 1: Growing the existing strategy
- Spatial Strategy 2: Exploring new settlement and employment locations
- Spatial Strategy 3: Exploring growth along transport corridors

It should be noted that the only difference between the spatial strategies is the locations of the proposed development. The total amount of proposed housing (6,540 new dwellings) and employment (187,635m^2 of employment floor space) is the same for each Spatial Strategy.

A breakdown of the proposed employment floorspace and housing is summarised in Sections 3.3.1 to 3.3.3 for each Spatial Strategy and the location of the proposed development is shown graphically.

A breakdown per settlement for each Spatial Strategy is included in Section 3.4.

3.3.1 Spatial Strategy 1

Table 3.4: Spatial Strategy 1: Housing and employment proposed development

	Total	Year 1 23/24	Year 2 24/25	Year 3 25/26	Year 4 26/27	Year 5 27/28	Year 6 28/29	Year 7 29/30	Year 8 30/31	Year 9 31/32	Year 10 32/33	Year 11 33/34	Year 12 34/35	Year 13 35/36	Year 14 36/37	Year 15 37/38	Year 16 38/39	Year 17 39/40	Year 18 40/41
Housing (no of dwellings)	**6,540**	24	24	24	24	24	286	286	286	286	286	414	414	414	414	414	973	973	974
Employment (floorspace m^2)	**187,635**	16489	16489	16489	16489	16489	2062	2062	2062	2062	2062	10050	10050	10050	10050	10050	14877	14877	14876

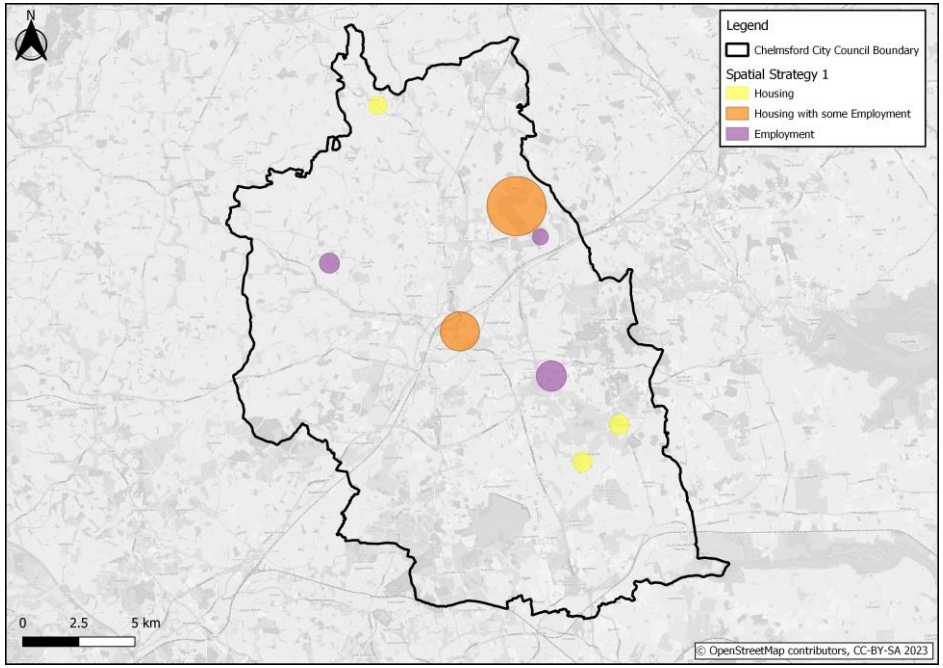


Figure 3.2: Proposed developments - Spatial Strategy 1

3.3.2 Spatial Strategy 2

Table 3.5: Spatial Strategy 2: Housing and employment proposed development

	Total	Year 1 23/24	Year 2 24/25	Year 3 25/26	Year 4 26/27	Year 5 27/28	Year 6 28/29	Year 7 29/30	Year 8 30/31	Year 9 31/32	Year 10 32/33	Year 11 33/34	Year 12 34/35	Year 13 35/36	Year 14 36/37	Year 15 37/38	Year 16 38/39	Year 17 39/40	Year 18 40/41
Housing (no of dwellings)	**6,540**	24	24	24	24	24	220	220	220	220	220	630	630	630	630	630	723	723	724
Employment (floorspace m^2)	**187,635**	5463	5463	5463	5463	5463	2062	2062	2062	2062	2062	25014	25014	25014	25014	25013	8313	8313	8313

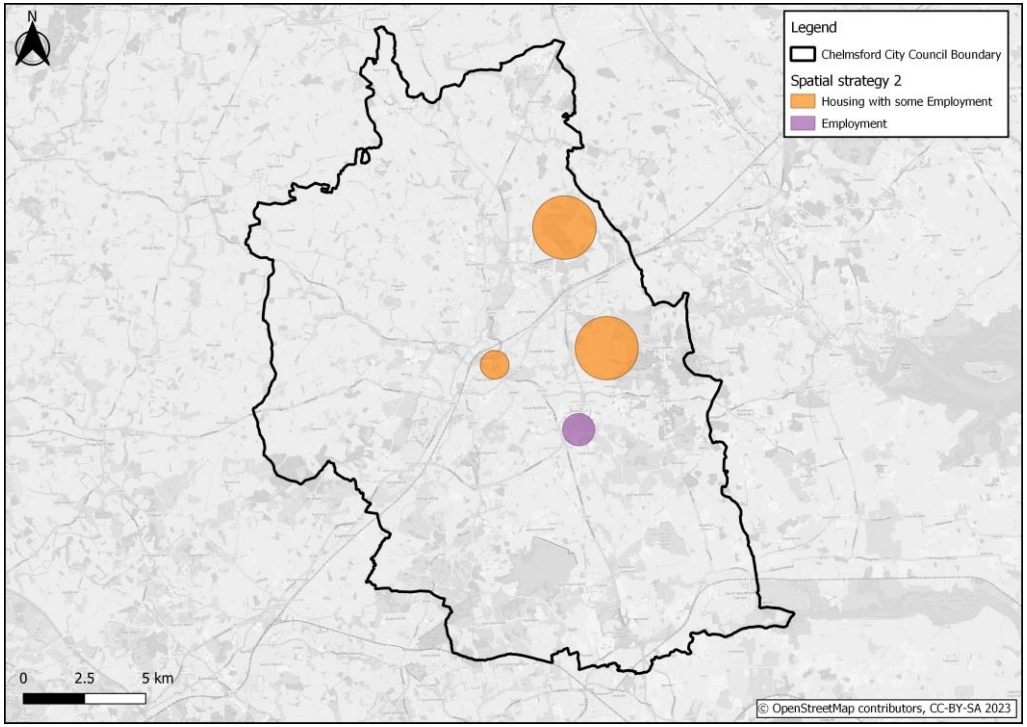


Figure 3.3: Proposed developments - Spatial Strategy 2

3.3.3 Spatial Strategy 3

Table 3.6: Spatial Strategy 3: Housing and employment proposed development

	Total	Year 1 23/24	Year 2 24/25	Year 3 25/26	Year 4 26/27	Year 5 27/28	Year 6 28/29	Year 7 29/30	Year 8 30/31	Year 9 31/32	Year 10 32/33	Year 11 33/34	Year 12 34/35	Year 13 35/36	Year 14 36/37	Year 15 37/38	Year 16 38/39	Year 17 39/40	Year 18 40/41
Housing (no of dwellings)	**6540**	24	24	24	24	24	280	280	280	280	280	360	360	360	360	360	1073	1073	1074
Employment (floorspace m^2)	**187635**	5463	5463	5463	5463	5463	2062	2062	2062	2062	2062	16699	16699	16699	16699	16698	22172	22172	22172

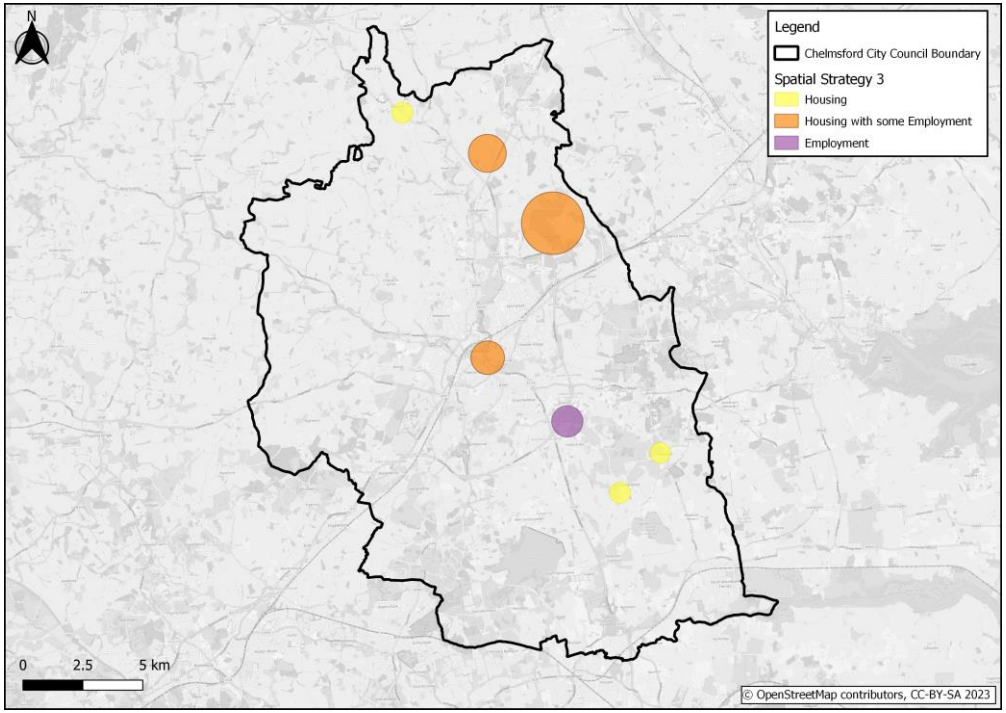


Figure 3.4: Proposed developments - Spatial Strategy 3

3.4 Development Summary

For the purposes of the WCS, the developments discussed in Section 3.2 and 3.3 were combined.

Each of the three spatial strategies were assessed independently with the remainder of the proposed development (allocated and committed sites) taken from the previous adopted local plan.

3.4.1 Housing

Table 3.7: Housing – Proposed developments considered in WCS

Hierarchy	Settlement	Housing Numbers (No.)			
		Adopted local plan allocations (2036) and committed sites as at December 2023	Spatial Strategy 1	Spatial Strategy 2	Spatial Strategy 3
City or Town	Chelmsford	6020	6240	3540	4830
Key Service Settlements	Bicknacre	0	100	0	100
Key Service Settlements	Boreham	17	0	0	0
Key Service Settlements	Broomfield	721	0	0	0
Key Service Settlements	Danbury	120	0	0	0
Key Service Settlements	Great Leighs	1125	0	0	10
Key Service Settlements	Writtle	974	0	0	0
Key Service Settlements	Galleywood	31	0	0	0
Key Service Settlements	Runwell	146	0	0	0
Key Service Settlements	Stock	33	0	0	0
Key Service Settlements	Hammonds Farm (new settlement)	0	0	3000	0
Service Settlements	East Hanningfield	23	100	0	100
Hamlet	South Hanningfield	20	0	0	0
Service Settlements	Ford End	0	100	0	100
Service Settlements	Great Waltham	17	0	0	0
Service Settlements	Little Waltham	6735	0	0	0

Hierarchy	Settlement	Housing Numbers (No.)			
		Adopted local plan allocations (2036) and committed sites as at December 2023	**Spatial Strategy 1**	**Spatial Strategy 2**	**Spatial Strategy 3**
Service Settlements	Rettendon Place	100	0	0	0
Service Settlements	Woodham Ferrers	1451	0	0	0
Service Settlements	Highwood	3	0	0	0
Service Settlements	Margaretting	11	0	0	0
Service Settlements	Roxwell	3	0	0	0
Small Settlements	Chatham Green	0	0	0	1400
Small Settlements	Good Easter	3	0	0	0
Small Settlements	Little Baddow	4	0	0	0
Hamlet	Chignal	9	0	0	0
Hamlet	Pleshey	3	0	0	0
Small Settlements	Sandon	191	0	0	0
	Total Housing (no. of dwellings)	**17759**	**6540**	**6540**	**6540**

3.4.2 Employment

Table 3.8: Employment – Proposed developments considered in WCS

Hierarchy	Settlement	Employment Floor Space (m^2)			
		Adopted local plan allocations (2036) and committed sites as at December 2023	**Spatial Strategy 1**	**Spatial Strategy 2**	**Spatial Strategy 3**
City or Town	Chelmsford	84011	130443	85813	116096
City or Town	South Woodham Ferrers	800	0	0	0
Key Service Settlements	Boreham	585	3500	0	0
Key Service Settlements	Broomfield	50762	0	0	0

Hierarchy	Settlement	Employment Floor Space (m^2)			
		Adopted local plan allocations (2036) and committed sites as at December 2023	**Spatial Strategy 1**	**Spatial Strategy 2**	**Spatial Strategy 3**
Key Service Settlements	Danbury	448	0	0	0
Key Service Settlements	Runwell	37	0	0	0
Key Service Settlements	Hammonds Farm (new settlement)	0	0	49880	0
Service Settlements	West Hanningfield	120	0	0	0
Service Settlements	Rettendon Place	768	0	0	0
Service Settlements	Margaretting	35	0	0	0
Service Settlements	Ramsden Heath/Downham	0	0	0	0
Service Settlements	Roxwell	749	6000	0	0
Small Settlements	Chatham Green	0	0	0	36233
Small Settlements	Good Easter	580	0	0	0
Small Settlements	Howe Green	0	0	49880	33244
Small Settlements	Sandon	0	45630	0	0
	Total Employment (floorspace m^2)	**138895**	**185573**	**185573**	**185573**

3.4.3 Educational

Table 3.9: Educational – Proposed developments considered in WCS

Hierarchy	Settlement	Adopted local plan allocations (2036) and committed sites as at December 2023
City or Town	Chelmsford	3 Primary school with nurseries 4 Nurseries 1 Secondary school 2 SEN schools
City or Town	South Woodham Ferrers	1 Primary school with nursery 1 Nursery
Key Service Settlements	Great Leighs	1 Primary school with nursery
Key Service Settlements	Broomfield	1 Nursery

It should be noted that one primary school with early years provision and one stand alone early years facility rather than one primary school and two standalone early years facilities have been assumed for site SGS10 in South Woodham Ferrers, in line with the adopted local plan. This is to be confirmed.

It should be noted that the development presented in Section 3 was as provided by CCC in October 2023; the developments and trajectories were not finalised and only gave an indication to what development is proposed. This will be updated to reflect the latest information during the Detailed WCS.

3.5 Key Gaps and Issues for Next Stages

The following issues should be considered as part of the Detailed WCS:

- Further assessment of proposed growth and development in line with the preferred Spatial Strategy to be taken forward in the CLP.
- Further assessment of proposed growth and development trajectory and agreement of when developments will occur.
- Further assessment of proposed educational facilities required to accommodate growth and development in line with the preferred Spatial Strategy to be taken forward in the CLP.
- Further assessment of proposed economic growth and development to ensure no double counting especially where there is a change of land use for an existing brownfield development.
- Layouts showing the proposed development locations and spatial strategies to inform water resources and wastewater assessments.

4Water Resources, Supply and Efficiency

4.1 Introduction

The aim of the water resources assessment is to ensure that sufficient water resources are available in the region to serve the proposed level of growth, without having a detrimental impact on the environment. This section outlines the key surface waterbodies and groundwater sources, and the current situation for water resources.

Essex and Suffolk Water is the sole statutory supplier of potable water to the Council's area. CCC is located in the Essex WRZ. Potable water in the Essex WRZ is supplied via the Essex and Suffolk Water network, a vast majority of which is abstracted from the rivers and reservoirs in the region. Approximately 2% of water supplied comes from groundwater chalk well sources which are located outside of the CCC area.

New developments can also be supplied by alternative providers through the Ofwat New Appointees and Variations (NAV) process.

4.2 Policy Context

Listed below are policies relevant to this water resources chapter. Details on additional policies are given in the following sections.

4.2.1 Water Recycling Long Term Plan

In 2018 Anglian Water Services (AWS) published a water recycling long term plan (WRLTP) to outline the investment needed over the next 25 years to balance the supply and demand for water recycling services. The plan considers risk from growth, climate change, severe drought, and customer behaviors and covers the asset management plan periods.

The plan outlines the long term growth strategy and expected investment. Within Essex, the plan allows for 46,871 homes planned to 2025 and a further 144,549 homes to 2045. To accommodate this growth, a £98 million investment plan is outlined to 2045. The delivery programme is adaptive and the optimal timing of the solution delivery will be driven by regularly reviewing risk, through the collection of growth intelligence, monitoring of key indicators and modelling the impact of growth.

4.2.2 River Basin Management Plans

River Basin Management Plans (RBMP) set out the strategy, including a programme of measures, for each catchment to comply with the requirements of the WFD. These plans are developed by the regional offices of the EA, and were published in 2009, with updates published in 2015 and 2022, each update is classified as a new cycle. The current Cycle 3 Anglian RBMP, covering CCC, was published and accepted by the Secretary of State for the Environment, Food and Rural Affairs in December 2022.

4.2.3 Sustainability Reductions

The government's 25-year environment plan aims to improve the environment with specific targets for sustainable abstractions. In 2020, the EA published the national framework for water resources, which set out the expectation for achieving and maintaining sustainable abstractions to 2050 and beyond. It was identified under the Water Industry National Environment Programme (WINEP) to avoid the WFD no deterioration risk that a number of current abstraction licences annual licensed quantities were unsustainable. The reduction will occur when time limited licences are due for renewal or by 2030.

4.2.4 Environmental Destination

Some abstraction licence quantities are considered unsustainable in the longer term. These licences will require reductions to enable the environment to be resilient to the effects of climate change. The longer term protection and resilience of the environment is called environmental destination. The national framework for water resources stated that environmental destination should be achieved by 2050 but does not outline how fast this should be undertaken. Environmental destination has three goals:

- Ensure no deterioration in status of water bodies.
- Address unsustainable abstraction.
- Improve environmental resilience in the face of climate change.

Environmental destination has four scenarios: business as usual (BAU), business as usual plus (BAU+), enhanced and adapt. Each scenario has different requirements and scale of reductions. As a minimum the EA require companies to plan for BAU+.

4.2.5 Regional Planning

Under the national framework for water resources it is a requirement for water companies within geographic regions of the UK to form regional groups. The regional groups must produce a regional plan, which sets out their long term water resources goals and must be aligned with the water companies water resources management plan 2024 (WRMP24).

Each regional group will also develop a regional water resources model. This can be used to assess the impact of supply and demand options at the regional scale for the potential purposes of inter-company transfers.

In January 2022, each regional group submitted an emerging plan which set out the high-level targets they hope to meet. Essex and Suffolk Water are a part of Water Resources East (WRE); WRE includes Affinity Water, Anglian Water Services and Cambridge Water (part of South Staffordshire Water). In November 2022, WRE published a draft regional plan for consultation. It is currently planned that regional plans from all regional groups are published by December 2023.

4.2.6 Water Stressed Areas

The EA publish (and periodically update) a water stressed areas report, which sets out which water companies are under "Serious" or "Not Serious" water stress. Serious water stress is defined in the Water Industry Regulations 1999 as: "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 which is likely to be available to meet that demand." The "Serious" classification can be used by water companies to implement compulsory metering as an option within the WRMP.

The EA published the classifications in 2007, with updates in 2013 and 2021. In 2013 Essex and Suffolk Water was classified as being under "Serious" water stress. This was not changed in the 2021 update.

4.3 Water Environment and Regulation

4.3.1 Abstraction Licensing Strategy

4.3.1.1 Policy Context

The EA prepare an Abstraction Licence Strategy (ALS) for each sub-catchment within a river basin to identify what the main water resources pressures are. The strategy sets out local approaches to the sustainable management of water resources. The ALS provides an overview of the abstraction availability and management measures for unsustainable abstractions within the catchment. The aim of the ALS process is to aid in meeting of the environmental objectives under the WFD by:

- Meeting RBMP objectives for water resource activities.
- Avoiding deterioration within the catchment.

It also applies to:

- All downstream surface water bodies that may be affected by any reduction in abstraction related flow.
- Adjacent groundwater bodies affected by any reduction in groundwater level.

All new abstraction licences are time limited to a common end date dependent on area. This allows for periodic review of licences and reductions or revoking licences which pose a risk to the environment. The ALS is important for the WRMP as it outlines the availability of current and future water resources for the supply and demand balance.

4.3.1.2 Abstraction Licensing Strategy Overview

CCC is located in the Essex Abstraction Licensing Strategy (ALS) area, as shown in Figure 4.1 below. The ALS for Essex was published in 2017 superseding the Catchment Abstraction Management Strategy (CAMS) issued in 2013. Essex and Suffolk Water's Essex WRZ is located within both the Essex Abstraction Licensing Strategy and Roding, Beam, Ingrebourne and Mardyke ALS area.

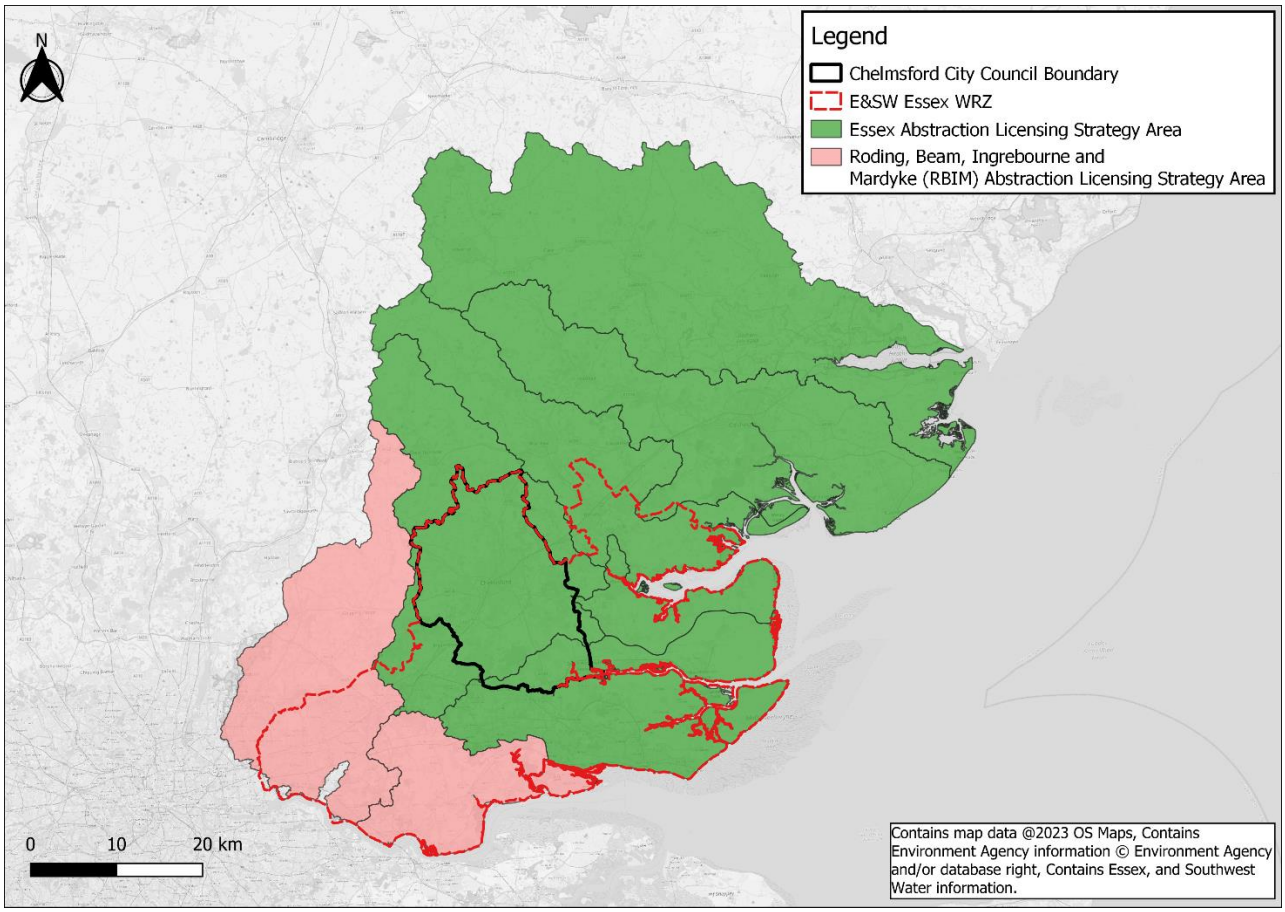


Figure 4.1: The Essex WRZ and the two ALS areas it is located within: the Essex ALS and the RBIM ALS.

The availability of water for abstraction is determined by the relationship between the fully licensed (all abstraction licences being used at full capacity) and recent actual flows (amount of water abstracted in the last 6 years) in relation to Environmental Flow Indicators (EFI). Surface water availability is calculated at selected assessment points (AP). The two ALSs consist of 30 APs in total that contribute to the Essex and Suffolk Water WRZ. Eleven of these APs are within the Essex and Suffolk Water WRZ boundary.

Within the ALS, the EA assessment of the availability of water resources is based on a RAG classification system that states resource availability for licensing. The categories of resource availability are given in Table 4.1.

Table 4.1: Water resource availability and impact on licensing.

Water Resource Availability Class	**Implication for Licencing**
Water available for licencing	There is more water than required to meet the needs of the environment. New licences can be considered depending on local and downstream impacts. Some time-limited licence renewals may require changes to reflect historic annual usage in order to manage the risk of deterioration to the environment. Abstractions for non-consumptive uses can still be permissible in catchments where there are sustainability issues.
Restricted water available for licencing	Full licenced flows fall below the EFIs. If all licenced water is abstracted there will not be enough water left for the needs of the environment. No new consumptive licences would be granted. Some time-limited licence renewals may require changes to reflect historic annual usage in order to manage the risk of deterioration to the environment. It may also be appropriate to investigate the possibilities for reducing fully licenced risks. Water may be available by purchasing (known as licence trading) the amount equivalent to that recently abstracted from an existing licence holder. Abstractions for non-consumptive uses can still be permissible in catchments where there are sustainability issues.

Water Resource Availability Class	Implication for Licencing
Water not available for licencing	Recent actual flows are below the EFI. This scenario highlights water bodies where flows are below the indicative flow requirement to help support Good Ecological Status/Potential (GES/P) (as required by the Water Framework Directive). Action is being taken in water bodies that are not supporting GES/P meaning that no further consumptive licences will be granted. Some time-limited licence renewals may require changes to reflect historic annual usage in order to manage the risk of deterioration to the environment. Water may be available by purchasing (known as licence trading) the amount equivalent to that recently abstracted from an existing licence holder. Abstractions for non-consumptive uses can still be permissible in catchments where there are sustainability issues.
HMWBs (and/or discharge rich water bodies)	These water bodies have a modified flow that is influenced by reservoir compensation releases or they have flows that are augmented by a support scheme or large water recycling centre. These are often known as 'regulated rivers'. They may be managed through an operating agreement, often held by a water company. The availability of water is dependent on these operating agreements. Some time-limited licence renewals may require changes to reflect historic annual usage in order to manage the risk of deterioration to the environment. There may be water available for abstraction in discharge rich catchment dependent on consultation with the EA. Abstractions for non-consumptive uses can still be permissible in catchments where there are sustainability issues.

Water resource availability is assessed under four different flow conditions:

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

Figure 4.2 below shows the water available for licensing for each ALS within Essex WRZ under Q30, Q50, Q70 and Q95 scenarios.

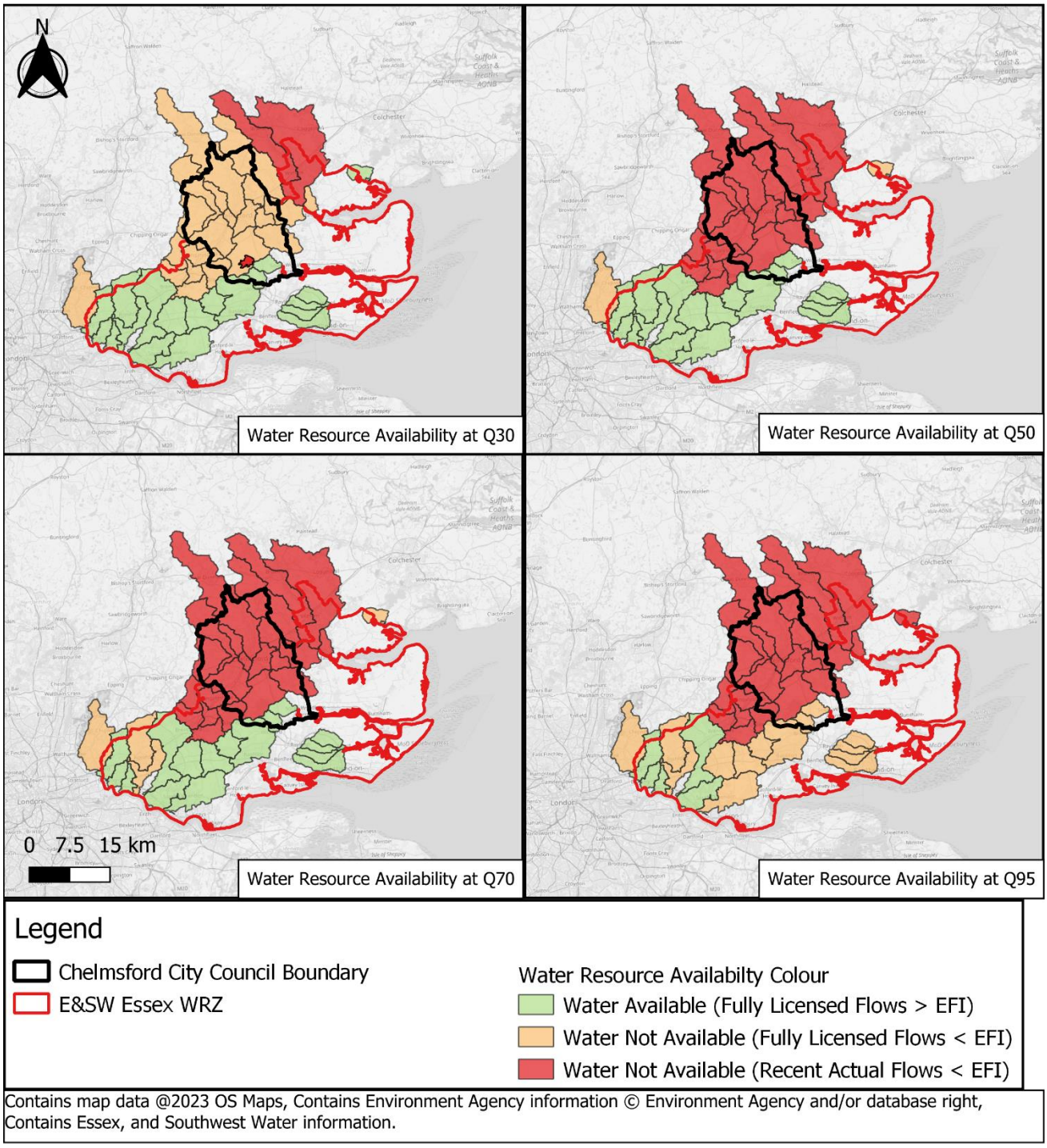


Figure 4.2: Water Resource Availability across the Essex WRZ.

4.3.1.3 Essex Abstraction Licensing Strategy

The Essex ALS sets out the approach to management of new and existing abstractions within the Essex catchment in the Anglian River basin district. The whole strategy focus area includes 22 APs, seven of these are within the Essex WRZ.

Within the Crouch and Roach Operational Catchment there are three APs. There is water available for licensing within the ALS under flows of Q30, Q50, and Q70.

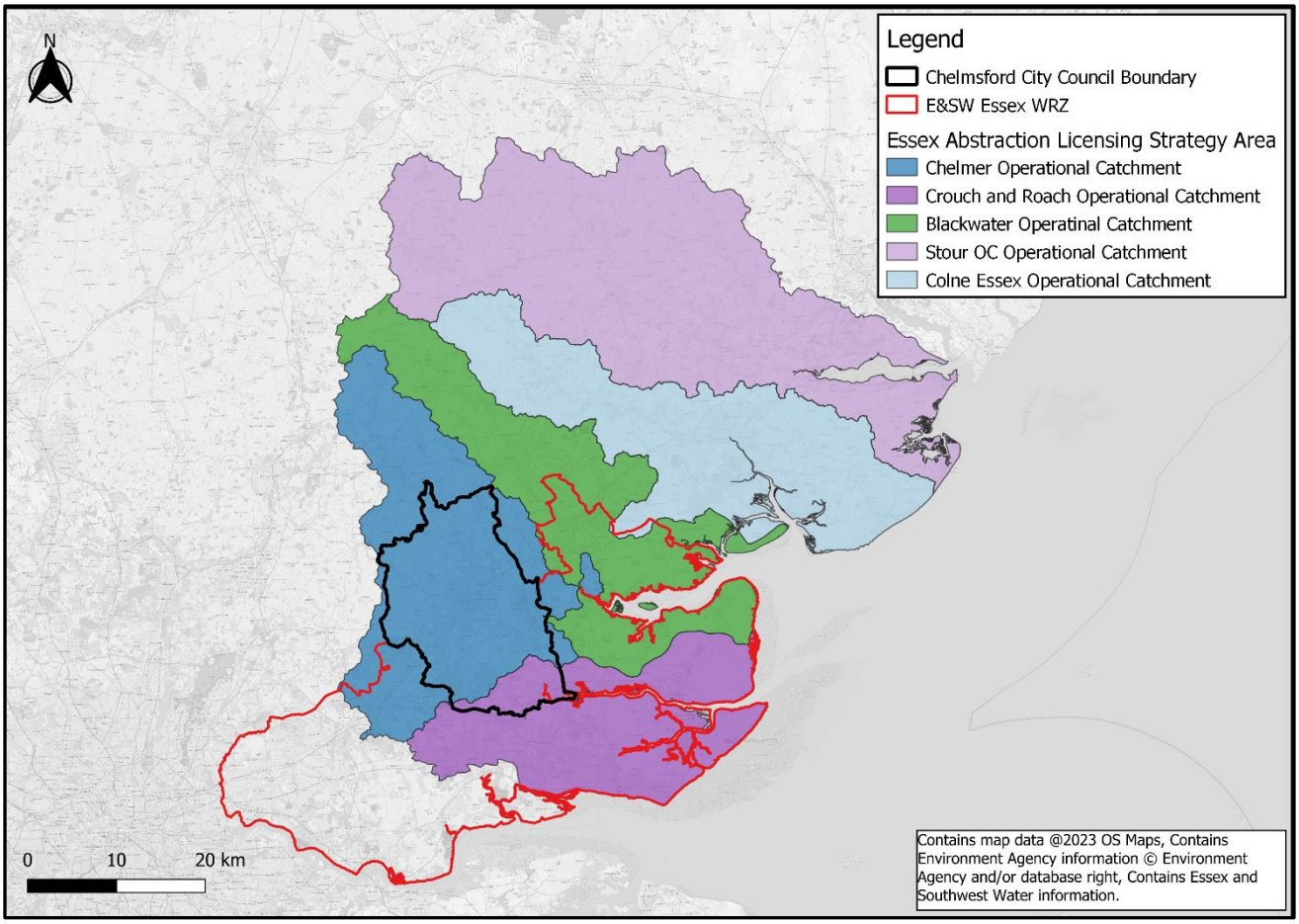


Figure 4.3: The area covered by the Essex Abstraction Licensing Strategy and the 5 Operational Catchments included in this.

Within the Blackwater operational catchment there is one AP. There is water available for licensing within the Virley Brook waterbody in the Blackwater catchment under Q30, and restricted water available for licensing under Q50 and Q70. For all other waterbodies within the overlap between the study area and operational catchment, and the Q90 flow rate for Virley Brook, there is no water available for abstraction under any flow rates.

Within the Chelmer operational catchment there are three APs. There is restricted water available for licensing under Q30 for all waterbodies. However, under Q50, Q70, and Q90 there is no water available for licensing. The Hanningfield Reservoir, within the southern area of the Chelmsford operational catchment, has no water available for licensing under any flow scenarios. This reservoir receives transfers from other rivers through a pump storage scheme hence this observation depends highly on the water availability of surrounding watercourses, and water availability for this reservoir should be confirmed with Essex and Suffolk Water as the operators of the reservoir.

4.3.1.4 Roding, Beam, Ingrebourne and Mardyke (RBIM) Abstraction Licensing Strategy

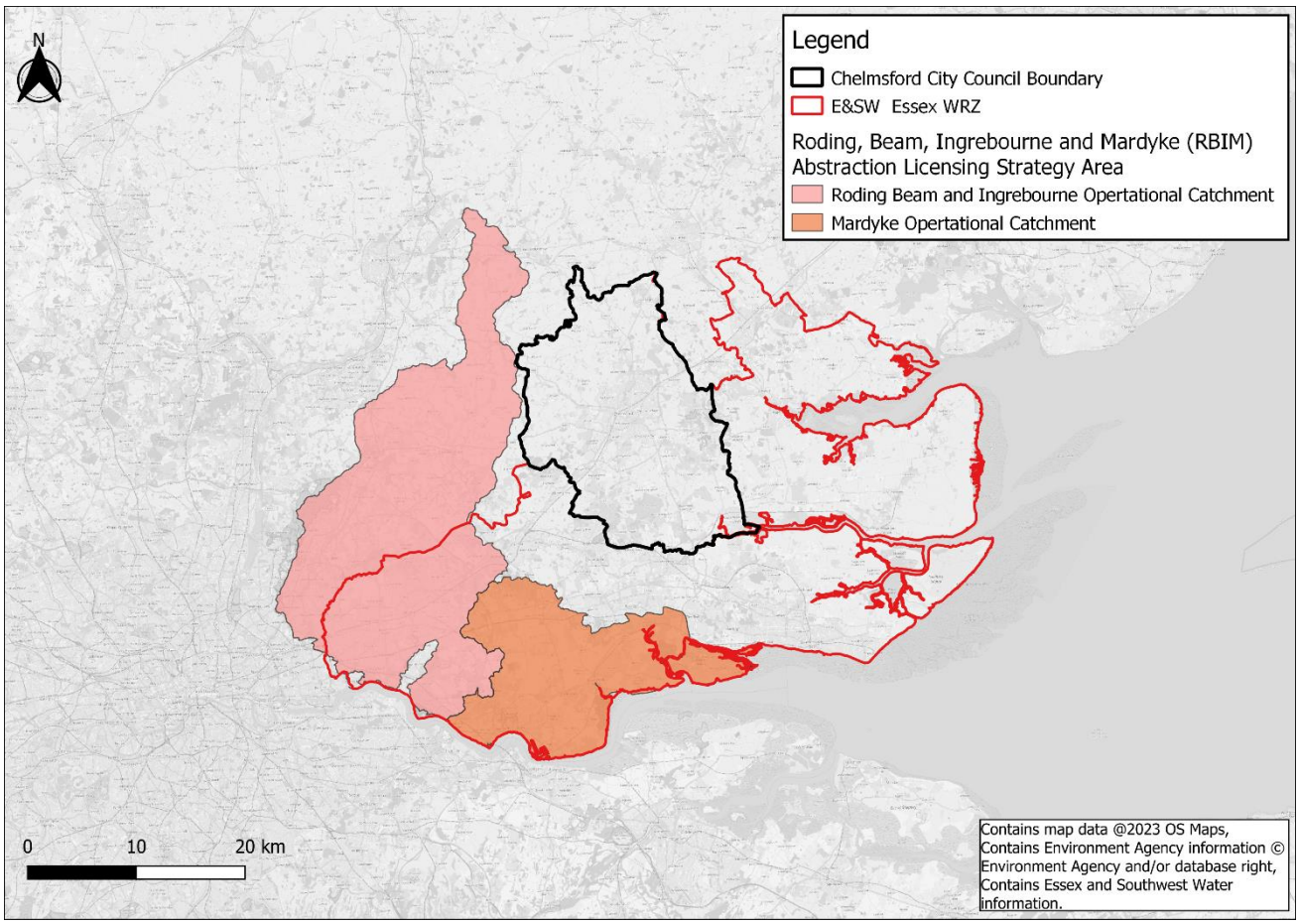


Figure 4.4: The area covered by the Roding, Beam, Ingrebourne and Mardyke (RBIM) Abstraction Licensing Strategy and the two Operational Catchments included in this.

The Roding, Beam, Ingrebourne and Mardyke (RBIM) ALS sets out the approach to management of new and existing abstraction and impoundment within the RBIM catchment in the Thames River basin district. The whole strategy area includes eight APs, four of these are within the Essex WRZ.

Within the Mardyke operational catchment there is one AP. This catchment has water available for licensing under flow conditions of Q30, Q50, and Q70, while at very low flow rates, Q95, the catchment has limited water available for licensing.

Within the Roding Beam and Ingrebourne operational catchment there are three APs. Within this catchment there is restricted water available for licensing within the Lower Roding waterbody under all flow rates. However, the other waterbodies within the Essex WRZ have water available for licensing under all flow rates apart from the Rom, and Bearn and Ravensbourne waterbodies under Q70 and Q95. The waterbodies within this ALS that lie outside of the Essex WRZ and west of Chelmsford have either limited water available or no water available for abstraction.

4.3.2 Groundwater Management Plans

The majority of CCC is underlain by the Essex Gravels groundwater Body. The overall WFD status of this body is "poor". According to the British Geological Survey the Chelmsford area is predominately underlain by a London Clay Formation of clay, silt, and sand with other sedimentary bedrocks present in small areas, such as the Bagshot Formation. London Clay is classified as unproductive, which has negligible impact for water supply. However, some of the bedrock aquifers (Bagshot and Claygate Member) are classified as Secondary A. These aquifers can also support base flow in rivers. It is expected that they provide support to the River Wid and its tributaries.

The superficial drift aquifer beneath the Chelmsford area is predominantly classified as a Secondary (undifferentiated) with some areas of Secondary A and B aquifers. As these aquifers all fall into the category of Secondary or unproductive aquifers, groundwater does not act as a local source of water as it would with a primary aquifer.

4.3.3 Conclusion

Section 4.3 describes the water environment and the potential for new abstractions by water companies, it highlights that under most flow conditions there is no available water to abstract in the north of the Essex WRZ. There is potential for water to be abstracted in the south of the WRZ. The amount of water that could be abstracted is not explored within this section as the option to abstract is a decision that Essex and Suffolk Water would have to screen for. This is explored further in Section 4.4.

4.4 Essex and Suffolk Water Region

Essex and Suffolk Water is responsible for supplying approximately 1.76 million customers in the Essex supply area and 0.28 million customers in the Suffolk supply area. Each supply area is split into water resource zones (WRZ). Essex and Suffolk Water operates four WRZs, the Essex supply area is one WRZ (Essex WRZ) (see Figure 4.5), whilst the other three (denoted Suffolk WRZ in Figure 4.5) are located approximately 70km northeast of the Essex WRZ.

The Council's study area is located entirely within the Essex WRZ, as shown in Figure 4.5 below. As of 2021, CCC had a population of approximately 181,500 which is around 10% of the population within the Essex WRZ. According to the ONS data, the population of CCC will increase by approximately 20,800 to 202,300 by 2041 which will be approximately 6% of the estimated population increase by Essex and Suffolk Water, as discussed in Section 4.5.4.

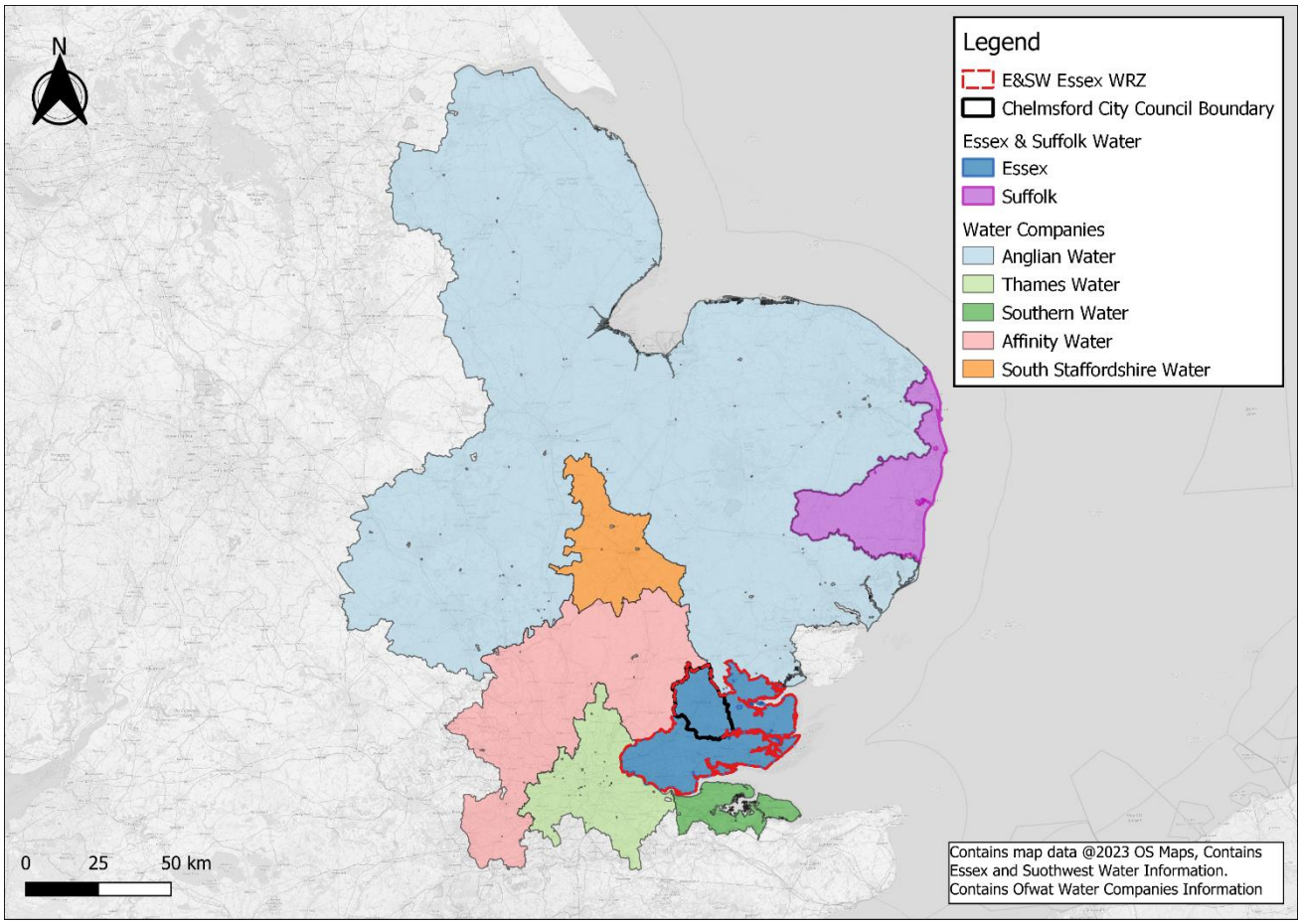


Figure 4.5: Essex WRZ in the context of the adjacent water companies.

The Essex WRZ is primarily supplied by surface water from river and reservoir abstractions, with support from groundwater (approximately 2%) in the southwest of the zone. It also has transfers from neighboring water companies. The transfers come from two sources; the Chigwell raw water bulk supply from Thames Waters Lea Valley reservoirs and the Ely Ouse to Essex Transfer Scheme.

Figure 4.6 below provides an overview of the Essex WRZ supply network; the network primarily supplies water from north to south, with a contribution from the southwest from borehole sources and transfers from Chigwell.

Water is transferred via a pipeline from Langham water treatment works, past Abberton Reservoir into the Essex WRZ and supplied to the region alongside Hanningfield reservoir. Local authorities relying on the sources of water which supply Chelmsford are Maldon, Rochford, Basildon, Southend-on-Sea, Havering and Brentwood.

Figure 4.6: Essex WRZ supply network as published in the revised draft WRMP24.

4.4.1 Interactions with other Local Authorities

As shown in Figure 4.7 below, the Essex WRZ supplies several local authorities including Basildon, Brentwood, Castle Point, Maldon, Rochford and Southend-on-Sea.

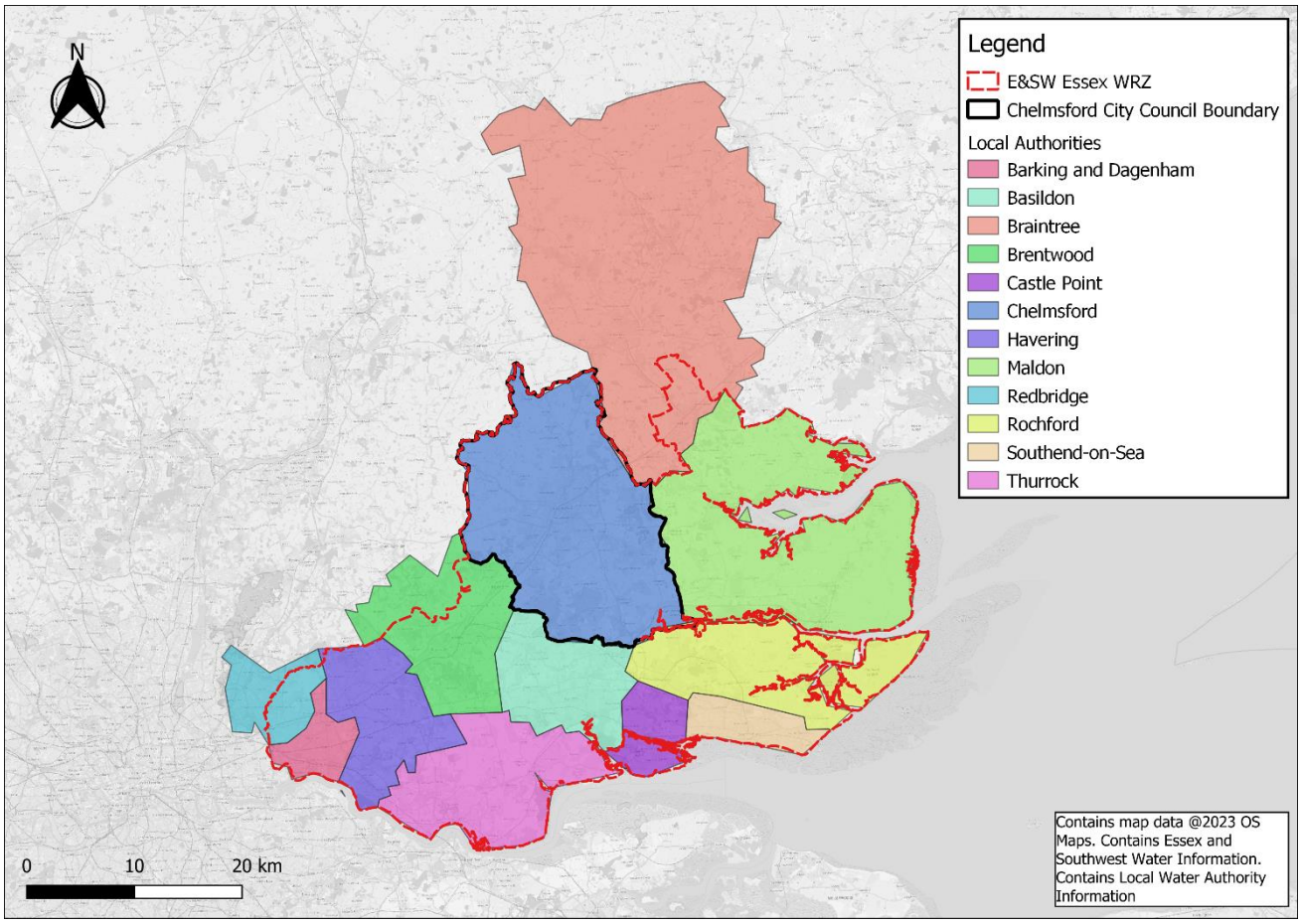


Figure 4.7: Local authorities within the Essex and Suffolk Water Essex WRZ

Each of the local authorities will have growth within their respective Local Plans, the Detailed WCS will explore if this is consistent with the growth Essex and Suffolk Water are planning for.

4.5 Water Resources Management Plan

The currently published WRMP is WRMP 2019 (WRMP19), however, since the publication of WRMP19 a number of environmental reductions in supply have resulted in the plan not being appropriate for informing this WCS. The revised draft WRMP24 was published in September 2023 and will be used as the plan for this WCS.

4.5.1 Policy Context

WRMPs are 25-year strategies that water companies are required to prepare and update every five years. Each planning period is known as an asset management plan (AMP) period. An AMP is a five year period used by Ofwat to set the price of customer bills. Table 4.2 below outlines each of the AMP periods that the current published WRMP will cover.

Table 4.2: Years covered by AMP periods.

AMP7	AMP8	AMP9	AMP10	AMP11
Current (2020-2025)	2025-2030	2030-2035	2035-2040	2040-2045

WRMP are required to assess:

- Future demand (due to population and business growth)
- Future water availability (including any impacts due to abstraction reductions)
- Demand management and supply options.
- How the company will address any deficits in the supply demand balance
- The impacts of climate change
- Expected per capita consumption and water efficiency measures.

When required the water company will set out additional water supply measures and demand management to meet growth within the region and describe the supply demand balance over the entire period.

4.5.2 Baseline Supply Forecast

Table 4.3 summarises the Essex and Suffolk Water baseline supply forecast for the Essex WRZ per AMP as published in the revised draft WRMP24. Essex and Suffolk Water's total water available for use (WAFU) remains broadly the same at the end of the WRMP24 planning period as at the start, however it decreases by 11Ml/d due to a combination of sustainability reductions (5Ml/d), increases to climate change impacts (3Ml/d) and an increase to water exported (3Ml/d) until 2030/31. However, the halting of water exports out of the WRZ (i.e., 29Ml/d in 2025/26) will become less effective as the export will decrease by approximately 18Ml/d in 2035/36. The WAFU is at 379.66Ml/d in 2049/50 compared to the 383.59M/l at 2025/26.

Table 4.3: Supply forecasts for Essex Water Resource Zone (Essex and Suffolk Water revised draft water resources management plan 2024)

Essex WRZ	2025/ 2026	2030/ 2031	2035/ 2036	2040/ 2041	2045/ 2046	2049/ 2050
DO (before forecast changes) (Ml/d)	428	428	428	428	428	428
Climate Change impact (Ml/d)	-17	-20	-23	-26	-29	-31
Sustainability Reductions (Ml/d)	0	-5	-5	-5	-5	-5

Essex WRZ	2025/ 2026	2030/ 2031	2035/ 2036	2040/ 2041	2045/ 2046	2049/ 2050
Environmental Destination (Ml/d)	0	0	0	-2	-2	-2.00
Outage* (Ml/d)	0	0	0	0	0	0
Process Losses (Ml/d)	0	0	0	0	0	0
WAFU (Own sources) (Ml/d)	411.27	403.40	400.47	395.48	392.43	389.96
Water Imported** (Ml/d)	1	1	1	1	1	1
Water Exported (incl. NAVs) (Ml/d)	-29	-32	-11	-11	-11	-11
Total WAFU (Ml/d)	**383.59**	**372.59**	**390.17**	**385.18**	**382.13**	**379.66**

* Outage under the 1 in 200 Dry Year Annual Average year scenario is 5.70Ml/d.
** Previously water incorporated into the Essex WRZ system Aquator model, and so the majority of the bulk import of raw water is no longer split.

4.5.3 Baseline Demand Forecast

The Essex WRZ has currently approximately 670,560 household properties (2022/23), with a population of approximately 1,829,590 and 32,340 non-household (employment and education) properties. This is expected to increase to approximately 846,500 household properties, with a population of approximately 2,168,380 and 34,640 non-household properties by 2049/2050.

Table 4.4 summarises Essex and Suffolk Water's baseline demand forecast for the Essex WRZ, per AMP as reported in the revised draft WRMP24. Essex and Suffolk Water's final demand (distribution input) is expected to increase across the planning period from approximately 402.1Ml/d to 418.2Ml/d.

Table 4.4: Demand forecasts for Essex Water Resource Zone (Essex and Suffolk Water revised draft water resources management plan 2024).

Essex WRZ	2025/ 2026	2030/ 2031	2035/ 2036	2040/ 2041	2045/ 2046	2049/ 2050
Water delivered measured non-household (Ml/d)	60.09	62.84	62.95	61.23	61.19	61.17
Water delivered unmeasured non-household (Ml/d)	1.08	1.05	1.03	1.01	1.00	0.98

Essex WRZ	2025/ 2026	2030/ 2031	2035/ 2036	2040/ 2041	2045/ 2046	2049/ 2050
Water delivered measured household (Ml/d)	175.92	208.61	218.34	224.66	235.20	238.42
Water delivered unmeasured household (Ml/d)	117.29	89.07	81.82	77.95	73.73	71.14
Distribution losses (Ml/d)	37.21	37.29	37.11	36.84	36.54	36.28
Additional water* (Ml/d)	10.51	10.51	10.51	10.51	10.51	10.51
Final Distribution input (Ml/d)	**402.10**	**409.36**	**411.76**	**412.21**	**418.17**	**418.50**

*(Water taken unbilled, Distribution system operational use, Void Properties – USPL)

4.5.4 Property and Population Forecast

The Essex and Suffolk Water WRMP24 uses a combination of ONS data, adopted Local Plan evidence from all local authorities and the latest census (2021) data to estimate population and property forecasts. As part of their adaptive planning, three different scenarios were selected (medium, low and high). The medium scenario is classified as the baseline forecast and uses population growth underpinned by local authority Local Plan housing growth trajectories. Following the final year of local authority data, projected housing growth in non-London areas uses ONS long term growth averages.

The revised draft WRMP24 estimates that the Essex WRZ is expected to have an increase in population of approximately 22% over the next 25 years (forecast from 2025 to 2050). For household property, it is estimated that on average the number of properties will increase by approximately 29% over the next 25 years (forecast 2025 to 2050).

Essex and Suffolk Water use Edge Analytics to understand the growth within each WRZ from each local authority. Edge Analytics use published Local Plans and consultation to calculate the housing growth. The documents which Edge Analytics used for the Chelmsford district were "2022.04.00 - Chelmsford - Housing Trajectory.pdf" and "2022.08.00 - Chelmsford - Issues & Options Housing Topic Paper". The first document provided details of the planned growth and was used within the revised draft WRMP24. The second document was used as a check to understand the housing need within the district to determine deficits between the numbers. The data used by Edge Analytics is now out of date with respect to the spatial strategies outlined in this document. However, since it is the data used for the revised draft WRMP24, it will be used for this comparative analysis.

In total, starting from 2023/24, Essex and Suffolk Water are planning for 16,571 homes and CCC are planning for 24,299. Whilst this is a deficit of 7,728 homes, the majority of these homes are expected to be delivered between 2034/35 and 2040/41

(approximately 4,200), hence the differences in the short term to medium term numbers need to be explored in more detail. Table 4.5 below shows a comparison of the latest CCC housing strategy used for all three spatial strategies (see Section 3, Table 3.1, Table 3.4, Table 3.5 and Table 3.6 for more details) against the latest Essex and Suffolk Water planned dwellings over the next seven years.

Table 4.5: Difference of annualised housing numbers in CCC and Essex and Suffolk Water housing plans for the remaining adopted Local Plan period.

Data Source	2023 /24	2024 /25	2025 /26	2026 /27	2027 /28	2028 /29	2029 /30	2030 /31
Essex and Suffolk Water Chelmsford housing trajectory data*	1,192	1,199	1,132	1,336	1,397	1,696	994	1,054
CCC housing trajectory for Spatial Strategy 1[1]	1,154	1,080	1,443	1,920	1,893	1,661	1,454	1,505
CCC housing trajectory for Spatial Strategy 2[2]	1,154	1,080	1,443	1,920	1,893	1,595	1,388	1,439
CCC housing trajectory for Spatial Strategy 3[3]	1,154	1,080	1,443	1,920	1,893	1,655	1,448	1,499
Difference (Essex and Suffolk Water trajectory minus CCC housing trajectory for Spatial Strategy 1)	38	119	-311	-584	-496	35	-460	-451
Difference (Essex and Suffolk Water trajectory minus CCC housing trajectory for Spatial Strategy 2)	38	119	-311	-584	-496	101	-394	-385
Difference (Essex and Suffolk Water trajectory minus CCC housing trajectory for Spatial Strategy 3)	38	119	-311	-584	-496	41	-454	-445

*Data provided from Edge Analytics which is based on 2022/04/00 - Chelmsford - Housing Trajectory.pdf

[1] See Table 3.4 for more details.

[2] See Table 3.5 for more details.

[3] See Table 3.6 for more details.

Table 4.5 shows a surplus of homes accounted for by Essex and Suffolk Water for the first two years, but then shows a deficit. With a total deficit of approximately 5929

homes by the end of the adopted Local Plan period (2023-2036) for Spatial Strategy 1, 6247 for Spatial Strategy 2 and 4627 for Spatial Strategy 3.

From 2031/32 until 2040/41, Essex and Suffolk Water are planning for a total of 6,571 new homes, whilst CCC is planning for an increase of 12,189 homes. Since the CLP 2023 is still an emerging plan and not adopted, as per water resource planning guidelines Essex and Suffolk Water are only required to account for the adopted plan.

Each WRMP planning period is not independent, with planning for the next WRMP starting soon after the WRMP is published. This is to account for new information that cannot be captured during the lead up to publishing the WRMP. As per water resources planning guidance, Essex and Suffolk Water have to use adopted Local Plans within the supply and demand balance although they can plan for other scenarios. Currently a shortfall in housing between the spatial strategies and Essex and Suffolk Water's planned growth is shown. However, this shortfall does not start until 2025/26, after the publication of WRMP24. The selected Spatial Strategy when the emerging Local Plan is adopted will then be used within the next WRMP planning cycle WRMP29.

Since the WRMP planning period is a 5-year cycle, water companies start the planning process as soon as possible. So, when the emerging CLP is adopted, the shortfall in housing in 2025/26 will be updated within the next planning period.

4.5.5 Current and Future Supply

4.5.5.1 Current Supply

Currently Essex and Suffolk Water rely primarily on surface water, reservoir storage and bulk transfer for supply in the Essex WRZ. The two main reservoirs used to supply Essex WRZ are:

- Hanningfield Reservoir - a 25,500Ml capacity reservoir
- Abberton Reservoir - a 26,000Ml capacity reservoir

The main river abstractions are located on the River Chelmer, Blackwater, Stour and Roman. Groundwater contributes approximately 2% to supply.

Essex and Suffolk Water have two transfers into the region. The Chigwell raw water transfer from the Thames Water's Lea Valley reservoirs accounts for approximately 20% of the potable water supplied in the Essex WRZ. The second raw water transfer is the Ely Ouse transfer scheme. Alongside importing water into the WRZ, Essex and Suffolk Water currently export approximately 20Ml of raw water to the Thames Water region as per the water sharing agreement and 8Ml/d of potable water.

Essex WRZ operates an effluent recycling scheme, which intercepts effluent from Chelmsford WRC before discharging into the River Chelmer 3km upstream of an

abstraction intake. This water can then be re-abstracted at intakes at Langford treatment works or for storage into Hanningfield Reservoir. The scheme produces approximately 20Ml/d of water during May to November.

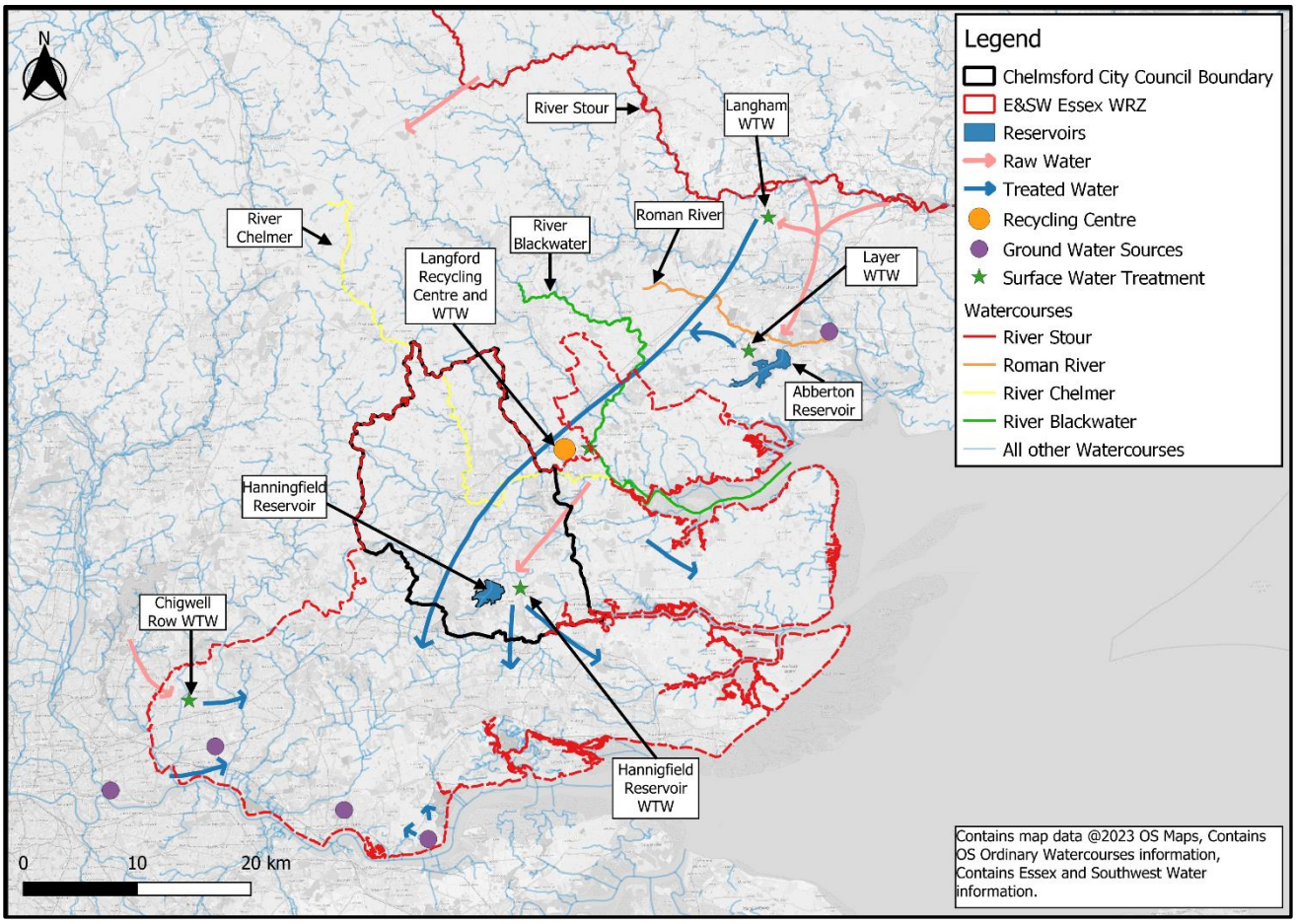


Figure 4.8: The Essex and Southwest Water main reservoir, river, and groundwater abstraction areas.

4.5.5.2 Future Options

Within the revised draft WRMP24, Essex and Suffolk Water have assessed 127 supply options; a total of 32 options were initially rejected. Of the 95 remaining options, a strategic environmental assessment was undertaken to determine the environmental impacts the options might have. The remaining 41 options were modelled, and six options were chosen for the Best Value Plan. Due to sustainability reductions there is limited potential for new river and borehole abstractions. The proposed supply options consist of:

- Water treatment works upgrades at Linford WTW
- Nitrate scheme at Langham
- Nitrate scheme at Langford WTW
- Water re-use scheme at Langford
- Ceasing of the Thames Water sharing agreement
- Upgrading of the Abberton raw water pumping station and the clarifier at Langford WTW

The total expected benefits of the new supply options are shown in Table 4.6 below. After 2034/35 the supply benefit is expected to be 31.85Ml/d per annum.

Table 4.6: Expected benefits from supply options.

	2028/ 2029	**2029/ 2030**	**2030/ 2031**	**2031/ 2032**	**2032/ 2033**	**2033/ 2034**	**2034/ 2035**
Total benefit from supply options (Ml/d)	13	16.85	24.85	24.85	24.85	24.85	31.85

In addition to the supply options, the demand options consist of:

- Smart Metering
- Leakage reduction
- Water efficiency measures which are focused on the highest water users and use measures such as home flow restrictions (flow controllers), leaking toilet identification and repair alongside toilet rebates, digital engagement and national campaigns.

Table 4.7 below outlines the expected benefits by 5-year time steps.

Table 4.7: Expected benefits from demand options.

Option	**2024/ 2025**	**2029/ 2030**	**2034/ 2035**	**2039/ 2040**	**2044/ 2045**	**2049/ 2050**
50% leakage reduction by 2050 (Ml/d).	0	0.98	2.25	4.2	6.14	8.1
Total of other demand options (Ml/d).	40.85	55.15	54.62	69.64	81.65	83.3

As per water resource guidance, each water company must produce multiple plans when producing a WRMP, which consists of best value, least cost, central plan etc. This enables the regulator to determine whether the water company has selected the most appropriate way forward. In the revised draft WRMP24, it was concluded by Essex and Suffolk Water that the best value plan was the Least Cost Central Plan.

4.5.6 Water Resources Management Plan Supply and Demand Analysis

Table 4.8 shows that without interventions Essex and Suffolk Water expect to start 2025/26 with a 26.13Ml/d in a deficit, with this deficit increasing to 41.24Ml/d by 2049/50.

Table 4.8: Essex WRZ baseline supply demand balance.

Essex WRZ	2025/ 26	2030/ 31	2035/ 36	2040/ 41	2045/ 46	2049/ 50
WAFU (Ml/d)	383.59	372.59	390.17	385.18	382.13	379.66
Distribution input (Ml/d)	402.10	409.36	411.76	412.21	418.17	418.50
Target Headroom (Ml/d)	7.62	4.83	2.96	3.78	2.71	2.4
Supply demand balance (Ml/d)	-26.13	-41.6	-24.56	-30.81	-38.75	-41.24

However, as outlined in Section 4.3.3 Essex and Suffolk Water have a number of options to reduce the deficit into a surplus. Table 4.9 below shows the updated supply demand balance once interventions have been taken into account.

Table 4.9: Essex and Suffolk Water final supply demand balance.

Essex WRZ	2025/ 2026	2030/ 2031	2035/ 2036	2040/ 2041	2045/ 2046	2049/ 2050
WAFU with interventions (Ml/d)	410.09	417.11	423.67	418.68	415.63	413.16
Distribution input with interventions (Ml/d)	398.95	388.75	367.33	351.07	346.20	343.13
Target Headroom (Ml/d)	7.68	7.12	5.12	6	4.86	4.65
Supply demand balance (Ml/d)	3.46	23.23	51.22	61.61	64.56	65.38

4.6 Draft Water Resources East Regional Plan

Essex and Suffolk water are part of Water Resources East (WRE) and so the revised draft WRMP24 is aligned with the Regional Plan. Currently the regional plan is in draft, with the expected publication date of December 2023. This scoping study will use the draft regional plan and consultation response for its conclusions however, it is noted that these may change or vary from the revised draft WRMP24.

4.6.1 Supply and Demand Analysis

The draft regional plan states that all water companies within WRE will start 2025 with no surplus water in supply. A supply-demand deficit of approximately 598Ml/d is predicted by 2050 if no action is taken. The regional plan is proposing a 160Ml/d per day reduction in demand and a 510Ml/d increase in supply options by 2050 to reduce the deficit.

The supply options consist of a 50,000Ml capacity reservoir located in the Cambridgeshire Fens, a South Lincolnshire reservoir, and a strategic pipeline to transfer the water from the north of the Anglian Water area to the south of the Anglian Water area. None of these options will benefit Essex and Suffolk Water. The two options within the regional plan that will benefit Essex and Suffolk water's Essex WRZ are:

- Linford water treatment plant upgrade
- Re-use scheme at Southend

The currently planned demand measures within the regional plan are in line with the demand measures proposed in the revised draft WRMP24. These include leakage reduction, increased metering penetration and reduction in household consumption through water efficiency measures.

4.7 Potable Water Demand Projections

To determine if the growth from the spatial strategies is in line with the growth Essex and Suffolk Water have currently planned for potable water, demand projections will be calculated.

4.7.1 Per Capita Consumption

The impact on water resources and infrastructure as a result of new developments in the Council's area does not solely depend upon the number of dwellings constructed. Demographic changes, i.e., changes in population and occupancy rates, will influence the impact of each new dwelling. Behavioral changes such as changes in per capita consumption (PCC), in both new and existing dwellings, will also affect the impact that the development has on the water infrastructure.

Table 4.10 below provides a summary of the current PCC from measured and unmeasured households for 2023/24 and the 2049/50 aspiration for the Essex WRZ. In the Essex WRZ it is estimated that by the end of 2024/25 approximately 68.51% of domestic properties will be metered. With this rising to approximately 87.2% by 2049/50.

Table 4.10: Table of PCC for measured and unmeasured households.

Type of Household	PCC in 2023/24	PCC in 2049/50
Measured (l/h/d)	154.7	111.8
Unmeasured (l/h/d)	166.5	131.5
Average (l/h/d)	159.9	112.1

Through consultation with Essex and Suffolk Water it was determined that the current planned PCC within the revised draft WRMP for new build homes was 115 l/h/d (falling to 112 l/h/d for homes which have smart meters fitted).

This value is larger than the Government's optional 110 l/h/d requirements. Following dialogue with multiple local authorities, Essex and Suffolk Water concluded that over 55% of responders apply the 110 l/h/d standard with the remaining using 125 l/h/d.

Due to the variability in usage of non-household buildings (Employment and Education), a PCC value is very difficult to estimate. For the Scoping WCS they will not be considered as part of the analysis but will be explored in the Detailed WCS.

4.7.2 Proposed Methodology

The future potable water demand, due to increase in demand from the proposed housing development (defined in Section 3) in the plan period up to 2041 and the change in existing dwelling demand, has been estimated using the following equation:

Future CCC potable water demand = Change in demand from existing dwellings + proposed dwellings demand

Where demand from new and existing dwellings is calculated from:

Dwellings demand = Number of dwellings x occupancy rate x PCC

Four demand scenarios have been considered within the Scoping WCS, to assess how CCC can enable the potential development and growth whilst minimising the impact on water resources. The demand scenarios are based on predicted changes to PCC driven by the Essex and Suffolk Water strategy and consultation with them. As per the previous adopted Local Plan, CCC are currently aiming for a PCC of 110 l/h/d and this will form the Preferred demand scenario. The Reasonable scenario will be informed by the Essex and Suffolk Water revised draft WRMP24 such that the baseline for new developments will be 114.2 l/h/d. The High scenario will be informed by the estimate from Essex and Suffolk Water such that currently metered homes within the Essex WRZ will have a PCC of 129 l/h/d by the end of the current adopted local plan period (2035/36). The Low scenario will be informed by evidence within the east of the country such that PCC values of approximately 90 l/h/d have been successfully achieved. Table 4.11 below describes each of these demand scenarios.

Table 4.11: Potable demand scenarios

Scenario	Details	Litres per head per day (PCC)
Low	Based on evidence of PCC within the wider region in the east of the country	90
Preferred	CCC preferred PCC	110
Reasonable	Based on Essex and Suffolk Water WRMP24 baseline forecast predicting 114.2 litres per head per day PCC by end of the WRMP24 planning period of 2050.	114.2
High	Based on Essex and Suffolk Water planned PCC reductions for current homes.	129

4.7.3 Potable Water Demand Projection Results

The projections show that, if PCC rates align with the Preferred scenario, the increase in potable water within CCC's administrative area is set to be 6.41Ml/d. This increases to 6.66Ml/d with the Reasonable scenario and then 7.52Ml/d with the High scenario. Whilst the total potable water drops to 5.25Ml/d for the Low scenario. These results are outlined in Figure 4.9 and Table 4.12 below. It should be noted that CCC have three spatial strategies, with the same total amount of homes but the number delivered per year will change. Only strategy one is presented below as the change in demand per year for each strategy are very similar (less than 1%) between them.

Table 4.12: Increase in demand dependent on potable demand scenarios.

Scenario	Increased in Demand (Ml/d)	Increase in Demand (%)
Low (Yellow line on Figure 4.9)	5.25	18.69
Preferred (Blue line on Figure 4.9)	6.41	22.84
Reasonable (Orange line on Figure 4.9)	6.66	23.72
High (Grey line on Figure 4.9)	7.52	26.79

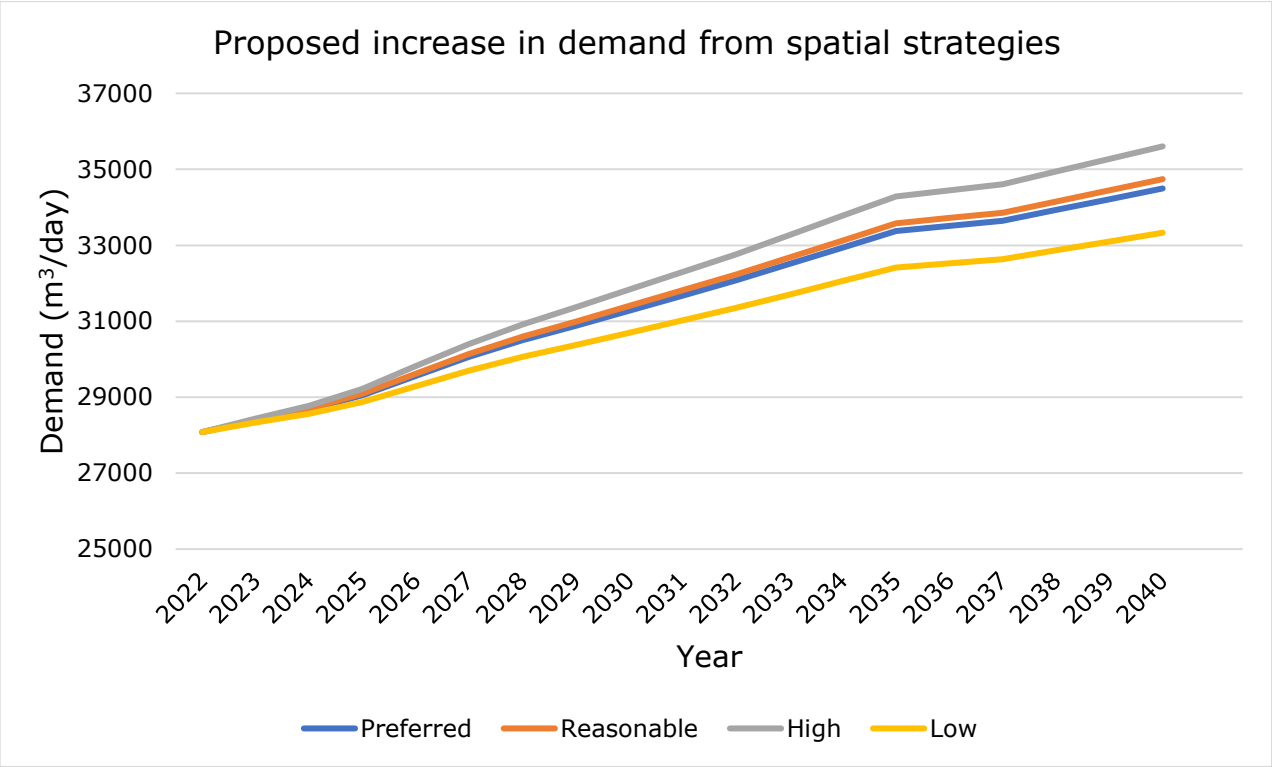


Figure 4.9: Potable water demand projection results.

The results show that in 2040/41 a difference of approximately 2140 m^3/day (214,000 l/d or 0.21Ml/d) between the Low scenario and the High scenario. This could lead to a significant effect on Essex and Suffolk Water's resources in the Essex WRZ if all new build homes (approximately 200,000) can only achieve the High scenario instead of the lower scenarios. Collaboration between Essex and Suffolk Water and CCC will be critical to the success in maintaining a PCC of 110 l/h/d but ideally lowering this further.

Smart water meters within every home will be the most effective method to monitor PCC within households. Smart water meters with internal displays offer the potential to engage consumers and highlight the cost savings they can achieve, whilst information placards, strategically placed at water features throughout development sites (for example at attenuation basins) can highlight the importance of water resources to the environment. In the revised draft WRMP24 Essex and Suffolk Water outline that smart meters can provide benefits of up to 3 l/h/d, compared to regular meters.

4.7.4 Limitations

In addition to the limitations associated with accurately predicting occupancy rates and PCC, the high-level calculations described above contain a number of inherent limitations. These include:

- Future climatic changes may increase the demand for water: this is factored into the water company plans but may make future more stringent water efficiency targets

such as the proposed new lower standard of 100 l/h/d by the government's Plan for Water in seriously water stressed areas, such as Essex WRZ.
- The link between occupancy rates and PCC: the conventional understanding within the water industry is that smaller households tend to have higher PCC rates, as there are less opportunities to 'share' demand for washing machines, dishwashers etc. The predicted trend of falling occupancy rates therefore may make the above PCC targets harder to achieve.
- These calculations assume a fixed PCC for every person, whereas in reality different people have different needs which may increase their PCC. This cannot be completely accounted for, but the Detailed WCS will explore alternative scenarios.
- Non-household usage (employment and educational facility sites) has not been accounted for.

4.8 Water Efficiency

Water efficiency is the practice of reducing water usage through the implementation of efficient fixtures or capturing additional water. Water efficient measures include water efficient fixtures, rainwater harvesting, educational campaigns on the use of water, metering and greywater recycling. This will be explored further in the Detailed WCS, with indicative costs and gains outlined.

4.8.1 Water Neutrality

Water neutrality is the practice for the total water use of a new development, in the wider area after the development, to be equal or less than the total water use in the wider area before development.

The wider area is an ambiguous size, and so should be reflective of the development. Be this at the local authority boundary, water resource zone or water abstraction boundary. For example, if a development was in an area of water stress due to abstraction from a source, offsetting the water use in a neighboring development that uses a different source will not be considered as water neutrality, unless the two sources are interlinked by transferring pipe network.

Water neutrality can be achieved in housing developments in a number of ways:

- Leakage reduction
- Water efficient new developments.
- Offsetting new demand by retrofitting homes with water efficient devices.
- Implementing a smart business tariff system, such that a business that uses large amounts of water offsets household properties.

Water neutrality can be achieved by non-household use in a number of ways:

- Offsetting new demand by retrofitting commercial and business users or schools with water efficient devices.
- Leakage reduction within large buildings.

- Reducing agricultural demand consumption through the creation of smaller water storages for local use, and single or multiple users (whilst maximising benefits of nature-based solutions)
- A water tariff system, such that a company invests in retrofits of another location to then use the additional water saved.

4.8.2 Rainwater Harvesting and Greywater Recycling

Rainwater harvesting is the process of collecting and storing rainwater to be re-used as opposed to being converted into surface runoff and discharge offsite. Rainwater harvesting is classified as a SuDS measure and is an integral part of integrated water management systems.

Greywater is water that has been used in the home in appliances such as washing machines, showers, hand basins etc. This water is then treated and can be re-used in in the home for other appliances such as the toilet. Grey water recycling requires more treatment than rainwater harvesting. Public perception is one challenge associated with the use of grey water recycling; an in-depth review conducted by Oteng-Peprah (2018) showed that members of the public in the UK are more willing to use recycled water from their own properties as opposed to unknown sources. Acceptance of using recycled water becomes less when the water is used for tasks that involve personal contact such as washing machines. Public support for greywater recycling is higher in areas which are under water stress.

It is currently UK policy that these types of water efficiency currently cannot be used in drinking water supply as there are strict rules on water company potable water use, however it can be used in other domestic systems.

4.8.3 Local SuDS Design Guide

Essex County Council are the Lead Local SuDS Authority for CCC. They have produced a guide to SuDS design within Essex. This guide outlines what is expected at each stage of the planning process, alongside guidance for water quality, maintenance, rates, and storage. SuDS can provide benefits such as:

- Water Quantity: Through controlling the quantity of runoff to support the management of flood risk and in helping to maintain and protect the natural water cycle.
- Water Quality: Through managing surface water runoff such that it does not adversely impact the water quality of any receiving water bodies.
- Biodiversity: Through the creation of green spaces to create more sustainable places for nature.

SuDS measures will be explored further within the Detailed WCS, outlining the current policies and guidance.

4.9 Policy Recommendations

The revised draft WRMP24, shows that the Essex WRZ with the proposed interventions in place will be in surplus, but if water usage increases this could result in issues for supply. The CCC current Policy DM25- Sustainable buildings, states that all new dwellings shall meet building regulations optional requirement for water efficiency of 110 l/h/d. Water re-use such as rainwater harvesting or site wide re-use schemes should be considered and promoted. As outlined in the Review of Adopted Local Plan – Issues and Options Consultation 2022, this will reflect the emerging Essex County Council's Essex Water Strategy and WRMP24.

Whilst 115 l/h/d for all new build properties is the current reasonable assumption of Essex and Suffolk Water, the government's Plan for Water has proposed a new lower standard of 100 l/h/d in seriously water stressed areas, such as the Essex WRZ. This is supported by a statement published by AWS in October 2023, which states that they will help Local Planning Authorities to achieve tighter PCC limits of 100 l/h/d or 80 l/h/d. Whilst AWS does not supply potable water to CCC, they and Essex and Suffolk Water are located within WRE. Consequently, emerging CCC policies should consider aligning with the anticipated new PCC standard. In practice, simply building a new property to water efficient standards might not be suitable as residents may choose replace fixtures. It should be encouraged under Policy DM25- Sustainable buildings, that property developers provide water efficient documentation with new homes to educate prospective home buyers.

Approximately 20% of the water use within the CCC administrative area is non-household, in addition SP8- Delivering Economic Growth sets out CCCs desire to increase employment and in particular universities. Currently, water use recommendations for reducing non-household use is not given in the Local Plan, (except VERY GOOD BREAM status). However, Ofwat is now instructing water companies to reduce water supplied to businesses by approximately 9% by 2038. Therefore, a Local Plan policy that incentivizes businesses to offset water usage is encouraged; this could include final effluent reuse schemes, retrofitting of existing businesses to reduce the water consumption and reuse the surplus water or closed loop processes i.e. rainwater/greywater reuse.

4.10Key Gaps and Issues for Next Stage

Updates in the Detailed WCS should consider the following:

- Engagement with Essex and Suffolk Water on the potential infrastructure constraints of new developments.
- Consider further water resource policy updates in the context of water resources and provide further details.
- Understand the water efficiency targets that CCC require and provide updated water efficiency guidance.

- Consider the growth of other local authorities located in the Essex WRZ, to understand the pressure on water resources. This task is required because Essex and Suffolk Water are currently planning for less homes than the number planned by CCC. It is considered necessary to determine whether this issue occurs only in Chelmsford or more widely across the Essex WRZ.
- Update the potable water demand results to include non-household usage.
- The Scoping WCS does not conclude a pressing need for implementing a strict water neutrality planning requirement within CCC, but this could be further explored if needed.

5Wastewater Treatment and Sewerage

5.1 Anglian Water Services - DWMP report

Anglian Water Services (AWS) completed their drainage and wastewater management plan (DWMP) in May 2023. The document contains details regarding AWS long-term strategic plan (actions and investments) over the next 25 years (up to 2050). It contains details on how AWS WRCs and the connecting drainage networks can be maintained, extended and improved to ensure robustness and resilience to future developments and risks (including water quality, population growth and climate change).

The AWS DWMP includes the promotion of nature-based solutions (mainly retrofit SuDS) with respect to removal of surface water from the combined sewer networks to provide future resilience. It also provides information where existing WRCs are close to their discharge permits and technical achievable limits (TAL) of the existing processes (for example Ammonia or Phosphate limits).

A summary of the DWMP output for each of the WRCs in CCC's administrative area is provided in ***Appendix A***.

5.2 Existing Water Recycling Centres

CCC's administrative area is served by the WRCs listed in Table 5.1 and Table 5.2 and shown in Figure 5.1.

The majority of the WRCs are owned by AWS. There are a few small privately owned WRCs in addition. Information, including GIS datasets, was provided by the EA and AWS.

Table 5.1: Water recycling centres (WRCs) serving CCC's administrative area: AWS owned.

Chelmsford WRC	Ingatestone WRC (located outside CCC's administrative area)
Good Easter WRC	PlesheyWRC
Great Leighs WRC	Roxwell WRC
Highwood WRC	South Woodham Ferrers WRC
Wickford WRC (located outside CCC's administrative area)	

Table 5.2: WRCs in CCC's administrative area: Privately owned. WRC names are as supplied by the EA.

Kings Poultry	SSO Kings Bridge
Cuton Lock	Pertwee Drive
Russell Way	Extensions and the Brookend
Railway Viaduct	WRC at 5 and
High Street	WRC at Stock
Howe Green -Sandon	Ramsde Heath
Spalding Way	Great Baddow High Street Tabors
Avon Road SSO Chelmsford	Vicarage LaneGreat Baddow
Mill Green Freyning	WRC 5 Flats

The existing permit information for each of the WRCs serving CCC's administrative area was provided by the EA and is contained in ***Appendix B***.

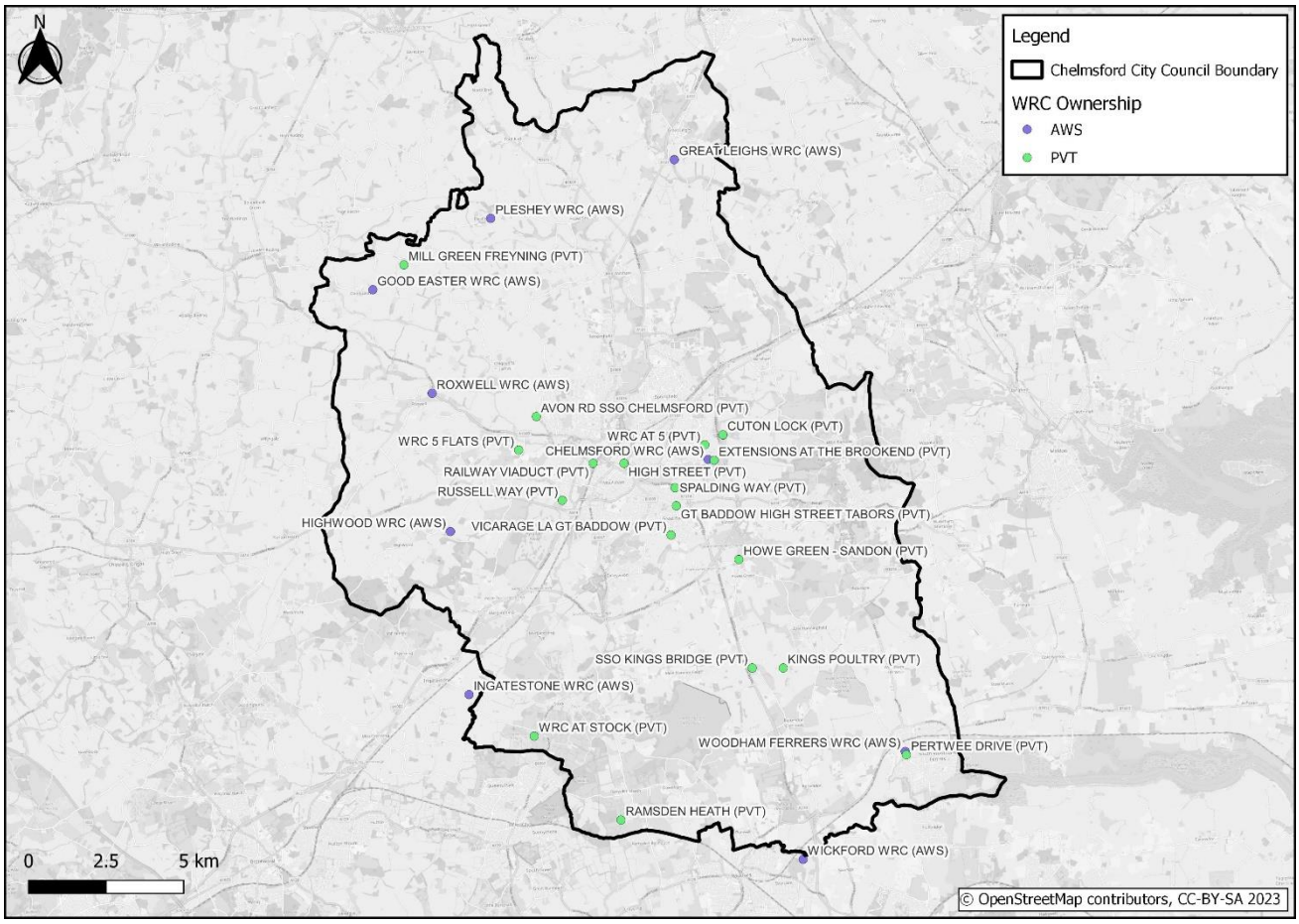


Figure 5.1: Existing water recycling centres (AWS and privately owned)

5.3 Existing dry weather flow

Before assessing the impact of the potential proposed development trajectory on the volumetric discharge in terms of dry weather flow (DWF) of the existing WRCs, the existing DWF and existing discharge consents needed to be assessed and any existing shortfalls identified. DWF is an estimation of the flow of wastewater to a WRC during a period of dry weather.

The measured Q80 existing DWF used in this study to assess the existing DWF is based on the nonparametric 20-percentile value (Q80) of a time series of measured total daily volume data. This is the value exceeded by 80% of the recorded daily flow values, excluding any wet weather flows during rainy or storm conditions.

Table 5.3 contains the existing DWF information for each WRC (owned by AWS) with regards to:

- Existing consented DWF containing the WRC discharge consents provided by the EA.
- Measured DWF containing the averaged Q80 DWF for 2021 and 2022 were provided by AWS.

Where the WRC has exceeded its DWF consent in any of the years, these values have been highlighted in bold and the cells coloured.

Table 5.3: Water recycling centres (WRCs) owned by AWS in CCC's administrative area: Existing permit review.

WRC	**Settlements Served**	**Existing Consented dry weather flow (DWF) (cubic metres per day)**	**Existing DWF: Q80 measured 2021 in cubic metres per day**	**Existing DWF: Q80 measured 2022 in cubic metres per day**
Chelmsford	Bicknacre Boreham Broomfield Chelmsford Danbury Galleywood Great and Little Waltham Hammonds Farm West Hanningfield Howe Green Little Baddow Margaretting Sandon Writtle	**52,050**	34,239	25,843

WRC	Settlements Served	Existing Consented dry weather flow (DWF) (cubic metres per day)	Existing DWF: Q80 measured 2021 in cubic metres per day	Existing DWF: Q80 measured 2022 in cubic metres per day
Good Easter	Good Easter	44	27	20
Great Leighs	Chatham Green Ford End Great and Little Leighs Howe Street	650	**865**	**707**
Highwood	Edney Common Highwood	45	N/A	N/A
Ingatestone	Stock	1,600	1,559	1,489
Pleshey	Pleshey	39	N/A	N/A
Roxwell	Chignal Roxwell	220	159	115
South Woodham Ferrers	East Hanningfield South Hanningfield Rettendon Common Rettendon Place South Woodham Ferrers Woodham Ferrers	3,900	**4,440**	**4,014**
Wickford	Ramsden Heath/Downham Runwell	7,500	**7,653**	**8,142**

The majority of the WRCs fall within their existing consented DWF permits when comparing the 2021 and 2022 measured DWF data. The WRCs which were found to have capacity issues (measured DWF above the permit DWF) have been listed in bold and the cells highlighted in Table 5.3.

It should be noted that there are combined sewer networks in CCC's administrative area which convey both foul and surface water. In combined sewer networks, wet weather flows can be significantly higher than dry weather flows. This assessment is focused on dry weather flows and the impact of wet weather flows was not considered in this study.

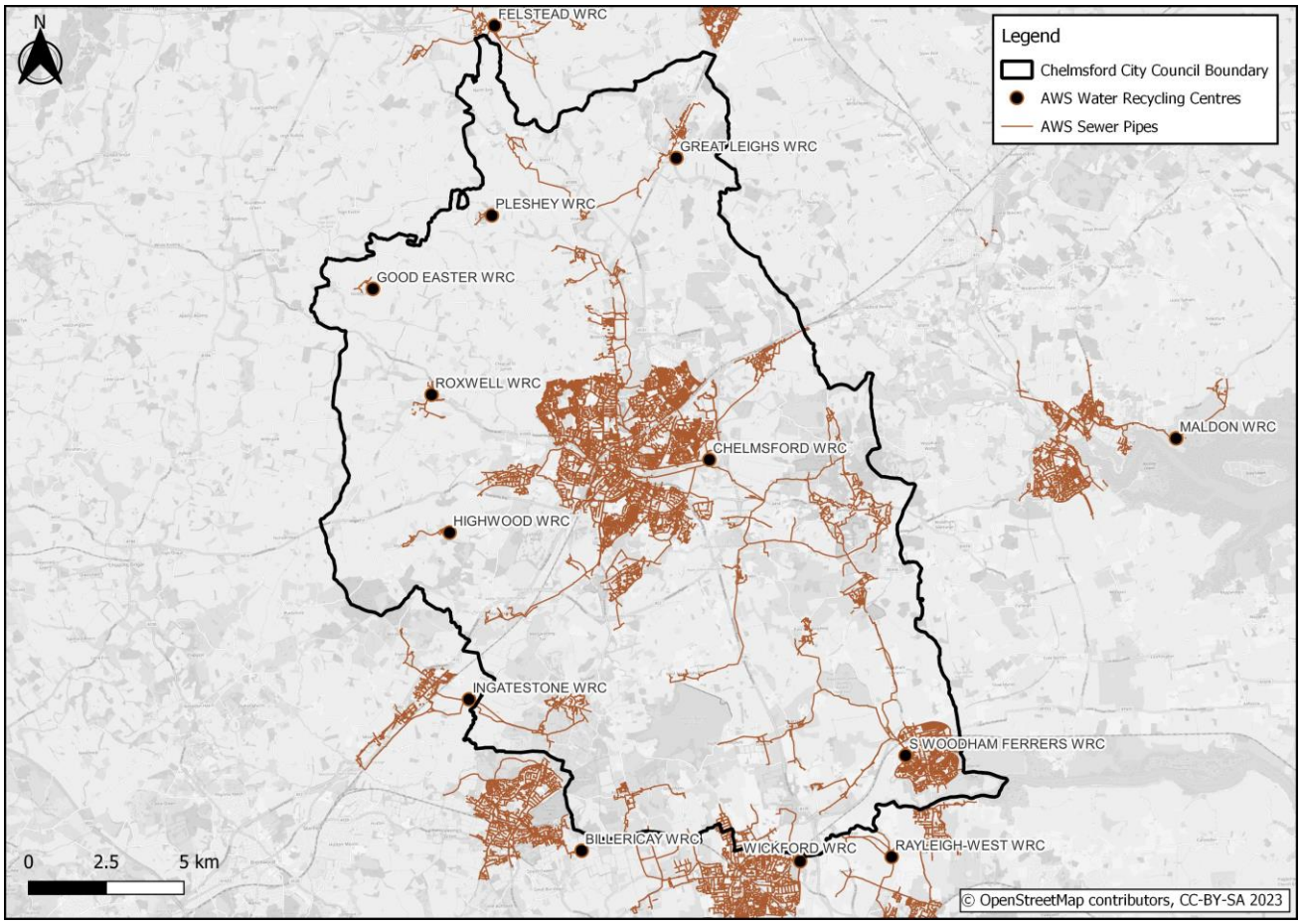


Figure 5.2: CCC existing AWS water recycling centres and sewer infrastructure

5.4 Proposed Growth and Development

To provide evidence that the proposed growth and development can be accommodated, as discussed in Section 3, all proposed growth in CCC within the AWS operational area have been reviewed.

The AWS infrastructure assets (WRCs and sewer pipes) are shown in conjunction with the proposed development (including each Spatial Strategy) in Figure 5.3 to Figure 5.6.

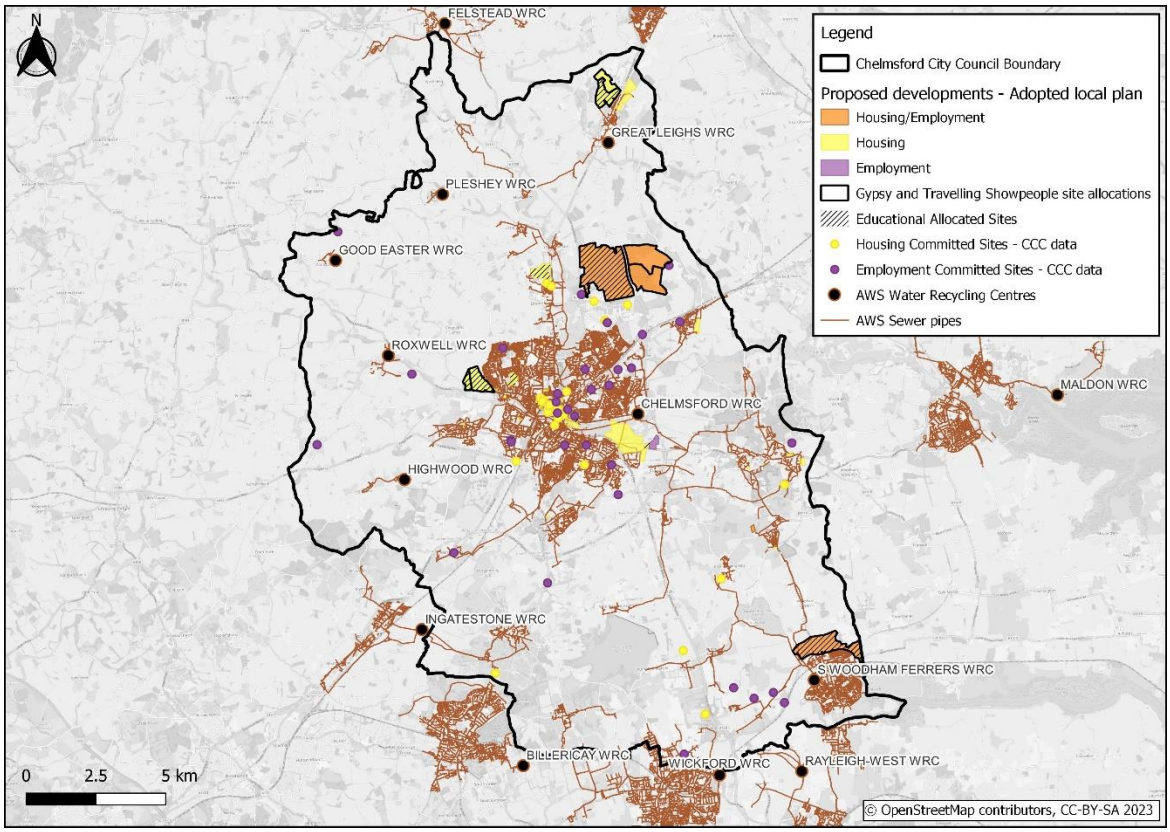


Figure 5.3: Adopted local plan proposed development and AWS sewer infrastructure

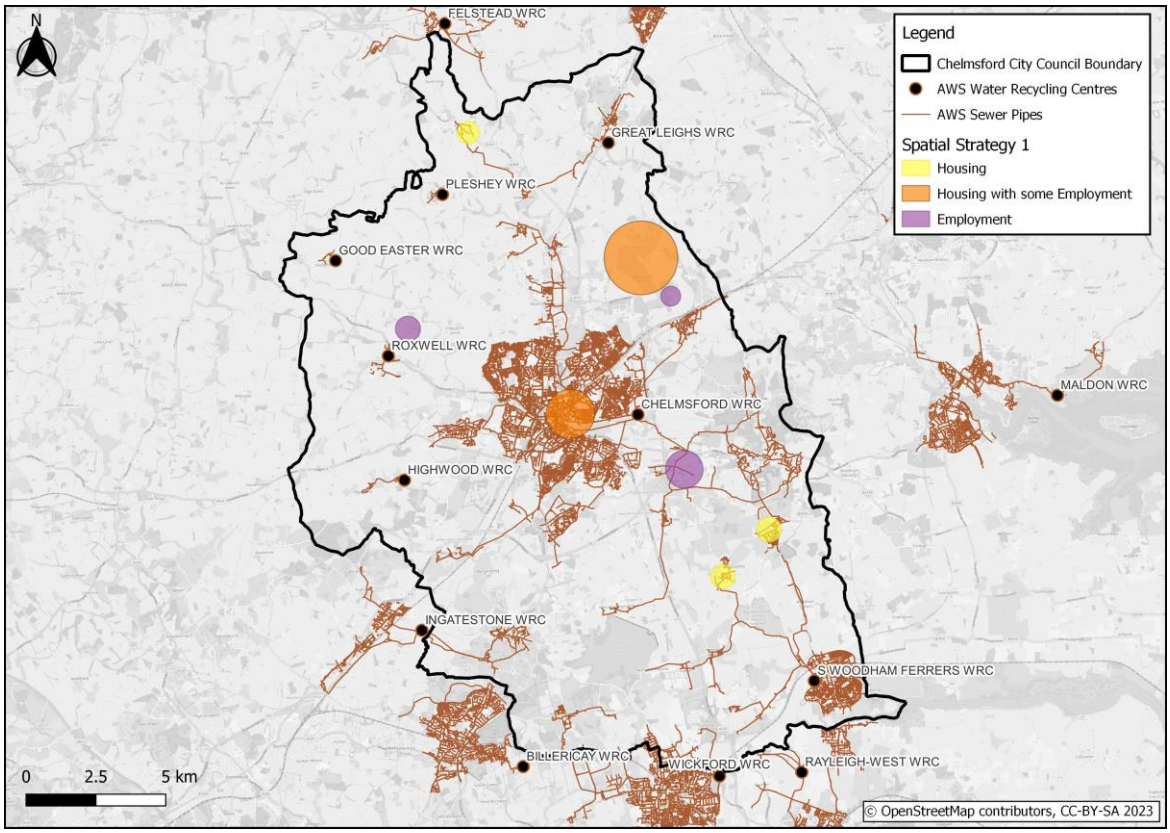


Figure 5.4: Spatial Strategy 1 proposed development and AWS sewer infrastructure

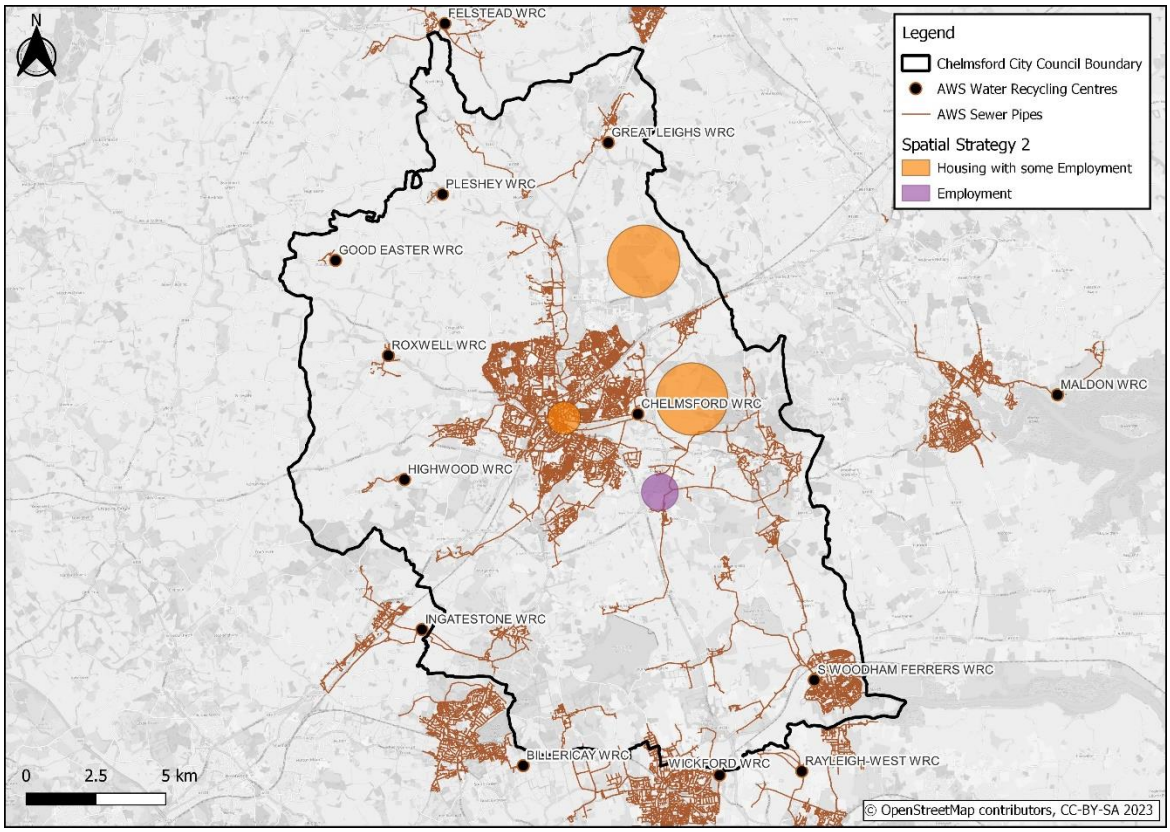


Figure 5.5: Spatial Strategy 2 proposed development and AWS sewer infrastructure

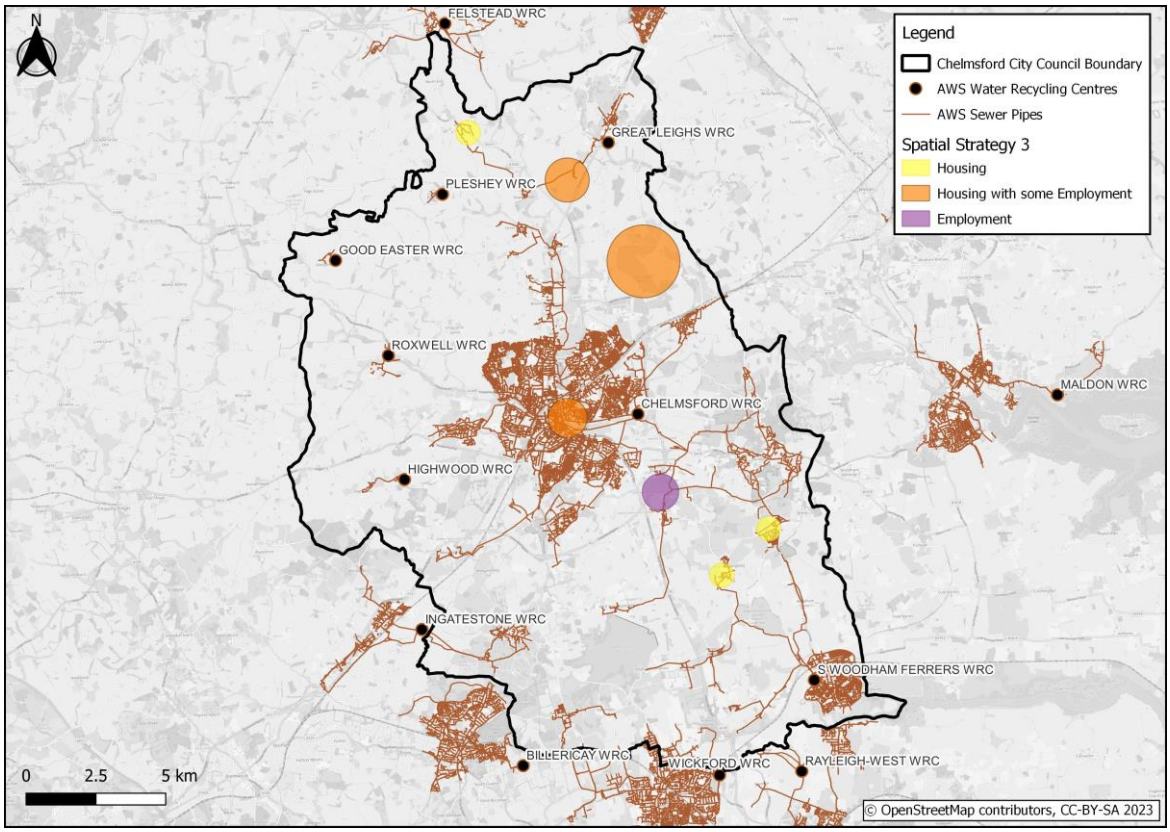


Figure 5.6: Spatial Strategy 3 proposed development and AWS sewer infrastructure

5.4.1 Trade Effluent

It has been assumed that trade effluent from businesses remains constant for the foreseeable future across CCC's administrative area. Intensification of existing employment areas is unlikely to result in a net increase in industrial demand associated with trade effluent as it is predicted that companies with significant water use will improve efficiency and be replaced with service-orientated industry over time, which will incorporate more water efficient fittings and re-use measures.

In addition, AWS are under no obligation to accept trade effluent into their wastewater systems. In doing so, they may require improvements to the capacity of their networks and process streams, depending on the volume and chemical consistency of the effluent. The capital required for this work will be a consideration that the water companies take into account when making a financial agreement with the businesses in question.

5.5 Water Recycling Centre Capacity Assessment

5.5.1.1 Future Dry Weather Flow Estimation

The future development DWF was calculated to assess the impact of the potential proposed development trajectory on the existing WRCs. The future DWF for each WRC was calculated using the formula below:

Future DWF = Existing DWF (Q80) + Future developments DWF (PG + IDWF + E)

Where:

Existing DWF (Q80) is the existing 2022 measured DWF (cubic metres per day).

P is the catchment or development population (number). These differ depending on the type of development:

- Domestic: Number of proposed dwellings (catchment and development scale) times the occupancy rate (based on an occupancy rate of 2.4 which is the UK average)
- Employment: See Section 3
- Educational: See Section 3

G is the future per capita flow (litres per person per day) from the new developments. It was estimated using the PCC of water which was multiplied by the percentage returned to the sewer system. It was assumed that 90% of domestic water consumption was returned to the sewer. The PCC differs depending on the type of development:

- Domestic: For housing developments (household consumption), domestic PCC is aligned with CCC policies. A conservative PCC of 125 litres per person per day was used in the Scoping WCS as per the AWS DWMP 2023 and as agreed with AWS.

- Employment: For employment, commercial and industrial developments the PCC of each of the office employees and members of staff was set as 50 litres per person per day as agreed with AWS.
- Educational: For educational developments the PCC of each of the teachers was 50 litres per person per day and the pupils 15 litres per person per day.

I_{DWF} is the dry weather infiltration (litres per day); a value of 25% was agreed with AWS. This accounts for water entering the sewerage network from incorrect or illegal connections, and through defects in the existing assets. Infiltration was not calculated on a per catchment scale.

E is the trade effluent flow that could arise from proposed developments (litres per day).

5.5.1.2 Future Dry Weather Flow per Water Recycling Centre

Using the above formula and assumptions, the future DWF, generated by potential future development, for each of the WRC was determined.

Table 5.4 summarises the results of the DWF analysis for future development overview in relation to each of the WRC catchments.

A red, amber, green (RAG) status was allocated for each of the WRCs with respect to their future DWF in relation to their permit:

Colour	Description
Red	Future DWF exceeding permit due to proposed/existing development
Amber	Future DWF close to exceeding permit due to proposed/existing development - headroom <10%
Green	Future DWF not exceeding permit due to proposed/existing development - headroom >10%

The results indicate that the proposed developments can be accommodated at all but three of the WRCs without resulting in the existing DWF consents being exceeded by 2041.

The results indicate that the development proposed in the plan period up to 2041 (including each Spatial Strategy in turn) can be accommodated at the majority of WRCs without failing their existing DWF consent.

Chelmsford WRC catchment, where the majority of development is being proposed for the plan period up to 2041, has significant spare capacity and can accommodate the proposed development for all three spatial strategies (see Figure 5.7).

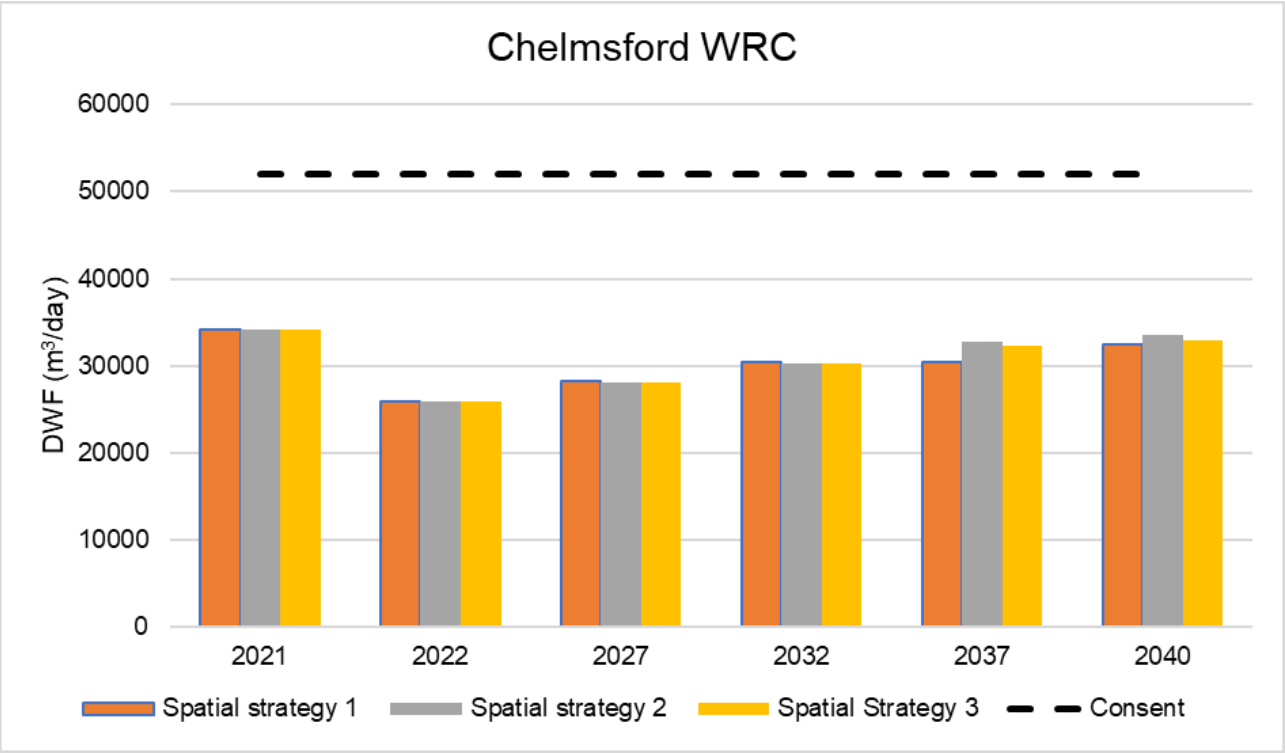


Figure 5.7: Chelmsford WRC – Future DWF for plan period up to 2041 versus DWF permit

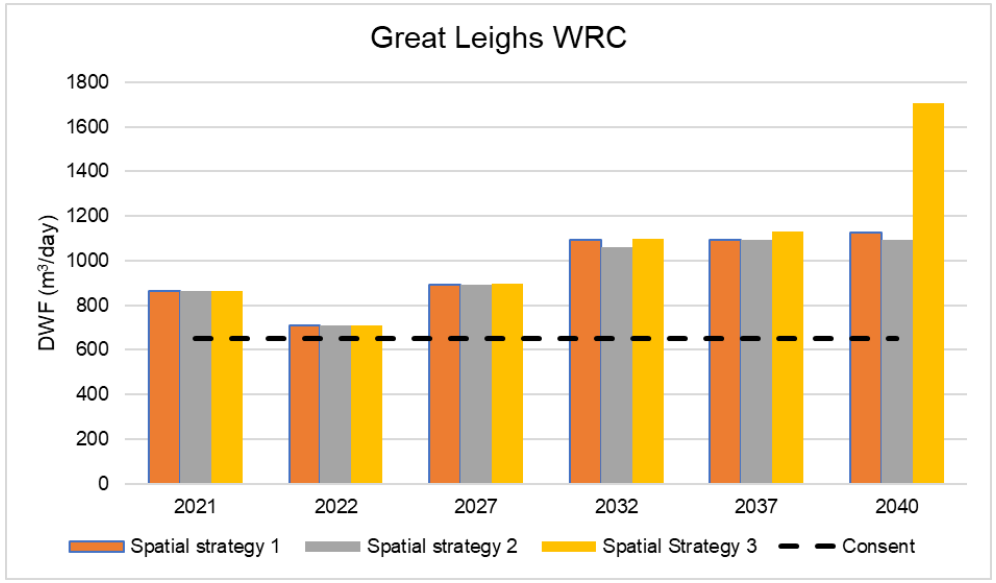
As per Table 5.4 and Figure 5.8, the growth proposed within three of the WRC catchments will, however, exceed the current DWF consents by 2041, namely:

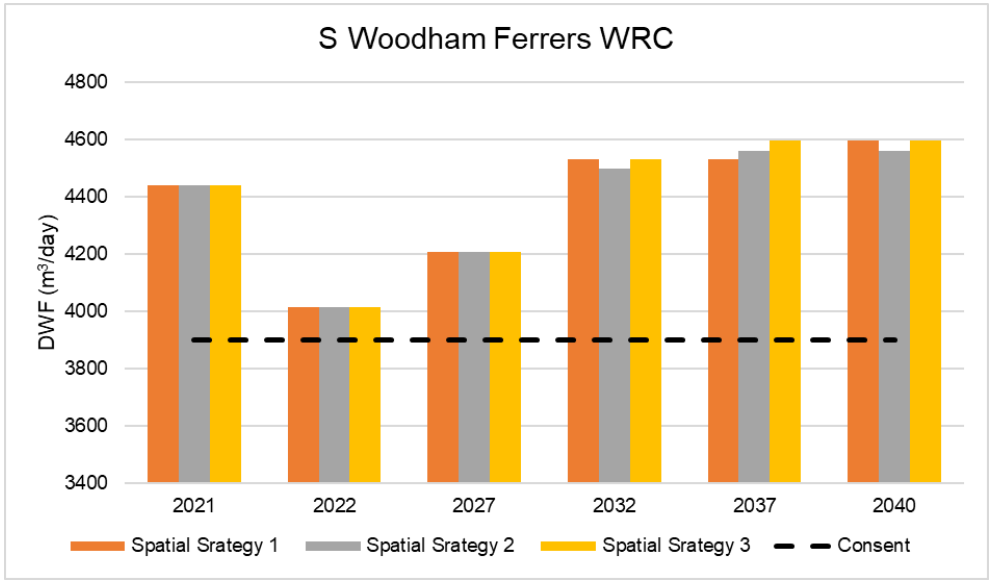
- Great Leighs WRC (consent exceeded in 2021/2022)
- South Woodham Ferrers WRC (consent exceeded in 2021/2022)
- Wickford WRC (consent exceeded in 2021/2022)

Table 5.4: Spatial strategies - Water recycling centres: proposed development future dry weather flow review.

Water recycling centre (WRC)	Settlements served	Existing consented DWF (cubic metres per day)	Existing DWF (Q80 measured 2022) (cubic metres per day)	Strategy 1			Strategy 2			Strategy 3		
				Increase in dwellings (2023-2041)	Increase in employment area and educational facilities. (2023-2041)	2041 calculated DWF (m^3/day)	Increase in dwellings (2023-2041)	Increase in employment area and educational facilities. (2023-2041)	2041 calculated DWF (m^3/day)	Increase in dwellings (2023-2041)	Increase in employment area and educational facilities. (2023-2041)	2041 calculated DWF (m^3/day)
Chelmsford	Bicknacre Boreham Broomfield Chelmsford Danbury Galleywood Great and Little Waltham Hammonds Farm West Hanningfield Howe Green Little Baddow Margaretting Sandon Writtle	**52,050**	25,843	**21,181** dwellings	**322,327m²** employment floorspace 3 Primary schools, 1 Secondary school, 2 SEN schools, 4 Nurseries (including those in primary schools)	33,536 (7693m^3/d increase in DWF)	**21,381** dwellings	**328,327m²** employment floorspace 3 Primary schools, 1 Secondary school, 2 SEN schools, 4 Nurseries (including those in primary schools)	33,610 (7,767m^3/d increase in DWF)	**19,640** dwellings	**292,094m²** employment floorspace 3 Primary schools, 1 Secondary school, 2 SEN schools, 4 Nurseries (including those in primary schools)	32,965 (7,122m^3/d increase in DWF)
Good Easter	Good Easter	**44**	20	**3** dwellings	**580m²** employment floorspace	22 (2m^3/d increase in DWF)	**3** dwellings	**580m²** employment floorspace	22 (2m^3/d increase in DWF)	**3** dwellings	**580m²** employment floorspace	22 (2m^3/d increase in DWF)
Great Leighs	Chatham Green Ford End Great and Little Leighs Howe Street	**650**	**707**	**1,225** dwellings	**0m²** employment floorspace 1 Primary school and 1 Nursery (including those in primary schools)	**1127** (420m^3/d increase in DWF)	**1,125** dwellings	**580m²** employment floorspace 1 Primary school and 1 Nursery (including those in primary schools)	**1094** (387m^3/d increase in DWF)	**2,765** dwellings	**36,233m²** employment floorspace 1 Primary school and 1 Nursery (including those in primary schools)	**1705** (998m^3/d increase in DWF)
Highwood	Edney Common Highwood	**45**	N/A	**3** dwellings	**0m²** employment floorspace	N/A	**3** dwellings	**0m²** employment floorspace	N/A	**3** dwellings	**0m²** employment floorspace	N/A
Ingatestone	Stock	**1,600**	1,489	**33** dwellings	**0m²** employment floorspace	1,500 (11m^3/d increase in DWF)	**33** dwellings	**0m²** employment floorspace	1,500 (11m^3/d increase in DWF)	**33** dwellings	**0m²** employment floorspace	1,500 (11m^3/d increase in DWF)
Pleshey	Pleshey	**39**	N/A	**3** dwellings	**0m²** employment floorspace	N/A	**3** dwellings	**0m²** employment floorspace	N/A	**3** dwellings	**0m²** employment floorspace	N/A
Roxwell	Chignal Roxwell	**220**	115	**12** dwellings	**6,749m²** employment floorspace	127 (12m^3/d increase in DWF)	**12** dwellings	**749m²** employment floorspace	120 (5m^3/d increase in DWF)	**12** dwellings	**749m²** employment floorspace	120 (5m^3/d increase in DWF)

Water recycling centre (WRC)	Settlements served	Existing consented DWF (cubic metres per day)	Existing DWF (Q80 measured 2022) (cubic metres per day)	Strategy 1			Strategy 2			Strategy 3		
				Increase in dwellings (2023-2041)	Increase in employment area and educational facilities. (2023-2041)	2041 calculated DWF (m^3/day)	Increase in dwellings (2023-2041)	Increase in employment area and educational facilities. (2023-2041)	2041 calculated DWF (m^3/day)	Increase in dwellings (2023-2041)	Increase in employment area and educational facilities. (2023-2041)	2041 calculated DWF (m^3/day)
South Woodham Ferrers	East Hanningfield South Hanningfield Rettendon Common Rettendon Place South Woodham Ferrers Woodham Ferrers	**3,900**	**4,014**	**1,694** dwellings	**1768m²** employment floorspace 1 Primary school and 2 Nurseries (including those in primary schools)	**4,596** (582m^3/d increase in DWF)	**1,594** dwellings	**1768m²** employment floorspace 1 Primary school and 2 Nurseries (including those in primary schools)	**4,562** (548m^3/d increase in DWF)	**1,694** dwellings	**1,768m²** employment floorspace 1 Primary school and 2 Nurseries (including those in primary schools)	**4,596** (582m^3/d increase in DWF)
Wickford	Ramsden Heath/Downham Runwell	**7,500**	**8,142**	**146** dwellings	**37m²** employment floorspace	**8,191** (691m^3/d increase in DWF)	**146** dwellings	**37m²** employment floorspace	**8,191** (691m^3/d increase in DWF)	**146** dwellings	**37m²** employment floorspace	**8,191** (691m^3/d increase in DWF)





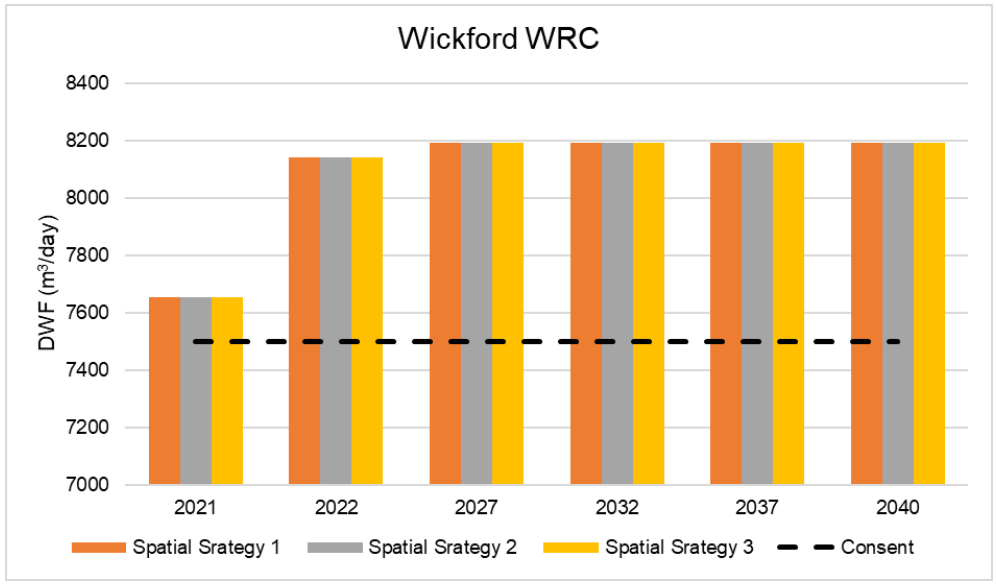


Figure 5.8: Water recycling centres failing dry weather flow consents within plan period (2021 to 2041)

The AWS DWMP provides some solutions and strategies to address existing and future risks and vulnerabilities at some of the WRCs within CCC's administrative area. The potential solutions for the three failing WRCs are shown in Table 5.5.

AWS was consulted on the assessments for the WRCs and asked to provide any comments or concerns where the existing WRCs will not be able to accommodate the proposed developments on a catchment scale. The AWS comments have been summarised in Table 5.5.

Table 5.5: Proposed developments review: water recycling centres exceeding dry weather flow consent summary.

Water recycling centre (WRC)	Dry weather flow (DWF) consent exceedance	Dwellings able to be delivered within existing WRC DWF consent	AWS DWMP 2021: strategies	Anglian Water Services (AWS) consultation comments
Great Leighs	DWF Consent: 650m^3/d Existing DWF: 707m^3/d Strategy 1: 1127m^3/d Strategy 2: 1094m^3/d Strategy 3: 1705m^3/d	**0 dwellings** Will impact any proposed development in: Chatham Green Ford End Great and Little Leighs Howe Street	Infiltration reduction.	The WRC has exceeded its existing DWF consent in both 2021 and 2022. The previous WCS completed in 2018 also indicated that Great Leighs WRC has limited flow capacity under all growth scenarios, therefore growth upgrades and careful development phasing will be required. Treatment process upgrades are likely to be required to meet river quality targets. Permit setting recommended for phosphate. Based on discussions with AWS, the consents at Great Leighs, Roxwell and Ingatestone WRCs will all be reduced to technical achievable limit (TAL) for phosphorus (P) by the end of AMP8. AWS are also already challenged at Great Leighs WRC due to historic flow compliance issues and it will be difficult to accept development in if it causes the consent to go above TAL.

Water recycling centre (WRC)	Dry weather flow (DWF) consent exceedance	Dwellings able to be delivered within existing WRC DWF consent	AWS DWMP 2021: strategies	Anglian Water Services (AWS) consultation comments
South Woodham Ferrers	DWF Consent: 3900m^3/d Existing DWF: 4014m^3/d Strategy 1: 4596m^3/d Strategy 2: 4562m^3/d Strategy 3: 4596m^3/d	**0 dwellings** Will impact any proposed development in: East Hanningfield South Hanningfield Rettendon Common Rettendon Place South Woodham Ferrers Woodham Ferrers	WRC capacity increase. 10% surface water removal such as strategies in network with focus on sustainable drainage systems (SuDS).	South Woodham Ferrers WRC has exceeded its existing DWF consent in both 2021 and 2022. Development would give short term flow non-compliance and drive investment.
Wickford	DWF Consent: 7500m^3/d Existing DWF: 8142m^3/d Strategy 1: 8191m^3/d Strategy 2: 8191m^3/d Strategy 3: 8191m^3/d	**0 dwellings** Will impact any proposed development in: Ramsden Heath/Downham Runwell	WRC capacity increase. 25% surface water removal such as strategies in network with focus on sustainable drainage systems (SuDS).	Wickford WRC has exceeded its existing DWF consent in both 2021 and 2022. Development would give short term flow non-compliance and drive investment.

5.6 Increased dry weather flows: flood risk

The impact of additional discharge on flood risk downstream receptors has been assessed at an outline level in Section 7.

5.7 Key Gaps and Issues for Next Stage

Updates in a Detailed WCS should consider the following tasks:

- The WRCs which fail their existing DWF consent should be discussed with AWS.
- Review the scale and location of the development planned within the updated CLP to ensure the assessment is focused on all WRC catchments where development is planned.
- Review the WRCs where the development and growth have the largest impact (failing consents) and discuss with AWS and the EA to identify potential solutions, including determining the most sustainable development locations and any phasing requirements.
- Odour assessment.
- Infrastructure capacity and supply assessment - establish any specific sewerage network capacity issues related to the proposed growth locations once the preferred options and site locations are agreed.
- WRC assessment based on the preferred Spatial Strategy to be taken forward in Local plan: preferred options assessment.

6 Local Environmental Capacity (Water Quality)

6.1 Water Framework Directive (WFD)

6.1.1 Water Framework Directive: Cycle 2

The WFD is an EU directive, first published in 2000, which commits every EU member to achieve good qualitative and quantitative status of all water bodies by 2015. It was adopted into legislation in England and Wales in 2003 and updated in 2017. The WFD classified what a "good status" for environmental quality measures should be. In 2022, a review of the 25 year environment plan highlighted that only 14% of assessed rivers in England were at "good" ecological status.

The WFD sets out a strategy for protecting and enhancing the quality of groundwater, rivers, lakes, estuaries and coasts. It introduces an integrated approach to river basin management, identifying and characterising the water bodies and protected areas in each river basin, and the pressures and risks upon them. Water quality has always been an important consideration; however, more stringent standards on surface and groundwater quality (and hence discharges into rivers from WRC) are being applied by the EA, as the WFD is implemented at regional and local levels.

Discharges from WRCs, industry and surface water run-off (in particular from agricultural areas) can lead to negative and wide ranging water quality impacts within the receiving watercourses. High levels of nutrients such as phosphates or nitrates can encourage excessive algal growth. This can adversely affect the biodiversity of the watercourse, particularly as it decreases the oxygen levels in the water that other life forms depend upon. Phosphate levels are a concern throughout the majority of the east of England, and will require on-going cooperation between water companies, the EA and other parties such as Defra to overcome this issue at a national and regional level.

The main objectives of the WFD are to prevent any deterioration in current water quality and bring all water bodies up to "Good" status by 2027. The elements most at risk from growth and in relation to WRC permitting are ammonia, phosphate and dissolved oxygen. The WFD requirements could have implications for proposed future developments.

Local Planning Authorities (LPA) need to consider the WFD during the planning process, through assessing the impact of additional wastewater flows on local river quality.

6.1.2 WFD: Water Quality Baseline

The baseline conditions with regards to the WFD classification are outlined in Table 6.1 below. Detailed information relating to the WFD classifications are contained within **Appendix C**.

Where the existing DWF discharge consent (Section 5) is predicated to be exceeded, and the physio-chemical consent standards might require tightening to ensure no deterioration in the WFD status, the site has been outlined in bold text and highlighted in yellow. All of the receiving watercourses are classified as "Moderate" or "Poor".

Table 6.1: WRC Receiving WFD waterbodies water quality baseline

WRC	Discharge point Easting	Discharge point Northing	Receiving WFD waterbody	Overall WFD Classification (2019)
Good Easter WRC	563030	212220	Can	Poor
Chelmsford WRC	574190	206910	Chelmer (downstream of confluence with Can)	Poor
Pleshey WRC	566856	214603	Chelmer (Great Easton - River Can)	Moderate
Roxwell WRC (discharges to Newland Brook tributary of Crouch)	564910	208860	Roxwell Brook	Poor
Great Leighs WRC	**572630**	**216350**	**Ter**	**Moderate**
Ingatestone WRC	566420	199070	Wid (Ingatestone Hall - Margaretting Hall)	Moderate
Wickford WRC (discharges to Sandy Brook tributary of Crouch)	**576910**	**194010**	**Crouch (downstream Wickford)**	**Moderate**
South Woodham Ferrers WRC (discharges into Crouch)	**580040**	**197170**	**Crouch**	**-**

6.2 Existing Water Recycling Centre Consents

The EA is responsible for regulating sewage discharge releases via a system of environmental permits (EP). Permitted discharges are based on a statistic known as the DWF as discussed in the preceding sections of this report.

The EP for WRC consent is set for maximum concentrations of pollutants which, in most cases are suspended solids (SS), biochemical oxygen demand (BOD) and ammonia (NH_4). Some WRCs, usually the larger WRCs, also have permits for phosphorous (P). These are determined by the EA with the objective of ensuring that the receiving

watercourse is not prevented from meeting its environmental objectives, with specific regard to the chemical status element of the WFD classification.

The existing permits of the WRCs within Chelmsford are shown ***Appendix B***.

6.3 Protected Areas

6.3.1 Urban Wastewater Directive

The urban wastewater directive (UWWTD) is designed to make sure all wastewater in the EU is treated to the appropriate standard. An essential element of the directive is that quality standards for effluent fall into categories depending on the size of the treatment works and the sensitivity of the receiving watercourse. This directive also defines sensitive areas. There are four sensitive areas which could be affected by development in the Council's area as defined in Table 6.2.

Table 6.2: Urban wastewater directive sensitive areas

Urban wastewater directive sensitive area	**Sensitivity**
River Wid, Can and Chelmer	Existing eutrophic sensitive area (rivers)
River Chelmer	Existing nitrate sensitive area

6.3.2 Nitrates Directive

The Nitrates Directive (91/676/EEC) aims to improve water quality by protecting water against pollution caused by nitrates from agricultural sources with a key focus on promoting better management of animal manures, chemical nitrogen fertilisers and other nitrogen-containing materials spread onto land. There are five sensitive areas in CCC's administrative area:

- Crouch nitrate vulnerable zone (NVZ)
- Sandlings and Chelmsford
- River Chelmer NVZ
- River Blackwater NVZ

The proposed growth and development does not include any agricultural sites therefore future assessment of Nitrates Directive is not required.

6.3.3 Nutrient Neutrality

Natural England has previously advised 32 Local Planning Authorities (LPA) that, where protected sites are in an unfavourable condition due to excess nutrients, development should only go ahead if it will not cause additional pollution to the protected sites. In March 2022, Natural England advised a further 42 LPAs that their areas are covered by

this advice. Development achieves nutrient neutrality when the nutrient load created through additional wastewater (including surface water) from the development is mitigated.

Currently the Council's area is not located within a nutrient neutrality area even though there are several protected and nutrient sensitive areas located within CCC's administrative area.

6.3.4 Natura 2000 Sites

Natura 2000 is the centrepiece of EU nature and biodiversity policy. It is an EU wide network of nature protection areas established under the 1992 Habitats Directive. Natura 2000 sites is the combined term for sites designated as Special Areas of Conservation (SAC) and Special Protected Areas (SPA). The aim of the network is to assure the long-term survival of Europe's most valuable and threatened species and habitats. Natural England is the statutory nature conservation body for England and has responsibility for ensuring that England's unique natural environment including its flora and fauna, land and seascapes, geology and soils is protected and improved. This includes ensuring the protection, improvement, and management of Natura 2000 protected areas to meet the requirements of the Habitats and Wild Birds Directives.

Due to the limited currently available information on the location and scale of development within the Council's area, the development impacts cannot be fully assessed at this scoping WCS stage. Therefore, all Natura 2000 Sites should be scoped for the Appropriate Assessment for the Chelmsford Local Plan and further assessment will be required during Detailed WCS, in consultation with Natural England.

The most recently published Natura 2000 dataset contains no data for the UK, as a result of the UK leaving the EU on January 31st 2020. Archived data from the 'end 2019' Natura 2000 dataset has therefore been considered.

The main Natura 2000 protected areas noted which could be affected by proposed developments and growth within the Council's area are summarised in Table 6.3.

Table 6.3: Natura 2000 Site Summary

Special Areas of Conservation (SAC)	Special Protection Areas (SPA)	Ramsar sites
Essex Estuaries	Outer Thames Estuary Crouch & Roach Estuaries (Mid-Essex Coast Phase 3) Foulness (Mid-Essex Coast Phase 5)	Dengie (Mid-Essex Coast Phase 1) Blackwater Estuary (Mid-Essex Coast Phase 4)

Site Improvement Plans (SIP) have been developed for each Natura 2000 site in England. SIPs take into account proposed development included within approved Local Plans and are presented based on the existing condition of the site. They are used as a guide to help maintain and keep the site in a favourable condition.

The protected areas listed above are covered by two Site Improvement Plans (SIP077 – Essex Estuaries and Outer Thames Estuary (SIP238)).

Essex Estuaries SAC and the three SPAs are the Natura 2000 sites which could potentially be impacted by proposed development in CCC, however, as it stands, none of the proposed development sites are located in the vicinity of the Natura 2000 sites. Despite the boundary for these two Natura 2000 sites falling within the CCC administrative area, CCC are not listed as a consultee on any of the issues or measures covered by the SIP.

Any change in the discharge from any of the WRCs or additional runoff leading to River Chelmer or River Crouch would ultimately have the potential to impact the respective SACs and SPAs (Natura 2000 sites).

6.4 Proposed Development and Growth Impact

As discussed in Section 5, due to the proposed development and growth in the plan period up to 2041, there are three WRCs which will fail their DWF consents:

- Great Leighs
- Wickford
- South Woodham Ferrers

To ensure the most sustainable strategy is developed regarding wastewater treatment in CCC's administrative area, potential impacts of the increased discharges from the WRCs were reviewed for this WCS.

Table 6.4 contains a summary of the potential solutions discussed during consultation with AWS during the Scoping WCS, some potential solutions extracted from the DWMP and solutions to be discussed with AWS and EA during the Detailed WCS.

Table 6.4: WRCs exceeding DWF consent assessment – potential solutions

WRC	Settlements served	Potential solutions
Great Leighs	Chatham Green Ford End Great and Little Leighs Howe Street	As per the WRC assessment in Section 5, the WRC exceeded its existing DWF consent in both 2021 and 2022 by 9% and 33%. As per Section 3, there are 1125 proposed dwellings identified as part of existing commitments and allocations up to 2036 still to be completed. These will increase the DWF to 1094m^3/day (exceedance of 444m^3/day). In addition, based on the proposed three spatial strategies for growth and development for the plan period up to 2041: • 100 dwellings are proposed as part of Spatial Strategy 1 • 1500 dwellings and 36233m^2 of employment floorspace as proposed as part of Spatial Strategy 3. These developments will increase the DWF to 1094 - 1705m^3/day (exceedance of up to 998m^3/day). These developments will cause the WRC to exceed its DWF consent even further if no interventions are incorporated to accommodate the additional developments. The DWMP proposes the main medium to long term strategy is to reduce infiltration while their planning objectives are WRC compliant. There are no strategies to increase WRC capacity or change the existing permit to allow for growth. This will likely result in deterioration of the river or waterbody quality. As per initial discussions with AWS, the consents at Great Leighs, Roxwell and Ingatestone WRCs will all be reduced to TAL for P by the end of AMP8. AWS are also already challenged at Great Leighs WRC due to historic flow compliance issues and it will be difficult to accept development in if it causes the consent to go above TAL. Additional options to be discussed with the EA and AWS could be: • Diverting flows away from the WRC by pumping flows to another WRC catchment (potentially to Chelmsford WRC) • Optimisation of treatment process for specific water quality parameter (e.g. phosphate or ammonia). • Re-evaluating the consent limit with detailed WRC discharge water quality data

WRC	Settlements served	Potential solutions
South Woodham Ferrers	East Hanningfield South Hanningfield Rettendon Common Rettendon Place South Woodham Ferrers Woodham Ferrers	As per the WRC assessment in Section 5, the WRC has exceeded its existing DWF consent in both 2021 and 2022 by 3% and 14%. As per Section 3, there are 1594 proposed dwellings, educational facilities (1 primary school and 2 nurseries) and 1768m^2 employment land as part of existing commitments and allocations up to 2036 still to be completed. These will increase the DWF to 4562m^3/day (exceedance of 548m^3/day). In addition, based on the proposed three spatial strategies for growth and development for the plan period up to 2041, 100 dwellings are proposed as part of Spatial Strategy 1 and 3. These will increase the DWF to between 4562 to 4596m^3/day (exceedance of up to 582m^3/day). These developments will cause the WRC to exceed its DWF consent even further if no interventions are incorporated to accommodate the additional developments. This will likely result in deterioration of the river or waterbody quality. The DWMP states objectives to increase WRC capacity as the growth included in the DWMP breaches the DWF and to remove 10% of surface water through network strategies such as SuDS. As per initial discussions with AWS, South Woodham Ferrers is slightly exceeding its permit. Development would give short term flow non-compliance and drive investment. Additional options to be discussed with the EA and AWS could be: • Optimisation of treatment process for specific water quality parameter (e.g. phosphate or ammonia). • Re-evaluating the consent limit with detailed WRC discharge water quality data

WRC	Settlements served	Potential solutions
Wickford	Ramsden Heath/Downham Runwell	As per the WRC assessment in Section 5, the WRC has exceeded its existing DWF consent in both 2021 and 2022 by 2% and 9%. As per Section 3, there are 146 proposed dwellings and 37m^2 employment land as part of existing commitments and allocations up to 2036 still to be completed. These will increase the DWF to 8191m^3/day (exceedance of 691m^3/day). No additional development is proposed in any of the three spatial strategies for growth and development for the plan period up to 2041. It should however be noted that a large portion of the Wickford WRC catchment is outside of CCC. Any potential additional development from these areas has not been allowed for in this assessment. The 146 dwellings and 37m^2 employment land will cause the WRC to exceed its DWF consent even further if no interventions are incorporated to accommodate the additional developments. This will likely result in deterioration of the river or waterbody quality. The DWMP states objectives to increase WRC capacity as the growth included in the DWMP breaches the DWF and to remove 25% surface water. As per initial discussions with AWS, Wickford is exceeding its permit. Development would give short term flow non-compliance and drive investment. Additional options to be discussed with the EA and AWS could be: • Optimisation of treatment process for specific water quality parameter (e.g. phosphate or ammonia). • Re-evaluating the consent limit with detailed WRC discharge water quality data

Upgrading processes at these WRCs to accommodate the increase in growth and to improve the quality of the discharge may require an increase in capital and operational expenditure by AWS. Operation of more advanced processes typically increases power consumption, hence increasing operational costs and environmental impact. As water company funding is primarily from consumers, and regulated by Ofwat, AWS must consider all of the above factors when planning WRC upgrades to ensure the correct

balance of technical feasibility, economic viability, and environmental sustainability is achieved.

Any application from AWS, to increase a volumetric discharge consent (for a WRC) will at the least require the 'no deterioration' consent standards to be met. Regardless of growth, the EA may seek to further tighten consent standards in the future to assist in meeting the long-term objectives of the WFD (i.e. achieving Good Ecological Potential (GEP) in all watercourses by 2027). It is imperative that the available treatment capacity is not exceeded by the connection of wastewater from new developments, as this would increase the risk of pollution events and associated impacts on water quality.

If the 'no deterioration' standards cannot be met, it should be noted that the discharge permits required for the new volumetric discharge consent required may not be approved by the regulatory authorities. To ensure the Chelmsford Local Plan is deliverable, where the WRC fails its consent it needs to be demonstrated that there are viable alternative options, which could include relocation of some planned development to settlements in non-failing WRC catchments. Planning conditions may be required to prevent development ahead of WRC capacity being available, as part of the future planning application approvals.

6.5 Key Gaps and Issues for Next Stage

Updates in a Detailed WCS should consider the following:

- Indicative water quality modelling to assess whether increases in DWF as a result of the proposed development can be technically incorporated within the revised permits for receiving failing WRCs and not lead to water quality deterioration.
- Consultation with the EA and AWS to assess the likelihood of obtaining increased volumetric discharge consents for the affected WRC, considering water quality, environmental constraints and flood risk issues. Discussion of potential solutions to accommodate development at the failing WRCs.
- Identify any showstoppers to increasing DWF volumetric discharge permits at these impacted WRCs, receiving watercourses and Natura 2000 sites. Natural England should also be consulted. Where permits cannot be amended, discuss with CCC and AWS to relocate some planned development or transfer flows to non-failing WRCs.
- Confirming with AWS the necessary key strategic sewerage and WRC upgrades (or new WRC), including highlighting the trigger points and delivery timescales for any necessary updates in order to inform the potential phasing of growth, following confirmation of the preferred development options through the Local Plan process. Suitable planning policies and conditions may also be required to ensure that the infrastructure upgrades will delivered be ahead of the development commencing.

7Flood Risk and Surface Water

The connection of new sites to the existing sewerage network and WRCs can potentially increase the risk of flooding in two ways:

- New developments connected to the existing sewerage network may exceed the network capacity causing surcharging of sewers with a consequential risk to properties being flooding with wastewater. This risk is increased during storm events, as increased infiltration of surface water from the existing catchment area can also add to the flows. This is in addition to direct storm flows into the combined systems.
- DWF at WRCs will be increased following the connection of new dwellings to the network. Whilst some flows may be stored on site during the peak of the event, an increase in volumetric flow rate of the discharge is likely. This may be within the existing volumetric flow discharge consent, as stipulated by the EA. However, discharges in excess of this, which will require an updated consent, may increase the fluvial flood risk to properties on the watercourse downstream of the discharge point.

These risks will be more likely for the larger development sites or intensification proposals due to the larger flow increases associated with these sites. Flood risk in CCC's administrative area is described in the documents set out in section 7.1.

7.1 Policy Context

7.1.1 Surface Water Management Plans

Surface Water Management Plans (SWMP) describe the surface water flood risk in a given area and set out options for the preferred surface water management strategy. In the context of the published SWMP, surface water flooding describes flooding from sewers, drains, groundwater and runoff from land or small watercourses that occurs as a result of heavy rainfall.

SWMPs are undertaken when required by Local Lead Flood Authorities (LLFA) in consultation with key local partners who are responsible for surface water management and drainage in their area. They are used to identify flood risk and outline any preferred strategies to mitigate the risk. Surface Water Management Plans (SWMPs) have been prepared by the Flood and Water Management team (Essex County Council) in consultation with local partners. Essex County Council have published ten SWMPs including one for the CCC administrative area. The current SWMP for Chelmsford was published in 2014 and was updated in 2022. The CCC administrative area is currently ranked 6th in terms of flood risk within Essex (out of ten local authorities). The Chelmsford SWMP outlines that 871 properties (residential and non-residential) are at risk of surface water flooding in the 1 in 100 annual chance of flooding event. When considering the impacts of climate change this increases to between 1288 properties when a lower climate change scenario defined as an additional 20% increase in peak rainfall intensity (Central allowance) is used and 1706 properties when an upper climate

change scenario defined as a 40% increase in peak rainfall intensity (Upper End allowance).

7.1.2 Flood Risk Management Plans

Flood risk management plans set out how to manage significant flood risk in nationally identified flood risk areas. The plans are divided by river basin district. CCC is located in the Anglian river basin district for which a flood risk management plan was originally published in March 2016 and updated in December 2022.

7.1.3 Local Flood Risk Management Strategy

The Local Flood Risk Management Strategy (LFRMS) is a document that is published by lead local authorities to manage the flood risk in England. These documents are published every six years or when there is significant change in policy or legislation. Essex County Council publish the LFRMS which covers the CCC administrative area.

7.1.4 Catchment Flood Management Plan

Catchment Flood Management Plans (CFMP) are high level policy documents, prepared by the EA which cover large river basin catchments. They set policies for sustainable flood risk management for the whole catchment covering the next 50 to 100 years.

The North Essex Catchment Flood Management Plan, published in 2011, covers the CCC administrative area. The North Essex CFMP has divided the catchment into eight sub-catchments which have similar physical characteristics, sources of flooding and level of risk. Each sub-catchment has been assigned a flood risk management policy. The six policy statements are:

- Policy 1: Areas of little or no flood risk where the EA will continue to monitor and advise.
- Policy 2: Areas of low to moderate flood risk where the EA can generally reduce existing flood risk management actions.
- Policy 3: Areas of low to moderate flood risk where the EA are generally managing existing flood risk effectively.
- Policy 4: Areas of low, moderate or high flood risk where the EA are already managing the flood risk effectively but where the EA may need to take further actions to keep pace with climate change.
- Policy 5: Areas of moderate to high flood risk where the EA can generally take further action to reduce flood risk.
- Policy 6: Areas of low to moderate flood risk where the EA will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits.

The CCC administrative area is covered by three sub-catchments which are shown in Figure 7.1 and described in Table 7.1.

Table 7.1: CMP: Sub Catchments and related policies

Sub catchment	Area	Policy
1 Blackwater and Chelmer, Upper Reaches and Coastal Streams	Encompasses the majority of the CCC administrative area	Policy 2
2 Chelmsford	City of Chelmsford	Policy 5
3 Along the River Wid	Predominantly rural, with a few properties	Policy 6

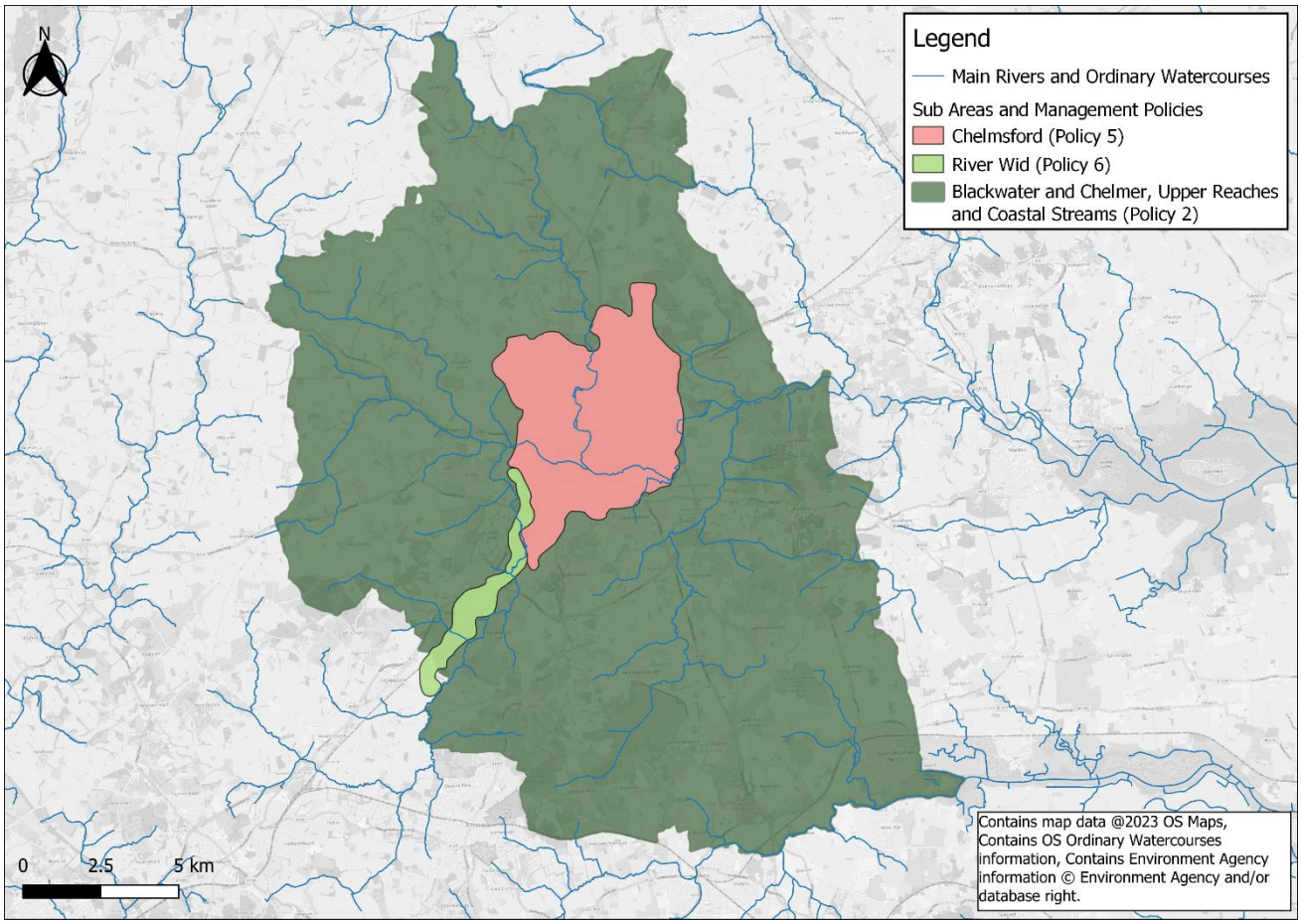


Figure 7.1: Sub Catchments and related policy numbers with watercourses.

7.1.5 Strategic Flood Risk Assessment

Local Plans are supported by Strategic Flood Risk Assessments (SFRA), which assess all forms of flood risk and provide recommendations pertaining to the management of flood risk. An SFRA takes a tiered approach to risk assessment and has two levels. A Level One SFRA provides a strategic overview of all forms of current and future flood risk whilst a Level Two SFRA provides a more detailed assessment of all sources of flood risk, providing a focus for specific sites where appropriate.

The National Planning Policy Framework (NPPF) sets out the tests needed to ensure people and property are protected from flooding. The sequential test is applied to all developments in order to direct development to the areas at lowest risk of flooding in preference to those in areas at higher risk. If the sequential test shows that there are no suitable development sites in areas of lower flood risk, then the exception test is applied. The exception test must demonstrate that the development has wider benefits that outweigh flood risk, that the development will be safe for its lifetime and will not increase flood risk elsewhere.

The Council published their Level 1 SFRA in 2008, with an updated Level 1 and Level 2 SFRA published in 2017. Recommendations from the SFRA follow current UK guidance in

terms of, taking a risk based approach to development and flood risk, assessment of cumulative impacts, requirements for site specific FRAs and analysis of residual risks. It recommends that where possible SuDS should be promoted. Currently a revised Level 1 SFRA is being produced with an expected publication date of February 2024. The focus of the Detailed WCS will be to review the outcomes of the Level 1 SFRA (2024) with respect to the finalised Spatial Strategy.

7.1.6 The Sustainable Drainage Systems Design Guide For Essex

The Flood and Water Management team at Essex County Council is a statutory consultee for surface water drainage proposals for major developments. This is part of their responsibility as the LLFA under the Town and Country Planning Order 2015. As LLFA, Essex County Council publish design guidance for SuDS, which outlines design standards and specific features. Specific features such as rainwater harvesting, soakaways and swales are given detailed specifications recommended locations. This guidance is used by Essex County Council to review planning applications.

7.2 Baseline Situation

Information from the 2017 SFRA, EA datasets and a review of available online media has been used to identify the historical flood events that have impacted the Chelmsford area. If the revised SFRA is published within suitable timeframes, this list will be reassessed as part of the Detailed WCS.

Table 7.2: Historical Flood Events in the Chelmsford area

Location	Date	Source	Additional Information
Chelmsford	March 1947	Previous SFRA (2008)	Flooding relating to heavy rain and snowfall causing significant damage to Chelmsford.
South Woodham Ferrers	January to February 1953	EA Recorded Flood Outlines	Tidal flooding via over-topping of defences.
River Can Catchment	September 1958	Previous SFRA (2008)	Flooding caused by intense rainfall of short duration of the saturated River Can catchment.
River Chelmer Catchment	September 1958	Previous SFRA (2008)	Flooding recorded downstream of Paper Mill Bridge. Also flooding at Felsted Mill and Church End.
River Chelmer Catchment	October 2000	Previous SFRA (2008)	Flooding resulting from wettest Autumn since 1700s. The worst affected town was Little Waltham where 8 properties were flooded.
River Chelmer Catchment	October 2001	Previous SFRA (2008)	10 properties in Great Dunmow, 14 in Little Waltham, 2 in Broomfield, 2 in Brook End and the Rivermead Industrial Estate in Chelmsford.
Various Locations	Summer 2007	Online media and subsequent national reviews	Major flood event throughout the UK which resulted in wide ranging flooding.
Chelmsford Area	February 2007	Media Article	Flooding of the River Wid near Chelmsford.
Chelmsford Area	September 2009	EA Recorded Flood Outlines	Flooding of River Chelmer Flood Plain and Central Park.
Various Locations	Winter 2012	Online media and subsequent national reviews	Major flood event throughout the UK which results in significant flooding.
Broomfield	December 2013	Media Article	Flood records of the River Chelmer out of bank in the vicinity of Broomfield.
Central Chelmsford	July 2014	Media Article	Flooding of central roads in Chelmsford.
Various Locations	August 2020	Media Article	Flooding in Loughton and flash flooding in Chelmsford.
Central Chelmsford	January 2021	Media Article	Flooding in central roads and areas in Chelmsford.
Various Locations	August 2022	Media Article	Flooding in Epping Forest District, Chelmsford, Braintree and Halstead.

7.3 Development Considerations and Impacts

7.3.1 Flood Risk Considerations

A summary of flood risk for site locations included in the adopted local plan allocations and CCC development trajectories up to 2036 and the three spatial strategies up to 2041 is provided in this section. Table 7.3 summarises the Flood Zone classification for the adopted local plan allocations including the CCC development trajectories up to 2036, only the locations that are within Flood Zones 2 or 3 are listed.

Table 7.3: Flood risk summary for adopted local plan housing and employment sites.

Location	Category	Flood Risk
Chelmsford	City or Town	Parts of the proposed housing and employment development are located within Flood Zone 2 and 3. These are located within the following main areas: Baddow Road, Wharf Road, Navigation Road, Springfield Road, Victoria Road, Medway Close.
East Chelmsford (North of Manor Farm)	City or Town	Nearly all of the mixed housing and employment development location is within Flood Zone 2 and 3. These zones are located adjacent to the River Chelmer and an unnamed watercourse. Parts of the housing only locations are within Flood Zone 2 and 3.
North of South Woodham Ferrers	Service Settlements	The mixed housing and employment development location is partially within Flood Zone 2 and 3. These zones are located adjacent to an unnamed watercourse. However, these zones are small.

Table 7.4 summarises the Flood Zones classifications for locations included in the three spatial strategies; all locations are included regardless of their flood zone classification.

Table 7.4: Flood risk summary for additional Spatial Strategy housing and employment sites.

Settlement location	Spatial Strategy one	Spatial Strategy two	Spatial Strategy three
Bicknacre	Parts of housing located within Flood Zone 2 and 3, adjacent to an unnamed watercourse.	Location not included in Spatial Strategy.	Parts of housing located within Flood Zone 2 and 3, adjacent to an unnamed watercourse.
Boreham	Not in Flood Zone 2 or 3.	Location not included in Spatial Strategy.	Location not included in Spatial Strategy.
Chatham Green	Location not included in Spatial Strategy.	Location not included in Spatial Strategy.	Not in Flood Zone 2 or 3.
Chelmsford	Employment and housing located within Flood Zone 2 and 3, adjacent to the River Can and River Chelmer.		
Ford End	Not in Flood Zone 2 or 3.	Location not included in Spatial Strategy.	Not in Flood Zone 2 or 3.
East Hanningfield	Not in Flood Zone 2 or 3.	Location not included in Spatial Strategy.	Not in Flood Zone 2 or 3.
Hammonds Farm	Location not included in Spatial Strategy.	Employment and housing located within Flood Zone 2 and 3, adjacent to Sandon Brook and the River Chelmer.	Location not included in Spatial Strategy.
Howe Green	Location not included in Spatial Strategy.	Employment is located within Flood Zone 2 and 3, adjacent to Sandon Brook and an unnamed tributary.	Employment is located within Flood Zone 2 and 3, adjacent to Sandon Brook and an unnamed tributary.
Roxwell	Not in Flood Zone 2 or 3.	Location not included in Spatial Strategy.	Location not included in Spatial Strategy.
Sandon	Employment is located within Flood Zone 2 and 3, adjacent to Sandon Brook.	Location not included in Spatial Strategy.	Location not included in Spatial Strategy.

Early consultation with the EA and the lead local flood authority (LLFA) is essential. Any development must pass the Sequential Test as per National Planning Policy Framework (NPPF). As set out in the Planning Practice Guidance, all forms of flooding should be considered. It is CCC's responsibility to undertake the sequential test as part of the CLP preparation process using the latest SFRA. Sequential design at the master planning stage should ensure that built development and access routes are entirely within Flood

Zone 1 and should avoid impacting on surface water flow routes or ordinary watercourses. Opportunities should be exploited at the master planning stage for multiple benefits in terms of a holistic and integrated approach to land use planning, sustainable drainage, water resources, flood risk, green infrastructure, amenity, biodiversity and WFD status. Construction Industry Research and Information Association (CIRIA) Report C787A provides useful guidance and physical case studies on delivering better water management through the planning system. The draft mandatory National SuDS standards are currently being prepared as part of an upcoming Schedule 3 implementation of the Flood and Water Management Act.

During the outline planning stage, a surface water drainage strategy must be submitted by the developer to the LPA in consultation with the LLFA and EA at an early stage to show how the impact of the development will be reduced through the use of SuDS. All major developments must carry out a flood risk assessment (FRA) including an assessment of flood risk from all sources, and hydraulic modelling of any watercourses, where necessary, to better define the flood zones, water levels and the impact of climate change.

AWS should be consulted at an early stage for major developments to ensure that there will be sufficient capacity in the wastewater system and any upgrades are carried out where necessary.

7.4 Flood Risk from Water Recycling Centre Discharges

Increased discharges from WRCs to watercourses can increase fluvial flood risk. A multi-criteria scoring system has been applied as part of the Scoping WCS; this methodology was developed as part of the AWS Waste Water Environmental Capacity Assessment. The assessment uses a multi-criteria approach to assess the increase in peak flow, the sensitivity of the watercourse to changes in flood levels, and the potential impact of flooding, to determine a combined flood risk index. The evaluation of flood risk is comprised of three elements:

- Quantification of the increase in peak river flows, resulting from the predicted increase in treated effluent discharges.
- Evaluation of the likely sensitivity of flood levels to increases in flood flows.
- Evaluation of the impact of increases in flood levels.

For each element the impact at each discharge site is classified as “high”, “medium”, or “low”, and the multi-criteria analysis applied to combine these elements.

7.4.1 Proposed Methodology

The analysis was conducted using a design flood with a 1 in 2 annual chance (50% annual exceedance probability) also known as the mean annual maxima flood (QMED). The design flood in the proposed methodology was selected because:

- Increases in WRC discharge during the 1 in 2 annual chance event would contribute a greater proportion of flood flows than if a more extreme flood event (i.e. 1 in 100 annual chance event) had been used, and hence results are likely to be conservative.
- The 1 in 2 annual chance event is the smallest event which can be estimated using standard techniques.

The increase in peak flow for the 1 in 2 annual chance event into the receiving waterbody will be calculated firstly, by calculating the baseflow using the Flood Estimation Handbook (FEH) method; and, secondly, by estimating the increase in dry weather flow discharge from the WRC (see Section 5).

In accordance with National Planning Policy, climate change has been factored into the receiving watercourse based on the climate change planning guidance.

DWF received at the WRC will be increased following the connection of new dwellings to the sewerage network. Whilst some of the increases may be stored at the WRC site during peak flows, an increase in the volumetric flow rate of discharge is likely. This may be within the existing volumetric discharge consent, as stipulated by the EA, and discussed in Section 5.5. However, WRC typically discharge up to three times their DWF (referred to as flow to full treatment (FTFT)) at the peak. FTFT is the maximum flow a WRC can treat. An increase in FTFT, due to growth in the catchment, may increase the flood risk to properties and environmental sites on the watercourse downstream of the discharge point.

The multi-criteria analysis provides a risk score for each of the impacted discharge points. The flood risk scores are assigned to each discharge by estimating the contribution that the increased FTFT flows due to proposed development to 2050 makes to the flow in the watercourses during a 1 in 2 annual chance flood. This was then weighted to account for the sensitivity of the watercourse to flow increases, and the potential local impacts of any flooding.

The methodology compares the total 2050 FTFT from the WRC (flows from both existing and proposed dwellings) against the 1 in 2 annual chance flood events for the watercourses, hence providing a risk score for the total predicted flows by 2050.

For each of the risk scores, a conservative approach was taken in order to understand the risk of the worst scenario in this Scoping WCS, with recommendations for further work as part of the Detailed WCS needed to understand the risk in more detail.

7.4.2 Results

If FTFT from the existing properties is considered to be an integral part of the current river flows, it can be shown that the actual increase in total peak flows in the rivers by 2050, which is solely attributable to the proposed growth, makes up a considerably smaller proportion. Due to the lack of information on permit location, Pleshey WRC has not been assessed in the Scoping WCS. Due to the small increase in flow, due to the proposed dwellings in each of the spatial strategies, the results shown in Table 7.5 are relevant to all three spatial strategies.

Table 7.5: Flow to full treatment by water recycling centre and receiving watercourse.

WRC	Receiving Watercourse	Percentage of Increased flow by 2050	Combined Risk Score	Risk Assessment
Chelmsford*	Blackwater Estuary	0.07%	2.2	Low
Good Easter	Wares Brook	0.04%	1.9	Low
Great Leighs	River Ter	0.40%	1.6	Low
Highwood	River Wid	0.06%	1.3	Low
Ingatestone	River Wid	0.01%	1.6	Low
Roxwell	Newland Brook	0.01%	1.6	Low
South Woodham Ferrers	Fenn Creek	0.05%	2.2	Low
Wickford	The River Crouch	-0.53%	1.6	Low

*Chelmsford WRC discharges outside of the Chelmsford area.

None of the proposed increases in WRC discharges change the combined risk score compared to the current situation. Chelmsford WRC and South Woodham Ferrers WRC have the "highest" risk scores. Of the three elements that make up the risk score, neither Chelmsford or South Woodham Ferrers WRC identified increase in flow as a significant risk; the overall risk score is predominantly driven by the placement of infrastructure upstream and downstream of the WRC outfall.

7.5 Key Gaps and Issues for Next Stage

Updates in a Detailed WCS should consider the following:

- The three spatial strategies are currently not finalised; the results presented in the Scoping WCS are applicable for all three spatial strategies but this may change when the preferred options Spatial Strategy has been developed by CCC. A follow-up analysis using a similar conservative approach should be undertaken once the preferred options Spatial Strategy is completed.
- SuDS recommendations will be explored with respect to an integrated water management approach highlight potential ways to reduce flood risk and maximise wider benefits.

- If the revised SFRA is published, the Detailed WCS will review the outcomes with respect to the finalised Spatial Strategy. Whilst detailed flood risk considerations will be the subject of the revised SFRA, supplementary information will be supplied in the Detailed WCS where available.

8 Proposed Development Strategies: Constraints, Solutions and Opportunity Summary

Table 8.1 contains a summary of the constraints and opportunities relating to each proposed development Spatial Strategy:

Table 8.1: Proposed development strategies: constraints, solutions and opportunity summary

Development Strategy	Water Resources and Supply	Water Recycling Centres and Sewerage	Local Environment (water quality)	Flood Risk
Adopted local plan (development up to 2036)	WCS indicated no major concerns with respect to water resources in terms of accommodating additional development set out in the current adopted local plan and remaining development up to 2036 as well as accommodating additional development to 2041 as per Spatial Strategy 1,2 or 3 up to 2041. Currently Essex and Suffolk Water predict a deficit in supply (Essex WRZ) if no interventions are implemented. They are however proposing a number of measures to generate a surplus in supply throughout the WRMP planning period (up to 2050), by implementing a combination of supply and demand measures (including leakage reduction, metering water re-use and other options). Nevertheless, considering that Chelmsford is in a seriously water stressed area there is a general need to reduce water consumption through water positive planning measures involving water efficiency, rainwater harvesting, SuDS and nature-based solutions.	The WRC assessment indicates that the proposed development set out for the plan period up to 2041 (including each Spatial Strategy) can be accommodated at the majority of WRCs (including Chelmsford WRC where the majority of the development is proposed) without failing their existing DWF consent. The existing DWF consents are exceeded at the following three WRCs, creating an existing restriction to any growth which is exacerbated by the additional development and growth in the plan period up to 2041. **Great Leighs WRC** Additional growth is proposed as part of Spatial Strategy 3 in the Great Leighs WRC catchment in addition to the adopted local plan growth which will exacerbate the DWF exceedance. Therefore, proposed development will be limited and unlikely to be accommodated as explained below. The consents at Great Leighs, Roxwell and Ingatestone WRCs will all be reduced to TAL for P by the end of AMP8. AWS are also already challenged at Great Leighs WRC due to historic flow compliance issues and it will be difficult to accept development if it causes the consent to increase above TAL. There is potential to divert flows to Chelmsford WRC to accommodate the growth if it cannot be accommodated at Great Leighs WRC. **South Woodham Ferrers WRC** A small amount of additional growth is proposed as part of Spatial Strategy 1 and 3 in the South Woodham Ferrers WRC catchment in addition to the adopted local plan growth, which will exacerbate the DWF exceedance. Therefore, proposed development will be limited and unlikely to be accommodated without timely interventions at the WRC. South Woodham Ferrers is exceeding its permit. Development would give short term flow non-compliance and drive investment. The AWS DWMP has also indicated that a WRC capacity increase in addition to surface water removal is required to accommodate future growth. **Wickford WRC** No additional growth is proposed as part of Spatial Strategy 1, 2 or 3 in the Wickford WRC catchment. Wickford is exceeding its permit. Development would give short term flow non-compliance and drive investment. The AWS DWMP has also indicated that a WRC capacity increase in addition to surface water removal is required to accommodate future growth.	It is likely that the proposed development can be accommodated within the existing consent and the existing permit can remain in place with DWF and limits intact at the majority of the WRCs. A new DWF consent at the failing WRCs (Great Leighs, South Woodham Ferrers and Wickford WRC) will require tighter limits for all water quality parameters, to ensure there is no deterioration to the water environment, as a result of increased discharge from the receiving WRC. However, in the case of Great Leighs WRC the required permit limits may not be achievable (P will be set at TAL in AMP8), and alternative solutions will be necessary. For example, diverting flows and/or relocating some development to Chelmsford WRC catchment to accommodate the CLP growth. Opportunity should be maximised for new development to implement Sustainable Drainage and Natural Flood Management techniques to improve the quality of surface water management, flood risk reduction and net biodiversity gain from the sites post development.	The WCS indicates that a number of the proposed development locations would be at risk of flooding, due to their location in Flood Zone 2 and 3. The updated SFRA should inform these flood risk constraints to inform the sequential test process undertaken by CCC when allocating new sites as well was ensuring a sequential approach by future developers in their site designs. Opportunities for SuDS will be further explored in the Detailed WCS to supplement the recommendations in the SFRA. This WCS found no major concerns with respect to Flood Risk in terms of accommodating additional DWF from the receiving WRCs development from the CLP growth for all three spatial strategies.
Spatial Strategy 1				
Spatial Strategy 2				
Spatial Strategy 3				

9Conclusions and Recommendations

The development proposed within the Chelmsford Local Plan (CLP) for the plan period up to 2041 (to supersede the existing Adopted Local Plan up to 2036) has been analysed as part of this Water Cycle Study (WCS) to assess if it can be accommodated by the water and wastewater infrastructure, and the wider water environment.

This Scoping WCS provides a preliminary assessment of the baseline conditions and the three emerging spatial strategies for the plan period up to 2041 and supports CCC in developing the Preferred Options to take forward to the Regulation 18 Preferred Options Consultation. A Detailed WCS will follow, which will assess the Spatial Strategy in the Preferred Options Plan and provide further evidence and recommendations for the CLP preparation on how the final Spatial Strategy for the plan period up to 2041 can be accommodated.

The conclusions and recommendations of the outline assessment are presented in the section below.

It is considered that the capacity of the existing Water Recycling Centres (WRCs) and the associated impact on water quality and water environment are the greatest potential issues in relation to the currently proposed development aspirations within CCC's administrative area.

As this is a Stage 1 Scoping WCS it should be treated as a 'draft living document' with the conclusions and analysis being subject to change following further investigation and consultation, as part of the Stage 2 Detailed WCS.

9.1 Spatial Strategies for Plan Period

This Scoping WCS is intended to inform CCC of the possible constraints and opportunities to various development options (spatial strategies), which will inform the Regulation 18 Preferred Options Consultation (2024) for the CLP consolidating the three strategies into one preferred Spatial Strategy.

Based on the available information and assessment results within the WCS, the proposed Spatial Strategy 2 for the plan period is the preferred Spatial Strategy as all the proposed development is located within the Chelmsford WRC catchment which has sufficient headroom capacity.

9.2 Water Resources and Supply

Water within the study area is supplied by Essex and Suffolk Water. The initial demand calculations show an overall increase in potable water demand in CCC's administrative area of between 5.25Ml/d and 7.52Ml/d between 2023 and 2041.

Currently Essex and Suffolk Water predict a deficit in supply if no interventions are implemented. They are proposing a number of measures to generate a surplus in supply of 3.46Ml/d in 2025/26 rising to 61Ml/d by 2040/41. This is achieved through a combination of supply and demand measures (including leakage reduction, metering and water re-use) combined with a reduction in total current household usage to 111.8Ml/d. Consultation with Essex and Suffolk Water highlighted their assumption that all new properties will have a Per Capita Consumption (PCC) rate of 115 l/h/d, under the revised draft Water Resources Management Plan 2024 (WRMP24).

The Essex and Suffolk Water supply area is classified by the EA as an area of 'serious water stress' with very little additional capacity for available water for abstraction. Hence there is a key driver in terms of managing water demand across CCC for all new developments in order to achieve long term sustainability.

In the latest revised draft WRMP24, Essex and Suffolk Water are working from a CCC 2022 housing trajectory which is different to the trajectory information included in the three latest three spatial strategies received from CCC to inform this WCS. Currently a surplus of homes is predicted from 2022/23 until 2025/26 when compared with the currently adopted Chelmsford Local Plan. However, from 2025/26, a deficit in the number of homes which Essex and Suffolk Water plan to supply is predicted, with a total deficit of approximately 2,100 homes by 2030/31. Due to the surplus in water supply predicted by Essex and Suffolk Water combined with potential future water efficiency policies promoted by CCC, this will not have an impact on new homes. During the next planning period (AMP8), Essex and Suffolk Water will engage with CCC to obtain the growth information from the emerging Local Plan to ensure that any updated development trajectories will be used to produce the new WRMP.

Sustainable Drainage Systems (SuDS) are promoted by Essex County Council and CCC to reduce flood risk, improve water quality, water resources etc. These measures can work with, and compliment, water efficiency measures to reduce demand on water use within communities; this will be explored further in the Detailed WCS.

9.3 Wastewater Treatment and Sewerage

The results of the analysis carried out in this Scoping WCS provide a preliminary indication of the impacts of the proposed development trajectory on existing wastewater assets. The assessment indicates that the proposed development included in the plan period up to 2041 (including each Spatial Strategy in turn) can be accommodated at the majority of Water Recycling Centres (WRCs) owned by Anglian Water Services (AWS), including Chelmsford WRC where most of the development is proposed, without failing their existing Dry Weather Flow (DWF) consent.

However, the scale of growth in the settlements within the WRC catchments is predicted to substantially exceed the existing DWF consents at:

- Great Leighs WRC
- South Woodham Ferres WRC
- Wickford WRC

The current DWF at these WRCs are already exceeding their existing DWF consents creating an existing restriction to any growth which is exacerbated by the additional growth.

The assessments and consultations undertaken to date have identified that there could be significant wastewater treatment and sewerage capacity issues for the proposed growth plans at these WRCs, but most notably at Great Leighs WRC. The AWS Drainage and Wastewater Management Plan (DWMP) 2023 and consultations with AWS have identified some solutions to increase compliance at the failing WRCs to possibly support additional development:

- **Great Leighs WRC**
  The consents at Great Leighs, Roxwell and Ingatestone WRCs will all be reduced to Technically Achievable Limits (TAL) for phosphorus (P) by the end of the next Asset Management Plan (AMP8) period. AWS are also already challenged at Great Leighs WRC due to historic flow compliance issues and it will be difficult for them to accept development if it causes the consent to go above TAL.

- **South Woodham Ferres WRC**
  South Woodham Ferrers is exceeding its permit. Development would give short term flow non-compliance and drive investment. The AWS DWMP has also indicated that a WRC capacity increase in addition to surface water removal is required to accommodate future growth.

- **Wickford WRC**
  Wickford is exceeding its permit. Development would give short term flow non-compliance and drive investment. The AWS DWMP has also indicated that a WRC capacity increase in addition to surface water removal is required to accommodate future growth.

9.4 Water Quality Local Environmental Capacity (Water Quality)

The Natura 2000 sites which could be impacted by the proposed developments in the plan period up to 2041 within CCC's administrative area are:

- Essex Estuaries (SAC)
- Outer Thames Estuary (SPA)
- Crouch & Roach Estuaries (Mid-Essex Coast Phase 3) (SPA)
- Foulness (Mid-Essex Coast Phase 5) (SPA)

Mitigation measures explored in the Scoping WCS to ensure that development does not negatively impact on the Natura 2000 and the status of the WFD waterbodies are: delivering effective surface water and flood management, tightening WRC consent

standards, phasing of development to ensure the timely implementation of infrastructure upgrades and encouraging holistic water management.

If the WFD 'no deterioration' standards cannot be met, it should be noted that the permits required for the new volumetric discharge consent required at the failing WRCs may not be approved by the regulatory authorities.

To ensure the Local Plan is deliverable it needs to be demonstrated that there are viable alternative options at the failing WRCs through the Detailed WCS. Considering the volume of growth predicted in each of these impacted WRC catchments and their environmental sensitivity, this staged approach will be required to confirm that the new DWF consent requirements can conform with environmental legislation when the preferred Spatial Strategy option to be taken forward is confirmed.

9.5 Flood Risk Management

For all three of the spatial strategies, there is a risk that homes and businesses could be situated within Flood Zone 2 or 3, dependent on the exact locations within each area. Detailed flood risk considerations are not within the scope for a WCS and traditionally will be covered by the SFRA. Currently an update to the Level 1 SFRA is expected to be published in February 2024. The detailed WCS will provide recommendations in line with integrated water management policies, which will support the SFRA. These policies could help to reduce flood risk, whilst providing other water environment benefits.

A high-level assessment has been undertaken on each of the water recycling centres within CCC's administrative area. This is to determine if an increase in properties and population poses an increased flood risk to the receiving watercourses from discharges. The assessment produces a risk score based on river flows, infrastructure crossing the river and urban infrastructure near the river. A conservative approach (worst case) was taken, assuming all river crossings locations and infrastructure are in place and that there are properties located on the floodplain downstream. All WRC are seen as a low risk for increasing flooding in the receiving watercourse.

10 Scope for a Detailed WCS

This Scoping WCS provides CCC with a preliminary indication of where water and wastewater infrastructure, and the wider water environment, is likely to constrain the proposed development and/or further assessment is required to progress the CLP (Preferred Options) with regard to the final Spatial Strategy for the plan period up to 2041.

Therefore, a Detailed WCS should be completed alongside the finalisation of the CLP although the scope and detail of the Detailed WCS will depend on the final preferred options Spatial Strategy that is taken forward by CCC and the outcomes from the consultations with AWS and the EA.

The Detailed WCS will be required to:

- Work with CCC to agree and develop the preferred Spatial Strategy for the CLP minimising and avoiding, where possible, new development in Great Leighs WRC catchment. There is likely to be a need for securing significant developer contributions for implementing the necessary new sewer diversions to convey the extra flows to Chelmsford WRC if new development is to be allocated in the Great Leighs WRC Catchment.
- Inform and advise CCC of any potential policies and policy updates regarding water resources and supply to accommodate growth and development, especially policies advocating for water efficient fixtures and rainwater harvesting.
- Investigate how properties could achieve the proposed daily water consumption and how this could be monitored.
- Explore opportunities to work towards achieving water neutrality within CCC's administrative area.
- If published, review the updated Level 1 SFRA with respect to the finalised Spatial Strategy to provide relevant supplementary recommendations.
- Provide recommendations on an integrated water management approach to developments which could help to reduce water use and decrease flood risk.
- Collate additional baseline monitoring data and any ongoing assessments undertaken by the EA, AWS, NE and WRE with regard to the new consenting requirements at the impacted WRCs and viable water resources and supply options to accommodate growth and development in CCC's administrative area.
- Identify the potential requirements to protect the water environment (permit and capacity assessments including water quality discharge parameters for the most impacted WRCs) and confirm with AWS the scale and phasing of the required WRC upgrades (including timing constraints) to accommodate the preferred options and associated development trajectory, whilst protecting the water environment (including Natura 2000 Sites and WFD waterbodies).
- Confirm with Essex and Suffolk Water if the preferred Spatial Strategy can be accommodated by a combination of the existing water supply infrastructure and that which is currently planned for.
- Confirm with the AWS the scale and phasing of the sewerage and potable network upgrades required to allow the connection of the large extensions / intensification in the towns and key service centres.

- Identify how any infrastructure constraints identified through the WCS process can be overcome, the further action required to achieve this, and which of the stakeholders will be responsible for these actions.
- Inform the WCS stakeholders of the indicative costs of water efficiency and rainwater harvesting measures.
- Enable CCC to identify any potential 'showstoppers' early on and reallocate housing numbers to less sensitive WRC catchments, ahead of the selection of preferred options for CLP
- Provide a detailed and robust evidence base to inform the CLP Preferred Options

Appendix A

Anglian Water Services (AWS) Drainage and Wastewater Management Plan: CCC Summary

Asset Name	Ownership	2021 population	2035 population	2050 population	Passed Risk based catchment screening (RBCS)	Resilience risk score	Planning objective themes reviewed	Stakeholder concerns/ comments	Medium term strategy	2050 Strategy
CHELMSFORD WRC	AWS	147157	143610	154103	Yes	2	Escape from sewers WRC compliance Environment and wellbeing	Flood risk - priority catchment. Identified in SWMP. Concerns around climate change.	None	RC - process optimisation and increased capacity.
GOOD EASTER WRC	AWS	247	241	259	No	0	None	None	None	None
GREAT LEIGHS WRC	AWS	2887	5421	5588	Yes	1	Escape from sewers WRC compliance Environment and wellbeing	Infiltration reduction.	Wait and see.	None
HIGHWOOD WRC	AWS	330	322	346	No	0	None	None	WRC - New permit.	None

Asset Name	Ownership	2021 population	2035 population	2050 population	Passed Risk based catchment screening (RBCS)	Resilience risk score	Planning objective themes reviewed	Stakeholder concerns/ comments	Medium term strategy	2050 Strategy
INGATESTONE WRC	AWS	7248	7221	7454	Yes	1	Escape from sewers WRC compliance Environment and wellbeing	None	Network - mixed strategies with main solution of SuDS.	50% surface water removal.
PLESHEY WRC	AWS	203	198	212	No	0	None	None	None	None
ROXWELL WRC	AWS	730	711	764	No	0	None	None	None	None
SOUTH WOODHAM FERRERS WRC	AWS	19139	18671	20022	Yes	1	Escape from sewers WRC compliance Environment and wellbeing	Shellfish water.	Network - mixed strategies with main solution of SuDS.	WRC - increase capacity. 10% surface water removal.
WICKFORD WRC	AWS	42577	41859	41132	Yes	2	Escape from sewers WRC compliance Environment and wellbeing	Shellfish water. Identified in SWMP.	None	WRC - increase capacity. 25% surface water removal.

Appendix B

Existing Water Recycling Centres Within CCC's Administrative Area: Permit Information

Water recycling centre (WRC)	Dry weather flow (cubic metres per day)	Biochemical oxygen demand (BOD-ATU) (milligrams per litre)	Ammoniacal nitrogen (N) (milligrams per litre)	Phosphorous (milligrams per litre)
CHELMSFORD WRC	52,050	20 - 56	10 - 37	None
GOOD EASTER WRC	44	20	None	None
GREAT LEIGHS WRC	650	13 - 50	3 - 10	None
HIGHWOOD WRC	45	40	None	None
INGATESTONE WRC	1,600	15 - 50	5 - 20	2
PLESHEY WRC	39	20	None	None
ROXWELL WRC	220	40	None	None
SOUTH WOODHAM FERRERS WRC	3,900	10- 40	5 - 20	None
WICKFORD WRC	7,500	22 - 50	10 - 37	None

Appendix C

Water Framework Directive Cycle 2 (2019) Waterbodies Within CCC's Administrative Area: Key Metrics

Operational Catchment	Water Body Name	Overall Water Body Class	Dissolved oxygen Class	Phosphate Class	Ammonia (Phys-Chem) Class	WRC discharging	Discharge point Easting	Discharge point Northing
Chelmer	Can	Poor	Good	Moderate	High	GOOD EASTER WRC	563030	212220
Chelmer	Chelmer (downstream confluence with Can)	Poor	High	Poor	High	CHELMSFORD WRC	574190	206910
Chelmer	Chelmer (Great Easton - River Can)	Moderate	Good	Poor	High	PLESHEY WRC	566856	214603
Chelmer	Chelmer (upstream Great Easton)	Moderate	Good	Good	High	None	-	-
Chelmer	Roxwell Brook	Poor	High	Moderate	High	ROXWELL WRC (discharges to Newland Brook tributary of Crouch)	564910	208860
Chelmer	Sandon Brook	Moderate	High	Moderate	High	None	-	-
Chelmer	Sandon Brook (East arm)	Moderate	High	Moderate	High	None	-	-
Chelmer	Sandon Brook (West arm)	Moderate	High	Moderate	High	None	-	-
Chelmer	Ter	Moderate	High	Poor	High	GREAT LEIGHS WRC	572630	216350
Chelmer	Wid (Doddinghurst Brook - Shenfield WRC)	Poor	Good	Poor	High	None	-	-
Chelmer	Wid (Ingatestone Hall - Margaretting Hall)	Moderate	Good	Poor	Good	INGATESTONE WRC	566420	199070
Chelmer	Wid (Margaretting Hall - River Can)	Poor	Good	Poor	High	None	-	-
Chelmer	Wid (Shenfield STW - Ingatestone Hall)	Moderate	Bad	Poor	Good	None	-	-

Operational Catchment	Water Body Name	Overall Water Body Class	Dissolved oxygen Class	Phosphate Class	Ammonia (Phys-Chem) Class	WRC discharging	Discharge point Easting	Discharge point Northing
Crouch and Roach	Crouch (Upper) – upstream A129	Moderate	High	Poor	High	None	-	-
Crouch and Roach	Crouch (A129 - Wickford)	Moderate	Good	Bad	High	None	-	-
Crouch and Roach	Crouch (downstream Wickford)	Moderate	Good	Poor	High	WICKFORD WRC (discharges to Sandy Brook tributary of Crouch)	576910	194010
Crouch and Roach	Crouch - No complete WFD waterbody data where WRC discharges	-	Good	-	-	SOUTH WOODHAM FERRERS WRC (discharges into Crouch)	580040	197170

Appendix D

Chelmsford Water Cycle Study - Flood Risk Multi Criteria Assessment Site Scoring

WRC	Receiving Watercourse	Existing QMED Flow	Predicted Future Total Flow (River QMED CC + FFT)	Increase in Flow from WRC	Percentage of Increased flow		Sensitivity		Impact		Total Risk Value (various weightings used)			Combined Risk Score	Risk Assessment
		(m^3/s)	(m^3/s)	(m^3/s)	Percentage	Risk Value	Assessment	Risk Value	Assessment	Risk Value	Sensitivity	Impact	Water levels		
Chelsmford	Blackwater Estuary	43.53	60.53	0.040	0.07%	1	High	3	High	3	0.9	0.9	0.4	**2.2**	Low
Good Easter	Wares Brook, Tributary of the River Can	0.17	0.23	0.000	0.03%	1	Medium	2	High	3	0.6	0.9	0.4	**1.9**	Low
Great Leighs	River Ter	3.93	5.42	0.016	0.29%	1	High	3	Low	1	0.9	0.3	0.4	**1.6**	Low
Highwood	River Wed	0.16	0.22	0.000	0.04%	1	Medium	2	low	1	0.6	0.3	0.4	**1.3**	Low
Ingatestone	River Wed	13.50	18.54	0.001	0.01%	1	High	3	Low	1	0.9	0.3	0.4	**1.6**	Low
Roxwell	Newland Brook, Tributary of Roxwell Brook, Tributary of River Can	1.48	2.03	0.000	0.01%	1	High	3	Low	1	0.9	0.3	0.4	**1.6**	Low

WRC	Receiving Watercourse	Existing QMED Flow	Predicted Future Total Flow (River QMED CC + FFT)	Increase in Flow from WRC	Percentage of Increased flow		Sensitivity		Impact		Total Risk Value (various weightings used)			Combined Risk Score	Risk Assessment
		(m^3/s)	(m^3/s)	(m^3/s)	Percentage	Risk Value	Assessment	Risk Value	Assessment	Risk Value	Sensitivity	Impact	Water levels		
South Woodham Ferrers	Fenn Creek, Tributary of the River Crouch (Tidal)	9.91	13.69	0.005	0.04%	1	High	3	High	3	0.9	0.9	0.4	**2.2**	Low
Wickford	River Crouch	1.33	2.06	-0.008	-0.41%	1	High	3	High	1	0.9	0.3	0.4	**1.6**	Low

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