

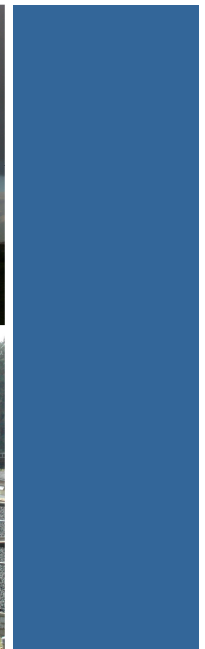
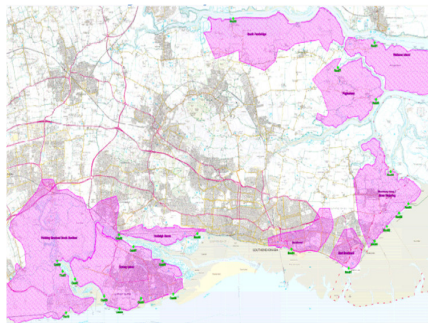
Essex Thames Gateway

Essex Thames Gateway Water Cycle Study

Scoping Study

Final Report

March 2009



Prepared for:

Basildon District Council,
Castle Point Borough Council,
Rochford District Council,
Southend-on-Sea Borough Council,
Essex County Council

Revision Schedule

Essex Thames Gateway Water Cycle Study – Scoping Report March 2009

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02	March 2009	Final Scoping report	Mary Pyne Assistant Water Specialist	Carl Pelling Senior Consultant - Water	Jon Robinson Associate

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1 Executive Summary

1.1 Introduction

This Essex Thames Gateway Water Cycle Study Scoping report has undertaken a sub-regional review of the existing condition of both the natural water environment and the water infrastructure which serves the population of the South Essex study area.

A significant level of growth and new development is proposed within the planning authority areas of Basildon District Council, Southend-on-Sea Borough Council, Castle Point Borough Council and Rochford District Council whose administrative boundaries make up the immediate study area. This development has the potential to have a negative impact on the water environment and there is potential for there to be limitations on the capacity of the infrastructure available to service this new development

This scoping study aims to identify where there are issues and constraints within the water environment and water infrastructure that requires further consideration in the next phase of the Water Cycle study. It also defines the extent of the study area, implications from the recent Pitt review into the 2007 floods and sets the scope of the work required in the next stage of the study.

1.2 Water Resources & Supply

The following scopes the existing condition with respect to Water Resources and Water supply infrastructure in the Essex Thames Gateway area and what is require to be addressed in future stage of the WCS:

- The Essex Thames Gateway area does not have sufficient raw water resources to supply existing development. As a result, the area is reliance on transfer of raw and treated water to the area from the Thames Region and from Norfolk and Suffolk
- This means that there is limited water is available for further abstraction from surface or groundwater sources and therefore further transfer of water resources will be required to supply water to new developments within the Essex Thames Gateway area;
- Future water demand is expected to be met through the proposed increase in storage at Abberton Reservoir and the commensurate increase in abstraction and transfer from the Ely-Ouse transfer scheme, which if approved will come online in 2014. Until the scheme is in place and operational, there will be a deficit in available water resources during drought years in Essex Thames Gateway area
- The next stages of the WCS are required to define how much growth the Abberton scheme can accommodate, and to identify what water efficiency measures are required in new and existing development to minimise the impact of additional growth.

- There are no immediate limitations on supply infrastructure pipelines, reservoirs, water treatment works or pumping stations. The next stage of the WCS will need to confirm this relative to the location of development options.

1.3 Waste Water Treatment, Collection and Water Quality

There are several WWTW within the study area that have been assessed and as part of the Scoping Study. In each case, the capacity in both the treatment works itself and the sewerage network collection system has been described.

In the majority of cases there is sufficient treatment capacity and capacity in the network to allow planned development in the study area up to 2015. Development beyond this in most cases will require upgrades to the treatment capacity of several of the WWTW and the construction of new strategic sewer mains to service new development; this will need to be defined and assessed in the next stage of the WCS.

Several of the WWTW and future upgrades need to be assessed for the quality of the treated wastewater discharges to ensure that there is no deterioration in water quality of the receiving watercourses under the Water Framework Directive, the Shellfish Directive and the Bathing Waters Directive. The next stage of the WCS will need to consider the consent parameters to be applied to increases in discharges at WWTW to ensure no compliance with these directives.

Water quality of watercourses in the Essex Thames Gateway varies from good to poor. As well as wastewater discharges, runoff from development will need to be managed to ensure that increases in developed land does not lead to an increase in urban pollution and further impacts on water quality. The use of Sustainable urban Drainage Systems (Suds) will need to be addressed as part of the next stage of the WCS.

1.4 Ecology and Baseline Biodiversity.

The Essex Thames Gateway area contains several sites of ecological importance including the Essex Estuaries Special Area of Conservation (SAC), Foulness SSSI and Ramsar site; the Crouch and Roach SSSI SAC and SPA; and, Benfleet and Southend Marshes SPA; all of which have the potential to be impacted upon by development in the study Area. There is unlikely to be any increase in existing abstractions from surface or groundwater sources and as such it is possible to screen out impacts to the sites within the study area as a result of water resources. However, discharges of wastewater still have the potential to impact on these sites and this needs to be considered in the next stage of the WCS.

However, a further sixteen European sites outside of the study area, are considered to have links with development as they have the potential to be impacted by increased water demand up to and post 2014. The sites associated with the Abberton abstraction and transfer scheme will continue to be affected by development in the Essex Thames Gateway area, this will need to be investigated further in the next stage of the WCS.

1.5 Surface Water Management

The management of surface water runoff from new development has the potential to act as a constraint to development within the Essex Thames Gateway area, not just because of space requirements, but because the requirement for a reduction in runoff rates and volumes is likely to be onerous. This would need to be further investigated as part of the outline and detailed stages of the WCS to ensure that the appropriate strategic level constraints and mitigation measures are identified and that guidance is given to the development of a Surface Water Management Plan (SWMP) for each District/Borough as recommended by the recent Pitt Report. The WCS and SWMP will also help to ensure that developers address the required surface water management issues during preparations of site specific FRAs.

1.6 Study area for WCS next phase

The Essex Thames Gateway study area encompasses the administrative boundaries of the authorities of Southend-on-Sea Borough Council, Rochford District Council, Castle Point Borough Council, and Basildon District Council, as well as the Abberton reservoir and the route of raw water transfer from Denver. It is important to note that the study area for the catchment is wider than the definition of the Thames Gateway South Essex authorities for two reasons.

Firstly, the Water Cycle Study must consider the water cycle issues for the entire administrative boundaries of the local authorities of Basildon and Rochford which are not located entirely within the Thames Gateway Growth Area zone.

Secondly, whilst issues to do with wastewater treatment, transfer and discharge are confined to the South Essex authorities and associated ecological sites, the water resources for the area are managed on a wider Essex scale. In addition, the transfer of raw water to the Essex WRZ from outside of Essex further increases the consideration of the study area.

It is recommended that each authority progresses with an Outline WCS based on the preferred locations for development. For the case of Basildon District Council, it is considered that a 'Pre-Outline' study is undertaken where the baseline capacity for water and wastewater services infrastructure and water environment is undertaken for the whole district (at a strategic level) to inform the selection of preferred development locations.

2 Introduction

2.1 Background

The Client Group consisting of: South Essex Strategic Planning Authorities of Essex County Council and Southend-on-Sea Borough Council; and the Local Planning Authorities of Rochford District, Castle Point Borough and Basildon District Councils, require a Scoping Report, as a preliminary stage to achieving a South Essex Water Cycle Study (WCS) and a review of the Thames Gateway South Essex Strategic Flood Risk Assessment (SFRA) which was published in 2006.

The Essex Thames Gateway Scoping WCS will act as a preliminary stage to achieve a South Essex WCS that will provide a sufficient level of detail to inform the emerging Local Development Framework (LDF) and the other Local Development Documents for each of the client authorities.

As part of the scoping, the data collection and collation process has been instigated and has gathered together relevant information ready for use in the next stage of the study.

2.2 Aims and Objectives

The overall objective of the main WCS is to produce a study for South Essex that will provide an integrated approach to managing flood risk, water supply, and wastewater infrastructure in the study area, while being mindful of the environmental constraints. This aims to ensure that all the elements of the water cycle and water infrastructure can be addressed as part of the delivery of the long term planning provision for growth in the area.

3 Essex Thames Gateway Water Cycle Study

3.1 The Water Cycle

In its simplest form, the Water Cycle can be defined as ‘the process by which water is continually recycling between the earth’s surface and the atmosphere’. Without considering human influences, it is simply the process by which rain falls, and either flows over the earth’s surface or is stored (as groundwater, ice or lakes) and is then returned to the atmosphere (via evaporation from the sea, the soil, surface water or animal and plant life) ready for the whole process to repeat again.

In the context of this study, the ‘water cycle’ has a broader definition than the simple water or ‘hydrological’ cycle. The human influence on the water cycle introduces many new factors into the cycle through the need to abstract water from the natural environment, use it for numerous purposes and then return to the natural system. The development and introduction of technology such as pipes, pumps, drains, and chemical treatment processes has meant that human development has been able to manipulate the natural water cycle to suit its needs and to facilitate growth and development. ‘Water Cycle’ in this context is therefore defined as both the natural water related environment (such as rivers, wetland ecosystems, aquifers etc), and the water infrastructure (hard engineering focused elements such as: water treatment works, supply pipelines and pumping stations) which are used by human activity to manipulate the cycle.

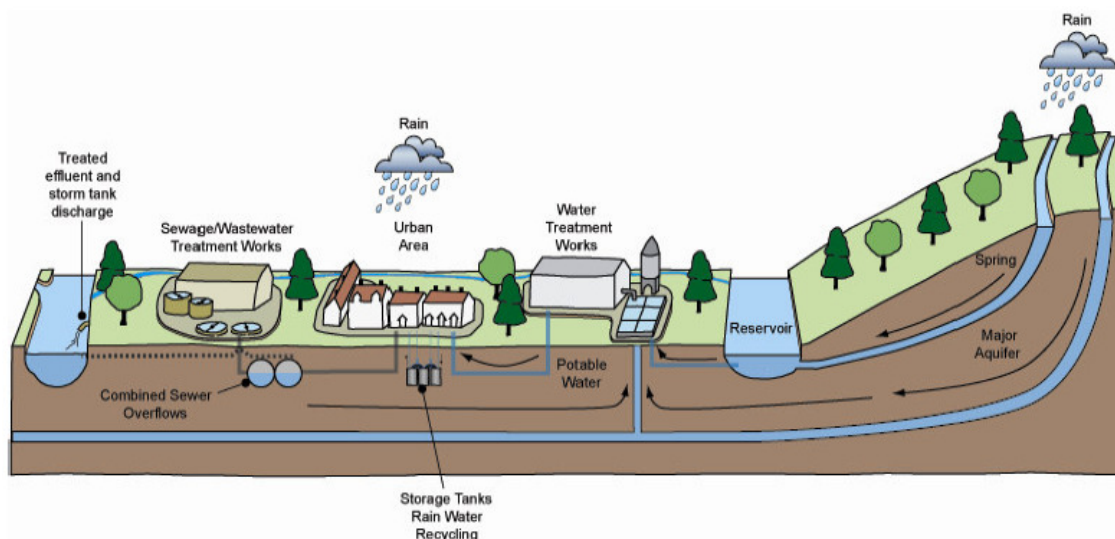


Figure 3-1 The Water Cycle Study (Source: Environment Agency¹)

¹ Water Cycle Study Manual – Guidance on how to carry out a water cycle study, Environment Agency (<http://www.environment-agency.gov.uk/research/planning/33368.aspx>)

3.2 Implications for Development

In directly manipulating elements of the water cycle, man affects many changes to the natural water cycle which can often be negative. To facilitate growth and development, there is a requirement for clean water supply which is taken from natural sources (often depleting groundwater stores or surface systems); the treatment of waste water which has to be returned to the system (affecting the quality of receiving waters); and the alteration and management of natural surface water flow paths which has implications for flood risk. These impacts can indirectly affect ecology which can be dependent on the natural features of a water cycle for example wading birds and wetland habitat, or brown trout breeding in a Chalk stream which derives much of its flow from groundwater sources.

In many parts of the UK, some elements of the natural water cycle are considered to be at, or close to their limit in terms of how much more they can be manipulated. Further development will lead to an increase in demand for water supply and a commensurate increase in the requirement for waste water treatment; in addition, flood risk may increase if development is not planned for in a strategic manner. The sustainability of the natural elements of the water cycle is therefore at risk.

A WCS is an ideal solution to address this problem. It will ensure that the sustainability of new development is considered with respect to the water cycle, and that new water infrastructure introduced to facilitate growth is planned for in a strategic manner; in so doing, the WCS can ensure that provision of water infrastructure is sufficient such that it maintains a sustainable level of manipulation of the natural water cycle.

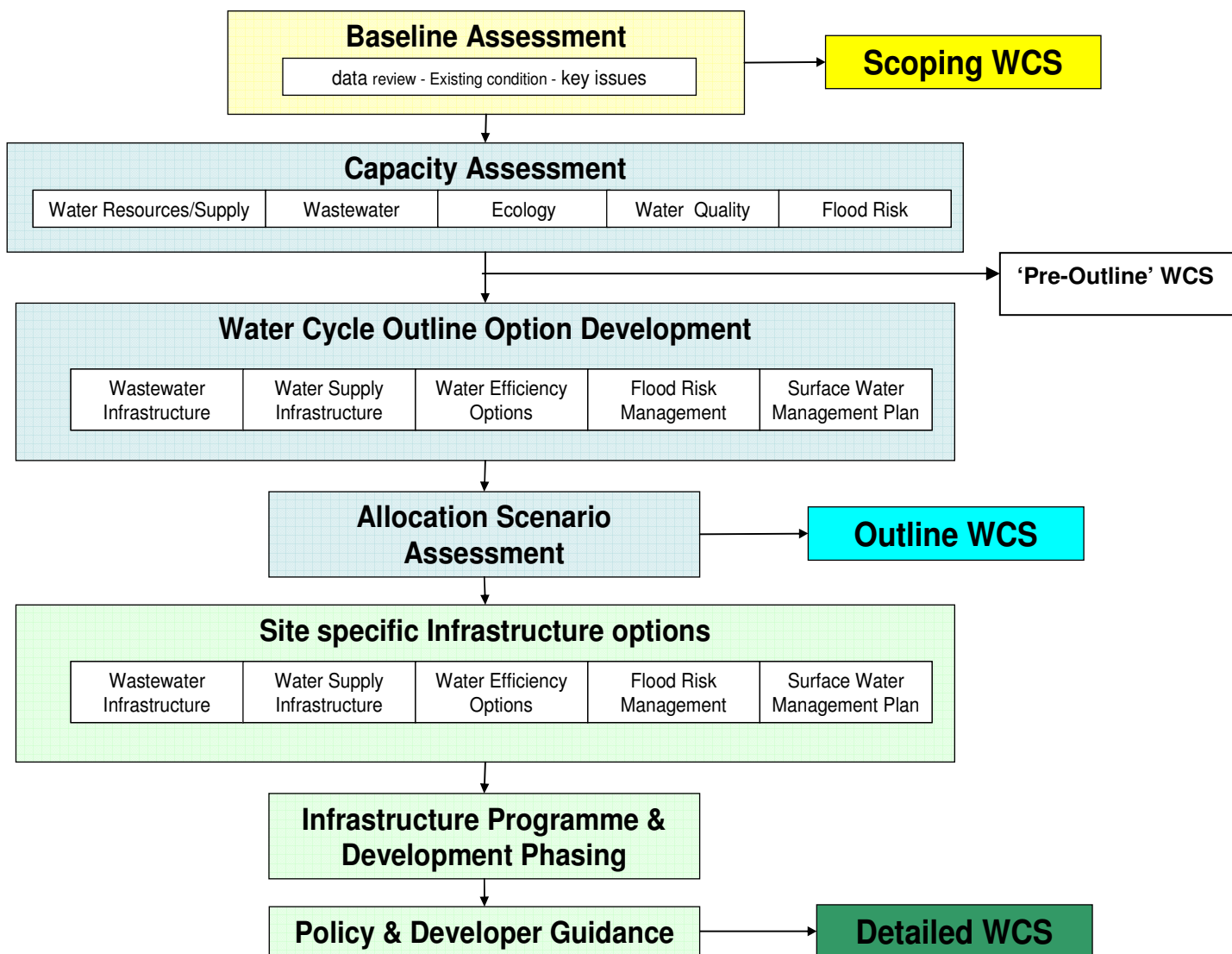
3.3 Stages of a Water Cycle Study

Current guidance on Water Cycle Studies² suggests that WCS's should generally be undertaken in three stages, dependent on the status of the various Local Development Documents (LDDs), as part of the wider Local Development Framework (LDF), being prepared by Local Planning Authorities (LPAs) for submission. In order to determine the requirements of future stages of the Essex Thames Gateway WCS in relation to the varying LDF programmes for each of the client authorities, a scoping WCS has been undertaken to define the key issues for each authority and the sub-region as a whole.

Figure 3-2 Stages of the Water Cycle Study Process illustrates the three stages of the WCS and how they inform planning decisions and documents. This study undertakes the first stage, the Scoping Study.

² Water Cycle Study Manual – Guidance on how to carry out a water cycle study, Environment Agency (<http://www.environment-agency.gov.uk/research/planning/33368.aspx>)

Figure 3-2 Stages of the Water Cycle Study Process



In some cases, it may be that the progress of the Local Development Framework is such that a full outline study cannot be completed as preferred options for site allocations are not known. In such situations, it is considered that a 'pre-outline' study can be undertaken that takes the step of completing the baseline and capacity assessments across a study area to inform the selection of preferred site allocations. This is indicated in Figure 3-2 above.

3.3.1 Scoping Water Cycle Study

The scoping study determines the key 'water-cycle' areas where development is likely to either impact on the water environment, or where development is likely to require significant investment in water infrastructure (i.e. pipes, or treatment) to service it.

Its key purpose is to define whether there are significant constraints that would need further assessment to determine whether they affect either the locations of allocation options, or the amount of development that can be provided within an allocation site or spatial location.

It is a high level assessment that looks at area-wide or sub regional issues. The level of assessment covers whether:

- There is a potential for an area-wide negative supply and demand balance for potable water i.e. demand is likely to be greater than supply for the sub regional area;
- There are any ecologically sensitive sites that have a hydrological link to development in the sub region i.e. an SAC wetland site located on a river downstream of discharges from a wastewater treatment works;
- An area in the sub region has a history of sewer flooding and hence potential restrictions on new connections from development; and
- Local watercourses have water quality concerns which will be made worse if further discharge of wastewater from new development occurs.

A scoping study therefore defines the study area and concludes what issues require further investigation and therefore, what the scope of the Outline Study should be.

3.3.2 Outline and Detailed Water Cycle Studies

Outline Study

The Outline Study considers all of the ways in which new development will impact on the water environment or water infrastructure specific to where growth is most likely to be targeted. It is usually undertaken during consideration of allocation sites such that it can inform the decision process in terms of where development will be targeted for each authority. The key aim of the Outline Study is to provide Local Planning Authorities (LPAs) with the evidence base which ensures that water issues have been taken into account when deciding the location and intensity of development within an authority's planning area as part of the development of the Core Strategy. It also gives the water company an evidence base to its business plans which determine how much they can charge customers to invest in upgrades and the provision new infrastructure required to service proposed development.

As previously described, a 'pre-outline' study can be undertaken when preferred sites are not known. This stage would be undertaken before the full Outline Study but develops the Scoping study outputs further by defining baseline and existing infrastructure and environmental capacity across a study area, rather than being focused on preferred site allocations. The pre-outline capacity assessment is undertaken at a high level to provide sufficient detail to inform planning decisions, but without undertaking abortive detailed work on sites or areas that would not be taken forward for development.

It could be that the Outline Study identifies that water cycle issues are not significant, and that new development can be implemented without significant new investment. If this is the case, a detailed study may not be required. However, if new infrastructure is required, or an impact on the water environment cannot be ruled out as insignificant, a detailed water cycle study will need to be undertaken for site specific allocations, or for the authority as a whole.

Detailed Study

The detailed study can vary significantly in its scope and remit. However, its key purpose is to define what specific infrastructure and mitigation is required to facilitate development, once the decisions have been made on the location of allocations. Dependent on the findings of the Outline Study, there could be the potential requirement to undertake detailed and complex studies in order to define exactly what infrastructure or mitigation is required to feed into LDF Infrastructure Plans. The Detailed study should be undertaken in conjunction with the development of DPDs such as Area Action Plans and should provide the evidence base to site specific policies in Supplementary Planning Documents (SPDs).

3.4 Integration with the Planning System

As part of the Local Development Framework (LDF) process, Local Planning Authorities (LPAs) are required to produce evidence based studies which support the selection processes used in deciding on final growth targets and areas to be promoted for growth. The WCS is one such example of an evidence-based study which specifically addresses the impact of proposed growth on the 'water cycle'.

As part of the Essex Thames Gateway Authorities overall strategy to meet future growth targets set out in the RSS in a sustainable way, the WCS will make up one of a number of strategic studies and plans which will form part of the evidence base supporting the production of each Essex Thames Gateway Authorities' LDF.

3.5 Data Availability

Undertaking of the Essex Thames Gateway Water Cycle Scoping Study has required a large amount of data collection, much of which has been reliant on the willingness of third parties to supply in order to allow the study to be progressed. In some cases, the availability of data with respect to water cycle infrastructure and future planning has not been available within the time required to undertake the assessment in the Scoping Study. In such cases, various assumptions have been used to enable the study to continue. Under each relevant topic, this report identifies what data has been used in each assessment and identifies where assumptions have been adopted and the reasoning behind these assumptions. Recommendations are also made for further, more detailed investigation in the Outline and Detailed WCS.

A full list of the data requested and that which was made available to the study is included in a data catalogue and Appendix A. This data catalogue recommends the data required for the next stage of the WCS, as well as the expected quality and availability of this data and associated cost (where known).

4 Development in Essex Thames Gateway

4.1 The Essex Thames Gateway Area

The Essex Thames Gateway area consists of the authorities of Southend-on-Sea Borough Council, Rochford District Council, Castle Point Borough Council, Basildon District Council and Thurrock District Council. Due to the advanced nature of Thurrock's LDF, the council is progressing a separate WCS. This report therefore addresses the scoping of a WCS for the remaining Essex Thames Gateway authorities.

The area covered by the Essex Thames Gateway authorities has a mixture of heavily developed areas and large areas of rural landscape. The heavily developed areas are typically adjacent to the banks of the River Thames, with land use being mostly either industrial (for example Tilbury Docks) or high-density residential development (e.g. Southend-on-Sea or Canvey Island). Rural areas constitute much of the north and east of the study area.

The main watercourse in the area is the Thames Tideway. Other main rivers in the area are the Rivers Roach and Crouch. The River Crouch flows east from Wickford and then north of Hullbridge from where it forms the northern boundary of the Rochford District, eventually issuing to the North Sea at Foulness Point. The River Roach flows east from the town of Rochford, north of Southend, and joins the River Crouch at Wallasea Island, east of Burnham-on-Crouch. These watercourses have substantial tidal sources. There are several other smaller watercourses throughout the study area; however these are predominately tributaries of the main watercourses identified above. Many of the watercourses in the area form the boundaries of island landmasses, such as Canvey Island and Foulness Island. Such formations are particularly prominent in the east of the region where the area is low-lying and dominated by marshland and wetland.

Some of the key issues in the study area that are of major significance to the development of a WCS and SFRA are:

- The Thames Estuary is an area increasingly at risk of flooding due to rising sea levels and increased rainfall intensity associated with the effects of climate change;
- The most significant flood events in the South Essex area are the result of storm surges, coinciding with high spring tides to produce high tidal water levels that can result in overtopping or breaching of tidal defences;
- Surface Water management is a concern, with the need to consider the impact of rising sea levels as a result of climate change on the discharge of surface water runoff to tidal systems;
- Rising groundwater poses a risk in terms of groundwater flooding, management of surface water discharge (SuDS), and pollution impacts to waste sites;
- There are capacity issues at several major waste water treatment works (WWTW) within the Essex Thames Gateway authorities' administrative areas, and discharges from WWTW such as Basildon, Rochford, Wickford, Rayleigh East and Southend have implications for the conformity with the EU Bathing Water and Shellfish Directives.

4.2 National, Regional and Local Drivers and Policies

The Thames Gateway is an area of national priority for regeneration and has been earmarked for major development over the next 10 years. With such development come particular challenges with regard to sustainable development, provision of water and waste-water services and impacts and influences on flood risk.

4.2.1 National Drivers and Policies

The growth within the Essex Thames Gateway area is driven by regional planning policy, but any growth and changes to the environment will need to comply with the main EU Directives and UK legislation and guidance on water as provided in Table 4-1.

Table 4-1 EU Directives and UK Legislation and Guidance on Water

Directive/Legislation/ Guidance	Description
Bathing Waters Directive 76/160/EEC	To protect the health of bathers, and maintain the aesthetic quality of inland and coastal bathing waters. Sets standards for variables, and includes requirements for monitoring and control measures to comply with standards.
Shellfish Waters Directive	To protect or improve shellfish waters in order to support shellfish life and growth, therefore contributing to the high quality of shellfish products directly edible by man. Sets physical, chemical and microbiological water quality requirements that designated shellfish waters must either comply with ('mandatory' standards) or endeavour to meet ('guideline' standards).
Code for Sustainable Homes	The Code for Sustainable Homes has been introduced to drive a step-change in sustainable home building practice, providing a standard for key elements of design and construction which affect the sustainability of a new home. It will become the single national standard for sustainable homes, used by home designers and builders as a guide to development, and by home-buyers to assist in their choice of home. It will form the basis for future developments of the Building Regulations in relation to carbon emissions from, and energy use in homes, therefore offering greater regulatory certainty to developers.
Environment Act 1995	Sets out the role and responsibility of the Environment Agency.
Environmental Protection Act, 1990	Integrated Pollution Control (IPC) system for emissions to air, land and water.
Future Water, February 2008	Sets out the Government's vision for water in England in 2030. The strategy sets out an integrated approach to the sustainable management of all aspects of the water cycle, from rainfall and drainage, through to treatment and discharge, focusing on practical ways to achieve the vision to ensure sustainable use of water. The aim is to ensure sustainable delivery of water supplies, and help improve the water environment for future generations.

Directive/Legislation/ Guidance	Description
Groundwater Directive 80/68/EEC	To protect groundwater against pollution by ‘List 1 and 2’ Dangerous Substances.
Making Space for Water, 2004	Outlines the Government strategy for the next 20 years to implement a more holistic approach to managing flood and coastal erosion risks in England. The policy aims to reduce the threat of flooding to people and property, and to deliver the greatest environmental, social and economic benefit.
Planning Policy Statements and Planning Policy Guidance	<p>Planning policy in the UK is set by Planning Policy Statements (PPSs) (formerly Planning Policy Guidance Notes (PPGs)) after a public consultation. They explain statutory guidelines and advise local authorities and others on planning policy and operation of the planning system.</p> <p>PPSs also explain the relationship between planning policies and other policies which have an important bearing on issues of development and land use. These must be taken into account in preparing development plans.</p> <p>A water cycle study helps to balance the requirements of the various planning policy documents, and ensure that land-use planning and water cycle infrastructure provision is sustainable.</p> <p>The most relevant PPSs to WCS are:</p> <p>PPS1 – Delivering Sustainable Development (and its climate change supplement)</p> <p>PPS3 – Housing;</p> <p>PPS9 – Biodiversity and Geological Conservation</p> <p>PPS12 – Local Development Frameworks;</p> <p>PPS23 – Planning and Pollution Control; and</p> <p>PPS25 – Development and Flood Risk.</p>
The Pollution Prevention and Control Act (PPCA), 1999	Implements the IPPC Directive. Replaces IPC with a Pollution Prevention and Control (PPC) system, which is similar but applies to a wider range of installations.
Water Act 2003	Implements changes to the water abstraction management system and to regulatory arrangements to make water use more sustainable.
Water Framework Directive (WFD) 2000/60/EC	The WFD was passed into UK law in 2003. The overall requirement of the directive is that all river basins must achieve “good ecological status” by 2015 unless there are grounds for derogation and that there should be no deterioration in quality. The WFD will, for the first time, combine water quantity and water quality issues together. An integrated approach to the management of all freshwater bodies, groundwaters, estuaries and coastal waters at the river basin level will be adopted. It will effectively supersede all water related legislation which drives the existing licensing

Directive/Legislation/ Guidance	Description
	and consenting framework in the UK. UKTAG ³ , the advisory body responsible for the implementation of the WFD in the UK, has proposed water quality, ecology, water abstraction and river flow standards to be adopted in order to ensure that water bodies in the UK (including groundwater) meet the required status ⁴ . These are currently in draft form as published in the draft River Basin Management Plans (RBMPs) and will not be formalised until the final RBMPs are published in December 2009 (prior to EC sign off). However, the WCS is required to consider the longer term issues with respect to the water cycle and water environment and as such, should include an assessment of the impact of the interim WFD standards as recently published in draft RBMPs.
The Pitt Review 2008	The independent review by Sir Michael Pitt ⁵ into the 2007 summer floods made 92 commendations for how improvements can be made to the management of flooding, and the contingency planning and post event recovery process associated with flooding in the UK. A Government response to the Pitt Review has since been released in late 2008 setting out how the Government intends to deliver the recommendations as set out in the review.
Water Resources Act, 1991	Protection of the quantity and quality of water resources and aquatic habitats.

4.2.2 Regional Drivers and Policies

Regional Spatial Strategy – The East of England Plan

The Regional Spatial Strategy (RSS) for the East of England⁶, published in May 2008, set targets to guide the scale and location of growth in the Essex Thames Gateway area up to 2021. Part of the Essex Thames Gateway area lies within the Thames Gateway, which is the Government’s top priority for regeneration in the UK, and high rates of development are planned for the area over the forthcoming two decades. The Thames Gateway was designated as a growth area by the Sustainable Communities Plan in 2003.

Housing and growth targets collectively account for at least 25,800 homes and 29,000 jobs divided between the South Essex Districts and Boroughs. They are divided as follows

- Basildon – 10,700 homes and 11,000 jobs.

³ The UKTAG (UK Technical Advisory Group) is a working group of experts drawn from environment and conservation agencies. It was formed to provide technical advice to the UK’s government administrations and its own member agencies. The UKTAG also includes representatives from the Republic of Ireland.

⁴ UK Environmental Standards and Conditions (Phase I) Final Report, April 2008. UK Technical Advisory Group on the Water Framework Directive.

⁵ published in June 2008

⁶ East of England Plan – The Revision to the Regional Spatial Strategy for the East of England, Government Office for the East of England, May 2008.

- Castle Point – 4,000 homes and 2,000 Jobs
- Rochford – 4,600 homes and 3,000 jobs
- Southend – 6,500 homes and 13,000 jobs.

The RSS also includes spatial policies relating to water and flooding which are forming part of the driver for the WCS. Those of particular mention are WAT1, WAT2 and WAT4.

- **Policy WAT1** - The Government will work with the Environment Agency, water companies, OFWAT, and regional stakeholders to ensure that development in the spatial strategy is matched with improvements in water efficiency delivered through a progressive, year on year, reduction in per capita consumption rates. Savings will be monitored against the per capita per day consumption target set out in the Regional Assembly's monitoring framework.
- **Policy WAT2** - Water Infrastructure seeks that the public, private and regulatory sector work together to ensure the timely provision of the appropriate additional infrastructure for water supply and waste water treatment to cater for future development, whilst managing surface and ground water and maintaining their respective quality, through a coordinated programme of water and river cycle studies.
- **Policy WAT 4** - Sets the approach to be taken in the region with respect to preventing, mitigation and managing, coastal and river flooding.

4.2.3 Local Drivers and Policies

Local Development Framework

Minerals and Waste Development Plan Document (DPD)

The Minerals and Waste DPD currently being produced by Essex CC, will address the two specialist topic areas that are of particular interest in the Essex Thames Gateway area and provide detailed site and development control issues. Local mineral mining and waste issues require consideration due to the associated impacts with extracting minerals and providing sites for the waste. Historically, holes dug to access minerals were later filled with waste but in reality, is more complicated with complex pathways existing between the sites and groundwater, watercourses, ecological sites. Space in existing landfill sites for waste is limited, and as such the Essex Thames Gateway Authorities must consider the future of providing minerals and dealing with waste within the district.

The Minerals and Waste DPD will be produced in conjunction with other strategic documents as part of the Local Development Scheme undertaken by each local authority. The choice of where to locate new development, and new waste water sites, will directly impact upon one another. Due to this, the WCS needs to provide guidance and advice to inform the Minerals and Waste DPDs to avoid any adverse effects on the water environment within the Essex Thames Gateway area. Similarly, findings from any studies undertaken into future development of waste and minerals sites will need to feed into and be assessed within the Outline WCS.

Water Company Planning

It is important to consider the planning timelines, both for the Essex Thames Gateway authorities in terms of the various LDFs but also Essex and Suffolk Water (ESW) and Anglian

Water Services (AWS) in terms of the funding mechanisms for new water supply and water treatment infrastructure.

There are two elements of Water Company planning that are pertinent to the Essex Thames Gateway WCS and specifically, with regard to integration with Spatial Planning timelines for Local Planning Authorities and Regional Government.

Financial and Asset Planning

Water companies currently plan for Asset Management and the financial procurement required for this through the Asset Management Plan (AMP) process which runs in 5 year cycles. The Office of Water Services (OFWAT) is the economic regulator of the water and sewerage industry in England and Wales, and regulates this overall process.

In order to undertake maintenance of its existing assets and to enable the building of new assets (asset investment), water companies seek funding by charging customers according to the level of investment they need to make. The process of determining how much asset investment required is undertaken in conjunction with:

- the Environment Agency as the regulator determining investment required to improve the environment;
- the Drinking Water Inspectorate (DWI) who determine where investment is required to improve quality of drinking water; and,
- OFWAT who along with the Environment Agency require Water Companies to plan sufficiently to ensure security of supply (of potable water) to customers during dry and normal years.

The outcome is a Business Plan which is produced periodically, every five years, by each Water Company setting out the required asset investment over the next five year period, the justification for it and the price increases required to fund it.

Overall, the determination of how much a Water Company can charge its customers is undertaken by OFWAT. OFWAT will consider the views of the Water Company, the other regulators (Environment Agency, DWI) and consumer groups such as the Consumer Council for Water when determining the price limits it will allow a water Company to set in order to enable future asset investment. This process is known as the Price Review (PR) and is undertaken in 5 year cycles. When OFWAT make a determination on a Water Company's business plan, the price limits are set for the proceeding five year period allowing the water company to raise the funds required to undertake the necessary investment which will also be undertaken in that 5 year planning period (the AMP period).

At the time of undertaking the Essex Thames Gateway WCS, Water Companies are preparing for Price Review 2009 (PR09), whereby they are currently consulting on their draft Strategic Business Plans which seek funding for asset investment for the 5 year period covering 2010 – 2015 (known as AMP5).

It therefore follows that any new asset (or infrastructure) investment required to meet the requirements of the WCS needs to feed into the final drafting of the Strategic Business Plan for PR09. OFWAT will determine the final price limits from this process in November 2009. This ultimately means that there will be no funding available to undertake significant water cycle infrastructure upgrades until 2010 at the earliest. It can also be seen that, if significant water cycle infrastructure requirements are not included in this current price review (PR09), the funding cannot be sought for it until the next Price Review towards the end of AMP5 (PR14)

which would result in funding not being available until AMP6 running from 2015 -2020. Water companies are able to submit interim determinations within the 5 year AMP cycles to seek funding for unforeseen investment requirements; however it is considered that infrastructure for planned development should be planned for in sufficient time for to be included in the relevant Business Plan and Price Review.

Water Resource Planning

Water companies are now required to produce Water Resource Management Plans (WRMP) on a statutory basis covering 25 year planning horizons. WRMPs set out how a water company plans to provide and invest in existing and new water resource schemes (e.g. reservoirs, desalination) to meet increases in demand for potable supply, as a result of new development, population growth and climate change over the next 25 year period. When complete, the new statutory WRMPs will be updated in 5 yearly cycles to coincide with the Price Review and AMP process.

At the time of undertaking the Essex Thames Gateway Scoping WCS, ESW are in the process of consulting on their draft WRMP09. This Scoping WCS has made use of the draft WRMP09 to inform the water resources assessment for growth in the Essex Thames Gateway area. However, until such time as consultation is complete and the WRMP09 is approved and published in 2009, it is not possible to state with any certainty as to what options will be taken forward.

The WCS is therefore essential for several reasons: It allows the discrepancies in the planning timeframes of AWS, ESW and the Essex Thames Gateway Authorities to be reconciled through strategic planning as well as providing sufficient evidence base for the Essex Thames Gateway Authorities statutory LDF process and robust evidence and justification for AWS and ESW Strategic Business Plans for investment required in AMP5 (2010-2015) and beyond.

Additional Information

In addition to the legislation and guidance set out in Table 4-1 above, the following studies, reports and information are relevant to and have been used within the Essex Thames Gateway WCS:

- Environment Agency South Essex Catchment Abstraction Management Strategy (June 2004);
- Environment Agency The Combined Essex Catchment Abstraction Management Strategy (Feb 2007);
- Essex and Suffolk Water Draft Water Resources Management Plan (April 2008);
- Findings from meetings with Essex and Suffolk Water and Anglian Water Services on 13th November 2008;
- Essex and Suffolk Water – Water Resources for the future – the Abberton Scheme (October 2006);
- Roach and Crouch Shellfish pollution reduction plans, Environment Agency (July 2008);
- Outer Thames and Southend-on-sea Shellfish pollution reduction plans, Environment Agency (July 2008); and
- TGSE Sub-regional housing strategy 2008-2011

4.3 Housing/Employment Development

Minimum growth targets in the RSS for each of the authorities have been set as:

- Basildon – 10,700 homes and 11,000 jobs.
- Castle Point – 4,000 homes and 2,000 Jobs
- Rochford – 4,600 homes and 3,000 jobs
- Southend – 6,500 homes and 13,000 jobs

The development areas are described below. Maps of the proposed development areas should be developed and produced in the outline stage to help test the proposed areas.

4.4 Development Areas

4.4.1 Housing Development Areas

Basildon

Basildon are yet to determine their allocations for development. They currently have “Areas of Future Development Potential” which they intend to use in the next stage of the Water Cycle Study to test their suitability from a water cycle perspective.

Castle Point

Castle point will provide the proposed new homes split between Canvey Island, Benfleet, Hadleigh and Thundersley. 70% of the development will be focused on previously developed land within the existing urban extent, with safeguards to protect the metropolitan greenbelt⁷.

Specific sites on the mainland to be assessed include:

- Manor Trading Estate;
- Kiln Road;
- Hadleigh Town Centre; and
- East of Rayleigh Road.

Rochford

Rochford’s preferred option⁸ for development in the district is to place 30% of the new development on previously developed land as identified in the Urban Capacity Study. The remaining 70% of development will be on Greenfield areas as sustainable extensions to existing settlements. Rochford has divided the districts towns into four tiers with the settlements in the higher tier considered more suitable for development. In addition approximately 1300 dwellings are expected to be developed within existing residential areas up to 2021.

Southend

Housing development will be focused, in line with the spatial strategy in the adopted Core Strategy DPD, in the proposed regeneration areas of: Southend Town Centre and Central

⁷ Castle Point Core Strategy Alternative Publication DPD.

⁸ Rochford Local Development Framework, Core Strategies Preferred Options, October 2008

Area, the Seafront and Shoeburyness⁹. Area Action Plans will be produced for these key areas and will identify development sites.

4.4.2 Employment Development Areas

Basildon

Basildon are yet to determine any new preferred employment allocations. The Areas of Future Development Potential identified in 3.4.1 will be tested as part of the next stage of the WCS.

Castle Point

Employment will be concentrated on Canvey Island as this is the area that suffers from the highest degree of unemployment. The development will be focused on existing employment areas as well as improving leisure facilities to regenerate the seafront. Development in the Benfleet, Hadleigh and Thundersley area is proposed to regenerate the town centres and existing trading estates⁷.

Rochford

Rochford are planning on reviewing existing employment Site Allocations through the Employment Land Study⁸. In addition, Rochford are allocating land to the west of Rayleigh as an employment park. Rochford will encourage the development of employment uses within existing settlements where appropriate. An Eco-Enterprise Centre is to be encouraged in conjunction with the Private Sector within an existing employment allocation.

Southend

New employment in Southend will be directed to the spatial areas proposed for regeneration: Southend Town Centre and Central Area, the Seafront and Shoeburyness London Southend Airport and Environs.

⁹ Southend on Sea Core Strategy, Development Document one. Adopted December 2007.

5 Water Cycle Environment and Infrastructure Baseline

5.1 Introduction

This section describes the environmental and infrastructure baseline within the administrative area of the partner authorities with regards to the various components of the water cycle. It is important to establish the baseline and hence spare capacity of the water environment and associated water/wastewater infrastructure because a basic assumption of the WCS is that it is preferential to maximise the use of existing facilities without causing negative effects upon the existing water environment. This is to reduce cost, reduce impact to existing communities and to allow early phasing of some new development which will not have to rely on longer lead in times associated with securing funding for new infrastructure through the statutory water company planning process.

5.2 Water Resources

5.2.1 Climate

The climate within the Essex Thames Gateway area is typified by low rainfall with little variation in the average amount throughout the year, averaging about 600mm in the west to 550mm in the east. The annual evapotranspiration averages 380mm in the west and 450mm in the east. Most of the evapotranspiration occurs during the summer months and exceeds rainfall totals over this period. However, winter rainfall and recharge provides the water required to offset this seasonal imbalance.

The watercourses within the Essex Thames Gateway area respond rapidly to rainfall during the winter period due to the impermeability of the London Clay underlying much of the area, especially when the soil moisture deficit is low. Extensive modification of the watercourses, for drainage and flood alleviation purposes, adds to the 'flashy'¹⁰ behaviour of the river catchments. These factors, in combination with the very small volumes of baseflow provided by the shallow sand and gravel aquifers, contribute to the extremely low river flows during the summer months.

5.2.2 Geology & Groundwater Sources

Chalk underlies the whole of the Essex Thames Gateway area however, whilst it is closer to the surface in the south west of the region, it is mainly beneath deep deposits of London Clay for the rest of the area. The Chalk is the principal underlying aquifer in the area. Rainfall percolates into the aquifer and recharges it over the autumn and winter months. However, the impermeable London Clay precludes infiltration of rainfall over large areas of the chalk aquifer, thereby restricting its use for water resource development.

¹⁰ 'Flashy' behaviour is when surface water rushes off the surrounding catchment quickly in response to rainfall events causing water levels and flows to rise and fall quickly.

Over most of the region, the chalk aquifer is confined by the London Clay and no problems are envisaged as groundwater rises. River terrace gravels and other superficial deposits are present over much of the area and provide limited baseflow to the rivers and are used to supply water for various small scale non-public water supply purposes.

The nature of the soil within a catchment plays an important role in the dynamics of water movement. Along the coastal zone, soils are predominantly alluvial with significant clay content and are periodically or permanently waterlogged. The soils inland are predominantly clay but also exhibit a loamy characteristic making them more suitable for cultivation. Generally the soils are fertile with the majority classified as Grade 3 or above under agricultural land classification. Nevertheless, the tendency of these soil types to water logging, and their impermeable nature during this state, is an important factor which adds to the 'flashy' nature of the surface water catchment.

5.2.3 Rivers

As described, the main river systems within the Essex Thames Gateway Study area are the Thames Tideway forming the southern border of the study area, and the River Roach and the River Crouch.

The source of the River Crouch is in Little Burstead, south of Billericay. The river flows to the east of Battlesbridge where it becomes tidal and forms part of the Crouch Estuary. The Crouch has a catchment size of 109.7km² and a main river length of 16km.

The River Roach originates in Rochford at the confluence of three tributaries, Hockley Brook, Rayleigh Brook and Noblesgreen Ditch. The river becomes tidal downstream of Rochford at Rochford Mills where another major watercourse, the Prittle Brook, joins the tidal river after flowing through Southend-on-Sea. All of these watercourses then drain into the Roach Estuary. The Roach Catchment is 54.8km², with a combined tributary network length of 20km.

5.2.4 Abstractions

Though much of the area within the Essex Thames Gateway Area is agricultural in nature, the large numbers of agriculture licences are shown collectively to be a minority use of water. The majority of water abstracted for agriculture is for spray irrigation storage; water that is abstracted in the winter months and placed into storage reservoirs for use in the summer months. Spray irrigation is considered to be fully consumptive i.e. very little water is returned to the immediate environment. Although the total volume of water abstracted for this use is not as great as for other uses, it represents a significant loss from river system because the water is not directly returned to the environment.¹¹

Industrial, non domestic, abstractors take the greatest volume of water within the Essex Thames Gateway area. Water is used for a variety of purposes such as non-evaporative cooling, sanitation, mineral washing and a range of other industrial processes. The majority of these activities are non-consumptive (i.e. almost all of the water is returned to the source after use) and industrial abstraction within the entire South Essex CAMS area as a whole is on average 50% consumptive.

¹¹ South Essex Catchment Abstraction Management Strategy (CAMS), Environment Agency (June 2004)

Figure 5-1 and Figure 5-2 show the surface water and groundwater abstractions within the South Essex CAMS area respectively. It should be noted that a small area of Basildon (around the town of Billericay) lies within the North Essex Environment Agency CAMS area due to the proximity of the river Wid to the west of the town. Details of abstractions in this small section of the overall Study Area are not available in the revised and more recent 2007 combined South Essex CAMS documents for reasons to do with Defra instructions over security,

Figure 5-1 Surface Water Abstractions in the South Essex CAMS Area (Source: South Essex CAMS, Environment Agency (June 2004))

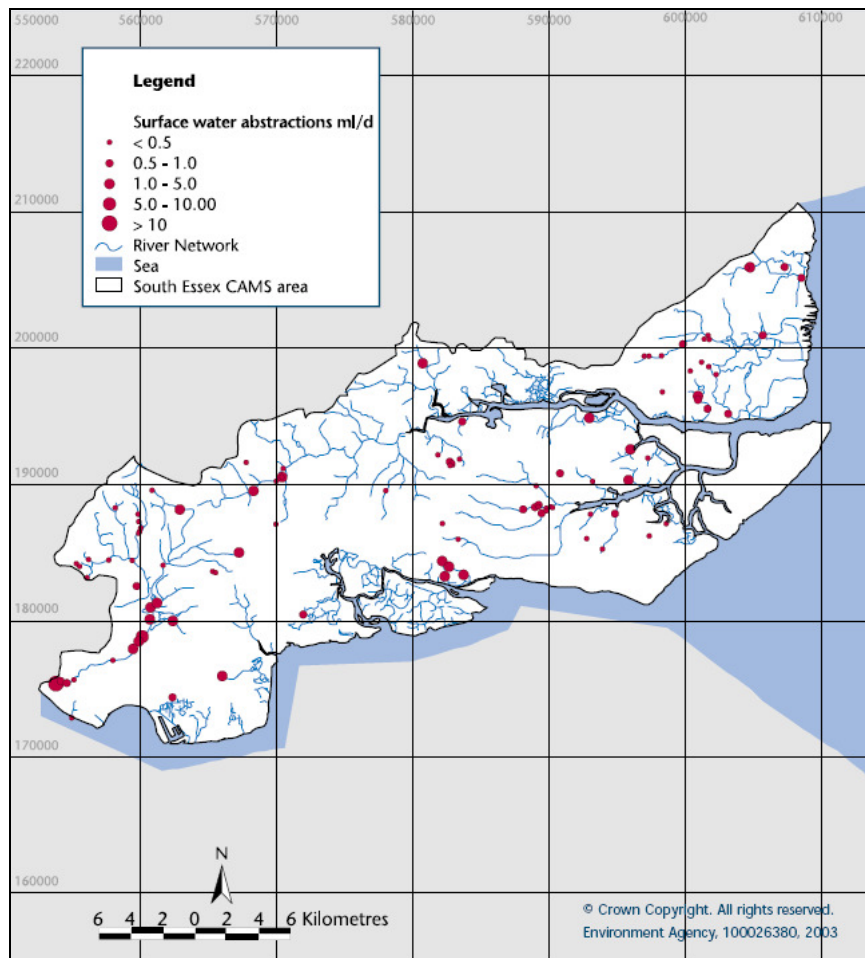
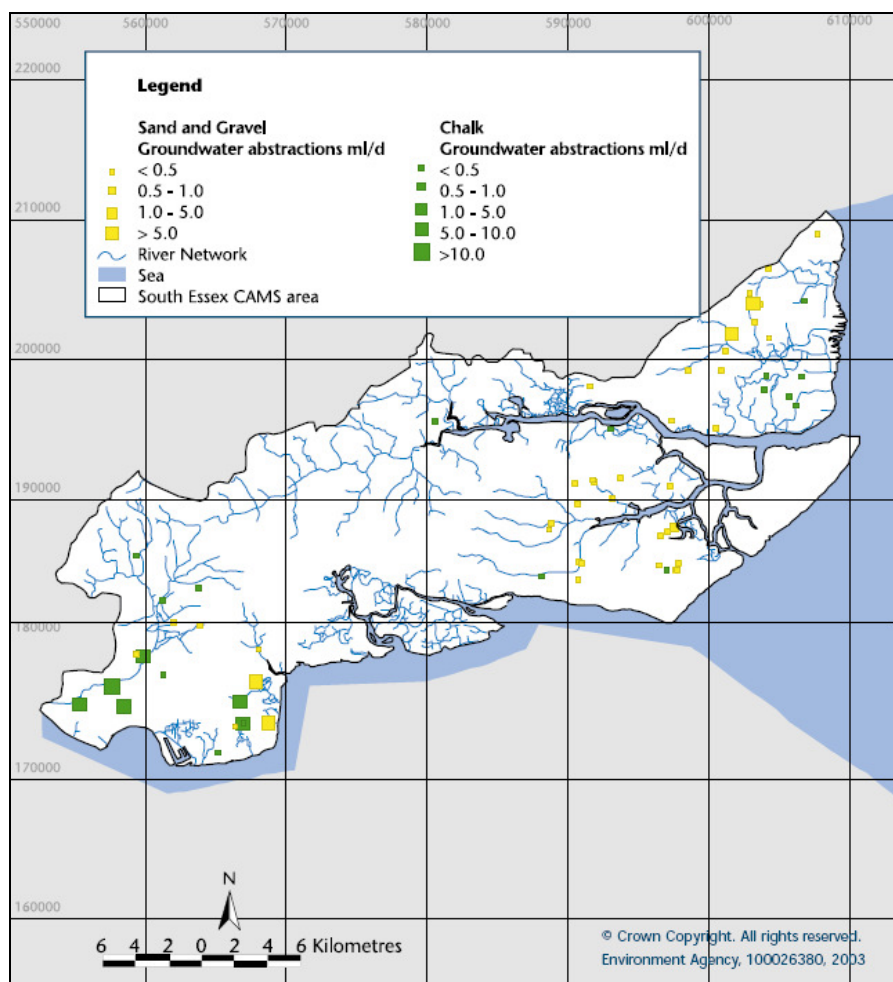


Figure 5-2 Groundwater Abstractions in the South Essex CAMS Area (Source: South Essex CAMS, Environment Agency (June 2004))



5.2.5 Water Resource Management

Within the South Essex CAMS area, there are water resource management units (WRMU) covering the Essex Thames Gateway area; WRMU 2 – Upper Roach and WRMU 3 – Upper Crouch (Figure 5-3). The area of Billericay that is within the North Essex CAMS is in WRMU1 of that CAMS area (Pant/Backwater, Tar, Roman/Layer, Wid, Brain, and Chelmer)

A WRMU is a distinct unit within a CAMS area for which water can be considered separate to water within other WRMU. These are assessed for water availability based on the sensitivity of the ecology to changes in river flow. The amount of water needed for the ecology is compared to the amount of water currently abstracted, this gives a level of water available for abstraction. The ratings range from over abstracted to water available.

Figure 5-3 Water Resource Management Units in the South Essex CAMS Area (Source: South Essex CAMS, Environment Agency (June 2004))

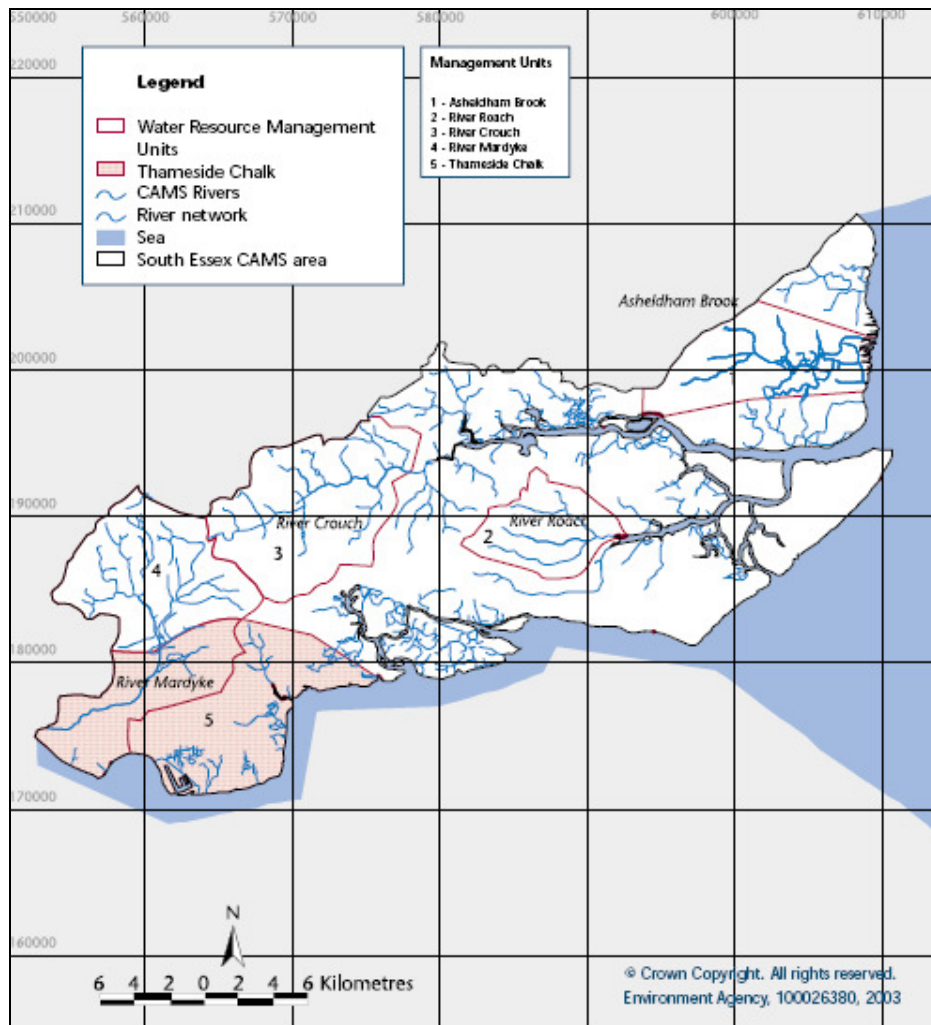
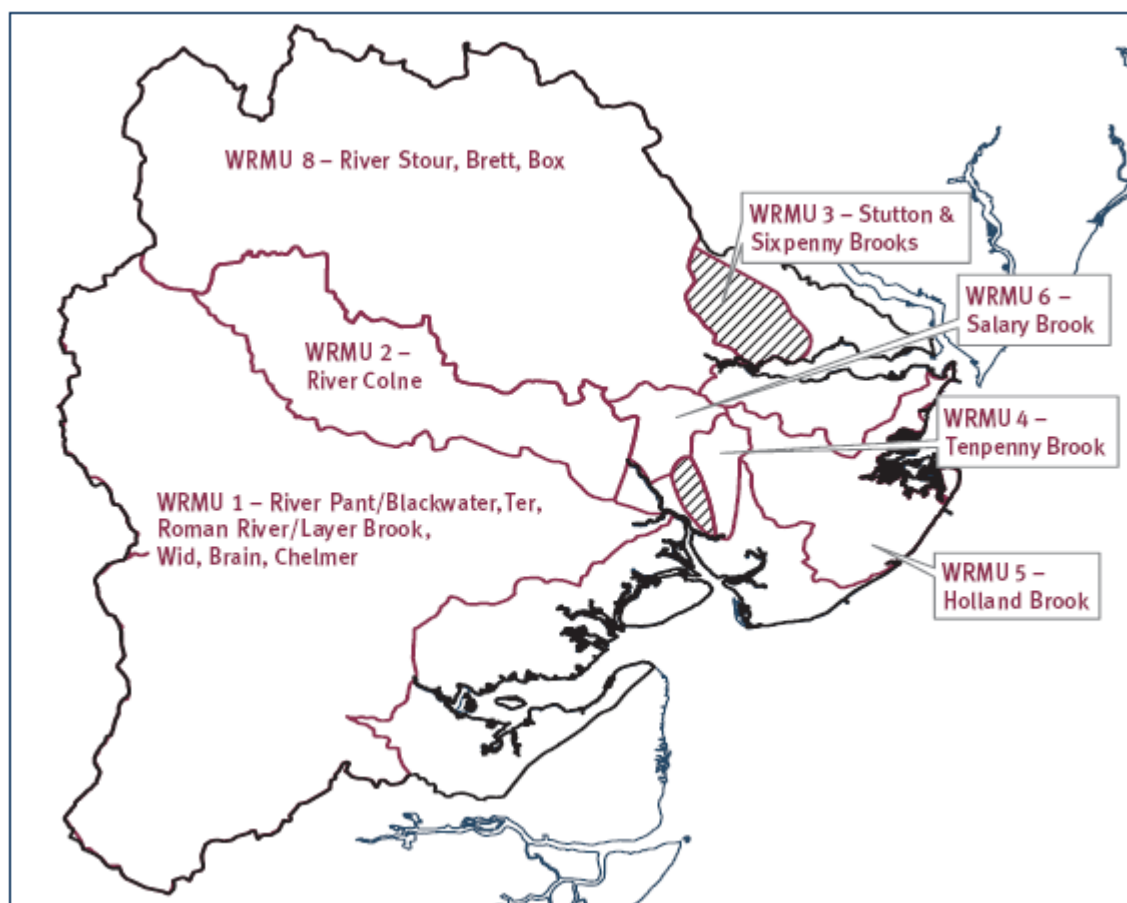


Figure 5-4: Water Resource Management Units in the North Essex CAMS Area - Source: The Combined Essex CAMS, Environment Agency (Feb 2007).



South Essex, Water Resource Management Unit 2 – Upper Roach

The WRMU is formed by the convergence of three tributaries, Hockley Brook, Rayleigh Brook and Noblesgreen Ditch, form the main river Roach which becomes tidal at Rochford Mills. The Prittle Brook, which drains into the tidal roach, is excluded from resource assessment.

The Roach catchment is very flashy due to the urban nature of the catchment and the predominance of the London Clay, which underlies the catchment. Some small areas of sand and gravel aquifer are present in the upper reaches and provide a small amount of baseflow. The ability of these areas to retain winter recharge for sustaining summer flows is much reduced due to recent urbanisation.¹²

Most abstraction is located in the lower reaches of the catchment and as a result, much of the middle and upper catchment remains in a semi-natural state, although the Sewage Treatment Works at Rayleigh East discharges into the headwaters of the Rayleigh tributary which

¹² South Essex Catchment Abstraction Management Strategy (CAMS), Environment Agency (June 2004)

consequently exhibits a range of flows that are significantly elevated above the natural. It should be noted that the Eastwood Brook to the south and the northern tributary do not benefit from this discharge although no separate resource assessment for these tributaries is available.

The river discharges into the intertidal areas of Crouch and Roach Estuaries Site of Special Scientific Interest (SSSI), Special Protection Area (SPA) and Ramsar site. The importance of freshwater inputs into these habitats is not fully understood. For example, it is not known how important freshwater flows are to birds and/or in maintaining salinity gradients to support rare plants and invertebrates that are listed as SSSI and Ramsar features. This is being addressed as part of the review of consent process under the Habitats Directive and as such, needs to be reviewed as part of the next stage of the study.

The unit has been assessed as Water Available at low flows, when the water company's sewage discharges are included in the assessment. It should be noted that should the discharges cease the unit would most likely be assessed as No Water Available at low flows.

South Essex, Water Resource Management Unit 3 – Upper Crouch

The Crouch Catchment is flashy due to the urban nature of parts of the catchment and the predominance of London Clay, which underlies the catchment. The higher ground to the north of the catchment does contain some sand and gravels, which are limited in extent. Small spreads of river terrace gravel deposits also occur but are unlikely to contribute significantly towards sustaining summer baseflow. Levels of urban development are significant throughout the catchment, particularly towards the lower reaches where the river flows through the centre of the town of Wickford. The water courses within this catchment have been significantly affected as a result of past flood management and some are little more than concrete lined drains. Many of the rivers suffer from water quality problems associated with urban areas.

A low level of water resource development for spray irrigation has occurred in the lower reaches of the catchment for both direct abstraction in the summer and for winter storage of water for subsequent summer spray irrigations. To a certain extent, abstraction is supported by the discharge from the Billericay (Outwood) STW. This makes a significant contribution to the total flow of the crouch and maintains a higher than natural flow regime.

This unit has been assessed as Water Available at low flows, when the water company's sewage discharges are included in the assessment. It should be noted that should the discharge cease, the unit would most likely be assessed as No Water Available at low Flows.

North Essex, Water Resource Management Unit 1 – (Wid/Can)

WRMU 1 includes the APs located in the disparate catchments of the Pant/Backwater, the Chelmer and its major tributaries, and the Roman River/Layer Brook which discharge into the Colne Estuary. The water resource availability status of this WRMU is Over Abstracted at low flows. The resource availability statuses of the River Brain, River Wid and River Tar have been overridden due to the more critical status of the River Backwater and River Chelmer in order to protect these critical downstream.

5.2.6 Water Supply

In South Essex evaporation exceeds rainfall during the summer months and a recent series of dry winters continues to strain the water supply network further. The low rainfall levels affect the amount of water which can be sustainably extracted from rivers, reservoirs and aquifers. As a result of this Essex suffers a water deficit in relation to the demand. Therefore, the Essex and Suffolk areas are not self sufficient in relation to water resources and over the last 25 years, Essex has been dependent on the transfer of water from other areas.

There are three principle water treatment works, operated by Essex and Suffolk Water that supply potable water to the Essex Thames Gateway area; Langham; Layer; and Hanningfield. Langham and Layer are situated in Colchester, while Hanningfield is located near Chelmsford.

The water in Langham and Layer Water Treatment Works comes from the River Stour. When the water in these works is running low the River Stour is used to transport water from the River Ouse in Cambridge to top up the supply. This is the Ely - Ouse to Essex Transfer Scheme which is licensed and operated by the Environment Agency.

Hanningfield Reservoir is fed from the Rivers Backwater and Chelmer. The Environment Agency can also transfer water from the River Stour into the River Pant which then joins with the River Backwater. Water is taken from the Rivers Backwater and Chelmer at Maldon and it is pumped to Hanningfield where it is treated. Water is also supplied from Abberton reservoir, from which water is subsequently supplied to the Herongate and Heaton Grange service Reservoirs. The Abberton reservoir is filled via abstractions from local watercourses including Layer Brook, Roman River and the River Stour, and these abstractions are supplemented from flow augmentation in the River Ely Ouse via a transfer of raw water from the Ely-Ouse catchment at Denver in Norfolk.

The water from the three works is mixed together at the service reservoir on the outside of Brentwood (Herongate). This mixed water is then pumped to The Essex Thames Gateway area (Figure 5.5).

The Essex Thames Gateway area is part of the fully integrated Essex water resource zone (WRZ), which is controlled by Essex and Suffolk Water (ESW). This WRZ boundary is shown in Figure 4.5. Water can be moved around the zone as required. ESW have developed 8 water supply network (pipeline) models in the Essex WRZ which includes the Essex Thames Gateway area and have undertaken modelling for all proposed future development scenarios to aid in their planning process and ensure that water will be available over future years in line with growth in the area. There are no identified pressure or capacity issues in the water supply infrastructure, with local reinforcements provided within the Essex Thames Gateway area based on minimum growth targets. Further stages of the WCS will need to confirm this is the case based on additional growth targets up to beyond 2021.

Figure 5-5: Essex Resource Zone and Associated Infrastructure¹³



¹³ Essex and Suffolk Water Draft Water Resources Management Plan, Essex and Suffolk Water, April 2008 (http://www.eswater.co.uk/ESW_Draft_Water_Resources_Management_Plan.pdf)

5.3 Flood Risk

At the scoping stage, flood risk is being considered within the Strategic Flood Risk Assessment (SFRA).

5.4 Wastewater Treatment and Collection

Discussions with AWS (meeting on the 13th of November) highlighted wastewater treatment works and network areas where there may not be enough ability to transfer or treat the waste water generated by the minimum growth targets up to 2021. Each of the works has been introduced below; further information is in table 5.1.

5.4.1 Basildon

Basildon WWTW is located to the north east of Basildon. The works serves the town of Basildon. The works discharges to the Thames tideway via the Pitsea Creek. There has been discussion about the point of discharge for the Basildon WwTW. Basildon Council held previous meetings with AWS concluding that the works discharged into the Nevendon Brook. However during data gathering for this scoping study, AWS have since confirmed that the Basildon WwTW discharges to the Thames Tideway via the Pitsea Creek and the discharge consent has been provided to confirm this.

Pitsea WWTW serves is located to the south east of Basildon and serves the Pitsea area of Basildon. The works discharges to the Pitsea Creek.

Billericay WWTW is located to the southeast of Billericay. The works discharges to a tributary of the River Crouch.

Wickford WWTW serves the area of Wickford and discharges to the River Crouch

5.4.2 Castle Point

Canvey Island WWTW is located on the south of Canvey Island. The treatment works serves Canvey Island and discharges to the Thames Tideway via surface water ditches.

Benfleet WWTW is located to the south west of Benfleet. The works discharges into the Thames Tideway.

5.4.3 Rochford

Rochford WWTW is located to the east of Rochford. The works receives sludge from the Southend-on-sea works. The works discharges to a tributary of the River Roach.

Rayleigh East WWTW is located to the North East of Rayleigh. The works discharges to a tributary of the River Roach.

Rayleigh West WWTW is located to the North West of Rayleigh. The works discharges to a tributary of the River Crouch.

5.4.4 Southend

Southend WWTW is located to the North of Southend-On-Sea. The works drains Southend and is discharged into the Thames Tideway.

5.5 Water Quality

Invertebrate sampling, part of the Biological General Quality Assessment (GQA) system, gives a measure of river health and there are 15 sampling points within the Essex Thames Gateway area. Grades range from 'A' (very good) to 'E' (poor). Sample points are mostly located away from the headwaters and so tend to be in the more urban parts of the catchment. As such, localised problems with water and habitat quality, due to a number of factors, have been identified. Urban runoff is a particular problem as it can introduce untreated polluting matter. Habitat quality is also affected by the urban nature of the catchment due to the need to alleviate flooding. Consequently, watercourses are often highly modified, (e.g. artificial banks) and this along with the scouring action of the flood flows, reduce habitat diversity.

Biological GQA grades for the Crouch have dropped from C (Fairly Good) in 2003 to between C and E (Poor) in 2006. Results on the Roach are all 'D' (Fair) and 'E' (Poor). There is no riverine freshwater fishery on either the Crouch or the Roach. Low flows and variable water quality are believed to be the limiting factor for fisheries in the Crouch and Roach headwaters.

The Chemical GQA of the Crouch from 2003 to 2007 has remained level at grade C (Fairly Good). Chemical GQA is determined by the lowest grade in a series of determinants tested for (Ammonia, Biological Oxygen Demand [BOD] and Dissolved Oxygen [DO]), DO is the limiting factor for the Crouch, meaning that the low grades are generally due to lack of oxygen in the water. The headwaters of the Roach have chemical GQA grades between B (Good) and D (fair) and in these GQA stretches, Ammonia is the limiting factor.

5.6 Ecology and Biodiversity

The Essex Thames Gateway area contains several areas/sites of ecological importance which are hydrological linked to potential development in the sub region, including the Thames Estuary and Marshes Special Protection Area (SPA) and Ramsar site, the Essex Estuaries Special Area of Conservation (SAC) Foulness Site of Special Scientific Interest (SSSI) Ramsar Site, the Crouch and Roach Estuaries SSSI SAC and SPA, The water dependent sites within and around Essex Thames Gateway are illustrated in Figure 5-6.

The Thames Estuary & Marshes SPA and Ramsar site, the Foulness Ramsar site, the Dengie SPA, the Roach and Crouch estuaries SPA's are the only European Sites that lies wholly or partly within the Essex Thames Gateway area. However, a further sixteen European sites outside of the district are considered to have links with development within Essex Thames Gateway via identified pathways.¹⁴ These 16 sites are associated with water supply to the region for example, Abberton Reservoir and the associated transfer from Denver.

The sites have the potential to be impacted by the following water-related impacts:

- **Coastal squeeze** - due to possible Green Belt development preventing the managed retreat of the habitats within the European site in the face of sea-level rise;

¹⁴ Habitat Regulations Assessment Final Report, October 2007, Scott Wilson for Thurrock Council (http://www.thurrock.gov.uk/planning/strategic/pdf/ldf_preferred_ear_hra.pdf)

- **Water quality** - reduced due to increased volumes of treated sewage effluent being discharged into the Thames Tideway as a result of development in the Essex Thames Gateway area; and,
- **Abstraction** – further abstraction for domestic, agricultural or industrial uses.

Figure 5-6 Water Dependent Conservation Sites in the South Essex CAMS Area (Source: South Essex CAMS, Environment Agency (June 2004))



5.7 Definition of Study Area

The Essex Thames Gateway study area encompasses the administrative boundaries of the authorities of Southend-on-Sea Borough Council, Rochford District Council, Castle Point

Borough Council, and Basildon District Council, as well as the Abberton reservoir and the route of raw water transfer from Denver. The Dengie SPA and Foulness Ramsar site are also included as they may be affected by discharges into the watercourses that flow through the wetlands.

It is important to note that the study area for the catchment is wider than the definition of the Thames Gateway South Essex authorities for two reasons.

Firstly, the Water Cycle Study must consider the water cycle issues for the entire administrative boundaries of the local authorities of Basildon and Rochford which are not located entirely within the Thames Gateway Growth Area zone.

Secondly, whilst issues to do with wastewater treatment, transfer and discharge are confined to the South Essex authorities and associated ecological sites (as described), the water resources for the area are managed on a wider Essex scale via the integrated Essex Water Resource Zone and the area of Basildon that falls into the North Essex CAMS area associated with the River Wid. In addition, the transfer of raw water to the Essex WRZ from outside of Essex further increases the consideration of the study area. Due to the complexities of the water resource management, the study area is best described by the WRZ area shown in Figure 5-5 along with the routes of transfer from the Denver licence.

6 Preliminary Findings, Constraints and Recommendations

6.1 Water Resources and Supply

The Essex Thames Gateway area is typified by low rainfall and clay geology. There is a confined chalk aquifer at depth and there are shallow deposits of sands and gravels. In addition, while there are some local abstractions, there is water available for water supply, if the sewage treatment work discharges are taken in to account, within the water resource management units there is no water available if the discharges are stopped.

Water is currently supplied to the Essex Thames Gateway area by Essex and Suffolk Water (ESW). The Essex Thames Gateway area is part of the wider Essex 'Water Resource Zone' (WRZ). The intrinsic water resources include the Essex Rivers Chelmer, Backwater, Stour and Roman River which support pumped storage reservoirs at Hanningfield and Abberton; these local sources have to be supplemented through strategic transfers into the Zone from a Thames Water Utilities raw water bulk supply from Lea Valley reservoirs to Chigwell Water Treatment Works. The Abberton reservoir is filled via abstractions from local watercourses and these abstractions are supplemented from flow augmentation in the River Ely Ouse via a transfer of raw water from the Ely-Ouse catchment at Denver in Norfolk. This transfer is licensed and operated by the Environment Agency. Even without further development the sub-region of South Essex currently does not have sufficient Water Resources within it's catchment to supply the resident population, which is why it is reliant on importing water from outside the sub-region.

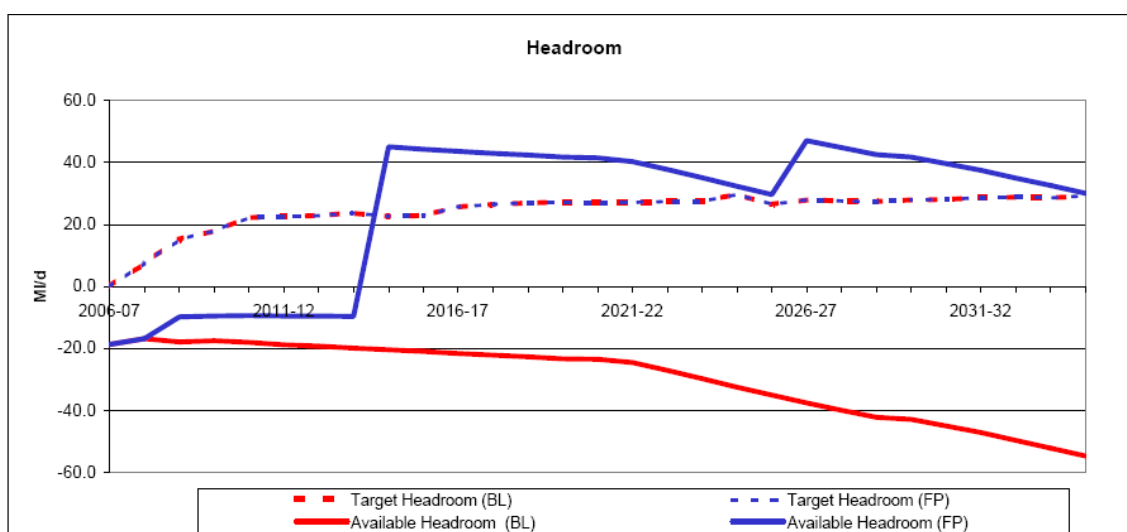
During normal years, ESW have sufficient water resources to supply all demand from existing housing and non-domestic use in the Essex WRZ; however, for very dry years (drought conditions) ESW are currently running at a 'supply and demand deficit' in their water resources planning for this zone. This means that during a very dry year there is considered to be insufficient resources to meet peak demand, and as such ESW are at greater risk of not meeting their 'levels of service' to customers. 'Levels of service' refers to a water company's targets in ensuring water supplies in dry years. A water company must be able to demonstrate that it can supply sufficient water in all conditions which ensures that measures such as restrictions on use, and hosepipe bans are only implemented according to a given frequency as agreed with Ofwat (the water industry regulator). Whilst this does not mean that water resources are not available for new development in 'normal years' it does mean that new development cannot be guaranteed to receive the same 'level of service' for water supply until new resources or demand measures are put in place.

ESW, as part of their Draft Water Resources Management Plan¹⁵ (WRMP) have proposed an increase in storage volume at Abberton Reservoir; if approved this will come online in 2014. ESW have confirmed that Colchester Borough Council has agreed to recommend the scheme for approval to the GO-East and it is expected that by the end of 2008 a decision will be made on whether a Public Inquiry will be required, or whether the scheme will receive approval.

¹⁵ Essex and Suffolk Water Draft Water Resources Management Plan, Essex and Suffolk Water, April 2008
(http://www.eswater.co.uk/ESW_Draft_Water_Resources_Management_Plan.pdf)

There is an element of risk in meeting the proposed demand for Essex up to 2014 during extreme prolonged dry periods until the Abberton Reservoir scheme comes online. Figure 5.1 illustrates the forecasted supply and demand balance for Essex up to and post 2031. The thick blue line represents predicted supply if all schemes in the draft plan are implemented and the blue dotted line is the predicted demand from customers. The difference between the two is the supply/demand balance.

Figure 5.1 Essex Resource Zone Forecasted Supply and Demand Balance (Source: ESW¹⁶)



In order to address this deficit in the dry year supply and demand balance, and to meet the additional demand expected from development as proposed in the East of England Plan and its revisions, future water demand is expected to be met through the proposed increase in storage at Abberton Reservoir and the commensurate increase in abstraction and transfer from the Ely-Ouse transfer scheme, which if approved will come online in 2014. The scheme has undergone comprehensive public consultation and at the time of producing this scoping report, has been recommended for approval by Colchester Borough Council's Development Control Committee. The Government Office for the East of England (GO East) will have the final decision on whether the scheme will go ahead, and this decision is expected by the end of 2008.

Development up to 2014 therefore has a constraint in that new development could affect the levels of service provided by ESW; phasing of development up to 2014 will have to be carefully considered and potentially minimised to ensure that 'levels of service' for water provision by ESW are not adversely affected. In addition, development beyond 2014 is reliant on the Abberton scheme being given approval and being complete by this date. If the scheme is not given approval, then the current planned development will be constrained as a result of dry-year water resources planning. If implementation of the scheme is delayed by the need for a Public Inquiry into the scheme, then the phasing of development will be constrained up until the revised date for implementation of the scheme.

¹⁶ Essex Water Resources Planning Guidelines Supply Demand Worksheets, Essex and Suffolk Water, March 2008, (http://www.eswater.co.uk/DryYr_Essex_DraftPlanFinal_April_2008.pdf)

In light of the dry year supply and demand deficit and the lead in time associated with the Abberton Reservoir scheme, it is important that water efficiency of new development is considered in further detail in the next stages of the WCS. It will be important to develop a water efficiency strategy for growth in the study area which covers both new development and potential reductions in demand from existing housing stock. Such an approach aims to reduce existing demand such that demand from new development can be accommodated without a net increase in overall demand post development. This concept is referred to as 'water neutrality' and it will be important to test the feasibility of achieving neutrality in the next stages of the WCS. This will help to ensure that strong water efficiency policy can be supported in the various DPDs to be produced by each partner authority.

As discussed, ESW have undertaken extensive consultation to minimise the likelihood of objection to the Abberton scheme from statutory and non-statutory stakeholders as well as the local community, and hence their draft Water Resources Management Plan (WRMP) is based on the Abberton scheme receiving approval. It is considered that the risk of the scheme not being given approval is relatively low; nevertheless, the scheme cannot, at this stage, be guaranteed and hence water resources do currently represent a potential limit to growth in the Essex Thames Gateway area.

In terms of the water supply infrastructure (i.e. transmission pipes and pumping stations) there are no pressure or capacity issues which would affect future growth and local reinforcements have been provided to the piped network within The Essex Thames Gateway area up to 2015. Future plans for reinforcements and upgrades are planned for in ESW's next 5 year planning period (AMP5) running from 2010 to 2015; however, at the time of compiling this scoping report, ESW are currently consulting with Ofwat on their draft Strategic Business Plan (SBP). The SPB is the document which sets out ESW's requirements for new infrastructure (such as reinforcement of pipe supply networks) and seeks approval from Ofwat to increase water charges during the AMP5 period in order to pay for the investment. As with any water company's investment proposals, there is a risk that Ofwat will not approve the price increases required for specific elements of investment (in this case the required reinforcements) and hence there is a risk that new development could be constrained beyond AMP5 (after 2015). This risk can be mitigated by the Water Cycle Study which should act as an evidence base to the ESW's Business Plan as well as the Essex Thames Gateway Authorities Local Development Frameworks (LDF) which further strengthens ESW's case for further investment in AMP5.

In summary, the following issues within the Essex Thames Gateway area in relation to future development and water resources and supply have been identified:

- Limited water is available for further abstraction from surface or groundwater sources and therefore additional water resources will be required to supply water to new developments within the Essex Thames Gateway area;
- Water resources from surface and groundwater sources within the Essex Thames Gateway area are supplemented by strategic transfers into the area from the Abberton and Hanningfield reservoirs and via a Thames Water Utilities raw water bulk transfer from Lea Valley reservoirs;

- In very dry years (drought conditions) ESW are currently running at a 'supply and demand deficit' in their water resources planning for the Essex Thames Gateway area, meaning that during a very dry year there is considered to be insufficient resources to meet peak demand;
- Future water demand is expected to be met through the proposed increase in storage at Abberton Reservoir and the commensurate increase in abstraction and transfer from the Ely-Ouse transfer scheme, which if approved will come online in 2014; though the risk of the scheme being rejected is relatively low, at this stage the scheme cannot be guaranteed and hence water resources currently represent a potential limit to growth in the Essex Thames Gateway area;
- Phasing of development up to 2014 will have to be carefully considered and potentially minimised to ensure that 'levels of service' for water provision by ESW are not adversely affected; and
- There are no pressure or capacity issues in the water supply infrastructure that would affect future growth, with local reinforcements provided to the piped network within the Essex Thames Gateway area up to 2015.

These findings will be reviewed and further investigated as part of the Outline and Detailed Stage of the WCS, in conjunction with Essex and Suffolk Water.

6.2 Flood Risk Management

Flood Risk

The TGSE Strategic Flood Risk Assessment (SFRA) is due to be updated in accordance to PPS25 and its guidance document, incorporating new climate change allowances, new water levels, and updated breach modelling. These will feed into a Level 1 and Level 2 SFRA for the Essex Thames Gateway authorities, providing information on the flood risk from fluvial, tidal, surface, ground and artificial water sources to aid the Essex Thames Gateway Authorities in their application of the Sequential Test and inform the Sustainability Appraisal and subsequent planning policies. Guidance on the location of development in relation to flood risk will be assessed in the SFRA.

Surface Water Management

Surface Water Management is a key consideration when assessing development within large areas. PPS25 requires that new development does not increase the risk of flooding elsewhere by managing surface water runoff generated as a result developing land. Altering large areas of land by urbanising it fundamentally alters the way in which rainfall drains to watercourses and has the potential to increase the rate and amount of water that enters watercourses causing an increase in flood risk. In many cases, the management of surface water is achieved via a requirement to restrict runoff from developed sites to that which occurs from the pre-development site usage and this is achieved by incorporating a range of Sustainable Drainage Systems (SuDS) which aim to maximise the amount of rainwater which is returned to the ground (infiltration) and then to hold back (attenuate) excess surface water. Incorporating SuDS often requires a large amount of space and for large developments often requires the

consideration of large scale strategic features such as balancing ponds which can attenuate and store large volumes of water generated during very heavy rain storms to prevent flood risk downstream.

The management of surface water has the potential to act as a constraint to development within the Essex Thames Gateway area, not just because of space requirements, but because the reduction in runoff rates and volumes is likely to be onerous. This is because discharge of surface water to the Thames Tideway can be restricted during 'tide-locked' conditions, where the water level in the Thames Tideway at high tides prevents surface water drains from discharging. Pumping is often required; but with expected increases in tidal water levels as a result of climate change, there is likely to be an increase in the length of time during which surface water discharges are tide-locked, or require pumping. Alternatively, the outlet pipe heights will need altering. These issues should be further investigated as part of the outline and detailed stages of the WCS to ensure that the appropriate strategic level constraints and mitigation measures are identified and that guidance is given to the development of a Surface Water Management Plan (SWMP) for each District/Borough as recommended by the recent Pitt Report. The WCS and SWMP will also help to ensure that developers address the required surface water management issues during preparations of site specific FRAs.

Incorporation of SuDS techniques such as rainwater harvesting can also help to reduce potable water demand which is an important consideration for the Essex Thames Gateway authorities with respect to the outlined dry year supply demand deficit.

Pitt Review Recommendations

The independent review by Sir Michael Pitt¹⁷ into the 2007 summer floods made 92 commendations for how improvements can be made to the management of flooding, and the contingency planning and post event recovery process associated with flooding in the UK.

Several of these recommendations are directed towards Local Authorities and in December 2008 the government released a response to the review. The Government supports changes in response to all of the Pitt review recommendations and for each of the recommendation, the response sets out: how implementation has taken place to date under existing policy and legislation; the next steps (including future legislation); how the changes will be funded; and, potential implementation date for the changes and associated policy/legislative drivers.

There are several recommendations which assign a responsibility to local authorities, and some of these recommendations and the Government's proposed changes have the opportunity to be tackled within the remit of a WCS or SFRA. Advice is therefore provided to the client authorities within the Essex Thames Gateway area, as to what elements of the recommendations and proposed changes can be covered by the scope of the main WCS or SFRA.

Recommendations 14-18 of the Pitt review encompass proposed changes in responsibility of dealing with local flooding issues such as surface water management as well as proposed changes in the way that stakeholders must actively engage in the process of managing flood risk and contingency planning. Recommendation 14 requires that:

¹⁷ published in June 2008

“Local authorities should lead on the management of local flood risk, with the support of relevant organisations”

In order to deliver on this recommendation, the Government proposes that local authorities will be required to take the leadership role for new stakeholder partnership arrangements. These partnership organisations will include: county, unitary, and district authorities; the Environment Agency; water companies; sewerage undertakers; and, internal drainage boards. Whilst local authorities will be required to lead these organisations and funding will be made available from Defra to deliver this, individual responsibilities for specific areas of flooding will still fall under the remit of key stakeholders. In the case of the Essex Thames Gateway client authorities, the Environment Agency will still be responsible for catchment coastal, tidal and Main River flooding management, whilst AWS will be responsible for sewer flooding management. The responsibility of local authorities will be on local flooding issues in their area covering surface water management, local groundwater flooding and ordinary watercourses (smaller rivers, ditches and drainage channels). This is covered in Recommendation 15:

“Local authorities should positively tackle local problems of flooding by working with all relevant parties, establishing ownership and legal responsibility”

The government has acknowledged that to deliver on recommendations 14-18 and implement the required changes, primary legislation is needed, and it is expected that this will be outlined in the forthcoming draft Floods and Water Bill which is due out in the Spring of 2009. This draft bill will be accompanied by an Impact Assessment into the impact of changing the regulatory roles of affected organisations.

It is expected that, as well as having the primary role for leading partnership organisations, one of the key requirements of the new bill will be for local authorities to produce and implement Surface Water Management Plans (SWMP). These plans would ensure that local authorities can plan for and manage two of the facets of flood risk that they have direct responsibility for i.e. surface water management, and ordinary watercourses. Recommendation 18 directly references the requirement for SWMPs to be introduced, and production of a comprehensive SWMP would also ensure delivery of recommendation 16:

“Local authorities should collate and map the main flood risk management and drainage assets (over and underground), including a record of their ownership and condition”

Recommendation 17 would be achieved by a proposed provision in the draft Floods and Water Bill for all bodies involved in flooding to openly share information. Input to a SWMP would achieve this aim.

Whilst it is expected that SWMPs will become a statutory requirement once the Floods and Water Bill is finalised, the timetable for the introduction of the final bill cannot be known and depends on the Parliamentary timetable. At the present time, guidance on SWMP coverage and production is being produced in tandem with a series of pilot projects funded by DEFRA in areas where surface water flooding is a serious concern. In the interim period, it is recommended as part of this scoping study that certain elements of surface water management planning are commenced as part of the next stage of the Water Cycle Study. It is considered

that in commencing these initial stages of surface water planning, the main WCS will also address the requirements of the client brief including:

- To identify where interventions of a strategic or localised nature (e.g. SuDS) would be necessary in the sub-region, to reduce or manage the water cycle and flooding risks. This should also include general and area/site specific guidance of how they can be applied at local levels, accounting for sub-regional variances and opportunities to assist in new habitat creation (e.g. wetlands²) and other biodiversity enhancements that help deliver local, Essex and national Biodiversity Action Plan (BAP) targets; and
- Surface Water management is a concern, with the need to consider the impact of rising sea levels as a result of climate change on the discharge of surface water runoff to tidal systems.

There are two major components of surface water management planning that can be commenced as part of the WCS and prior to the development of a potentially future statutory SWMP:

the production of an “outline” or scoping level surface water management plan (SWMP) including the identification of surface water flooding hot spots or critical drainage areas with opportunities for improving the quality of diffuse pollution for both new and existing development; and

the production of a detailed-level screening tool to assess and evaluate options for mitigating surface water runoff for the major growth sites thus providing spatial planners with the necessary evidence base to make robust planning decisions with respect to future growth and green infrastructure.

As well as the Pitt Review, there are several other drivers for production of a SWMP

SWMP Drivers

- EU Floods Directive (Flooding from all sources must be mapped by 2013)
- Civil Contingencies Act – Emergency Planning & Preparedness
- Planning Policy Statement 25 (PPS25)
- Local Development Framework
- Pitt Review
- Regional Spatial Strategies, Area Action Plans
- Local Resilience Forums (LRFs)
- Association of British Insurers (ABI) – better knowledge and communication about surface water flood risk is needed

A proposed methodology for both aspects of surface water management in WCS is included in Appendix 2.

6.3 Wastewater Treatment and Collection

Table 5.1 Waste Water Capacity in the Essex Thames Gateway area.

Waste Water Treatment Works (WWTW)	Location	Receiving Watercourse	Population Equivalent – 2006 Estimate East of England Sewerage Capacity Study.	Comments
Basildon WWTW	Basildon Borough	Pitsea Creek – Thames Tideway,	103,000	<p>There is spare treatment capacity up to 2015 for Basildon WWTW. Beyond 2015 (into AMP6), Basildon WWTW's treatment capacity will be limited because the final effluent pipeline which discharges to the Thames Tideway and the storm tank discharge will be unable to receive further flows. A solution will be required to allow development post 2015 to take place.</p> <p><i>Waste water transmission pipework (sewer network)</i></p> <p>There are capacity issues in the wastewater network for Basildon associated with pinch points in the main Laindon trunk sewer which runs along the A127 north of Basildon. Pinch points are areas in the network where there is a pumping station or other narrowing in the network which can cause a reduction in overall space within the network or be a point where the sewer surcharges during high flows. The capacity issues in the trunk sewer also affect capacity in the rising main sewers running south to north up to the main trunk sewer and hence there are sewer flooding pinch points in several areas of the town.</p> <p>Upgrades works have been identified for the AMP5 period and again, there is a risk that these may not be approved and hence resulting in a potential constraint. Post 2015, options will be considered for a new strategic trunk main or diversion of part of the drainage catchment to the Pitsea WWTW. These options will be discussed within the further stages of the WCS but it is considered by AWS that these are feasible options which should remove the constraint. However, without these improvements, there will be a constraint on development post 2015. For the period up to 2015, AWS have recommended that development should be completed from east to west to ease pressure on the</p>

Waste Water Treatment Works (WWTW)	Location	Receiving Watercourse	Population Equivalent – 2006 Estimate East of England Sewerage Capacity Study.	Comments
				system.
Pitsea WWTW	Basildon Borough	Pitsea Creek – Thames Tideway	21,000	Pitsea has not been identified as having existing capacity problems. AWS have proposed that the Pitsea works should be upgraded to take flow from existing development in Basildon so that the effluent from new development can be directed to Basildon.
Wickford WWTW	Basildon Borough	River Crouch		<p>The Wickford WWTW is currently experiencing process capacity issues with the existing flow to the works. The planned growth which exceeds 1,500 PE (Population Equivalent the measure of the organic load produced per person) will require major investment post 2015 and this investment will need to be identified in the further stages of the WCS.</p> <p>Wickford WWTW is being included in PR09 for consideration of microbial reduction in AMP5 in order to improve the quality of waters entering the Shellfish Waters. Any additional flows through this works would also need to be subject to microbial reduction.</p> <p><i>Sewer Network</i></p> <p>The Southend to London railway is currently acting as a pinch point to drainage, flow of wastewater under it is restricted due to constraints on pipe sizes. Because most of the development in Wickford is proposed on the opposite side of the railway to the WWTW, there is an existing constraint on further connections to the existing sewer network. AWS have proposed a solution in AMP5 to alleviate this pinch point; however it should be caveated that there is a risk that this solution might not be funded by Ofwat</p>
Billericay	Basildon Borough	Tributary of the River Crouch.	7,000	Currently not considered to be a constraint; exact capacity would need to be confirmed in the next stage of the WCS

Waste Water Treatment Works (WWTW)	Location	Receiving Watercourse	Population Equivalent – 2006 Estimate East of England Sewerage Capacity Study.	Comments
Mountnessing	Brentwood Borough			May receive some flow from Billericay, this is to be identified in the Outline stage of the WCS
Canvey Island	Castle Point Borough	Thames Tideway		<p>There is spare capacity within the Canvey Island WWTW; however, there is a need to improve the treatment process to allow the WWTW to continue to be compliant with the Bathing Water Directive and AWS have not planned for this specifically in AMP5. In addition the site is land-locked so new land would need to be purchased before upgrades can be undertaken. Significant growth on Canvey Island could represent a constraint in terms of meeting Bathing Water Directive requirements.</p> <p><i>Sewer Network</i></p> <p>The sewer network is an old combined system and is difficult to maintain as a result of unstable ground conditions. In addition, the flat gradient on the island means that there is a requirement for pumping the majority of the drained wastewater to the WWTW; this can exacerbate the flooding situation due to capacity issues with the pumping stations. As a result of this, it is considered that there is limited capacity within the network to accommodate further wastewater generated by growth without causing an increase in flood risk or a potentially unacceptable increase in CSO discharges to the Thames Tideway (affecting Water Quality)</p>
Benfleet	Castle Point Borough	Thames Tideway	31,000	<p>AWS have indicated that there is capacity in the works for the predicted growth. However, the drainage of the proposed 10,000 Olympic Arena would alter this conclusion, hence the further stages of the WCS need to consider this and the potential increases in capacity that may be required.</p> <p>The network is generally adequate to cope with the additional development planned; however, there are some flooding issues to be tackled during AMP 5 and onwards to AMP 6. Again, it</p>

Waste Water Treatment Works (WWTW)	Location	Receiving Watercourse	Population Equivalent – 2006 Estimate East of England Sewerage Capacity Study.	Comments
				should be caveated that there is a risk that these works may not be funded by Ofwat
Rochford	Rochford	River Roach	32,000	Rochford WWTW currently receives sludge for treatment from Southend WWTW. There are some capacity issues with both the WWTW and the network which will need resolving post 2015 and the WCS is required to address these upgrades to ensure that the phasing of development up to 2015 does not exacerbate sewer flooding issues.
Rayleigh East	Rochford District	River Roach		There is currently process capacity at Rayleigh East WWTW. However, the WWTW is being included in PR09 for consideration of microbial reduction in AMP5 in order to improve the quality of waters entering the Shellfish Waters. Any additional flows through this works would also need to be subject to microbial reduction.
Rayleigh West	Rochford District	River Crouch		There is currently process capacity at Rayleigh West WWTW
Southend WWTW	Southend Borough	Thames Tideway		Southend WWTW is currently at capacity and therefore does not have the capability to treat further wastewater flows as a result of increase in development. AWS have proposed measures to increase this capacity during the AMP5 period (2010 – 2015) and are confident that these measures will ensure that the increase in housing planned in this period can be catered for. As with the water resources concerns, there is a risk that Ofwat will not approve funding to increase capacity during AMP5 and this could be a constraint. Post 2015 (i.e. into AMP6) there will be a constraint on development if further measures to increase capacity are not considered and AWS have asked that this is covered specifically

Waste Water Treatment Works (WWTW)	Location	Receiving Watercourse	Population Equivalent – 2006 Estimate East of England Sewerage Capacity Study.	Comments
				<p>in the WCS. Phasing of development up to 2015 will therefore have to be carefully considered.</p> <p>The Southend WWTW is also required to be compliant with the Bathing Water Directive and the Shellfish Waters Directive and AWS and the Environment Agency have stated that Southend is the most sensitive/susceptible area to potential growth. Any increase in flow to the treatment works will have to be carefully assessed to ensure that the increase does not impact on the discharge requirements to meet with both directives.</p> <p><i>Wastewater transmission pipework (sewer network)</i></p> <p>Some parts of the sewer network (sewers and pumping stations) are older combined system (i.e. it transmits and discharges both wastewater and surface water) and any increase in flows through these combined sections of the network is likely to cause an increase in the frequency of diluted but untreated discharges from the combined sewer overflows (CSOs) network which discharge to the Thames Tideway. This has the potential to impact on compliance with the Bathing Water Directive.</p> <p>Work was completed in AMP3 (2000 to 2005) to provide drainage storage to reduce the frequency of spills from the system, but the full extent of growth planned in the Borough would mean that further improvements are required to the system to prevent unacceptable increases in discharges.</p> <p>Up to 2015, new development is currently proposed close to the trunk sewer; however, post 2015 there will be no further capacity within the network to take the level of planned development. AWS will need to consider solutions to the capacity problems post 2015 and have asked that this is covered in the next stages of the WCS.</p>

6.4 Water Quality

The quality of the rivers in the Essex Thames Gateway area is generally compliant with the River Ecosystem (RE Targets) as set for them by the Environment Agency, although Eastwood Brook which drains to the River Roach has failed to reach its target. Rayleigh East discharges into Eastwood Brook and maintains the flows during low flows. The Outline WCS will examine the impact of the Rayleigh East discharge on the water quality of the Eastwood Brook and subsequently the River Roach to determine whether discharges are likely to exacerbate the issue. This places a potential constraint in the Rayleigh East catchment area until the impacts are known as requirements to meet with stricter water quality standards as part of the Water Framework Directive (WFD) could mean that improvements are required to the process capacity beyond existing treatment levels. This should be investigated during the next phase of the WCS.

The various catchments of the main rivers vary between urban and rural catchments; urban catchments increase the risk of poor quality run-off entering the water courses. To prevent failure to meet RE and WFD targets, SUDS will be required in the developments to improve the water quality of the run-off entering the rivers.

The River Crouch and River Roach drain into the Crouch and Roach Estuaries Site of Special Scientific Interest (SSSI), Special Protection Area (SPA) and Ramsar site. The Environment Agency have advised that the Crouch and Roach are shellfish waters and they are generally not compliant with quality objectives for shellfish waters, and improvements are still required in reduction of faecal coliform levels. Further development has the potential to exacerbate this problem, particularly with growth which will drain to the Wickford, Rayleigh East and Rayleigh West WWTWs. Options for improving the treatment quality should be investigated in the next stages of the WCS.

The Southend-on-Sea Shellfish water has passed the required quality levels based on the existing discharges to the Thames Tideway. As discussed in the Waste water Treatment section, Southend WWTW cannot treat any further effluent because it is already at capacity and further flow will lead to the works exceeding the limits imposed by the Bathing Water and Shellfish Directives. There is a constraint on development in the Southend WWTW catchment area until the quality and capacity issues are addressed. Options for improvements will be considered within the outline WCS.

6.5 Biology and Biodiversity

The Essex Thames Gateway area contains several sites of ecological importance including the Essex Estuaries Special Area of Conservation (SAC), Foulness SSSI and Ramsar site; the Crouch and Roach SSSI SAC and SPA; and, Benfleet and Southend Marshes SPA; all of which have the potential to be impacted upon by development in the study Area. There is unlikely to be any increase in existing abstractions from surface or groundwater sources and as such it is possible to screen out impacts to the sites within the study area as a result of water resources. However, discharges of wastewater still have the potential to impact on these sites and this needs to be considered in the next stage of the WCS.

However, a further sixteen European sites outside of the study area, including the Wash, Abberton Reservoir and RAMSAR and Special Area of Conservation (SAC) sites bordering the Thames Estuary in Essex and Kent are considered to have links with development as they have the potential to be impacted by increased water demand up to and post 2014 when, subject to Government approval, the Abberton Scheme comes online. The sites associated with the Abberton abstraction and transfer scheme will continue to be affected by development in the Essex Thames Gateway area, this will need to be investigated further in the next stage of the WCS.

This is not a Essex Thames Gateway area-specific issue but should be considered alongside increased water demand within South Essex. Phasing of development to ensure that development cannot occur until sufficient water supply is available from the proposed scheme should ensure that there are no adverse impacts on sites associated with the scheme.

The impact of development on these sites will be considered in the outline and detailed stages of the WCS.

7 Recommendations

7.1 Progression of WCS

The next stage of the Water Cycle Study is, following agreement by the stakeholders of the findings and recommendations from the Scoping stage, to progress to the Outline Stage of the WCS. The Outline Study will build on the findings of the Scoping Study and consider all of the ways in which new development will impact on the water environment or water infrastructure specific in relation to where growth is most likely to be targeted. It will be undertaken during consideration of allocation sites such that it can inform the decision process in terms of where development will be targeted. The key aim of the Outline Study is to provide the Essex Thames Gateway Authorities, with the evidence base which ensures that water issues have been taken into account when deciding the location and intensity of development within an authority's planning area as part of the development of the Core Strategy. It also gives the water company an evidence base to its business plans which determine how much they can charge customers to invest in upgrades and the provision new infrastructure required to service proposed development.

If new infrastructure is required, or an impact on the water environment cannot be ruled out as significant, a detailed water cycle study will need to be undertaken for site specific allocations, or for the authority as a whole.

Because each of the authorities are at different stages of their LDF programme, it is recommended that different elements of the main WCS are undertaken at the LPA level as opposed to Sub-Regional. This is explained in section 6.3.

7.2 Project Group/Stakeholder

Once the Detailed WCS has determined the requirement for new infrastructure it will be necessary for the following key Stakeholders to agree to the WCS findings:

- The Strategic and Local Planning Authorities in the Essex Thames Gateway area;
- Emergency Planning Representation from Essex Resilience Forum (ERF)
- The Environment Agency – as the statutory planning and flood risk consultee as well as regulator for water quality;
- Anglian Water Services – as provider of wastewater infrastructure; and
- Essex and Suffolk Water – as provider of and water supply infrastructure.
- Natural England – as statutory planning consultee for protected species and biodiversity

Having due regard to the planning timeframes there will need to be stakeholder agreement on what infrastructure will be required (as recommended by the WCS) as well as when it will be required and how it will be funded. This should be undertaken in the outline and detailed phases of the WCS.

Appendix A – Data Catalogue

Data/Title	From - Company	Format	Received / Required	Quality	Notes (including cost where applicable)
Roach and Lower Crouch Shellfish Waters information	Environment Agency	PDF	Received for Scoping	Good	
South Essex Fresh Water Fisheries information	Environment Agency	.DOC	Received for Scoping	Good	
Upper Crouch Shellfish Waters information	Environment Agency	PDF	Received for Scoping	Good	
Upper Roach Shellfish Waters information	Environment Agency	PDF	Received for Scoping	Good	
GQA and RE Background	Environment Agency	PDF	Received for Scoping	Good	
Science Summary - Climate change and river flows in the 2050s SC070079/ss1	Environment Agency	PDF	Received for Scoping	Good	
South Essex Catchments and WWTWs	Environment Agency				Require GIS Layers
South Essex GQA Stretches	Environment Agency				Require GIS Layers
South Essex Rivers GQA & RE Compliance 2003-2007	Environment Agency	.xls	Received for Scoping	Good	
Outer Thames Shellfish Waters info	Environment Agency	.doc	Received for Scoping	Good	
Southern Shellfish waters	Environment Agency	.doc	Received for Scoping	Good	

Data/Title	From - Company	Format	Received / Required	Quality	Notes (including cost where applicable)
Projected Growth data (2021, 2026, 2031)	Essex County Council	.xls / GIS	Required for main study		
OS Base mapping	Essex County Council	GIS	Required for main study		
Remote Topo Data (LiDAR & SAR)	Environment Agency		Required for main study		Potential cost associated - approximately
Emerging Green Infrastructure Strategy	Essex County Council		Required for main study		
Areas of Important Biodiversity	Essex County Council	GIS	Required for main study		
Mineral Development Document/SFRA	Eunomia				Details in email from Barbara Kendall 01-11-08
Likely Boundary for Future Development and Growth	Basildon Council			Not fully developed	subject to change due to early stage of LDF process
Basildon Open Spaces Strategy	Basildon Council		Required for main study	In Development	
TG Green Grid Strategy		weblink	Received for Scoping		www.greengrid.co.uk/main.cfm
Basildon emerging LDF	Basildon Council	weblink	Received for Scoping	adequate	www.basildon.gov.uk/ldf
Basildon Local Plan Saved Policies 2007	Basildon Council	weblink	Received for Scoping	good	www.basildon.gov.uk/80256B7500420D16/vweb/wpafen6u7d23
Development Control Guidelines SPG	Basildon Council	weblink	Received for Scoping		http://www.basildon.gov.uk/80256B7500420D16/vWeb/flAPSY586DLY/\$file/dc+guidelines.pdf
Gardiners Lane South SPG	Basildon Council	weblink	Received for Scoping		http://www.basildon.gov.uk/80256B7500420D16/vWeb/wpEFEN5RHJ4C

Data/Title	From - Company	Format	Received / Required	Quality	Notes (including cost where applicable)
Wickford Town Centre Masterplan 2006	Basildon Council	weblink	Received for Scoping		http://www.basildon.gov.uk/80256B90004A6718/vWeb/wpSGUT6GVCHR
Basildon Town Centre Development Framework	Basildon Council	weblink	Received for Scoping		http://www.basildonrenaissance.com/38_RegenerationProjectsArchive.html?item=1
Pitsea Town Centre Masterplan 2007	Basildon Council	weblink	Received for Scoping		http://www.basildonrenaissance.com/38_RegenerationProjectsArchive.html?item=3
Local Wildlife Sites location and information	Basildon Council		Required for main study	Reviewed by Essex Wildlife Trust	GIS Format
Priority Habitats	Basildon Council		Required for main study		GIS Format
Location and number of existing industrial/commercial properties	Basildon Council		Required for main study	Location of industrial and commercial areas	Suggested AWS or ESW
HOST (Hydrology of Soil Type) data	Centre for Ecology and Hydrology (CEH)	GIS	Required for main study		GIS format
South Essex CAMS	Environment Agency	PDF	Received for Scoping		
Draft Water Resource Management Plan	Essex and Suffolk Water	PDF	Received for Scoping		
Southend adopted Core Strategy	Southend Council	.pdf	Received for Scoping		

Data/Title	From - Company	Format	Received / Required	Quality	Notes (including cost where applicable)
Areas Action Plans for Seafront Airport and Shoeburyness	Southend Council	.pdf	Received for Scoping		
Strategic House availability Database for Southend on Sea	Southend Council	.dbf	Received for Scoping	Database format assumed as .dbf	
Basildon Completed Development	Basildon Council	Layer file	Received for Scoping		
Basildon housing under construction	Basildon Council	Layer File	Received for Scoping		
Basildon Homes with permission	Basildon Council	Layer file	Received for Scoping		
Basildon New Development Compartment	Basildon Council	Layer file	Received for Scoping		
Castle Point Core Strategy	Castle Point Council	pdf / .doc	Received for Scoping		
Canvey Area Action Plan	Castle Point Council	pdf / .doc	Received for Scoping		
Benfleet, Hadleigh and Thundersley plan	Castle Point Council	pdf / .doc	Received for Scoping		
Rochford Local Plan	Rochford Council	pdf / .doc	Received for Scoping		
Draft Allocations Document	Rochford Council	pdf / .doc	Received for Scoping		
Wastewater treatment facility assessment	Essex County Council	pdf / .doc	Required for main study		



Data/Title	From - Company	Format	Received / Required	Quality	Notes (including cost where applicable)
Existing and proposed waste & minerals sites	Essex County Council	pdf / .doc	Required for main study		
Sewer Overflow Layers	Anglian Water	.ID.MAP. TAB .DAT	Received for Scoping		
Sewer Outfalls Layer	Anglian Water	.ID.MAP. TAB .DAT	Received for Scoping		
Location of Treatment Works and Pumping Stations	Anglian Water	.ID.MAP. TAB .DAT	Received for Scoping		
WWTW consents for study area	Anglian Water	pdf	Required for main study		Basildon WWTW consent received
WWTW information covering: treatment type current DWF and FFT figures, process capacities (if available) PE figures, trade flow figures, infiltration assumptions	Anglian Water	.xls	Required for main study		
Data from sewerage and treated water capacity assessment studies in support of the development of Business Plans for Price Review 09.	Anglian Water	xls / .doc	Required for main study		
DG5 Register information - sewer flooding hotspots	Anglian Water	.xls	Required for main study		

Data/Title	From - Company	Format	Received / Required	Quality	Notes (including cost where applicable)
Confirmation of Coverage of wastewater network models each town.	Anglian Water	email	Required for main study		
WTW locations and capacities	Essex and Suffolk Water	.xls / GIS	Required for main study		
GIS layers of Clean water supply network layout for each town, including pipe sizes, pumping stations and any problem areas with regards to pressures.	Essex and Suffolk Water	GIS	Required for main study		
Confirmation on coverage and reliability status of any clean water supply network models for each town	Essex and Suffolk Water	email	Required for main study		
Location of service reservoirs & information on size	Essex and Suffolk Water	.xls / GIS	Required for main study		
Bulk Supplies information, including locations of service reservoirs	Essex and Suffolk Water	.doc / .xls	Required for main study		
Percentage utilisation of abstraction licences if available	Essex and Suffolk Water	.doc / .xls	Required for main study		

Data/Title	From - Company	Format	Received / Required	Quality	Notes (including cost where applicable)
Detailed information on Denver transfer scheme	Essex and Suffolk Water	.doc	Required for main study		
EIA for Abberton scheme permission	Essex and Suffolk Water	.doc / pdf	Required for main study		
ownership of surface water discharge pumps to Tidal stretches of river	Environment Agency	email / .doc	Required for main study		
Abstraction Licences and limits	Environment Agency	pdf / .xls	Required for main study		
River flow gauging locations and mean flow values.	Environment Agency	.xls / GIS	Required for main study		
GIS Layers of the Main Rivers	Environment Agency	GIS	Required for main study		
Main Watercourse cross-sections in proximity of the settlements & WWTW discharge points (not required for discharges direct to the Thames Tideway)	Environment Agency	.xls	Required for main study		
EA 25 year regional water resource plan	Environment Agency	.doc / pdf	Required for main study		
Source Protection Zones GIS Layer	Environment Agency	GIS	Required for main study		

Essex Thames Gateway Planning Authorities

Water Cycle Study – Scoping Study



Data/Title	From - Company	Format	Received / Required	Quality	Notes (including cost where applicable)
Appropriate Assessments and Habitats regulation Assessments of LDF or DPDs to date	All client authorities	.doc / pdf	Required for main study		Required where complete
ordinary or minor watercourse maps	All client authorities	GIS	Required for main study		
GIS layers for recently built development, sites with PP and Urban Capacity study sites	All client authorities	GIS	Required for main study		
GIS layers for Site Allocation options	All client authorities	GIS	Required for main study		where available (dependent on progress of LDF)
employment Land reviews where available	All client authorities	.doc / pdf	Required for main study		
Stage 3 and 4 Review of Consent Reports for the Crouch and Roach SPA/Ramsar Sites, Foulness, Thames Estuary & Marshes	Environment Agency	.doc / pdf	Required for main study		

Appendix B - Surface Water Management Plan Methodology.

Stage 1 – Scoping Level Surface Water Management Plan

The overall aim of this element of work is to produce an “outline” (or scoping level) Surface Water Management Plan (SWMP) that summarises flood risk from all sources and provides recommendations to the Thames Gateway, South Essex Steering Group for a more detailed SWMP to be undertaken in the future. This high-level study will establish the foundation for a future SWMP focusing on identifying the Critical Drainage Areas (CDAs) or surface water flooding “hot spots”. We envisage that although at a high-level of detail this study will still provide a good opportunity to test new Defra guidance on surface water management plans.

Outline SWMP Methodology – Overview

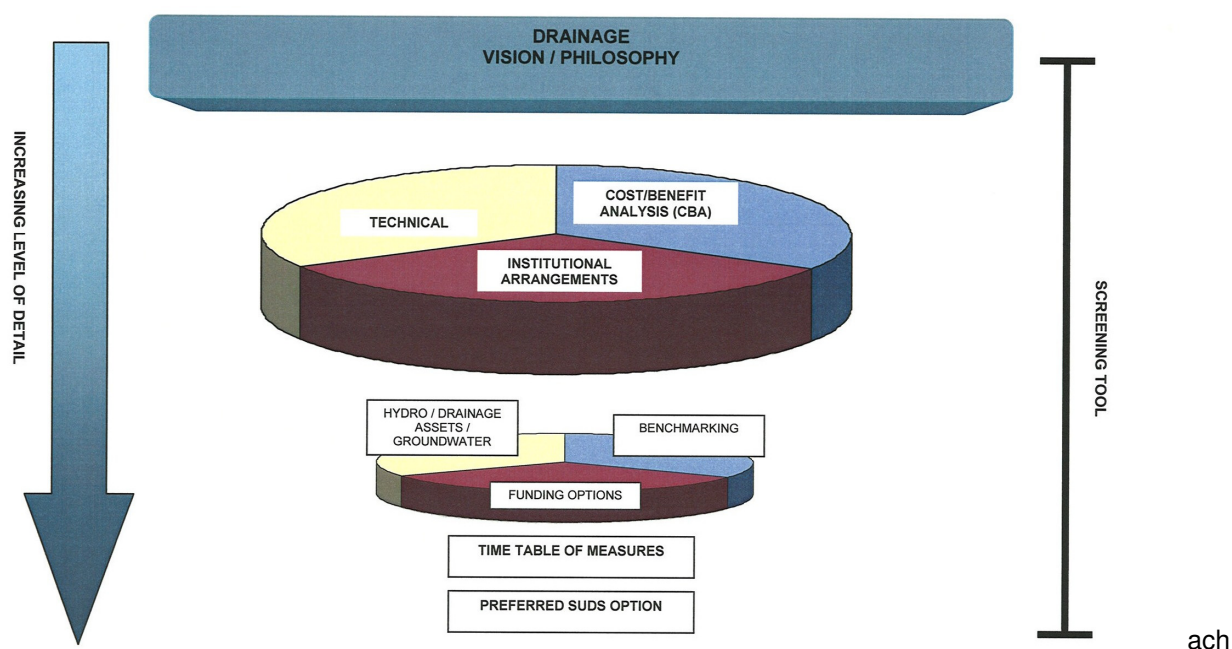
Our methodology for preparation of this element of the WCS is primarily based on the contents of the recently released Defra guidance for surface water management plans as well our experience of preparing strategic flood documents for other authorities.

The proposed outline approach is summarised in the table below:

Scoping-Level SWMP Methodology	
Component	Key Tasks
Phase 1	Inception Phase (Start Up) A workshop(s) with the Steering Group and key partners will be held to confirm the methodology and the level of detail. Agree roles and responsibilities. Identify constraints, links to other plans, develop and agree success criteria.
	Surface Water Management Communication Plan Ensures that the Steering Group provide clear and consistent messages to the public and that external messages are coordinated.
Phase 2	Identify & Understand Issues In conjunction with key partners undertake data collection, review and mapping. Define drainage networks (overland and underground), assess historical flood risk and interactions between flood sources, assess predicted runoff and flow routes and identify potential future flood risk issues. Develop consistent policies across sub-region for the development of a future surface water management plan. Identify risk assessment and selection criteria for areas requiring more detail.
	Identify Risks and develop approach Undertake preliminary screening – identify areas requiring more detailed assessment on flood risk – feed in future development proposals from RSS, DPDs, Growth Points etc. Identify missing data (topographic, hydrological etc.) and outline methods to capture new data (survey, gauges etc.).
Phase 3	Conduct high-level assessment of flood risk from all sources Assess flood risk from all sources across the study area. By using GIS software, utilise the “rolling ball” technique to identify surface water flooding locations. Define requirements and policies for existing and new development sites – ensure consistency in approach across the study area (e.g. SUDs Policies and Maps).
	Disseminate findings Communicate and discuss findings with the Steering Group, key partners and Stakeholders. Agree approach to communicate findings with public following communications strategy.
Reporting	Outline SWMP Report & Final Workshop Summarise interim findings of our scoping level SWMP and recommend next steps (options development, appraisal, detailed modelling, action plan and implementation) for critical drainage areas. Hold final workshop to present findings to Steering Group, key partners and Key Stakeholders and provide requirements for the delivery of a future SWMP.

Stage 2 - Appraisal of Regional and Localised SUDs Interventions

We have developed an innovative 3-pronged approach which incorporates the technical, institutional and cost/benefit elements of appraising the most suitable SUDs for growth sites within the Thames Gateway, South Essex. This triple-bottom line approach to the appraisal of SUDs, we call the “detailed level screening tool” provides a bespoke assessment of the most suitable options and will ultimately give the Thames Gateway South Essex Steering Group the necessary time table of measures and the preferred SUDs options for future growth sites. The schematic diagram below sets out our unique process.



determine, for each development site and type of system:

- **the most relevant adopting agency**, likely to depend mostly on the specialist skills required to maintain different elements of SUDS
- **the method and level of control** required by the three local authorities involved, which expected to depend on the size and the complexity of each SUDS scheme
- **the various design standards used by each stakeholder**: early consultation needs to take place with appropriate regulators to determine the relevant design criteria, which may vary from one body to another. For instance, sewerage undertakers and highways authorities will adopt SUDS elements compliant with *Sewers for adoption*, and *Design Manual for Roads and Bridges*, respectively.
- **the funding mechanisms available to each stakeholder and the potential funding opportunities**: ensuring the continued performance and maintenance of SUDS requires a specific

source of revenue to be secured by the management body, which again will vary with the adopting body, from commuted sums or bonded arrangements, to surface water sewerage charge or specific maintenance contracts of budgeted allocation. Opportunities for alternative sources of funding, like the EU Interreg IVB programme or the Defra / Environment Agency R&D scheme will also be looked at.

- **a time framework and prioritisation** for the identified measures to be implemented for each development site, depending on the progress of the planning application process and the severity of the identified issues.

SUDs Appraisal Methodology – Detailed

