CC003

Chelmsford Council Water Cycle Study

Stage 2 – Detailed Water Cycle Study

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Chelmsford Council Water Cycle Study

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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
IDB	Internal Drainage Boards
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	Technically 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 Detailed WCS provides an in depth assessment of the final spatial strategy for the plan period up to 2041. This WCS will build upon the baseline assessment within a Scoping WCS produced for CCC in 2023.

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.

Water Resources and Supply

Potable water within the study area is supplied by Essex and Suffolk Water. 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 the Chelmsford district is located. Essex and Suffolk Water will achieve the required capacity for the WRZ through several supply and demand options, which include leakage reduction, metering and water re-use. With the proposed interventions in place, Essex and Suffolk Water estimates that it will have an estimated 3.46 Ml/d surplus in 2025/26, rising to an estimated 65.38 Ml/d by 2040/41.

Demand calculations show an overall increase in household potable water demand in the Chelmsford Administrative Area of between 4.68 Ml/day and 6.71 Ml/day between 2023 and 2041 as a result of the proposed development identified in the plan period up to 2041. Non-household potable water demand will increase by an estimated 0.4 Ml/d.

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 latest housing trajectory set out in the adopted CLP. However, from 2025/26 a deficit in the number of planned homes requiring supply is predicted, with a total deficit of approximately 4,410 homes identified by 2035/36, rising to 5,082 by 2041/42. 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 the capacity to accommodate new homes. During the next WRMP planning period, an updated housing trajectory will be used by Essex and Suffolk Water and therefore the deficit in housing numbers can also be adjusted. Surrounding local authorities show no large deficits within the short-term, hence it is not expected that Essex and Suffolk Water will have problems with supply potable water to new developments within the Essex WRZ.

Consultation with Essex and Suffolk Water has identified three potential future pressures:

- Hanningfield Water Treatment Works ability to supply new developments
- Existing customer Per Capita Consumption (PCC)
- Network issues located at Boreham.

Hanningfield Water Treatment Works has infrastructure risks associated with supplying new developments. Essex and Suffolk Water advises that plans are in place to address this. Essex and Suffolk Water note that the largest potential pressure from existing customers is high PCC rates; whilst the revised draft WRMP24 has measures to reduce water consumption, if they are unsuccessful this could lead to supply issues. Potential network issues within Boreham are noted, such that a burst or incident could lead to reduced supply. However, this issue is acknowledged and Essex and Suffolk Water is considering options to mitigate for this.

Integrated Water Management

Essex and Suffolk Water promotes water efficiency within households and non-households to reduce demand. Within the current Local Plan, a PCC of 110 l/h/d is mandatory for new build households. This WCS proposes that a value of 105 or 100 l/h/d is achievable through recommended BREAAM fixtures presented alongside a new policy on integrated water management.

Rainwater harvesting can help reduce potable water usage as well as promoting biodiversity and reducing flood risk. This WCS recommends that rainwater harvesting is mandatory within new developments wherever practicable.

Currently "Policy DM25 – Sustainable Buildings" states that non-residential buildings within Chelmsford with a floor area in excess of 500m² need to achieve a minimum BREEAM rating of 'Very Good'. This does not cover larger water users, so it is recommended that this policy is expanded upon.

Water Recycling Centres and Sewerage

The Detailed WCS indicates that the proposed growth and development set out in the plan period up to 2041 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. Additionally, Ingatestone WRC is within 5% of its DWF consent.

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.

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 Blackwater Estuary (Mid-Essex Coast Phase 4) (SPA).

A review of water quality compliance at the failing WRCs and discharging WFD waterbodies has been carried out in this Detailed WCS. AWS and CCC would need to work with the Environment Agency (EA) to find the most suitable solution or combination of solutions to address the identified risk at each WRC.

It has not yet been fully confirmed if the potential solutions discussed in the WCS can be implemented in a timely manner to fully address the risk of meeting the 'no deterioration' policy appropriately within the plan period, based on the current proposed development trajectories (development timings and number of dwellings) used within this Detailed Water Cycle Study (WCS). Therefore, CCC must prevent development occurring ahead of capacity at the WRCs becoming available, either by taking a stepped approach or by redirecting some development into another WRC catchment with sufficient capacity. However, this needs to be informed by further discussions with AWS and the EA and can inform the Pre-Submission Local Plan.

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; these are located primarily within, and immediately surrounding, the city of Chelmsford. It is not the main purpose of the WCS to address the sequential test, however recommendations are provided for these developments. A review of the SFRA Level 1 (2024) was undertaken for this WCS and the conclusions and relevant information is referenced. The suitability of SuDS and policy recommendations within the SFRA Level 1 (2024) is assessed within this WCS as well, such that developers should incorporate SuDS where possible.

1Introduction

1.1 Study Area

Chelmsford City Council (CCC) (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 for which Chelmsford City Council are responsible for.

According to the Office for National Statistics (ONS) the population of the Chelmsford district 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.

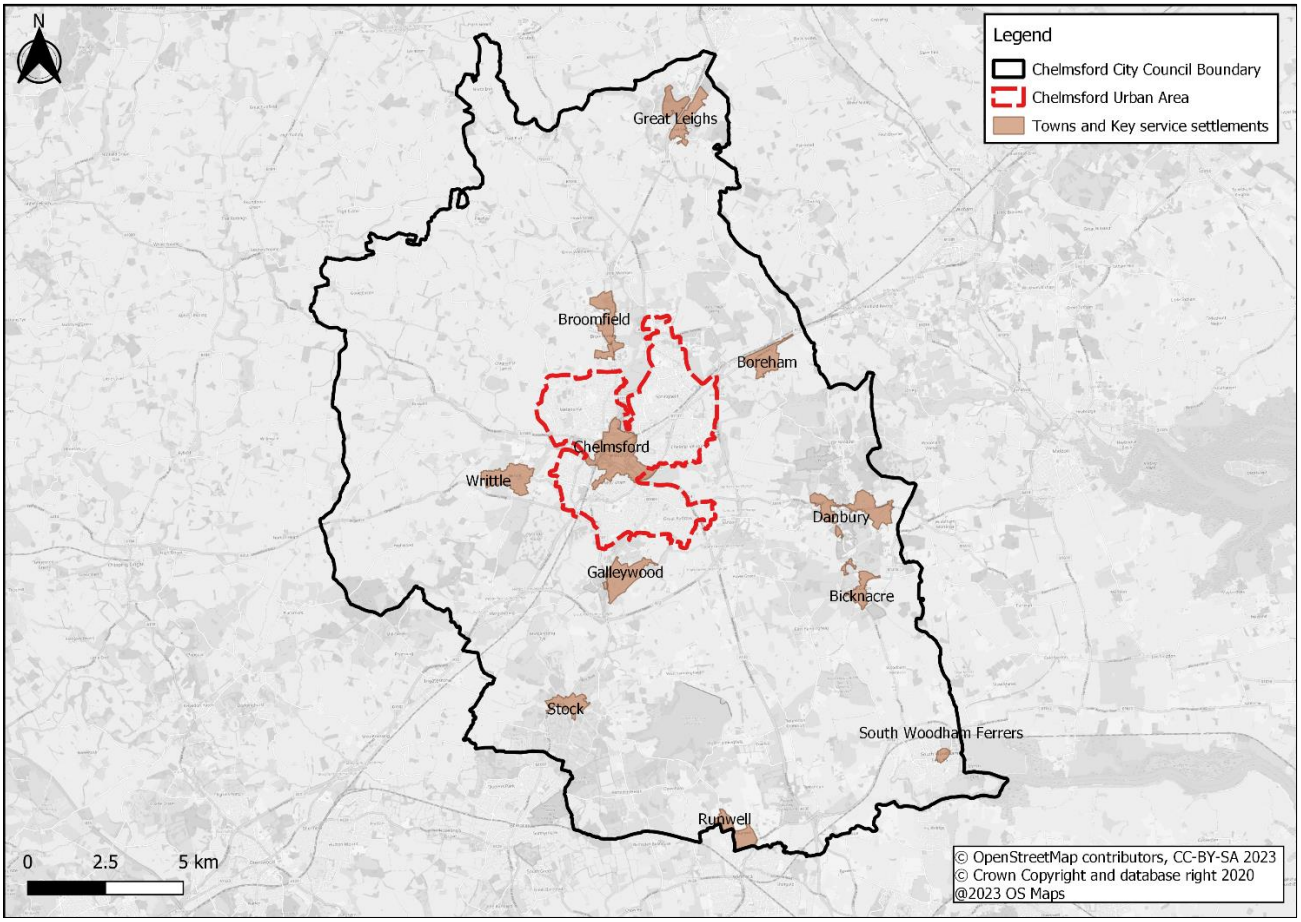


Figure 1-1: Chelmsford City Council Administrative Area and Chelmsford urban area.

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 (LLFA) 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.

Much 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 water resources management plan (WRMP). More information is included in Section 4.

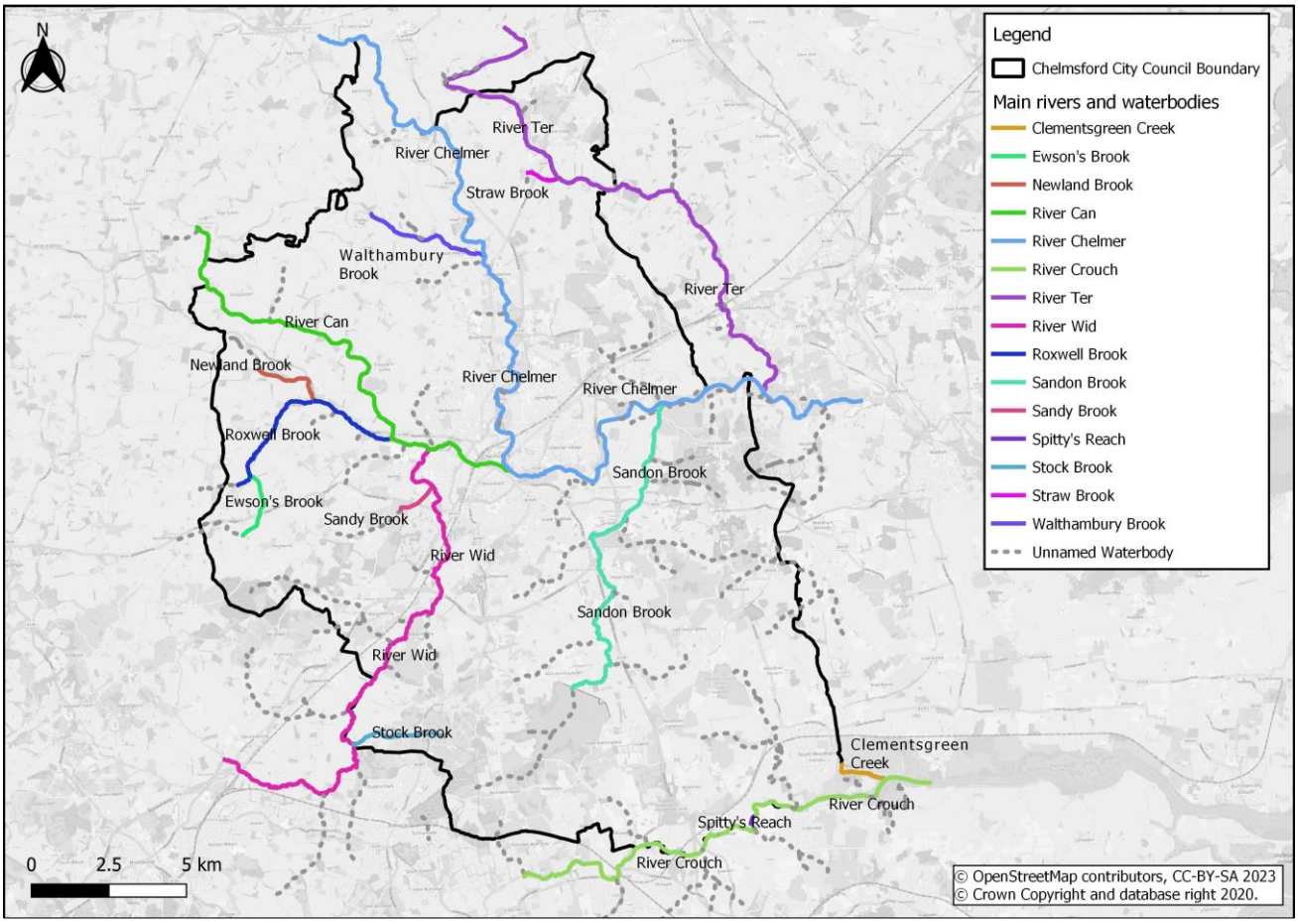


Figure 1-2: Chelmsford hydrological setting.

Anglian Water Services (AWS) is responsible for collecting and treating wastewater within the Chelmsford administrative area. 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 a Scoping WCS. The Scoping WCS was completed in December 2023 and provided evidence to CCC of the possible constraints and opportunities to various development options (three hybrid spatial strategies), which in turn informed the selection of the Preferred Spatial Strategy for the CLP. The Scoping WCS concluded that more detailed studies were required to support the preparation of the Chelmsford Local Plan. CCC appointed Arcadis to complete the Detailed WCS to aid with this. The Detailed WCS (this document) will assess the final 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, EA (EA), Essex County Council (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)	

The aims of this Detailed WCS are to:

- Identify any water infrastructure services provision and usage (water consumption) constraints based on natural or anthropogenic changes, whilst testing the potential impact of CCC development plans (housing and employment) on the water environment. Includes assessment in the context of Essex and Suffolk Water's available potable supply.
- Provide policy recommendations which will help CCC accommodate the growth within the Local Plan in line with the wider environment.
- Develop a sustainable framework that enables the phased delivery of the key infrastructure needs (including any development phasing and adaptation of future developments), in line with the aspirations and environmental demands as well as proposed development requirements 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 including fluvial, surface water and groundwater, and incorporate within designs ideas such as sustainable drainage systems (SuDS) to help reduce this threat and further manage the water cycle. Includes understanding the flood risk potential from increased discharge from WRCs on receiving watercourses.
- 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 water quality and 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.
- Ensure that 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.
- Quantify the impact of climate change on every aspect of the WCS.

1.3 Previous Water Cycle Studies: Pre 2023

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.

1.4 Scoping Water Cycle Study: December 2023

In December 2023, a Level 1 Scoping WCS was prepared for CCC by Arcadis. It helped to refine the three, hybrid preliminary development spatial strategies to one preferred spatial strategy for proposed development. It also provided a baseline which this Detailed WCS has built upon. The main findings of the Scoping WCS were:

- Essex and Suffolk Water had capacity to supply the growth proposed within the Council's area.
- The Scoping WCS indicates that the proposed development for the plan period can be accommodated at the majority of WRCs.
- There were however three WRCs where both the existing and proposed dry weather flow (DWF) exceeded the consented DWF. The existing DWF exceedance already caused an existing restriction to any growth, which is exacerbated by the additional proposed growth. The three WRCs were:
    - Great Leighs
    - South Woodham Ferrers
    - Wickford WRCs.
- All discharges from WRC were assessed as having a "low risk" of increased flooding for the receiving watercourse.

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 Detailed WCS:

- Essex County Council – Lead Local Flood Authority (flood risk and drainage)
- AWS - 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.

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 general deterioration in the environment. Following processing at a water treatment works (WTW) 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.

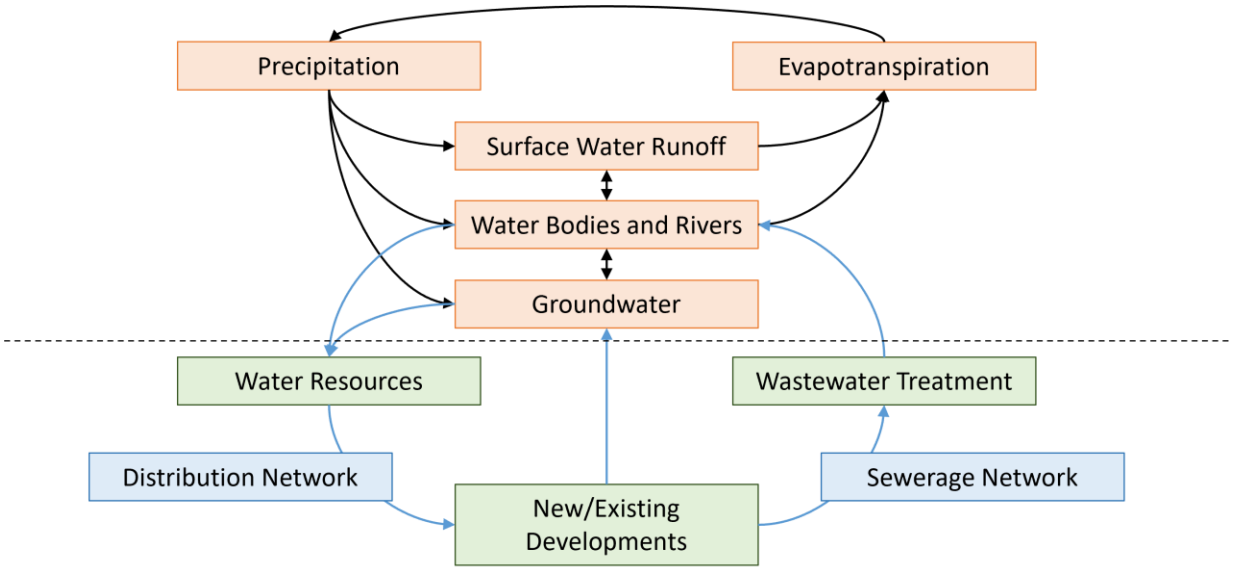


Figure 1-3: The wider water cycle

In the context of Chelmsford, specifically relating to the proposed growth and developments, the key elements relevant to the water cycle explored within the Detailed 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)
- Climate change (Section 8)
- Integrated Water Management (Section 9)
- Conclusions and recommendations (Section 10).

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 revised in December 2023 in response to the Levelling-up and Regeneration Bill: reforms to national planning policy consultation and it sets out the government's planning policies for England and how these are expected to be applied. 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 in reducing (or even eliminating) 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 2019, 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, which is informed by a Water Cycle Study (WCS), 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.

This section summarises the proposed growth and development as defined in the current Adopted Local Plan and CCC's development trajectories (employment, education and residential) up to 2036, along with the proposed development defined in the Preferred Spatial Strategy for the remainder of the plan period up to 2041 (employment, education and residential).

The future volume of water abstraction and wastewater discharge requirements (Section 4 and 5) 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 Growth and Development Considerations

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 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 then 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.

The Scoping WCS informed CCC of the possible constraints and opportunities to various development options (three hybrid spatial strategies), which assisted in consolidating them into one preferred Spatial Strategy for assessment in this Detailed WCS.

Since the Scoping WCS was completed (December 2023), CCC has developed a Preferred Spatial Strategy for proposed development up to 2041. The Preferred Spatial Strategy data was supplied by CCC in December 2023 with further refinement of the developments and trajectories taking place during January 2024. The latest Preferred Spatial Strategy data for the proposed growth and development, in conjunction with the remaining committed/ permitted sites and allocated sites data, provided by CCC have been considered in this Detailed WCS.

The proposed developments and trajectories used in this WCS are derived from the data provided by CCC in January 2024. Any subsequent changes to growth numbers or data have not been considered in this assessment unless where specifically highlighted in the report.

The proposed development considerations for the residential, educational and economic developments are summarised below.

3.2 Residential Proposed Growth and Development

CCC provided information on the expected housing growth and development trajectories up to 2041. The housing development data 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 include: large sites, small sites and mixed use contributions taken from the latest Housing Site Schedule April 2023 as provided by CCC in January 2024.
  - The schedule includes the Five year Housing Land Supply (5YHLS) published by CCC. The National Planning Policy Framework (NPPF) requires Local Planning Authorities to identify a supply of specific deliverable sites where construction will start on site within five years, which are then measured against the housing requirement. The Planning Practice Guidance (PPG): Housing Supply and Delivery gives further advice on this. It should be noted that the schedule includes both committed and permitted sites but also site allocations, which are discussed below.

- **Allocations:** Housing sites allocated in the three growth areas described in the Adopted Local Plan and additional allocations in the Preferred Spatial Strategy. Preferred Spatial Strategy allocations are highlighted in yellow/ gold in Table 3.6.

- **Traveller Sites:** Gypsy and Travelling Showpeople sites allocated within the Adopted Local Plan and additional allocations in Preferred Spatial Strategy.

- **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 beyond the 2036 Adopted Pocal Plan period up to 2041.

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

The housing distribution based on settlement hierarchy is summarised in Table 3.1, indicating the majority of the proposed housing supply will be within towns and service settlements.

Table 3.1: Proposed housing growth and development distribution (2023 to 2041)

Settlement Hierarchy	Number of Dwellings
City or Town	9,757
Key Service Settlements	3,310
Service Settlements	8,375
Small Settlements	198
Hamlet	13
Total	**21, 653**

Note that the settlement hierarchy categories values in Table 3.1 refer to the settlement hierarchy provided in the Chelmsford Adopted Local Plan.

The housing trajectory for the plan period is shown in Table 3.6 consisting of both committed /permitted sites (based on relevant planning applications and permissions) and allocated sites. The proposed number of dwellings per settlement (if more than 10 dwellings) is shown graphically in Figure 3-1.

3.3 Other Proposed Growth and Development

Proposed housing development is not the only development which will have an impact on the future volume of water (abstraction) and wastewater requirements. Other developments such as new employment and educational sites need to be reviewed as well. New employment sites reviewed include but are not limited to mixed-use, industrial, commercial, or retail facilities.

3.3.1 Employment

CCC provided information on the expected economic/ employment growth and development trajectories up to 2041. The data provided by the council consisted of:

- **Permitted / Committed Sites:** Sites which are not allocated in the Adopted Local Pan (or Preferred Spatial Strategy), but have full, outline or hybrid planning permission, but where construction has not yet started.

- **Allocations**: Employment sites allocated within the Adopted Local Plan and additional allocated sites within the Preferred Spatial Strategy. Preferred Spatial Strategy allocations are highlighted in yellow/ gold in Table 3.7.

The employment distribution based on settlement hierarchy is summarised in Table 3.2, indicating the majority of the proposed employment supply will be within towns and key service settlements.

Table 3.2: Proposed employment growth and development distribution (2023 to 2041)

Settlement Hierarchy	**Employment floorspace (m^2) –** *See Note below in italics*
City or Town	163,537
Key Service Settlements	113,354
Service Settlements	7,793
Small Settlements	580
Hamlet	0
Total	**285, 264**

Note - *It should be noted that at the time this Detailed WCS was carried out the Preferred Spatial Strategy included an allocation of 43,000m^2 of employment space in Chelmsford Urban Area (Ref GS1cc). This site has subsequently been removed from the Council's Preferred Spatial Strategy, but remains in this Detailed WCS. The conclusions of this report should therefore be read in this context.*

For the WCS, it was important to relate the hectares of employment land to the potential employees which it could support to determine the impact on the water and wastewater infrastructure. To determine these values, the assumptions shown in Table 3.3 were used as defined in the draft employment land review study (not publicly available) shared by CCC and confirmed through consultation with CCC.

Table 3.3: Employment land densities

Type of employment land	**Square meters per employee**
Office space and Research - E(g)(i)/(ii)	14.4
Light industrial - E(g)(iii)	35.4
General industrial (B2)	37.8
Commercial, business and service (E)	35.4
Warehousing (B8)	70

The employment trajectory for the plan period is shown in Table 3.7 consisting of both committed/permitted sites (based on relevant planning applications and permissions) and allocated sites. The proposed employment floorspace per settlement is graphically in Figure 3-2.

3.3.2 Educational

The increase in population resulting from the proposed housing developments and growth in CCC's administrative area means that the existing schools will not have the capacity for the future additional pupils.

Within the Adopted Local Plan, several education sites have been allocated up to 2036 to accommodate the proposed growth and development which haven't been constructed and are shown in Table 3.8. In addition, additional education sites have been allocated to accommodate the proposed development as per the Preferred Spatial Strategy especially at Hammonds Farm. The Preferred Spatial Strategy educational allocations are highlighted in yellow/ gold in Table 3.8.

The education distribution based on settlement hierarchy is summarised in Table 3.4, indicating the majority of the proposed employment supply will be within towns and key service settlements.

Table 3.4: Proposed educational growth and development distribution (2023 to 2041)

Settlement Hierarchy	Educational sites
City or Town	2 SEN schools 5 Primary schools with nurseries 6 Nurseries/ EYs 1 Through school
Key Service Settlements	3 Primary school with nurseries 1 Through school 1 Nursery/ EYs
Service Settlements	None
Small Settlements	None
Hamlet	None

It should be noted that for site SGS10 as per the Adopted Local Plan in South Woodham Ferrers, it was assumed to be one primary school with early years provision and one standalone early years rather than two standalone early years. This was a conservative approach as it accounted for more pupils and teachers. The actual proposed educational development proposed will be confirmed by CCC at a later stage outside of this WCS.

Additionally, it should be noted that at the time this Detailed WCS was carried out the Preferred Spatial Strategy only included for one additional stand-alone nursery at Hammonds Farm (Ref SGS16a). CCC has subsequently added two additional stand-alone nurseries to Hammonds Farm in the Council's Preferred Spatial Strategy to accommodate the proposed growth, but remains as one within this Detailed WCS. The conclusions of this report should therefore be read in this context. The impact of the additional 2 stand-alone nurseries would be negligible.

For the Detailed WCS, it is important to relate the number of schools to the likely number of school staff and students to determine the impact on the water and wastewater infrastructure. The assumed values confirmed through consultation with CCC are summarised in Table 3.5.

Table 3.5: Educational facility staff and pupil distribution

Type of educational facility	**Number of pupils**	**Pupils per staff**
Primary school	280	21
Standalone nursery/ early years	56	12
Nursery/ early years – within primary school	56	13
Special (SEN) school	130	7
Secondary school	1,000	17
Through school (Primary and secondary school with sixth form and nursery/early years)	Combination of various facility pupils and staff requirements above	

The educational trajectory for the plan period is shown in Table 3.8 consisting of both committed/permitted sites (based on relevant planning applications and permissions) and allocated sites. The proposed educational facilities are shown graphically per settlement in Figure 3-3.

Table 3.6: Proposed housing growth and development (plan period up to 2041)

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	2,345	534	374	181	245	172	177	133	133	133	133	130	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	3,334	0	116	588	579	563	233	187	187	187	187	182	65	65	65	65	65	0	0
1.6 Growth Area 1 - Central and Urban Chelmsford (Preferred Spatial Strategy)	747	0	0	12	0	0	0	119	119	119	119	119	28	28	28	28	28	0	0
1.7 Growth Area 2 - North Chelmsford	7,802	0	100	425	780	760	685	633	633	633	633	630	378	378	378	378	378	0	0
1.7 Growth Area 2 - North Chelmsford (Preferred Spatial Strategy)	40	0	0	0	0	0	0	8	8	8	8	8	0	0	0	0	0	0	0
1.8 Growth Area 3 - South and East Chelmsford	1,394	42	0	36	95	175	180	164	164	164	164	160	10	10	10	10	10	0	0
1.8 Growth Area 3 - South and East Chelmsford (Preferred Spatial Strategy)	3,075	0	0	0	0	0	0	285	285	285	285	285	236	236	236	236	236	235	235
1.9 WINDFALL ALLOWANCE	1,461	0	0	0	73	166	82	40	100	100	100	100	100	100	100	100	100	100	100
1.10 GT sites	55	0	0	0	0	15	0	20	0	0	0	0	20	0	0	0	0	0	0
Total	**21,653**	**1,130**	**1,012**	**1,431**	**1,896**	**1884**	**1,375**	**1,601**	**1,641**	**1,641**	**1,641**	**1,626**	**837**	**817**	**817**	**817**	**817**	**335**	**335**

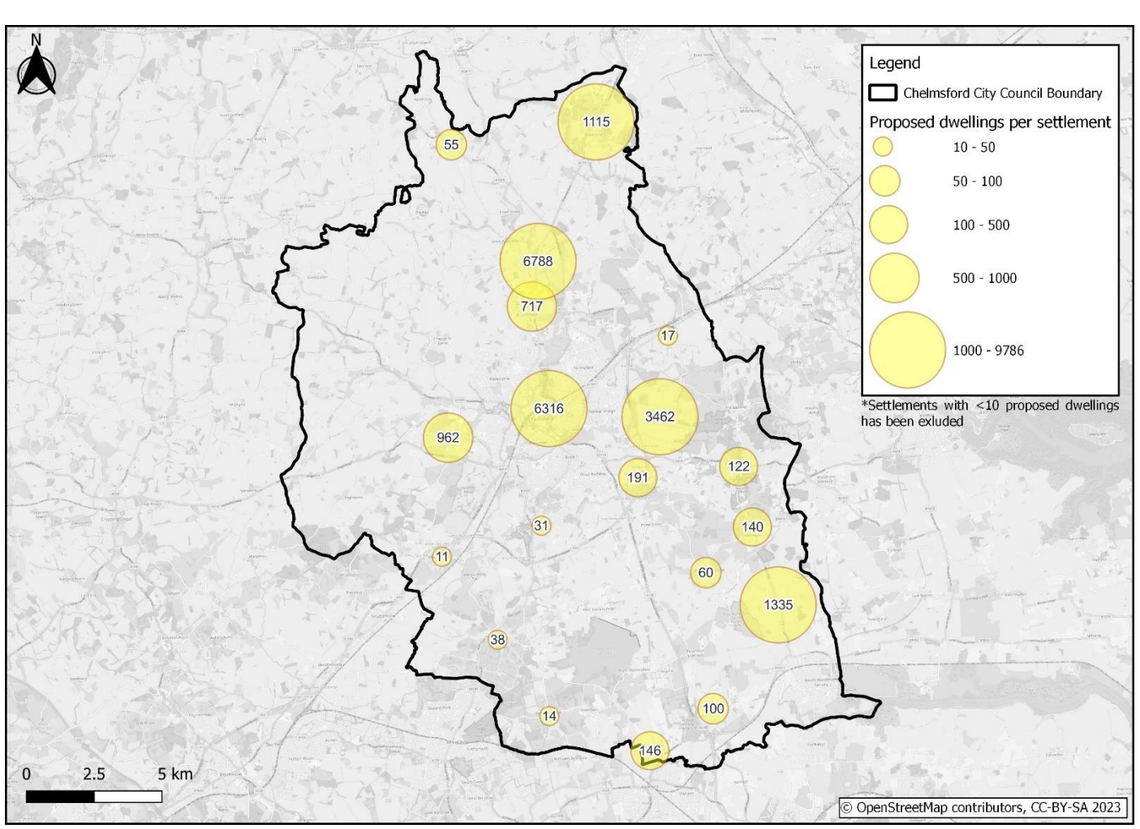


Figure 3-1: Proposed housing development and growth (2023 - 2041) – Number of proposed dwellings per settlement

Table 3.7: Proposed employment growth and development (plan period up to 2041)

Employment	**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	62,300	0	0	0	62,300	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2.1 Local Plan Allocations *(includes additional employment as per Preferred Spatial Strategy at site SGS6)*	67,146	6,564	4,064	4,064	4,064	4,064	4,804	4,804	4,804	4,804	4,804	4,064	4,064	4,064	4,064	4,050	0	0	0
2.2.2 Preferred Spatial Strategy Allocations	138,500	7,801	7,801	7,801	7,801	7,801	12,101	12,101	12,101	12,101	12,101	7,801	7,801	7,801	7,801	7,786	0	0	0
2.3 All other Permissions	17,318	4,344	11,276	1,683	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (m^2 floorspace)	**285,264**	**18,709**	**23,141**	**13,548**	**74,180**	**11,865**	**16,905**	**16,905**	**16,905**	**16,905**	**16,905**	**11,865**	**11,865**	**11,865**	**11,865**	**11,836**	**0**	**0**	**0**

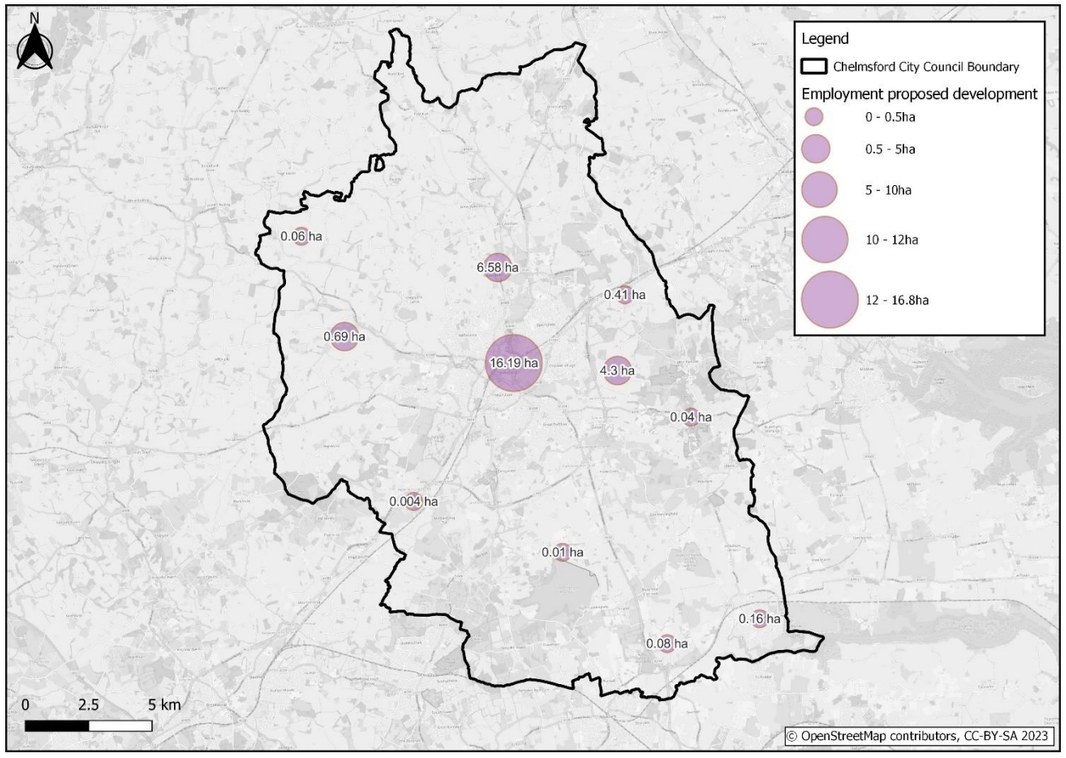


Figure 3-2: Proposed employment development and growth (2023 - 2041) – Proposed employment floorspace per settlement

Table 3.8: Proposed educational growth and development (plan period up to 2041)

Educational	**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 *(Includes additional primary school and Through school at site SGS6 as per preferred spatial strategy)*	2 Primary school 2 SEN schools 4 Nurseries (including within primary school)		1 Primary school 2 Nurseries (including within primary school)	1 Primary school 2 Nurseries (including within primary school)		1 standalone nursery	Existing allocation changed to Through School (Primary and secondary school with sixth form and nursery/ early years (EY))	1 Primary school 1 Nursery (including within primary school)					1 standalone nursery				Additional primary school with nursery/ EY to existing allocation	
Preferred Spatial Strategy Allocations							1 Primary school with nursery/ EY 1 standalone EY			Through School (Primary and secondary school with sixth form and nursery/ EY)					1 Primary school with nursery/ EY			

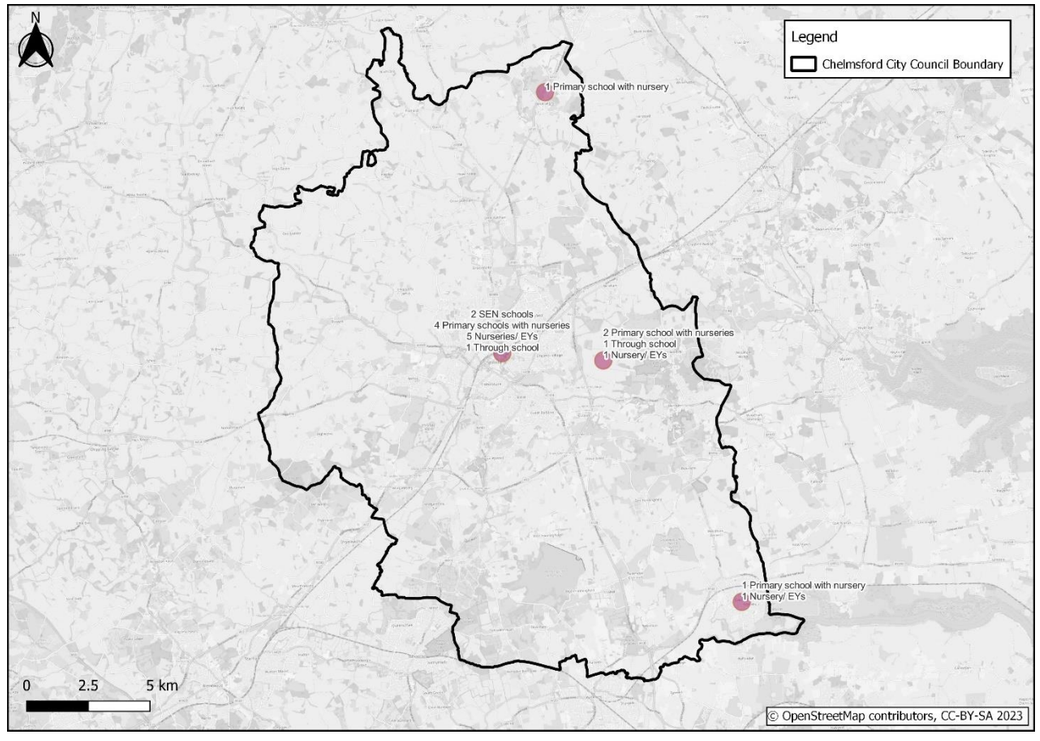


Figure 3-3: Proposed educational facilities development and growth (2023 - 2041) – Proposed educational facilities per settlement

3.4 Proposed Growth and Development Summary

Table 3.9 provides a per settlement summary of the residential (including Gypsy and Travelling Showpeople sites), employment and education proposed development sites within the plan period (up to 2041). The proposed development sites include the remaining committed and permitted sites (with relevant planning permissions), site allocations (Adopted Local Plan and Preferred Spatial Strategy allocations) and windfall sites as of January 2024.

Table 3.9: Proposed growth and development summary per settlement (plan period up to 2041)

Settlement Hierarchy	Settlement	Proposed housing (number of dwellings)	Proposed Employment (Hectares)	Proposed Education sites
City or Town	Chelmsford	6,316	16.19	2 SEN schools 4 Primary schools with nurseries 5 Nurseries/ EYs 1 Through school
City or Town	South Woodham Ferrers	0	0.16	1 Primary school with nursery 1 Nursery/ EYs
Key Service Settlements	Bicknacre	140	0.00	
Key Service Settlements	Boreham	17	0.41	
Key Service Settlements	Broomfield	717	6.58	
Key Service Settlements	Danbury	122	0.04	
Key Service Settlements	Galleywood	31	0.00	
Key Service Settlements	Great Leighs	1,115	0.00	1 Primary school with nursery
Key Service Settlements	Hammonds Farm	3,462	4.30	2 Primary school with nurseries 1 Through school 1 Nursery/ EYs
Key Service Settlements	Runwell	146	0.00	
Key Service Settlements	Stock	38	0.00	
Key Service Settlements	Writtle	962	0.00	
Service Settlements	East Hanningfield	60	0.00	

Settlement Hierarchy	Settlement	Proposed housing (number of dwellings)	Proposed Employment (Hectares)	Proposed Education sites
Service Settlements	Ford End	55	0.00	
Service Settlements	Great Waltham	4	0.00	
Service Settlements	Highwood	3	0.00	
Service Settlements	Little Waltham	6,788	0.00	
Service Settlements	Margaretting	11	0.00	
Service Settlements	Ramsden Heath/Downham	14	0.00	
Service Settlements	Rettendon Place	100	0.08	
Service Settlements	Roxwell	3	0.69	
Service Settlements	West Hanningfield	2	0.01	
Service Settlements	Woodham Ferrers	1,335	0.00	
Small Settlements	Chatham Green	0	0.00	
Small Settlements	Edney Common	0	0.00	
Small Settlements	Good Easter	3	0.06	
Small Settlements	Howe Green	0	0.00	
Small Settlements	Howe Street	0	0.00	
Small Settlements	Little Baddow	4	0.00	
Small Settlements	Rettendon Common	0	0.00	
Small Settlements	Sandon	191	0.00	
Hamlet	Chignal	9	0.00	
Hamlet	Little Leighs	0	0.00	
Hamlet	Pleshey	3	0.00	
Hamlet	South Hanningfield	2	0.00	
	Total	**21,653**	**28.52**	

CCC provided GIS and spatial information for the proposed housing, employment and educational developments including the committed, permitted, and allocated sites (excluding small sites and windfall sites). The distribution of these sites is shown in Figure 3-4.

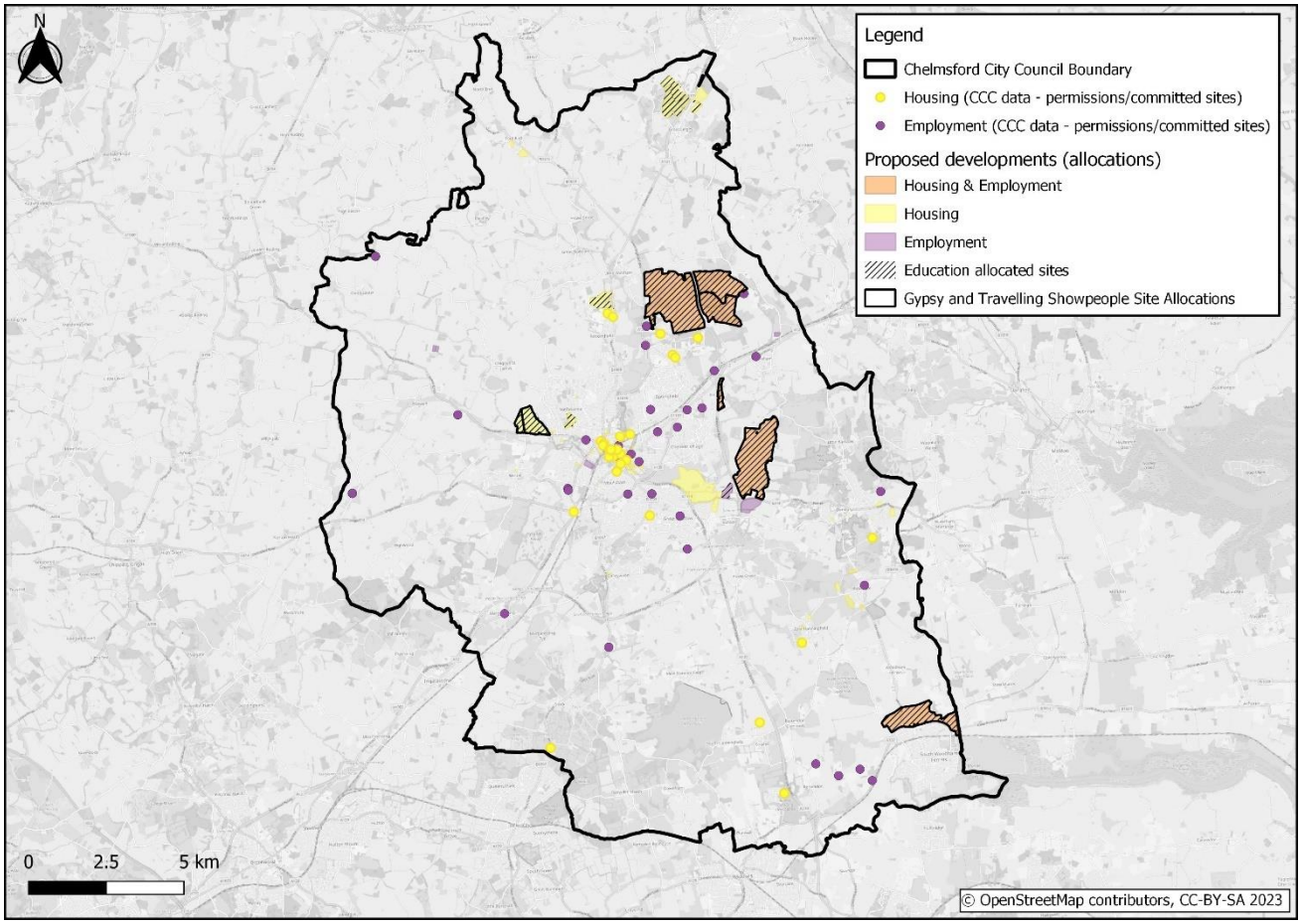


Figure 3-4: Distribution of proposed growth and development sites within CCC's administrative area – Allocated, permitted, and committed sites (plan period 2023 - 2041)

Detailed information on the housing, employment and educational sites including trajectories on a site-by-site basis are provided in ***Appendix A***. Each of the settlements have also been extracted showing the proposed growth and development spatially in ***Appendix B***.

4Water Resources

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.

Essex and Suffolk Water is the sole statutory supplier of potable water to the Council's area which is located in the Essex water resource zone (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 Council's area.

New developments can also be supplied by alternative providers through the Ofwat New Appointees and Variations (NAV) process. A NAV is a limited company which provides water and/ or sewerage service to customers in an area; they have the same duties and responsibilities as a statutory water company.

4.1 Water Cycle Study Stage 1 Outcomes

Arcadis completed the Stage 1 (scoping) Water Cycle Study (WCS) in December 2023. A summary of Stage 1 WCS conclusions in terms of water resources is shown below; these have been re-assessed in this Detailed WCS:

- Essex and Suffolk Water predicts a deficit in supply if no interventions are implemented. However, through the implementation of a number of measures it will generate a surplus in supply up to 2050/51.
- Essex and Suffolk Water is planning to supply a smaller number of houses per year than that planned within the CCC housing trajectory.
- No consultation was available with Essex and Suffolk Water with regards to water infrastructure.
- There was little to no water in the local environment for additional river abstractions.

4.2 Water Cycle Study stage 2: Detailed Water Cycle Study

This Stage 2 (Detailed) WCS includes a more detailed assessment and review of new information, specifically:

- New information has been received and consultations have been undertaken with Essex and Suffolk Water regarding the supply infrastructure constraints of new developments.
- Since the publication of the Scoping WCS, the Water Resources East final Regional Plan was published.
- An update to the potable water demand assessment results using the final housing trajectory and non-household demand has been carried out.

4.3 Policy Context

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

4.3.1 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; all homes planned for in the period up to 2036 within the CCC Adopted Local Plan will have been included within the water recycling long term plan. 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.

4.3.2 River Basin Management Plan

River Basin Management Plans (RBMP) set out the strategy, including a programme of measures, for each catchment to comply with the requirements of the Water Framework Directive (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 the Council's area, was published and accepted by the Secretary of State for the Environment, Food and Rural Affairs in December 2022.

4.3.3 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 risk of 'no deterioration' under the WFD, that a number of annual licenced quantities on current abstraction licences were unsustainable. The reduction will occur when time limited licences are due for renewal or by 2030.

4.3.4 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 water companies to plan for BAU+.

4.3.5 Water Stressed Areas

The EA publishes (and periodically updates) 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 (Prescribed Condition) Regulations 1999 (as amended) 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." Local authorities can use the water stress determination to inform potential tighter standards than 110 litres per head per day (l/h/d) in new developments. In addition, 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.

4.3.6 Environmental Improvement Plan

A roadmap toward greater water efficiency in new developments was published as part of the Environmental Improvement Plan. The roadmap outlines ten goals for the environment, these include; wildlife, air quality, water, chemicals and pesticides, sustainability, climate change, reducing environmental hazards, enhancing biosecurity, and enhancing beauty. The goal which is most relevant for the water resources section is: "Goal 3 Clean and plentiful water".

4.4 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, AWS and Cambridge Water (part of South Staffordshire Water). In November 2022, WRE published a draft regional plan for consultation, with the final regional plan published in December 2023.

4.4.1 Regional Supply and Demand Analysis

Since the completion of the Scoping WCS, the final regional plan was published in December 2023. The regional plan states that all water companies within WRE will start 2025 with no surplus water in supply. To meet the "Business as Usual Plus Enhanced Destination" a supply-demand deficit of approximately 730 Ml/d is predicted by 2050 if no action is taken. The regional plan is proposing a 333 Ml/d per day reduction in demand across all water companies, and a 485 Ml/d increase in supply options by 2050 to reduce the deficit.

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

- Water treatment works upgrades at Linford water treatment works (for more details see Section 4.7.5.1).
- A water re-use scheme at Southend (screened out within Essex and Suffolk Water's revised draft WRMP24 due to financial and environmental reasons).

Alongside the supply measures, a number of demand measures are also proposed. These include:

- Water efficiency measures for existing households to reduce household consumption (e.g. water efficiency products, customer behaviour changes, rainwater harvesting and grey water recycling).

- Water efficiency measures for non-households to reduce use.
- Government led interventions, such as national water consumption targets, water labelling, ministerial statement to Defra, public engagement on water efficiency.
- Leakage reduction.
- Metering penetration, with full roll-out of smart metering by 2035 for Essex and Suffolk Water.

All the above demand measures are described within the Essex and Suffolk revised draft WRMP24 (See Section 4.7.5.2 for more details) except for rainwater harvesting and grey water recycling. Within the regional plan, the aspiration is for existing households to have a PCC of 110 l/h/d by 2050. This is different to the Essex and Suffolk Water revised draft WRMP24 which proposes a value of 114.2 l/h/d.

4.5 Water Environment and Regulation

4.5.1 Abstraction Licensing Strategies

4.5.1.1 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.

The ALS is important for the WRMP as it outlines the availability of current and future water resources for the supply and demand balance.

4.5.1.2 Abstraction Licence

To manage the amount of water an individual or company can take from the environment the EA have an abstraction licence system. All new abstraction licences are classified as time limited to a common end date dependent on area. This allows for periodic review of licences which could lead to reductions or revoking licences which pose a risk to the environment. In addition, the Environment Act 2021 allows the Secretary of State to vary or revoke permanent abstraction licences from January 2028 to protect the environment. Under the government's 25-year environment plan the

deadline for the first full review of all abstraction licences within the UK is 2030, these are called sustainability reductions.

Essex and Suffolk Water acknowledges that there is a risk of future loss of deployable output (DO) due to non-renewal of time limited abstraction licences. As explained further in Section 4.6, the majority of potable water supplied to the CCC administrative area comes from reservoir storage which is not subject to licencing. Therefore, the changes in abstraction licences should not have an impact on the water available to supply the proposed growth set out in the CLP.

4.5.1.3 Abstraction Licensing Strategy Overview

CCC is located in the Essex Abstraction Licensing Strategy 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 area and the Roding, Beam, Ingrebourne and Mardyke ALS area.

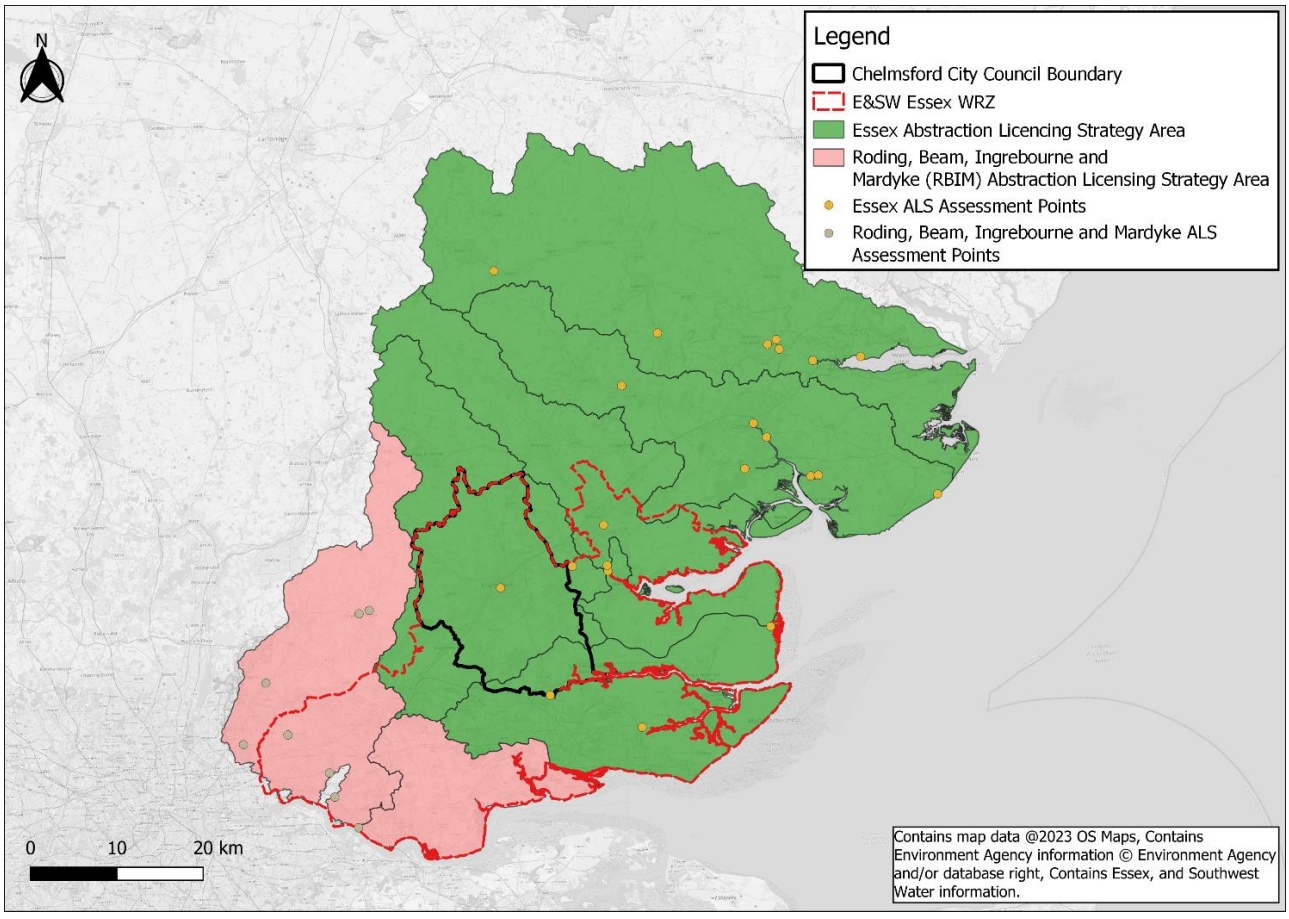


Figure 4-1: The Essex WRZ and the two ALS areas it is located within; the Essex ALS and the RBIM ALS.

The availability of water for abstraction is determined by the relationship between the fully licenced (all abstraction licences being used at full capacity) and recent actual flows (amount of water abstracted in the last six years) in relation to Environmental Flow Indicators (EFI). Surface water availability is calculated at selected assessment points (AP). The two ALSs that are relevant to the Essex WRZ and supply of CCC 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 shown in Figure 4-1.

Within the ALS, the EA assessment of the availability of water resources is based on a red-amber-green (RAG) classification system that identifies the resource availability for licensing. The categories of resource availability are as follows:

- Water Available (green areas) – Water available for licencing; waterbodies where there is more water than required to meet the needs of the environment.
- Water Not Available (yellow areas) – Restricted water available for licensing; waterbodies where if all licenses were to abstract the maximum allowable there would not be enough water for the environment. New abstractions on these water bodies can only be obtained if they can be 'bought' (known as licence trading) from the existing licence holder. These licenses are at risk from EA reductions.
- Water Not Available (red areas) – Water not available for licensing; waterbodies where flows are below the indicative flow required to support healthy ecology in the rivers. Potential reductions in these licenses are currently being reviewed by the EA.

The water resource availability is assessed under four different flows:

- 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 shows the water available for licensing for each ALS within Essex WRZ under Q30, Q50, Q70 and Q95 scenarios. The implications of this are described in the subsequent sections.

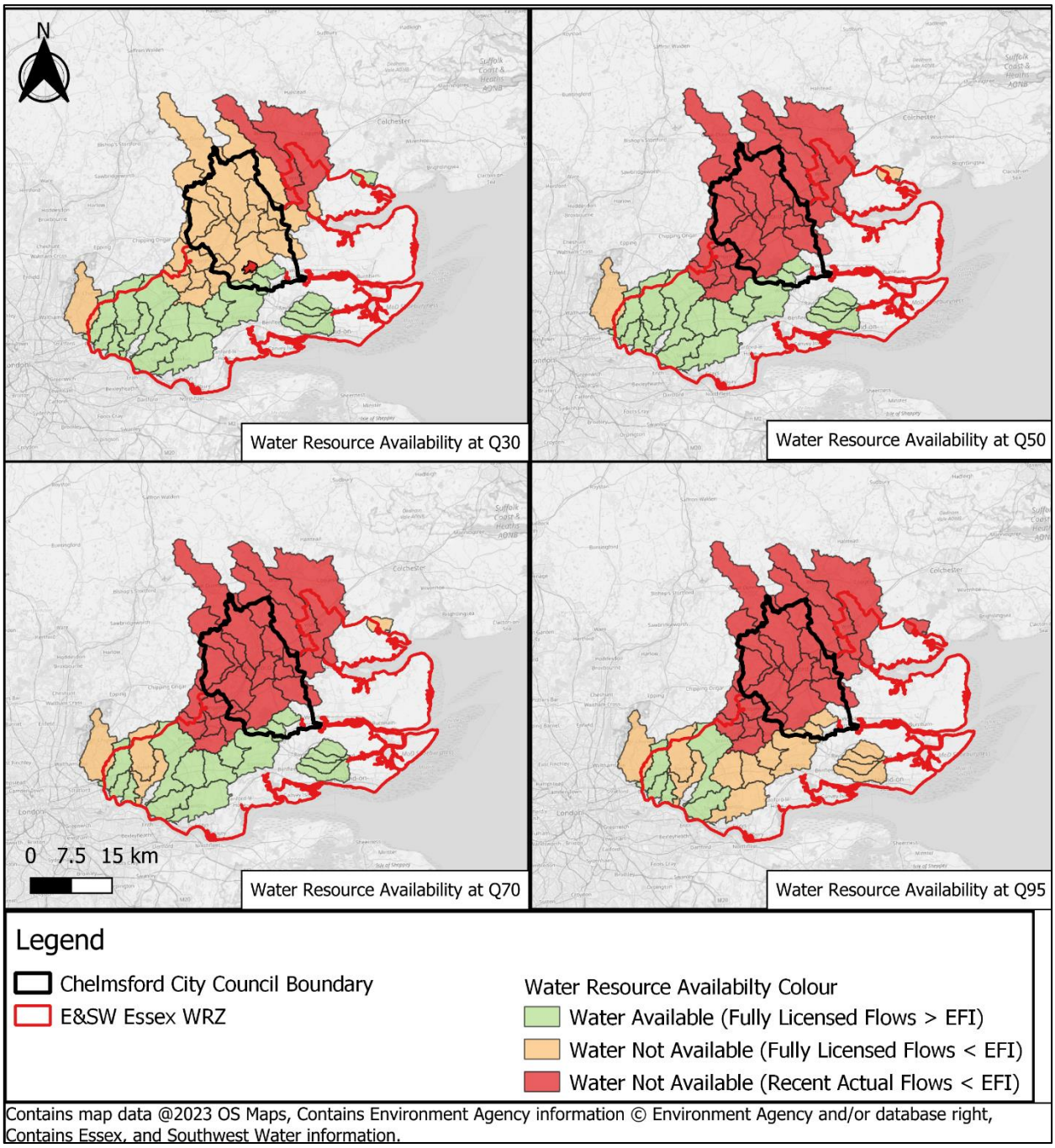


Figure 4-2: Water Resource Availability across the Essex WRZ.

4.5.1.4 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 (RBD). The whole strategy focus area includes 22 APs, as shown in Figure 4-3; seven of these are within the Essex WRZ.

The CCC administrative area is located predominately within the Chelmer Operational Catchment. There are three APs located within the Chelmer Operational Catchment. There is currently "Restricted water available" for licensing under Q30 for all waterbodies within this area, as shown in Figure 4-2. 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, as shown in Figure 4-2. 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.

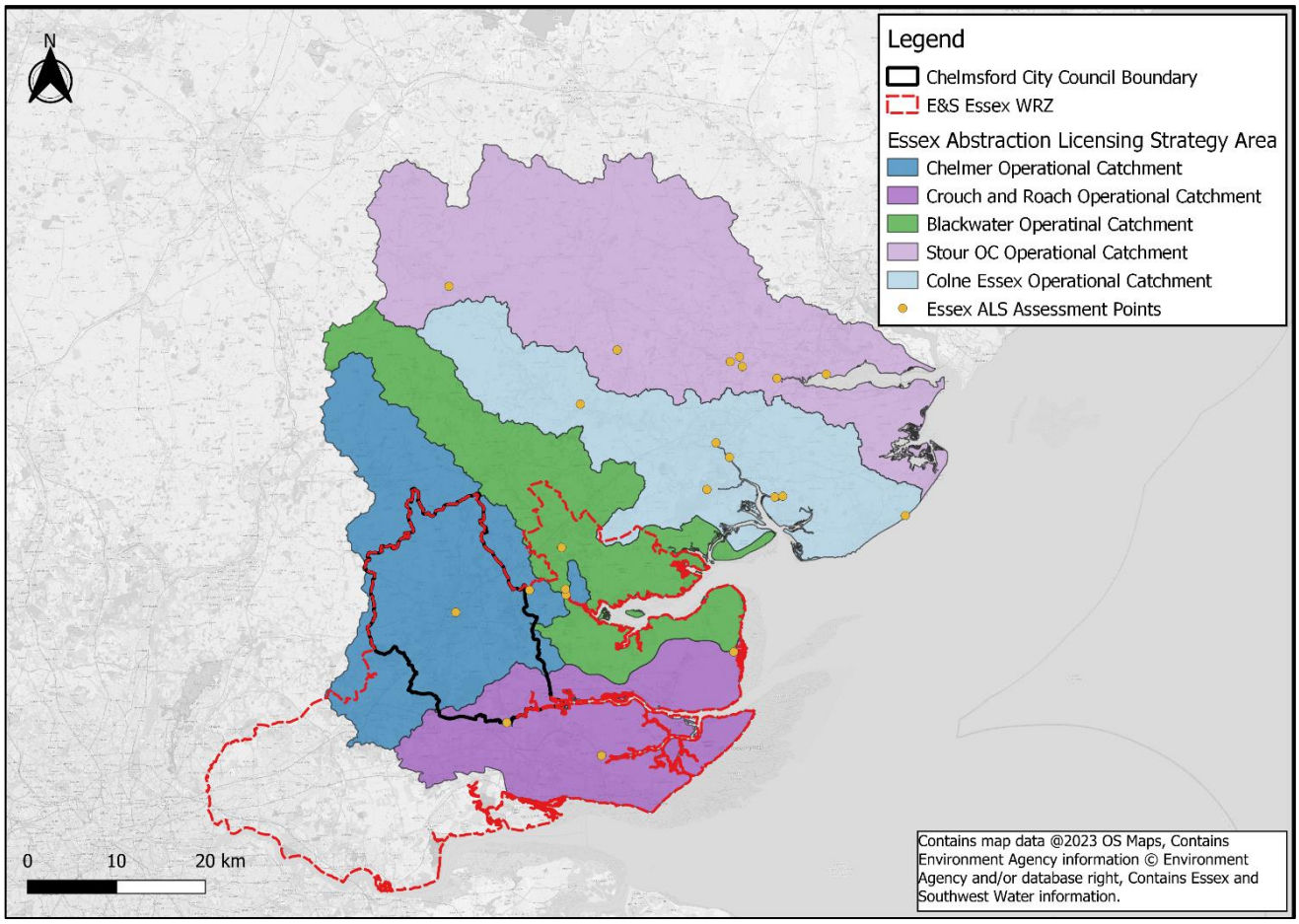


Figure 4-3: The area covered by the Essex Abstraction Licensing Strategy and the 5 Operational Catchments included within this.

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 (higher flows). Whilst for the Q95 flows (very low flows), there is restricted water available.

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. Under Q90 there is no water available for abstraction. For all other waterbodies within the overlap between the Council's study area and the Blackwater Operational Catchment there is no water available for abstraction under any flow rates.

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

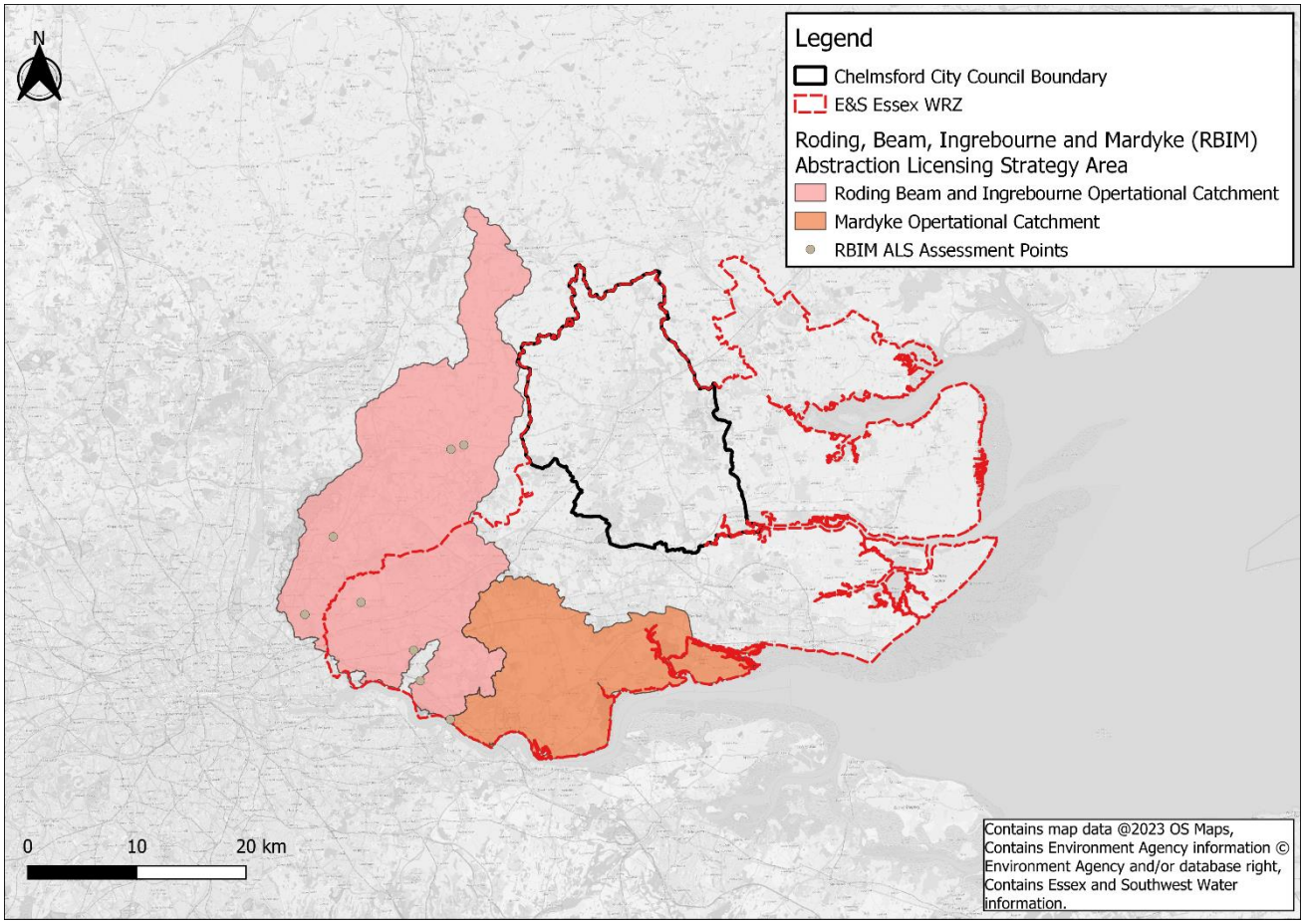


Figure 4-4: The area covered by the Roding, Beam, Ingrebourne and Mardyke (RBIM) Abstraction Licensing Strategy and the two Operational Catchments included in this.

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 as shown in Figure 4-4.

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.

4.5.2 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) is 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.

4.6 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 WRZ. Essex and Suffolk Water operates four WRZs, the Essex supply area is one WRZ (Essex WRZ), whilst the remaining three are located approximately 70km northeast of the Essex WRZ and are defined in this WCS as the Suffolk WRZ's, see Figure 4-5 for more details. Bordering the three Suffolk WRZs is AWS, whilst bordering the Essex WRZ is AWS, Affinity Water and Thames Water.

The Council's study area is located entirely within the Essex WRZ, as shown in Figure 4-5 below. As of 2021, CCC has 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 201,300 by 2041 which will be approximately 6% of the estimated population increase by Essex and Suffolk Water, as discussed in Section 4.7.2.

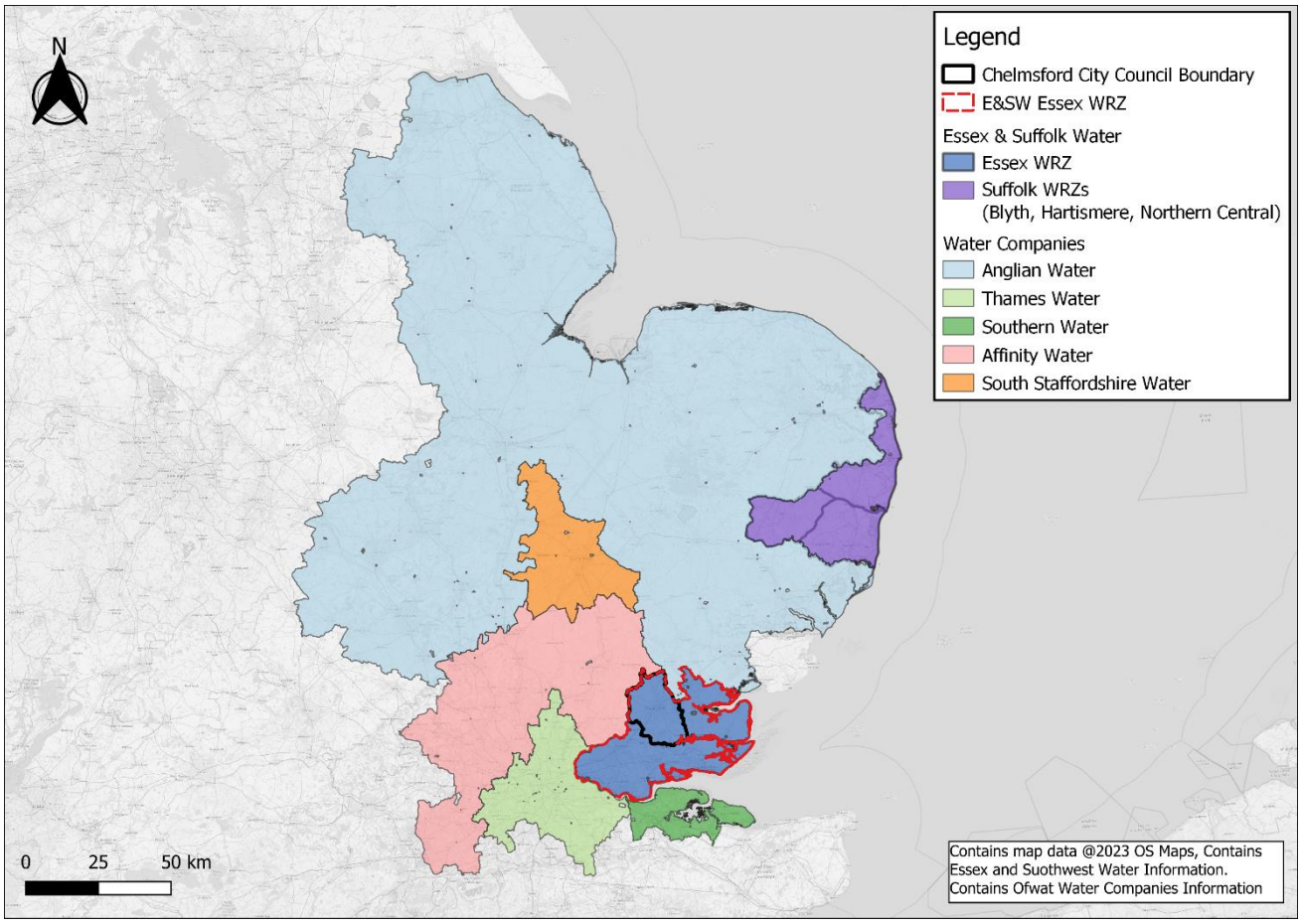


Figure 4-5: Essex WRZ with areas of the adjoining local water companies.

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 receives transfers from neighbouring water companies. The transfers come from two sources: the Chigwell raw water bulk supply from Thames Water's Lea Valley reservoirs and the Ely Ouse to Essex Transfer Scheme.

4.6.1 Interactions with other Local Authorities

The Chelmsford administrative authority is not the only local authority supplied by Essex and Suffolk Water. Within the Essex WRZ, Basildon, Brentwood, Castle Point, Maldon, Rochford, and Southend-on-Sea local authorities are all also supplied, as shown in Figure 4-6. Whilst this Detailed WCS is focused on CCC, the influence and growth within these authorities will need to be explored. If development across multiple local authorities places pressure on the available supply within Essex WRZ, then water efficient policies for all local authorities may need to be considered. This is explored further in Section 4.7.2.2.

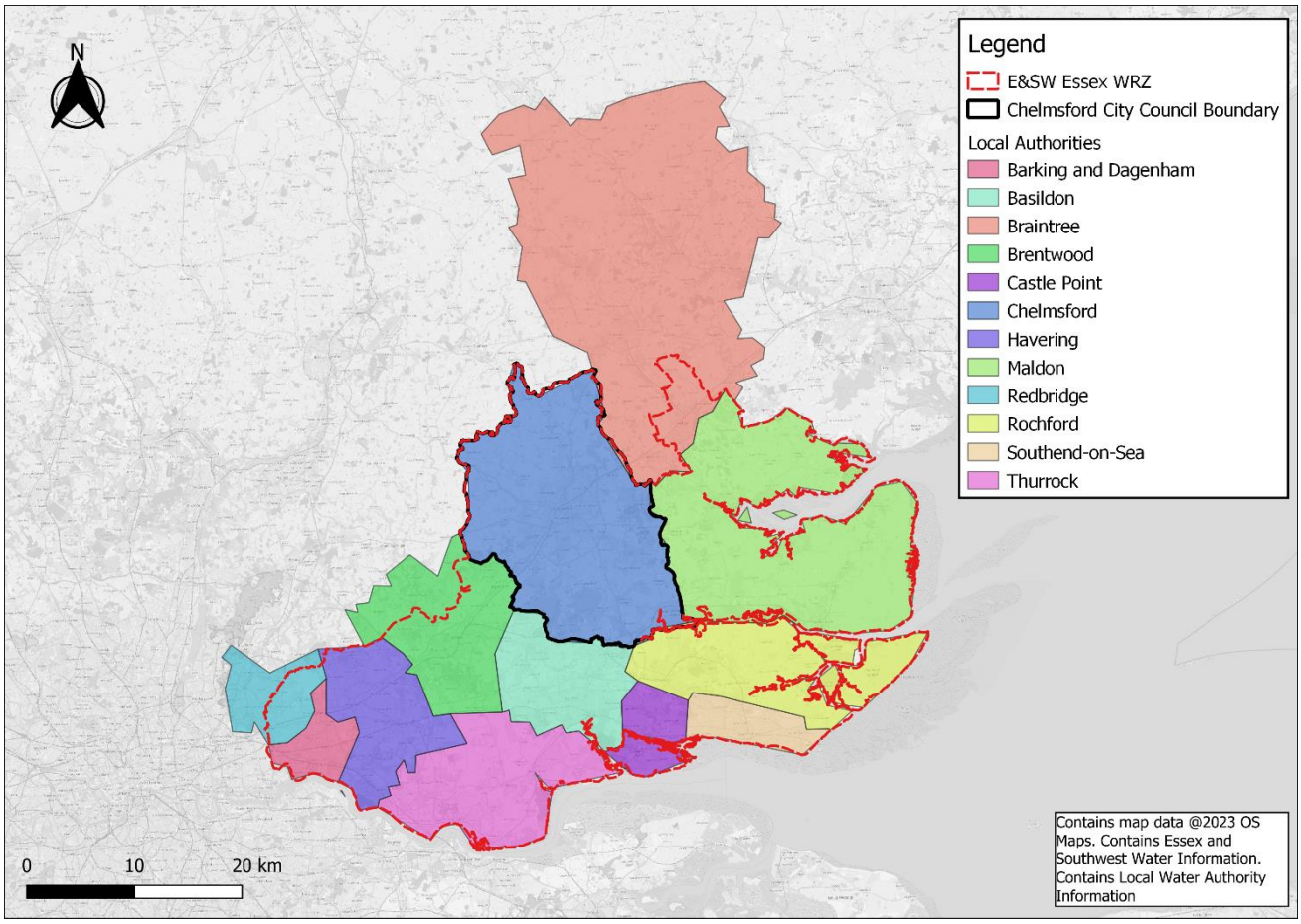


Figure 4-6: Local authorities within the Essex and Suffolk Water Essex WRZ.

4.7 Water Resources Management Plan

Warer Resources Management Plans (WRMPs) are 25-year strategies that water companies are required to prepare and update every five years. The currently published WRMP is WRMP 2019 (WRMP19). However, since the publication of WRMP19, proposed sustainability reductions and environmental destination have reduced the available water for supply. The revised draft WRMP24 was published in September 2023 and was therefore used to inform this WCS.

Each water resources management 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 4.1 below outlines each of the AMP periods, including the currently published WRMP19, will cover.

In line with water resources planning guidance, multiple WRMP need to be produced:

- Least cost, which is a benchmark to appraise other plans against.
- Multiple best value plans which use various different options to attempt to provide the best economic costs whilst achieving the best overall benefits to the customer, environment and overall society.
- Central plan.

Table 4.1: AMP periods for the revised draft WRMP24.

AMP7	AMP8	AMP9	AMP10	AMP11	AMP12
Current (2020-2025)	2025-2030	2030-2035	2035-2040	2040-2045	2045-2050

The WRMPs 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.

4.7.1 Baseline Supply and Forecast

4.7.1.1 Current Supply

The current Essex WRZ network (Figure 4-7) 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.

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

- Hanningfield reservoir (25,500Ml capacity reservoir)
- Abberton reservoir (26,000Ml capacity reservoir).

The main river abstractions are located on the River Chelmer, Blackwater, Stour and Roman. Groundwater contributes approximately 2% to the supply. Essex and Suffolk Water have two transfers into the region. The Chigwell raw water transfer from 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 20 Ml/d (mega litres per day) of raw water to the Thames Water region as per the water sharing agreement and 8 Ml/d of potable water.

Essex WRZ operates an effluent recycling scheme, which intercepts effluent from Chelmsford WRC at a purpose-built treatment plant near Langford water treatment works (WTW) before discharging into the River Chelmer 3km upstream of an abstraction intake. This treated water is used to augment the natural flow of the River Chelmer, which can be abstracted at Langford WTW for supply or storage into Hanningfield Reservoir for later use. This effluent recycling scheme produces approximately 20 Ml/d of water during May to November.

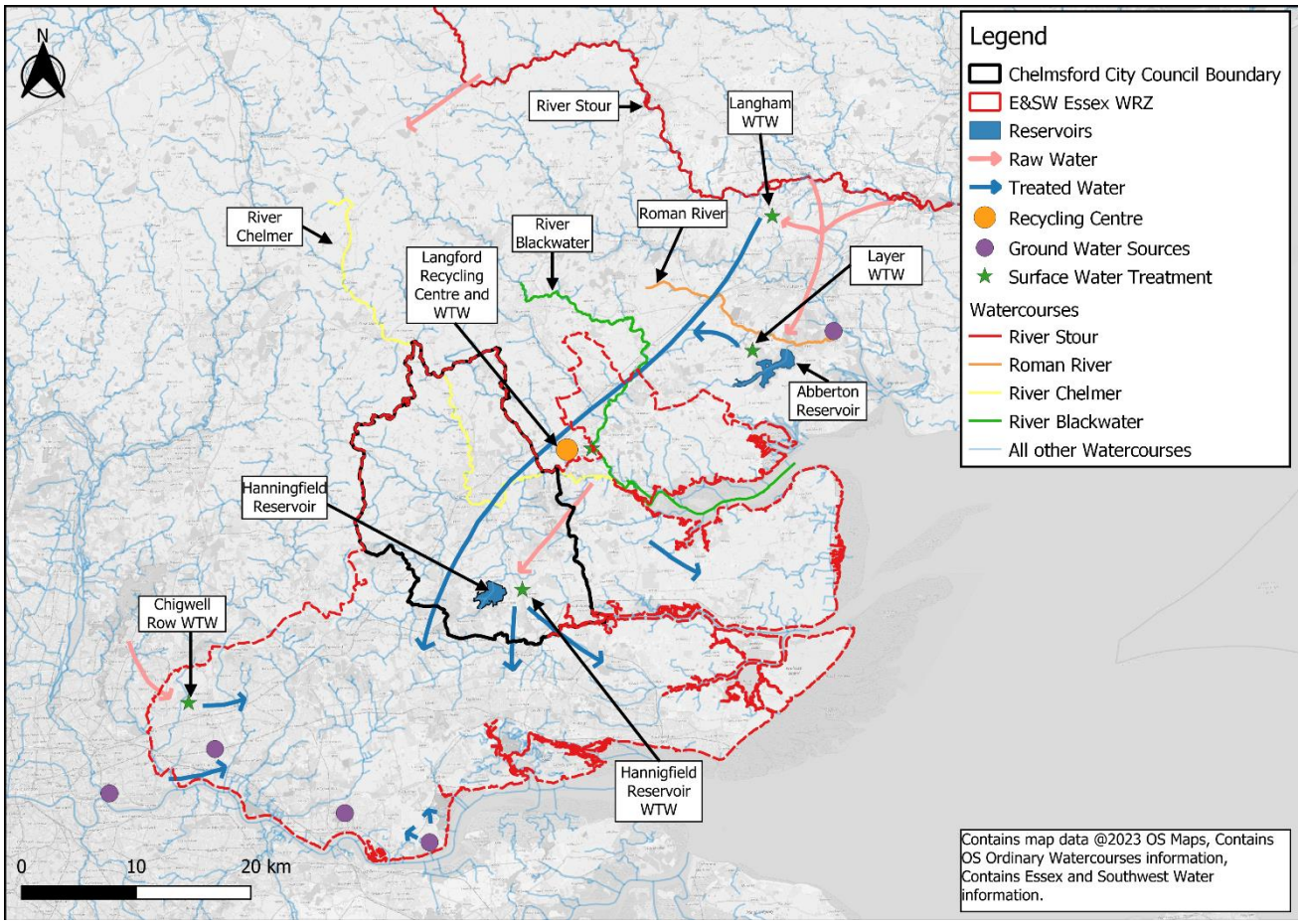


Figure 4-7: The Essex and Southwest Water Main Reservoir, River, and Groundwater abstraction areas.

4.7.1.2 Baseline Supply Forecast

Table 4.2 summarises the Essex and Suffolk Water baseline supply forecast for the Essex WRZ per AMP as published in the revised draft WRMP24; this is before interventions. 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 11 Ml/d due to a combination of sustainability reductions (5 Ml/d), climate change impacts (3 Ml/d) and an increase to water exported (3 Ml/d) until 2030/31. However, the cessation of water exports out of the WRZ (initially 29 Ml/d in 2025/26) will become less impactful on the WAFU after 2035/36, as the export will only decrease by approximately 18 Ml/d.

Table 4.2: Baseline supply forecast 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
Environmental Destination (Ml/d)	0	0	0	-2	-2	-2
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 (supply)	**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 5.70 Ml/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.

4.7.2 Household Property and Population Forecast

As outlined in Section 4.6, 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. This is growth of approximately 6,516 properties per annum.

To account for household growth, the Essex and Suffolk Water revised draft 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 (low, medium, 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 properties, 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 utilises Edge Analytics to understand the growth proposed by each local authority within each WRZ. Edge Analytics uses published Local Plans, housing topic papers and consultation to calculate the housing growth.

4.7.2.1 Chelmsford City Council

For housing growth within CCC, Edge Analytics used two documents "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 between 2019/20 and 2035/36. 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 proposed housing trajectory outlined in this WCS document, see Section 3 (Table 3.6) for more details. Table 4.3 below shows a comparison of the housing trajectory proposed by CCC against the housing numbers Essex and Suffolk Water are currently planning for houses over the next seven years.

Table 4.3: Difference in the CCC and Essex and Suffolk Water housing plans for the remaining Adopted Local Plan period (number of dwellings).

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 proposed housing trajectory (Table 3.6)	1,130	1,012	1,431	1,896	1,884	1,375	1,601	1,641
Difference (Essex and Suffolk Water trajectory minus CCC trajectory)	62	158	-299	-560	-487	321	-607	-587

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

Table 4.3 shows an initial surplus of homes planned for by Essex and Suffolk water for the first two years, but then a deficit. There is a total deficit of approximately 4,410 homes by the end of the current Adopted Local Plan period (2023-2036), which increases to 5,082 by the end of 2041/42 (time frame for the emerging CLP). In total Essex and Suffolk Water is planning for a total of 16,571 new homes, whilst CCC is planning for an increase of 21,653. This results in a deficit of approximately 267 homes per year.

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 within the lead up to publishing the WRMP. As per water resources planning guidance Essex and Suffolk Water must use Adopted Local Plans within the supply and demand balance, however it can (and do) plan for other scenarios. Currently a shortfall in housing between the spatial strategies and Essex and Suffolk Water's planned growth is shown for the Chelmsford district. However, this shortfall does not start until 2025/26, after the publication of WRMP24. The spatial strategy and housing trajectory outlined within this WCS should inform the next WRMP planning cycle (WRMP29).

Other local authorities also contribute to the total increase in homes and their water demand within the Essex WRZ; section 4.7.2.2 below outlines the growth within to the local authorities which are adjacent to CCC and considers how it compares to what is currently being planned for by Essex and Suffolk Water.

4.7.2.2 Surrounding Local Authorities

As shown in Figure 4-6, the local authorities bordering CCC and within the Essex WRZ are Brentwood, Basildon, Rochford, Maldon and Braintree. Each of the five councils are at different stages of updating their Adopted Local Plans. Edge Analytics has used multiple different data sources to inform the housing growth within the Essex WRZ. A comparison of the Edge Analytics housing trajectories and the published local authority plans is provided below:

- **Brentwood Borough Council**: The current Adopted Local Plan housing trajectory is the same as the housing trajectory used by Edge Analytics.
- **Basildon District Council:** Local Plan has been withdrawn and a Regulation 18 Issues and Options consultation was held between June 2023 and September 2023. No housing trajectory could be obtained for comparison; the data used by Edge Analytics was a draft report sent to AWS who is the statutory water provider for this Council. In place of a housing trajectory, the housing need of the Basildon District Council area is used. This shows a deficit of 100 home per year planned for by Essex and Suffolk Water until 2026/27 when this increases to a deficit of 405 homes per year.
- **Rochford District Council:** The current Adopted Local Plan housing trajectory and the Edge Analytics housing trajectory are different. From 2022/23 until 2026/27 Essex and Suffolk Water is planning to supply a surplus of 1,351 homes. From

2027/28, the housing need planned for by Essex and Suffolk Water is the same as that planned for by Rochford District Council.

- **Maldon District Council:** The Council's yearly five-year housing land supply statement provides details of the net completions of homes from 2014/2015 until 2022/23. Comparing with the Essex and Suffolk Water planned values from 2019/2020 until 2022/23, shows similar values with a total deficit of 79 homes. For 2023/24 and 2024/25 Essex and Suffolk Water are planning for more homes than Maldon District Council's trajectory however, this becomes a deficit from 2026/27 until 2028/29 with a total deficit of 457 homes. However, from 2026/27 Essex and Suffolk Water only plan for 80 homes per annum which is below the housing need stimulated by Maldon District Council of 310 per annum.
- **Braintree District Council:** The number of planned homes for Braintree District Council's housing topic paper is the same as that planned for by Essex and Suffolk Water.

Overall, Essex and Suffolk Water are planning to supply a surplus or on target of new homes (except Basildon District Council), this adds resilience to Essex and Suffolk Water's ability to supply additional homes. Any deficit which might be caused by CCC in the short term can then be made up from this additional supply.

4.7.3 Baseline Demand Forecast

4.7.3.1 Household Demand Forecast

Table 4. summarises Essex and Suffolk Water's baseline household demand forecast for the Essex WRZ, per AMP as reported in the revised draft WRMP24, before interventions.

Table 4.4.: Household demand forecast for Essex WRZ.

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
Household distribution input (Ml/d) (demand)	**293.21**	**297.68**	**300.16**	**302.61**	**308.93**	**309.56**

4.7.3.2 Non-Household Demand Forecast

Forecasting non-household demand is more complex than forecasting for household properties as different businesses require different amounts of water. Non-households are classified by Essex and Suffolk Water as premises where the primary use is for non-domestic purposes and can be referred to as business customers. This can also include the population living in communal establishments (e.g. care homes and prisons). For the purposes of this section, this is how non-household will be defined.

To estimate non-household demand Essex and Suffolk Water provides Ovarro DA Ltd with local authority, large user data, non-household consumption data, population, and property forecasts. In addition to this data, Ovarro uses employment and Gross Value Added (GVA) ONS data with large scale commercial project search data to create demand forecasts. The baseline non-household demand is presented in Table 4.4.

Table 4.4: Essex WRZ Baseline Non-Household Demand.

Essex WRZ	**2025/ 2026**	**2030/ 2031**	**2035/ 2036**	**2040/ 2041**	**2045/ 2046**	**2049/ 2050**
Non-Household demand (Ml/d)	60.09	62.84	62.95	61.23	61.19	61.17

4.7.3.3 Baseline Demand Forecast

Alongside the household and non-household demand, leakage, and additional water losses (e.g. unbilled, distribution input for operational use, void properties etc.) are included in the total baseline demand forecast. Essex and Suffolk Water's final demand (distribution input) is expected to increase across the planning period from approximately 402.1 Ml/d to 418.2 Ml/d.

Table 4.5: 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
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) (demand)	**402.10**	**409.36**	**411.76**	**412.21**	**418.17**	**418.50**

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

4.7.4 Supply and Demand Analysis (Baseline)

Table 4.6 shows that without interventions Essex and Suffolk Water expect to start 2025/26 with a 26.13 Ml/d deficit, with this deficit increasing to 41.24 Ml/d by 2049/50.

Table 4.6: Essex WRZ baseline supply demand balance.

Essex WRZ	**2025/ 26**	**2030/ 31**	**2035/ 36**	**2040/ 41**	**2045/ 46**	**2049/ 50**
WAFU (supply) (Ml/d)	383.59	372.59	390.17	385.18	382.13	379.66
Distribution input (demand) (Ml/d)	402.10	409.36	411.76	412.21	418.17	418.50
Target Headroom (all other components) (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

4.7.5 Future Supply and Demand Options

To avoid a supply and demand deficit, options (interventions) need to be implemented by Essex and Suffolk Water. These options can range from large, new strategic options e.g. reservoirs, to smaller options e.g. water treatment works upgrades/ maintenance that provide a smaller benefit.

4.7.5.1 Future Supply Options

Within the revised draft WRMP24, Essex and Suffolk Water has 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 water treatment works.
- 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 the Langford WTW.

In addition to the supply benefits, the current method by which Essex and Suffolk Water calculate their DO is different than that used in WRMP19. This is because drought measures and water up to the 1 in 200 event are now included in DO assessments. As such the Total WAFU is now shown in Table 4.7 below.

Table 4.7: Essex WRZ total WAFU including new DO and supply options.

Essex WRZ	**2025/ 2026**	**2030/ 2031**	**2035/ 2036**	**2040/ 2041**	**2045/ 2046**	**2049/ 2050**
DO (post forecast changes - including supply options) (Ml/d)	443.47	453.60	434.47	429.48	426.43	423.96
Raw water losses (Ml/d)	0.00	-0.33	-0.50	-0.5	-0.5	-0.5
Total Outage allowance (Ml/d)	-5.7	-1.85	0.00	0.00	0.00	0.00
Water Available for Use (own sources)	**437.77**	**451.42**	**433.97**	**428.98**	**425.93**	**423.46**
Raw water imported (Ml/d)	0.00	0.00	0.00	0.00	0.00	0.00
Potable water imported (Ml/d)	1.00	1.00	1.00	1.00	1.00	1.00
Raw water exported (Ml/d)	-20.00	-23.50	0.00	0.00	0.00	0.00
Potable water exported (Ml/d)	-8.68	-11.82	-11.30	-11.30	-11.30	-11.30
Total WAFU (supply)	**410.09**	**417.11**	**423.67**	**418.68**	**415.63**	**413.16**

4.7.5.2 Future Demand Options

In addition to the supply options, three demand options are also proposed; these are presented in Table 4.8.

Table 4.8: Demand options

Option	**Purpose**
Smart Metering	Essex and Suffolk Water's smart metering option consists of several phases. Firstly, a compulsory installation scheme such that all non-smart meters are upgraded to smart meters by 2035. Additionally, all households that have a meter fitted but choose to be on an unmetered tariff will automatically receive metered bills. Alongside household metering, Essex and Suffolk Water are rolling out a non-household metering campaign, with the aim to have all non-household properties metered by the end of AMP8 (2039/40).
50% Leakage reduction by 2050	Essex and Suffolk Water is aiming to reduce leakage to 50% of current levels by 2050.

Option	Purpose
Water Efficiency Measures	Essex and Suffolk Water is also proposing to implement a number of water efficiency measures for existing households. This is to bring the existing homes Per Capita Consumption (PCC) down to the same rate as that required for new build homes, as well as managing excess water usage. Measures are focused on the highest water users and will focus on fixing potential physical issues with infrastructure. Measures include home flow restrictions (flow controllers), leaking toilet identification, and repair alongside toilet rebates. Alongside physical measures in the home, digital engagement and national campaigns are proposed to educate water users.

Table 4.9 outlines the expected benefits per AMP; the values are presented as negative as they represent a reduction in demand, thus an increase to supply. The Scoping WCS reported the benefits including drought measures. These numbers have been updated in the Detailed WCS to be consistent with the supply and demand balance differences presented in Section 4.7.6.

Table 4.9: Expected benefits from demand options. Negative values indicate a reduction in demand.

Option	2025/ 26	2030/ 31	2035/ 36	2040/ 41	2045/ 46	2049/ 50
50% leakage reduction by 2050 (Ml/d) – reduced demand	-0.2	-1.21	-2.58	-4.57	-6.53	-8.07
Total of other demand options (Ml/d) – reduced demand	-2.95	-21.40	-41.86	-56.58	-65.43	-67.3

There is an inherent risk to demand measures which are focused on customer usage, as opposed to changes to infrastructure as customers could choose to ignore water saving measures or refuse smart meters.

In line with water resource guidance, each water company must produce multiple plans when producing a WRMP, which consists of best value, least cost, central plan (for more details see Section 4.7). This enables the regulator to determine whether the water company has selected the most appropriate approach. In the revised draft WRMP24, it was concluded by Essex and Suffolk Water that the best value plan was the least cost plan.

4.7.6 Supply and Demand Analysis (with interventions)

As outlined in Section 4.7.5 Essex and Suffolk Water has several options to reduce the deficit and create a surplus in water supply.

Table 4.10 below shows the updated supply demand balance once proposed interventions have been included.

Table 4.10: 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 (supply) (Ml/d)	410.09	417.11	423.67	418.68	415.63	413.16
Distribution input with interventions (demand) (Ml/d)	398.95	386.75	367.33	351.07	346.20	343.13
Target Headroom (all other components) (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

After a large portion of supply measures have been taken into account (2030/31), the surplus results from the proposed demand management measures. The benefits from the demand management measures also increase per AMP. There is an inherent risk to demand measures involving the general public as these measures rely on their acceptance and adopting behavioral changes. However, Essex and Suffolk Water will aim to mitigate this risk through educational initiatives and the implementation of the governments new water labelling scheme to keep customers informed on the importance of efficient and sustainable water use.

4.8 Potable Water Demand Projections

To determine if the proposed growth from CCC's preferred spatial strategy is in line with the growth Essex and Suffolk Water has currently planned for potable water in the revised draft WRMP24, high level demand projections have been calculated in this WCS as outlined below.

4.8.1 Per Capita Consumption

The impact on water resources and infrastructure due to new developments in CCCs administrative 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 4.11 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 69% of domestic properties will be metered. With this rising to approximately 87% by 2049/50.

Table 4.11: Table of PCC for measured and unmeasured households.

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

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, and the CCC current Local Plan policy of 110 l/h/d. 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. As outlined in Section 4.7.2 Ovarro provide Essex and Suffolk Water with future demand projections. Through consultation with Essex and Suffolk Water it was advised that 35 l/h/d should be used for employees and education staff and 15 l/h/d for students in education.

4.8.2 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 household 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

Whilst non-household is defined as:

Future non-household CCC potable water demand = Change in demand from existing non-household properties + proposed non-household properties demand

Where demand from new and existing non-household properties is calculated from:

Non-household properties demand = number of properties x number of workers/ pupils/ staff x property/ occupier specific PCC.

Several assumptions were also made with regards to the existing household and non-household demand when estimating the future total water demand, these include:

- All existing properties were assumed to be 'measured' at the current PCC of 154.7 l/h/d (throughout the entire Local Plan period) without splitting them into 'measured' and 'unmeasured'.
- No planned extra demand management measures for the existing households were applied, ensuring a conservative estimate.
- Non-household current and future demand was fixed at the values shown in Table 4.13.

Five household potable demand scenarios have been considered within the Detailed WCS (detailed in Table 4.12) to assess how CCC can support enabling the planned development and growth whilst minimising the impact on the limited water resources. These demand scenarios are based on potential predicted changes to PCC driven by the Essex and Suffolk Water strategy and the recent consultation carried out for this WCS.

As per the Adopted Local Plan policies, CCC are currently aiming for a PCC of 110 l/h/d in the emerging Local Plan, which forms the 'Preferred' demand scenario. The 'Tighter' scenario is informed by the government's environmental improvement plan for higher water efficiency in the home of 100 l/h/d in seriously water stressed areas (for more details see Section 9.2). The 'Reasonable' scenario has been informed by the Essex and Suffolk Water's 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 4.12: Household potable demand scenarios.

Scenario	Details	Litres per head per day
Low	Based on evidence of PCC within the wider region in the east of the country	90
Tighter	Environmental improvement plan tighter restrictions	100
Preferred	CCC preferred PCC (building regulations optional requirement)	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

One scenario for non-household demand has been considered which will not change irrespective of the household scenario presented in Table 4.12. The non household PCCs used are highlighted in Table 4.13 as per the consultation with Essex and Suffolk water and published literature on non-household demand.

Table 4.13: Non-Household potable demand.

Type of non-household property	Litres per head per day
Employees and education staff	35
Education (students)	15

4.8.3 Potable Water Demand Projection Results

The increases in total potable demand for new households and non-household scenarios are outlined in Table 4.14.

Figure 4-8 shows the total potable demand of current and new water users per household scenario, but for simplicity non-household demand is not included as it would be a 0.4 Ml/d uplift for each of the five scenarios.

Table 4.14: Increase in potable water demand for household and non-households per scenario.

Scenario	Increase in Potable Water in 2040(Ml/d)	Increase in Potable Water in 2040 (%)
Low (Yellow line on Figure 4-8)	4.7	16.7
Tighter (black line on Figure 4-8)	5.2	18.5
Preferred (Blue line on Figure 4-8)	5.7	20.4
Reasonable (Orange line on Figure 4-8)	5.9	21.2
High (Grey line on Figure 4-8)	6.7	23.9
Non-Household	0.4	11.1

The results show that in 2040/41 there will be a difference of approximately 2.03 Ml/d between the High scenario and Low scenario, whilst this is decreasing to approximately 1 Ml/d between the High scenario and Preferred 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 21,563) can only achieve the High scenario instead of the lower scenarios, with more pressures if larger PCC values are consumed by households.

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.

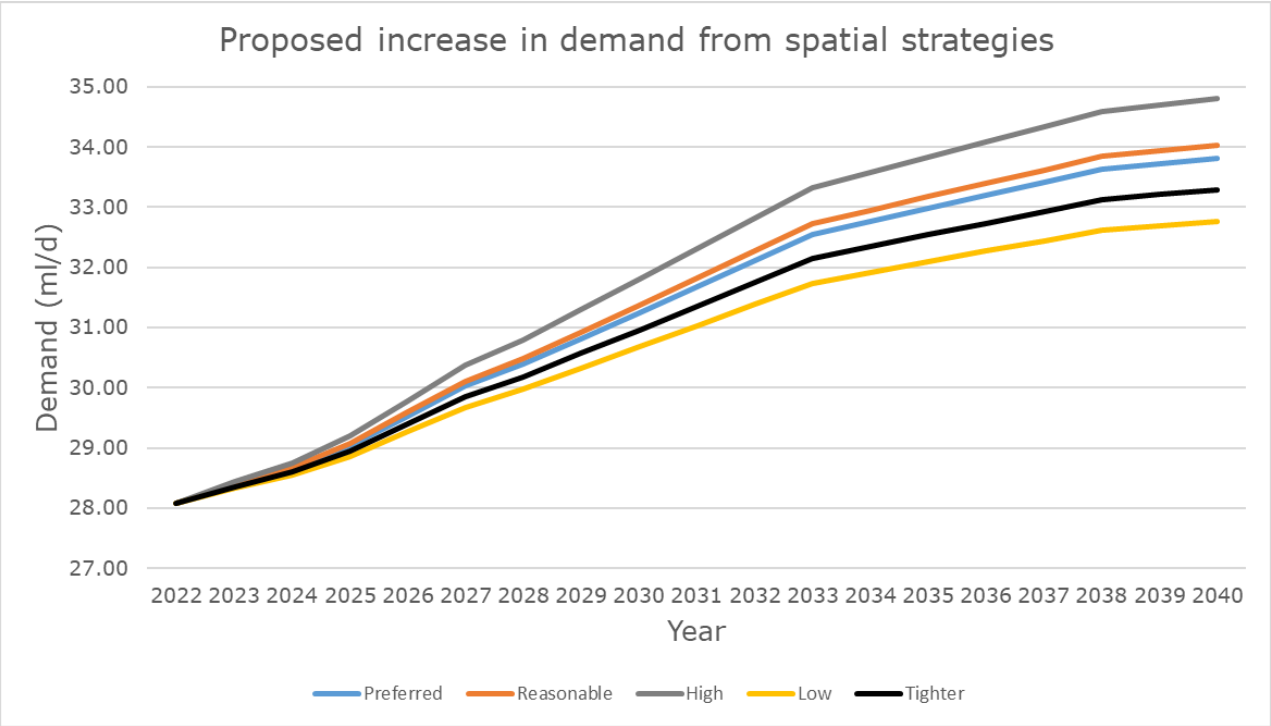


Figure 4-8: Total potable water demand projection results.

4.8.4 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 water company plans but will make 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 similar to Essex WRZ more difficult to achieve. For more information on climate change within Essex and Suffolk Water's WRMP see Section 8.
- 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. Therefore, the predicted trend of falling occupancy rates 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 or reduce their PCC.
- Non-household usage (employment and educational facility sites) has been assigned a fixed PCC whereas, in reality businesses may use more or less water depending on their function.

4.9 Future Water Supply Infrastructure Considerations

Potable water is supplied to Chelsmford via the Essex and Suffolk Water network, a vast majority of which is abstracted from Abberton and Hanningfield reservoirs, with some additional supplies coming from river abstractions.

Currently the network primarily supplies water from north to south, with a contribution from the southwest from borehole sources and transfers from Chigwell. Abstracted water is treated at three water treatment works (WTW): (Layer WTW, Langham WTW and Hanningfield WTW).

Consultation with Essex and Suffolk Water was undertaken to understand the potential impact of the development proposed by CCC on the water infrastructure network. Based on comments from Essex and Suffolk Water, the majority of CCC's growth proposals are not expected to have any significant future infrastructure pressures but there are some aspects which need to be considered as shown in Table 4.15.

Table 4.15: Future development water infrastructure considerations - Essex and Suffolk Water comments

Item	Essex and Suffolk Water comments
Water treatment works	The Essex and Suffolk Water network team confirmed that the growth studies they have undertaken have shown that there are no infrastructure issues at Langham WTW or Layer WTW. New developments that will be supplied by Hanningfield WTW could impact head loss, pressure, and velocity in the network. However, Essex and Suffolk Water advises that there are already works in progress to address this.
PCC	It was noted by Essex and Suffolk Water that the largest potential pressure is from the PCC of existing customers. Such that whilst measures are in place in the revised draft WRMP24, if water consumption does not reduce as planned it could lead to supply issues. Any potential reductions in new customer PCC (for further details see Section 9), will also reduce the impact of the proposed growth on the existing water distribution infrastructure.
Water network (water mains)	Essex and Suffolk Water indicated that there are existing network issues (bursts and reduced supply) within Boreham. This will have to be considered for any of the proposed non-household developments within Boreham. However, Essex and Suffolk Water is considering options to alleviate this pressure. In addition, new water mains will be required to link the proposed sites to the nearest trunk main (or large diameter distribution main with available capacity), or the potential need for reinforcement and capacity upgrades to the surrounding distribution mains. Such upgrades would be funded through the developer requisition process, during which Essex and Suffolk Water would investigate the most efficient solution to connect to each proposed site, utilising existing capacity where available. CCC and developers should continue to consult with Essex and Suffolk Water throughout the Local Plan process, and as planning applications are developed, to identify where new networks may be put in place, and the existing network reinforced, to serve a number of sites. Consulting with Essex and Suffolk Water will increase the efficiency of the planning and construction of network upgrades, which should serve to reduce overall costs to developers, and the disruption to the existing settlements.

4.10 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.

The impact of water efficiency within the context of integrated water management has been assessed in Section 9.

5Wastewater Treatment and Sewerage

Wastewater collection and treatment services for the Council's administrative area are provided by Anglian Water Services (AWS). Wastewater is taken to water recycling centres (WRCs) via gravity and pumped networks before releasing back to the ordinary watercourses or rivers. There are both privately and AWS owned WRCs within the Council's area.

An overview map of the AWS WRCs and the sewer network that serve CCC is provided in Figure 5-1 below.

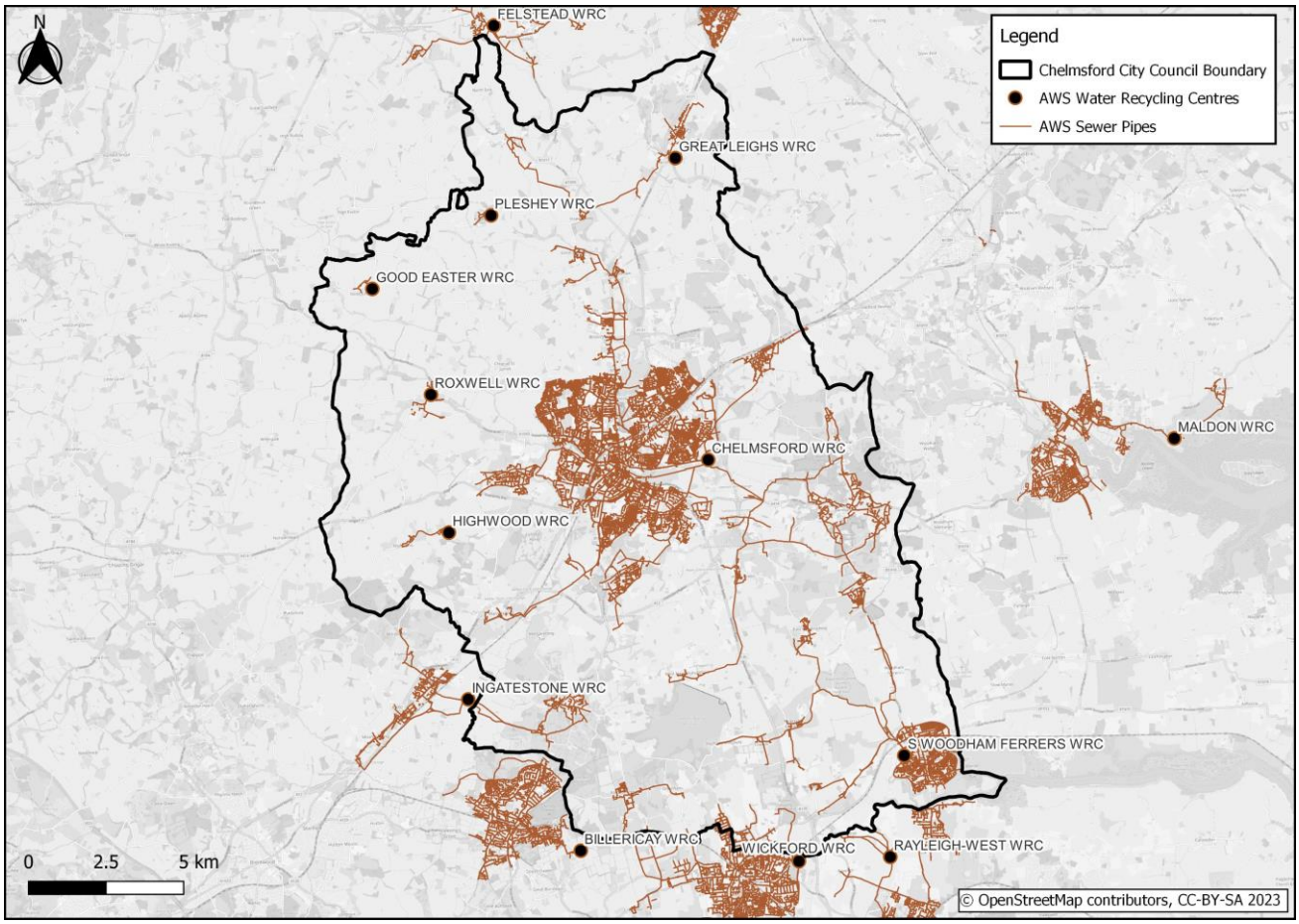


Figure 5-1: CCC existing AWS WRCs and sewer infrastructure

This section contains the assessment of the capacity of the existing wastewater infrastructure (piped network and WRCs) to accommodate the increase in foul flows as a result of the population increase due to the planned proposed developments within CCC administrative area.

5.1 Water Cycle Study Stage 1 Outcomes

Arcadis completed the Stage 1 (scoping) Water Cycle Study (WCS) in December 2023. A summary of Stage 1 WCS conclusions in terms of wastewater treatment and sewerage is shown below; these have been re-assessed in this Detailed WCS:

- Development in CCC's administrative area can be accommodated at most WRCs without major upgrades.
- Constraints have been identified in terms of accommodating developments in the Great Leighs, Wickford, and South Woodham Ferrers WRC catchments. Current consented dry weather flow (DWF) will be exceeded at these works.
- Further consultation is required during the CCC Local Plan and drainage, wastewater management plan (DWMP) processes to investigate the above exceedance issues and upgrade existing infrastructure during the upcoming AWS asset management plan (AMP) cycles.
- The Stage 1 study excluded assessment of the existing sewer network infrastructure and odour and further attention to this is required.

5.2 Water Cycle Study Stage 2: Detailed Water Cycle Study

This Stage 2 (Detailed) WCS will include a more detailed assessment and review of the WRC and sewerage infrastructure, including following the next steps identified in the Stage 1 WCS:

- The WRCs which fail their existing DWF consent should be discussed with AWS.
- Review of the impact of cross boundary proposed development within the Wickford and Ingatestone WRC catchments when assessed in combination with the proposed development in CCC's administrative area.
- 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 to 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 the Local Plan: preferred options assessment.

5.3 Water Cycle Studies for Adjacent Councils

Some AWS WRCs serve the CCC administrative area as well as areas within adjacent council areas. Therefore, this will need to be factored into the review of the WRCs.

The WCSs of both Brentwood Borough Council (served by Ingatestone WRC) and Basildon County Council (served by Wickford WRC) were reviewed. A summary of findings is provided in Table 5.1.

Table 5.1: Summary of WRC impacts for adjacent councils as reported in their WCS.

Council WCS	WCS summary
Basildon District Council - South Essex Outline Water Cycle Study (2011)	• Wickford WRC was identified during the AWS flow audit as operating at or above DWF capacity. • Wickford WRC was deemed to have no capacity in its consented DWF for any further discharge from growth. • Load standstill calculations were used to calculate the maximum flows that could be discharged from the works. • Due to relatively relaxed consent limits of Wickford WRC compared to the limits of conventional wastewater treatment there is potential for the consent standards to be tightened. However significant upgrades would be required to enable the discharge quality to be improve. • The previous WCS accounted for the development proposed in CCC's administrative area at the Runwell Hospital site.
Brentwood Borough Council scoping/ outline WCS (2011)	• A comparison of 2010 measured flows with consented permit flows indicates there is limited capacity at Ingatestone WCS (less than 25% headroom). • Flow consents were increased at Ingatestone WRC to meet the existing requirements from effluent flow (pre-publication of the2011 WCS). • The 2011 WCS stated that Brentwoood Borough Council should regard Ingatestone WRC as being at capacity and unable to accommodate any strategic growth without further variation in licence and potential investment. • If a new discharge permit were required to accommodate growth in Ingatestone WRC catchment, a corresponding tightening of the permitted quality limits would also be required be the EA. • The 2011 WCS also indicated potential sewer infrastructure capacity issues in Ingatestone WRC catchment due to previous recorded DG5 flooding events.

5.4 Anglian Water Services - DWMP report

AWS completed their drainage and wastewater management plan (DWMP) in May 2023. The document contains details regarding their 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 technically achievable limits (TAL) of the existing processes (for example Ammonia or Phosphate limits).

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

5.5 Sewer Network Infrastructure (including pipes and pumps)

The sewerage infrastructure (pipes, combined sewer overflows (CSOs) and pump stations) linking the developments and the WRCs needs to be assessed to determine if there are any capacity issues in the system and if it can adequately manage with both the existing and future sewer flows. Existing private drainage was not assessed, and the main focus was on AWS foul and combined sewer infrastructure (public sewer infrastructure) between the developments and the WRCs.

For houses built after 1 October 1937, all pipework serving more than one property is considered a private sewer until it connects to a public sewer, which is normally under a road. Maintenance of private sewers is the responsibility of the homeowner and not the water company. Only the public sewers were assessed in this report.

AWS is the water company responsible for providing public sewer services for the whole of the Council's area. To assess the sewer infrastructure, the GIS layers of the sewer pipes and associated infrastructure (including CSOs and pumps) between the development and the WRCs was provided by AWS and reviewed.

Neither the Stage 1 nor Stage 2 WCS undertook hydraulic modelling. The WCS assessments focus on the foul sewer network in dry weather flow conditions and do not account for the presence of any surface water flows in the combined systems.

5.5.1 Existing Sewer Network

Assessment of the existing combined or foul sewer network (pipes, pump stations and CSOs) provides a good baseline for determining if the increased flows from future developments (population increase) will be able to be accommodated within a catchment.

Sewer flooding (as identified by entries in the DG5 register of sewer flooding incidents) is a good indicator of capacity within a network as it indicates areas in a sewer network where the network is constrained and struggles to operate effectively with current wastewater volumes flowing through it. The DG5 register is a living document and therefore provides current information on known flooding issues.

The DG5 register is not available as a publicly accessible document due to the confidentiality of the data held within the register. AWS was thus consulted to provide non-confidential summary information of current known flooding within the sewer network within the whole of the CCC Administrative Area and the adjacent council's areas (***Appendix F***).

AWS provided a spatial dataset of DG5 properties grouped by postcode, which is shown in ***Appendix F***. The information doesn't indicate any significant internal flooding during 2022 and 2023, however in some areas more than 50 properties were noted as experiencing external flooding. Based on the discussions with AWS no significant existing infrastructure capacity constraints were noted.

5.5.2 Proposed Developments - Sewer Network Assessment

Any new development within CCC's administrative area will require sewerage infrastructure to connect it to the WRC. The sewer infrastructure could be constrained in two main ways:

- A lack of capacity within the existing network to accommodate the proposed development flows.
- The existing sewer network is not within close proximity to the development sites.

For the sewer network assessment within this Detailed WCS, the proposed developments with existing planning permissions (full or outline and hybrid), were not included. It was assumed that the proposed developments with planning permissions should have been appraised in the planning consultation process and were likely included in previous local plans and WCS, and therefore already planned for in the previous and current AWS plans. Each planning application would be expected to have been supported by either a pre-development enquiry to AWS to connect to a public sewer or an S106 (application to connect to a public sewer under section 106 of the Water Industry Act) application at the detailed design stage or prior to construction.

As shown in Figure 5-2, most of the proposed development sites are located within the existing WRC catchments defined by AWS. The sites that fall completely outside the existing WRC catchments, are mainly located within:

- Hammonds Farm (new settlement)
- Little Boyton Farm
- Little Waltham
- Great Leighs
- Ford End
- South Woodham Ferrers
- Chelmsford.

Where the proposed development sites fall within existing WRC catchments, it was assumed that these sites would be able to connect to the existing sewer network (either by gravity or pumping). For the sites that fall outside existing WRC catchments, it was assumed additional infrastructure would be required to accommodate these developments.

For the existing brownfield sites, which are proposed for redevelopment, where the existing site's surface and foul drains are connected to the public combined sewer, it is assumed the redevelopment would result in the separation of surface and foul water drainage. This would increase capacity in the existing public combined sewer to accept additional foul flows from new developments.

Additionally for brownfield sites, where the land-use will only undergo minor alterations (industrial to commercial), the existing public sewers were assumed to be able to accommodate the proposed developments without requiring additional upgrades.

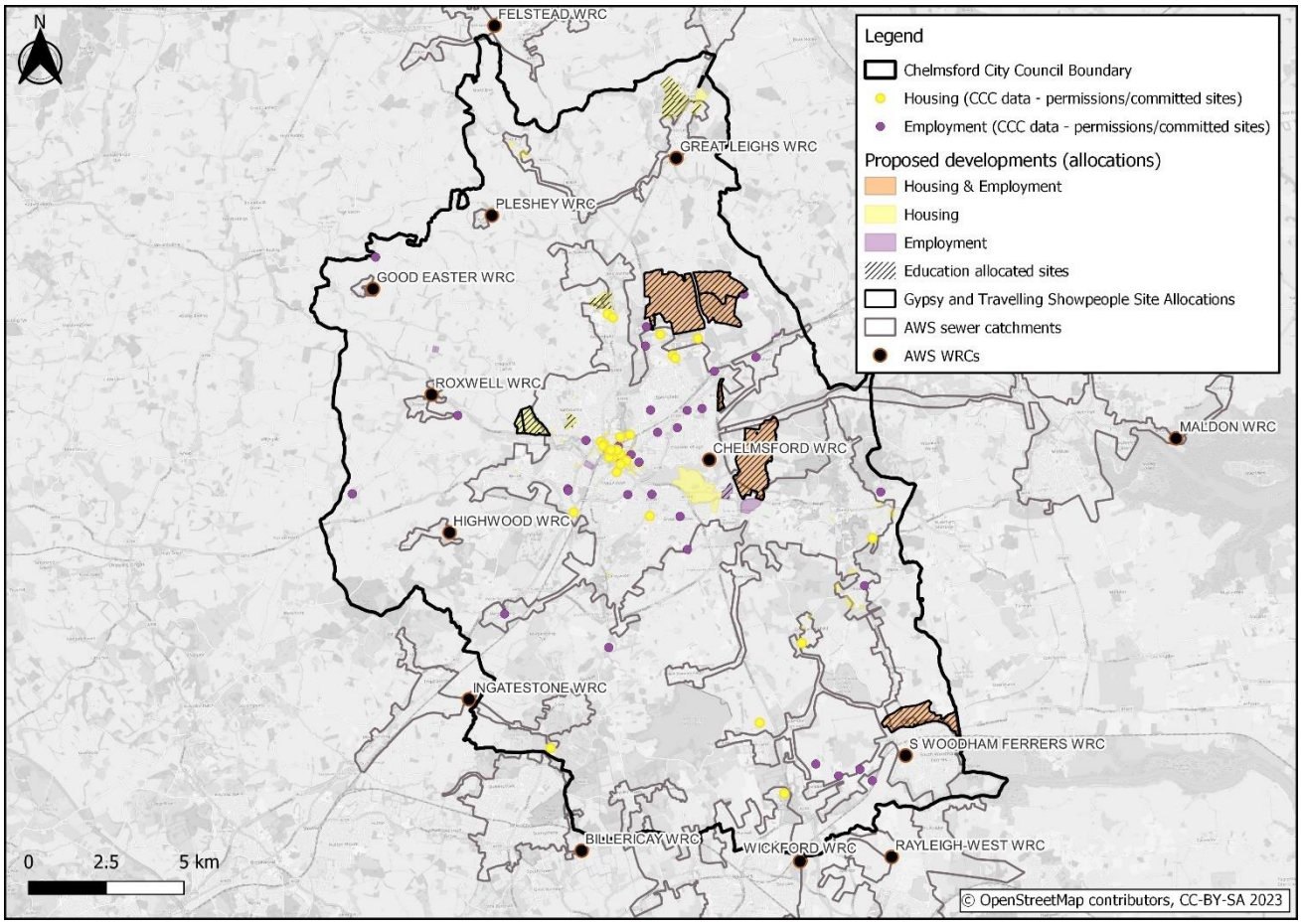


Figure 5-2: Proposed development and AWS sewer catchments

A red, amber, green (RAG) status was allocated for each of the proposed developments (***Appendix C***), which were categorised as shown in Table 5.2.

Table 5.2: Proposed developments: Infrastructure assessment RAG status categories

Colour	Description
Red	A greenfield site with no public sewer infrastructure close by and outside existing WRC catchment boundary. Requires major infrastructure upgrade or extension which will need to be delivered by developers and AWS.
Amber	The existing brownfield or greenfield site is just outside an existing WRC catchment boundary and infrastructure is within 100 m of the site. Requires minor infrastructure upgrade or extension which will need to be delivered by developers and AWS.
Green	The existing brownfield or greenfield site within an existing WRC catchment boundary with infrastructure within 50 m of the site. Requires no to little infrastructure upgrade or extension which will need to be delivered by developers and AWS.

To inform the existing sewer network assessment, AWS was consulted to provide any comments or concerns to identify where the existing sewer infrastructure will not be able to accommodate the proposed developments on a catchment scale.

AWS indicated that, in WRC catchments where the population is predicted to significantly increase, DWF headroom may be available at the WRC, however the additional loading is likely to still require investment.

The AWS DWMP was reviewed for each of the WRC catchments to determine the current concerns and future strategies; a summary provided in ***Appendix E***. It was found that the DWMP suggested some solutions to address existing and future risks and vulnerabilities within the sewer networks.

No growth investment, driven by the proposed development within the CLP, is planned for the current Asset Management Plan (AMP7) period for any of the impacted WRCs and their drainage networks. The main solutions proposed within the DWMP to address the potential risks were mixed network strategies, sustainable drainage systems (SuDS), infiltration reduction, WRC capacity increase and the removal of surface water from the combined sewer networks to improve capacity and future resilience.

5.6 Water Recycling Centres

5.6.1 Existing Water Recycling Centres

The Council's administrative area is served by the WRCs listed in Table 5.3 and Table 5.4, and shown in Figure 5-3.

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

Table 5.3: WRCs serving CCC's administrative area: AWS owned.

Chelmsford WRC	Ingatestone WRC (Located Outside CCC)
Good Easter WRC	Pleshey WRC
Great Leighs WRC	Roxwell WRC
Highwood WRC	South Woodham Ferrers WRC
Wickford WRC (Located Outside CCC)	

Table 5.4: WRCs in CCC administrative area: Privately owned.

Kings Poultry	SSO Kings Bridge
Cuton Lock	Pertwee Drive
Russell Way	Extensions At the Brookend
Railway Viaduct	WRC At 5 And
High Street	WRC At Stock
Howe Green - Sandon	Ramsden Heath
Spalding Way	Gt Baddow High Street Tabors
Avon Rd SSO Chelmsford	Vicarage La Gt Baddow
Mill Green Freyning	WRC 5 Flats

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

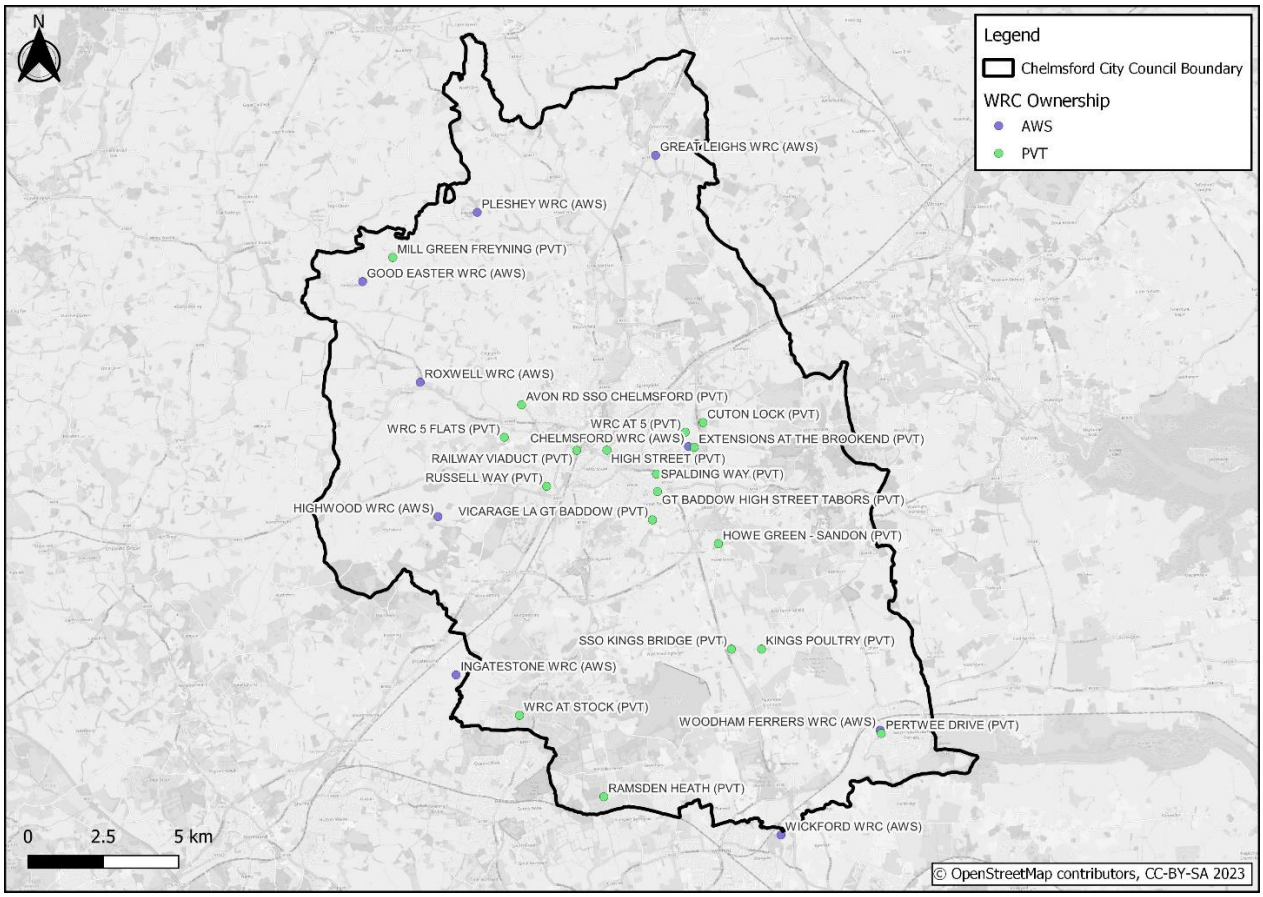


Figure 5-3: CCC existing WRCs (AWS and privately owned)

5.6.2 Existing Dry Weather Flow

Before assessing the impact of the 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 were assessed, and any existing shortfalls identified. DWF is an estimation of the flow of wastewater to a WRC during a period of dry weather.

There are two principal ways to calculate the existing DWF for each WRC as described below.

5.6.2.1 Dry Weather Flow (DWF) Estimation: Theoretical Flow Estimation

The first approach is calculating the existing DWF for each WRC using:

Theoretical or calculated existing DWF = PG + IDWF + E

Where:

DWF is the total dry weather flow (cubic meters per day (m^3/day)).
P is the catchment population (number).
G is the existing per capita domestic flow (litres per head per day (l/h/d)): Water consumption of 133l/h/day as agreed with AWS and assuming 90% return of domestic water consumption to sewer.
I_{DWF} is the dry weather infiltration (litres per day): 25% as agreed with AWS. Accounts for water entering the sewerage network from incorrect or illegal connections, and through defects in the existing assets.
E is the trade effluent flow (litres per day).

5.6.2.2 Dry Weather Flow (DWF) Estimation: Measured Flow

The second approach is determining the DWF based on the nonparametric 10-percentile value (Q90) or 20-percentile value (Q80) of a time series of measured total daily volume data. This is the value exceeded by 90% or 80% of the recorded daily flow values, excluding any wet weather flows during rainy or storm conditions.

As advised by AWS, Q90 values were used in this study to assess the existing DWF and used to calculate future DWFs. Table 5.5 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 for the Stage 1: Scoping WCS.
- Measured DWF containing the averaged Q90 DWF for 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 5.5: WRCs owned by AWS in CCC administrative area: Existing permit and measured DWF review.

WRC	Settlements Served	Existing Consented dry weather flow (DWF) (m^3/day)	Existing DWF: Q80 measured 2021 in m^3/day	Existing DWF: Q80 measured 2022 in m^3/day	Existing DWF: Q90 measured 2022 in 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	34,239	25,843	24,192
Good Easter	Good Easter	44	27	20	18
Great Leighs	Chatham Green Ford End Great and Little Leighs Howe Street	767	**865**	707	669
Highwood	Edney Common Highwood	45	N/A	N/A	N/A
Ingatestone	Stock Including relevant settlements in Basildon District Council (Ingatestone, Fryerning and Mountnessing)	1,600	1,559	1,489	1,414
Pleshey	Pleshey	39	N/A	N/A	N/A
Roxwell	Chignal Roxwell	220	159	115	104

WRC	Settlements Served	Existing Consented dry weather flow (DWF) (m^3/day)	Existing DWF: Q80 measured 2021 in m^3/day	Existing DWF: Q80 measured 2022 in m^3/day	Existing DWF: Q90 measured 2022 in m^3/day
South Woodham Ferrers	East Hanningfield South Hanningfield Rettendon Common Rettendon Place South Woodham Ferrers Woodham Ferrers	3,900	**4,440**	**4,014**	3,899
Wickford	Ramsden Heath/Downham Runwell Including relevant settlements in Brentwood Borough Council (Wickford)	7,500	**7,653**	**8,142**	**7,933**

The majority of the WRCs are 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 5.5. These were discussed with AWS and the comments received are summarised in Table 5.6.

Table 5.6: Water recycling centres that have existing capacity issues.

Water recycling centre (WRC)	Anglian Water Services (AWS) comments
Great Leighs (2021)	WRC fails in 2021 but not in 2022. 2022 was a particularly dry year so Q80/90 flows can appear more favourable compared to 2021 for which was a very wet year. However, the headroom for 2022 is very limited.
South Woodham Ferrers (2021 and 2022)	WRC fails in 2021 and 2022. 2022 was a particularly dry year so Q80/90 flows can appear more favourable compared to 2021 for which was a very wet year. However, WRC is not failing as assessments for future investment and DWMP are based on Q90 and not Q80 flows. However, the headroom is very limited.
Wickford (2021 and 2022)	WRC failing which is most likely to be growth related as majority of the catchment is within Basildon Borough Council area i.e. outside of CCC.

It should be noted that there are combined sewer networks in CCC 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.

5.7 Proposed Growth and Development

To provide evidence that the proposed growth and development can be accommodated, all CCC growth proposals within the AWS operational area have been reviewed. The AWS infrastructure assets (WRCs and sewer pipes) are shown in conjunction with the proposed development in Figure 5-4.

5.7.1 Residential

The proposed residential (housing) growth for the planning period up to 2041 is discussed in Section 3.2. These developments will require modification and upgrades to the existing wastewater network in addition to any updates resulting from their additional contributions to wastewater flows entering the WRCs.

5.7.2 Employment, Commercial and Industrial

The additional employment (allocations and committed sites) will require modification and upgrades to the existing wastewater network in addition to any updates resulting from their additional contributions to wastewater flows entering the WRCs. These have been accounted for and assessed in this Detailed WCS.

5.7.3 Educational Facilities (Schools)

Due to the increase in population resulting from the proposed housing developments and growth within the area, the existing schools will not be able to accommodate the future additional pupils. To accommodate the growth, several new schools (see section 3.3.2) have been proposed in CCC's administrative area where significant growth is planned.

The additional educational facilities (schools) will require modification and upgrades to the existing wastewater network in addition to any updates resulting from their additional contributions to wastewater flows entering the WRCs.

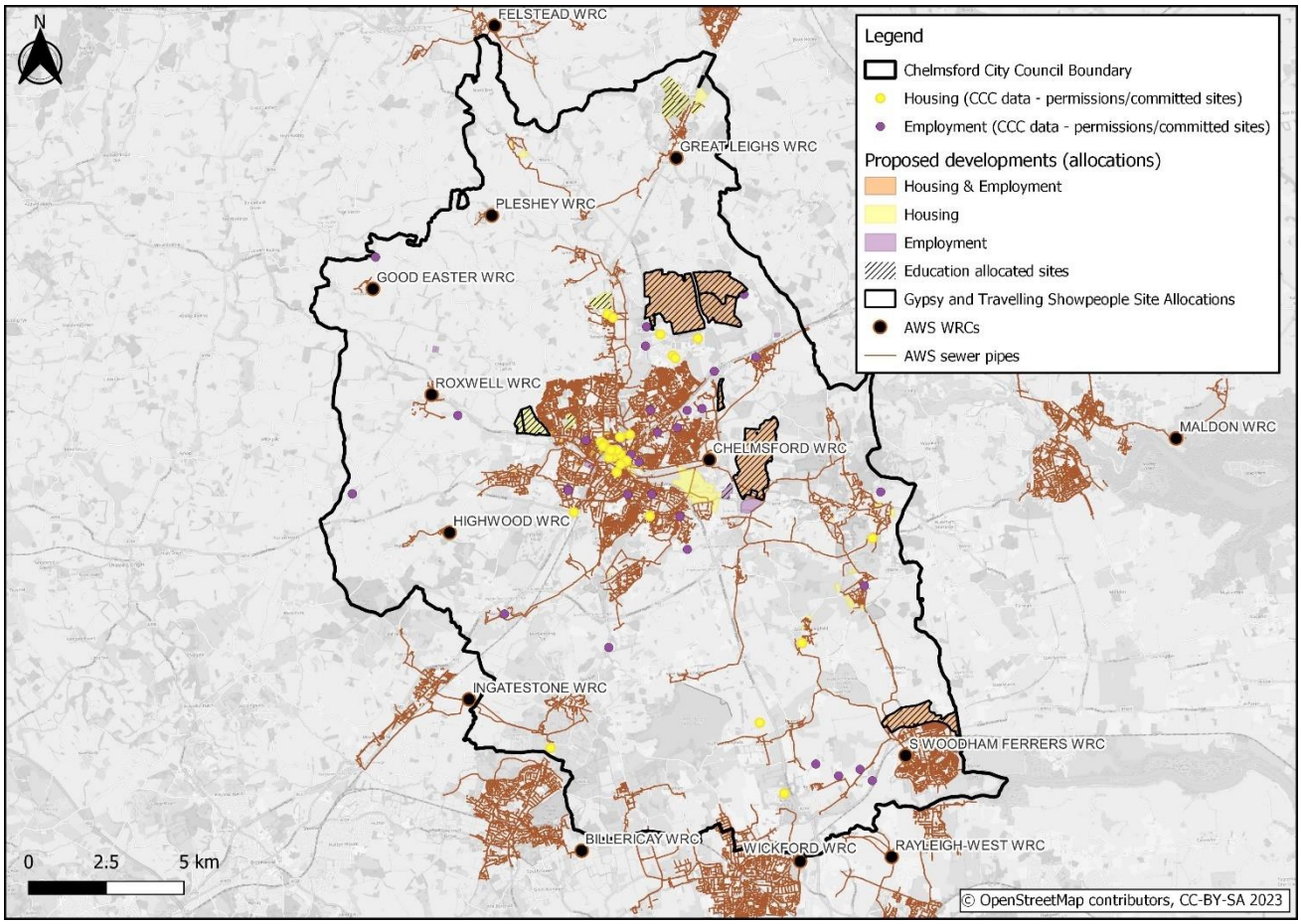


Figure 5-4: Proposed development locations (within CCC's administrative area) in relation to Anglian Water sewer infrastructure

5.7.4 Trade Effluent

It has been assumed that trade effluent from businesses remains constant for the foreseeable future across CCC. 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 their water 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 to 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.

AWS are also unable to project future trade effluent flows as they are highly variable and dependent on the business type. AWS can only provide existing flows. For non-

household foul flows (trade effluent discharge from trade premises), the AWS regulatory position is that their demand cannot put at risk the capacity for AWS to treat household flows, both now and in the future. AWS can request that the developer pay for any required upgrades to the receiving WRC which are deemed to be required for their development. Early engagement from these development types is therefore critical as this process can be costly and take a number of years to deliver.

5.7.5 Adjoining Council's Proposed Development

The majority of Ingatestone and Wickford WRC catchments are located in adjoining council areas. For the Detailed WCS, the planned developments at both WRCs have been considered for CCC and the adjoining councils in combination; the findings are discussed below.

5.7.5.1 Basildon District Council (Wickford WRC)

Basildon District Council withdrew their Local Plan in 2022 and conducted their Regulation 18 Issues and Options consultation from June to September 2023. The findings from the Issues and Options consultation is expected to be published in 2024.

As there was no local plan to ascertain the development proposed by Basildon District Council in the Wickford WRC catchment, the five year land supply report (completed in June 2023) was used to determine the proposed housing development and growth. The proposed housing is summarised in Table 5.7.

5.7.5.2 Brentwood Borough Council (Ingatestone WRC)

The Brentwood Borough Council Local plan was adopted in 2022 and provided information on the housing, educational and employment proposed development.

To ascertain the development proposed by Brentwood Borough Council in the Ingatestone WRC catchment, the five year land supply report (completed in 2022) was used, in conjunction with the 2022 Adopted Local Plan to determine the proposed housing development and growth in the Ingatestone WRC catchment. The proposed housing is summarised in Table 5.8.

Table 5.7: Basildon District Council – planned housing growth (5-year housing supply)

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**
Permissions/ committed sites	329	80	69	65	61	64	0	0	0	0	0	0	0	0	0	0	0	0	0
Allocated sites	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**329**	**80**	**69**	**65**	**61**	**64**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Table 5.8: Brentwood Borough Council – planned housing growth (5-year housing supply and Local Plan allocations)

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**
Permissions/ committed sites	115	19	50	46	0	0	0	0	0	0	0	0	0	0	00	0	0	0	0
Allocated sites	218	128	80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**333**	**147**	**130**	**46**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

5.8 Water Recycling Centre Capacity Assessment

5.8.1.1 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 (Q90) + Future developments DWF (PG + I_{DWF} + E)

Where:

Existing DWF (Q90) is the existing 2022 measured DWF (m^3/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 3.3.1
- Educational: See Section 3.3.2

G is the future per capita flow (litres per head per day (l/h/d)) 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 125l/h/d 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 50l/h/d day as agreed with AWS.
- Educational: For educational developments the PCC of each of the teachers was 50l/h/d and the pupils 15l/h/d.

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).

5.8.1.2 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 5.9 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 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 (Figure 5-5).

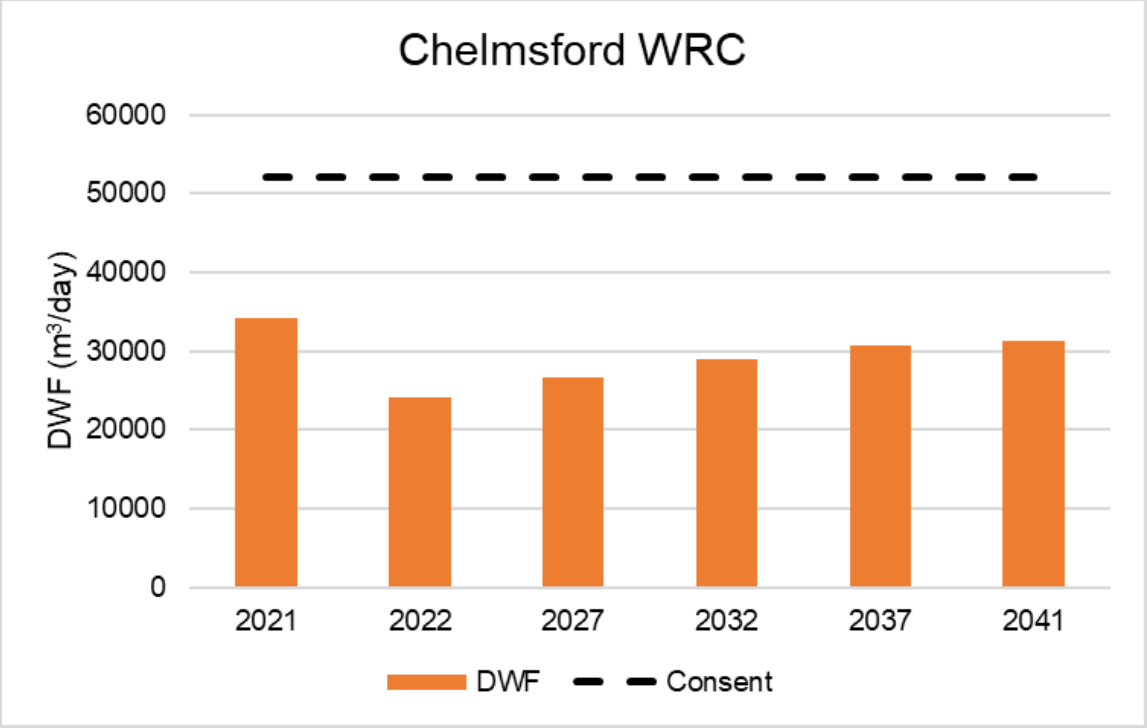


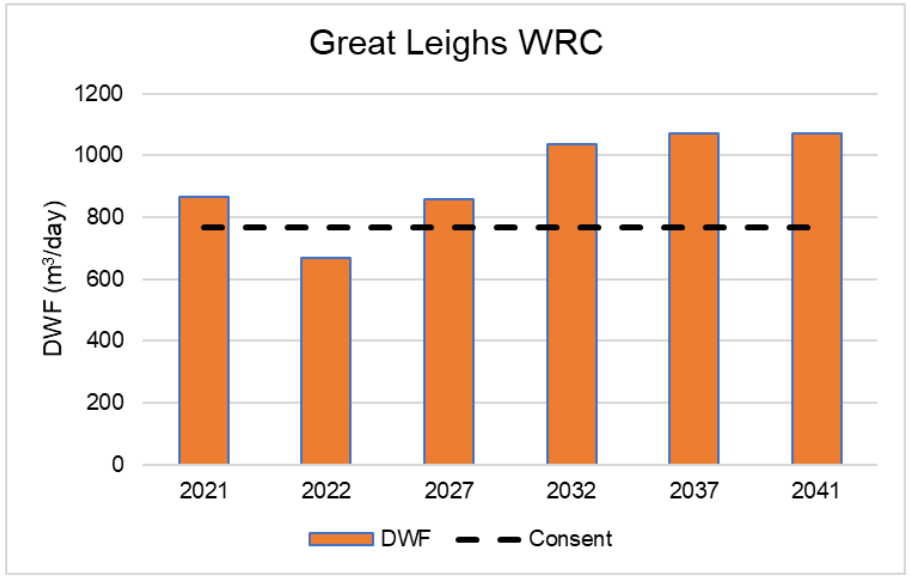
Figure 5-5: Chelmsford WRC – Future DWF for plan period up to 2041 versus DWF permit

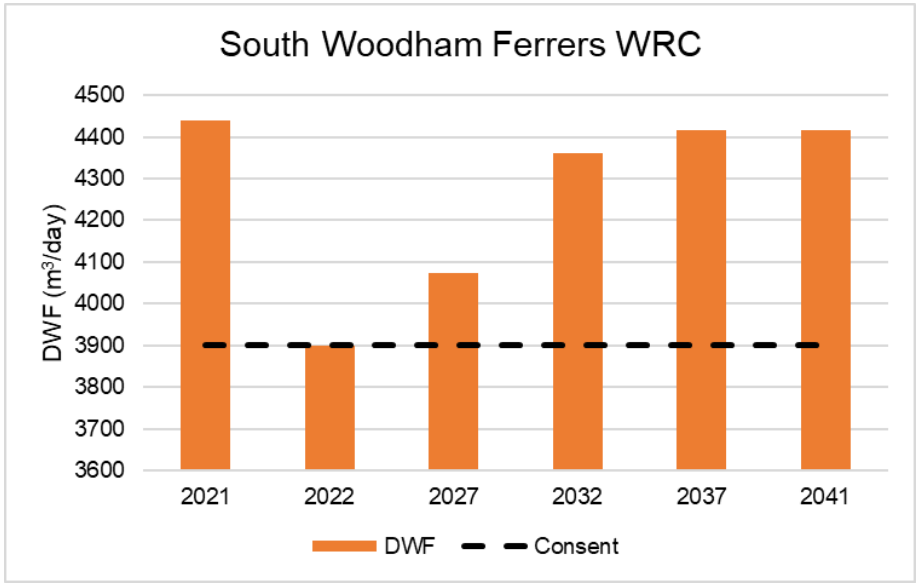
Table 5.9: WRCs: proposed development future dry weather flow review.

WRC	Settlements served	Existing consented DWF (m^3/day)	Existing DWF (Q90 measured 2022) (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**	24,192	**18,769** dwellings	**275,449m²** employment floorspace 2 SEN schools 6 Primary schools with nurseries 6 Nurseries/ EYs 2 Through school	31,210 (7,018m^3/d increase in DWF)
Good Easter	Good Easter	**44**	18	**3** dwellings	**580m²** employment floorspace	20 (2m^3/d increase in DWF)
Great Leighs	Chatham Green Ford End Great and Little Leighs Howe Street	**767**	669	**1,171** dwellings	**0m²** employment floorspace 1 Primary school with nursery	**1,071** (402m^3/d increase in DWF)

WRC	Settlements served	Existing consented DWF (m^3/day)	Existing DWF (Q90 measured 2022) (m^3/day)	Increase in dwellings (2023-2041)	Increase in employment area and educational facilities. (2023-2041)	2041 calculated DWF (m^3/day)
Highwood	Edney Common Highwood	**45**	N/A	**3** dwellings	**0m²** employment floorspace	N/A
Ingatestone	Stock Including relevant settlements in Basildon District Council (Ingatestone, Fryerning & Mountnessing)	**1,600**	1,414	**38** dwellings in CCC's administrative area **329** dwellings in Basildon	**0m²** employment floorspace	1,536 (122m^3/d increase in DWF)
Pleshey	Pleshey	**39**	N/A	**3** dwellings	**0m²** employment floorspace	N/A
Roxwell	Chignal Roxwell Little Boyton Farm (assumed)	**220**	104	**12** dwellings	**6,870m²** employment floorspace	117 (13m^3/d increase in DWF)
South Woodham Ferrers	East Hanningfield South Hanningfield Rettendon Common Rettendon Place South Woodham Ferrers Woodham Ferrers	**3,900**	3,899	**1,496** dwellings	**2,365m²** employment floorspace 1 Primary school with nursery 1 Nursery/ EYs	**4,417** (518m^3/d increase in DWF)

WRC	Settlements served	Existing consented DWF (m^3/day)	Existing DWF (Q90 measured 2022) (m^3/day)	Increase in dwellings (2023-2041)	Increase in employment area and educational facilities. (2023-2041)	2041 calculated DWF (m^3/day)
Wickford	Ramsden Heath/Downham Runwell Including relevant settlements in Brentwood Borough Council (Wickford)	**7,500**	**7,933**	**160** dwellings in CCC's administrative area **323** dwellings in Brentwood	**0m²** employment floorspace	**8,098** (165m^3/d increase in DWF)





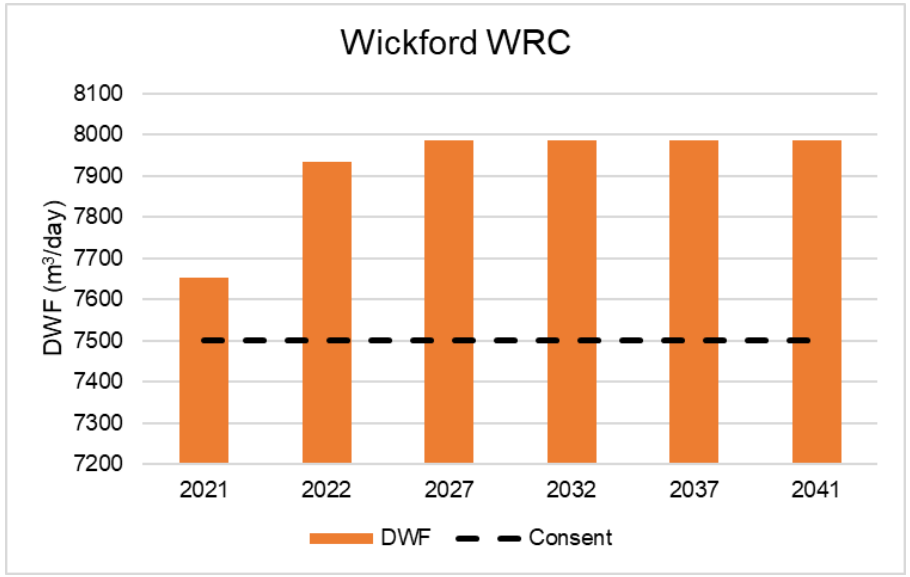


Figure 5-6: WRCs failing dry weather flow consents within plan period (2021 to 2041)

Table 5.9 and Figure 5-6 confirm that the growth proposed within three of the WRC catchments will exceed the current DWF consents by 2041, namely:

- Great Leighs WRC (consent exceeded in 2026)
- South Woodham Ferrers WRC (consent exceeded in 2021/2022)
- Wickford WRC (consent exceeded in 2021/2022)

It should also be noted that Ingatestone WRC is predicted to be within 5% of its DWF consent in 2025 as shown in Figure 5-7.

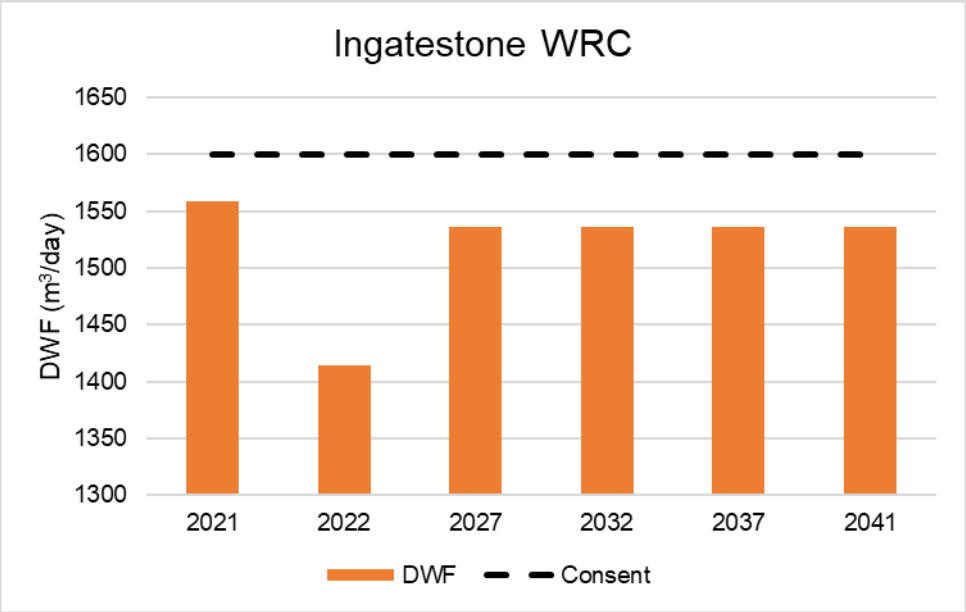


Figure 5-7: Ingatestone WRC – Future DWF for plan period up to 2041 versus DWF permit

The developments proposed by CCC for the plan period that are located within Great Leighs, South Woodham Ferrers and Wickford WRC sewer catchments are shown in Figure 5-8 to Figure 5-10: Wickford WRC – sewer infrastructure and proposed developments within catchment

respectively. Any proposed growth and development outside CCC is not shown.

The AWS DWMP sets out some solutions and strategies to address existing and future risks and vulnerabilities at some of the WRCs within CCC administrative area. The potential solutions for the three failing WRCs are shown in Table 5.10.

AWS was consulted on the conclusions of 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.

AWS engineers and planners, based on their knowledge of current capacity and performance at the three WRCs failing their DWF consents, have provided information on potential upgrades or solutions required, the feasibility of such upgrades and potential timeframes for upgrades. These have been summarised in Table 5.10.

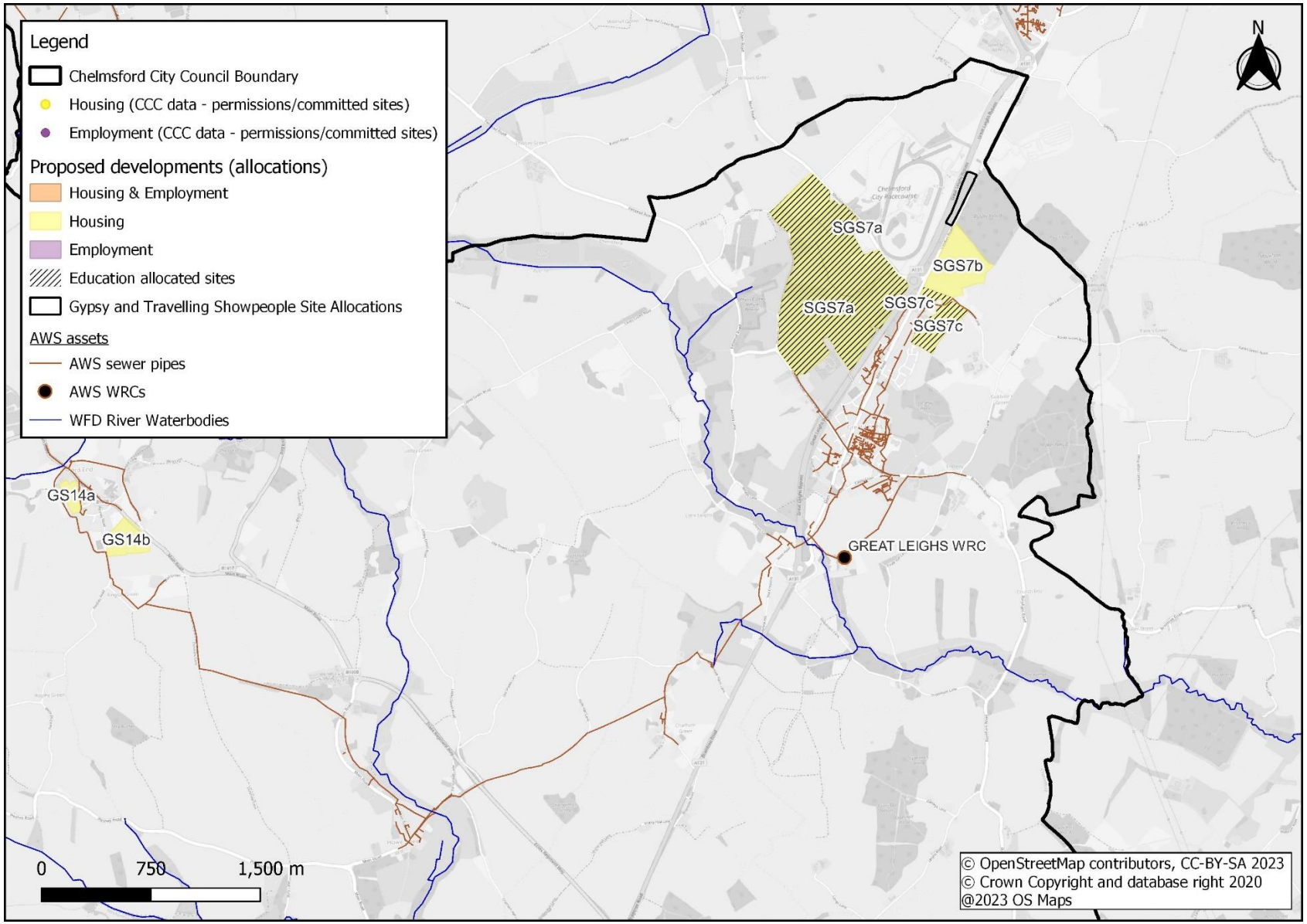


Figure 5-8: Great Leighs WRC – sewer infrastructure and proposed developments within catchment

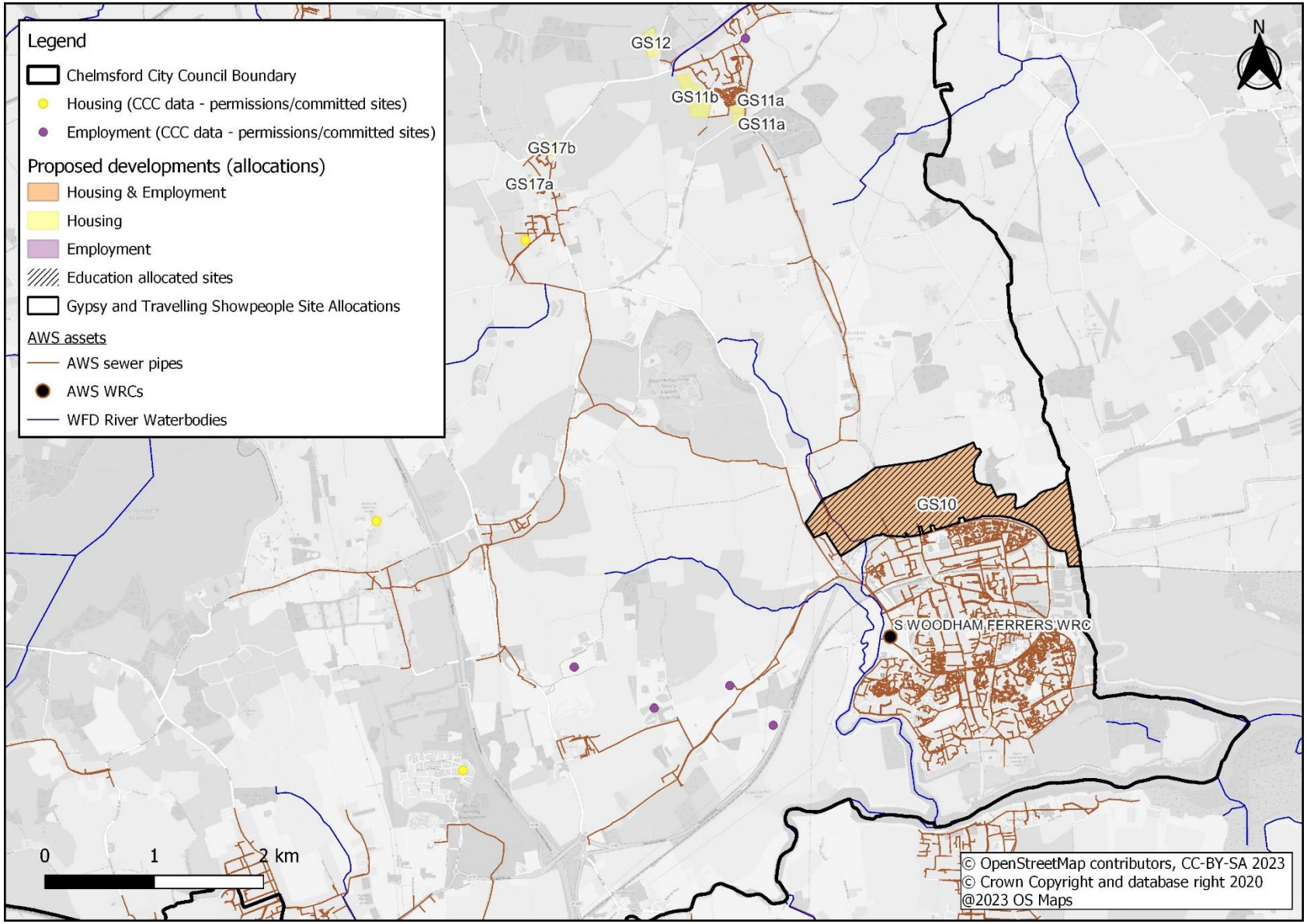


Figure 5-9: South Woodham Ferrers WRC – sewer infrastructure and proposed developments within catchment

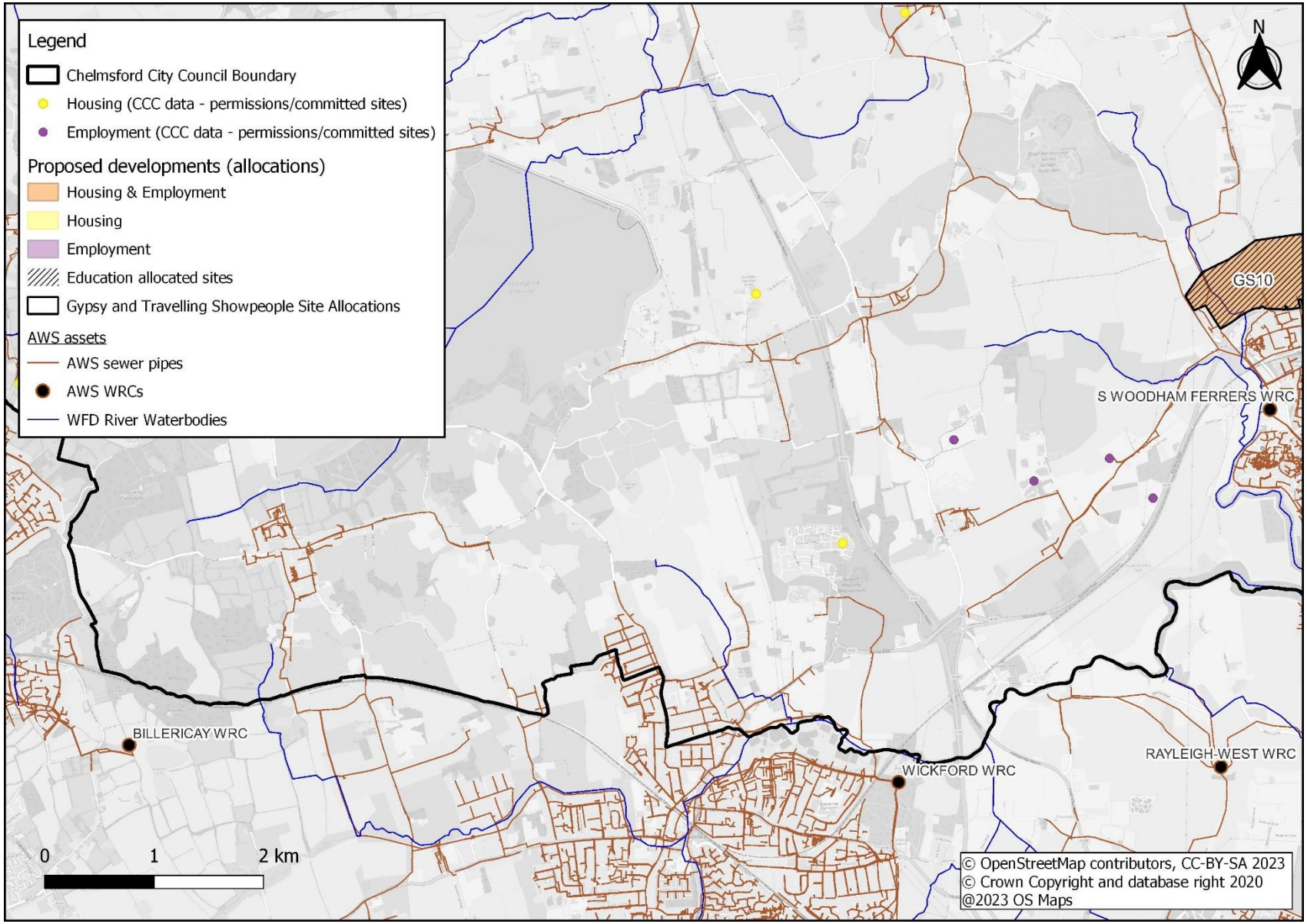


Figure 5-10: Wickford WRC – sewer infrastructure and proposed developments within catchment

Table 5.10: Proposed developments review: water recycling centres exceeding dry weather flow consent summary.

Water recycling centre	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: 767 m^3/d Existing DWF: 669 m^3/d Future DWF: 1,071 m^3/d DWF exceedance: 304 m^3/d	**63 of 1,171 dwellings** Exceedance will impact proposed development in: Ford End Great and Little Leighs 1,108 dwellings will need additional WRC upgrades before they can be constructed allowing for 10% headroom of DWF consent	Infiltration reduction.	The WRC has exceeded its existing DWF consent in both 2021 and 2022 for the Q80 flows. However, based on the Q90 flow it is within its permit and is used to inform the DWMP and assessing WRC for future investment (Figure 5-6). 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 TAL for P by the end of AMP8. Based on discussions with AWS there will be limitations on capacity for growth when the WRC goes to TAL for P by the end of AMP8 as part of their proposed WINEP obligations. Therefore, DWF permits are unlikely to be increased due to increased loading. The impact of environmental pressures, including sites at TAL, and the approach required to enable future sustainable growth is a matter AWS will continue to discuss with the EA and key stakeholders to assess future options for growth. Due to historic flow compliance issues and it will be difficult to accept development if it causes the consent to go above TAL. This is discussed in more detail in Section 6.7.1

Water recycling centre	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 Wooodham Ferrers	DWF Consent: 3,900 m^3/d Existing DWF: 3,899 m^3/d Future DWF: 4,417 m^3/d DWF exceedance: 517 m^3/d	**0 of 1,496 dwellings** Exceedance will impact proposed development in: East Hanningfield South Hanningfield Rettendon Place South Woodham Ferrers Woodham Ferrers All additional dwellings will need additional WRC upgrades before they can be constructed	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 for the Q80 flows. It however does not exceed its permit for the Q90 flow of 2022 which is used to inform the DWMP and assessing WRC for future investment (Figure 5-6). Based on discussions with AWS there are environmental concerns regarding the WRC in terms of copper concentrations. The impact of environmental pressures, and the approach required to enable future sustainable growth is a matter AWS will continue to discuss with the EA and key stakeholders. This is discussed in more detail in Section 6.7.2
Wickford	DWF Consent: 7,500 m^3/d Existing DWF: 7,933 m^3/d Future DWF: 7,987 m^3/d DWF exceedance: 487 m^3/d	**0 of 160 dwellings** Exceedance will impact proposed development in: Ramsden Heath/Downham Runwell All additional dwellings will need additional WRC upgrades before they can be constructed	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 for the Q80 and Q90 flow values (Figure 5-6). Based on discussions with AWS this is a strategic cross boundary matter as the majority of Wickford WRC catchment is within Basildon local planning authority area. The combination of proposed growth in the Wickford WRC catchment area will therefore be a driver for future investment at the WRC. There are no specific constraints that AWS are currently aware of for Wickford WRC to prevent a future growth scheme in the next AMP – subject to final determination of AWS PR24 business plan in 2024 and reprioritisation for the next AMP cycle. This is discussed in more detail in Section 6.7.4

It should be noted that AWS has an obligation to accept domestic flows, in particular in respect of committed/ permitted housing development sites and would need to find suitable solutions to enable the development proposed at the failing or restricted capacity WRCs. CCC can place conditions on existing planning applications and allocations, however, based on discussions with AWS it is not advocated to give pre-commencement conditions for proposed developments as it could lead to issues for various stakeholders including developers, LPA, and AWS.

5.9 Wastewater Assets: Odour Assessment

5.9.1 Odour Assessment Considerations

The strength of odours from wastewater assets such as WRCs, pump stations or combined sewer overflows (CSO) at any particular time will depend on various factors:

- Distance from the source.
- Wind strength and direction.
- Ambient temperature.

The concentration of the odour will normally diminish as the distance from the source increases.

As described below, AWS recommends that a cordon sanitaire should be respected around wastewater assets, specifically WRCs, to ensure that developments which are likely to be sensitive to odours are not constructed in locations likely to be affected by odour nuisance.

5.9.1.1 Water Recycling Centres

AWS strongly recommend that local planning authorities (LPA) safeguard a cordon sanitaire of 400 m from WRC boundaries.

Following consultation with AWS, this distance may be relaxed on a case-by-case basis depending upon the:

- Processes in place at the WRC.
- Sensitivity of its location.
- Type and scale of the proposed development.
- Using the AWS risk assessment to determine likelihood of odour risk based on the population equivalent (PE) the WRC is serving.

5.9.1.2 Pumping Stations and Combined Sewer Overflows

AWS also recommends that developments are excluded from within 15 m of sewage pumping stations and CSOs. As with WRCs, this distance may be reduced dependent on the location and context.

5.9.2 Odour Assessment

Each of the proposed development and growth sites were reviewed in relation to their distance to wastewater assets, the assessment is included in ***Appendix D*** and is summarised below.

5.9.2.1 Water Recycling Centres

Following a review of the proposed developments in relation to WRCs, there were no sites found to be located within the 400 m Cordon Sanitaire required by AWS.

5.9.2.2 Pumping Stations

In review of the proposed developments in relation to wastewater pumping stations the following sites were found to be located within the 15 m exclusion distance required by AWS:

- **SGS1d**: Riverside Ice and Leisure Land Victoria Road Chelmsford for approximately 150 residential dwellings. AWS sewer pumping station is located within development boundary.
- **GS1q**: Land rear of 17-37 Beach's Drive Chelmsford for approximately 18 residential dwellings. AWS sewer pumping station is located within development boundary.
- **SGS1w**: Meadows Shopping Centre and Meadows Surface Car Park for approximately 350 residential dwellings. AWS sewer pumping station is located within development boundary.

Developers should liaise with AWS to determine the type of developments suitable to avoid odour nuisances. Odour nuisance potentially reduces the value of new homes, and dealing with potential complaints increases costs to AWS.

5.9.2.3 Combined Sewer Overflows

None of the proposed growth sites are within 15 m of an AWS CSO and are not predicted to be impacted by any of the existing CSOs.

5.10 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.

6 Local Environmental Capacity (Water Quality)

This section contains the assessment of the environmental capacity of the receiving waterbodies or watercourses to accommodate the increase in foul flows from WRCs as a result of the planned proposed growth (including the population increase).

6.1 Water Cycle Study Stage 1 Outcomes

Arcadis completed the Stage 1 (scoping) Water Cycle Study (WCS) in December 2023. A summary of Stage 1 WCS conclusions in terms of environmental capacity is shown below; these have been re-assessed in this Detailed WCS:

- The Water Framework Directive (WFD) cycle 2 data was used to set a water quality baseline. The available WRC consent data was also used to define the discharge point along the respective WFD waterbody and water quality parameters.
- AWS were consulted regarding the three WRCs that exceeded their dry weather flow (DWF) consent and AWS provided information regarding the WRCs and approaches that should be considered in the Detailed WCS. The three failing WRCs were Great Leighs, Wickham and South Woodham Ferrers.
- The Natura 2000 sites located within CCC's administrative area and their respective site improvement plans (SIP) were investigated.

6.2 Water Cycle Study Stage 2: Detailed Water Cycle Study

This Stage 2 (Detailed) WCS includes a more detailed assessment and review of the environmental capacity, including following the next steps identified in the Stage 1 WCS:

- 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 without leading 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.
- Identification of any showstoppers to increasing DWF volumetric discharge permits at these impacted WRCs, receiving watercourses and Natura 2000 sites. 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.

6.3 Water Framework Directive (WFD)

6.3.1 Water Framework Directive: Cycle 2 & 3

The WFD is a European Union (EU) directive, first published in 2000, which committed 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 government's 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 river basin management pans are currently in cycle 3 (2021 to 2027) with cycle 2 having finished in 2021. 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 (LPAs) need to consider the WFD during the planning process, through assessing the impact of additional wastewater flows on local river quality.

6.3.2 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 H.***

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 WRC has been outlined in bold text and highlighted in yellow. All the receiving watercourses are classified as "Moderate" or "Poor".

The scope of the Detailed Water Cycle Study (WCS) is to demonstrate that the achievement of all relevant WFD requirements is not compromised by the proposed growth. Whilst no deterioration is an absolute requirement of the WFD, improvements towards "good" status will be subject to technical feasibility and disproportionate cost assessments, particularly if the growth is not the primary reason for failure.

Table 6.1: WRC Receiving WFD waterbodies water quality baseline (Cycle 2)

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**	**River 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**	**No data – Tidal waterbody**

6.4 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 which is discussed in the preceding sections.

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 show ***Appendix G***.

6.5 Protected Areas

6.5.1 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

6.5.2 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 the CCC administrative area:

- Crouch nitrate vulnerable zone (NVZ)
- Sandlings and Chelmsford

- River Chelmer NVZ
- River Blackwater NVZ.

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

6.5.3 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.

Nutrient Neutrality areas, if defined by Natural England, are only applicable to Natura 2000 Sites (described in Section 6.5.4) to demonstrate compliance with Habitat Regulation Assessment tests.

Currently CCC (including any downstream impacted areas) is not located within a defined Nutrient Neutrality area even though there are several protected and nutrient sensitive areas located within CCC administrative area.

6.5.4 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. 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.

The main Natura 2000 protected areas noted which could be affected by proposed developments and growth within CCC’s administrative area are:

- Special Areas of Conservation (SAC)
- Special Protection Areas (SPA)

As per the Habitat Regulation Assessment (HRA) considerations, protected areas close to CCC were also considered due to the potential hydrological connection both above and below ground and the potential impact of the proposed growth and development in

CCC's administrative area on these downstream areas. A HRA is a process that determines whether or not development plans could negatively impact local plans on a recognised protected European site beyond reasonable scientific doubt.

The main Natura 2000 protected areas which could be affected by proposed developments and growth within the CCC are summarised in Table 6.3 along with their proximity to proposed development.

Table 6.3: Natura 2000 Site Summary

Category	Special Areas of Conservation (SAC)	Special Protection Areas (SPA)
Sites lying partly within CCC boundary (no sites wholly within CCC boundary)	Essex Estuaries	Crouch & Roach Estuaries (Mid-Essex Coast Phase 3)
Sites lying outside CCC boundary but wholly or partly within a 20 km buffer of the boundary	None	Outer Thames Estuary Dengie (Mid-Essex Coast Phase 1) Blackwater Estuary (Mid-Essex Coast Phase 4)
Sites lying entirely outside the 20 km buffer of the CCC boundary but scoped into Habitat Regulation Assessment due to potential hydrological connection with the Natura 2000 sites.	None	None

Distance of the Natura 2000 site from the proposed growth and development was taken into account when scoping Natura 2000 sites into the WCS assessment.

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 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 protected areas listed above are covered by two Site Improvement Plans:

- Essex Estuaries (SIP077)

- Outer Thames Estuary (SIP238)

The Natura 2000 sites which could be impacted by development allocated in the CLP along with a summary of the issues from the SIPs and the proposed mitigation measures are included in Table 6.4. The mitigation measures recommended are to ensure that developments do not negatively impact on the Natura 2000 sites.

Table 6.4: Natura 2000 Sites that could be impacted by proposed growth and development.

<table>
<tr><th>Natura 2000 Site</th><th>WRC catchments with proposed growth</th><th>Issue or Priority</th><th>Site improvement plans mitigation measures</th></tr>
<tr><td>Essex Estuaries (SAC)</td><td>No proposed growth or development within the SAC but could be potentially impacted by growth upstream
(Upstream: South Woodham Ferrers* and Wickford*)</td><td>1. Changes in species distributions
2. Planning Permission: general</td><td>1. Investigate site level and larger scale factors affecting the declining SPA species
2. Collate and analyse data to develop guidance for the site</td></tr>
<tr><td>Crouch & Roach Estuaries (Mid-Essex Coast Phase 3) (SPA)</td><td rowspan="4">No proposed growth or development within the SPA but could be potentially impacted by growth upstream
(Upstream: Chelmsford and Great Leighs*)</td><td colspan="2" rowspan="3">Included as within the Essex Estuaries (SAC) SIP</td></tr>
<tr><td>Dengie (Mid-Essex Coast Phase 1) (SPA)</td></tr>
<tr><td>Blackwater Estuary (Mid-Essex Coast Phase 4) (SPA)</td></tr>
<tr><td>Outer Thames Estuary (SPA)</td><td>1. Fisheries: Commercial marine and estuarine</td><td>1. Introduce and enforce appropriate management as necessary</td></tr>
</table>

* Estimated that the growth will exceed the current dry weather flow at the receiving WRCs of these settlements

Essex Estuaries SAC and the four SPAs are the main Natura 2000 sites which could potentially be impacted by proposed development in CCC's administrative area. Despite the boundary for some of the 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 discussed above.

None of the proposed development sites are located in the vicinity of the Natura 2000 sites, however the receiving WRCs do connect to waterbodies which ultimately have the potential to impact the respective SACs and SPAs.

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).

A load standstill approach has been adopted in the WCS methodology to determine the new WwTW discharge permit requirements (as discussed in Section 6.7), which will aim to maintain the same nutrient loads, as per the current discharge consents. This will maintain the existing water quality in the receiving watercourses to ensure WFD compliance.

Furthermore, none of the WRCs that have been assessed within the WCS will discharge into a designated nutrient neutrality SAC catchment by the Natural England. Therefore, there is unlikely to be a negative impact on any Natura 2000 sites in terms of the HRA compliance. However, this should be further discussed and confirmed within the HRA for the CLP which will be prepared by CCC in consultation with Natural England.

6.6 Water Quality Impact Assessment Methodology

Connecting new developments into each of the existing WRC catchments could be technically difficult to accommodate as the future DWF is predicted to exceed the currently permitted DWF. A robust assessment as part of the Detailed WCS was carried out to show that the growth proposed in the Local Plan will not lead to a breach of the WFD requirements.

Developments have the potential to adversely affect water quality in two main ways with respect to foul water:

- Increases in final treated foul water or effluent load from the WRC which causes a deterioration in water quality.
- Increase in intermittent discharges from combined sewer overflows, pumping stations and storm tanks at the WRC.

A review of water quality compliance has been carried out to confirm that the planned development will not adversely affect water quality and does not hinder the ability of a waterbody to meet the requirements of the WFD.

The WCS should demonstrate that the growth proposed in the Local Plan can be accommodated without causing a deterioration in river quality or WFD status. As the permitted DWF limit is predicted to be exceeded at some WRC locations, this has the risk of deteriorating the current water quality of the receiving watercourse unless

suitable actions and measures are taken to ensure legal compliance of the Local Plan with the environmental legislation in order to demonstrate the soundness of the Local Plan. Therefore, further analysis has been undertaken to address this risk as described below.

It has been assumed that surface water runoff from all the growth and developments will be managed in separate systems from the foul water and therefore the risk of increased intermittent discharges can be discounted.

Based on the impact of the proposed developments on the WRCs (Section 5), only three WRCs are predicted to exceed their DWF consents.

The WRCs that are not predicted to exceed their DWF consents have a DWF headroom of 25% or greater. Further assessment of these WRCs was therefore deemed unnecessary due to the significant headroom available. However, one WRC is within 5% of its consent and therefore this was assessed.

The focus of the water quality impact assessment within this section is on the three WRCs that are predicted to exceed their consents as well as the WRC which is within 5% of its consent:

- Great Leighs WRC (exceeds DWF permit)
- South Woodham Ferrers WRC (exceed DWF permit)
- Ingatestone WRC (within 5% of DWF permit)
- Wickford WRC (exceeds DWF permit)

To determine whether future developments or proposed growth adversely affect water quality, two main methods have been considered to assess the WRCs and their receiving waterbodies:

- Method one: EA River Quality Planning (RQP) tool
- Method two: Load standstill

6.6.1 Method One: EA River Quality Planning (RQP) tool

The EA's River Quality Planning (RQP) tool is a Monte-Carlo simulation mass balance model developed by the EA for calculating WRC permit conditions. The tool uses the WRC consent data and the water quality information for the receiving waterbody. The tool determines what statistical quality is required from discharges to meet defined downstream targets or to determine the impact of a discharge on downstream water quality compliance statistics.

The current discharge quality for the WRC was taken as the current permitted limits for each water quality elements (***Appendix G***). Values for the mean and standard deviation of each element were calculated based on these permit levels.

Water quality data used for the modelling was taken from the publicly available data provided by EA for each WFD waterbody. The WFD 'no deterioration' target for each WRC is the downstream status, for each water quality element, based on river monitoring data for the most recent three years of sampling data (where available).

The tool requires water quality information (biochemical oxygen demand (BOD), ammonia and phosphate) upstream and downstream (discharge point) of the WRC. The mean value and standard deviation were calculated using this data.

The flow data required by the RQP tool was obtained from the National River Flow Archive published by the UK Centre for Ecology and Hydrology.

6.6.2 Method Two: Load Standstill

The load standstill calculation was used where the RQP tool method was not feasible or no river quality or flow information was available.

The load standstill method ensures that as effluent volume increases, the pollutant discharged does not increase.

6.6.3 Other Considerations

For the purposes of this Detailed WCS, the limits of conventionally applied treatment processes are referred to as technically achievable limits (TAL) and are:

- 5 milligrams per litre (mg/l) for biochemical oxygen demand (BOD)
- 1 mg/l for ammoniacal-nitrogen
- 0.25 mg/l for phosphate.

Upgrading processes at the WRC 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 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 require, as a minimum, the 'no deterioration' policy standards to be met. Regardless of development growth, the EA may also 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 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.

6.7 Water Quality Impact Assessment

Details of the water quality assessment and results for the three WRCs that are predicted to exceed their consents (Great Leighs WRC, South Woodham Ferrers WRC and Wickford WRC) as well as the WRC which is within 5% of its consent (Ingatestone WRC), are provided below.

6.7.1 River Ter: Great Leighs WRC

Great Leighs WRC, which currently exceeds its DWF consent and will be exacerbated due to the proposed developments in the plan period, is located adjacent to and discharges to the River Ter.

River Ter (WFD waterbody reference number GB105037033940) is classified as a 'not designated artificial or heavily modified waterbody' under the WFD. Its overall status was reported in the river basin management plan (RBMP) as "Moderate". The WFD classification is shown in Table 6.5.

Table 6.5: River Ter Water Framework Directive classification.

WFD Waterbody	WRCs discharging to waterbody (including national grid reference of discharge point)	Overall Water Body Classification	Dissolved oxygen	Phosphate	Ammonia (Phys-Chem)
River Ter	Great Leighs WRC (TL 7263 1635)	Moderate	High	Poor	High

The publicly available EA information of water quality and WFD status information based on monitoring data collected at along River Ter was assessed. There is one relevant monitoring point along the waterbody:

- River Ter Deres Drive, (EA sampling point ID: AN-TE0155) located downstream of Great Leighs WRC

There are no monitoring points located directly downstream of Great Leighs WRC. There are several monitoring points located further downstream of Great Leighs along the River Ter but were not deemed appropriate as they are too far downstream.

The available water quality data was averaged over the available monitoring period for the monitoring point and is provided in Table 6.6.

Table 6.6: River Ter: EA monitoring points data.

Monitoring point	**Biochemical oxygen demand (BOD) (mg/l)**	**Ammoniacal Nitrogen as N (mg/l)**	**Orthophosphate, reactive as P (mg/l)**
River Ter Deres Drive, (AN-TE0155) (2012 – 2014 data)	No data	No data	0.075

The WRC and the respective monitoring points are shown in Figure 6-1.

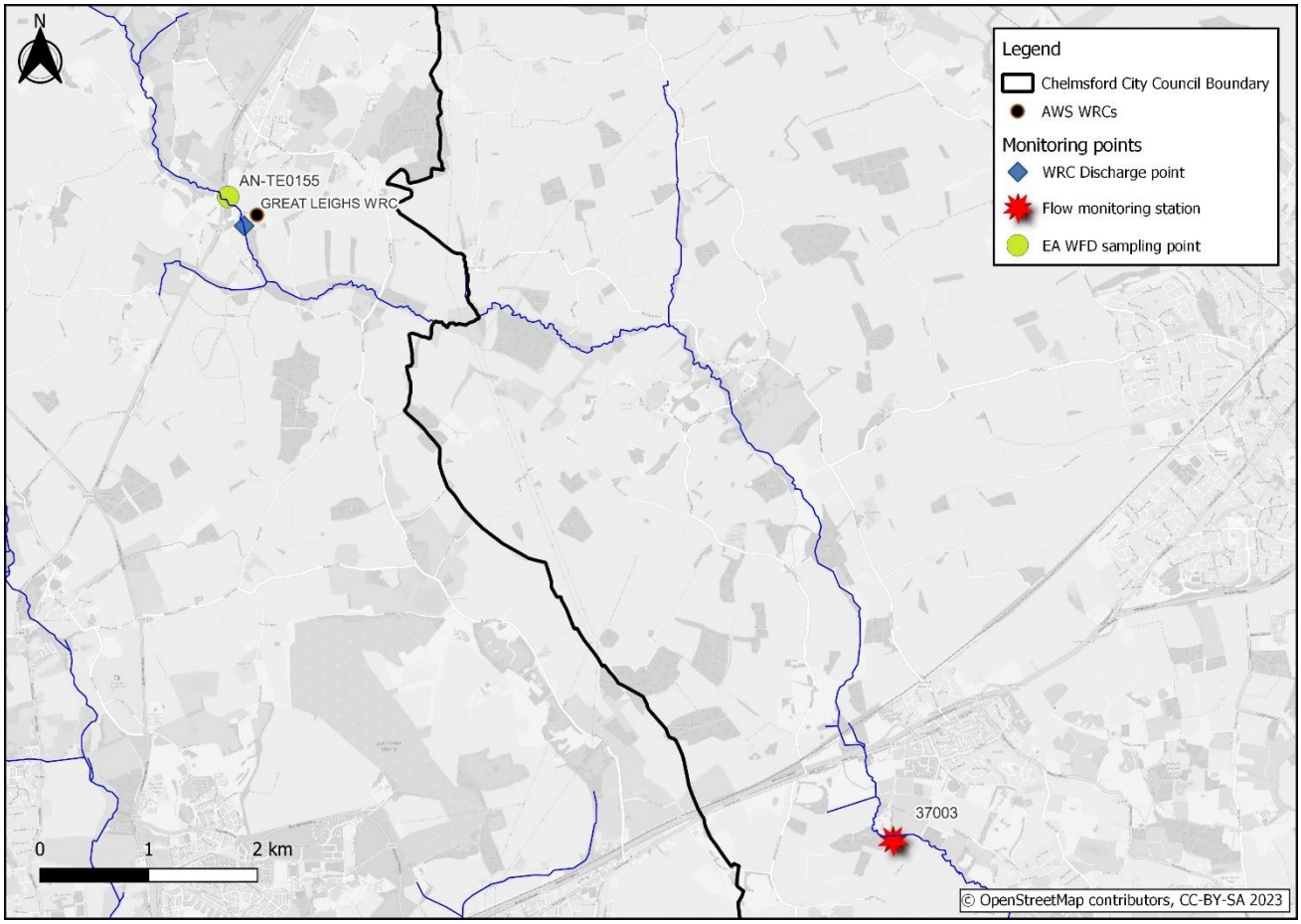


Figure 6-1: River Ter: EA WFD monitoring points and river flow monitoring points

The WRC consent limits for Great Leighs WRC are given in Table 6.7.

Table 6.7: River Ter: Great Leighs WRC consent limits

WRC	Dry weather flow (DWF) (24 hours) m^3/day	Biochemical oxygen demand (BOD-ATU) (mg/l)	Ammoniacal nitrogen (N) (mg/l)	Phosphorous (mg/l)
Great Leighs WRC	650	13 - 50	3 - 10	None

To undertake a statistical quality assessment using the River Quality Planning (RQP) tool, the existing river flows upstream of the WRC discharge point are required. No upstream river flow data was available for Great Leighs WRC. The only river flow monitor (37003) along the River Ter was located further downstream of Great Leighs WRC (see Figure 6-1) and was not appropriate for use in the tool.

Due to the limitations of available information, the load standstill approach (method two) rather than the RQP tool (method one) was used as described below to assess water quality for Great Leighs WRC.

6.7.1.1 River Ter: Load Standstill Water Quality Assessment

The DWF consent is currently exceeded at Great Leighs WRC (Section 5) based on the measured DWF and the proposed developments will exacerbate the exceedance.

A 'maintain permitted load' or 'load standstill' approach was used to calculate new consent limits. Maintaining permitted load would ensure further growth exceeding the existing DWF limit does not cause a deterioration in water quality.

Based on the current WRC consent limits, the future consent limits required at the WRC to accommodate the additional DWF are presented in Table 6.8.

Table 6.8: Potential future limits of Great Leighs WRC to accommodate additional DWF: load standstill method.

Parameter	Consent limit values (ranges)	Future required WRC consent limits calculated (load standstill) (No headroom)	Future required WRC consent limits calculated (load standstill) (10% headroom)	Technically achievable limit (TAL)
Dry weather flow (DWF) (m^3/day)	767	1071	1178 (allowing for 10% headroom)	Not applicable
BOD (mg/l: 95 percentile)	13 – 50 (13 used)	9.31	8.46	5.0
Ammonia (mg/l: 95 percentile)	3 – 10 (3 used)	2.15	1.95	1.0
Phosphate (mg/l: mean)	None	None	None	0.25

Based on Table 6.8, it is predicted that the proposed development can be accommodated using the 'load standstill' method associated with the current WRC consent limits, if the current 2023 consent limits for BOD and ammonia are tightened accordingly. There is no Phosphate limit at present, but a new Phosphate limit is likely to be required, which is to be confirmed by the EA.

In relation to the Phosphate limit, as set out in the Outline WCS produced in 2023/2024, there is currently a scheme being proposed at Great Leighs WRC to reduce the phosphate limits to TAL within AWS AMP8 period.

Therefore, the EA suggested that the 'maintain permitted load' or 'load standstill' baseline consent limit for phosphate stated in Table 6.8 is not appropriate and this should be modelled at 0.25 mg/l, with the increased flow to determine the impact. The results of this analysis are shown in Table 6.9.

Table 6.9: Potential future limits of Great Leighs WRC to accommodate additional DWF: load standstill method – Post AMP8 consent values.

Parameter	**Consent limit values (ranges)**	**Future required WRC consent limits calculated (load standstill) (No headroom)**	**Future required WRC consent limits calculated (load standstill) (10% headroom)**	**Technically achievable limit (TAL)**
Dry weather flow (DWF) (m^3/day)	767	1071	1178 (allowing for 10% headroom)	Not applicable
BOD (mg/l: 95 percentile)	13 – 50 (13 used)	9.31	8.46	5.0
Ammonia (mg/l: 95 percentile)	3 – 10 (3 used)	2.15	1.95	1.0
Phosphate (mg/l: mean)	**0.25 (TAL)**	**0.18 (Below TAL)**	**0.16 (Below TAL)**	0.25

To achieve a 'load standstill' or 'maintenance of permitted load' at the WRC, the phosphate permit limit will need to be tighter than the accepted TAL figure shown in Table 6.9 to achieve 'maintenance of permitted load'. This is unlikely to be achievable or accepted by AWS as it would require significant investment because it will not be achievable within limits of conventionally applied treatment processes.

Due to the limitations with adjusting the WRC consent at Great Leighs WRC as the phosphate consent will be set at TAL in AMP8, to ensure the Local Plan is deliverable, it needs to be demonstrated that there are viable alternative options to address this key issue.

Potential viable alternative options at the WRC to accommodate the growth could include:

- Once the AMP8 scheme has been finished at Great Leighs WRC and effluent data has been recorded for an appropriate period remodel the impact on river quality at the current discharge location using non-parametric data. Effluent quality data distributions tend not to follow 'the norm' once permit limits are tight or set at TAL. The non-parametric data sets better represent the likely effluent quality data distribution where a permit limit has been set at 0.25mg/l. This method often, though not always, predicts that the impact on river quality is less damaging compared to the other methods due to the greater level of accuracy in the analysis undertaken.

- Accurate river flow and quality parameter data upstream and downstream of the WRC for RQP analysis.
- Pumping/ diverting flows to a nearby WRC catchment with sufficient DWF headroom to accommodate the shortfall at Great Leighs WRC. Potential suitable WRC would be Chelmsford WRC.
- Optimisation of treatment process for specific water quality parameter (e.g. phosphate or ammonia). Unlikely to be a viable option as an AMP8 scheme is already being planned to set P to TAL.
- Move the discharge point to a more appropriate watercourse. However, there are no WFD waterbodies in close proximity and unlikely to be a viable option.
- The AWS DWMP proposes network strategies which include mainly infiltration reduction. However, this will not have a significant or any impact on the DWF.

AWS has not yet discussed the solutions described in Section 6 with the EA. Therefore, AWS and CCC should work with the EA to find the most suitable solution or combinations of solutions to address the identified risk.

It has not yet been fully confirmed if the potential solutions discussed above for Great Leighs WRC would be able to implement or address the risk of meeting the 'no deterioration' policy appropriately within the plan period, based on the current proposed development trajectories (development timings and number of dwellings) used within this Detailed WCS (Section 5).

Therefore, CCC must prevent development occurring ahead of capacity at the WRC capacity becoming available as a stepped approach or redirect some development into another WRC catchment with sufficient capacity if needed. However, this needs to be informed by further discussions with AWS and the EA and can inform the Pre-Submission Local Plan.

Alternatively (as per the previous consultations with the EA), if the 'no deterioration' standards cannot be met for the WFD waterbody and no solution can be found as it is a legal obligation not to breach the environmental legislation, the new development proposed within the catchment may have to be directed to another WRC catchment or settlement.

6.7.2 Tidal River Crouch: South Woodham Ferrers WRC

South Woodham Ferrers WRC, which exceeds its DWF consent, currently and will be exasperated due to the proposed developments in the plan period, is located along a tributary (Fenn Creek) of the Tidal River Crouch.

The Tidal River Crouch (WFD waterbody reference number GB520503704100) is classified as a heavily modified waterbody under the WFD. Its overall status was reported in the river basin management plan (RBMP) as "Moderate". The WFD classification is shown in Table 6.10.

Table 6.10: Tidal River Crouch Water Framework Directive classification.

WFD Waterbody	WRCs discharging to waterbody (including national grid reference of discharge point)	Overall Water Body Classification	Dissolved oxygen	Phosphate	Ammonia (Phys-Chem)
Tidal River Crouch	South Woodham Ferrers WRC (TQ 8004 9717)	Moderate	Good	No data	No data

The publicly available EA information of water quality and WFD status information based on monitoring data collected at along Tidal River Crouch was assessed. There is one relevant monitoring point along the tributary of the Tidal River Crouch (Fenn Creek):

- Fenn Creek South Of Eyotts Farm, (EA sampling point ID: AN-CE1520) located downstream of South Woodham Ferrers WRC

There are no monitoring points upstream of South Woodham Ferrers WRC. Additionally, for the available monitoring point there was no quality parameter data for the appropriate water quality parameters (see Table 6.15).

Table 6.11: Tidal River Crouch (Tributary Fenn Creek): EA monitoring points data.

Monitoring point	Biochemical oxygen demand (BOD) (mg/l)	Ammoniacal Nitrogen as N (mg/l)	Orthophosphate, reactive as P (mg/l)
Fenn Creek South of Eyotts Farm (AN-CE1520) (2016 – 2023 data)	No data	No data	No data

The WRC and the respective monitoring points are shown in Figure 6-2.

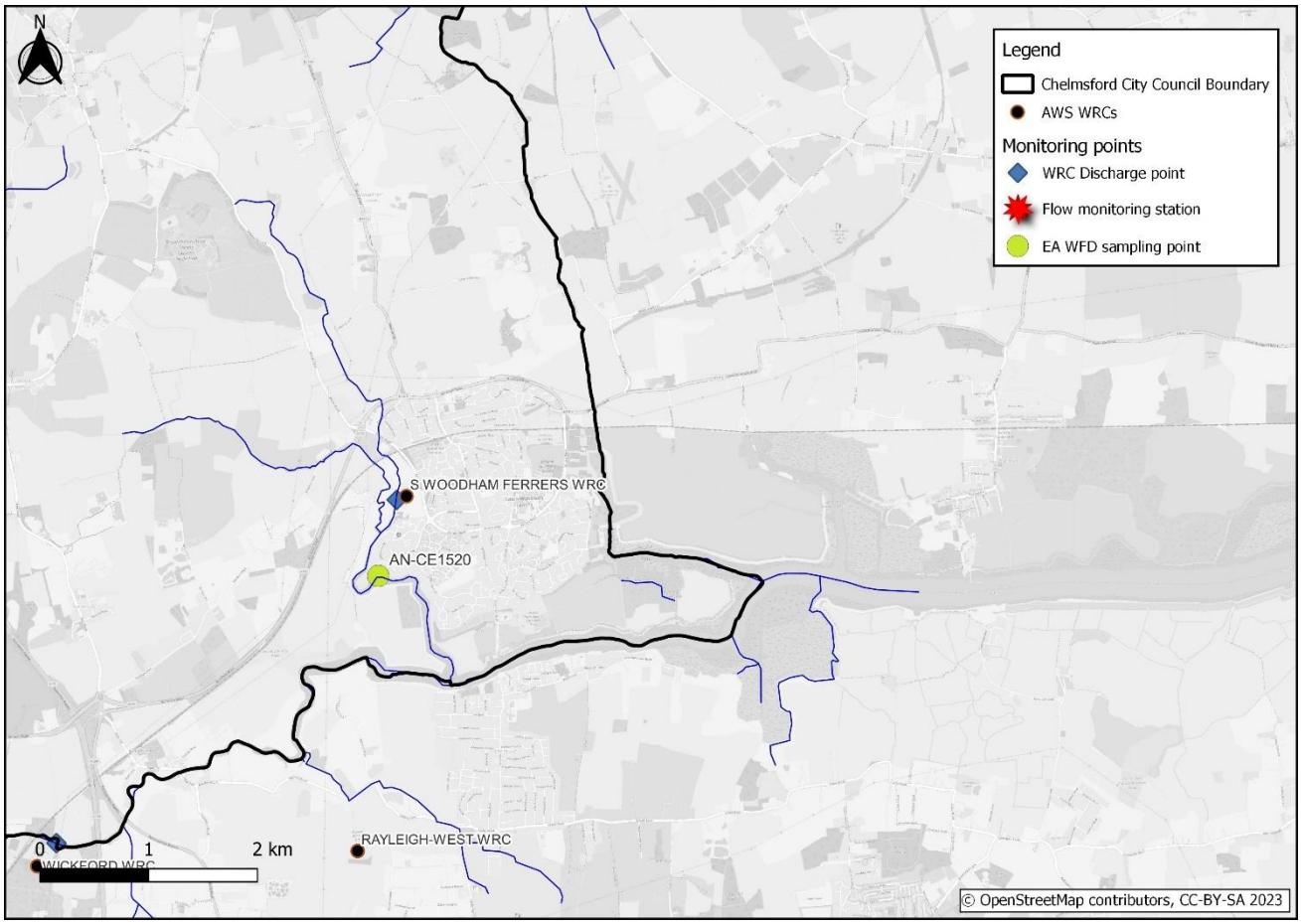


Figure 6-2: Tidal River Crouch (Fenn Creek): EA WFD monitoring points and flow monitoring points.

The WRC consent limits for South Woodham Ferrers WRC are given in Table 6.16.

Table 6.12: River Ter: South Woodham Ferrers WRC consent limits

WRC	**Dry weather flow (DWF) (24 hours) m^3/day**	**Biochemical oxygen demand (BOD-ATU) (mg/l)**	**Ammoniacal nitrogen (N) (mg/l)**	**Phosphorous (mg/l)**
South Woodham Ferrers WRC	3,900	10- 40	5 - 20	None

To do a statistical quality assessment using the RQP tool, the existing waterbody flows upstream of the WRC discharge point is required. Based on the available information, no river flow data was available for South Woodham Ferrers WRC upstream or downstream of the WRC along the Tidal River Crouch (Fenn Creek).

Due to the limitations of available information and the fact that the waterbody is a tidal river, the load standstill approach (method two) rather than the RQP tool (method one) was used to assess water quality for South Woodham Ferrers WRC.

6.7.2.1 Crouch: Load Standstill Water Quality Assessment

Based on Section 5, the DWF consent is currently exceeded at South Woodham Ferrers WRC based on the measured DWF and the proposed developments will exacerbate the exceedance.

A 'maintain permitted load' or 'load standstill' approach was used to calculate new consent limits. Maintaining permitted load would ensure further growth exceeding the existing DWF limit does not cause a deterioration in water quality.

Based on the current WRC consent limits, the future consent limits required at the WRC to accommodate the additional DWF are presented in Table 6.13.

Table 6.13: Potential future limits of South Woodham Ferrers WRC to accommodate additional DWF: load standstill method.

Parameter	**Consent limit values (ranges)**	**Future required WRC consent limits calculated (load standstill) (No headroom)**	**Future required WRC consent limits calculated (load standstill) (10% headroom)**	**Technically achievable limit (TAL)**
Dry weather flow (DWF) (m^3/day)	3,900	4,417	4,858 (allowing for 10% headroom)	Not applicable
BOD (mg/l: 95 percentile)	10 – 40 (10 used)	8.83	8.03	5.0
Ammonia (mg/l: 95 percentile)	5 – 20 (5 used)	4.42	4.01	1.0
Phosphate (mg/l: mean)	None	None	None	0.25

Based on Table 6.13, it is predicted that the proposed development can be accommodated using the 'load standstill' method associated with the current WRC consent limits, if the current 2023 consent limits for BOD, ammonia, and phosphate are tightened accordingly.

Based on discussions with AWS the specific water quality parameter at South Woodham Ferrers WRC of concern is copper where the main/ only source is from

domestic flows. Optimisation of treatment process of copper could be a potential solution. Potential viable additional options due to the limitations with adjusting the WRC consent to accommodate the growth could include:

- Modelling the impact on river quality at the current discharge location using non-parametric data. This method often, though not always, predicts that the impact on river quality is less damaging compared to the other methods due to the more accuracy in the analysis undertaken.
- Accurate river flow and quality parameter data upstream and downstream of the WRC for RQP analysis.
- Pumping/ diverting flows to a nearby WRC catchment with sufficient DWF headroom to accommodate the shortfall at South Woodham Ferrers WRC. Unlikely to be a viable option as there is no WRC close with sufficient headroom.
- Optimisation of treatment process for specific water quality parameter (e.g. phosphate, copper, or ammonia).
- Move the discharge point to a more appropriate watercourse. However, there are no WFD waterbodies in close proximity and unlikely to be a viable option.
- The AWS DWMP proposes network strategies which include mainly sustainable drainage systems (SuDS) within the catchment which will reduce flows (25% removal of surface water) into the WRC. However, this will not have a significant or any impact on the dry weather flow (DWF). The DWMP does however identify WRC capacity increase as one of the strategies.

AWS has not yet discussed the solutions described in Section 5.8 with the EA. Therefore, AWS and CCC should work with the EA to find the most suitable solution or combinations of solutions to address the identified risk.

It has not yet been fully confirmed if the potential solutions discussed above for South Woodham Ferrers WRC would be able to address the risk of meeting the 'no deterioration' policy appropriately within the plan period, based on the current proposed development trajectories (development timings and number of dwellings) used within this Detailed WCS (Section 5).

Therefore, CCC must prevent development occurring ahead of capacity at the WRC capacity becoming available as a stepped approach or redirect some development into another WRC catchment with sufficient capacity if needed. However, this needs to be informed by further discussions with AWS and the EA and can inform the Pre-Submission Local Plan.

Alternatively (as per the previous consultations with the EA), if the 'no deterioration' standards cannot be met for the WFD waterbody and no solution can be found as it is a legal obligation not to breach the environmental legislation, the new development proposed within the catchment may have to be directed to another WRC catchment or settlement.

6.7.3 Wid (Ingatestone Hall - Margaretting Hall): Ingatestone WRC

Ingatestone WRC, doesn't exceed its DWF consent, currently or due to the proposed developments in the plan period. However, the proposed DWF is within 5% of the current DWF consent. The WRC is located along the River Wid (Ingatestone Hall - Margaretting Hall section) waterbody and discharges into the waterbody.

River Wid (Ingatestone Hall - Margaretting Hall section) (WFD waterbody reference number GB105037028690) is classified as a not designated artificial or heavily modified waterbody under the WFD.

Its overall status was reported in the river basin management plan (RBMP) as "Moderate". The WFD classification is shown in Table 6.14.

Table 6.14: River Wid (Ingatestone Hall - Margaretting Hall section) WFD classification.

WFD Waterbody	WRCs discharging to waterbody (including national grid reference of discharge point)	Overall Water Body Classification	Dissolved oxygen	Phosphate	Ammonia (Phys-Chem)
River Wid (Ingatestone Hall - Margaretting Hall)	Ingatestone WRC (TQ 6642 9907)	Moderate	Good	Poor	Good

The publicly available EA information of water quality and WFD status information based on monitoring data collected at along River Wid (Ingatestone Hall - Margaretting Hall section) was assessed. There are two relevant monitoring point along the waterbody:

- River Wid Ingatestone Bridge, (EA sampling point ID: AN-WD02) located downstream of Ingatestone WRC
- River Wid At Brook Farm (EA sampling point ID: AN-WD0180) located further downstream of Ingatestone WRC

There are no monitoring points upstream of Ingatestone WRC. The available water quality data was averaged over the available monitoring period at both monitoring points and is provided in Table 6.15.

Table 6.15: River Wid (Ingatestone Hall - Margaretting Hall section): EA monitoring points data.

Monitoring point	**Biochemical oxygen demand (BOD) (mg/l)**	**Ammoniacal Nitrogen as N (mg/l)**	**Orthophosphate, reactive as P (mg/l)**
River Wid Ingatestone Bridge, (AN-WD02) (2017 – 2020 data)	No data	0.126	0.66
River Wid At Brook Farm (AN-WD0180) (2015 – 2017 data)	No data	0.197	0.46

The WRC and the respective monitoring points are shown in Figure 6-3.

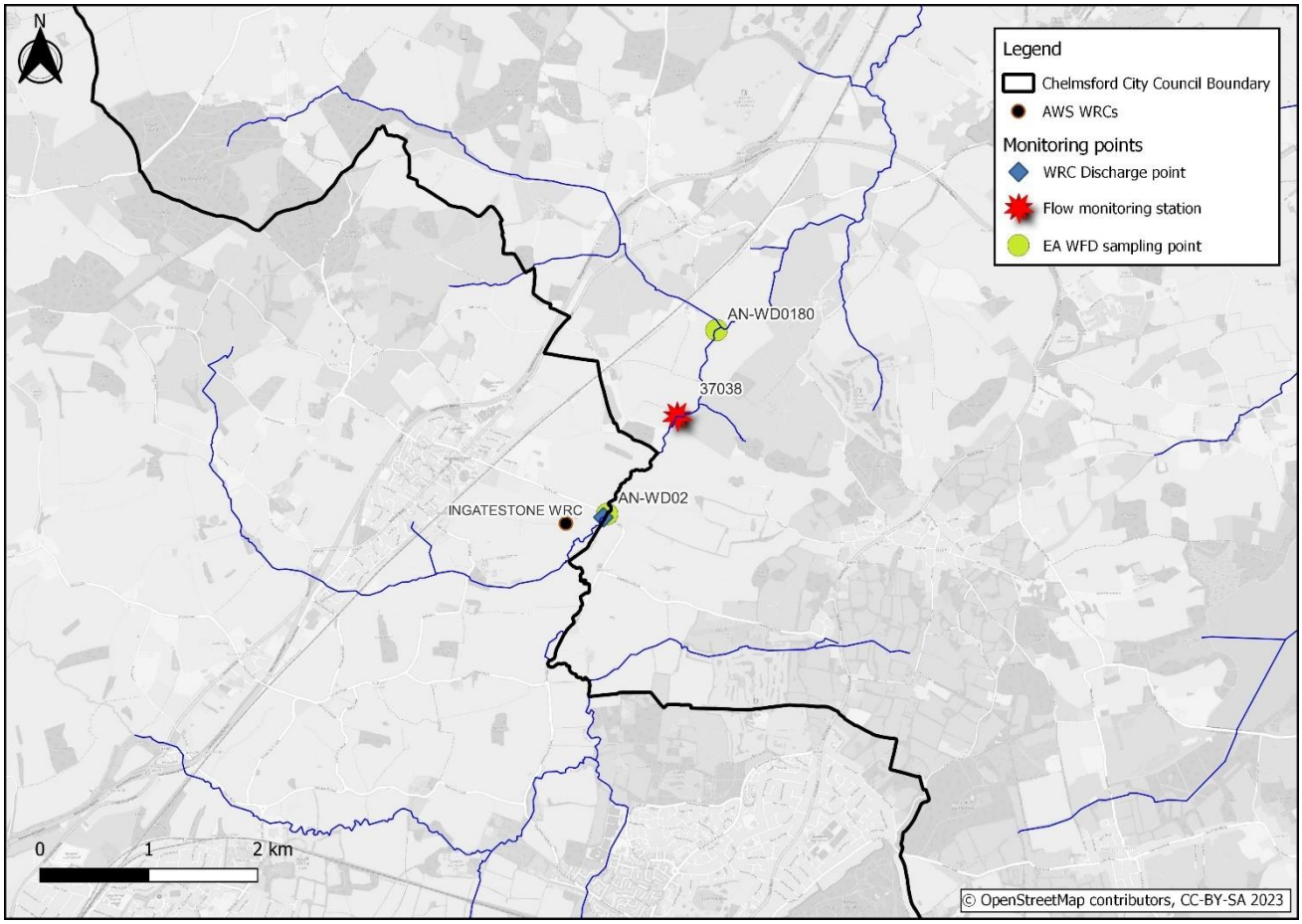


Figure 6-3: River Wid: EA WFD monitoring points and flow monitoring points.

The WRC consent limits for Ingatestone WRC are given in Table 6.16.

Table 6.16: River Wid: Ingatestone WRC consent limits

WRC	Dry weather flow (DWF) (24 hours) m^3/day	Biochemical oxygen demand (BOD-ATU) (mg/l)	Ammoniacal nitrogen (N) (mg/l)	Phosphorous (mg/l)
Ingatestone WRC	1,600	15 - 50	5 - 20	2

To do a statistical quality assessment using the RQP tool, the existing waterbody flows upstream of the WRC discharge point is required. Based on the available information, no river flow data was available for Ingatestone WRC upstream of the WRC. The only river flow monitor (37038) along the River Wid (Ingatestone Hall - Margaretting Hall section) was located further downstream of Ingatestone WRC (see Figure 6-3) and was not appropriate for use in the tool.

Due to the limitations of available information, the load standstill approach (method two) rather than the RQP tool (method one) was used to assess water quality for Ingatestone WRC.

6.7.3.1 Wid (Ingatestone Hall - Margaretting Hall): Load Standstill Water Quality Assessment

Based on Section 5, the DWF consent is currently not exceeded at Ingatestone WRC based on the measured DWF and the proposed developments will reduce the DWF headroom to less than 10%.

A 'maintain permitted load' or 'load standstill' approach was used to calculate new consent limits. Maintaining permitted load would ensure further growth exceeding the existing DWF limit does not cause a deterioration in water quality.

Based on the current WRC consent limits, the future consent limits required at the WRC to accommodate the additional DWF are presented in Table 6.17.

Table 6.17: Potential future limits of Ingatestone WRC to accommodate additional DWF: load standstill method.

Parameter	Consent limit values (ranges)	Future required WRC consent limits calculated (load standstill) (No headroom)	Future required WRC consent limits calculated (load standstill) (10% headroom)	Technically achievable limit (TAL)
Dry weather flow (DWF) (m^3/day)	1,600	1,600	1,690 (allowing for 10% headroom)	Not applicable
BOD (mg/l: 95 percentile)	15 - 50 (15 used)	15	14.21	5.0
Ammonia (mg/l: 95 percentile)	5 – 20 (5 used)	5	4.74	1.0
Phosphate (mg/l: mean)	2	2	1.89	0.25

Based on Table 6.17, it is predicted that the proposed development can be accommodated using the 'load standstill' method associated with the current WRC consent limits, if the current 2023 consent limits for BOD, ammonia, and phosphate are tightened accordingly.

However, as set out in the Outline WCS produced in 2023/2024, there is currently a scheme being proposed at Ingatestone WRC to reduce the phosphate limits to TAL within asset management plan 8 (AMP8).

Therefore, the EA suggested that the 'maintain permitted load' or 'load standstill' baseline consent limit for phosphate stated in Table 6.17 is not appropriate and this should be modelled at 0.25 mg/l, with the increased flow to determine the impact. The results of this analysis are shown in Table 6.18.

Table 6.18: Potential future limits of Ingatestone WRC to accommodate additional DWF: load standstill method – Post AMP8 consent values.

Parameter	Consent limit values (ranges)	Future required WRC consent limits calculated (load standstill) (No headroom)	Future required WRC consent limits calculated (load standstill) (10% headroom)	Technically achievable limit (TAL)
Dry weather flow (DWF) (m^3/day)	1,600	1,600	1,690 (allowing for 10% headroom)	Not applicable
BOD (mg/l: 95 percentile)	15 - 50 (15 used)	15	14.21	5.0
Ammonia (mg/l: 95 percentile)	5 – 20 (5 used)	5	4.74	1.0
Phosphate (mg/l: mean)	**0.25 (TAL)**	**0.25 (TAL)**	**0.24 (Below TAL)**	0.25

To achieve a 'load standstill' or 'maintenance of permitted load' at the WRC, the phosphate permit limit will need to be tighter than the accepted TAL figure shown in Table 6.18 to achieve 'maintenance of permitted load'. This is unlikely to be achievable (however it is just below TAL) or accepted by AWS as it would require significant investment because it will not be achievable within limits of conventionally applied treatment processes.

Due to the limitations with adjusting the WRC consent at Ingatestone WRC as the phosphate consent will be set at TAL in AMP8, to ensure the Local Plan is deliverable, it needs to be demonstrated that there are viable alternative options to address this key issue.

Potential viable alternative options at the WRC to accommodate the growth could include:

- Once the AMP8 scheme has been finished at Ingatestone WRC and effluent data has been recorded for an appropriate period remodel the impact on river quality at the current discharge location using non-parametric data. Effluent quality data distributions tend not to follow 'the norm' once permit limits are tight or set at TAL. The non-parametric data sets better represent the likely effluent quality data distribution where a permit limit has been set at 0.25 mg/l. This method often, though not always, predicts that the impact on river quality is less damaging compared to the other methods due to the greater level of accuracy in the analysis undertaken.

- Accurate river flow and quality parameter data upstream and downstream of the WRC for RQP analysis.
- Pumping/ diverting flows to a nearby WRC catchment with sufficient DWF headroom to accommodate the shortfall at Ingatestone WRC. Unlikely to be a viable option as there is no WRC close with sufficient headroom.
- Optimisation of treatment process for specific water quality parameter (e.g. phosphate or ammonia). Unlikely to be a viable option as an AMP8 scheme is already being planned to set P to TAL.
- Move the discharge point to a more appropriate watercourse. However, there are no WFD waterbodies in close proximity and unlikely to be a viable option.
- The AWS DWMP proposes network strategies which include mainly sustainable drainage systems (SuDS) within the catchment which will reduce flows (25% removal of surface water) into the WRC. However, this will not have a significant or any impact on the dry weather flow (DWF). The DWMP does however identify WRC capacity increase as one of the strategies.

AWS has not yet discussed the solutions described above with the EA. Therefore, AWS and CCC should work with the EA to find the most suitable solution or combinations of solutions to address the identified risk.

It has not yet been fully confirmed if the potential solutions discussed above for Ingatestone WRC would be able to address the risk of meeting the 'no deterioration' policy appropriately within the plan period, based on the current proposed development trajectories (development timings and number of dwellings) used within this Detailed WCS (Section 5).

Therefore, CCC must prevent development occurring ahead of capacity at the WRC capacity becoming available as a stepped approach or redirect some development into another WRC catchment with sufficient capacity if needed. However, this needs to be informed by further discussions with AWS and the EA and can inform the Pre-Submission Local Plan.

Alternatively (as per the previous consultations with the EA), if the 'no deterioration' standards cannot be met for the WFD waterbody and no solution can be found as it is a legal obligation not to breach the environmental legislation, the new development proposed within the catchment may have to be directed to another WRC catchment or settlement.

6.7.4 Tidal River Crouch (downstream Wickford): Wickford WRC

Wickford WRC currently exceeds its DWF consent, and this will be exacerbated due to the proposed developments in the plan period, is located along the Tidal River Crouch (downstream Wickford section) waterbody and discharges into the waterbody.

Tidal River Crouch (downstream Wickford section) (WFD waterbody reference number GB105037028550) is classified as a heavily modified waterbody under the WFD. Its

overall status was reported in the river basin management plan (RBMP) as "Moderate". The WFD classification is shown in Table 6.19.

Table 6.19: Tidal River Crouch (downstream Wickford section) WFD classification.

WFD Waterbody	WRCs discharging to waterbody (including national grid reference of discharge point)	Overall Water Body Classification	Dissolved oxygen	Phosphate	Ammonia (Phys-Chem)
Tidal River Crouch (downstream Wickford section)	Wickford WRC (TQ 7691 9401)	Moderate	Good	Poor	High

The publicly available EA information of water quality and WFD status information based on monitoring data collected at along Tidal River Crouch (downstream Wickford section) was assessed. There is one relevant monitoring point along the waterbody:

- River Crouch Memorial Park Wickford, (EA sampling point ID: AN-CR01) located upstream of Wickford WRC

There are no monitoring points upstream of Wickford WRC. The available water quality data was averaged over the available monitoring period for the monitoring point and is provided in Table 6.20.

Table 6.20: Tidal River Crouch (downstream Wickford section): EA monitoring points data.

Monitoring point	Biochemical oxygen demand (BOD) (mg/l)	Ammoniacal Nitrogen as N (mg/l)	Orthophosphate, reactive as P (mg/l)
River Crouch Memorial Park Wickford (AN-CR01) (2017 – 2020 data)	1.5	0.21	1.03

The WRC and the respective monitoring points are shown in Figure 6-4.

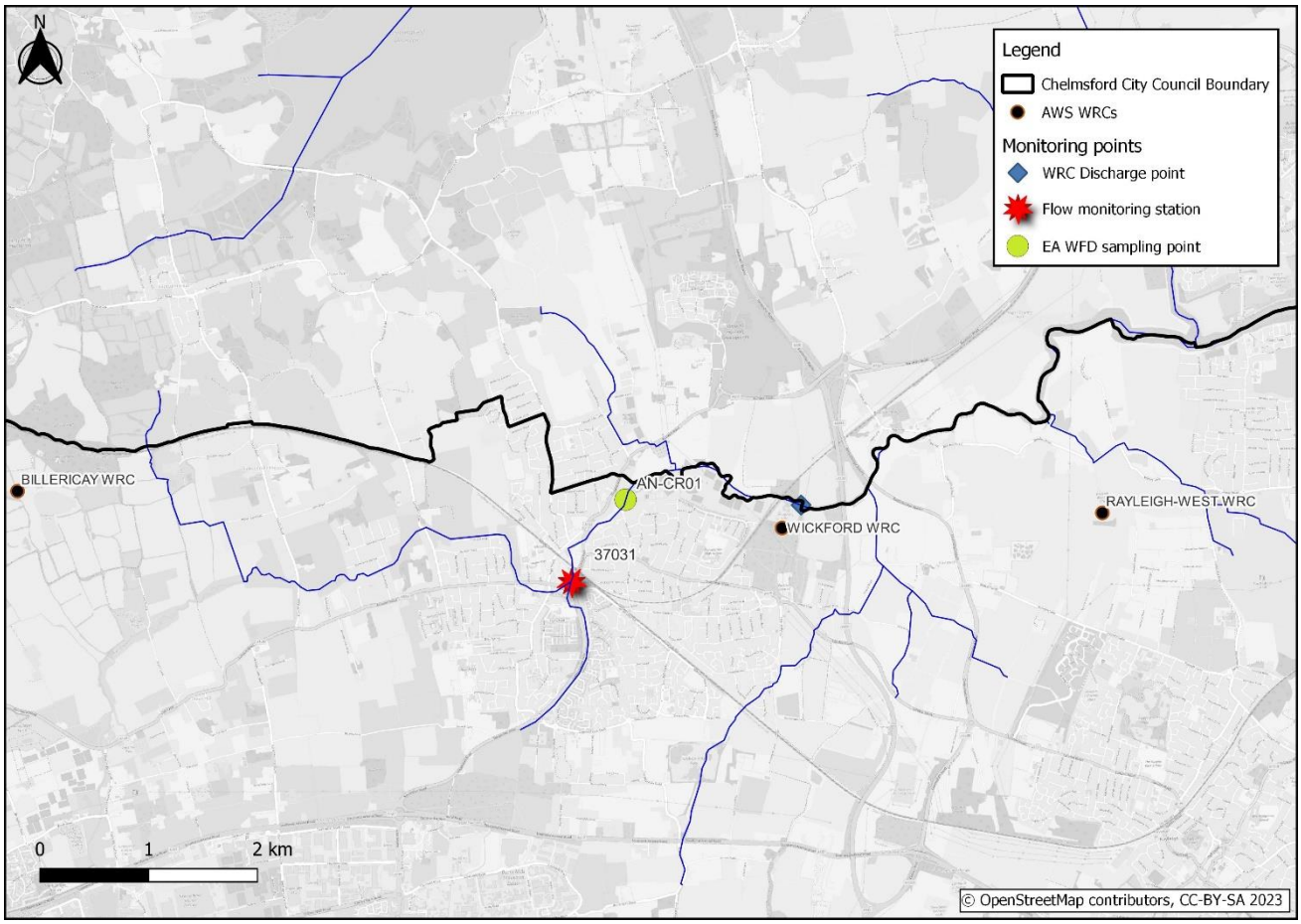


Figure 6-4: Tidal River Crouch: EA WFD monitoring points and flow monitoring points.

The WRC consent limits for Wickford WRC are given in Table 6.21.

Table 6.21: Tidal River Crouch: Wickford WRC consent limits

WRC	**Dry weather flow (DWF) (24 hours) m^3/day**	**Biochemical oxygen demand (BOD-ATU) (mg/l)**	**Ammoniacal nitrogen (N) (mg/l)**	**Phosphorous (mg/l)**
Wickford WRC	7,500	22 - 50	10 - 37	None

To carry out a statistical quality assessment using the RQP tool, the existing waterbody flows upstream of the WRC discharge point are required. Based on the available information, no river flow data was available for Wickford WRC upstream of the WRC. The only river flow monitor (37031) along the Tidal River Crouch (downstream Wickford section) was located further upstream of Wickford WRC (see Figure 6-4) and was not appropriate for use in the tool.

Due to the limitations of available information and as the waterbody is tidally influenced, the load standstill approach (method two) rather than the RQP tool (method one) was used to assess the water quality impacts for Wickford WRC.

6.7.4.1 Crouch (Downstream Wickford): Load Standstill Water Quality Assessment

The DWF consent is currently exceeded at Wickford WRC (Section 5) based on the measured DWF and the proposed developments will exacerbate this exceedance.

A 'maintain permitted load' or 'load standstill' approach was used to calculate new consent limits. Maintaining permitted load would ensure further growth exceeding the existing DWF limit does not cause a deterioration in water quality.

Based on the current WRC consent limits the future consent limits required at the WRC to accommodate the additional DWF are presented in Table 6.22.

Table 6.22: Potential future limits of Wickford WRC to accommodate additional DWF: load standstill method.

Parameter	**Consent limit values (ranges)**	**Future required WRC consent limits calculated (load standstill) (No headroom)**	**Future required WRC consent limits calculated (load standstill) (10% headroom)**	**Technically achievable limit (TAL)**
Dry weather flow (DWF) (m^3/day)	7,500	8,098	8,908 (allowing for 10% headroom)	Not applicable
BOD (mg/l: 95 percentile)	22 – 50 (22 used)	20.38	18.52	5.0
Ammonia (mg/l: 95 percentile)	10 - 37 (10 used)	9.26	8.54	1.0
Phosphate (mg/l: mean)	None	None	None	0.25

Based on Table 6.22, it is predicted that the proposed development can be accommodated using the 'load standstill' method associated with the current WRC consent limits, if the current 2023 consent limits for BOD, ammonia, and phosphate are tightened accordingly.

Based on previous discussions with AWS, the DWF consent is a strategic cross boundary matter as the majority of Wickford WRC catchment is located within the Basildon District Council area (Section 5). The combination of proposed growth in the

Wickford WRC catchment area will therefore be a driver for future investment at the WRC. There are no specific constraints that AWS are currently aware of for Wickford WRC which would prevent a future growth scheme in the next AMP. However, any scheme would be subject to final determination of the AWS PR24 business plan in 2024 and reprioritisation for the next AMP cycle.

After the consent has been updated (based on the load standstill method), the impact on river quality at the current discharge location using non-parametric data should be modelled. This method often, though not always, predicts that the impact on river quality is less damaging compared to the other methods due to the greater accuracy in the analysis undertaken. Additionally, accurate river flow and quality parameter data upstream and downstream of the WRC for RQP analysis would be required.

The AWS DWMP also proposes network strategies which include mainly sustainable drainage systems (SuDS) within the catchment which will reduce flows (25% removal of surface water) into the WRC. However, this will not have a significant or any impact on the dry weather flow (DWF). The DWMP does however identify WRC capacity increase as one of the strategies.

AWS has not yet discussed the solutions described above with the EA. Therefore, AWS and CCC should work with the EA to find the most suitable solution or combinations of solutions to address the identified risk.

It has not yet been fully confirmed if the potential solutions discussed above for Wickford WRC would be able to address the risk of meeting the 'no deterioration' policy appropriately within the plan period, based on the current proposed development trajectories (development timings and number of dwellings) used within this Detailed WCS (Section 5).

Therefore, CCC must prevent development occurring ahead of capacity at the WRC becoming available, either as a stepped approach or redirect some development into another WRC catchment with sufficient capacity if needed. However, this needs to be informed by further discussions with AWS and the EA and can inform the Pre-Submission Local Plan.

Alternatively (as per the previous consultations with the EA), if the 'no deterioration' standards cannot be met for the WFD waterbody and no solution can be found as it is a legal obligation not to breach the environmental legislation, the new development proposed within the catchment may have to be directed to another WRC catchment or settlement.

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 Water Cycle Study Stage 1 Outcomes

Arcadis completed the Stage 1 (scoping) Water Cycle Study (WCS) in December 2023. A summary of Stage 1 WCS conclusions in terms of flood risk is shown below; these have been re-assessed in this Detailed WCS.

- The increase in WRC discharges will not increase the flood risk from the receiving watercourses.
- A number of developments proposed within the spatial strategy were at risk of fluvial flooding as reported in the EA Flood Map for Planning.

7.2 Water Cycle Study Stage 2: Detailed Water Cycle Study

This Stage 2 (Detailed) WCS includes a more detailed assessment and review of new information. The following next steps as identified in the Stage 1 WCS are:

- At the time of submitting the Scoping WCS, the final spatial strategies were not finalised. This Detailed WCS will review the final preferred strategy in terms of flood risk.
- An updated assessment of the flood risk associated with discharges to watercourses will be presented using the final preferred strategy.
- The SFRA Level 1 (2024) was provided to Arcadis to review before publication to ensure that any conclusions are consistent with this Detailed WCS.

7.3 Policy Context

7.3.1 Surface Water Management Plan

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. The 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 1,288 properties when a lower climate change scenario defined as an additional 20% increase in peak rainfall intensity (Central allowance) is used and 1,706 properties when an upper climate change scenario defined as a 40% increase in peak rainfall intensity (Upper End allowance).

7.3.2 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. The CCC administrative area 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.

7.3.3 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. The latest report was published in October 2018.

7.3.4 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 CCC	Policy 2
2 Chelmsford	City of Chelmsford	Policy 5
3 Along the River Wid	Predominantly rural, with a few properties	Policy 6

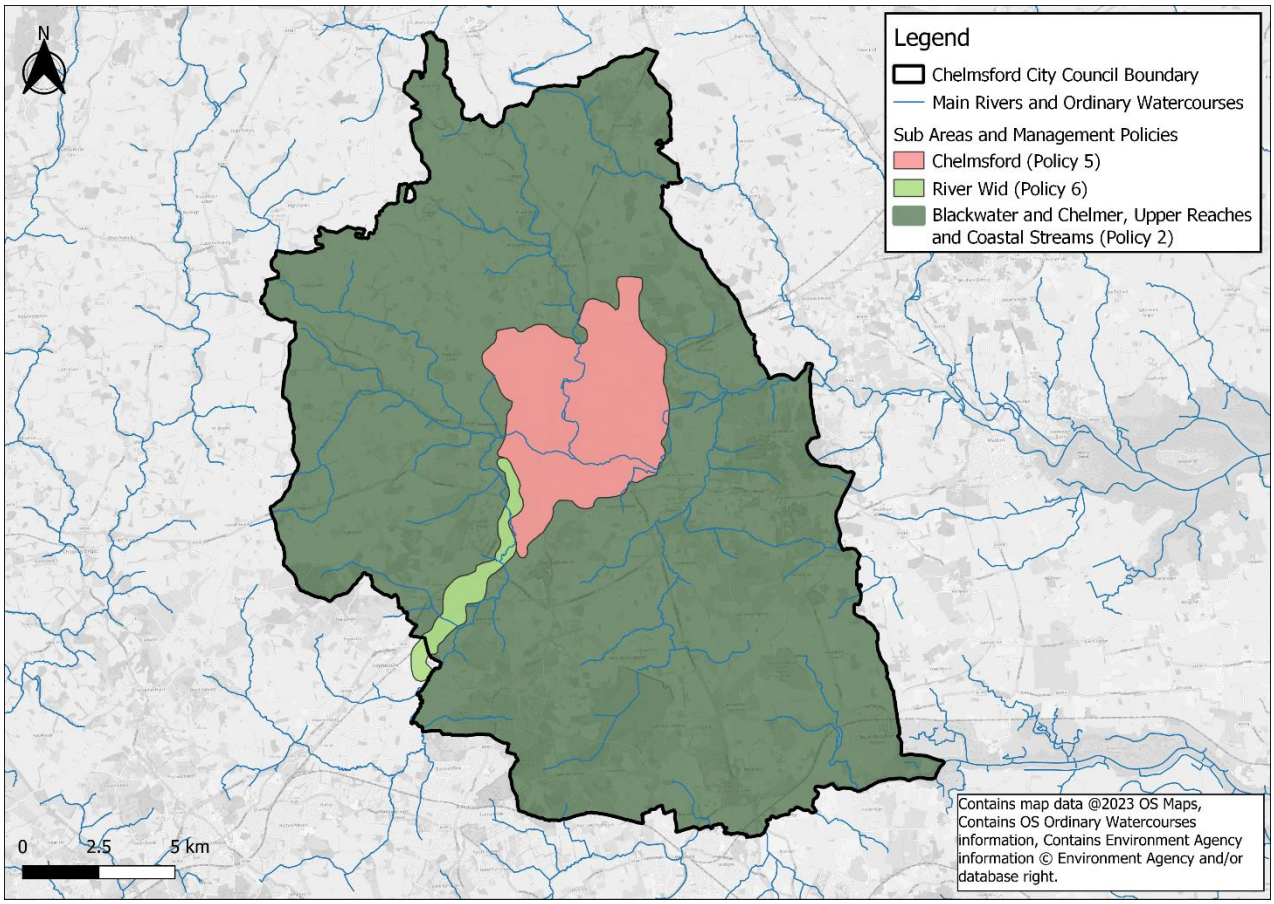


Figure 7-1: Sub catchments and relating policy numbers with watercourses.

7.3.5 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 to direct development to 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. A revised SFRA Level 1 is expected to be published in early

2024 and the focus of this Detailed WCS has been to review the outcomes of the SFRA with respect to the finalised spatial strategy.

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.

7.3.6 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 the LLFA, Essex County Council published design guidance for SuDS in February 2020, which outlines design standards and specific features. Specific features such as rainwater harvesting, soakaways, and swales are given. With detailed specifications and recommended locations also provided. This guidance is used by Essex County Council to review planning applications. However, new national SuDS standards are set to be published in 2024 and so the design guidance for SuDS will need to be reviewed and updated.

7.4 Baseline Situation

Information from the SFRA Level 1 (2024), EA datasets and a review of available online media has been used to identify the historical flood events that have impacted the CCC administrative area. The results are collected in Figure 7-2 below. Figure 7-2 shows the flood extents of larger events as recorded by the EA. Overall, the most at risk areas are located along the River Chelmer and within the city of Chelmsford itself.

Table 7.2: Historical Flood Events in the CCC administrative area

Location	Date	Source	Additional Information
Chelmsford	March 1947	Level 1 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	Level 1 SFRA (2008)	Flooding caused by intense rainfall of short duration of the saturated River Can catchment.
River Chelmer Catchment	September 1958	Level 1 SFRA (2008)	Flooding recorded downstream of Paper Mill Bridge. Also flooding at Felsted Mill and Church End.

Location	Date	Source	Additional Information
River Chelmer Catchment	October 2000	Level 1 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	Level 1 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 City Centre	2007	Revised Level 1 SFRA (2024)	15 incidents of external and internal flooding of properties.
Various Locations	2007	Revised Level 1 SFRA (2024)	1 incident of property flooding in Writtle, 1 incident in Foxwell, 3 incidents in Howe Green and some flooding in Boreham.
Chelmsford City Centre	2008	Revised Level 1 SFRA (2024)	4 incidents of internal and external flooding.
Various Locations	2008	Revised Level 1 SFRA (2024)	1 incident of property flooding in Galleywood, 1 incident in Danbury, and 3 incidences in South Woodham Ferrers.
Chelmsford Area	September 2009	EA Recorded Flood Outlines	Flooding of River Chelmer Flood Plain and Central Park.
Chelmsford City Centre	2009	Revised Level 1 SFRA (2024)	3 incidents of property flooding due to water overflow from drains causing internal and external flooding.
Various Locations	2009	Revised Level 1 SFRA (2024)	3 incidents of cars trapped by flood water in Great Baddow. 2 incidents of property flooding in Bicknacre. 4 incidents of property flooding in Rettendon Common. 1 incident of external flooding in South Woodham Ferrers. Road flooding in Great Leighs.
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	EA flood records	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.
Chelmsford Area	January 2024	Media Article	Major flood event throughout the UK with flooding on the outskirts of Chelmsford including land subject to planning application for affordable homes.

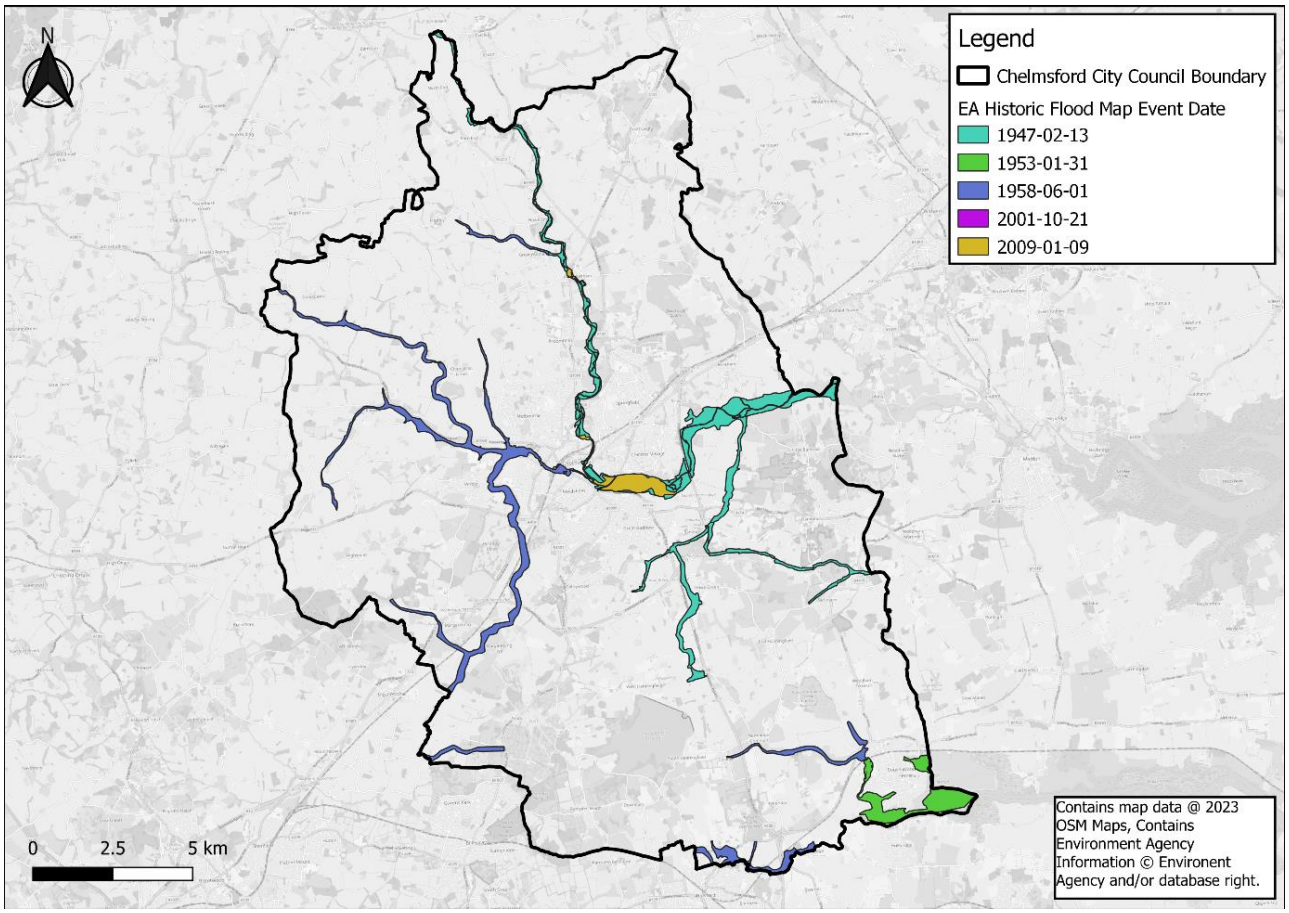


Figure 7-2: EA Historic Flood Outlines within the CCC administrative area.

7.5 Development Considerations and Impacts

Early consultation with the EA and the lead local flood authority (LLFA) is essential. Any development must pass the sequential test in line with the 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. A sequential approach to the site planning and 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 can be explored 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.

7.5.1 Fluvial Flood Risk to the Developments

The Level 1 SFRA is expected to be published in early 2024 and will provide an overview of all the different sources of potential flooding within the council's area. Appendix E of the SFRA combines each source with the notable flood risks within the study area. This WCS builds upon this table with regards to the fluvial flood risk to all the proposed developments.

A summary of the flood risk for the site locations in the Adopted Local Plan allocations and included in the CCC development trajectory up to 2041 is provided in ***Appendix I***. Locations of the allocated sites and the associated flood risk are provided in the figures within ***Appendix I***. Table I-1 (in ***Appendix I***) summarises the flood zone classifications for the Adopted Local Plan allocations including the CCC development trajectory up to 2040/41.

The majority of the proposed developments located within Flood Zone 2 or Flood Zone 3 are located within the city of Chelmsford and the surrounding areas. The waterbodies associated with the flooding are primarily the River Can and River Chelmer. Table I-2 (in ***Appendix I***) outlines the potential flood zones classifications for the committed sites; most of the sites at risk from fluvial flooding are located within the Chelmsford city area.

CCC should undertake a sequential test based on this information which will take all forms of flooding into account. A more detailed assessment of impacts from an FRA and consultation with the EA will be required at the planning application stage. Potential onsite mitigation might be required, such as monitoring of the weather and river levels, land drainage measures and EA flood warning service where applicable. During operation of the sites specific fluvial flood mitigation measures will need to be agreed with the EA, with SuDS measures being embedded into the design to manage operational surface water runoff.

7.6 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 Detailed WCS. This methodology was developed as part of the AWS Wastewater 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.

7.6.1 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 hydrological estimation 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 DWF 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 5.8. 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 estimated total FTFT in 2050 from the WRC (flows from both existing and proposed dwellings) against the 1 in 2 annual chance flood events for the watercourses (including climate change), hence providing a risk score for the total predicted flows by 2050.

7.6.2 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. The risk scores and percentage increase in flow by 2050 are shown in Table 7.3 below. The full calculations are reported in ***Appendix J***.

Table 7.3: Flow to full treatment by WRC 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	0.03%	1.3	Low
Great Leighs	River Ter	0.29%	1.3	Low
Highwood	River Wid	0.04%	1.3	Low
Ingatestone	River Wid	0.01%	1.6	Low
Pleshey	Walthambury Brook	0.00%	1.3	Low
Roxwell	Newland Brook	0.00%	1.3	Low
South Woodham Ferrers	Fenn Creek	0.01%	1.9	Low
Wickford	The River Crouch	-0.41%	1.6	Low

*Chelmsford WRC discharges outside of the CCC administrative 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 WRC nor 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.

7.7 Suitability of Sustainable Drainage Systems

In January 2023, the government confirmed that regulations and processes for the creation of SuDS on new developments would be devised in order that Schedule 3 of the Flood and Water Management Act 2010 can be implemented. This means that SuDS will be mandatory on all new developments in England. Schedule 3 of the Flood and Water Management Act 2010 provides a framework for the approval and adoption of drainage systems covering design standards, operation and maintenance. It also makes the right to connect surface water runoff to public sewers conditional upon a drainage system being approved before construction begins. From 2024, SuDS will be mandatory for all new built developments under the Flood and Water Management Act 2010.

In 2021, the Association of SuDS Authorities (ASA) published a series of recommendations to update the Non-Statutory Technical Standards for Sustainable Drainage Systems. The final recommendations were to replace the existing Non-Statutory SuDS standards with a new set of six standards which the Department of Environment, Food & Rural Affairs (Defra) could use to inform drainage policy development:

- Standard 1: Runoff destinations
- Standard 2: Everyday rainfall
- Standard 3: Extreme rainfall
- Standard 4: Water quality
- Standard 5: Amenity
- Standard 6: Biodiversity

The Level 1 SFRA (2024) provides the following recommendations on the use of SuDS within the Council's area:

- "Chelmsford City Council should work closely with neighbouring local authorities to develop complementary Local Planning Policies for catchments that drain into and out of the Administrative Area to other local authorities in order to minimise cross boundary issues of cumulative impacts of development."

- "Developers should incorporate SuDS and provide details of adoption, ongoing maintenance and management on all development sites. Proposals will be required to provide reasoned justification for not using SuDS techniques, where ground conditions and other key factors show them to be technically feasible. Preference will

be given to systems that contribute to the conservation and enhancement of biodiversity and green infrastructure where practicable. Developers should refer to the relevant LLFA guidance (Essex County Council) for the requirements for SuDS in Chelmsford City council's Administrative Area, including Technical and Development Type-specific Guidance for Developers."

This WCS supports both recommendations.

8Climate Change

Climate change is, and will continue to, have an impact upon the entire water cycle and how this is managed as well as future infrastructure needs. Impacts may include a decrease in summer rainfall and an increase in temperature, leading to increased pressures on water supply. Increased winter rainfall could lead to an increase in available water but also an increased flood risk.

A summary of the potential impacts of climate change and the assessment method used to assess them within the WCS is provided in Table 8.1.

Table 8.1: Assessment of climate change pressures and impacts.

Assessment	**Potential impact of climate change**	**Assessment method of climate change within the WCS**
Water Resources (Supply)	High - large reduction in WAFU	Quantitative consideration within the revised draft WRMP24 and WCS.
Water Resources (Demand)	Medium - small increase in demand.	Quantitative consideration within the revised draft WRMP24 and WCS.
Flooding from increased WRC discharge	Medium - Increase in flood risk	Quantitative and qualitive considerations within this WCS and Level 1 SFRA.

Whilst climate change will have a medium to high impact on all aspects of the water cycle, the overall consequence will be low to medium as detailed in this chapter once the proposed policies and actions are being taken into consideration to mitigate the predicted impacts. Chapter 9 also outlines additional integrated water management (IWM) measures which can address climate change impacts and provide more resilience.

8.1 Policy Context

8.1.1 Chelmsford City Council Policies

The current policy that addresses climate change in the current Adopted Local Plan, is Strategic Policy S2 - Addressing climate change and flood risk". This policy is focused on new developments that:

- Reduce greenhouse gas emissions.
- Promote efficient use of natural resources.
- Reduce the need to travel.

- Provide opportunities for renewable and low carbon energy technologies and schemes.
- Encourage design and construction techniques, which contribute to climate change mitigation and adaptation.

In addition, green infrastructure such as passive solar design, tree planning and SuDS are all promoted within this policy.

8.1.2 Surrounding Local Authority policies

Table 8.2 summarises a review of the local plans and policies published by local authorities which are adjacent to CCC.

Table 8.2: Climate change policies published by adjacent local authorities.

Local Authority	Policy
Brentwood	Brentwood Borough Council do not have a climate change specific policy within their current Local Plan; however, it has been incorporated throughout the following policies: • Strategic Policy NE02: Green and Blue Infrastructure • Strategic Policy NE01: Protecting and enhancing the natural environment • Policy NE03: Trees, Woodlands, Hedgerows • Strategic Policy NE08: Air quality • Strategic Policy NE09: Flood risk
Maldon	Maldon District Council has a climate change specific policy, "Policy D2 - Climate change and Environmental Impact of New Developments". This policy focuses on sustainable design and green infrastructure, minimising all forms of pollution.
Braintree	Braintree District Council has a climate change specific policy: "Policy LPP 71 Climate change". This policy outlines that developments need to lower carbon emissions, increase renewable energy, and adapt to expected impacts of climate change. Climate change is also incorporated into the flood risk policy: "Policy LPP 74 Flooding Risk and Surface Water Drainage". This policy outlines that new developments need to be resilient for their entire lifetime, taking climate change into account.

The CCC policies currently in place are sufficient to help mitigate potential new risks due to climate change. When compared with surrounding local authorities, the CCC local policies are consistent.

8.2 Climate Change Impacts on Water Resources

Water Resources East (WRE) acknowledges that the east of the country is the driest, and as such may be more vulnerable to climate change than other parts of the country.

In line with water resources planning guidance, the impacts of climate change need to be addressed and considered within the regional planning and WRMP process. Essex and Suffolk Water have incorporated climate change considerations into the previous two plans (WRMP14 and WRMP19). The following sections of this report outline the two key areas climate change will impact Essex and Suffolk Water namely water supply and water demand.

8.2.1 Water Resources (Supply)

The water resources planning guidance issued by the EA sets out clear guidance on how to assess the risk and potential impacts of climate change and methods of reporting the findings. Essex and Suffolk Water has used the UK Climate Projections 2018 (UKCP18) Regional Climate Model (RCM) to determine the impact of climate change on supply. The dataset used Representative Concentration Pathway (RCP) 8.5, which is classified as the "high" emission scenario. Using a combination of monthly climate change factors, stochastic data, and modelling, 12 deployable outputs were produced.

As per water resources planning guidance, a "medium" emission scenario needs to be considered. Essex and Suffolk Water calculated this by scaling the "high" emission scenario. As outlined in Section 4.7.1.1, the total reduction in WAFU by 2025/26 is 17 Ml/d rising to 31 Ml/d in 2049/2050. Table 8.3 below shows the reduction from climate change per AMP.

Table 8.3: Decrease in WAFU for Essex WRZ per AMP from climate change.

Essex WRZ	**Start of AMP8 2025/ 2026**	**Start of AMP9 (2030/ 2031)**	**Start of AMP10 (2035/ 2036)**	**Start of AMP11 (2040/ 2041)**	**Start of AMP12 (2045/ 2046)**	**End of AMP12 (2049/ 2050)**
Climate Change impact (Ml/d) – supply decrease	-17	-20	-23	-26	-29	-31

Whilst a large impact from climate change is seen, as detailed in Section 4.7.6, these impacts are mitigated through the supply and demand measures planned by Essex and

Suffolk Water. Whilst the supply reductions (droughts etc.) resulting from climate change do increase, as planned for in the revised draft WRMP24, the overall PCC and water need will reduce. Hence, some of these reductions due to climate change will be offset.

8.2.2 Water Resources (Demand)

Whilst climate change will reduce available water for supply through a reduction in rainfall, an increase in temperatures can lead to higher water usage. A report produced by UKWIR entitled "Impact of climate change on water demand" outlined the impacts of climate change on household and non-household demand. With estimates of the impact of climate change on household water demand for each UK region in the format of look-up tables. These look-up tables used older (UKCP09) climate projections; however, Essex and Suffolk Water have contracted Hydrology UK to produce demand projections for the UKCP18 projections. Table 8.4 below shows the increase in demand per AMP that climate change is predicted to cause.

Table 8.4: Predicted increase in household demand as a result of climate change for Essex WRZ per AMP.

Essex WRZ	**Start of AMP8 (2025/ 2026)**	**Start of AMP9 (2030/ 2031)**	**Start of AMP10 (2035/ 2036)**	**Start of AMP11 (2040/ 2041)**	**Start of AMP12 (2045/ 2046)**	**End of AMP12 (2049/ 2050)**
Climate change impact (Ml/d) – increase in demand	1.7	1.89	2.04	4.34	2.92	2.54

Whilst the impacts on demand from climate change are increasing, the overall PCC values are also decreasing per AMP due to the demand measures introduced by Essex and Suffolk Water. The demand options proposed by Essex and Suffolk Water in the revised draft WRMP24 aim to offset the loss in supply from climate change.

8.3 Climate Change Impacts on Wastewater

8.3.1 Anglian Water Services Climate Change Impacts on Wastewater

The DWMP outlines how AWS will account for climate change over the period 2025 to 2050. The climate change scenario chosen for the DWMP was an increase in temperatures of at most two degrees by 2050. A focus in the DWMP is removing surface water from the sewerage system through a range of mixed SuDS and traditional attenuation strategies to provide resilience against the temperature increase (increased rainfall and flooding).

For each WRC, the DWMP outlines the key challenges along with the medium-term strategy and 2050 strategy. These incorporate concerns from stakeholders that include climate change.

Chelmsford WRC was the only WRC in CCC's administrative area where stakeholders raised significant concerns in terms of climate change risks. However, the strategy up to 2050 within the DWMP includes process optimatisation and increased capacity is planned to mitigate the potential risks. Ingatestone, South Woodham Ferrers and Wickford WRC catchments also included 2050 strategies to remove surface water from the sewerage system.

8.4 Climate Change Impacts on Flood Risk

This WCS has produced a high-level assessment of the change in flood risk resulting from the increased WRC discharge into receiving watercourses. This assessment has included climate change allowances as per climate change planning guidance. As shown in Section 7.6.2 an increased risk in flooding from the increased discharge at WRCs from the planned developments is not predicted.

The 2024 Level 1 SFRA assesses the relevant climate change guidance for flood risk, how to apply the guidance and the impacts it has on flood risk. Since the publication of the 2017 Level 1 and Level 2 SFRA, the climate change allowances have increased and the modelling to be conducted in the forthcoming Level 2 SFRA will include these revised allowances. The 2024 Level 1 SFRA, also provides an overview of the potential areas at risk of flooding due to climate change pressures.

9Integrated Water Management

Integrated water management (IWM) is a collaborative process which promotes a coordinated management of water storage, supply, wastewater, flood risk, water quality and the wider environment.

This section will outline a number of measures that can be used to promote IWM, whilst framing the expected benefits through a number of case studies.

9.1 Integrated Water Management Benefits and Challenges

Documentation from the Chartered Institution of Water and Environmental Management (CIWEM) (CIWEM, 2011) and Construction Industry Research and Information Association (CIRIA) (CIRIA 2019) both outline the potential benefits realised through taking an IWM approach to catchments. Potential benefits range from cost savings, enhanced biodiversity, reduction in flood risk, increase in water efficiency and water quality improvements to the environment.

The benefits of an IWM approach to catchments include the following:

- Reduced risk of flooding; this can be from a number of different sources i.e. changes in landscape (natural flood management), reducing the risk of river flooding (SuDS), and attenuating runoff.
- Increased water efficiency and reduced potable water stress; reducing potable water through rainwater harvesting, greywater, and wastewater recycling/reuse.
- Improvement to the water environment; reduction of pollution from surface water and groundwater.
- Enhanced biodiversity; more natural environments can improve the ecosystem and enhance natural capital which contributes to net environmental gain.
- Economic growth and regeneration; improvements to the urban environment can enhance greenspaces and regenerate growth.

IWM is not without challenges, these include:

- Local Planning Authorities having insufficient resources (staff and budget) to develop plans, policies and engage with developers, water companies, or stakeholders.
- National policy which is not applied consistently and does not promote IWM.
- Local plans without IWM policies may take several years to be updated and, if opportunities arise the benefits can be missed.

IWM is not just the responsibility of the local authority but is a collaborative approach between the local authority, LLFA, developers, and water companies. Early engagement between parties can benefit all parties. This includes:

- the local authority is able to sustainably allocate land for developments.
- the water company is able to plan strategically.
- the developer can undertake strategic business planning and master planning.

Case studies demonstrating how IWM has been successfully planned and implemented are described in Table 9.9.

9.2 Water Efficiency

Water efficiency is the practice of reducing water usage through the implementation of efficient fixtures or by capturing additional water. Water efficient measures include water efficiency fixtures, rainwater harvesting, educational campaigns on the use of water, metering and greywater recycling.

Whilst water efficiency for existing households has been explored within Section 4.7.5.2, this section will focus on new properties and outline measures and methods to obtain the preferred PCC outlined in Table 4.14 of 110 l/h/d.

The relevant water efficiency policies and guidance considered in the WCS is shown in Table 9.1.

Table 9.1: Water efficiency policies and guidance

Guidance	**Description**
Chelmsford City Council Adopted Local Plan	Within the CCC current Local Plan, policy DM25 – sustainable buildings states: "The Council will expect all new dwellings and non-residential buildings to incorporate sustainable design features to reduce carbon dioxide and nitrogen dioxide emissions, and the use of natural resources, as follows where relevant. All new dwellings shall meet the Building Regulations optional requirement for water efficiency of 110 litres/person/day." 110 l/h/d is in-line with national policy (see Section 4.8), the neighbouring local authorities and the aspiration of WRE.
Building Regulations	Part G of the Building Regulations states that the average water use must not exceed 125 l/h/d in a residential building, with an optional requirement of 110 l/h/d. The tighter standards are controlled via the planning permission. For developers to plan to ensure compliance, it is recommended that the water efficiency calculator for new dwellings is used. Building regulations Part G also provides guidance on the fittings/fixtures that could be used. These fittings will be compared with more recent industry recommendations.

Guidance	Description
Buildings Research Establishment Environmental Assessment Method	Buildings Research Establishment Environmental Assessment Method (BREEAM) is a sustainability assessment which evaluates the procurement, design, construction, and operation of a development based on performance benchmarks. It focuses on several sustainability values across a range of categories, the most relevant for this WCS will be water. BREEAM use a credit system to classify which sustainability category any building is in. The different sustainability categories are: Pass, Good, Very Good, Excellent and Outstanding. Nine credits are available for water, as shown in ***Appendix K***, with the performance improvement required over the baseline, with indicative PCC values.
Environmental Improvement Plan	Goal 3 of the government's environmental improvement plan is clean and plentiful water. Within this goal, ten actions are proposed over the next ten years. Action 7 is: "Review the Building Regulations 2010, and the water efficiency, water reuse and drainage standards (regulation 36 and Part G2, H1, H2, H3 of Schedule 1), considering the competence and skills to enable this transition. We will encourage the use of a fittings-based approach linked to the water efficiency label. We will consider a new standard for new homes in England of 105 litres per head per day (l/h/d) and 100 l/h/d where there is a clear local need, such as in areas of serious water stress."
Plan for Water	In April 2023, the government outlined their ambition for water usage within the UK. Within this plan the government stated that by 2038 they wanted household PCC usage to reduce by 20% and non-household (businesses) to reduce by 9%. This is in line with the current trajectory to have 110 l/h/d by 2050, a reduction of 50% in leakage and 15% reduction in non-household water use by 2050. The plan for water outlines that the government will consider a new minimum water efficiency standard for new homes of 100 l/h/d when there is a clear local need, such as areas of serious water stress.

9.2.1 Water Efficient Fixtures

Water fixtures in the home can have a wide range in terms of water consumption rates. Part G of the building regulations provides the maximum fitting consumption for homes to meet both the 125 l/h/d and 110 l/h/d, these are provided in Table 9.2.

Table 9.2: Maximum consumption fixtures for 125 l/h/d and 110 l/h/d as reported by Part G of the building regulations.

Water fitting	**Maximum consumption**	**Maximum consumption**
WC	6/4 litres dual flush or 4.5 litres single flush	4/2.6 litres dual flush
Shower	10 l/min	8 l/min
Bath	185 litres	170 litres
Basin taps	6 l/min	5 l/min
Sink taps	8 l/min	6 l/min
Dishwasher	1.25 l/place setting	1.25 l/place setting
Washing machine	8.17 l/kg	8.17 l/kilogram
Approximate PCC (l/h/d)	125	110

Recent industry research by Stantec produced an Outline Water Cycle Study in 2021 as part of an integrated water management study on behalf of Greater Cambridge Shared Planning. Within the report three different combinations of fittings and appliances for a "baseline, efficient and highly efficient" PCC are presented and shown in Table 9.3 below.

Table 9.3: PCC for three combinations of fittings and appliances.

Fitting	**Baseline Practice**	**Efficient Practice**	**Highly Efficient Practice**
WC	Single flush 6 litres per flush	Dual flush 6 or 4 litres per flush	Dual flush 4.5 or 2.6 litres per flush
Taps (Other)	12 litres per min	6 litres per min	4 litres per min
Taps (Kitchen)	12 litres per min	8 litres per min	6 litres per min
Baths	200 litres capacity	180 litres capacity	155 litres capacity
Dishwashers	1.2 litres per place setting	1 litres per place setting	0.7 litres per place setting
Washing Machines	10 litres per kilogram dry load	8.5 litres per kilogram dry load	7 litres per kilogram dry load
Showers (electric)	8 litres per min	6 litres per min	6 litres per min
PCC*	136.9	107.8	92.1

*Calculated using the Water Efficiency Calculator. Parameters: 2 toilets, 4 taps (or each type), 1 bath, 1 dish washer, 1 washing machine, 1 shower.

If all the highly efficient practice fittings are used, the PCC is approximately 92.1 l/h/d. However, in practice it may prove difficult to maintain a PCC this low as customers may find or perceive that some water efficient fittings limit their water use experience to unsatisfactory levels. If this happens, consumers may choose to replace fittings and fixtures with less efficient ones.

BREEAM provides guidance and recommendations on water consumption for new builds. SRE Ltd has produced guidance and recommendations on the type of fixtures in order to gain water credits these are outlined in Table 9.4 below. As shown in ***Appendix K*** rainwater and grey water recycling is required to obtain 3, 4 and 5 credits. This section is wholly focused on fixtures and so this will not be included in Table 9.4, but will be considered in Section 9.3 to Section 9.4.

Table 9.4: Fixtures and PCC for BREEAM credits.

Fitting	**Baseline**	**1 credit**	**2 credits**	**3 credits**	**4 credits**	**5 credits**
WC (l/flush)	6	4.5	4	3.75	3.5	3
Taps- other (l/min)	10	8	6	5	4	3
Taps- kitchen (l/min)	10	8	7	6	5	5
Baths (l capacity)	200	180	160	140	120	100
Dishwashers** (l/ place setting)	1.25	1.25	1.25	1.25	1.25	1.25
Washing machines ** (l/kg load	8.17	8.17	8.17	8.17	8.17	8.17
Showers (electric) (l/m)	12	10	8	6	5	3.5
PCC	**145.8**	**126.2**	**110.9**	**98.1**	**89.3**	**77.9**

*Parameters assumed are 2 single flush toilets, 2 hand basin taps, 2 kitchen taps, 1 shower, 1 bath, 1 domestic sized dishwasher and 1 domestic sized washing machines.
** Dishwasher and washing machine parameters provided by BREEAM as litres per use and litres per cycle. Hence the water efficiency calculator recommendations were used.

9.3 Rainwater Harvesting

Rainwater harvesting is the collection and storage of rainwater for re-use rather than allowing it to be discharged from sites as surface water runoff. This can have many benefits such as reducing flood risk and improving water quality. Rainwater harvesting does not reduce PCC but can reduce potable water demand from water companies. Currently CCC do not have a policy relating to rainwater harvesting.

The relevant rainwater harvesting policies and guidance considered in the WCS is shown in Table 9.5.

Table 9.5: Rainwater harvesting guidance and policies.

Guidance	Description
Regional Plan	The draft regional plan includes rainwater harvesting as a demand management option. The aspiration of WRE is that both rainwater harvesting and greywater recycling will be included in the roadmap to tighter building standards. Rainwater harvesting is not included within Essex and Suffolk Water's revised draft WRMP24.
Plan for water	The UK government published its New Plan for Water in April 2023. The document includes a roadmap for water efficiency, which sets out 10 new actions that the government will take, which includes mandating SuDS, new water efficiency standards, and water efficiency labelling in England. Guidance is set to be published in 2024 which outlines a standardised drainage system. Rainwater harvesting was considered in developing the standardized drainage system standards.
Neighbouring Local Authorities (policies)	Of the neighbouring local authorities (Braintree, Brentwood, Maldon, and Rochford) which are located within the Essex WRZ (see Figure 4-6), all of them have water efficient Local Plan or planned Local Plan policies. However, none of them have policies directly related to the use of rainwater harvesting. Whilst SuDS is promoted by all local authorities, the focus of this is reduction in flood risk rather than water reuse.

9.3.1 Measures

The two main types of rainwater harvesting are at the individual property scale or at the site wide scale. Examples of property scale rainwater harvesting measures include:

- Water butts
- Submerged pump system
- Direct pump system
- Gravity collection system
- Indirect pump system
- Gravity only system

These systems can be located above or below ground but aim to capture runoff from roofs. Hence, they are only as effective as the amount of rainfall received as well as being influenced by the type of roof linked to them.

Examples of sitewide rainwater harvesting includes:

- Permeable paving
- Green spaces
- Natural road drainage

These larger systems would aim to capture runoff from group of properties or whole site where central storage facilities will be located in green spaces and other communal areas such as car parks. This can help to promote biodiversity, reduce flood risk, and supply water for non-potable consumption across the site. These systems are predominately managed by either the water company or the LLFA.

9.3.2 Benefits of Rainwater Harvesting

As outlined above, the benefits of rainwater harvesting are dependent on the amount of rain received by any given area. Other factors include the type of roof and size of the system. If rainwater harvesting is planned for new developments, considerations on roof type will be needed. PCC benefits will differ from year to year but is has been shown that it can reduce mains water usage by up to 50%. Additionally a study conducted by Ricardo showed that installations across all building sizes emit less carbon dioxide when compared with emissions of homes just using mains water over a 20 year lifetime.

Rainwater harvesting benefits are calculated by multiplying the collection area, a yield coefficient and hydraulic filter efficiency and the average annual rainfall divided by 365.

For example, a three-bedroom detached house will have an approximate collection area of 75 square metres. The yield coefficient and hydraulic filter efficiency is a value that ranges between 0.5 for a flat roof and 0.75 for a pitched roof. A value of 0.7 is used in this calculation. The average annual rainfall in Chelmsford is approximately 620mm . This gives an average daily rainfall collected (DRC) value of 89.34 litres. The DRC is then divided per occupant, so for a three-bedroom house it will be 29.73 l/h/d. This saving can then be factored into the total water consumption. An update to Table 9.4, which uses the BREEAM fixtures is given in Table 9.6.

Table 9.6: Reductions in potable water required once rainwater harvesting systems are used.

	Baseline	1 credit	2 credits	3 credits	4 credits	5 credits
PCC from just fixtures (l/h/d)	145.8	126.2	110.9	98.1	89.3	77.9
Contribution from rainwater harvesting for non-potable consumption (l/h/d)	29.78	29.78	29.78	29.78	29.78	29.78
Reduced PCC after rainwater harvesting (l/h/d)*	118.7	99.1	83.8	71	62.2	50.8

*A normalisation factor of 0.91 is applied by the WEC (this has already been applied to the PCC from just fixtures values reported) and so the potable water demand (row 3) is calculated via the following equation:

Potable water demand = PCC from just fixtures – Contribution from rainwater harvesting*0.91

9.3.3 Drawbacks of Rainwater Harvesting

Whilst it is shown that rainwater harvesting may provide benefits, it does have potential drawbacks. One is that water companies are not able to reliably include the potential benefits on potable water supply (i.e. reducing overall PCC) because rainwater systems can fail (in particular during long dry periods), so a backup (i.e. potable water) is still required. However, this should not disincentivise developers from considering the implementation of the systems or councils from providing policies related to the systems.

Rainwater harvesting is very dependent on the climate as low rainfall will yield lower benefits. The CCC administrative area is located within WRE which has the lowest volume of annual rainfall when compared with the other regional groups. Additionally, climate change impacts are expected to increase winter rainfall and decrease summer rainfall, further reducing the benefits as a full tank is unable to store more water. This can be carefully planned through larger storage; however, this can raise water quality concerns as water remains in the tank for long periods of time without being refreshed.

As shown in Table 9.6, rainwater harvesting can provide large benefits in reducing the amount of potable water required to serve houses even when highly efficient fixtures are used. However, due to water resources planning guidelines, it cannot be used in replacement of fixtures for water company planning purposes. Additional societal benefits (such as increased biodiversity or green spaces) from rainwater harvesting that promotes nature-based solutions can help to increase the value of the area and quality of life.

9.4 Grey Water Recycling

Grey water is domestic wastewater generated in households without faecal contamination; it is generated from appliances such as hand basins, baths, and showers. With the correct treatment, grey water can be used for toilet flushing, garden use and washing machines. Grey water use makes up approximately 50% to 80% of household water usage, hence reuse could save up to 70 l/h/d of potable water depending on the PCC of the individual current household.

The relevant grey water recycling policies and guidance considered in the WCS are shown in Table 9.7.

Table 9.7: Grey water recycling policies and guidance

Guidance	Description
Water Resources East	Within the regional plan WRE outline the potential uses for grey water recycling, however no recommendations are given on as to whether they should be mandatory.
Local Plan Policy	Neither the CCC current Local Plan nor any surrounding local authorities, have a Local Plan policy related to grey water recycling.
CIRIA- Delivering better water management through the Planning system	The Construction Industry Research and Information Association (CIRIA) report "Delivering better water management through the planning system" discusses IWM (more details are provided in Section 9). Within the report it outlines a number of case studies and policies for IWM; of the case studies, two have used grey water recycling. The first being a 2.13 ha development of eight tower blocks, with the excess grey water produced used to supply non-households. The second was a brownfield redevelopment in London, in which grey water recycling was used in combination with water efficiency and rainwater harvesting to reduce demand on potable water.

9.4.1 Benefits of Grey Water Recycling

Grey water recycling can reduce potable water demand in homes. A reduction in water within the mains infrastructure can reduce the carbon dioxide in the system. Reduced potable water demand in the home can also lead to a reduction in the volume of wastewater sent to wastewater treatment works. This can lead to increased capacity in the sewer network potentially contributing to a reduced flood risk.

Grey water recycling can have environmental benefits but can also lead to financial savings for large houses or small blocks of flats. However, cost savings can also be obtained from larger buildings, including larger blocks of flats and large multi house residential developments. This is in addition to the benefit gained from reducing the supply required from Essex and Suffolk Water.

The savings from using grey water recycling are dependent on the fittings that generate the grey water. This is because if highly efficient taps, baths, and shower fixtures are used, less grey water is produced for recycling. An update to Table 9.4, showing the reductions in potable water required once grey water harvesting systems are used is given in Table 9.8 below.

Table 9.8: Reductions in potable water required once grey water harvesting systems are used.

Scenario	Baseline	1 credit	2 credits	3 credits	4 credits	5 credits
PCC from fixtures only (l/h/d)	145.8	126.2	110.9	98.1	89.3	77.9
Contribution from grey water harvesting (l/h/d)	43.7	37.05	34.837	32.05	27.76	22.59
Potable water demand (l/h/d)*	106.1	92.5	79.2	69.0	64	57.3

*A normalisation factor of 0.91 is applied by the WEC (this has already been applied to the PCC from just fixtures values reported) and so the potable water demand (row 3) is calculated via the following equation:

Potable water demand = PCC from just fixtures – Contribution from grey water harvesting*0.91

9.4.2 Drawbacks of Grey Water Recycling

Currently the largest drawback for grey water recycling is public perception; 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 property as opposed to an unknown source. Furthermore, acceptance of using recycled water becomes less when the water is used for tasks that involve personal contact such as washing machines. However, public support for water efficiency measures such as grey water recycling is greater in areas which are water stressed. It was shown by Oteng-Peprah that misinformation and lack of information are the limiting factors to public acceptance in reuse systems.

9.5 Non-Household Demand Management

Currently non-domestic water demands i.e businesses do not have a statutory right to water supply although it is acknowledged that water companies will accommodate requests whenever possible. To support a case for water supply, businesses may be required to be water efficient or show that they can reduce water usage. Non-household demand currently accounts for 15% of the potable water supplied by Essex and Suffolk Water (approximately 60 Ml/d). Within the revised draft WRMP24 the ambition is to reduce this demand by approximately 9% by 2037/38 which is in line with the government's Plan for Water.

Currently, the CCC Local Plan states that all new non-residential buildings with a floor area in excess of 500 m^2 shall achieve a minimum BREEAM rating of 'Very Good'. Of the local authorities surrounding the CCC administrative area, only Brentwood Borough Council have a policy which is related to non-residential water efficiency, stating that:

- New non-residential development is expected to meet BREEAM 'Excellent' rating in category Wat 01.
- Major developments and high or intense water use developments (such as hotels) is expected to provide more substantial water management measures such as rain/ and grey water harvesting.

9.5.1 Potential Water Efficiency Recommendations for Non-Households

This section will outline several methods in which businesses and large water users can aim to reduce water usage.

Firstly, rainwater and grey water harvesting on a larger scale can provide similar benefits to that of household systems; however, due to the reduced water requirements for most businesses this will not be sufficient to replace potable water supplied from the water company. With the move to remote working, businesses would need to assess if this measure is cost effective for site usage. However, a larger system integrated with several businesses could provide cost saving benefits and will reduce potable water usage.

SUDs measures integrated into the design of a new business can help to reduce onsite usage. Measures such as permeable paving within car parks, swales running to greenspaces or rainwater capture systems. These measures can also provide flood reduction benefits and promote biodiversity. An example of this is provided in Section 9.3.

Additional measures such as on-site wastewater treatment works for water reuse could be considered, however this would only be beneficial for large water users. Retrofitting of fixtures within existing businesses to offsite the water usage within the new business. Non-household developments could also aim to meet BREEAM 'Excellent' rating as opposed to 'Very Good'.

9.6 Integrated Water Management: Case Studies

Successful IWM can be achieved through collaboration between developers, local authorities, and the EA. The three case studies in Table 9.9 below demonstrate successful implementation of IWM and outline how this relates to planning policy. Further details on these can also be found in the CIRA 2019 report.

Table 9.9: Integrated water management: case studies

Case Study Name	Purpose of the development	Policy	Benefits
Clay Farm, Cambridge	A mixed-use development.	Clay Farm was in response to policy contained within the Cambridge City Council Local Plan that required urban extensions of the city to use sustainable drainage. • "Policy 31 – Integrated water management and the water cycle".	• Reduced risk from flooding, • Increased water efficiency and reduced water stress, • Clean and good quality water environment, • Enhanced biodiversity, • Improved accessible public spaces and places, • Mitigating and adapting to climate change.
Eddington, Cambridge	Mixed use development	Set out in the joint plan between Cambridge City Council and South Cambridgeshire District Council, relevant policies: • "Policy NW24: Climate Change & Sustainable Design and Construction" • "Policy NW25: Surface Water Drainage" • "Policy NW26: Foul Drainage and Sewage Disposal"	• Economically efficient in meeting potable water usage reductions, calculated as approximately 40% cheaper than plot-based options (which consider black and grey water and plot based rainwater harvesting). • Use of the non-potable water recycling scheme reduced potable water usage to 80 l/h/d. • SuDS measures throughout the development, reduced the downstream risk of flooding to neighbouring communities.
Asda supermarket, Leicester	Large supermarket, car park, and petrol station	Leicester City Council Local Plan. • "CS2 Climate change and flood risk" • "CS17 Biodiversity" • "CS13 Green network; sustainable drainage" • "SPD Green infrastructure supplementary planning document" • "SPD Climate change" • "Surface Water Management Plan"	• The site consisted of an integrated SUDs scheme that combined proprietary and vegetative systems to achieve effective surface water management, whilst increasing biodiversity. • Treated water from the site go through swales to dissipate energy and aerate the water.

9.7 Chelmsford City Council Existing Policy

A policy on the IWM within a Local Plan would enable developers, local authorities and the regulator to take a coordinated approach to all aspects of water cycle management, the benefits of which are wide reaching. These policies would also promote various SuDS measures and water sensitive urban planning techniques with providing guidance and specifications.

Currently CCC aims to promote an IWM process through the following Local Plan policies:

- Policy DM18 - Flooding/ SuDS
- Policy DM25 - Sustainable Buildings
- Strategic Policy S4 - Conserving and enhancing the natural environment.

There is currently no specific IWM policy, however these policies are broadly in line with the case studies policies listed in Section 9.2.

9.8 Surrounding Local Authorities Local Policy

Currently Maldon District Council, Braintree District Council and Rochford District Council do not have specific Local Plan Policies related to IWM. However, in December 2019, Braintree District Council, Colchester Borough Council, Tendring District Council, the EA, and AWS published a statement of common ground which set out the areas of agreement between the parties in relation to water issues. Within this an integrated water management strategy (IWMS) was prepared.

Brentwood Borough Council does not have a Local Plan policy related to IWM; however, as a part of "Strategic Policy BE01: Carbon Reduction and Renewable Energy", guidance is given on water management such that "Development must optimise the opportunities for efficient water use, reuse and recycling, including integrated water management and water conservation.".

9.9 Policy Recommendations for Chelmsford City Council

Whilst an IWM policy is not essential to support the CCC Local Plan, the WCS guidance published by the EA advises the LPAs to use their WCS to develop local and site-specific policies on:

- water cycle management measures such as multifunctional sustainable drainage, water efficiency and integrated water management
- providing infrastructure at the right time

Therefore, the following recommendations are suggested to allow CCC to better address the potential water supply issues and other issues and challenges that are highlighted in this WCS report.

CCC could to develop a policy recommendation that is similar to Cambridge City Council "Policy 31: Integrated water management and the water cycle" (Cambridge City Council Local Plan, pages 121 - 125).

Provision of a specific IWM policy can help to promote sustainability credentials of CCC's administrative area through case studies and media, and provide additional benefits as evidenced in the case studies in Section 9.6. An IWM policy for CCC that brings together the existing policies, by encouraging collaborative processes and expanding the specifications of SuDS (including rainwater harvesting) can minimise the environmental impacts of new development (e.g. water resources, flood risk water quality and climate change) whilst maximising the wider benefits from the proposed development. In turn this will enable Essex and Suffolk Water to be more resilient and support WRE's regional plan such that any surplus potable water from Essex and Suffolk Water can also be transferred into other WRE water companies when needed.

Currently CCC's Policy DM25 – Sustainable Buildings sets out the requirement that all new dwellings should be built to the Building Regulations optional requirement of a PCC rate of 110 l/h/d. This WCS recommends that a tighter restriction is considered instead, in line with the Government's Environment Improvement Plan and Plan for Water. For example, 105 l/h/d or 100 l/h/d (i.e., where there is a clear local need, such as in areas of serious water stress). The required fixtures to achieve 105 l/p/d would provide between BREEAM 2 and 3 credits.

It is recommended that rainwater harvesting systems are used wherever practicable within residential developments. This can theoretically reduce potable water supply from approximately 110 l/h/d to 84 l/h/d. It will promote sustainable buildings, help Essex and Suffolk Water manage the current deficit of supplying new homes, and can incentivise developers in obtaining BREEAM water credits, to meet the current 'Very Good' rating within Policy DM25.

Currently, the only policy for water usage of businesses is part of "Policy DM25 – Sustainable Buildings" which states that all new non-residential buildings with a floor area in excess of 500 m^2 shall achieve a minimum BREEAM rating of 'Very Good'. Whilst this is sufficient for most businesses, it does not cover large water users or larger major developments. As such it is recommended that this policy is expanded such that larger developments and large water users should incorporate SuDS and rainwater harvesting or offsetting measures.

Whilst not a policy recommendation, the current Local Plan "Appendix B - Development Standards" does not have a recommendation for fixtures within the home, except the recommendation for a PCC rate of 110 l/h/d. To ensure that this, or a new tighter restriction of 105 l/h/d or 100 l/p/d is met, the fixtures that should be recommended are the BREEAM 3 credit which are listed within Table 9.4. Similarly, the current Local Plan "Appendix B - Development Standards" does not have a recommended roof gradient. To gain the benefits from rainwater harvesting methods from the above policy recommendation, it is recommended that a roof gradient which has a yield coefficient and hydraulic filter efficiency of 0.7 is used.

10 Conclusions and Recommendations

The latest growth and proposed developments have been analysed as part of the Detailed Water Cycle Study (WCS) to confirm and address the key environmental and water infrastructure capacity constraints. This WCS forms part of the key evidence base to assist CCC in deciding the scale, location and delivery needs of new site allocations in the CLP.

In terms of the WCS, it is considered that the capacity of the WRCs and the associated impact on water quality, unresolved water services infrastructure issues and water environment are the greatest potential issues in relation to the currently proposed development aspirations within CCC's administrative area.

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

10.1 Water Resources and Supply

Water within the CCC administrative area is supplied by Essex and Suffolk Water. Currently Essex and Suffolk Water predicts a deficit in supply if no interventions are implemented, with an estimated supply demand deficit of 26.13 Ml/d in 2025/26 rising to 41.24 Ml/d by 2049/50. Essex and Suffolk Water are proposing a number of interventions to generate additional supply, through a combination of water treatment works upgrades, nitrate schemes, ceasing of water sharing agreements and a water re-use scheme. Essex and Suffolk Water is also proposing to decrease the current total household usage to 114.2 l/h/d by 2049/50 through demand measures (including leakage reduction, metering, and current household water efficiency measures). This will result in a positive supply demand balance of 3.46 Ml/d in 2025/26 rising to 65.38 Ml/d by 2049/50. The majority of this surplus results from demand management options for existing households and network leakage reduction. Therefore, there is some risk in them not being delivered due to the reliance on behavioral changes related to water savings and challenges associated with eradicating leakage from aging pipe network.

In the latest revised draft WRMP24, Essex and Suffolk Water is using a now outdated housing trajectory from 2022, which is not consistent with the latest trajectory used in producing this WCS. A comparison of the two trajectories shows that currently, a surplus of homes is planned for by Essex and Suffolk Water from 2022/23 until 2024/25. However, from 2025/26 until 2027/28 a deficit is shown, followed by a surplus in 2028/29 and then a deficit until 2041/42. From 2023/24 until 2040/41 Essex and Suffolk Water are planning for a total of 16,571 new homes, whilst the trajectory used within this WCS includes 21,653 new homes.

Demand calculations (see Section 4.8.3 for further details) show an increase in household potable demand within the council's area of between 4.68 Ml/d (PCC of 90 l/h/d) and 6.71 Ml/d (PCC of 129 l/h/d) in 2040. With an estimated increase in non-household demand of 0.4 Ml/d by 2040. The difference in homes between Essex and Suffolk Water and the housing proposed by CCC is approximately 5,082; this equates to a maximum increase in potable water from households of 1.57 Ml/d (with a PCC of 129 l/h/d). Due to the surplus shown by Essex and Suffolk Water, the deficit in planned houses is not determined to be significant.

Consultation with Essex and Suffolk Water highlighted three potential future pressures. Whilst two of the three water treatment works are not under pressure, Hanningfield water treatment works can supply new developments but might have head loss, pressure and velocity issues when doing so. Essex and Suffolk Water advises that plans are in place to address this. Essex and Suffolk Water note that the largest potential pressure from existing customers is per capita consumption. Whilst the revised draft WRMP24 has measures to reduce water consumption, if they are unsuccessful this could lead to supply issues. Potential network issues exist within Boreham, such that a burst or incident could lead to reduced supply, however, this issue is acknoweldged and Essex and Suffolk Water are considering options to mitigate this.

10.2 Integrated Water Management

Water efficiency measures are reviewed, and policy recommendations are provided within this Detailed WCS, including one specifically for Integrated Water Management. Whilst the water resources and supply chapter demonstrates that Essex and Suffolk Water can supply new developments, existing PCC pressures could lead to supply issues in the future, in particular if the demand management measures that Essex and Suffolk Water is heavily reliant upon are not realised. Therefore, this WCS recommends that the PCC rate of 110 l/h/d policy is updated to be 105 1/h/d or 100 l/h/d, in line with the emerging government guidance. Whilst this will provide benefits to Essex and Suffolk Water, it will also increase resilience within the wider WRE region. This tighter recommended PCC can be met by developers through the recommended fixtures described in Section 9.2.1.

Other policy recommendations include rainwater harvesting schemes for new build homes to reduce potable water, increase biodiversity and help to reduce flood risk. Rainwater harvesting schemes can also be used to incentivise developers to achieve BREEAM 3 credits.

Additionally, the current CCC Local Plan policy on non-residential specifications is that buildings in excess of 500 m^2 should achieve a minimum BREEAM rating of 'Very Good'. The policy currently does not reflect large water users and so a policy update is recommended such that these businesses should be required to have more substantial water management measures.

10.3 Wastewater, Sewerage and Water Quality

This Detailed WCS provides a general indication of the impacts of the proposed growth trajectory on existing wastewater assets. The WCS indicates that development can be accommodated at the majority of WRCs and will not result in the existing DWF consents being exceeded within the plan period.

Based on the proposed growth anticipated within the plan period, the DWF consent will be exceeded at the following WRCs:

- Great Leighs WRC (consent exceeded in 2026)
- South Woodham Ferrers WRC (consent exceeded in 2021/2022)
- Wickford WRC (consent exceeded in 2021/2022)

It should also be noted that Ingatestone WRC is within 5% of its DWF consent in 2025 due to the combination of cross boundary development and proposed growth and development with the CCC's administrative boundary.

It should be noted that AWS has an obligation to accept domestic flows, in particular in respect committed/ permitted housing development sites and would need to find suitable solutions to enable the development proposed at the failing or restricted capacity WRCs. CCC can place conditions on existing planning applications and allocations, however, based on discussions with AWS it is not advocated to give pre-commencement conditions for proposed developments as it could lead to issues for various stakeholders including developers, LPA, and AWS.

The Detailed WCS aimed to demonstrate that the growth and development proposed can be accommodated without causing a deterioration in river quality or WFD status. If the WFD 'no deterioration' standards cannot be met, it should be noted that the permits required for the new volumetric discharge consent may not be approved by the regulatory authorities. However, to ensure the proposed growth and development is deliverable it needs to be demonstrated that there are viable alternative options.

For the WRCs that exceed their current permitted DWF limits the viable options considered in the Detailed WCS include:

- **Great Leighs WRC**
  - Once the AMP8 scheme has been finished at Great Leighs WRC and effluent data has been recorded for an appropriate period, remodel the impact on river quality at the current discharge location using non-parametric data. Effluent quality data distributions tend not to follow 'the norm' once permit limits are tight or set at TAL. The non-parametric data sets better represent the likely effluent quality data distribution where a permit limit has been set at 0.25 mg/l. This method often, though not always, predicts that the impact on river quality is less damaging compared to the other methods due to the greater level of accuracy in the analysis undertaken.

- Optimisation of treatment process for specific water quality parameter (e.g. phosphate or ammonia).
- Pumping/ diverting flows to a nearby WRC catchment with sufficient DWF headroom to accommodate the shortfall at Great Leighs WRC. Potential suitable WRC would be Chelmsford WRC.

- **South Woodham Ferrers WRC**
  - Model the impact on river quality at the current discharge location using non-parametric data. This method often, though not always, predicts that the impact on river quality is less damaging compared to the other methods due to the greater level of accuracy in the analysis undertaken.
  - Optimisation of treatment process for specific water quality parameter (e.g. phosphate or ammonia). Based on discussions with AWS, the specific water quality parameter at South Woodham Ferrers WRC of concern is copper where the main/ only source is from domestic flows. Optimisation of treatment process of copper could be a potential solution.
  - The AWS DWMP proposes network strategies which include mainly sustainable drainage systems (SuDS) within the catchment which will reduce flows (25% removal of surface water) into the WRC. However, this will not have a significant or any impact on the dry weather flow (DWF). The DWMP does however identify WRC capacity increase as one of the strategies.

- **Ingatestone WRC**
  - Once the AMP8 scheme has been finished at Ingatestone WRC and effluent data has been recorded for an appropriate period, remodel the impact on river quality at the current discharge location using non-parametric data. Effluent quality data distributions tend not to follow 'the norm' once permit limits are tight or set at TAL. The non-parametric data sets better represent the likely effluent quality data distribution where a permit limit has been set at 0.25 mg/l. This method often, though not always, predicts that the impact on river quality is less damaging compared to the other methods due to the greater level of accuracy in the analysis undertaken.
  - Optimisation of treatment process for specific water quality parameter (e.g. phosphate or ammonia).
  - The AWS DWMP proposes network strategies which include mainly sustainable drainage systems (SuDS) within the catchment which will reduce flows (25% removal of surface water) into the WRC. However, this will not have a significant or any impact on the dry weather flow (DWF). The DWMP does however identify WRC capacity increase as one of the strategies.

- **Wickford WRC**
  - Optimisation of treatment process for specific water quality parameter (e.g. phosphate or ammonia). The DWF consent is a strategic cross boundary matter as the majority of Wickford WRC catchment is located within the Basildon District Council area. The combination of proposed growth in the Wickford WRC catchment will therefore be a driver for future investment at the WRC. There are no specific constraints that AWS are currently aware of for Wickford WRC which would prevent a future growth scheme in the next AMP. However, any scheme would be subject to final determination of the AWS PR24 business plan in 2024 and reprioritisation for the next AMP cycle.
  - After the consent has been updated (based on the load standstill method), the impact on river quality at the current discharge location using non-parametric data should be modelled. This method often, though not always, predicts that the impact on river quality is less damaging compared to the other methods due to the greater level of accuracy in the analysis undertaken. Additionally, accurate river flow and quality parameter data upstream and downstream of the WRC for RQP analysis would be required.

AWS and CCC should work with the EA to find the most suitable solution or combination of solutions to address the identified risk at each WRC identified above.

It has not yet been fully confirmed if the potential solutions discussed above can be implemented in a timely manner to fully address the risk of meeting the 'no deterioration' policy appropriately within the plan period, based on the current proposed development trajectories (development timings and number of dwellings) used within this Detailed WCS. Therefore, CCC must prevent development occurring ahead of capacity at the WRC becoming available either by taking a stepped approach or by redirecting some development into another WRC catchment with sufficient capacity if needed. However, this needs to be informed by further discussions with AWS and the EA and can inform the Pre-Submission Local Plan.

In line with EA consultations, if the 'no deterioration' standards cannot be met for the WFD waterbody and no solution can be found (as it is a legal obligation not to breach environmental legislation), the new development proposed within the catchment may have to be directed to another WRC catchment or settlement.

A load standstill approach has been adopted in the WCS methodology to determine the new WwTW discharge permit requirements (as discussed in Section 6.7), which will aim to maintain the same nutrient loads, as per the current discharge consents. This will maintain the existing water quality in the receiving watercourses to ensure WFD compliance.

Furthermore, none of the WRCs that have been assessed within the WCS will discharge into a designated nutrient neutrality SAC catchment by the Natural England. Therefore, there is unlikely to be a negative impact on any Natura 2000 sites in terms of the HRA compliance. However, this should be further discussed and confirmed within

the HRA for the CLP which will be prepared by CCC in consultation with Natural England.

10.4 Flood Risk Management

A high-level assessment has been undertaken within this WCS to assess the impacts of increased WRC discharges into receiving watercourses. A multi-criteria analysis provided a risk-based score for each discharge point. The score was a combination of the impact from increase in peak river flows on the receiving watercourse, the sensitivity of the flood levels to surrounding infrastructure and the impact. All of the risk scores for the proposed increases in WRC discharges were assessed to be low.

This WCS also assessed the locations of the committed and allocated developments with respect to flood zones and provided a summary table of those at risk. Several of the proposed developments namely those located within and the surrounding areas of the city of Chelmsford are primarily located within Flood Zone 2 and 3.

The 2024 Level 1 SFRA has been reviewed as part of this WCS and a number of policy recommendations from the document are promoted within this WCS.

10.5 Climate Change

Climate change has the potential to impact every aspect of this WCS therefore a climate change impact assessment was undertaken. A RAG score, based on the method used to assess the relevant climate change pressures and the impact these pressures will have, was undertaken.

Quantitative assessments were undertaken for water resources; due to the high impact of climate change on supply this was rated as amber, whilst the impact on demand was rated green.

A quantitative and qualitative assessment of the impacts of climate change on flood risk was undertaken; due to the impact of climate change on flood risk being medium this was rated as amber.

No specific policy recommendations in respect of climate change have been identified for CCC, however, the adoption of an IWM policy (as outlined in Section 9) can help to reduce the potential impacts.

Appendix A

Proposed development and growth – Individual Sites

Table A-1: Proposed development and growth for individual allocated sites

No.	Site Address	Description of development	Settlement	Ward/ Parish	Planning Status	Estimated Total Capacity	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																									
H1.1.1	24 Duke Street Chelmsford	Demolition of existing building and erection of mixed use development comprising 112 residential units and 1 x commercial unit, together with parking, public realm and footpath improvements (Amendments to planning permission 14/01692/FUL).	Chelmsford	Chelmsford - Moulsham and Central	Permission granted	112	**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																									
H1.2.1	Land north south and east of Belsteads Farm Lane Broomfield (Channels) - Phase 3c 3d and 5	Residential Development	Broomfield	Broomfield - Broomfield and the Walthams	Permission granted	240	**46**	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.2.2	Land north south and east of Belsteads Farm Lane Broomfield (Channels) - Phase 4	Residential Development	Broomfield	Broomfield - Broomfield and the Walthams	Permission granted	27	**20**	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.2.3	Land north south and east of Belsteads Farm Lane Broomfield (Channels) - Phase 6	Residential Development	Broomfield	Broomfield - Broomfield and the Walthams	Permission granted	128	**71**	58	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.2.4	Land east of North Court Road and north of Hospital Approach Broomfield (Care Home)	Care Home	Broomfield	Broomfield - Broomfield and the Walthams	Permission granted	26	**26**	0	0	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.2.5	Greater Beaulieu Park White Hart Lane Springfield - Phase 2 - Zone K and L	Residential Development	Chelmsford	Springfield - Springfield North	Permission granted	300	**194**	60	79	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.2.6	Greater Beaulieu Park White Hart	Residential Development	Chelmsford	Springfield - Springfield North	Permission granted	82	**82**	60	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

No.	Site Address	Description of development	Settlement	Ward/ Parish	Planning Status	Estimated Total Capacity	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
	Lane Springfield - Phase 2- Zone J																								
H1.2.7	Greater Beaulieu Park White Hart Lane Springfield - Phase 3 - Zone M, N & Q	Residential Development	Chelmsford	Springfield - Springfield North	Permission granted	272	**198**	111	80	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.2.8	Greater Beaulieu Park White Hart Lane Springfield - Phase 3 - Zones O & P	Residential Development	Chelmsford	Springfield - Springfield North	Permission granted	111	**109**	26	46	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.2.9	Greater Beaulieu Park White Hart Lane Springfield - Phase 3 - Zone V	Residential Development	Chelmsford	Boreham - Boreham and the Leighs	Permission granted	145	**93**	59	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.2.10	Greater Beaulieu Park White Hart Lane Springfield - Phase 3 - Zone W	Residential Development	Chelmsford	Springfield - Springfield North	Permission granted	194	**194**	94	72	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.2.11	Greater Beaulieu Park White Hart Lane Springfield - Phase 3 - Zone T	Residential Development	Chelmsford	Springfield - Springfield North	Permission granted	66	**66**	0	28	28	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.2.12	Greater Beaulieu Park White Hart Lane Springfield - Remainder of phase 2-4	Residential Development	Chelmsford	Springfield - Springfield North	Permission granted	1246	**1246**	0	0	0	235	172	177	133	133	133	133	130	0	0	0	0	0	0	0
1.3 Site Allocations Development Plan Document Allocations																									
H1.3.1	Former Runwell Hospital (St Lukes) Runwell Chase Runwell - Phase 4	Residential Development	Runwell	Rettendon - Rettendon & Runwell	Permission granted	134	**36**	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.3.2	Former Runwell Hospital (St Lukes) Runwell Chase Runwell - Phase 5	Residential Development	Runwell	Rettendon - Rettendon & Runwell	Permission granted	71	**71**	31	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.3.3	Land at Former Runwell Hospital Runwell Chase Runwell Wickford	Residential Development	Runwell	Rettendon - Rettendon & Runwell	Permission granted	29	**29**	10	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

No.	Site Address	Description of development	Settlement	Ward/ Parish	Planning Status	Estimated Total Capacity	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
H1.3.4	Morelands Industrial Estate, Tileworks Lane, Rettendon	Application for the approval of reserved matters (layout, scale, landscaping and appearance) in relation to outline application permission for demolition of existing buildings and residential development of up to 92 dwellings with public open space and landscaping with all matters reserved except for the access into the site from Tile Works Lane, and relocation of existing bund to west side of A130 road.	Rettendon Place	Rettendon - Rettendon & Runwell	Permission granted	92	**92**	30	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.3.5	Land between Back Lane and Old Church Road East Hanningfield	Reserved matters application for scale, appearance and landscaping for 20 no. two storey detached and semi-detached houses, flats and bungalows and new formation of access.	East Hanningfield	East Hanningfield - Bicknacre and West Hanningfield	Permission granted	20	**20**	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
					1.1 TOTAL	**112**	**112**	0	112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
					1.2 TOTAL	**2837**	**2345**	534	374	181	245	172	177	133	133	133	133	130	0	0	0	0	0	0	0
					1.3 TOTAL	**346**	**248**	107	141	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
					SUBTOTAL	**3295**	**2705**	641	627	181	245	172	177	133	133	133	133	130	0	0	0	0	0	0	0

Table A-2: Proposed development and growth for individual large unallocated sites

No.	Site Address	Description of development	Settlment	Ward/ Parish	Planning status	Estimated Total Capacity	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
1.4 Large Sites (Unallocated)																									
H1.4.1	47 Broomfield Road Chelmsford	Demolition of existing office building and construction of new building comprising 14no. two bedroom flats,	Chelmsford	Chelmsford - Marconi	Permission granted	14	**14**	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.4.2	Site rear of 30-34 Broomfield Road	Demolition of existing buildings and redevelopment to provide 24no. dwellings and associated undercroft car parking, cycle parking, landscaping and access on land at Railway Square.	Chelmsford	Chelmsford - Marconi	Permission granted	24	**24**	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.4.3	10-13 Hoffmans Way Chelmsford	Determination as to whether the prior approval of the local planning authority is required for the proposed change of use from commercial office space (class e) to 11 residential apartments (class c3).	Chelmsford	Chelmsford Town Area - Marconi	Prior Approval Required - Approved	11	**11**	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.4.4	South Side Car Park Railway Street Chelmsford	Mixed-use development comprising of three commercial units on the ground floor and 10 no. Apartments over three floors with associated refuse & recycling collection, cycle stores and vehicle parking.	Chelmsford	Chelmsford - Marconi	Permission granted	10	**10**	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.4.5	Site at The Atlantic Hotel New Street Chelmsford	Construction of a five storey extension to existing hotel to create 2 ground floor retail units and 10 residential apartments, with associated soft landscaping and parking.	Chelmsford	Chelmsford - Marconi	Permission granted	10	**10**	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.4.6	Hill & Abbott First Floor Threadneedle House 9-10 Market Road Chelmsford	Determination as to whether the prior approval of the local planning authority is required for the proposed change of use of floors 1-6 of a building from office use (Class B1(a)) to 66 apartments (Class C3).	Chelmsford	Chelmsford - Moulsham and Central	Prior approval required - approved	66	**66**	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

No.	Site Address	Description of development	Settlment	Ward/ Parish	Planning status	Estimated Total Capacity	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
H1.4.7	Saxon House 27 Duke Street Chelmsford	Determination as to whether the prior approval of the local planning authority is required for the proposed change of use from offices (Class B1(a)) to 39 dwellings (Class C3).	Chelmsford	Chelmsford - Moulsham and Central	Prior approval required - approved	39	**39**	0	0	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.4.8	Makerstudy House Waterloo Lane Chelmsford	Determination as to whether the prior approval of the local planning authority is required for the proposed change of use from offices (Class C1(a)) to 22 dwellings (Class C3).	Chelmsford	Chelmsford - Moulsham and Central	Prior approval required - approved	22	**22**	0	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.4.9	1 Legg Street Chelmsford	Determination as to whether the prior approval of the local planning authority is required for the proposed change of use from offices to 88 dwellings.	Chelmsford	Chelmsford Town Area - Moulsham and Central	Prior Approval Required - Appeal Allowed	94	**94**	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.4.10	Sadlers House 2 Legg Street Chelmsford	Change of use and conversion of building from offices (use class - B1) to provide 13 new residential units (use class - C3) including construction of two new floors and external alterations to the existing building.	Chelmsford	Chelmsford Town Area - Moulsham and Central	Permission granted	13	**13**	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.4.11	39 Springfield Road Chelmsford	Determination as to whether the prior approval of the local planning authority is required for the proposed change of use from Offices (Class B1(a)) to 18 dwellings (Class C3)	Chelmsford	Chelmsford Town Area - Moulsham and Central	Prior Approval Required - Approved	18	**18**	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0
H1.4.12	Site at 137 Beehive Lane Great Baddow Chelmsford	Change of use from office to 10 residential apartments (use class C3). Construction of part ground, first and second floor extensions to the front, side and rear. Creation of associated parking areas with bin and cycle store.	Chelmsford	Great Baddow - Great Baddow West	Permission granted	10	**10**	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.4.13	Land to the rear of 51- 54A High Street Chelmsford	Part development of car park/service yard to provide 10 dwellings with associated cycle parking and refuse storage.	Chelmsford	Chelmsford - Moulsham and Central	Permission granted	10	**10**	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

No.	Site Address	Description of development	Settlment	Ward/ Parish	Planning status	Estimated Total Capacity	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
H1.4.14	39 Moulsham Street Chelmsford	Determination as to whether the prior approval of the local planning authority is required for the proposed change of use from Offices (Class B1(a)) to 12 dwellings (Class C3)	Chelmsford	Chelmsford Town Area - Moulsham and Central	Prior Approval Required - Approved	12	**12**	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.4.15	Royal & Sunalliance Parkview House Victoria Road South	Remodelling of ground, 1st & 2nd floors of existing building to provide 47 apartments, including infilling of openings at ground floor	Chelmsford	Chelmsford - Moulsham and Central	Permission granted	45	**45**	0	0	0	0	0	0	9	9	9	9	9	0	0	0	0	0	0	0
H1.4.16	Royal & Sunalliance Parkview House Victoria Road South	Remodelling of third floor of existing building to provide 15 apartments	Chelmsford	Chelmsford - Moulsham and Central	Permission granted	15	**15**	0	0	0	0	0	0	3	3	3	3	3	0	0	0	0	0	0	0
H1.4.17	Site at Dorset House Duke Street Chelmsford	Determination as to whether the prior approval of the local planning authority is required for the proposed change of use from Offices (Class B1(a)) to 40 dwellings (Class C3).	Chelmsford	Chelmsford Town Area - Moulsham and Central	Permission granted	40	**40**	0	0	0	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.4.18	Site at Victoria House 101-105 Victoria Road Chelmsford	Determination as to whether the prior approval of the local planning authority is required for the proposed change of use from Offices (Class B1 (a)) to 78 dwellings (Class C3).	Chelmsford	Chelmsford Town Area - Moulsham and Central	Permission granted	78	**78**	0	0	0	78	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.4.19	Victoria House 101-105 Victoria Road Chelmsford	Construction of 2 additional floors comprising of 44 residential apartments on top of the existing office building.	Chelmsford	Chelmsford Town Area - Moulsham and Central	Prior approval required - approved	44	**44**	0	0	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.4.20	St Josephs Nursing Home Gay Bowers Road Danbury	Part single and part two storey rear extension to form 20 bedrooms and ancillary facilities for Class C2 (Supported Housing) Use.	Danbury	Danbury - Little Baddow Danbury and Sandon	Permission granted	10	**10**	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.4.21	Brook Farm Riding Stables Stock Road Stock Billericay	Demolition of dilapidated former riding school associated buildings & erection of 10 bungalow style dwellings.	Stock	Stock - South Hanningfield, Stock & Margaretting	Permission granted	10	**10**	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.4.22	Site at Indian Nights London Road Chelmsford	Part-demolition and conversion of existing building and construction of new block, including basement car park, to create 12 flats.	Chelmsford	Chelmsford Town Area - Goat Hall	Permission granted	10	**10**	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0

No.	Site Address	Description of development	Settlment	Ward/ Parish	Planning status	Estimated Total Capacity	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
H1.4.23	Site at Windermere Main Road Broomfield Chelmsford	Demolish existing dwelling and garage. Construction of 3 separate buildings comprising of 10 supported living units, 1 staff apartment with an office/communal space and 5 self-contained units (Class Use C2). Provision of cycle parking, 11 car parking spaces with landscaping/courtyard space. Addition of perimeter site fencing. Formation of access.	Broomfield	Broomfield - Broomfield and the Walthams	Permission granted	14	**14**	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
					1.4 TOTAL	**619**	**619**	234	23	142	118	24	18		12	12	12	12	12	0	0	0	0	0	0	0

Table A-3: Proposed development and growth for small sites

No.	Site Address	Description of development	Settlment	Ward/ Parish	Planning status	Estimated Total Capacity	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
1.5 Small sites																									
H1.5		Small sites				426	421	213	146	47	6	9	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A-4: Proposed development and growth for growth areas 1, 2 and 3

No.	Site Address	Settlement	Ward/ Parish	Allocation	Estimated Total Capacity	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
1.6 Growth Area 1 - Central and Urban Chelmsford																								
H1.6.1	Former Gas Works Wharf Road Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	CW1a	450	**450**	0	0	60	110	125	0	20	20	20	20	20	11	11	11	11	11	0	0
H1.6.2	Lockside Navigation Road Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	CW1c	130	**130**	0	0	0	50	80	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.6.3	Baddow Road Car Park and Land to the East	Chelmsford	Chelmsford Town Area - Moulsham and Central	CW1d	190	**190**	0	0	0	0	70	0	24	24	24	24	24	0	0	0	0	0	0	0
H1.6.4	Travis Perkins Navigation Road Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	CW1e	75	**75**	0	0	0	0	0	0	15	15	15	15	15	0	0	0	0	0	0	0
H1.6.5	Navigation Road sites Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	CW1f	35	**35**	0	0	0	0	0	0	0	0	0	0	0	7	7	7	7	7	0	0
H1.6.6	Former St Peter's College Fox Crescent	Chelmsford	Chelmsford Town Area - St Andrews	SGS1b	185	**185**	0	0	23	54	54	54	0	0	0	0	0	0	0	0	0	0	0	0
H1.6.7	Riverside Ice and Leisure Land Victoria Road Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	SGS1d	150	**150**	0	0	75	75	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.6.8	Civic Centre Land Fairfield Road Chelmsford	Chelmsford	Chelmsford Town Area - Marconi	SGS1e	100	**100**	0	0	0	0	0	0	0	0	0	0	0	20	20	20	20	20	0	0
H1.6.9	Land West of Eastwood House Glebe Road Chelmsford	Chelmsford	Chelmsford - Marconi	SGS1f	197	**197**	0	0	197	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.6.10	Ashby House Car Parks New Street Chelmsford	Chelmsford	Chelmsford Town Area - Marconi	GS1h	80	**80**	0	0	0	0	0	0	0	0	0	0	0	16	16	16	16	16	0	0
H1.6.11	Chelmsford Social Club	Chelmsford	Chelmsford Town Area - Moulsham and Central	GS1g	29	**29**	0	0	0	0	0	0	6	6	6	6	5	0	0	0	0	0	0	0
H1.6.12	Rectory Lane Car Park West Rectory Lane Chelmsford	Chelmsford	Chelmsford Town Area - All Saints	GS1i	75	**75**	0	0	0	0	0	0	15	15	15	15	15	0	0	0	0	0	0	0
H1.6.13	Former Chelmsford Electrical and Car Wash Brook Street	Chelmsford	Chelmsford Town Area - Marconi	GS1k	40	**40**	0	0	0	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.6.14	BT Telephone Exchange Cottage Place Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	GS1l	30	**30**	0	0	0	0	0	0	0	0	0	0	0	6	6	6	6	6	0	0

No.	Site Address	Settlement	Ward/ Parish	Allocation	Estimated Total Capacity	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
H1.6.15	Rectory Lane Car Park East Rectory Lane Chelmsford	Chelmsford	Chelmsford Town Area - Marconi	GS1m	23	**23**	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.6.16	Waterhouse Lane Depot and Nursery Chelmsford	Chelmsford	Chelmsford Town Area - Waterhouse Farm	GS1n	20	**20**	0	0	0	0	0	0	4	4	4	4	4	0	0	0	0	0	0	0
H1.6.17	British Legion New London Road Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	GS1p	15	**15**	0	0	0	0	0	0	3	3	3	3	3	0	0	0	0	0	0	0
H1.6.18	Land rear Of 17-37 Beach's Drive Chelmsford	Chelmsford	Chelmsford Town Area - St Andrews	GS1q	18	**18**	0	0	13	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.6.19	Garage Site St Nazaire Road Chelmsford	Chelmsford	Chelmsford Town Area - St Andrews	GS1r	12	**13**	0	0	0	0	0	0	3	3	3	3	1	0	0	0	0	0	0	0
H1.6.20	Garage Site and Land Medway Close Chelmsford	Chelmsford	Chelmsford Town Area - St Andrews	GS1s	6	**6**	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.6.21	Car Park R/O Bellamy Court Broomfield Road Chelmsford	Chelmsford	Chelmsford Town Area - Marconi	GS1t	10	**10**	0	0	0	0	0	0	2	2	2	2	2	0	0	0	0	0	0	0
H1.6.22	Land Surrounding Telephone Exchange Ongar Road Writtle	Writtle	Writtle	GS5	25	**25**	0	0	0	0	0	0	0	0	0	0	0	5	5	5	5	5	0	0
H1.6.23	West Chelmsford	Writtle	Writtle	SGS2	880	**880**	0	37	120	120	120	120	73	73	73	73	71	0	0	0	0	0	0	0
H1.6.24	East Chelmsford - Manor Farm	Chelmsford	Great Baddow - Great Baddow East	SGS3a	360	**360**	0	50	50	50	50	50	22	22	22	22	22	0	0	0	0	0	0	0
H1.6.25	East Chelmsford - Land South and North of Maldon Road	Sandon	Sandon - Little Baddow Danbury and Sandon	SGS3c and SGS3d	174	**174**	0	0	50	51	64	9	0	0	0	0	0	0	0	0	0	0	0	0
H1.6.26	Land north of Galleywood Reservoir Beehive Lane Galleywood	Galleywood	Galleywood - Galleywood	GS4	24	**24**	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.6.27	Meadows Shopping Centre and Meadows Surface Car Park	Chelmsford	Chelmsford - Moulsham and Central	**SGS1w**	350	**350**	0	0	0	0	0	0	70	70	70	70	70	0	0	0	0	0	0	0
H1.6.28	Former Kay-Metzeler premises, Brook Street	Chelmsford	Chelmsford - Moulsham and Central	**SGS1x**	185	**185**	0	0	0	0	0	0	37	37	37	37	37	0	0	0	0	0	0	0

No.	Site Address	Settlement	Ward/ Parish	Allocation	Estimated Total Capacity	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
H1.6.29	Land between Hoffmans Way and Brook Street (Marriages Mill)	Chelmsford	Chelmsford - Moulsham and Central	**SGS1y**	100	**100**	0	0	0	0	0	0	0	0	0	0	0	20	20	20	20	20	0	0
H1.6.30	Granary Car Park	Chelmsford	Chelmsford - Moulsham and Central	**GS1z**	60	**60**	0	0	0	0	0	0	12	12	12	12	12	0	0	0	0	0	0	0
H1.6.31	Coval Lane Car Park	Chelmsford	Chelmsford - Waterhouse Farm	**GS1aa**	40	**40**	0	0	0	0	0	0	0	0	0	0	0	8	8	8	8	8	0	0
H1.6.32	Glebe Road Car Park	Chelmsford	Chelmsford - Moulsham and Central	**GS1bb**	12	**12**	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.7 Growth Area 2 - North Chelmsford																								
H1.7.1	Chelmsford Garden Community Zone 1 Pratts Farm Lane Little Waltham Chelmsford	Little Waltham	Little Waltham - Broomfield and the Walthams	SGS6 (including 6a)	1500	**1500**	0	50	100	100	100	150	150	150	150	150	150	50	50	50	50	50	0	0
H1.7.2	Chelmsford Garden Community Zone 2	Little Waltham	Little Waltham - Broomfield and the Walthams	SGS6 (including 6a)	3500	**3500**	0	0	40	70	70	180	300	300	300	300	300	328	328	328	328	328	0	0
H1.7.3	Chelmsford Garden Community Zone 3 Beaulieu Parkway Chelmsford	Little Waltham	Little Waltham - Broomfield and the Walthams	SGS6 (including 6a)	1250	**1250**	0	0	75	400	320	155	60	60	60	60	60	0	0	0	0	0	0	0
H1.7.4	Great Leighs - Land at Moulsham Hall	Great Leighs	Great and Little Leighs - Boreham and the Leighs	SGS7a	750	**750**	0	0	50	50	100	100	90	90	90	90	90	0	0	0	0	0	0	0
H1.7.5	Great Leighs - Land East of London Road	Great Leighs	Great and Little Leighs - Boreham and the Leighs	SGS7b	190	**190**	0	0	60	60	70	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.7.6	Great Leighs - Land North and South of Banters Lane	Great Leighs	Great and Little Leighs - Boreham and the Leighs	SGS7c	100	**100**	0	0	50	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.7.7	North of Broomfield	Broomfield	Broomfield - Broomfield and the Walthams	SGS8	512	**512**	0	50	50	50	100	100	33	33	33	33	30	0	0	0	0	0	0	0
H1.7.8	Land west of Back Lane, Ford End	Ford End	Broomfield - Broomfield and the Walthams	**GS14a**	20	**20**	0	0	0	0	0	0	4	4	4	4	4	0	0	0	0	0	0	0

No.	Site Address	Settlement	Ward/ Parish	Allocation	Estimated Total Capacity	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
H1.7.9	Land south of Ford End Primary School, Ford End	Ford End	Broomfield - Broomfield and the Walthams	**GS14b**	20	**20**	0	0	0	0	0	0	4	4	4	4	4	0	0	0	0	0	0	0
1.8 Growth Area 3 - South and East Chelmsford																								
H1.8.1	Land North West of Hamberts Farm Bunham Road South Woodham Ferrers Chelmsford	Woodham Ferrers	South Woodham Ferrers - South Woodham, Elmwood & Woodville	SGS10	1020	**1020**	0	0	0	30	100	180	142	142	142	142	142	0	0	0	0	0	0	0
H1.8.2	Land North of South Woodham Ferrers Burnham Road South Woodham Ferrers Chelmsford	Woodham Ferrers	South Woodham Ferrers - South Woodham, Elmwood & Woodville	SGS10	200	**200**	0	0	36	65	75	0	5	5	5	5	4	0	0	0	0	0	0	0
H1.8.3	South of Bicknacre	Bicknacre	Woodham Ferrers and Bicknacre - Bicknacre and East and West Hanningfield	GS11a	42	**42**	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.8.4	St Giles Moor Hall Lane	Bicknacre	Woodham Ferrers and Bicknacre - Bicknacre and East and West Hanningfield	GS12	32	**32**	0	0	0	0	0	0	7	7	7	7	4	0	0	0	0	0	0	0
H1.8.5	Danbury	Danbury	Danbury - Little Baddow Danbury and Sandon	SGS13	100	**100**	0	0	0	0	0	0	10	10	10	10	10	10	10	10	10	10	0	0
H1.8.6	East Chelmsford Garden Community (Hammonds Farm)	Chelmsford	Little Baddow/ Danbury / Sandon / Boreham / Chelmer and Beaulieu Park	**SGS16a**	3000	**3000**	0	0	0	0	0	0	270	270	270	270	270	236	236	236	236	236	235	235
H1.8.7	Land at Kingsgate, Bicknacre	Bicknacre	Bicknacre and East and West Hanningfield	**GS11b**	20	**20**	0	0	0	0	0	0	4	4	4	4	4	0	0	0	0	0	0	0
H1.8.8	Land west of Barbrook Way, Bicknacre	Bicknacre	Bicknacre and East and West Hanningfield	**GS11c**	20	**20**	0	0	0	0	0	0	4	4	4	4	4	0	0	0	0	0	0	0
H1.8.9	Land north of Abbey Fields, East Hanningfield	East Hanningfield	Bicknacre and East and West Hanningfield	**GS17a**	15	**15**	0	0	0	0	0	0	3	3	3	3	3	0	0	0	0	0	0	0
H1.8.10	Land east of Highfields Mead, East Hanningfield	East Hanningfield	Bicknacre and East and West Hanningfield	**GS17b**	20	**20**	0	0	0	0	0	0	4	4	4	4	4	0	0	0	0	0	0	0

No.	Site Address	Settlement	Ward/ Parish	Allocation	Estimated Total Capacity	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
				1.6 TOTAL	**4080**	**4081**	0	116	600	579	563	233	306	306	306	306	301	93	93	93	93	93	0	0
				1.7 TOTAL	**7842**	**7842**	0	100	425	780	760	685	641	641	641	641	638	378	378	378	378	378	0	0
				1.8 TOTAL	**4469**	**4469**	42	0	36	95	175	180	449	449	449	449	445	246	246	246	246	246	235	235
		WINDFALL ALLOWENCE				**1461**	**0**	**0**	**0**	**73**	**166**	**82**	**40**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table A-5: Proposed development and growth of gypsy, traveler, and travelling show people sites for growth areas 1, 2 and 3

No.	Site Address	Settlement	Ward/ Parish	Allocation	Estimated Total Capacity	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
1.10 GT and travelling showpeople sites																								
Growth Area 1 - Central and Urban Chelmsford																								
H1.10.1	Strategic Sites - West Chelmsford	Chelmsford	Chelmsford	SGS2	5	**5**	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Growth Area 2 - North Chelmsford																								
H1.10.2	North East Chelmsford	Little Waltham	Little Waltham - Broomfield and the Walthams	**SGS6 (including 6a)**	20	**20**	0	0	0	0	0	0	10	0	0	0	0	10	0	0	0	0	0	0
H1.10.3	Great Leighs - Land at Moulsham Hall	Great Leighs	Great and Little Leighs - Boreham and the Leighs	SGS7a	5	**5**	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Growth Area 3 - South and East Chelmsford																								
H1.10.4	North of South Woodham Ferrers	Woodham Ferrers	South Woodham Ferrers - South Woodham, Elmwood & Woodville	SGS10	5	**5**	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
H1.10.5	East Chelmsford Garden Community (Hammonds Farm)	Hammonds Farm	East Chelmsford Garden Community (Hammonds Farm)	**SGS16a**	20	**20**	0	0	0	0	0	0	10	0	0	0	0	10	0	0	0	0	0	0
				TOTAL	**55**	**55**	0	0	0	0	15	0	20	0	0	0	0	20	0	0	0	0	0	0

Table A-6: Proposed development and growth of allocated sites for growth areas 1, 2 and 3

No.	Site Address	Proposal	Settlement	Allocation	Proposed Use Class(es)	Proposed Retail/ Employment Floorspace	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
2.2 Allocations (adopted Local Plan and new spatial strategy)																								
Growth Area 1 - Central and Urban Chelmsford																								
E2.2.1	City centre (proposed employment land)	City Centre (several unconfirmed locations)	Chelmsford	**CC (TBC)**	100% Office space and Research - E(g)(i)/ (ii)	**4000**	267	267	267	267	267	267	267	267	267	267	267	267	267	267	262	0	0	0
E2.2.2	East of Chelmsford - Land North of Maldon Road	?	Chelmsford	SGSP3b	67% Office space and Research - E(g)(i)/ (ii) 33% - Light industrial - E(g)(iii)	**5000**	2500	0	0	0	0	500	500	500	500	500	0	0	0	0	0	0	0	0
E2.2.3	Chelmsford Urban area	ADVANCED MANUFACTURING & INNOVATION DISTRICT, WATERHOUSE LANE EMPLOYMENT AREA	Chelmsford	**SGS 1cc**	50% Office space and Research - E(g)(i)/ (ii) 50% - Light industrial - E(g)(iii)	**43000**	2867	2867	2867	2867	2867	2867	2867	2867	2867	2867	2867	2867	2867	2867	2862	0	0	0
Growth Area 2 - North Chelmsford																								
E2.2.4	NE Chelmsford	Includes Chelmsford Garden Community	Broomfield	SGSP6	45000m2 of employment 40% Warehousing (B8) 30% General industrial (B2) 30% Commercial, business and service € 11946m2 of employment 302m2 - Office space and Research - E(g)(i)/ (ii) 8379m2 - Light industrial - E(g)(iii) 3265m2 - Warehousing (B8)	**56946**	3797	3797	3797	3797	3797	3797	3797	3797	3797	3797	3797	3797	3797	3797	3788	0	0	0
E2.2.5	Boreham	Waltham road employment area (expansion to north of existing site)	Boreham	**SGS 9a**	50% Warehousing (B8) 50% General industrial (B2)	**3500**	234	234	234	234	234	234	234	234	234	234	234	234	234	234	224	0	0	0
E2.2.6	North west chelmsford	Little boyton hall farm rural employment area (expansion to north of existing site)	Chelmsford (rural) - Boyton hall farm	**SGS 15**	50% Warehousing (B8) 50% General industrial (B2)	**6000**	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	0	0	0
Growth Area 3 - South and East Chelmsford																								

No.	Site Address	Proposal	Settlement	Allocation	Proposed Use Class(es)	Proposed Retail/ Employment Floorspace	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
E2.2.7	North of South Woodham Ferrers	?	South Woodham Ferrers	SGSP10	33% Warehousing (B8) 33% General industrial (B2) 34% - Office space and Research - E(g)(i)/ (ii)	**1200**	0	0	0	0	0	240	240	240	240	240	0	0	0	0	0	0	0	0
E2.2.8	South east chelmsford	East chelmsfrod garden community (hammonds farm)	Hammonds farm	**SGS 16a**	67% Office space and Research - E(g)(i)/ (ii) 33% - Light industrial - E(g)(iii)	**43000**	0	0	0	0	0	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	0	0	0
E2.2.9	South east chelmsford	Land adjacent to A12 junction 18	Chelmsford	**SGS 16b**	4669m2 - Office space and Research - E(g)(i)/ (ii) 12777m2 - Light industrial - E(g)(iii) 12777m2 - Warehousing (B8) 12777m2 - General industrial (B2)	**43000**	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	0	0	0	0	0	0	0	0	0

Table A-7: Proposed development and growth of local development framework existing commitments and all other permissions/committed sites

No.	Site Address	Proposal	Settlement	Planning status	Proposed Use Class(es)	Proposed Retail/ Employment Floorspace	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																								
E2.1.1	Greater Beaulieu Park White Hart Lane Springfield Chelmsford	Mixed use development comprising residential development of up to 3,600 dwellings, mixed uses (up to 62,300sqm gross external) comprising employment floorspace including new business park, retail, hotel, leisure, open space, education & community facilities, landscaping, new highways including a radial distributor road, public transport provisions & associated and ancillary development, including full details in respect of roundabout access	Chelmsford	Outline Permission Granted	25% General industrial (B2) 25% Commercial, business and service (E) 25% Warehousing (B8) 25% Office space and Research - E(g)(i)/ (ii)	**62300**	0	0	0	62300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

No.	Site Address	Proposal	Settlement	Planning status	Proposed Use Class(es)	Proposed Retail/ Employment Floorspace	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
		from Essex Regiment Way & a priority junction from White Hart Lane.																						
2.2 All other Permissions/ Committed sites																								
E2.3.1	Land Adjacent Broadacre Vicarage Road Roxwell Chelmsford	Demolition of existing buildings; construction of a workshop and ancillary store building with alterations to landscaping; widening of existing access.	Roxwell	Permission Granted	50% Commercial, business and service (E) 50% Warehousing (B8)	**57**	0	0	57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.2	Vision IT Recruitment Ltd, The Out Post, Chelwater, Great Baddow, Chelmsford	Proposed replacement building to form meeting room / quiet working area with security gate	Chelmsford	Permission Granted	Office space and Research - E(g)(i)/ (ii)	**15**	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.3	Oak Tree Farm Burnham Road Battlesbridge Wickford	Change of use from agricultural buildings to B1 (business) with associated external works.	Rettendon Place	Permission granted	Commercial, business and service (E)	**200**	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.4	51 And 53 High Street Great Baddow Chelmsford	Change of use of garage to office (class e) and the creation of first floor office space with 9 new roof windows. Raising of the roof height. Alterations and additions to the fenestration.	Chelmsford	Permission Granted	Commercial, business and service (E)	**158**	158	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.5	Land East Of 1 To 5 Eagle Way Little Waltham Chelmsford	Application for the approval of reserved matters (appearance, layout and scale) in relation to outline application 20/00071/OUT (general industry (b2) and storage and distribution (b8), associated servicing and landscaping - all matters reserved except access) for four light industrial warehouse units (E(g)(iii)).	Broomfield	Permission Granted	50% Commercial, business and service (E) 50% General industrial (B2)	**8838**	0	8838	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

No.	Site Address	Proposal	Settlement	Planning status	Proposed Use Class(es)	Proposed Retail/ Employment Floorspace	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
E2.3.6	The Reserve Forces And Cadet Association 250 Springfield Road Chelmsford	Construction of new detached single storey building and single storey extension to existing building.	Chelmsford	Permission Granted	Commercial, business and service (E)	**244**	244	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.7	Land North West Of Churchgate House Rectory Lane Battlesbridge Wickford Essex	Single storey extension, alterations to access into the building including access ramp, internal alterations to building, use of building as a cafe, creation of a raised decking area to the rear of the building.	Rettendon Place	Permission Granted	Commercial, business and service (E)	**18**	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.8	Chelmsford Safety Supplies 21 Robjohns Road Chelmsford Essex	Single storey side extension and enclosure of area to rear below existing canopy.	Chelmsford	Permission Granted	Warehousing (B8)	**248**	248	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.9	Meadowcroft Nursery Woodham Road Battlesbridge Wickford Essex	Demolition of existing glasshouse. Extension to existing building to provide relocated garden centre restaurant. Revised parking arrangements to accomodate 54 additional vehicles.	Rettendon Place	Permission Granted	Commercial, business and service (E)	**497**	0	497	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.10	The Black Bull Main Road Margaretting Ingatestone Essex	Single-storey rear orangey and formalisation of the overflow car park	Margaretting	Permission Granted	Commercial, business and service (E)	**35**	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.11	Priory Pet & Country Stores Horseshoe Farm Main Road Bicknacre Chelmsford Essex	Demolition of existing building. Construction of new building for retail and office uses (Class E use), with associated parking and landscaping. Formation of access.	South Woodham Ferrers	Permission Granted	Commercial, business and service (E)	**397**	0	397	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.12	The Co-Operative Boreham Village Store Main Road Boreham Chelmsford Essex	Demolition of rear storage building. Construction of extension at rear and to create a first floor, extending store/cafe and utilising the first floor for 5 two bed flats and associated parking. Renewal of permission 17/00240/FUL	Boreham	Permission Granted	Commercial, business and service (E)	**142**	142	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

No.	Site Address	Proposal	Settlement	Planning status	Proposed Use Class(es)	Proposed Retail/ Employment Floorspace	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
E2.3.13	Temple Wood Industrial Estate Stock Road West Hanningfield Chelmsford	Demolition of existing buildings. Construction of new office building with a trade counter.	West Hanningfield	Permission Granted	Warehousing (B8)	**120**	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.14	Land East Of 1 To 5 Eagle Way Little Waltham Chelmsford	Variation of condition 2 to approved permission 20/00071/FUL - (Hybrid application, part full and part outline comprising: (i) Retail foodstore (A1), retail/cafe units, including drive thru (A1, A3, A5), associated parking, servicing and landscaping (full). (ii) General industry (B2) and storage and distribution (B8), associated servicing and landscaping, outline - all matters reserved except access). Construction of a garden centre that is ancillary to the approved foodstore.	Broomfield	Permission Granted	50% Commercial, business and service (E) 50% General industrial (B2)	**24**	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.15	27 Springfield Lyons Approach Springfield Chelmsford	Change of use of office (Class Use E(c)(iii)) to a medical clinic (Class Use E(e)) (with overnight capacity). Construction of two storey side extension and addition of single storey building to rear.	Chelmsford	Permission Granted	Commercial, business and service (E)	**174**	174	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.16	Superdrug Stores Plc 17 - 18 High Street Chelmsford	Subdivision of rear to create new shop units with associated internal works and 3 storey infill rear extension. Repositioned service ramp. New fire escape arrangements to include mall level exit and rooftop enclosure. Additional and amended fenestration.	Chelmsford	Permission Granted	Commercial, business and service (E)	**66**	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.17	Lidl Stores 2 Waterson Vale Chelmsford Essex	Construction of an extension to the existing store building and combining of the two existing retail units to form a single	Chelmsford	Permission Granted	Commercial, business and service (E)	**292**	292	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

No.	Site Address	Proposal	Settlement	Planning status	Proposed Use Class(es)	Proposed Retail/ Employment Floorspace	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
		retail unit. Alterations to the existing car park and and other associated works.																						
E2.3.18	32 - 33 New Street Chelmsford	Part single, part two storey side and rear extension and formation of two self contained flats at first floor level. Addition of obscured glazed windows to first floor side elevations.	Chelmsford	Permission Granted	Commercial, business and service (E)	**27**	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.19	Land North West Of Boreham Interchange Chelmer Road Boreham Chelmsford Essex	Application for the approval of Reserved Matters pursuant to Condition 7 of Planning Permission Reference 10/00021/EIA, for Beaulieu Park Station and associated development and for the discharge of Conditions 8, 9, 10, 11, 12, 13 and 14.	Boreham	Permission Granted	Commercial, business and service (E)	**183**	0	0	183	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.20	81 Springfield Road Chelmsford	Two storey extension to existing office building, alterations to existing roof and external refurbishment	Chelmsford	Permission Granted	Commercial, business and service (E)	**159**	159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.21	Site At The Atlantic Hotel New Street Chelmsford	Construction of a five storey extension to existing hotel to create 2 ground floor retail units and 10 residential apartments, with associated soft landscaping and parking.	Chelmsford	Permission Granted	Commercial, business and service (E)	**127**	0	127	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.22	Riverside Retail Park 33 - 39 Victoria Road Chelmsford	Addition of a mezzanine floor within the existing retail unit.	Chelmsford	Permission Granted	Commercial, business and service (E)	**1202**	1202	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.23	Land South Of Junction With Hopping Jacks Lane And Twitty Fee Danbury Chelmsford Essex	Determination as to whether the prior approval of the local planning authority is required for the proposed change of use from agricultural buildings to (Class B8) storage and distribution with ancillary office and staff facilities.	Danbury	Prior approval required - approved	Warehousing (B8)	**448**	448	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

No.	Site Address	Proposal	Settlement	Planning status	Proposed Use Class(es)	Proposed Retail/ Employment Floorspace	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
E2.3.24	War Memorial North East Of Whitehouse Farm Main Road Rettendon Chelmsford Essex	Construction of 2 wooden framed buildings for archive storage.	Rettendon Place	Permission Granted	Warehousing (B8)	**53**	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.25	Essex Healthcare Park West Hanningfield Road Great Baddow Chelmsford	Construction of a two storey healthcare building	Chelmsford	Permission Granted	Commercial, business and service (E)	**780**	0	780	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.26	109 Rainsford Road Chelmsford	Construction of a temporary car showroom for a period of 5 years.	Chelmsford	Permission Granted	Commercial, business and service (E)	**150**	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.27	Essex Police Small Workshop and Storage Hangar Waltham Road Boreham Chelmsford	Construction of a locker room and additional room and storage facility.	Boreham	Permission Granted	Warehousing (B8)	**260**	0	260	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.28	Age UK Unit 1 The Old Coal Yard Little Waltham Road Broomfield Chelmsford	Single-storey side extension and addition of rooflights. Amendment to hours of use to include out of business hours and emergency animal care.	Broomfield	Permission Granted	Commercial, business and service (E)	**13**	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.29	2 Queens Road Chelmsford	Change of use at ground floor from C3 residential to Class E(a) retail unit with internal alterations, maintain Class C3 residential to first floor with internal alterations to form 1 bedroom flat.	Chelmsford	Permission Granted	Commercial, business and service (E)	**49**	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.30	Essex County Laundries Ltd 31-31A Robjohns Road Chelmsford	Extension to east elevation. Alterations to existing ridge line of two mono-pitched roofs to provide 3 gantries.	Chelmsford	Permission Granted	Commercial, business and service (E)	**229**	0	229	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.31	1 Buckingham Court Springfield Chelmsford	Roof extension to create additional office floor space and terrace area. Replacement doors and windows to entrance.	Chelmsford	Permission Granted	Commercial, business and service (E)	**90**	0	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.32	Land Rear Of 14 To 16 Torquay Road Chelmsford	Construction of two storey building comprising commercial development (Use class E(g)) (Office/light	Chelmsford	Permission granted	Commercial, business and service (E)	**158**	0	0	158	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

No.	Site Address	Proposal	Settlement	Planning status	Proposed Use Class(es)	Proposed Retail/ Employment Floorspace	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
		industrial/research and development)																						
E2.3.33	Pipers Farm Mill Road Good Easter Chelmsford	Demolition of 1 x existing redundant building and part-retrospective change of use of 3 x redundant piggery sheds to use class b8 (storage and distribution).	Good Easter	Permission granted	Warehousing (B8)	**580**	580	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.34	Land Adjacent Homelands Retail Park Cuton Hall Lane Springfield Chelmsford	Construction of a new building for use as a coffee shop (Class E) with associated drive-thru, landscaping, car parking and access works.	Chelmsford	Permission granted	Commercial, business and service (E)	**168**	0	0	168	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.35	Radley Green Farm Radley Freen Road Roxwell Chelmsford	Change of use of the agricultural workshop building to commercial workshop (use class e- light industrial).	Roxwell	Permission granted	General industrial (B2)	**486**	0	0	486	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.36	Radley Green Farm Radley Freen Road Roxwell Chelmsford	Demolition of existing commercial and farm buildings and erection of a replacement commercial building and farm building to be occupied by Class E, Class B8 and farming uses.	Roxwell	Permission granted	Warehousing (B8)	**206**	0	0	206	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.37	Radley Green Farm Radley Freen Road Roxwell Chelmsford	Proposed change of use of agricultural building to commercial use class E - light industrial	Roxwell	Permission granted	General industrial (B2)	**121**	0	0	121	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E2.3.38	24 Duke Street Chelmsford	Demolition of existing building and erection of mixed use development comprising 118 residential units and 1 x commercial unit, together with parking, public realm and footpath improvements (Amendments to planning permission 14/01692/FUL).	Chelmsford	Permission granted	Commercial, business and service (E)	**304**	0	0	304	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A-8: Proposed development and growth of educational facilities in growth areas 1,2, and 3

No.	Location	Settlement	Allocation		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
Growth Area 1 - Central and Urban Chelmsford																						
ED1.1.1	Land off Langton Avenue, formerly St Peter's College and playing fields	Chelmsford	SGS1b		2 SEN schools																	
ED1.1.2	Land to the west of Chelmsford and north of Roxwell Road	Chelmsford	SGS2		1 Primary school with nursery/early years																	
ED1.1.3	Land to the west of Chelmsford and north of Roxwell Road	Chelmsford	SGS2		1 Nursery																	
ED1.1.4	Land to the north of Maldon Road	Chelmsford	SGSP3b							1 Nursery												
Growth Area 2 - North Chelmsford																						
ED1.1.5	Chelmsford Garden Community (North East Chelmsford) Land to the north-east of Chelmsford beyond the existing developments at Beaulieu and Channels including the former Boreham Airfield	Chelmsford	SGS6 & 6a								Through school 1 Primary and secondary school with sixth form and nursery/early years											
ED1.1.6	Chelmsford Garden Community (North East Chelmsford) Land to the north-east of Chelmsford beyond the existing developments at Beaulieu and Channels including the former Boreham Airfield	Chelmsford	SGS6 & 6a				1 Primary school with nursery/early years					1 Primary school with nursery/early years									1 Primary school with nursery/early years	

No.	Location	Settlement	Allocation		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
ED1.1.7	Chelmsford Garden Community (North East Chelmsford) Land to the north-east of Chelmsford beyond the existing developments at Beaulieu and Channels including the former Boreham Airfield	Chelmsford	SGS6				1 Nursery										1 Nursery					
ED1.1.8	Land to the west of the Key Service Settlement of Great Leighs Site 7a: Great Leighs – Land at Moulsham Hall and Site 7c	Great Leighs	SGS7a and SGS7c		1 Primary school with nursery/early years																	
ED1.1.9	Land to the north of Woodhouse Lane and west of Blasford Hill,	Broomfield	SGS8		1 Nursery																	
Growth Area 3 - South and East Chelmsford																						
ED1.1.10	Land to the north of Burnham Road (B1012) and east and west of the B1418,	South Woodham Ferrers	SGS10					1 Primary school with nursery/early years 1 Nursery															
ED1.1.11	East Chelmsford Garden Community (Hammonds Farm)	Hammonds farm	**SGS 16a**								1 Primary school with nursery/early years 1 standalone Early Years and Childcare Nursery			Through school 1 Primary and secondary school with sixth form and nursery/early years					1 Primary school with nursery/early years			

Appendix B

Proposed development and growth – Spatial distribution of sites

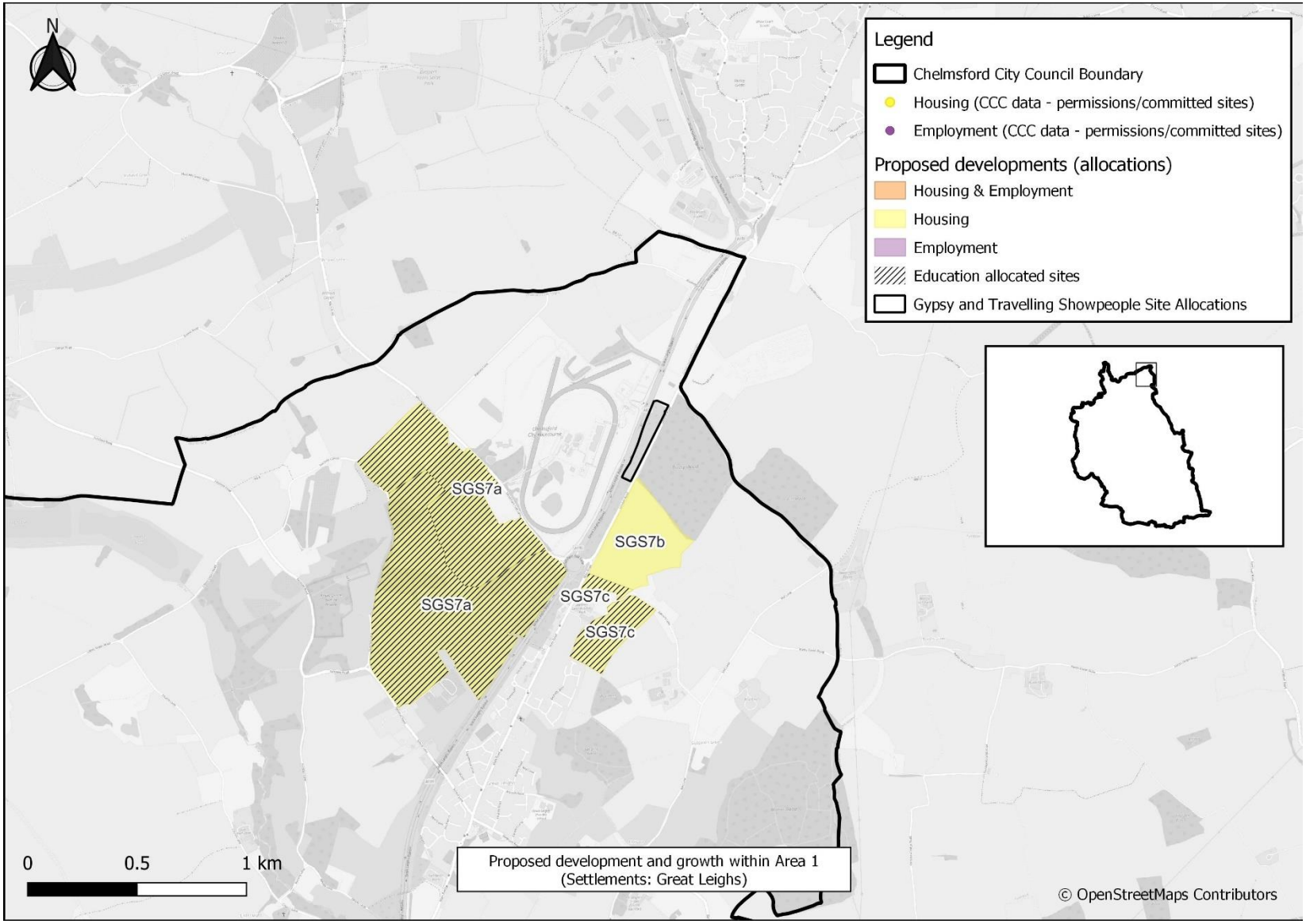


Figure B-1: Proposed development and growth within area 1 (Settlements: Great Leighs)

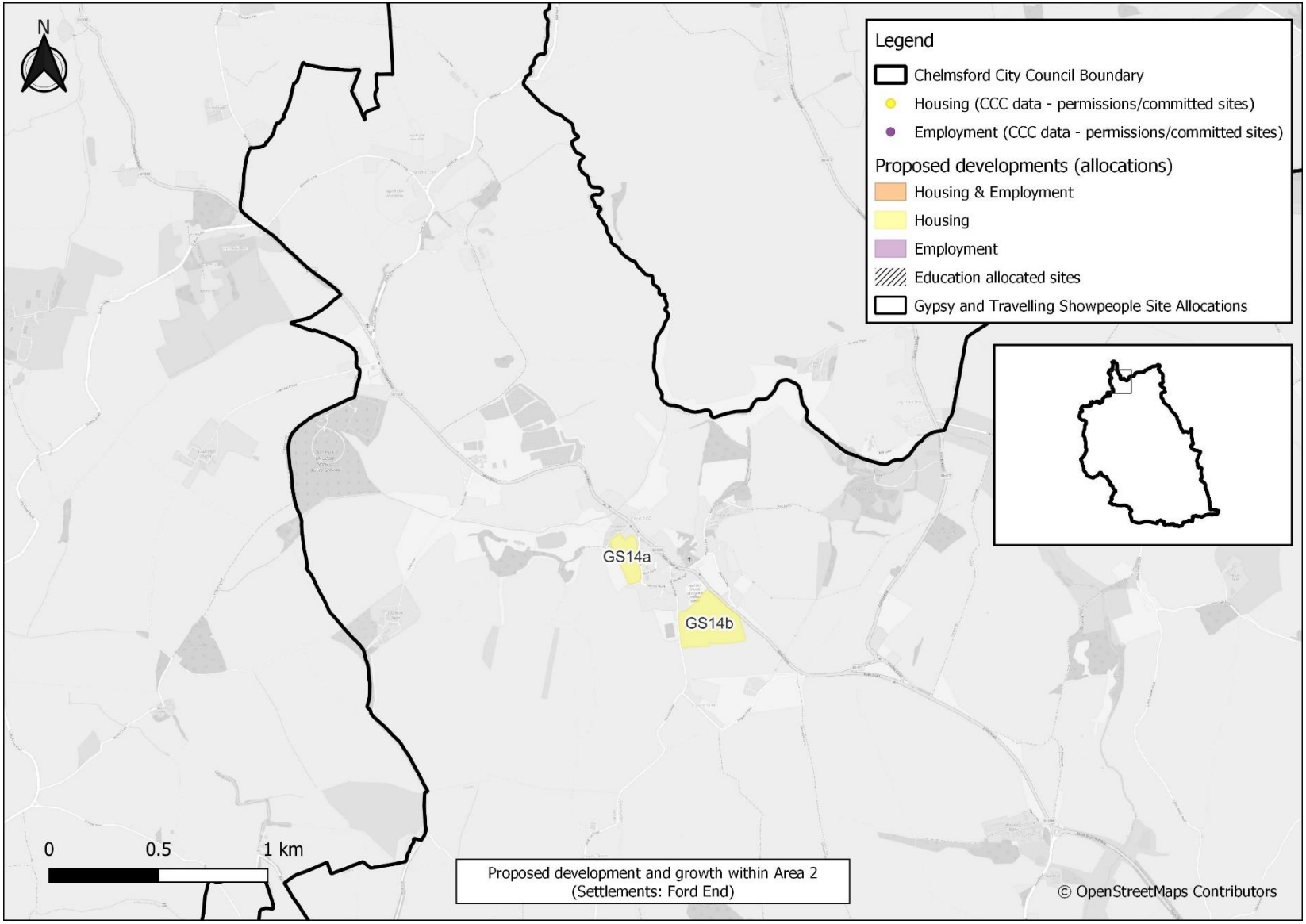


Figure B-2: Proposed development and growth within area 2 (Settlements: Ford End)

Figure B-3: Proposed development and growth within area 3 (Settlements: Chatham Green)

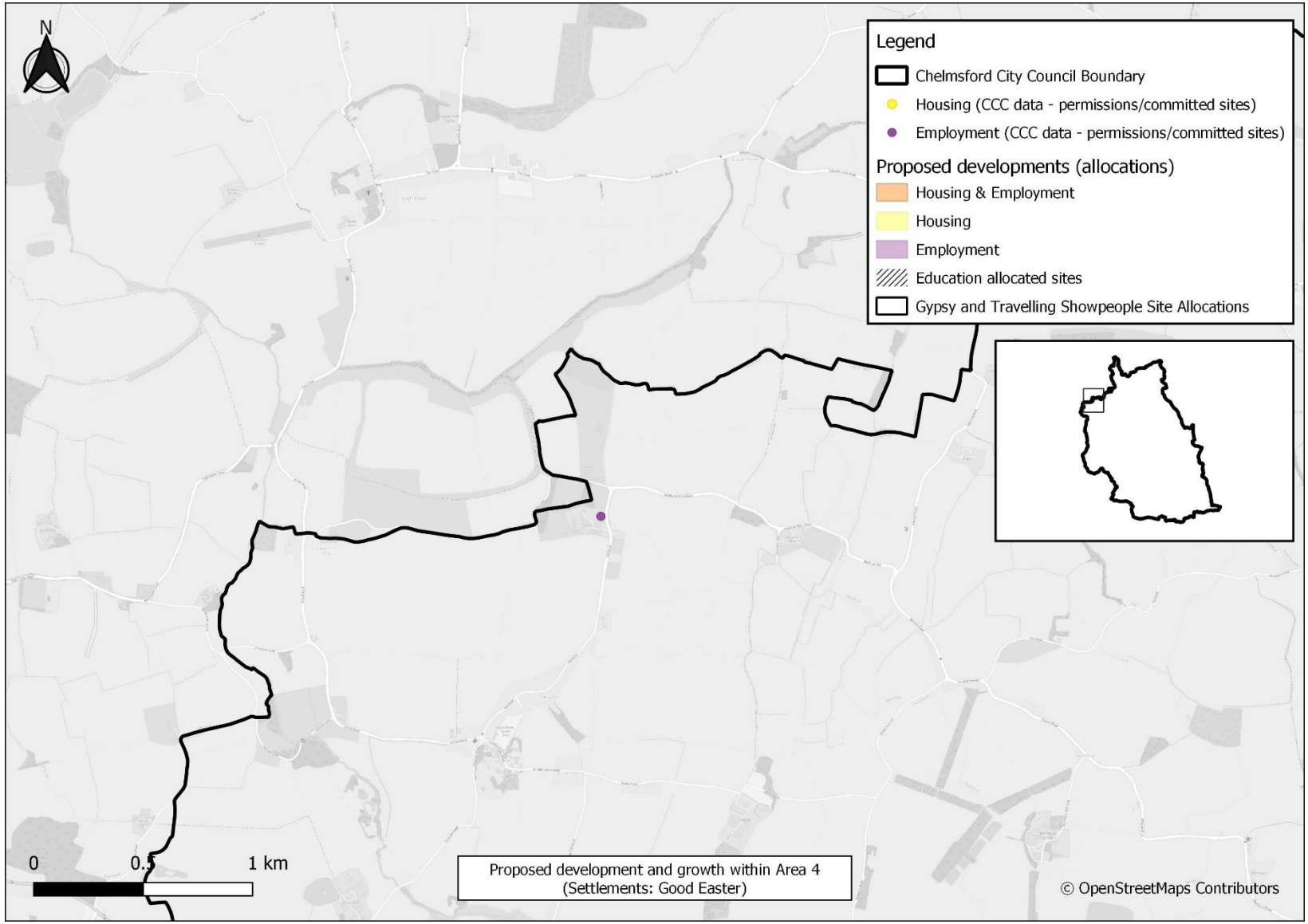


Figure B-4: Proposed development and growth within area 4 (Settlements: Good Easter)

Figure B-5: Proposed development and growth within area 5 (Settlements: Roxwell)

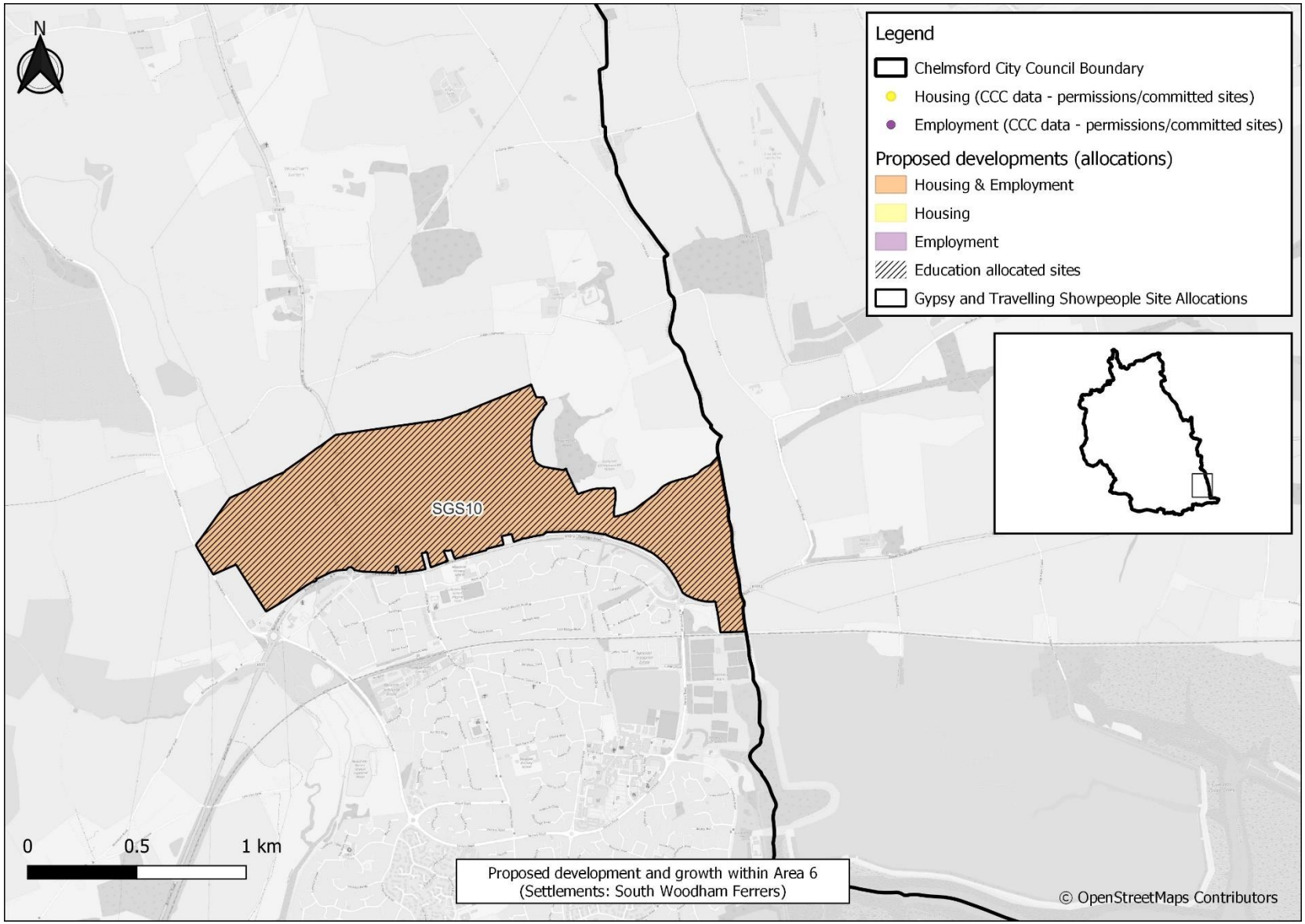


Figure B-6: Proposed development and growth within area 6 (Settlements: South Woodham Ferrers)

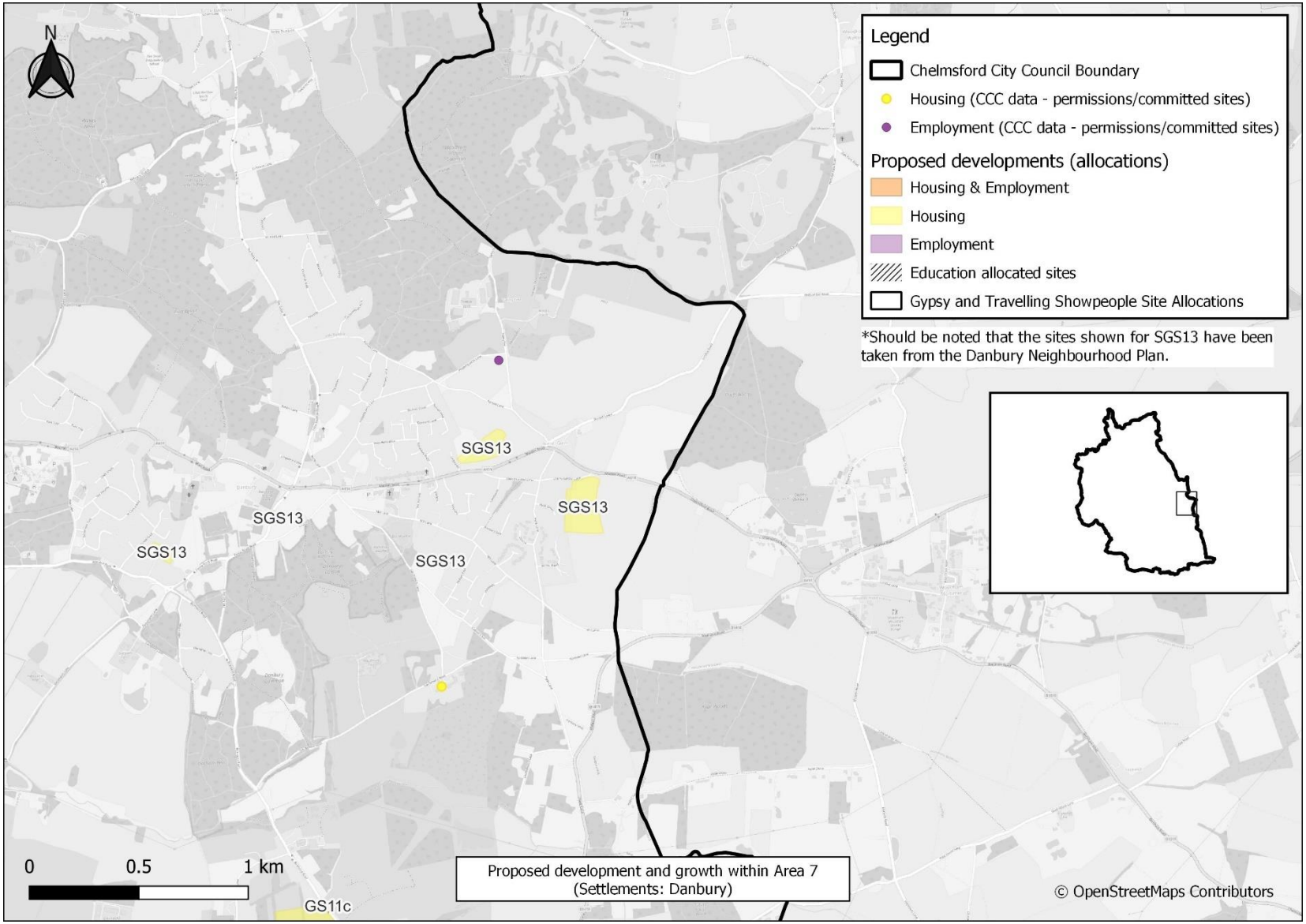


Figure B-7: Proposed development and growth within area 7 (Settlements: Danbury)

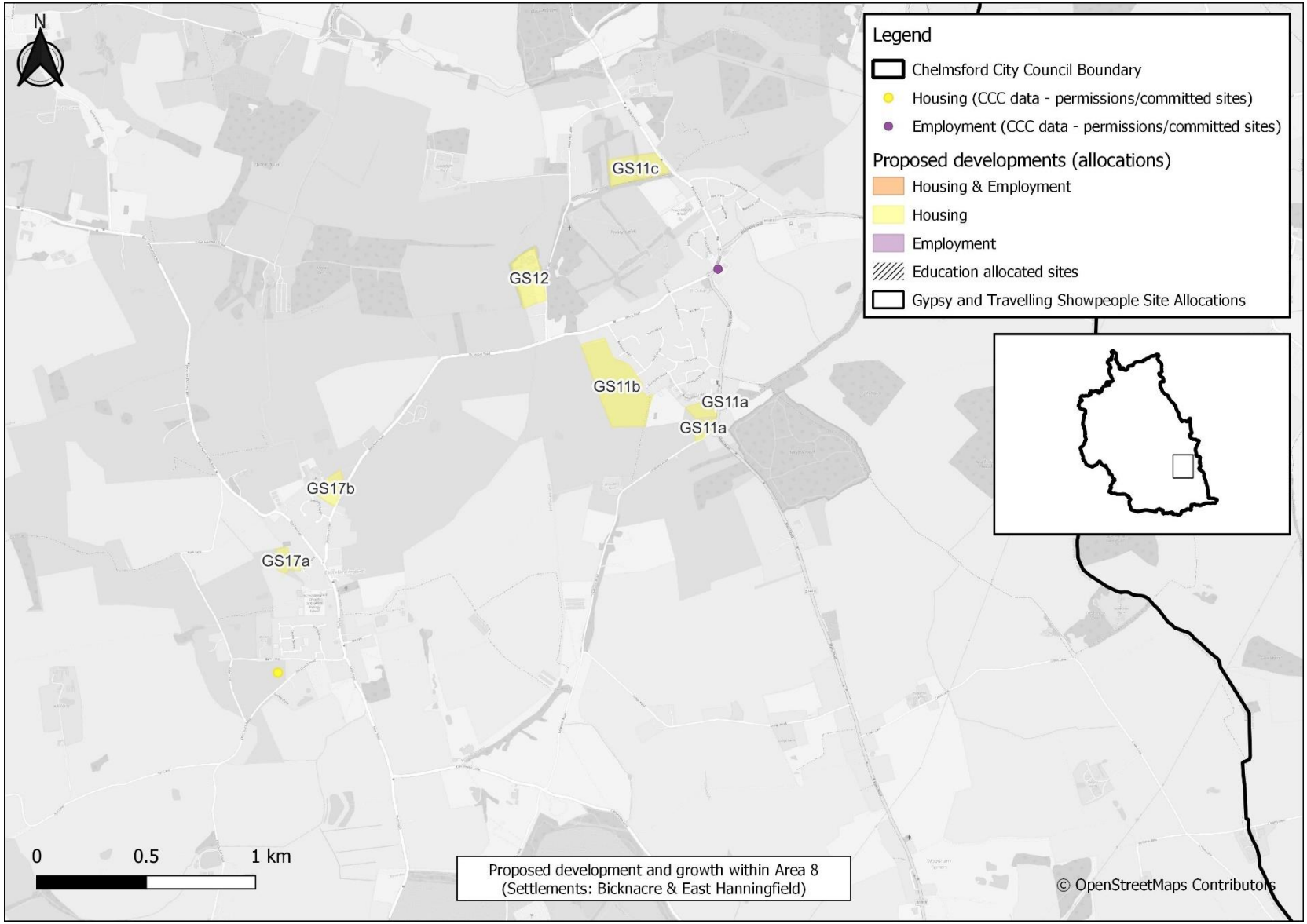


Figure B-8: Proposed development and growth within area 8 (Settlements: Bicknacre & East Hanningfield)

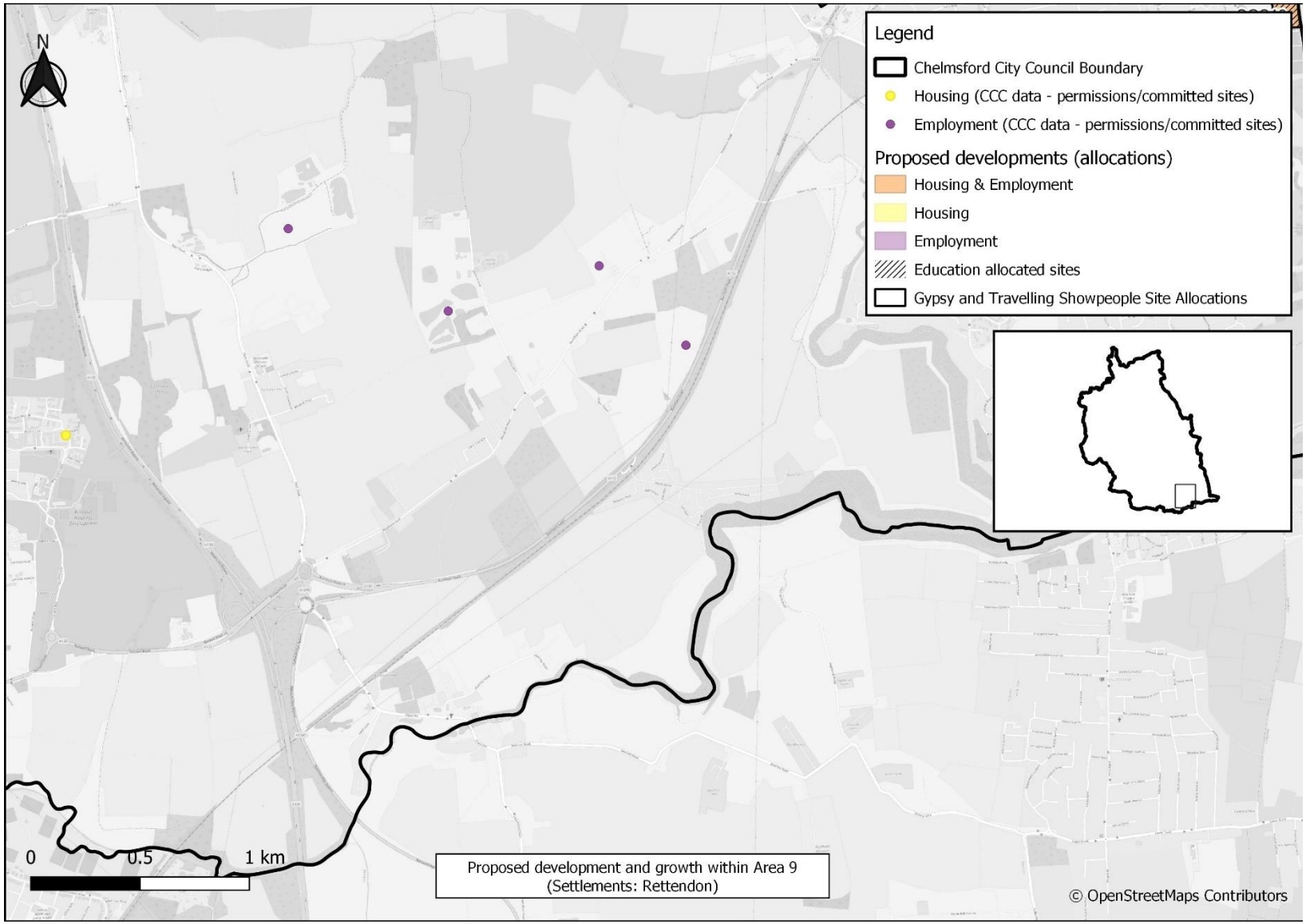


Figure B-9: Proposed development and growth within area 9 (Settlements: Rettendon)

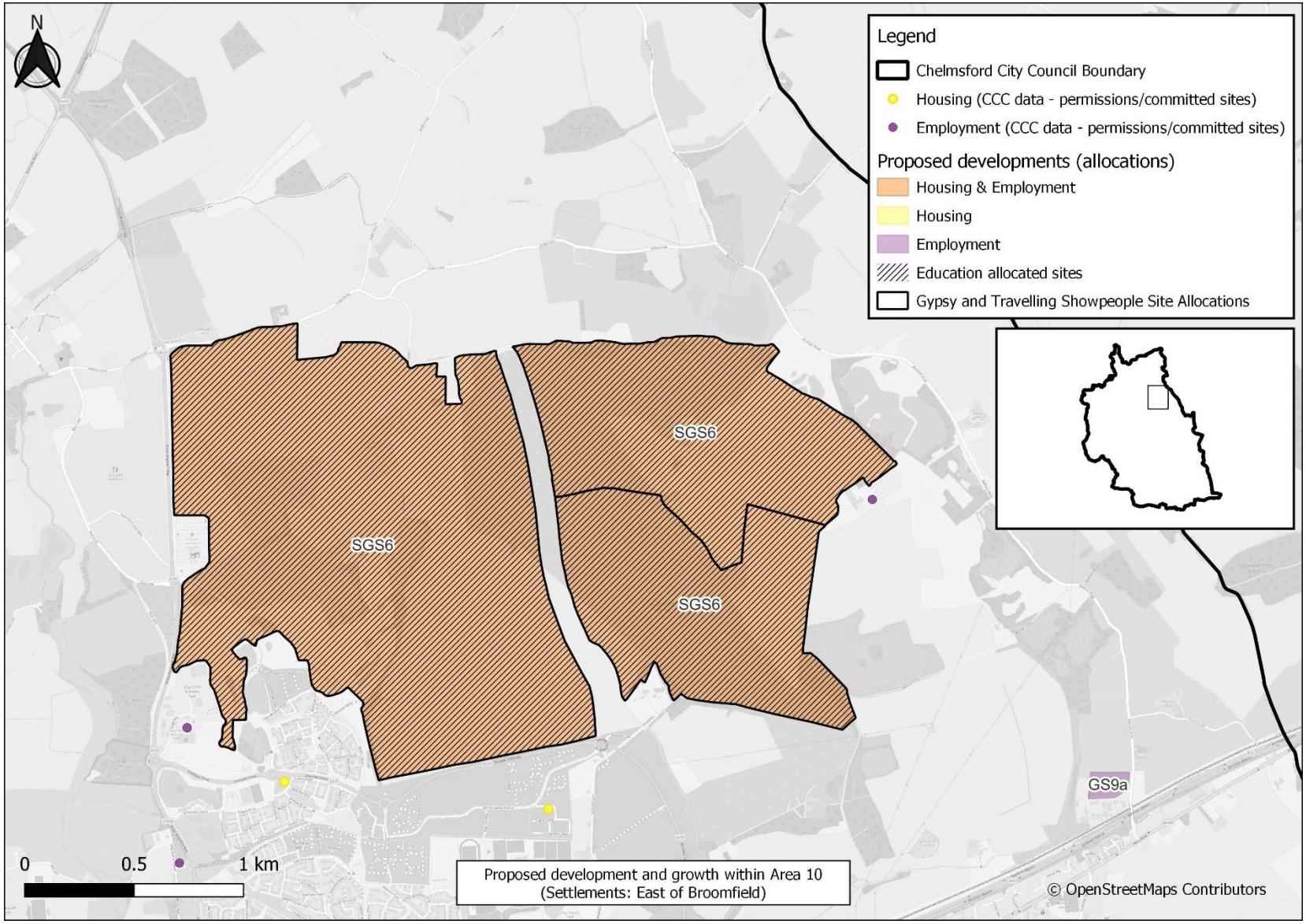


Figure B-10: Proposed development and growth within area 10 (Settlements: East of Broomfield)

Figure B-11: Proposed development and growth within area 11 (Settlements: Radley Green)

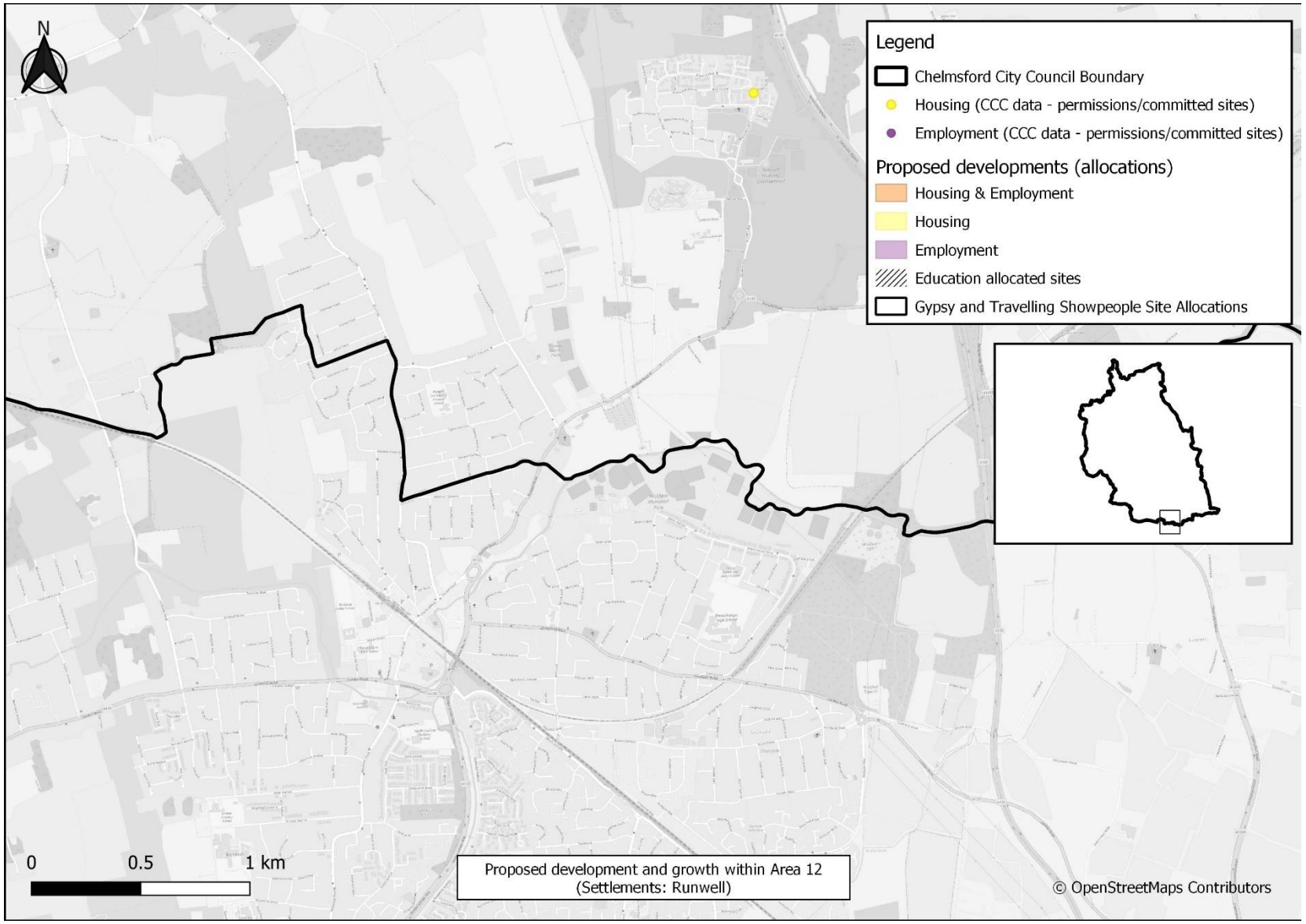


Figure B-12: Proposed development and growth within area 12 (Settlements: Runwell)

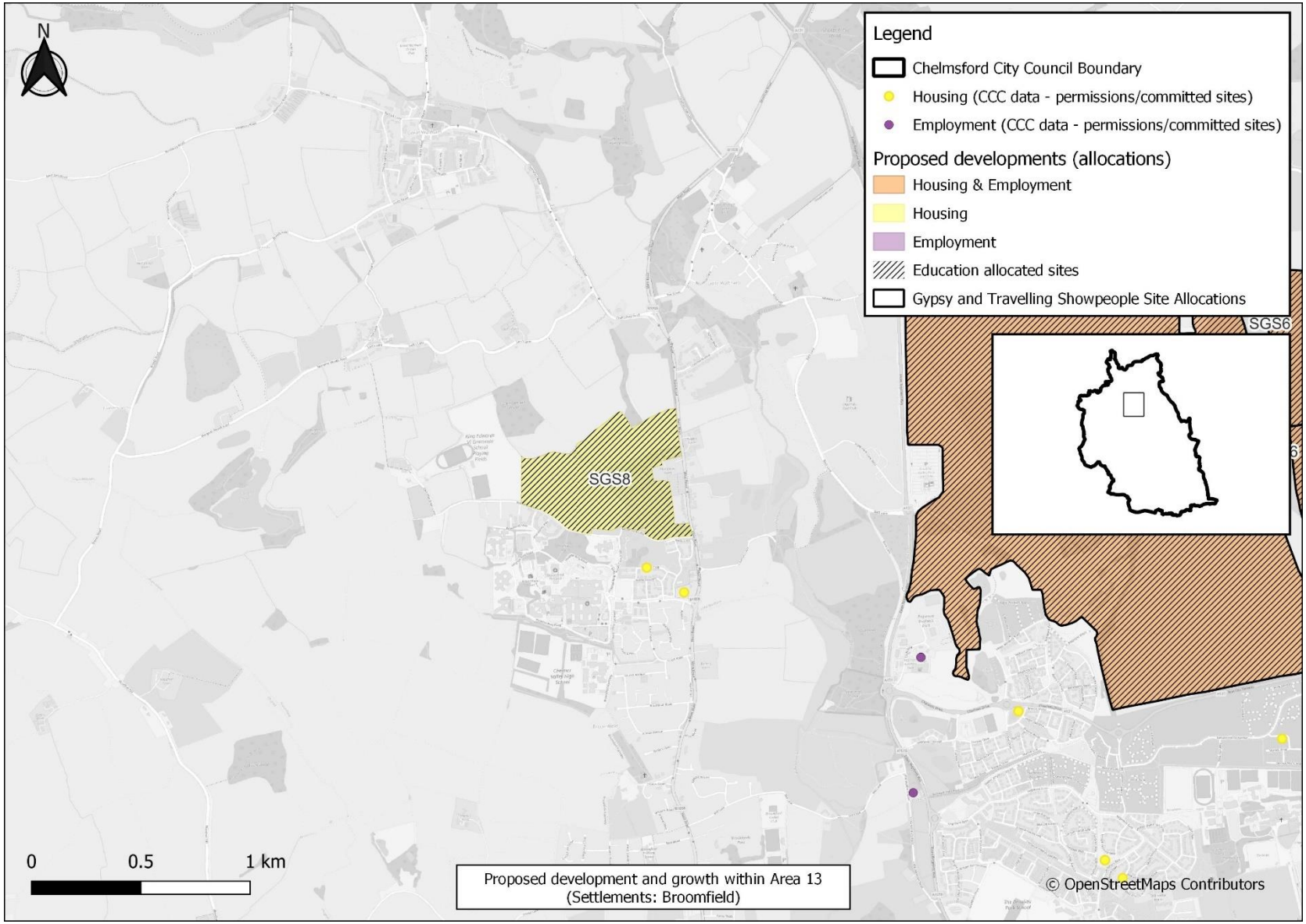


Figure B-13: Proposed development and growth within area 13 (Settlements: Broomfield)

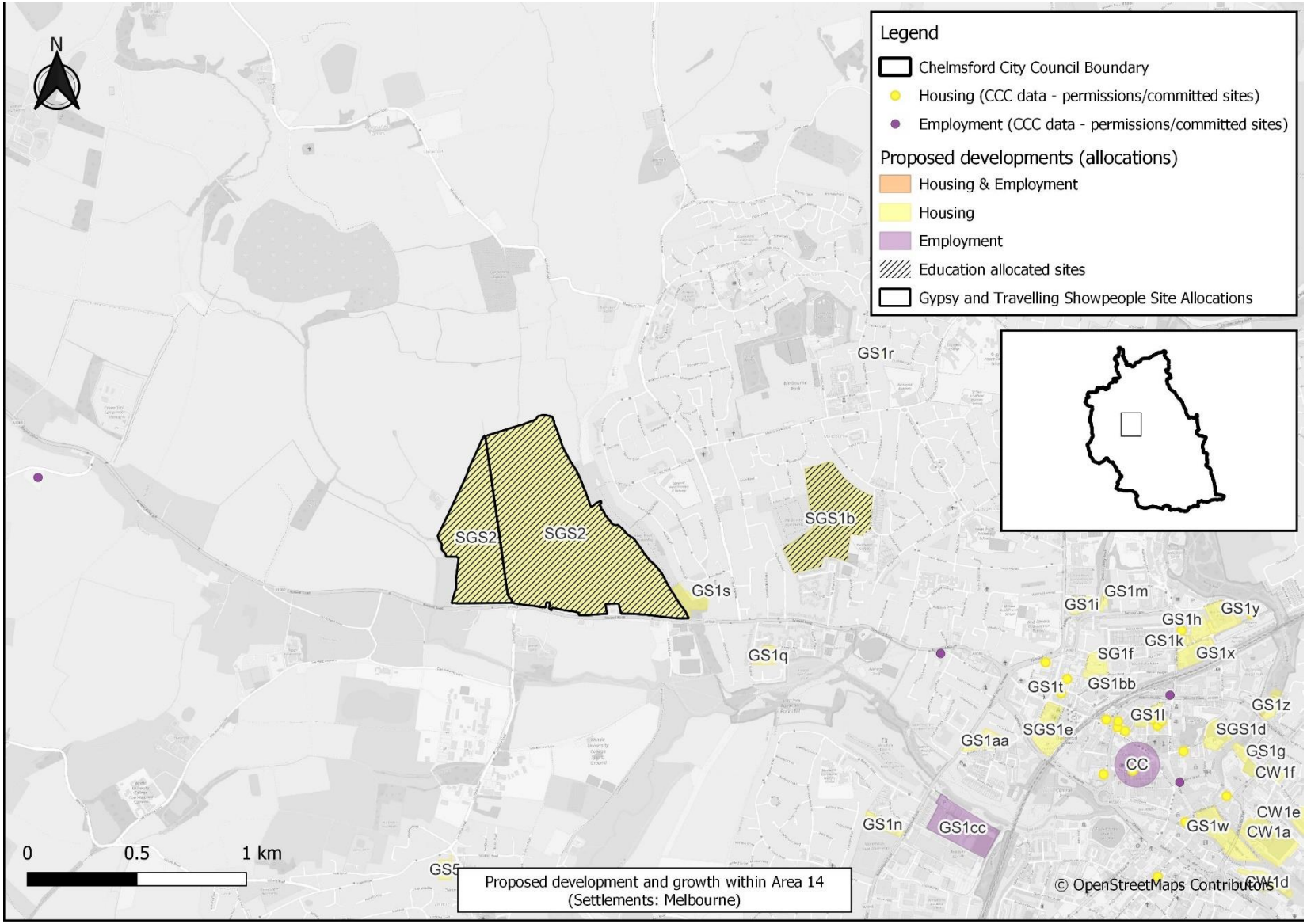


Figure B-14: Proposed development and growth within area 14 (Settlements: Melbourne)

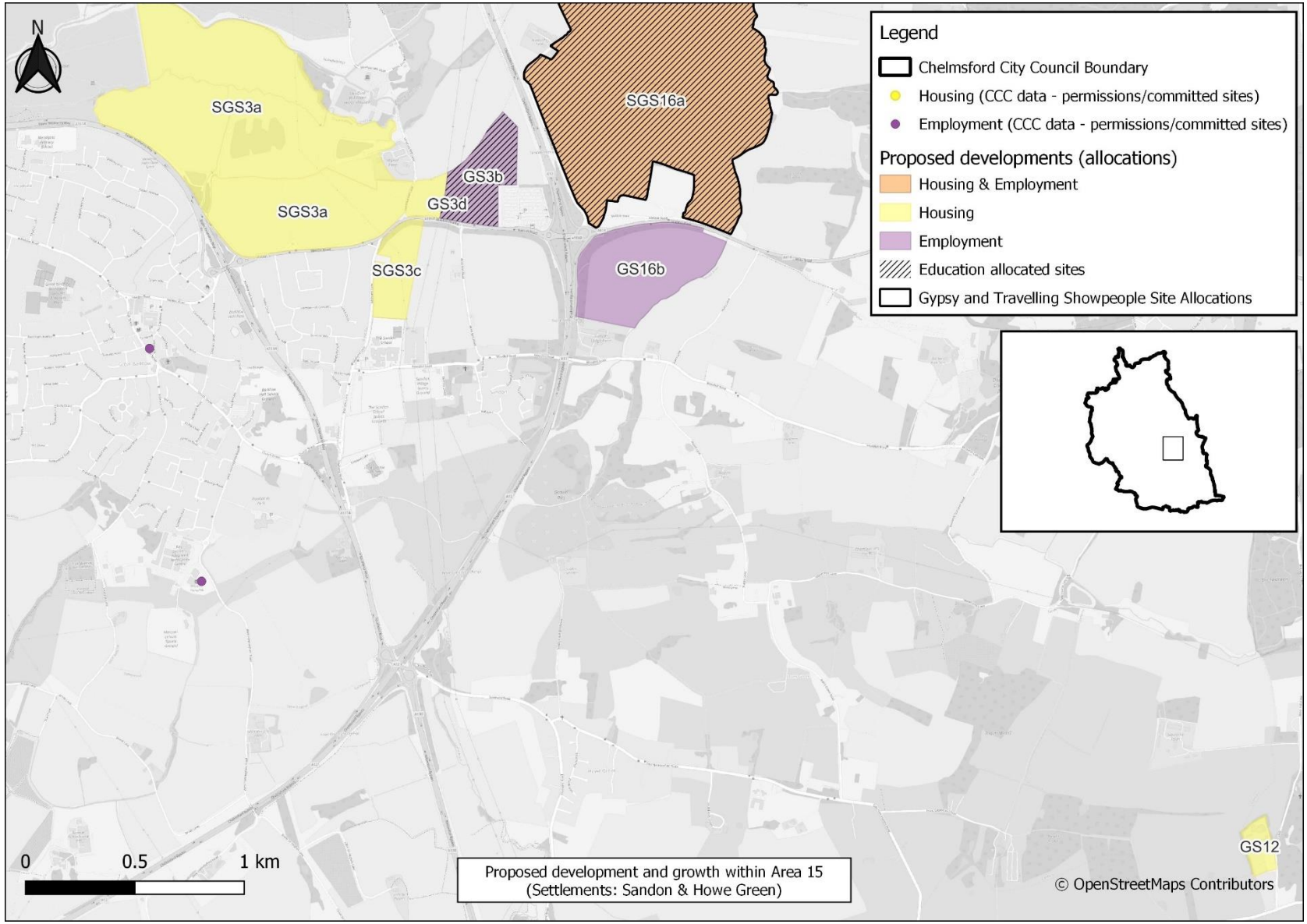


Figure B-15: Proposed development and growth within area 15 (Settlements: Sandon & Howe Green)

Figure B-16: Proposed development and growth within area 16 (Settlements: Temple Wood)

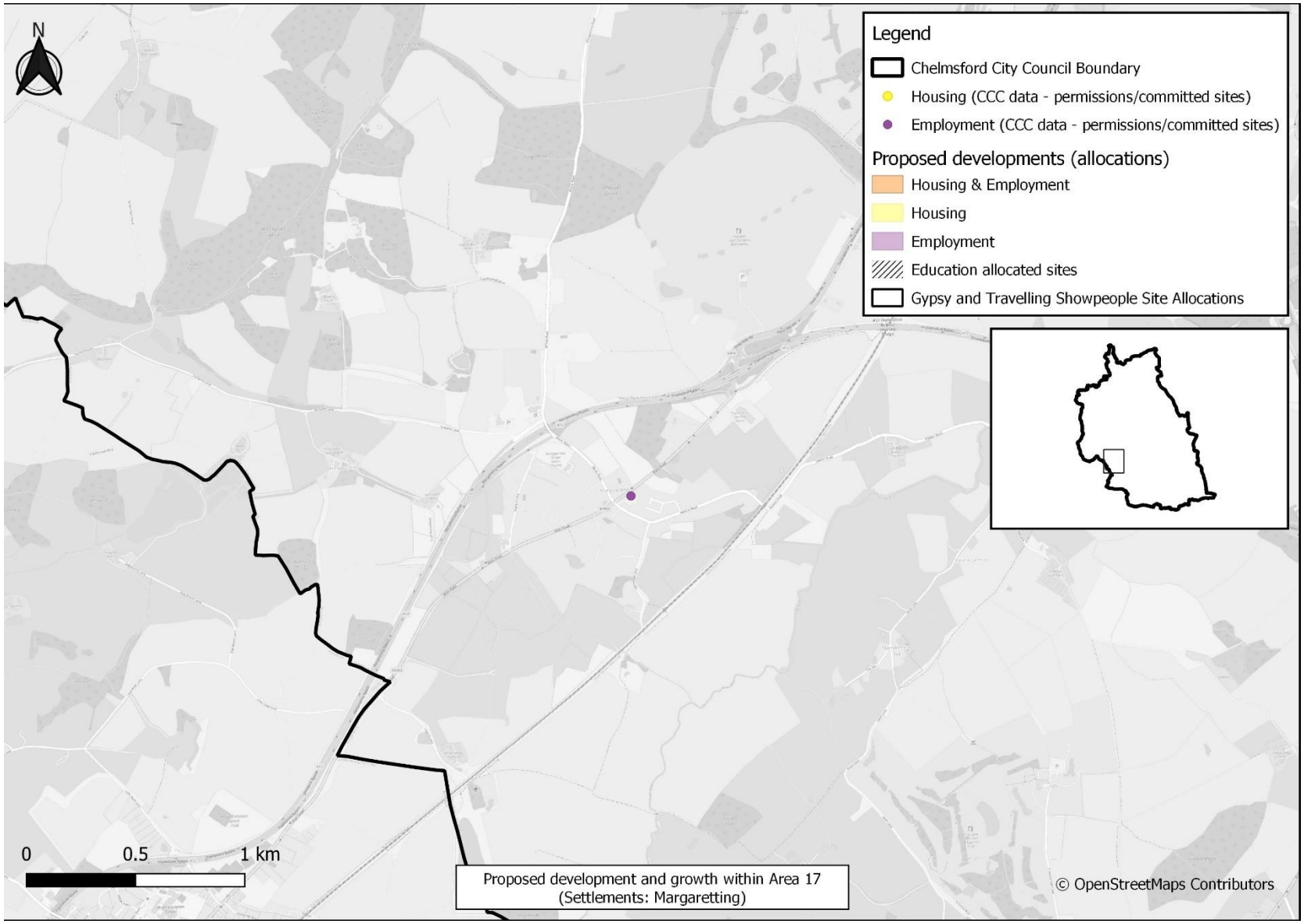


Figure B-17: Proposed development and growth within area 17 (Settlements: Margaretting)

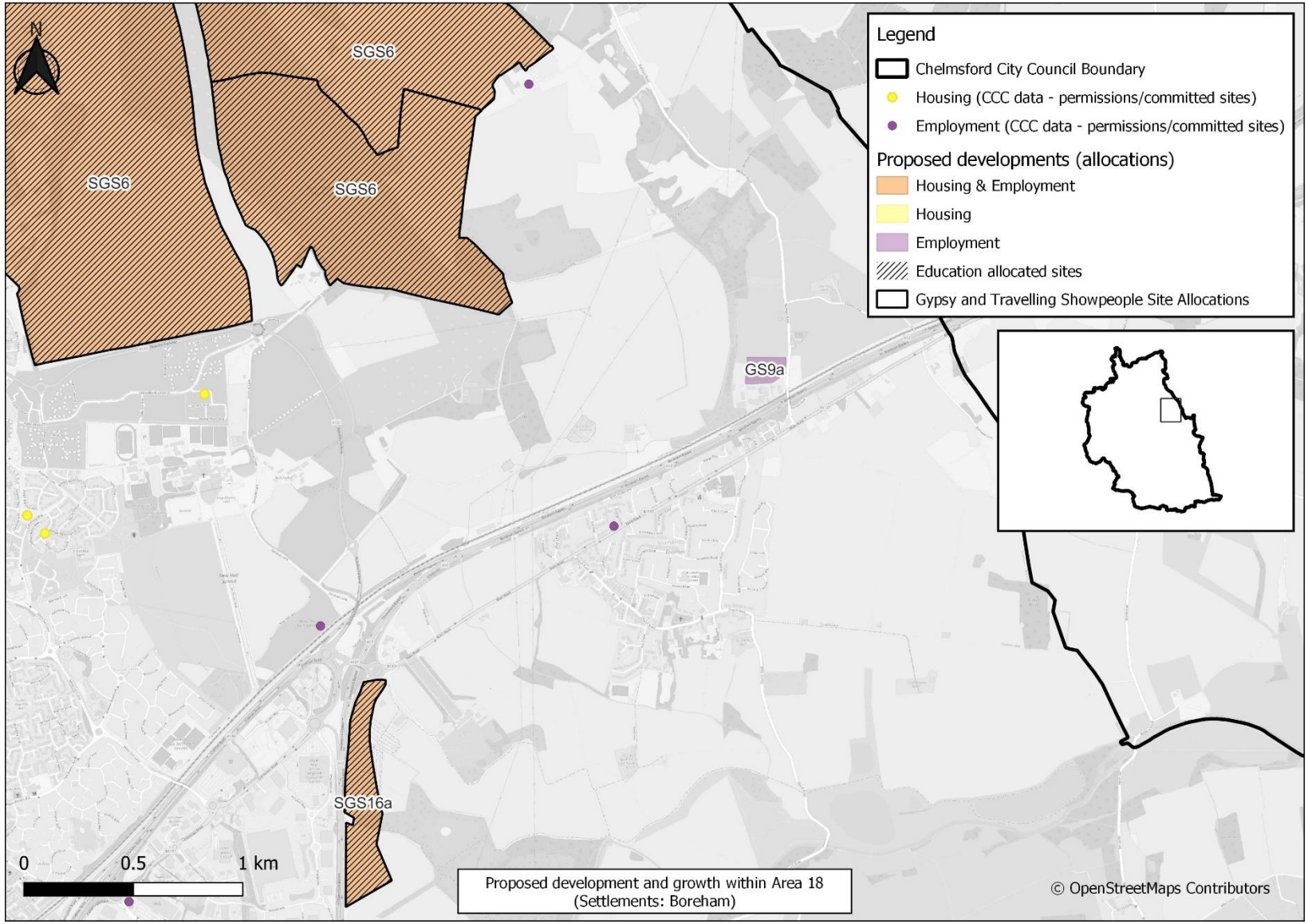


Figure B-18: Proposed development and growth within area 18 (Settlements: Boreham)

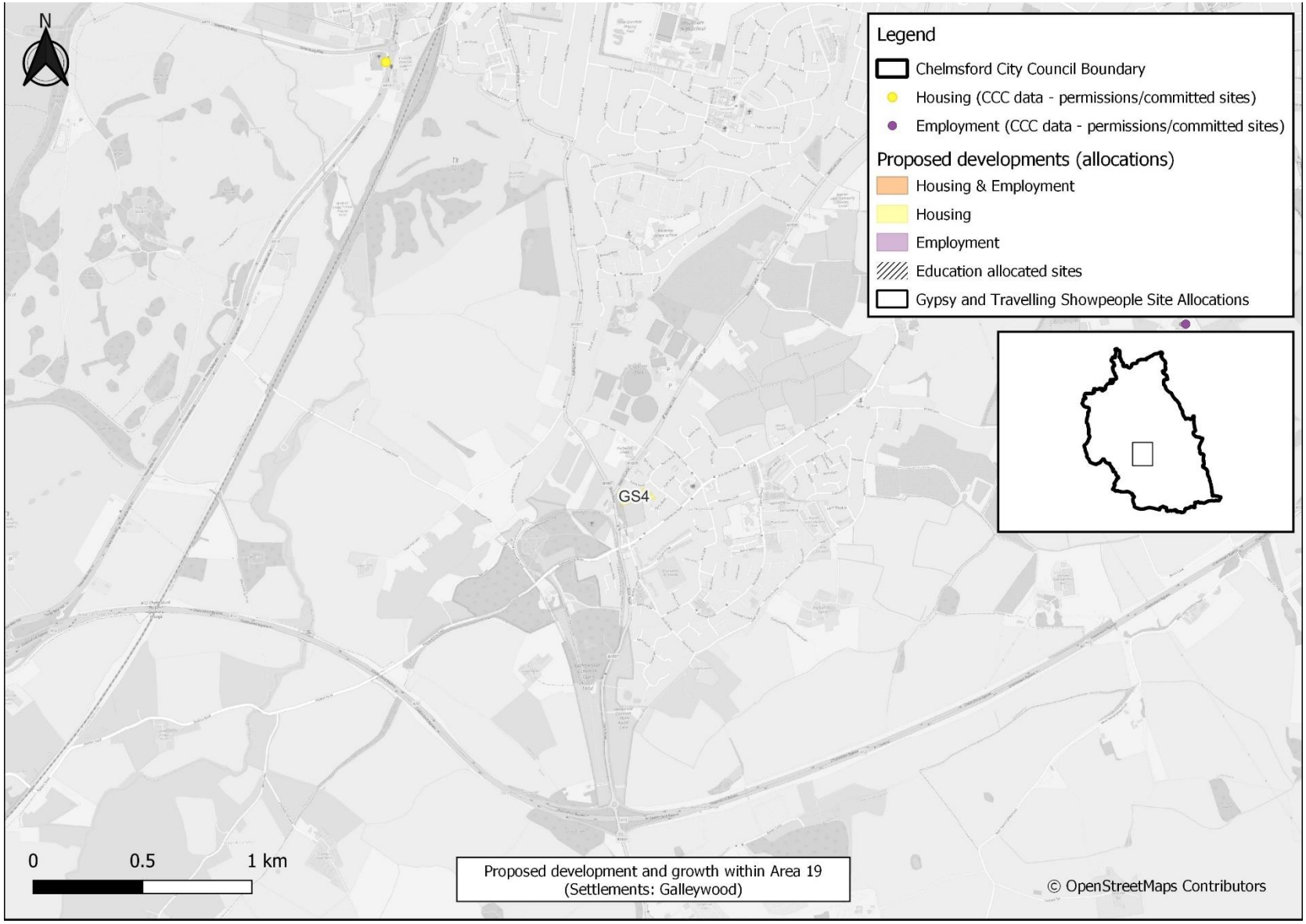


Figure B-19: Proposed development and growth within area 19 (Settlements: Galleywood)

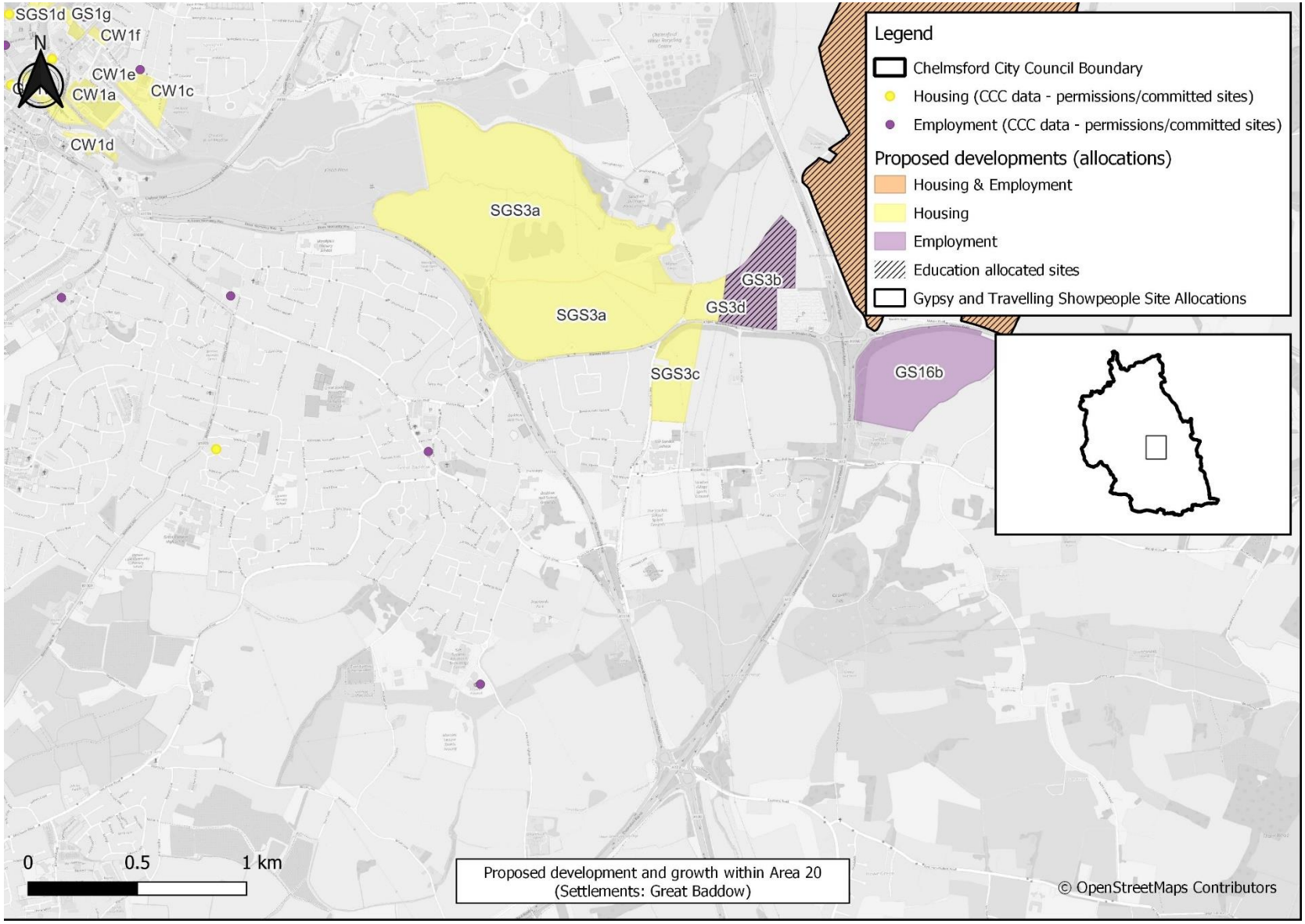


Figure B-20: Proposed development and growth within area 20 (Settlements: Great Baddow)

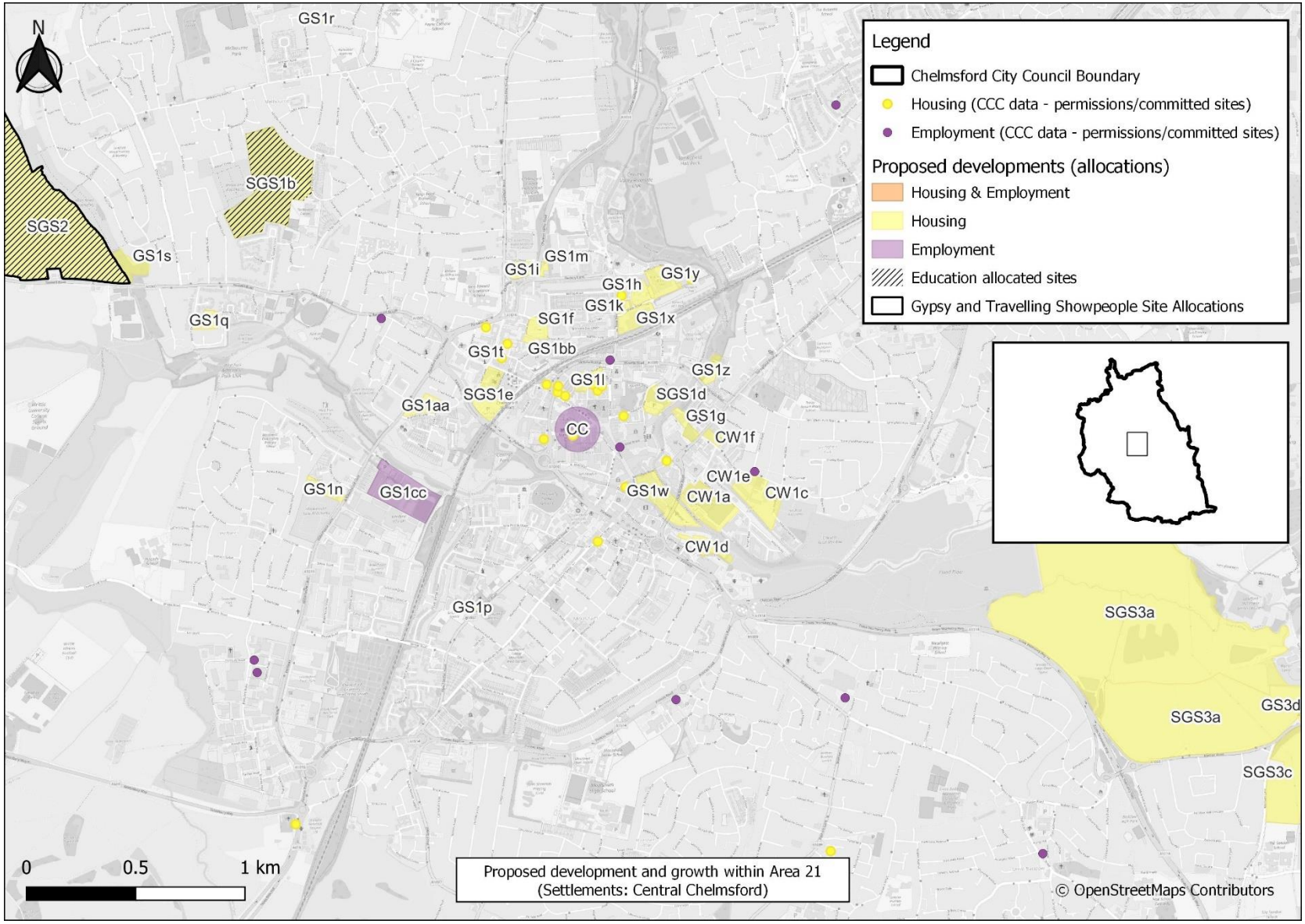


Figure B-21: Proposed development and growth within area 21 (Settlements: Central Chelmsford)

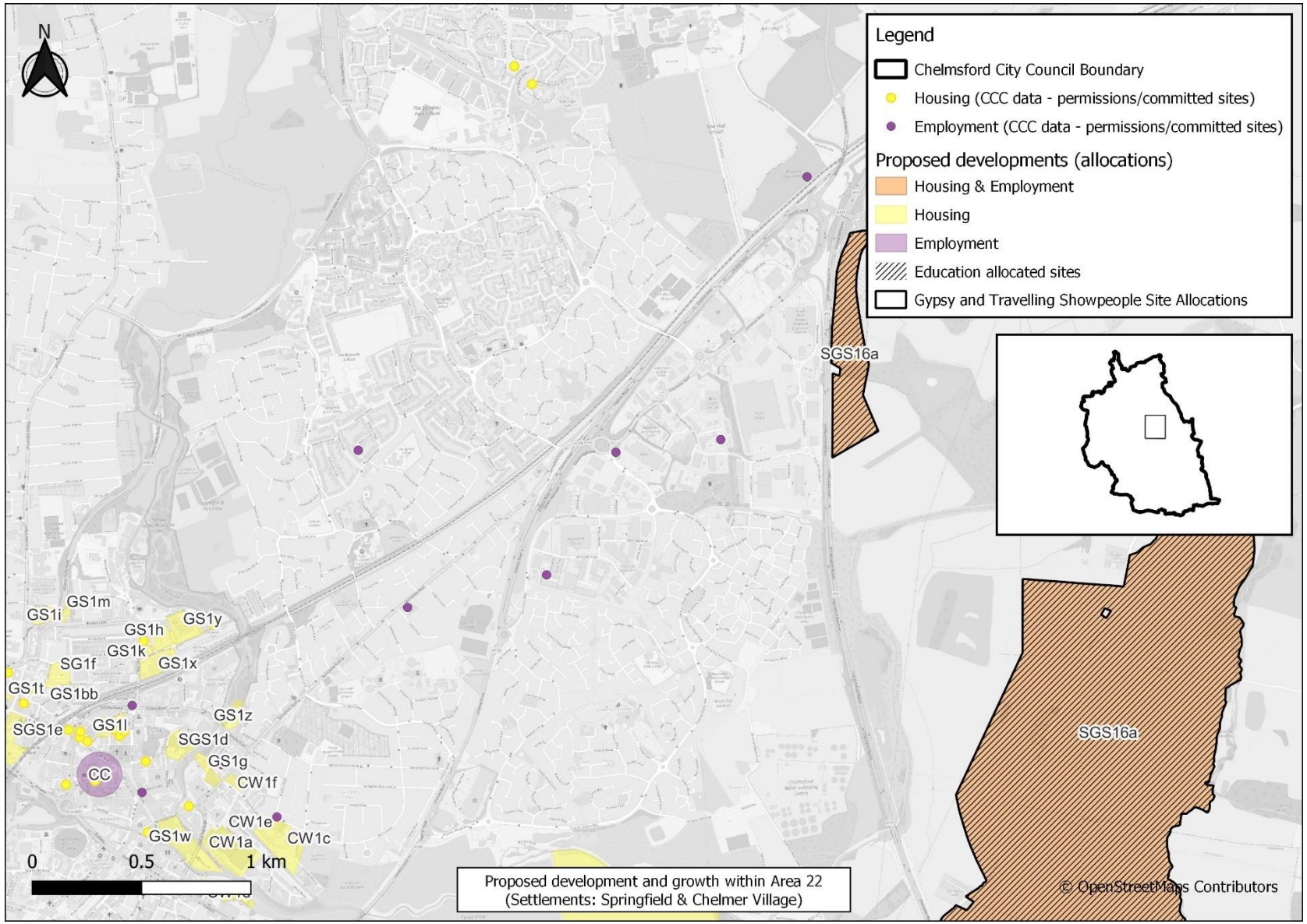


Figure B-22: Proposed development and growth within area 22 (Settlements: Springfield & Chelmer Village)

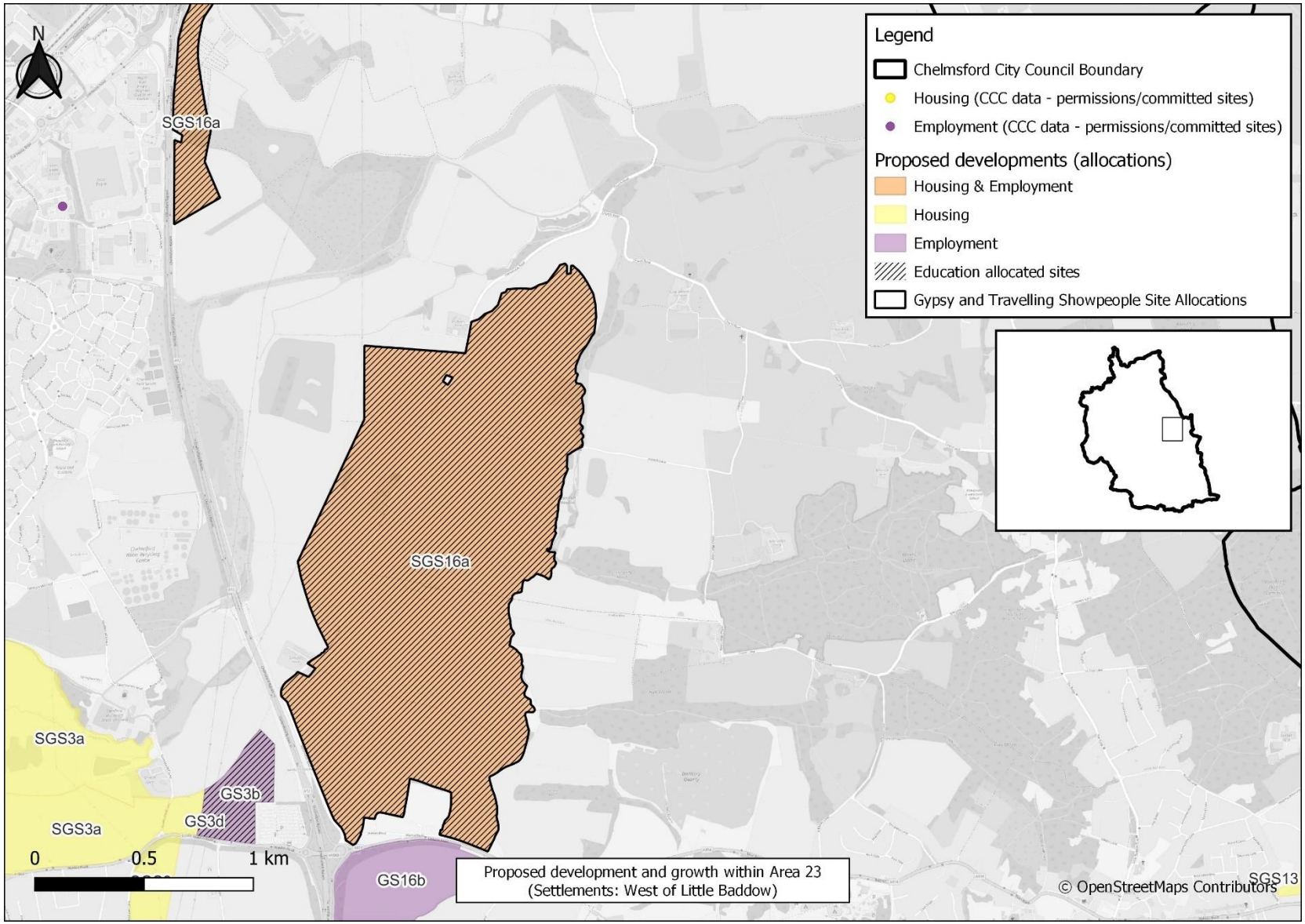


Figure B-23: Proposed development and growth within area 23 (Settlements: West of Little Baddow)

Appendix C

Proposed growth and development – Water Recycling Infrastructure Assessment

Colour	Description
Red	A greenfield site with no public sewer infrastructure close by and outside existing WRC catchment boundary. Requires major infrastructure upgrade or extension which will need to be delivered by developers and AWS.
Amber	The existing brownfield or greenfield site is just outside an existing WRC catchment boundary and infrastructure is within 100 m of the site. Requires minor infrastructure upgrade or extension which will need to be delivered by developers and AWS.
Green	The existing brownfield or greenfield site within an existing WRC catchment boundary with infrastructure within 50 m of the site. Requires no to little infrastructure upgrade or extension which will need to be delivered by developers and AWS.

Table C-1: Proposed growth and development of allocated water recycling infrastructure within growth area 1,2, and 3

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Infrastructure assessment
Allocations (adopted Local Plan and new spatial strategy)						
Growth Area 1 - Central and Urban Chelmsford						
H1.6.1	Former Gas Works Wharf Road Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	CW1a	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located within the site (>225mm diameter). Sewer will need to be extended to accommodate the development. The site is existing brownfield site to the south so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC)

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Infrastructure assessment
H1.6.2	Lockside Navigation Road Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	CW1c	CHELMSFORD WRC	Brownfield Site (partial greenfield area) Located within the existing Chelmsford WRC catchment Existing public sewers (>500mm diameter) located within the site. Sewer will need to be extended to accommodate the development. The site is existing brownfield site to the west so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC)
H1.6.3	Baddow Road Car Park and Land to the East	Chelmsford	Chelmsford Town Area - Moulsham and Central	CW1d	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers (>500mm diameter) located within the site. Sewer will need to be extended to accommodate the development. The site is existing brownfield site to the south so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC)
H1.6.4	Travis Perkins Navigation Road Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	CW1e	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located close (225mm diameter to the north) and within the site (225mm diameter). Sewer will need to be extended to accommodate the development. The site is existing brownfield site to the south so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC)
H1.6.5	Navigation Road sites Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	CW1f	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located close to the site (225mm diameter) within 50m of the site. Sewer will need to be extended to accommodate the development. The site is existing brownfield site to the south so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC)

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Infrastructure assessment
H1.6.6	Former St Peter's College Fox Crescent	Chelmsford	Chelmsford Town Area - St Andrews	SGS1b	CHELMSFORD WRC	Greenfield (partially Brownfield Site) Located within the existing Chelmsford WRC catchment Existing public sewers located close (<50m east) to the site (150mm diameter south and 225mm diameter east). Sewer will need to be extended to accommodate the development. The site is partially an existing brownfield site to the east so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC)
H1.6.7	Riverside Ice and Leisure Land Victoria Road Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	SGS1d	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located within the site (225 - 300mm diameter). Sewer will need to be extended to accommodate the development. The site is existing brownfield site to the south so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC)
H1.6.8	Civic Centre Land Fairfield Road Chelmsford	Chelmsford	Chelmsford Town Area - Marconi	SGS1e	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located within the site (150 - 300mm diameter). Sewer will need to be extended to accommodate the development. The site is existing brownfield site to the south so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC)
H1.6.9	Land West of Eastwood House Glebe Road Chelmsford	Chelmsford	Chelmsford - Marconi	SGS1f	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located within the site (300mm diameter). Sewer will need to be extended to accommodate the development. The site is existing brownfield site to the south so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC) - unlikely due to being existing car park

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Infrastructure assessment
H1.6.10	Ashby House Car Parks New Street Chelmsford	Chelmsford	Chelmsford Town Area - Marconi	GS1h	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located close to (<50m south) the site (150mm diameter). Sewer will need to be extended to accommodate the development. The site is existing brownfield site to the south so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC) - unlikely due to being existing car park
H1.6.11	Chelmsford Social Club	Chelmsford	Chelmsford Town Area - Moulsham and Central	GS1g	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located within the site (225mm diameter). Sewer will need to be extended to accommodate the development. The site is existing brownfield site so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC)
H1.6.12	Rectory Lane Car Park West Rectory Lane Chelmsford	Chelmsford	Chelmsford Town Area - All Saints	GS1i	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located close to the site (225mm diameter) within 100m (north and south). Sewer will need to be extended to accommodate the development. The site is existing brownfield site to the south so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC) - unlikely due to being existing car park
H1.6.13	Former Chelmsford Electrical and Car Wash Brook Street	Chelmsford	Chelmsford Town Area - Marconi	GS1k	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located close to (100m away to the south) the site (225mm diameter). Sewer will need to be extended to accommodate the development. The site is existing brownfield site to the south so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC)

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Infrastructure assessment
H1.6.14	BT Telephone Exchange Cottage Place Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	GS1l	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located within the site (225mm diameter). Sewer will need to be extended to accommodate the development. The site is existing brownfield site so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC)
H1.6.15	Rectory Lane Car Park East Rectory Lane Chelmsford	Chelmsford	Chelmsford Town Area - Marconi	GS1m	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located within the site (225mm diameter). Sewer will need to be extended to accommodate the development. The site is existing brownfield site so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC) - unlikely due to being existing car park
H1.6.16	Waterhouse Lane Depot and Nursery Chelmsford	Chelmsford	Chelmsford Town Area - Waterhouse Farm	GS1n	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located within the site (150 and 225mm diameter). Sewer will need to be extended to accommodate the development. The site is existing brownfield site so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC)
H1.6.17	British Legion New London Road Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	GS1p	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located close (<50m away) to the site (300mm diameter to the east). Sewer will need to be extended to accommodate the development. The site is existing brownfield site so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC)

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Infrastructure assessment
H1.6.18	Land rear Of 17-37 Beach's Drive Chelmsford	Chelmsford	Chelmsford Town Area - St Andrews	GS1q	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located close (<100m away) to the site (100mm diameter to the south, 150mmm to the west and 100mm diameter to the east). Sewer will need to be extended to accommodate the development. The site is existing brownfield site so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC)
H1.6.19	Garage Site St Nazaire Road Chelmsford	Chelmsford	Chelmsford Town Area - St Andrews	GS1r	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located close (<100m away to the west) to the site (unknown diameter). Sewer will need to be extended to accommodate the development.
H1.6.20	Garage Site and Land Medway Close Chelmsford	Chelmsford	Chelmsford Town Area - St Andrews	GS1s	CHELMSFORD WRC	Greenfield Site (partially brownfield) Located within the existing Chelmsford WRC catchment Existing public sewers located within the site (300mm diameter). Sewer will need to be extended to accommodate the development.
H1.6.21	Car Park R/O Bellamy Court Broomfield Road Chelmsford	Chelmsford	Chelmsford Town Area - Marconi	GS1t	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located close to (<50m to the east) the site (225mm diameter). Sewer will need to be extended to accommodate the development. The site is existing brownfield site so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC) - unlikely due to being existing car park
H1.6.22	Land Surrounding Telephone Exchange Ongar Road Writtle	Writtle	Writtle	GS5	CHELMSFORD WRC	Brownfield Site (partially greenfield) Located within the existing Chelmsford WRC catchment Existing public sewers located close (225mm diameter to the north and 300mm diameter to the south). Sewer will need to be extended to accommodate the development. The site is existing brownfield site so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC)

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Infrastructure assessment
H1.6.23	West Chelmsford	Writtle	Writtle	SGS2	CHELMSFORD WRC	Greenfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located close (<100m away) to the site (225 - 600mm diameter to the east). Sewer will need to be extended to accommodate the development. Sewer will likely need to be upgraded to accomodate the development (CSO close to development)
H1.6.24	East Chelmsford - Manor Farm	Chelmsford	Great Baddow - Great Baddow East	SGS3a	CHELMSFORD WRC	Greenfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located within the site (unknown diameter). Sewer will need to be extended to accommodate the development and potentially upgraded due to size of development.
H1.6.25	East Chelmsford - Land South and North of Maldon Road	Sandon	Sandon - Little Baddow Danbury and Sandon	SGS3c and SGS3d	CHELMSFORD WRC	Greenfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located close (<150m away to the west from site 3d and <50m away to the west from site ec) to the site (unknown diameter). Sewer will need to be extended to accommodate the development and potentially upgraded due to size of development.
H1.6.26	Land north of Galleywood Reservoir Beehive Lane Galleywood	Galleywood	Galleywood - Galleywood	GS4	CHELMSFORD WRC	Greenfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located close (<100m away to the west) to the site (150mm diameter). Sewer will need to be extended to accommodate the development and potentially upgraded.
H1.6.27	Meadows Shopping Centre and Meadows Surface Car Park	Chelmsford	Chelmsford - Moulsham and Central	SGS1w	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located within the site (225 - 1200mm diameter). Sewer will need to be extended to accommodate the development. The site is existing brownfield site so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC)

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Infrastructure assessment
H1.6.28	Former Kay-Metzeler premises, Brook Street	Chelmsford	Chelmsford - Moulsham and Central	SGS1x	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located close (<50m away to the south and north) to the site (225mm diameter to the north and 750mm diameter to the south). Sewer will need to be extended to accommodate the development. The site is existing brownfield site so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC)
H1.6.29	Land between Hoffmans Way and Brook Street (Marriages Mill)	Chelmsford	Chelmsford - Moulsham and Central	SGS1y	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located close (<100m away to the south) to the site (300 - 750mm diameter). Sewer will need to be extended to accommodate the development. The site is existing brownfield site so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC)
H1.6.30	Granary Car Park	Chelmsford	Chelmsford - Moulsham and Central	GS1z	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located withinthe site (225 - 300mm diameter). Sewer will need to be extended to accommodate the development. The site is existing brownfield site so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC) - unlikely due to being existing car park
H1.6.31	Coval Lane Car Park	Chelmsford	Chelmsford - Waterhouse Farm	GS1aa	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located within the site (150mm diameter). Sewer will need to be extended to accommodate the development. The site is existing brownfield site so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC) - unlikely due to being existing car park

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Infrastructure assessment
H1.6.32	Glebe Road Car Park	Chelmsford	Chelmsford - Moulsham and Central	GS1bb	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers located close to (<50m to the east) the site (300mm diameter). Sewer will need to be extended to accommodate the development. The site is existing brownfield site so assume an existing private drain connects to the public sewer and existing connection can be reused (TBC) - unlikely due to being existing car park
Growth Area 2 - North Chelmsford						
H1.7.1	Chelmsford Garden Community Zone 1 Pratts Farm Lane Little Waltham Chelmsford	Little Waltham	Little Waltham - Broomfield and the Walthams	SGS6 (including 6a)	CHELMSFORD WRC	Greenfield Site (partial brownfield areas) Located outside the existing Chelmsford WRC catchment Existing public sewer (unknown diameter) located >500m from the site. Sewer will need to be upgraded and extended to accommodate the development
H1.7.2	Chelmsford Garden Community Zone 2	Little Waltham	Little Waltham - Broomfield and the Walthams	SGS6 (including 6a)	CHELMSFORD WRC	Greenfield Site (partial brownfield areas) Located outside the existing Chelmsford WRC catchment Existing public sewer (unknown diameter) located >500m from the site. Sewer will need to be upgraded and extended to accommodate the development
H1.7.3	Chelmsford Garden Community Zone 3 Beaulieu Parkway Chelmsford	Little Waltham	Little Waltham - Broomfield and the Walthams	SGS6 (including 6a)	CHELMSFORD WRC	Greenfield Site (partial brownfield areas) Located outside the existing Chelmsford WRC catchment Existing public sewer (unknown diameter) located >500m from the site. Sewer will need to be upgraded and extended to accommodate the development
H1.7.4	Great Leighs - Land at Moulsham Hall	Great Leighs	Great and Little Leighs - Boreham and the Leighs	SGS7a	GREAT LEIGHS WRC	Greenfield Site Located outside the existing Great Leighs WRC catchment There are existing sewers (150mm diameter) located to the south and east of the site (>100m away some parts of site >500m away). Sewer will need to be upgraded and extended to accommodate the development

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Infrastructure assessment
H1.7.5	Great Leighs - Land East of London Road	Great Leighs	Great and Little Leighs - Boreham and the Leighs	SGS7b	GREAT LEIGHS WRC	Greenfield Site Located outside the existing Great Leighs WRC catchment There are existing sewers (150mm diameter) located to the south of the site (<100m away). Sewer will need to be upgraded and will need to be extended to accommodate the development
H1.7.6	Great Leighs - Land North and South of Banters Lane	Great Leighs	Great and Little Leighs - Boreham and the Leighs	SGS7c	GREAT LEIGHS WRC	Greenfield Site Located within the existing Great Leighs WRC catchment There are existing sewers (150mm diameter) located close to the site (<50m away). Sewer might need to be upgraded and will need to be extended to accommodate the development
H1.7.7	North of Broomfield	Broomfield	Broomfield - Broomfield and the Walthams	SGS8	CHELMSFORD WRC	Greenfield Site Located partially within the existing Chelmsford WRC catchment There are existing sewers (600mm diameter) located to the south of the site (<100m away). Sewer will need to be extended to accommodate the development There are also unknown diameter sewers located to the east and south of the site. These might need to be upgraded and extended to accomodate the development
H1.7.8	Land west of Back Lane, Ford End	Ford End	Broomfield - Broomfield and the Walthams	GS14a	GREAT LEIGHS WRC	Greenfield Site Located within the existing Great Leighs WRC catchment There are existing sewers (150mm diameter) located around the site (>50m away). Sewer might need to be upgraded and will need to be extended to accommodate the development
H1.7.9	Land south of Ford End Primary School, Ford End	Ford End	Broomfield - Broomfield and the Walthams	GS14b	GREAT LEIGHS WRC	Greenfield Site Located outside the existing Great Leighs WRC catchment There are existing sewers (150mm diameter) located to the southwest of the site (>50m away). Sewer might need to be upgraded and will need to be extended to accommodate the development
Growth Area 3 - South and East Chelmsford						

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Infrastructure assessment
H1.8.1	Land North West of Hamberts Farm Bunham Road South Woodham Ferrers Chelmsford	Woodham Ferrers	South Woodham Ferrers - South Woodham, Elmwood & Woodville	SGS10	S WOODHAM FERRERS WRC	Greenfield Site Located partially outside the existing S Woodham Ferrers WRC catchment There are existing sewers (150 - 675mm diameter) located to the south of the site (>50m away). Sewer might need to be upgraded and will need to be extended to accommodate the development
H1.8.2	Land North of South Woodham Ferrers Burnham Road South Woodham Ferrers Chelmsford	Woodham Ferrers	South Woodham Ferrers - South Woodham, Elmwood & Woodville	SGS10	S WOODHAM FERRERS WRC	Greenfield Site Located partially outside the existing S Woodham Ferrers WRC catchment There are existing sewers (150 - 675mm diameter) located to the south of the site (>50m away). Sewer might need to be upgraded and will need to be extended to accommodate the development
H1.8.3	South of Bicknacre	Bicknacre	Woodham Ferrers and Bicknacre - Bicknacre and East and West Hanningfield	GS11a	CHELMSFORD WRC	Greenfield Site Located within the existing Chelmsford WRC catchment There are existing sewers (150 - 600mm diameter) located to the north of the site (>50m away but some parts of site >500m away). Sewer might need to be upgraded and will need to be extended to accommodate the development
H1.8.4	St Giles Moor Hall Lane	Bicknacre	Woodham Ferrers and Bicknacre - Bicknacre and East and West Hanningfield	GS12	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing unknown diameter public sewers to the south of the site (<50m away). Sewer will need to be upgraded and extended to accommodate the development. The site is existing brownfield site so assume an existing private drain connects to the public sewer and existing connection can be reused

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Infrastructure assessment
H1.8.5	Danbury	Danbury	Danbury - Little Baddow Danbury and Sandon	SGS13	CHELMSFORD WRC	Brownfield and Greenfield Sites Located within the existing Chelmsford WRC catchment All of the individual SGS13 sites are located close to existing public sewers (<50m away). Sewers unlikely to need to be upgraded but will need to be extended to accommodate the development sites. Some of the sites are existing brownfield sites so assume an existing private drain connects to the public sewer and existing connection can be reused
H1.8.6	East Chelmsford Garden Community (Hammonds Farm)	Chelmsford	Little Baddow/ Danbury / Sandon / Boreham / Chelmer and Beaulieu Park	SGS16a	CHELMSFORD WRC	Greenfield Site Located partially within the existing Chelmsford WRC catchment There are existing sewers (250mm diameter) located to the south of the site (>100m away) and some sewers (150 - 375mm diameter) located to the west of the site (>100m away). Sewer might need to be upgraded and will need to be extended to accommodate the development
H1.8.7	Land at Kingsgate, Bicknacre	Bicknacre	Bicknacre and East and West Hanningfield	GS11b	CHELMSFORD WRC	Greenfield Site Located partially within the existing Chelmsford WRC catchment Existing unknown diameter public sewers to the north and east of the site (>50m away). Sewer will need to be upgraded and extended to accommodate the development.
H1.8.8	Land west of Barbrook Way, Bicknacre	Bicknacre	Bicknacre and East and West Hanningfield	GS11c	CHELMSFORD WRC	Greenfield Site Located within the existing Chelmsford WRC catchment There are existing sewers (150 diameter) located to the east of the site (<50m away). Sewer might need to be upgraded and will need to be extended to accommodate the development
H1.8.9	Land north of Abbey Fields, East Hanningfield	East Hanningfield	Bicknacre and East and West Hanningfield	GS17a	S WOODHAM FERRERS WRC	Greenfield Site Located inside the existing S Woodham Ferrers WRC catchment There are existing sewers (110 - 150 diameter) located to the east of the site (<100m away). Sewer might need to be upgraded and will need to be extended to accommodate the development

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Infrastructure assessment
H1.8.10	Land east of Highfields Mead, East Hanningfield	East Hanningfield	Bicknacre and East and West Hanningfield	GS17b	S WOODHAM FERRERS WRC	Greenfield Site Located inside the existing S Woodham Ferrers WRC catchment There are existing sewers (unkown diameter) located to the southwest of the site (<100m away). Sewer might need to be upgraded and will need to be extended to accommodate the development

Table C-2: Proposed growth and development of unallocated water recycling infrastructure within growth area 1,2, and 3

No.	Site Address	Settlement	Allocation	Water recycling centre (WRC) serving development	Infrastructure assessment
Allocations (adopted Local Plan and new spatial strategy)					
Growth Area 1 - Central and Urban Chelmsford					
E2.2.1	City Centre (several unconfirmed locations)	Chelmsford	100% Office space and Research - E(g)(i)/ (ii)	CHELMSFORD WRC	Location of site to be confirmed.
E2.2.2	?	Chelmsford	67% Office space and Research - E(g)(i)/ (ii) 33% - Light industrial - E(g)(iii)	CHELMSFORD WRC	Greenfield Site Located within the existing Chelmsford WRC catchment Existing public sewer (250-400mm diameter) located <150m from the north of the site. Sewer will need to be upgraded and extended to accommodate the development
E2.2.3	ADVANCED MANUFACTURING & INNOVATION DISTRICT, WATERHOUSE LANE EMPLOYMENT AREA	Chelmsford	50% Office space and Research - E(g)(i)/ (ii) 50% - Light industrial - E(g)(iii)	CHELMSFORD WRC	Brownfield Site Located within the existing Chelmsford WRC catchment Existing public sewers (225 - 600mm diameter) located within the site. Sewer will need to be extended to accommodate the development. The site is existing brownfield site to the south so assume an existing private drain connects to the public sewer and existing connection can be reused
Growth Area 2 - North Chelmsford					

No.	Site Address	Settlement	Allocation	Water recycling centre (WRC) serving development	Infrastructure assessment
E2.2.4	Includes Chelmsford Garden Community	Broomfield	45000m2 of employment 40% Warehousing (B8) 30% General industrial (B2) 30% Commercial, business and service € 11946m2 of employment 302m2 - Office space and Research - E(g)(i)/(ii) 8379m2 - Light industrial - E(g)(iii) 3265m2 - Warehousing (B8)	CHELMSFORD WRC	Greenfield Site (partial brownfield areas) Located outside the existing Chelmsford WRC catchment Existing public sewer (unknown diameter) located >500m from the site. Sewer will need to be upgraded and extended to accommodate the development
E2.2.5	Waltham road employment area (expansion to north of existing site)	Boreham	50% Warehousing (B8) 50% General industrial (B2)	CHELMSFORD WRC	Greenfield Site (partial brownfield areas) Located partially within the existing Chelmsford WRC catchment Existing public sewer (unknown diameter) located >100m to the south of the site. Sewer will need to be upgraded and extended to accommodate the development. The site is existing brownfield site to the south so assume an existing private drain connects to the public sewer and existing connection can be reused
E2.2.6	Little boyton hall farm rural employment area (expansion to north of existing site)	Chelmsford (rural) - Boyton hall farm	50% Warehousing (B8) 50% General industrial (B2)	ROXWELL WRC	Brownfield Site Located outside the existing Roxwell WRC catchment Existing public sewer (unknown diameter) located >500m from the site. Sewer will need to be upgraded and extended to accommodate the development. The site is existing brownfield site to the south so assume an existing private drain connects to the public sewer and existing connection can be reused
Growth Area 3 - South and East Chelmsford					

No.	Site Address	Settlement	Allocation	Water recycling centre (WRC) serving development	Infrastructure assessment
E2.2.7	?	South Woodham Ferrers	33% Warehousing (B8) 33% General industrial (B2) 34% - Office space and Research - E(g)(i)/ (ii)	S WOODHAM FERRERS WRC	Greenfield Site Located partially outside the existing S Woodham Ferrers WRC catchment There are existing sewers (150 - 675mm diameter) located to the south of the site (>50m away). Sewer might need to be upgraded and will need to be extended to accommodate the development
E2.2.8	East chelmsfrod garden community (hammonds farm)	Hammonds farm	67% Office space and Research - E(g)(i)/ (ii) 33% - Light industrial - E(g)(iii)	CHELMSFORD WRC	Greenfield Site Located partially within the existing Chelmsford WRC catchment There are existing sewers (250mm diameter) located to the south of the site (>100m away) and some sewers (150 - 375mm diameter) located to the west of the site (>100m away). Sewer might need to be upgraded and will need to be extended to accommodate the development
E2.2.9	Land adjacent to A12 junction 18	Chelmsford	4669m2 - Office space and Research - E(g)(i)/ (ii) 12777m2 - Light industrial - E(g)(iii) 12777m2 - Warehousing (B8) 12777m2 - General industrial (B2)	CHELMSFORD WRC	Greenfield Site Located outside the existing Chelmsford WRC catchment There are existing sewers (250mm diameter) located partially within the site boundary. Sewer might need to be upgraded and will need to be extended to accommodate the whole development

Appendix D

Proposed growth and development – Water Recycling Odour Assessment

Table D-1: Proposed growth and development Water Recycling Centre Odour Assessment for allocated sites in growth areas 1,2, and 3

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Water recycling centre - odour	Sewer pumpstation - odour	CSO - odour
Allocations (adopted Local Plan and new spatial strategy)								
Growth Area 1 - Central and Urban Chelmsford								
H1.6.1	Former Gas Works Wharf Road Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	CW1a	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.2	Lockside Navigation Road Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	CW1c	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.3	Baddow Road Car Park and Land to the East	Chelmsford	Chelmsford Town Area - Moulsham and Central	CW1d	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.4	Travis Perkins Navigation Road Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	CW1e	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.5	Navigation Road sites Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	CW1f	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.6	Former St Peter's College Fox Crescent	Chelmsford	Chelmsford Town Area - St Andrews	SGS1b	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.7	Riverside Ice and Leisure Land Victoria Road Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	SGS1d	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Development within 15m of a AWS pumpstation	CSOs in catchment but not close to development - No odour issues

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Water recycling centre - odour	Sewer pumpstation - odour	CSO - odour
H1.6.8	Civic Centre Land Fairfield Road Chelmsford	Chelmsford	Chelmsford Town Area - Marconi	SGS1e	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.9	Land West of Eastwood House Glebe Road Chelmsford	Chelmsford	Chelmsford - Marconi	SGS1f	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.10	Ashby House Car Parks New Street Chelmsford	Chelmsford	Chelmsford Town Area - Marconi	GS1h	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.11	Chelmsford Social Club	Chelmsford	Chelmsford Town Area - Moulsham and Central	GS1g	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.12	Rectory Lane Car Park West Rectory Lane Chelmsford	Chelmsford	Chelmsford Town Area - All Saints	GS1i	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.13	Former Chelmsford Electrical and Car Wash Brook Street	Chelmsford	Chelmsford Town Area - Marconi	GS1k	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.14	BT Telephone Exchange Cottage Place Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	GS1l	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.15	Rectory Lane Car Park East Rectory Lane Chelmsford	Chelmsford	Chelmsford Town Area - Marconi	GS1m	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.16	Waterhouse Lane Depot and Nursery Chelmsford	Chelmsford	Chelmsford Town Area - Waterhouse Farm	GS1n	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.17	British Legion New London Road Chelmsford	Chelmsford	Chelmsford Town Area - Moulsham and Central	GS1p	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.18	Land rear Of 17-37 Beach's Drive Chelmsford	Chelmsford	Chelmsford Town Area - St Andrews	GS1q	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Development within 15m of a AWS pumpstation	CSOs in catchment but not close to development - No odour issues

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Water recycling centre - odour	Sewer pumpstation - odour	CSO - odour
H1.6.19	Garage Site St Nazaire Road Chelmsford	Chelmsford	Chelmsford Town Area - St Andrews	GS1r	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.20	Garage Site and Land Medway Close Chelmsford	Chelmsford	Chelmsford Town Area - St Andrews	GS1s	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.21	Car Park R/O Bellamy Court Broomfield Road Chelmsford	Chelmsford	Chelmsford Town Area - Marconi	GS1t	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.22	Land Surrounding Telephone Exchange Ongar Road Writtle	Writtle	Writtle	GS5	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.23	West Chelmsford	Writtle	Writtle	SGS2	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.24	East Chelmsford - Manor Farm	Chelmsford	Great Baddow - Great Baddow East	SGS3a	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.25	East Chelmsford - Land South and North of Maldon Road	Sandon	Sandon - Little Baddow Danbury and Sandon	SGS3c and SGS3d	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.26	Land north of Galleywood Reservoir Beehive Lane Galleywood	Galleywood	Galleywood - Galleywood	GS4	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.27	Meadows Shopping Centre and Meadows Surface Car Park	Chelmsford	Chelmsford - Moulsham and Central	SGS1w	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Development within 15m of a AWS pumpstation	CSOs in catchment but not close to development - No odour issues
H1.6.28	Former Kay-Metzeler premises, Brook Street	Chelmsford	Chelmsford - Moulsham and Central	SGS1x	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Water recycling centre - odour	Sewer pumpstation - odour	CSO - odour
H1.6.29	Land between Hoffmans Way and Brook Street (Marriages Mill)	Chelmsford	Chelmsford - Moulsham and Central	SGS1y	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.30	Granary Car Park	Chelmsford	Chelmsford - Moulsham and Central	GS1z	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.31	Coval Lane Car Park	Chelmsford	Chelmsford - Waterhouse Farm	GS1aa	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.6.32	Glebe Road Car Park	Chelmsford	Chelmsford - Moulsham and Central	GS1bb	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
Growth Area 2 - North Chelmsford								
H1.7.1	Chelmsford Garden Community Zone 1 Pratts Farm Lane Little Waltham Chelmsford	Little Waltham	Little Waltham - Broomfield and the Walthams	SGS6 (including 6a)	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.7.2	Chelmsford Garden Community Zone 2	Little Waltham	Little Waltham - Broomfield and the Walthams	SGS6 (including 6a)	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.7.3	Chelmsford Garden Community Zone 3 Beaulieu Parkway Chelmsford	Little Waltham	Little Waltham - Broomfield and the Walthams	SGS6 (including 6a)	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.7.4	Great Leighs - Land at Moulsham Hall	Great Leighs	Great and Little Leighs - Boreham and the Leighs	SGS7a	GREAT LEIGHS WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.7.5	Great Leighs - Land East of London Road	Great Leighs	Great and Little Leighs - Boreham and the Leighs	SGS7b	GREAT LEIGHS WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	No CSO in catchment

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Water recycling centre - odour	Sewer pumpstation - odour	CSO - odour
H1.7.6	Great Leighs - Land North and South of Banters Lane	Great Leighs	Great and Little Leighs - Boreham and the Leighs	SGS7c	GREAT LEIGHS WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	No CSO in catchment
H1.7.7	North of Broomfield	Broomfield	Broomfield - Broomfield and the Walthams	SGS8	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.7.8	Land west of Back Lane, Ford End	Ford End	Broomfield - Broomfield and the Walthams	GS14a	GREAT LEIGHS WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	No CSO in catchment
H1.7.9	Land south of Ford End Primary School, Ford End	Ford End	Broomfield - Broomfield and the Walthams	GS14b	GREAT LEIGHS WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	No CSO in catchment
Growth Area 3 - South and East Chelmsford								
H1.8.1	Land North West of Hamberts Farm Bunham Road South Woodham Ferrers Chelmsford	Woodham Ferrers	South Woodham Ferrers - South Woodham, Elmwood & Woodville	SGS10	S WOODHAM FERRERS WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	No CSO in catchment
H1.8.2	Land North of South Woodham Ferrers Burnham Road South Woodham Ferrers Chelmsford	Woodham Ferrers	South Woodham Ferrers - South Woodham, Elmwood & Woodville	SGS10	S WOODHAM FERRERS WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	No CSO in catchment
H1.8.3	South of Bicknacre	Bicknacre	Woodham Ferrers and Bicknacre - Bicknacre and East and West Hanningfield	GS11a	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.8.4	St Giles Moor Hall Lane	Bicknacre	Woodham Ferrers and Bicknacre - Bicknacre and East and West Hanningfield	GS12	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues

No.	Site Address	Settlement	Ward/ Parish	Allocation	Water recycling centre (WRC) serving development	Water recycling centre - odour	Sewer pumpstation - odour	CSO - odour
H1.8.5	Danbury	Danbury	Danbury - Little Baddow Danbury and Sandon	SGS13	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.8.6	East Chelmsford Garden Community (Hammonds Farm)	Chelmsford	Little Baddow/ Danbury / Sandon / Boreham / Chelmer and Beaulieu Park	SGS16a	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.8.7	Land at Kingsgate, Bicknacre	Bicknacre	Bicknacre and East and West Hanningfield	GS11b	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.8.8	Land west of Barbrook Way, Bicknacre	Bicknacre	Bicknacre and East and West Hanningfield	GS11c	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
H1.8.9	Land north of Abbey Fields, East Hanningfield	East Hanningfield	Bicknacre and East and West Hanningfield	GS17a	S WOODHAM FERRERS WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	No CSO in catchment
H1.8.10	Land east of Highfields Mead, East Hanningfield	East Hanningfield	Bicknacre and East and West Hanningfield	GS17b	S WOODHAM FERRERS WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	No CSO in catchment

Table D-2: Proposed growth and development Water Recycling Centre Odour Assessment for unallocated sites in growth areas 1,2, and 3

No.	Site Address	Settlement	Allocation	Water recycling centre (WRC) serving development	Water recycling centre - odour	Sewer pumpstation - odour	CSO - odour
Allocations (adopted Local Plan and new spatial strategy)							
Growth Area 1 - Central and Urban Chelmsford							
E2.2.1	City Centre (several unconfirmed locations)	Chelmsford	100% Office space and Research - E(g)(i)/ (ii)	CHELMSFORD WRC	Location of site to be confirmed.	Location of site to be confirmed.	Location of site to be confirmed.
E2.2.2	?	Chelmsford	67% Office space and Research - E(g)(i)/ (ii) 33% - Light industrial - E(g)(iii)	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
E2.2.3	ADVANCED MANUFACTURING & INNOVATION DISTRICT, WATERHOUSE LANE EMPLOYMENT AREA	Chelmsford	50% Office space and Research - E(g)(i)/ (ii) 50% - Light industrial - E(g)(iii)	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
Growth Area 2 - North Chelmsford							
E2.2.4	Includes Chelmsford Garden Community	Broomfield	45000m2 of employment 40% Warehousing (B8) 30% General industrial (B2) 30% Commercial, business and service € 11946m2 of employment 302m2 - Office space and Research - E(g)(i)/ (ii) 8379m2 - Light industrial - E(g)(iii) 3265m2 - Warehousing (B8)	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues

No.	Site Address	Settlement	Allocation	Water recycling centre (WRC) serving development	Water recycling centre - odour	Sewer pumpstation - odour	CSO - odour
E2.2.5	Waltham road employment area (expansion to north of existing site)	Boreham	50% Warehousing (B8) 50% General industrial (B2)	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
E2.2.6	Little boyton hall farm rural employment area (expansion to north of existing site)	Chelmsford (rural) - Boyton hall farm	50% Warehousing (B8) 50% General industrial (B2)	ROXWELL WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	No CSO in catchment
Growth Area 3 - South and East Chelmsford							
E2.2.7	?	South Woodham Ferrers	33% Warehousing (B8) 33% General industrial (B2) 34% - Office space and Research - E(g)(i)/ (ii)	S WOODHAM FERRERS WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	No CSO in catchment
E2.2.8	East chelmsfrod garden community (hammonds farm)	Hammonds farm	67% Office space and Research - E(g)(i)/ (ii) 33% - Light industrial - E(g)(iii)	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues
E2.2.9	Land adjacent to A12 junction 18	Chelmsford	4669m2 - Office space and Research - E(g)(i)/ (ii) 12777m2 - Light industrial - E(g)(iii) 12777m2 - Warehousing (B8) 12777m2 - General industrial (B2)	CHELMSFORD WRC	WRC > 400m away from development - No odour concerns	Pumpstation > 15m away from development - No odour concerns	CSOs in catchment but not close to development - No odour issues

Appendix E

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

Table E-1: Anglian Water services drainage and wastewater management plan for water recycling centers

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

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
Highwood WRC	AWS	330	322	346	No	0	None	None	WRC - New permit.	None
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

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
										water removal.

Appendix F

DG5 flooded properties per postcode

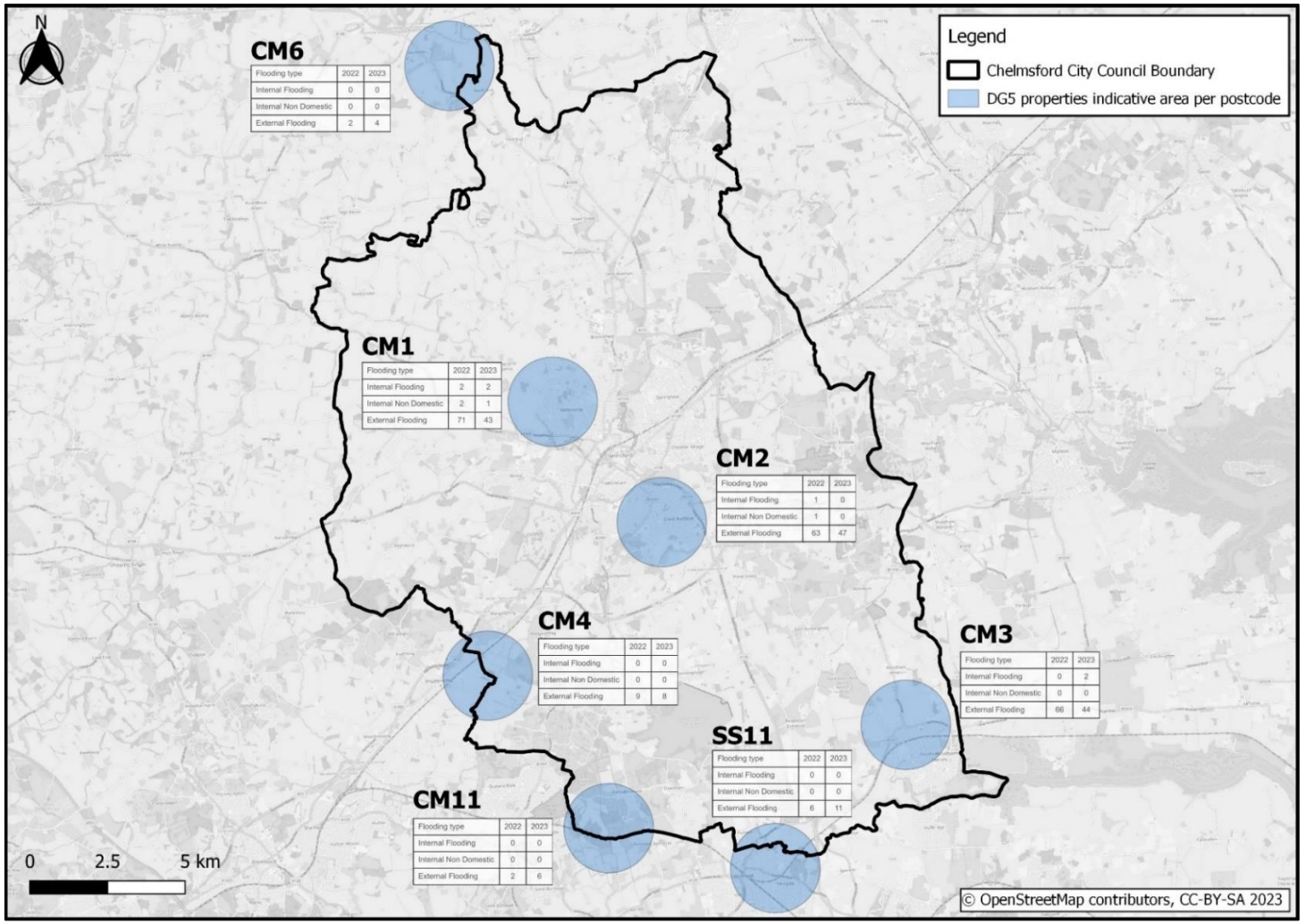


Figure F-1: The indicative areas of DG5 properties per postcode within the Chelmsford City Council Boundary

Appendix G

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

Table G-1: Permit Information for Water Recycling Centers within Chelmsford City Council's Administrative Area and the relevant 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 H

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

Table H-1: Key metrics from the WFD Cycle 2 for waterbodies within Chelmsford City Council's Administrative Area

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	-	-

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	Wid (Shenfield STW - Ingatestone Hall)	Moderate	Bad	Poor	Good	None	-	-
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 I

Flood Zones and Development Plots

Table I-1: Summary of Flood Zone risk for allocated sites.

Location	Allocation	Flood Risk
North of South Woodham Ferres	Housing/ Employment	Part of the proposed housing and employment development are located within Flood Zone 2 and 3 associated with a tributary of the River Crouch.
East Chelmsford Garden Community	Housing/ Employment	Parts of the proposed housing and employment development are located within Flood Zone 2 and 3 associated with Sandon Brook
West Chelmsford	Housing	Part of the proposed housing development is located within Flood Zone 2 and 3 associated with the River Can and one of its tributaries.
Medway Close	Housing	Part of the proposed housing development is located within Flood Zone 2 and 3 associated with a tributary of the River Can.
Beach's Drive	Housing	All of the proposed housing development is located within Flood zone 2 and 3, associated within the River Can.
New development north of Manor Farm	Housing	The majority of the proposed development is located within Flood Zone 2 and 3 associated with a tributary of the River Chelmer.
East Chelmsford-Manor Farm	Housing	Part of the proposed housing development is located within Flood Zone 2 and 3 associated with a tributary of the River Chelmer.
New Street	Housing	A small section of the proposed housing development is located within Flood Zone 2 and 3 associated with the River Chelmer.
Victoria Road	Housing	The majority of the proposed housing developments is located within Flood Zone 2, with some sections located within Flood Zone 3, associated with the River Chelmer.
Granary Car Park off Victoria Road	Housing	The majority of the proposed housing development is located within Flood Zone 2, with some sections located within Flood Zone 3, associated with the River Chelmer.
Springfield Road	Housing	The majority of the proposed housing development is located within Flood Zone 2 and 3, associated with the River Chelmer.

Location	Allocation	Flood Risk
Navigation Road	Housing	A small section of the proposed housing development is located within Flood Zone 2.
Meadows Shopping Centre	Housing	The majority of the proposed housing development is located within Flood Zone 3, with the rest located within Flood Zone 2, associated with the River Chelmer and the River Can.
Wharf Road	Housing	The majority of the proposed housing development is located within Flood Zone 3, with the rest located within Flood Zone 2, associated with the River Chelmer.
Navigation Road	Housing	The majority of the proposed housing developments is located within Flood Zone 2 and 3, associated with the River Chelmer.
Baddow Road Car Park and land to the east of the car park	Housing	The majority of the proposed housing development is located within Flood Zone 3, with a small section located within Flood Zone 2, associated with the River Chelmer.
Junction 18 of the A12	Employment	An area of the proposed employment development is located within Flood Zone 2 and 3, associated with Sandon Brook.
Water House Lane	Employment	The majority of the proposed development is located within Flood Zone 2 and 3, associated with the River Can.

Table I-2: Summary of Flood Zone risk for committed sites.

Location	Committed site type	Flood Risk
Victoria Road South	Housing	The committed site is located within Flood Zone 2.
Springfield Road	Housing	The committed site is located within Flood Zone 2.
Land to the rear of 51- 54A High Street	Housing	The committed site is located within Flood Zone 3.

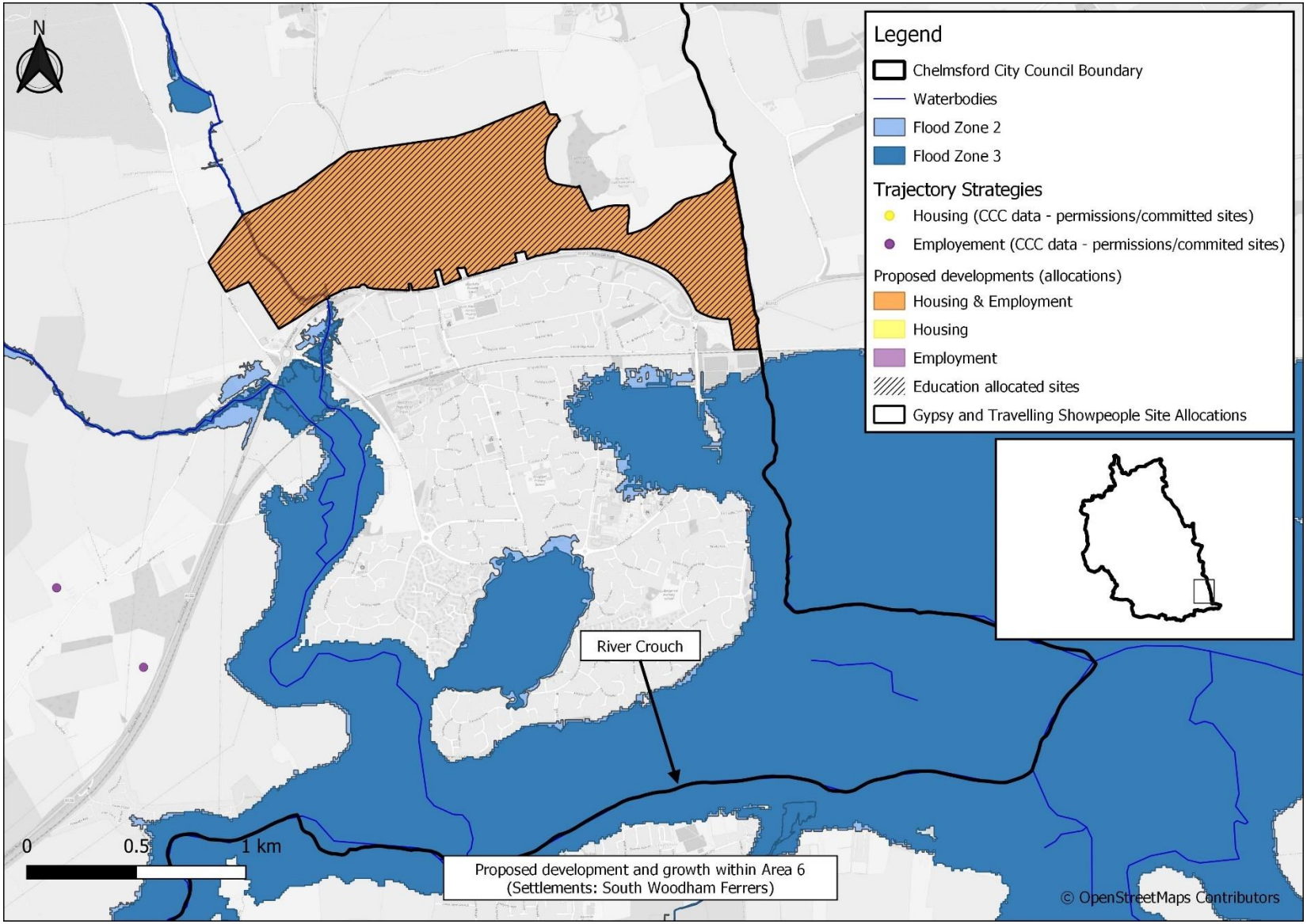


Figure I-1: Area 6 – Extent of Flood Zones 2 and 3 at Area 6 (Settlements: South Woodham Ferrers)

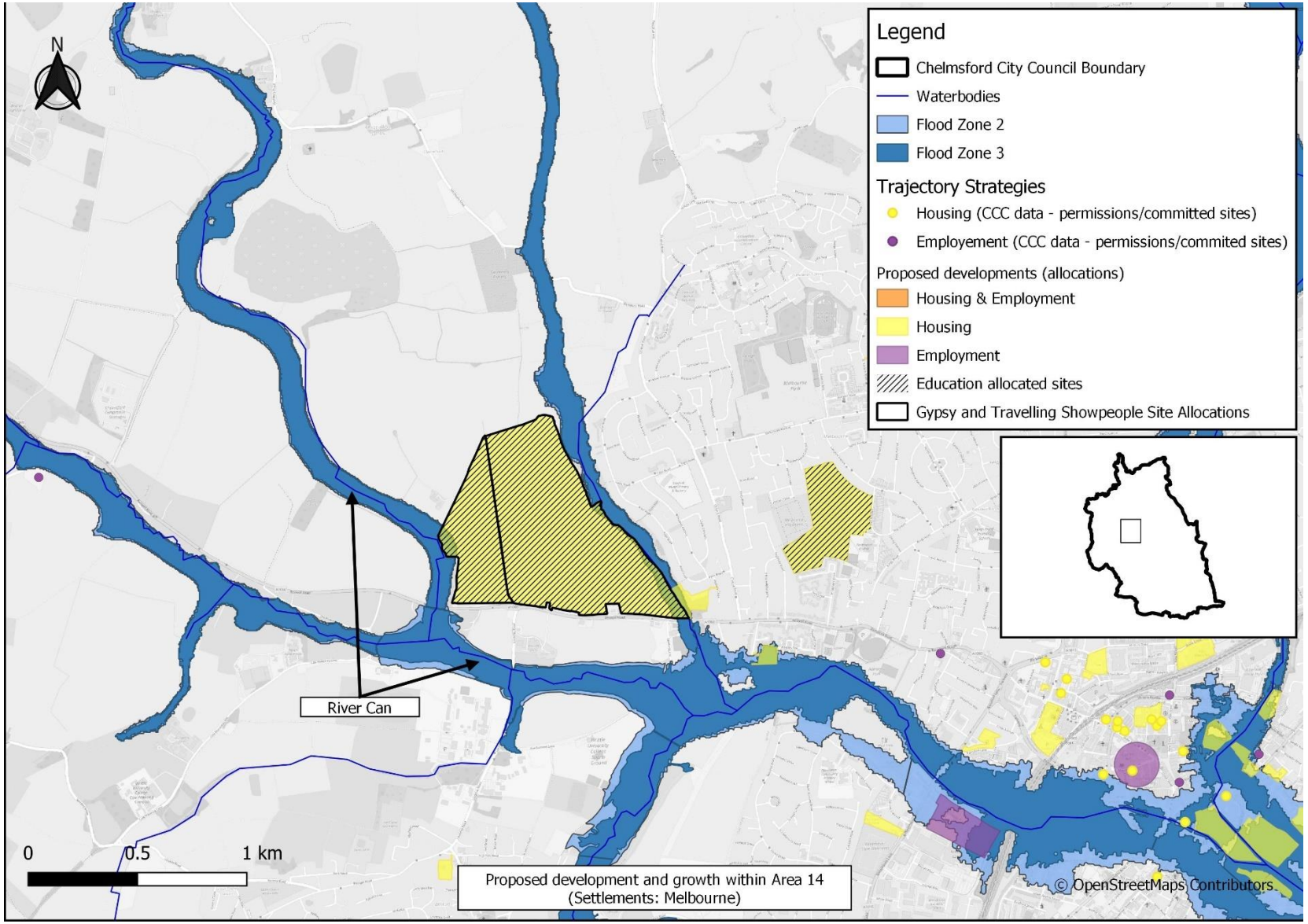


Figure I-2: Area 14 – Extent of Flood Zones 2 and 3 at Area 14 (Settlements: Melbourne)

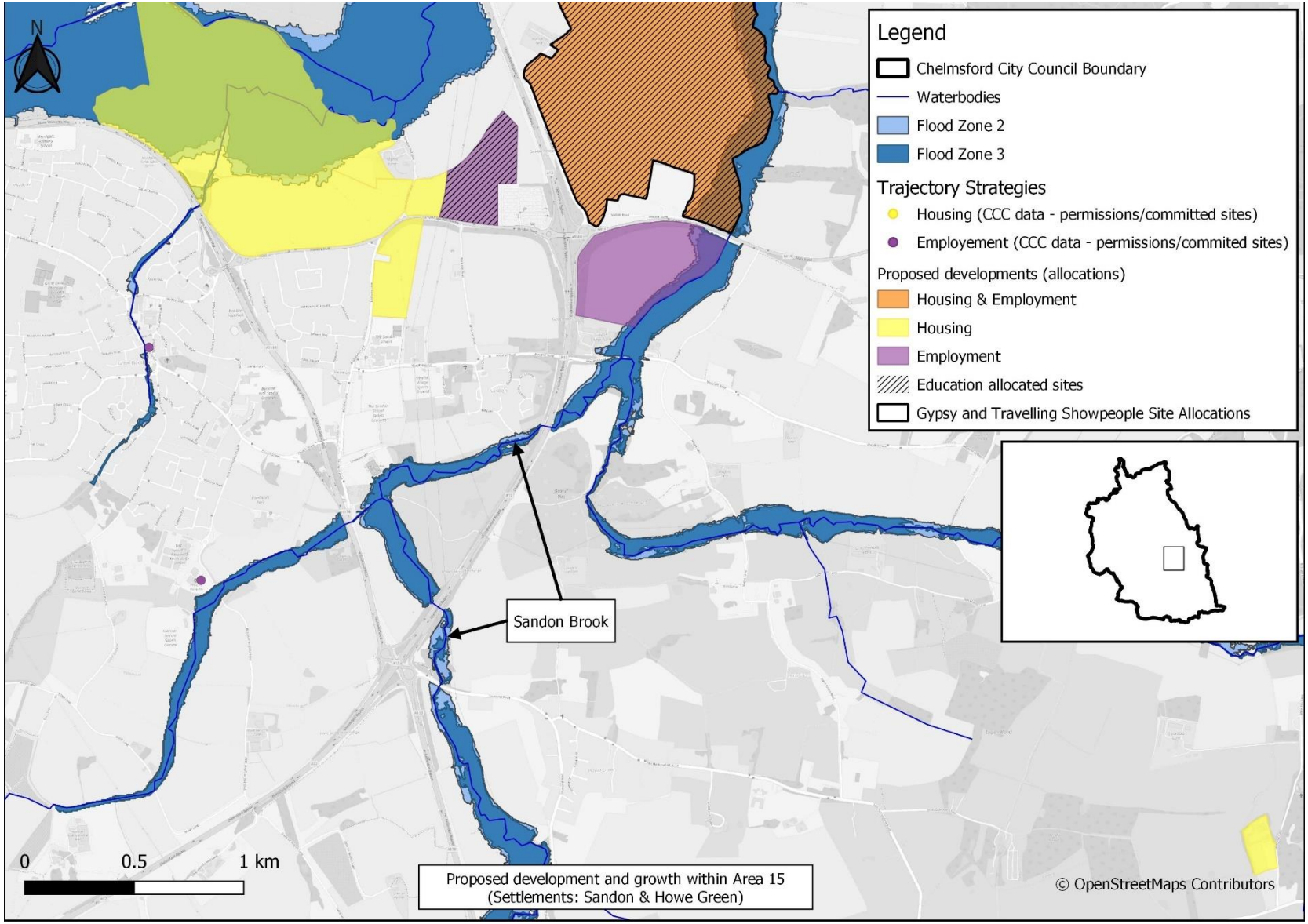


Figure I-3: Area 15 – Extent of Flood Zones 2 and 3 at Area 15 (Settlements: Sandon and Howe Green)

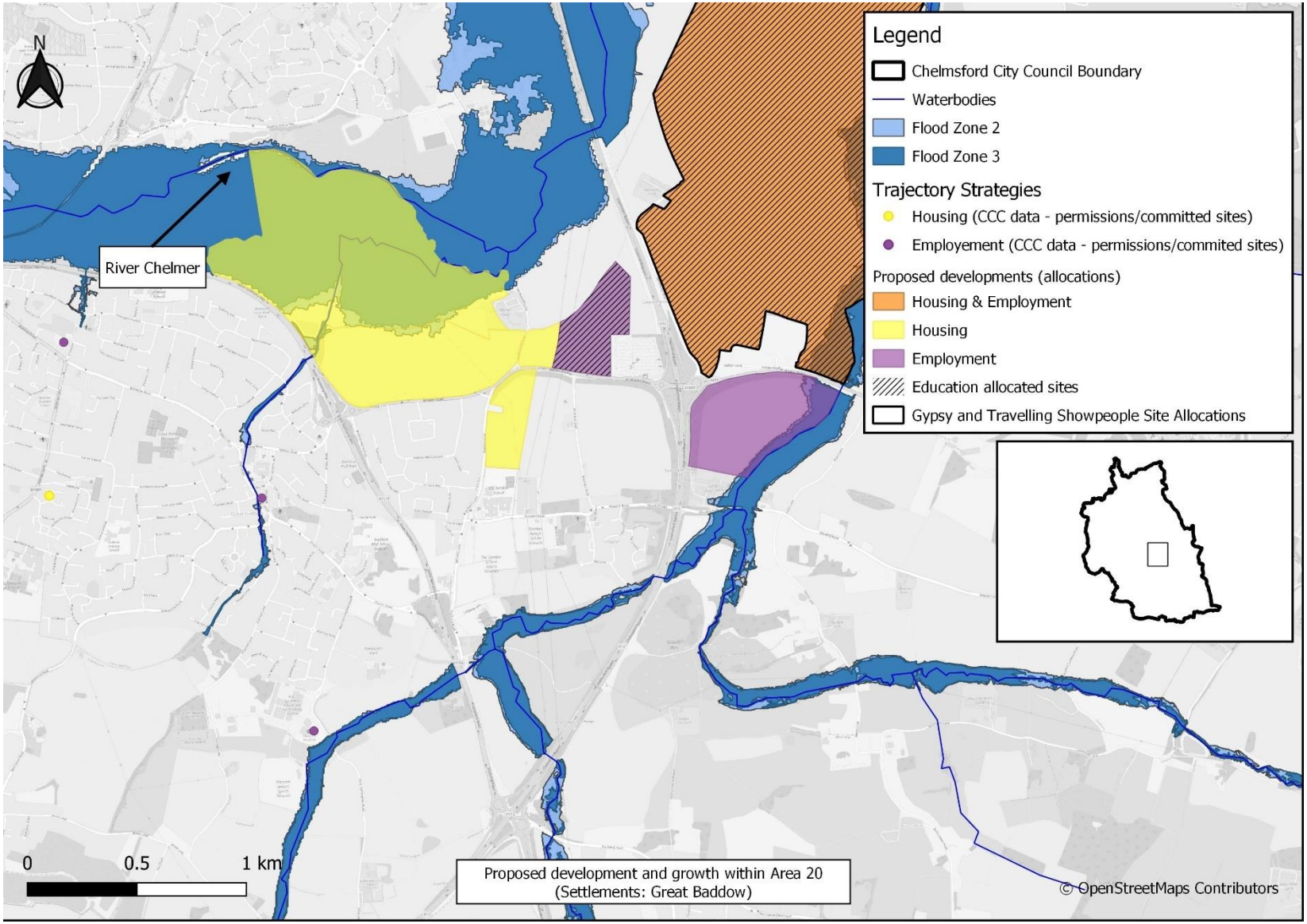


Figure I-4: Area 20 – Extent of Flood Zones 2 and 3 at Area 20 (Settlements: Great Baddow)

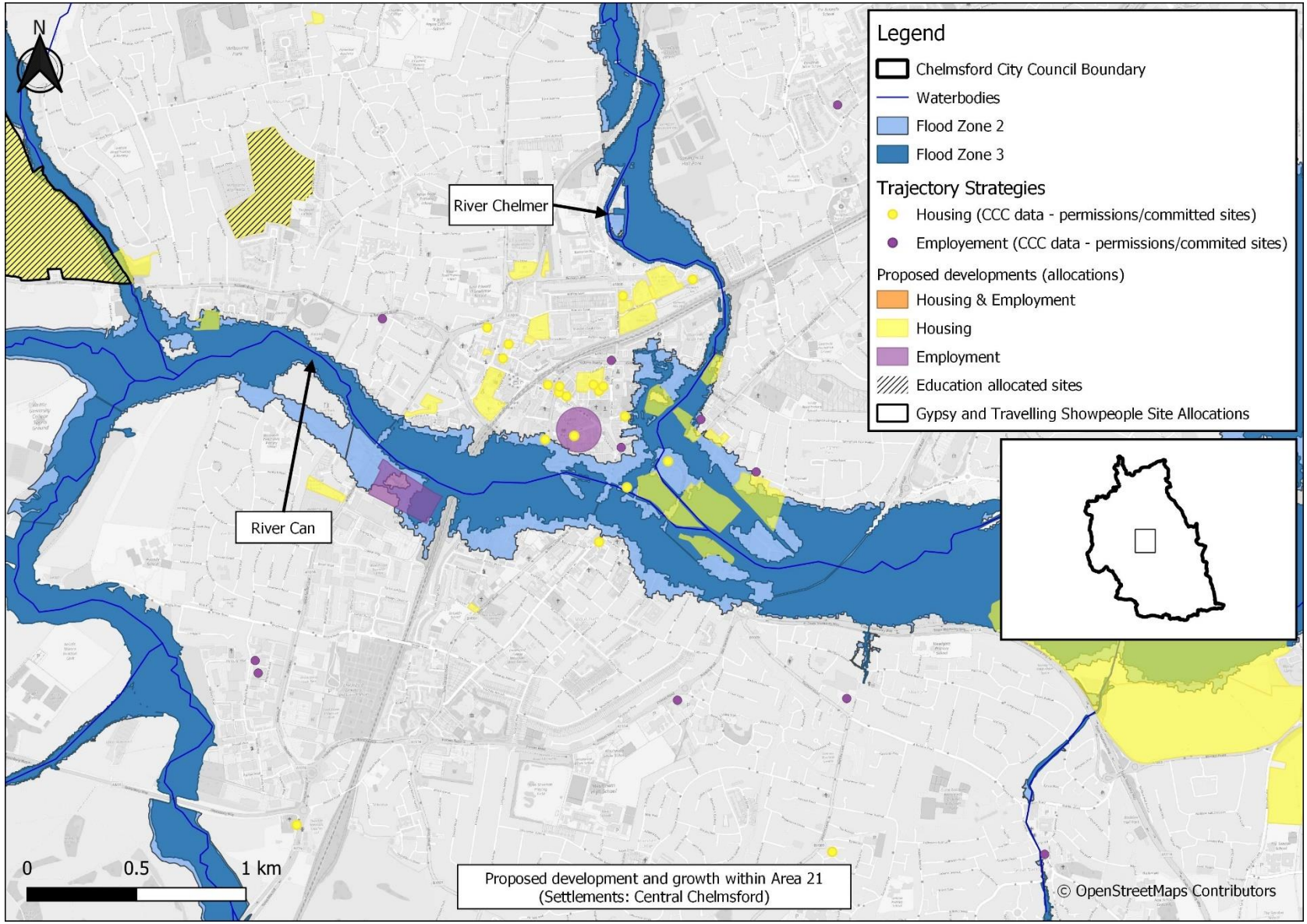


Figure I-5: Area 21 – Extent of Flood Zones 2 and 3 at Area 21 (Settlements: Central Chelmsford)

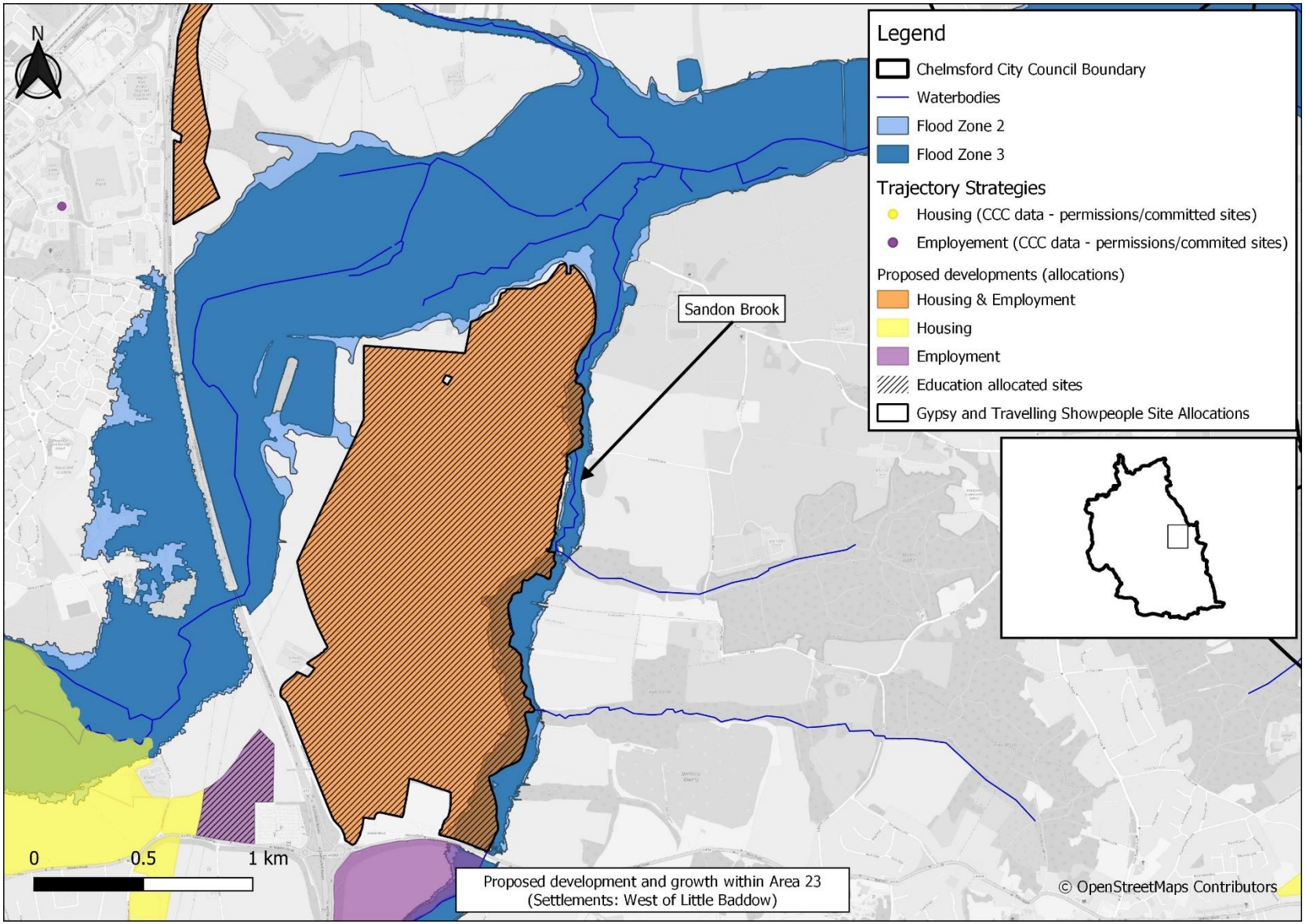


Figure I-6: Area 23 – Extent of Flood Zones 2 and 3 at Area 23 (Settlements: West of Little Baddow)

Appendix J

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

Table J-1: Flood risk multi-criteria assessment scoring for each Wastewater Recycling Centre within Chelmsford City Council's Administrative Area

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
Pleshey	Walthambury Brook, Tributary of	0.81	1.11	0.000	0.00%	1	Medium	2	Low	1	0.6	0.3	0.4	1.3	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		
	the River Chelmer														
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
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

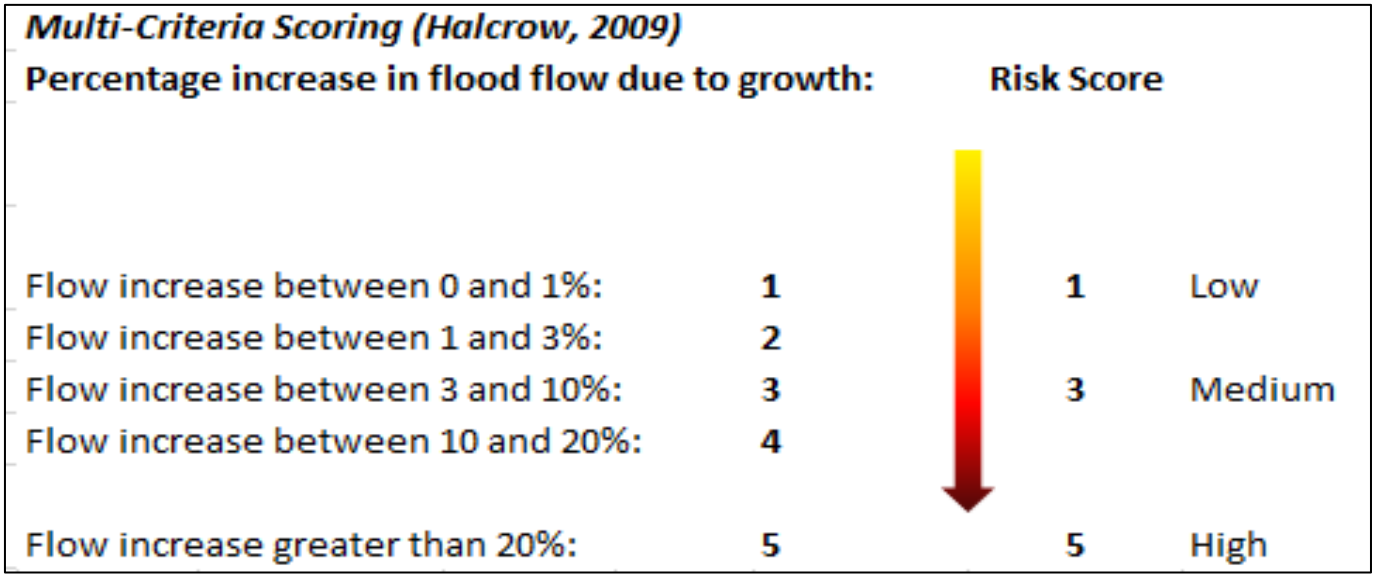


Figure J-1: The Thresholds for the multi-criteria scoring from Halcrow 2009

Appendix K

Chelmsford Water Cycle Study – BREEAM Credits

Table K-1: Potential BREEAM water credits for homes.

Category	Criteria	Credits
Water Consumption	Baseline	0
	12.5% improvement required over baseline	1
	25% improvement required over baseline	2
	40% improvement required over baseline Includes greywater and rainwater system	3
	55% improvement required over baseline Includes greywater and rainwater system	4
	65% improvement required over baseline Includes greywater and rainwater system	5
Water Monitoring	Water metering installed to meet standard specified	1
Water leak detection	Leak detection system installed to meet standard specified.	1
	Flow control devices installed to regulate water supply.	1
Water efficient equipment	Demonstrable reduction in all other water demands not listed in other categories	1

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