

4. Water Resources and Public Water Supply

4.1 Introduction

Water resources are managed by the Environment Agency in England and Wales, via the water abstraction licensing system. The Environment Agency uses a consistent national approach of Catchment Abstraction Management Strategies (CAMS) as a tool to inform licensing policy and local decisions. CAMS consider what level of abstraction is sustainable within a catchment, based on the environmental flow requirements (and, where relevant, groundwater level) at points within the catchment. The CAMS “status” of catchments within the study area indicates the extent to which the environment can support further abstractions to meet demand from new development.

Essex and Suffolk Water and Anglian Water are the public water supply undertakers in the Braintree area. The water company areas are subdivided into water resource zones. A water resource zone (WRZ) is the largest possible area in which all water resources, including external transfers, can be shared and hence the zone in which all customers experience the same risk of supply failure from a resource shortfall. Braintree is within Anglian Water’s East Suffolk and Essex WRZ, and Essex and Suffolk Water’s Essex WRZ. Haverhill is located within the Cambridgeshire and West Suffolk WRZ (Anglian Water). Figure 4.1 illustrates the WRZs and shows how the percentage of housing growth within each zone relates to the study area. Over 90% of the Braintree and St. Edmundsbury district is covered by the East Suffolk and Essex WRZ. The water companies measure demand from households at the WRZ level.

The network infrastructure in WRZs is highly integrated which means that water used for public supply purposes within Braintree could be sourced from outside the district, for example from Ardleigh Reservoir. The availability of resources within all of these zones could potentially constrain further development within the study area.

The following section reviews the CAMS status of the catchments surrounding the study area, and the balance between water supply and demand in the water resource zones.

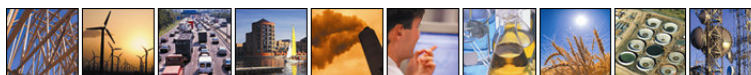
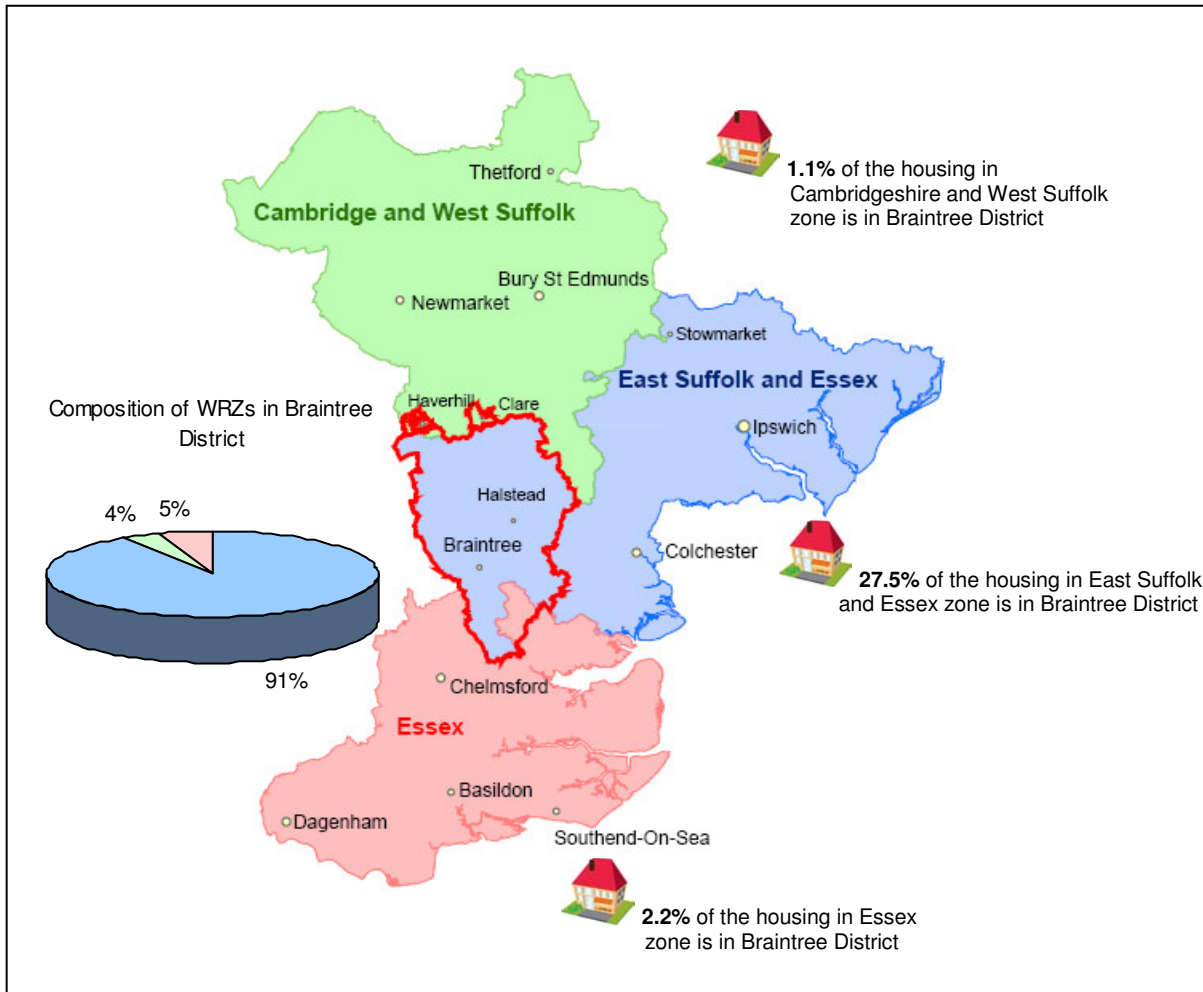


Figure 4.1 Water resource zones and existing housing structure in Braintree District, Haverhill and Clare study area

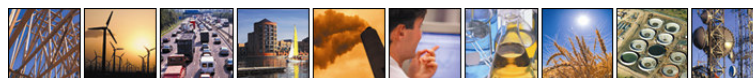


4.2 Availability of Water Resources

The Braintree District lies within the catchments of the Rivers Brain, Blackwater, Colne and Stour (these rivers are labelled in Figure 3.2).

The Environment Agency has completed its assessment of water availability and the impacts of existing abstraction on the aquatic environment in this area. Detail on the catchment resource assessments within Braintree is reported in the Combined Essex Catchment Abstraction Management Strategy (Environment Agency, 2007a). Resource assessments in adjacent areas are reported in the Cam and Ely Ouse CAMS (Environment Agency, 2007b), and the East Suffolk CAMS (Environment Agency, 2007c).

In the catchments directly related to Braintree over 80 per cent of all water abstracted is used in public water supply. Agricultural use (general agriculture and spray irrigation) accounts for approximately 10 per cent of total water abstraction, with the remaining 10 per cent being used for other purposes such as industrial processes.



Generally, most of the catchments in Essex and Suffolk are either *over-abstracted* or *over-licensed*. This means that the Environment Agency is unlikely to grant further licences to abstract water directly from the environment. More detail on the CAMS assessments is available in Appendix C. The Environment Agency has identified a limited number of locations where there may be additional water available for abstraction within the CAMS surrounding Braintree District. These are shown in Figure 4.2 and include the Tenpenny Brook in Essex; the Blyth and Lothingland Hundred catchments in Suffolk; and the Lower Cam chalk and Old West River catchments in Cambridgeshire. However, all these catchments are outside Braintree District and the water resource zones that supply the district and are subject to “Hands Off Flow” restrictions, meaning that during sustained dry periods water is unlikely to be available for abstraction.

The CAMS assessment also indicates that there is no additional groundwater available from the confined chalk within the Essex CAMS area. Where abstraction is identified as causing a problem, the Environment Agency’s licensing strategy is to secure licence variations that reduce abstraction volumes, when the licences are renewed.

The CAMS documents demonstrate that there is limited environmental capacity to support further abstraction to meet demand from new development. Increasing resource availability in this area is largely limited to making more efficient use of existing resources.

4.3 Public Water Supply

Water supply companies have recently set out their strategic requirements in their draft WRMPs. For each of their WRZs, the water companies forecast the demand for water over a 25 year period. This is compared against existing and baseline forecast supply capability. The demand forecasts are based on estimates of future consumption in existing homes and businesses, and also reflect best estimates of the numbers of new homes and businesses that may be built within that period. The baseline supply forecast reflects existing resources and schemes that are already planned and funded for implementation.

Where a shortfall in supply capability is identified the water company has to implement schemes to resolve the situation. These schemes are generally a combination of demand management and resource development. It should be noted that to ensure that supply will be secure the water companies have to take uncertainties into account in their WRMPs. These uncertainties include, for example, how climate change may affect demand and resource availability in the future.

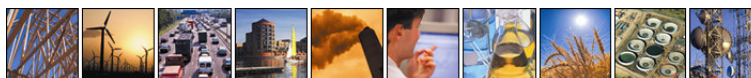
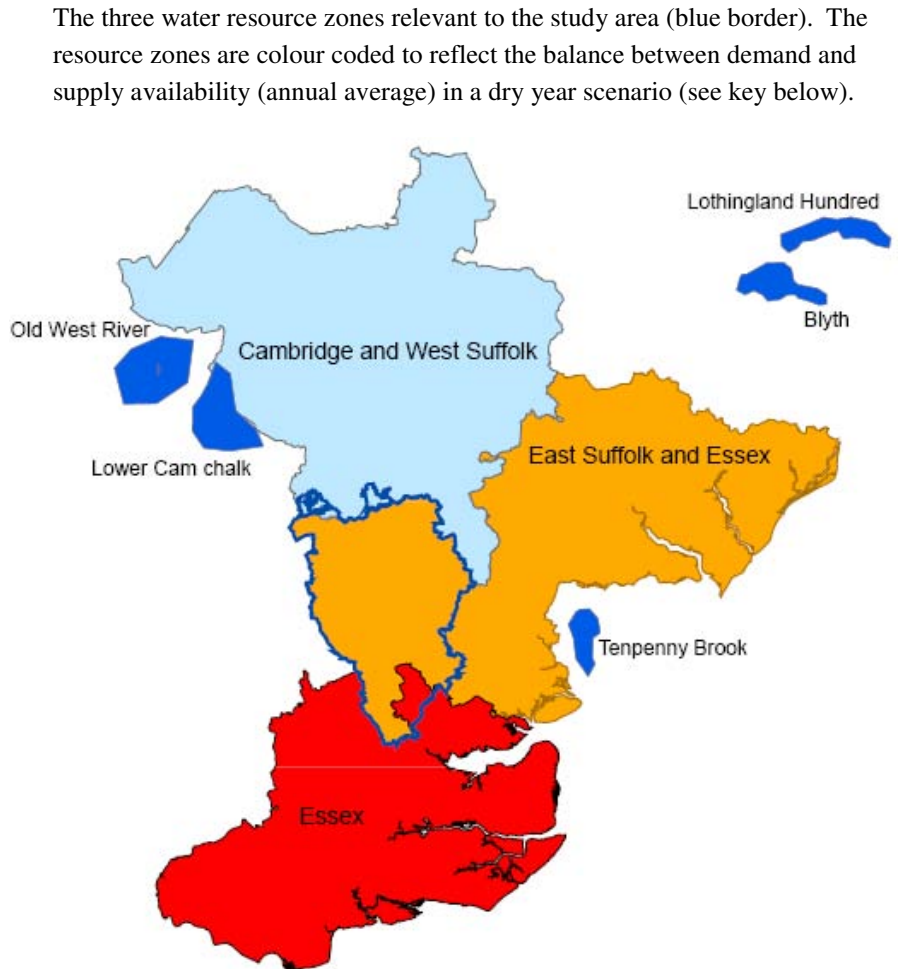



Figure 4.2 Supply-demand balance (baseline) and CAMS assessment of water availability



The location of the study within the wider context of Anglian Water's and Essex and Suffolk Water's company areas.



The three water resource zones relevant to the study area (blue border). The resource zones are colour coded to reflect the balance between demand and supply availability (annual average) in a dry year scenario (see key below).

Water Resource Zone	Supply-Demand Balance Forecast (Dry Year Annual Average Condition)
Cambridge and West Suffolk	No deficits. Surplus is forecast to decrease from 11.6 Ml/d in 2006/07 to 1.34 Ml/d by 2025/26
East Suffolk and Essex	Deficits forecast from 2013/14 increasing to -13Ml/d by 2025/26
Essex	Existing deficits forecast to increase from -24.5 Mld to -62 Mld by 2025/26
	Catchments assessed as Water Available at low flows. All other catchments in the region are over licensed or over abstracted

*Catchments defined based on CAMS documents

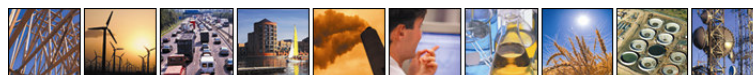


Figure 4.2 shows the areas of Braintree District supplied by the two water companies and it illustrates their baseline supply-demand balance situation. These figures take into account proposed housing growth at a WRZ level, and show what the water supply situation would be if the companies do not introduce new policies or schemes to respond to the potential demand.

4.4 Demand in Braintree

The previous sections show that water company plans are robust to the regional levels of housing growth being considered in this study, and that the water supply network in Anglian Water’s supply area needs to be developed to meet demand from new developments. Detailed water demand forecasts for the local supply areas that incorporate Braintree are not available.

The forecasts presented in this section illustrate the potential demand for water from development within Braintree and how this may be managed by constructing new homes to meet the standards of water efficiency set out in the Code for Sustainable Homes (more information on the code standards and the estimated cost of meeting the code is in Appendix F). Appendix D provides a description of the approach used to assess potential demand from the proposed development within study area.

4.4.1 New Household Demand Scenarios

Additional homes inevitably generate additional demand for water but how much extra is generated depends on the water efficiency level of the properties that are built. Constructing new water efficient homes, such as those set out in the Code for Sustainable Homes (CSH), presents the opportunity to minimise the demand from new houses. In the following section eight demand forecasts have been produced based on the two growth scenarios previously outlined and four ‘demand’ scenarios defined in Table 4.1.

Table 4.1 Definition of demand scenarios

Scenario	Definition
Business As Usual (BAU)	New homes are built to the water efficient standards that the water companies have assumed in their draft Water Resource Management Plans. The water companies’ pcc forecasts for new build properties are applied. The water companies have disaggregated forecast measured pcc into type including ‘New build’. The data are taken from the draft Water Resource Management Plans (WRP table 6)
Water efficiency CSH level 1/2	Assumes new homes are built to standards enabling a maximum pcc of 120 l/person/day plus an additional 4.8 l/household/day for outdoor use.
Water efficiency CSH level 3/4	Assumes new homes are built to standards enabling a maximum pcc of 105 l/person/day plus an additional 4.2 l/household/day for outdoor use.
Water efficiency CSH level 5/6	Assumes new homes are built to standards enabling a maximum pcc of 80 l/person/day plus an additional 4.3 l/household/day for outdoor use.



Figure 4.3 and Figure 4.4 show the different demand forecasts that may result from building 300 or 500 new homes per year. In the highest demand scenario (500 new homes per year under business as usual) the extra demand could be 3.5 MI/d. In the lowest demand scenario (300 new homes per year built to the highest standards of the Code for Sustainable Homes) the extra demand would be 2 MI/d. Figure 4.5 and Figure 4.6 show the demand forecasts that may result taking into account all households, new and existing.

Figure 4.3 Forecast demand from new households (300 per year)

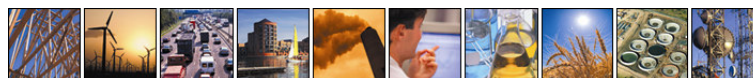
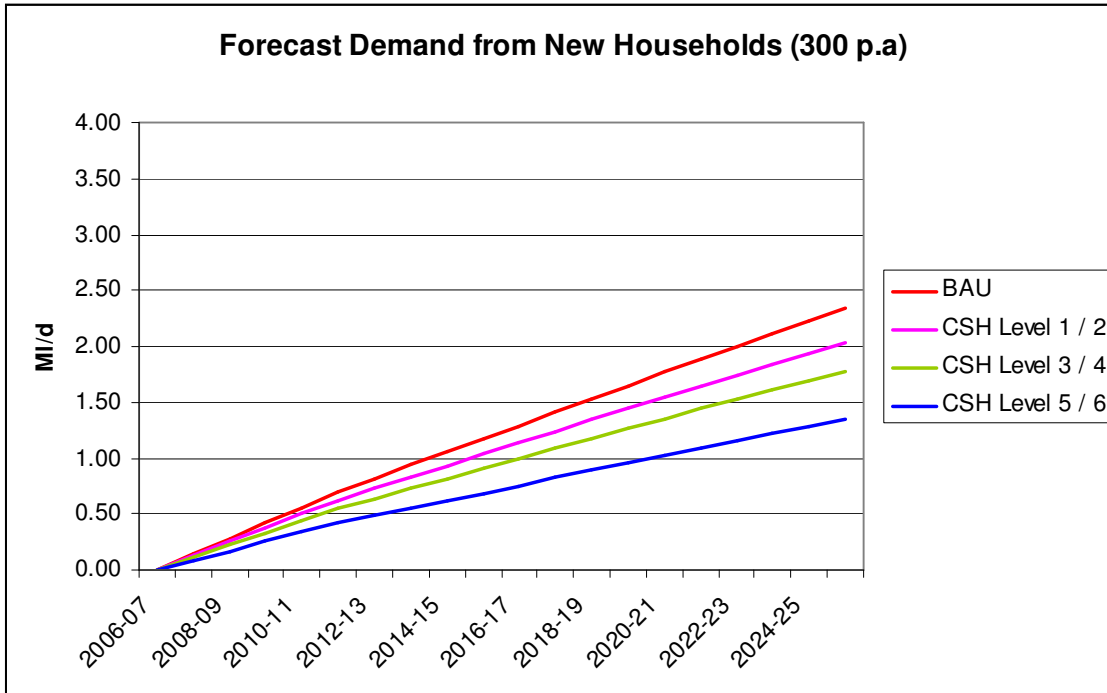


Figure 4.4 Forecast demand from new households (500 p.a. scenario)

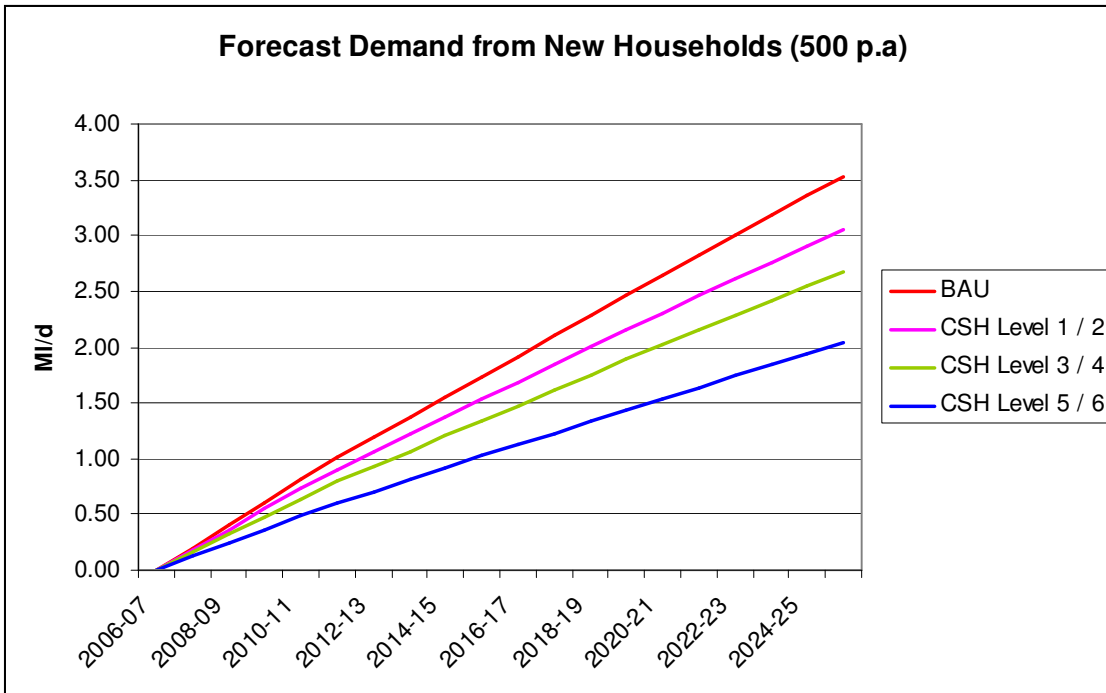


Figure 4.5 Forecast demand – all households (300 p.a. scenario)

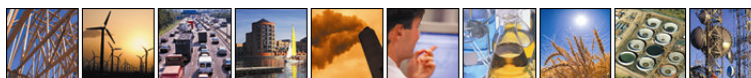
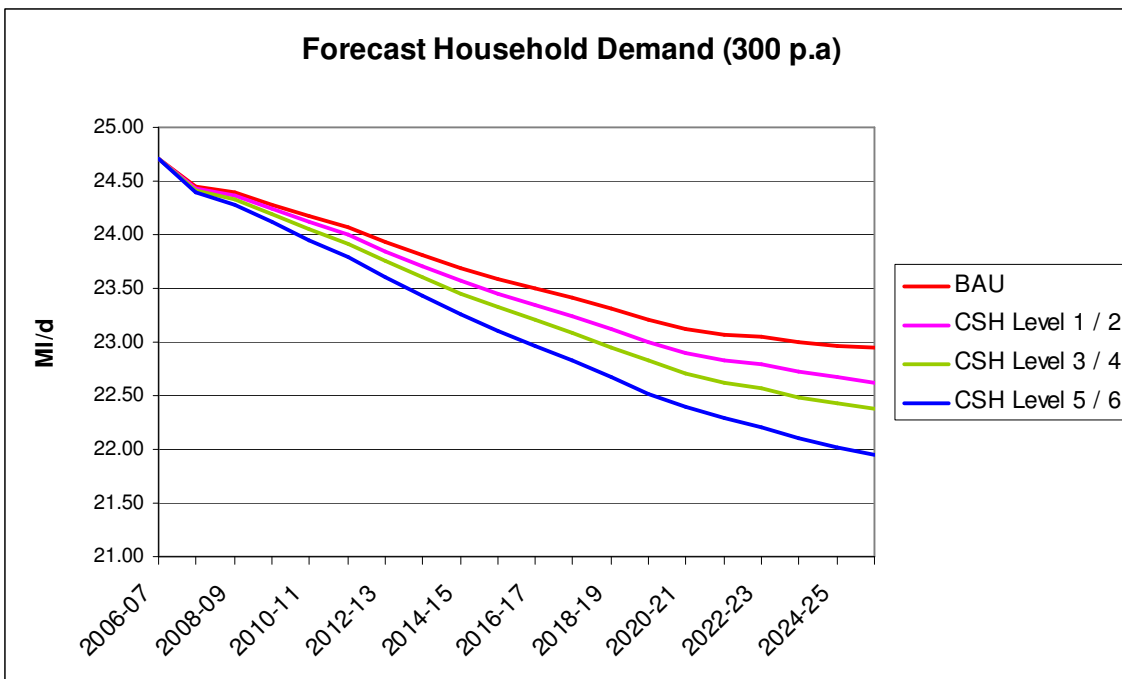


Figure 4.6 Forecast demand – all households (500 p.a. scenario)

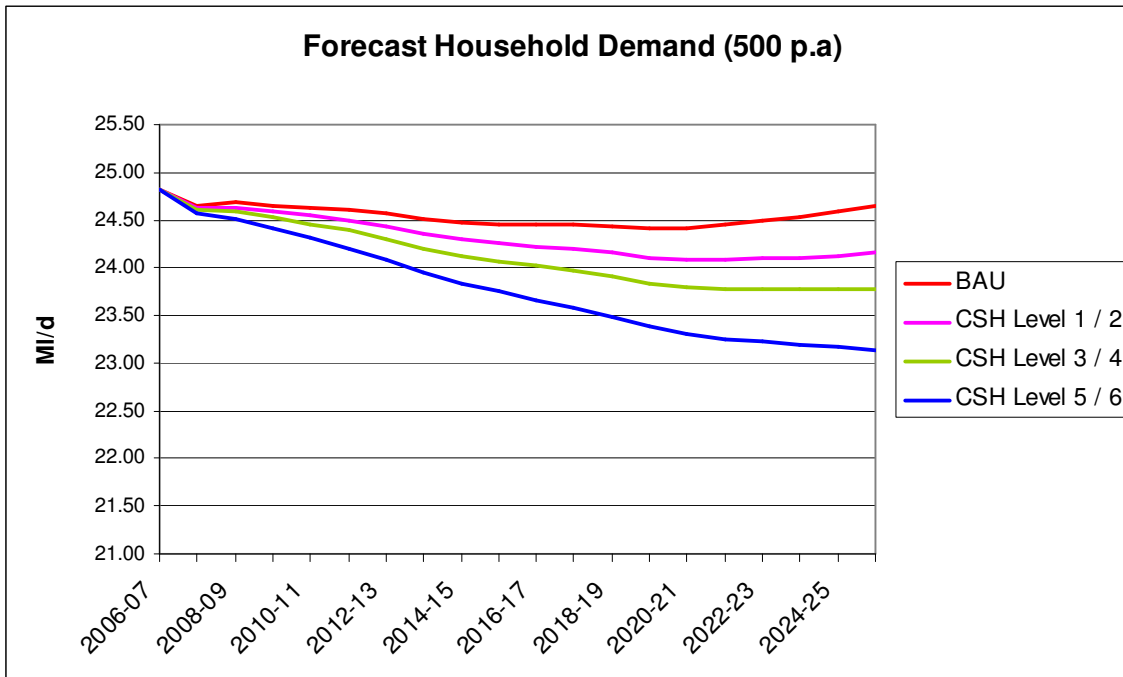


Figure 4.5 and Figure 4.6 show that despite the increase in demand from new households, a net decline in overall household demand is expected in all cases, excepting 500 per year under Business as Usual. This is largely due to the increase in metering which is forecast.

4.4.2 Non Household Demand

After reconciling the non household demand figures from the water companies' WRZs and Braintree District Council's information, existing non household demand in the Braintree area is approximately 8.59 MI/d. Existing non household demand is forecast to remain constant but demand from new non households is forecast to increase at a steady rate of 0.11 MI/d per annum until 2025-26 when total non-household demand may reach 10.71 MI/d. The water companies have forecast negligible increases (0.06 MI/d) in non household demand in their WRZs. The specific Braintree forecast is based on the spatial extent (floor space) of the proposed non household developments. There is uncertainty in both sets of demand forecast. In reality, the actual annual increase in non household demand may be somewhere in between the Braintree scale estimate of 0.11 MI/d and the WRZ estimate of 0.06 MI/d.

The plans for a proposed business park are being developed but it is possible to estimate the quantity of domestic type demand that could be generated based on approximate floor space and type of business. An English Partnership report (Arup Economics, 2001) explains how employment densities can be calculated based on floor space and British Standards (BS 6465-1:20060) dictate the provision of sanitary appliances required based on the number of people who will use the building. All demand estimates are based on assumptions regarding frequency



of use and the volume of water used per use of appliances. The demand figures in Box 4.1 have been developed by Entec using the best information that is currently available. However, there is significant uncertainty surrounding the figures and as such should be viewed with caution.

Box 4.1	Estimated Demand From Commercial Use In Relation to Area
	1 x 12 Ha office : 40% floor space ratio = 0.07 MI/d
	1 x 1 Ha Football pitch = 0.001 MI/d
	Total for 2 x 12 Ha offices and 1 hectare football pitch = 0.14 MI/d

4.4.3 Options to Maintain Public Water Supply

Both Anglian Water and Essex and Suffolk Water have made allowances at the strategic (WRZ) level for additional growth as set out in the draft East of England Plan. The Plan sets out housing growth will be concentrated rather than dispersed as this is more sustainable. It goes on to say that average annual growth in Braintree will be 385 net additional dwellings per year, totalling 7,700 by 2021. Provided that the water companies can implement their plans in full, water resource availability at the resource zone level should not be a constraint to growth in Braintree district. The water companies draft WRMPs set out the strategic and localised options that they consider necessary to secure public water supply over a 25 year planning period. The following section describes the options that the water companies are planning to implement to improve water supply in the study area.

Network Requirements

Anglian Water has reviewed its water distribution network and has assessed the improvements that would be required to support the construction of 7,700 new homes in the Braintree District by 2021 (Anglian Water, unpublished). This equates to at least 300 new homes per year and the requirements are set out in Table 4.2.

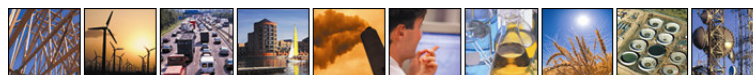


Table 4.2 Anglian Water network requirements – Braintree area

Requirement	Date required
Transfer main to the Haverhill Planning Zone	2020-2025
Transfer main to the Halstead Rural Planning Zone	2010-2015
Transfer main to the Braintree Planning Zone	2025-2030
Additional storage in the Braintree planning zone	After 2010
Additional storage in the Halstead planning zone	After 2010
Additional storage in Ardleigh area.	After 2010

The requirements include new trunk mains to transfer water into the study area to meet demand, and additional treated water storage around Braintree and Halstead. The company has also identified that a new trunk main to transfer water from Colchester to Haverhill will be needed in the early 2020's to meet demand from new development within the Haverhill area. Anglian Water has not identified the need for significant capital expenditure in the area around Haverhill between 2010-15 (AMP 5).

Essex and Suffolk Water has not identified any additional network requirements to meet growth within Braintree District. The company has planned resource developments to resolve its existing supply-demand balance issues. Low pressure has occurred in the past at Silver End and Rivenhall at times of peak demand (e.g. periods when there is more discretionary water use such as garden watering). Customer demand has since stabilised and the company has reduced leakage in the area such that low pressure is no longer being experienced by customers. Development in this area may require network improvements to move more water into the area if hundreds of houses are planned (Essex and Suffolk Water, *personal communication*). The location of the proposed housing development has not yet been planned, but if development in Braintree District is in line with the sustainable development principles outlined in the draft East of England Plan, i.e. concentrated rather than dispersed, then the majority of the proposed housing growth would be within Anglian Water's company area. Essex and Suffolk Water states that development in the Witham area is accounted for in its plans and will not require any network schemes.

Local mains laying will be required to connect individual developments to the water supply network. These are funded by developers and do not appear in water company plans. The water companies are preparing their final WRMPs during the latter half of 2008, which presents the opportunity for the companies to revise their forecasts should there be a requirement to do so.



4.5 Interim Conclusion

Q. Is Water Supply/Water Resources a constraint to growth in the Study Area?

Water is a precious and increasingly scarce resource, particularly in the South and East of England. There are limited opportunities for the water companies to increase their abstractions from the environment; therefore demand must be managed and water to meet increased demand must come from changes and improvements in the utilisation of existing resources. In the study area, water supply in itself is not a constraint to growth. In their draft Water Resource Management Plans Anglian Water and Essex and Suffolk Water have taken account of possible changes in demand from new growth. Both water companies have strategic and localised schemes in their plans to accommodate the scale of growth proposed for the study area. The plans to maintain secure public water supply incorporate schemes to improve the distribution network and to manage demand by increasing water efficiency in new and existing homes, and in non households. Water efficiency can also have a positive impact on both drainage and wastewater capacity and so should be adopted in substantial developments.

By constructing new homes to greater standards of water efficiency it may be possible to reduce the demand from new development significantly. The implementation of similar measures in non household buildings could result in the achievement of a 10% reduction in demand when compared to the construction of new non-household properties at the standard level.

Reducing demand from new development may delay or remove the need for new water infrastructure. However, these savings are not guaranteed for the following reasons:

- The CSH is currently voluntary. Publicly funded developers have made commitments to construct new homes to standards within the CSH (e.g. all new homes constructed on English Partnerships land will be constructed to CSH Level 3/4 from April 2008). The uptake of the CSH will be slower in the private sector;
- Research shows that it is possible to construct new homes to meet the standards set out in the CSH using fixtures and fittings currently available on the market. However, in practice this relies on the occupants retaining and using the fixtures and fittings at the frequency and duration modelled. Any deviation from this would increase water consumption;
- Homeowners could remove the water efficient fixtures and fittings and replace them with fixtures and fittings that consume more water. An example would include the replacement of a low-flow shower with a power shower.

Water companies have a statutory duty to supply new homes with water. The companies therefore have to plan for demand from new developments at an appropriate level. The water companies could not guarantee secure water supplies by planning on the basis of high levels of water efficiency.

