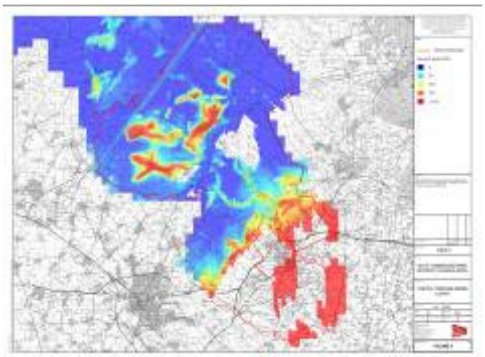
East Cambridgeshire & Fenland Water Cycle Study

Outline Study – Main Planning Report

April 2011



Cambridgeshire Horizons

driving forward sustainable communities

Revision Schedule

East Cambridgeshire & Fenland Water Cycle Study – Main Planning Report
Final
April 2011

Rev	Date	Details	Prepared by	Reviewed by	Approved by
01	June 2010	D129319 – Main Planning Report DRAFT FOR COMMENT	**Clare Postlethwaite** Consultant	**Carl Pelling** Principal Consultant	**Jon Robinson** Technical Director
02	July 2010	D129319 – Main Planning Report V2	**Clare Postlethwaite** Senior Consultant	**Carl Pelling** Principal Consultant	**Jon Robinson** Technical Director
03	Oct 2010	D129319 – Main Planning Report V3	**Clare Postlethwaite** Senior Consultant	**Carl Pelling** Principal Consultant	
04	Dec 2010	D129319 – Main Planning Report draft FINAL	**Clare Postlethwaite** Senior Consultant	**Carl Pelling** Principal Consultant	**Jon Robinson** Technical Director
05	April 2011	D129319 – Main Planning Report FINAL	**Clare Postlethwaite** Senior Consultant	**Carl Pelling** Principal Consultant	**Jon Robinson** Technical Director

Scott Wilson
Scott House
Alencon Link
Basingstoke
Hampshire
RG21 7PP

Tel: 01256 310200
Fax: 01256 310210

www.scottwilson.com

Table of Contents

Acronyms & Abbreviations

Abbreviation	Description
AMP	Asset Management Plan
AWS	Anglian Water Services
BGS	British Geological Society
BOD	Biochemical Oxygen Demand
CAMS	Catchment Abstraction Management Strategy
CBA	Cost Benefit Analysis
CFMP	Catchment Flood Management Plan
CSH	Code for Sustainable Homes
CLG	Communities and Local Government
DEFRA	Department for Environment, Food and Rural Affairs
DO	Dissolved Oxygen
DWF	Dry Weather Flow
DWI	Drinking Water Inspectorate
ECDC	East Cambridgeshire District Council
EEP	East of England Plan (the RSS for the East of England)
EGDB	Ely Group of Drainage Boards
FDC	Fenland District Council
FEH	Flood Estimation Handbook
FFT	Flow to Full Treatment
GQA	General Quality Assessment
GWMU	Groundwater Management Unit
HA	Highways Agency
HMWB	Heavily Modified Water Body (under the Water Framework Directive)
IDB	Internal Drainage Board
l/h/d	Litres/head/day (a water consumption measurement)
LDDs	Local Development Documents
LDF	Local Development Framework
LPA	Local Planning Authority
MLC	Middle Level Commissioners
Ml	Mega Litre (a million litres)
NE	Natural England
NWA	No Water Available (in relation to CAMS)
OFWAT	The Water Services Regulation Authority (formerly the Office of Water Services)
O-A	Over Abstracted (in relation to CAMS)
O-L	Over Licensed (in relation to CAMS)

Abbreviation	Description
P	Phosphorous
PE	Population Equivalent
PPS	Planning Policy Statement
PR	Periodic Review
PS	Pumping Station
RBMP	River Basin Management Plan
RSS	Regional Spatial Strategy (East of England Plan)
RQO	River Quality Objective
SAC	Special Area for Conservation
SFRA	Strategic Flood Risk Assessment
SPA	Special Protection Area
SPD	Supplementary Planning Document
SPZ	Source Protection Zone
SS	Suspended Solids
SSSI	Site of Special Scientific Interest
SUDS	Sustainable Drainage Systems
UKTAG	United Kingdom Technical Advisory Group (to the WFD)
UWWTD	Urban Wastewater Treatment Directive
WCS	Water Cycle Study
WFD	Water Framework Directive
WRMP	Water Resource Management Plan
WRMU	Water Resource Management Unit (in relation to CAMS)
WRZ	Water Resource Zone (in relation to a water company's WRMP)
WTW	Water Treatment Works
WwTW	Waste Water Treatment Works

Executive Summary

The districts of East Cambridgeshire and Fenland are expected to experience a significant increase in housing and employment provision over the period to 2031. This growth represents a challenge to both districts in ensuring that both the water environment and water services infrastructure has the capacity to sustain this level of growth and development proposed.

An Outline Water Cycle Study (WCS) has therefore been undertaken to identify any constraints that may be imposed by the water cycle and how these can be resolved. Furthermore, it provides a strategic approach to the management and use of water which ensures that the sustainability of the water environment in the study area is not compromised.

Three potential Growth Scenarios covering housing and employment targets for each authority have been discussed and agreed with the relevant planning officers at Fenland District Council (FDC), East Cambridgeshire District Council (ECDC) and Cambridgeshire County Council (CCC) and these scenarios have been tested in the Outline WCS. Neither authority was in a position to provide a definitive list of potential development locations; hence it has been necessary to carry out the assessment of capacity at a strategic level for this Outline Study.

Wastewater Strategy

Wastewater Treatment

Several WwTWs have capacity to accept wastewater flow from some growth, and the WCS has shown that wastewater flow from growth for all three scenarios at these locations can be accommodated within existing consent conditions.

However, several WwTWs do not have capacity to accept and treat any further wastewater from growth at the current time (i.e. before growth is considered) without requiring an increase in the volumes that they are permitted (or consented) to discharge.

For these catchments (and hence growth towns) a solution is required to treat additional wastewater generated as a result of growth. The Outline solution for these WwTW is to determine if the WwTW can increase the volume they are permitted to discharge without deteriorating downstream water quality of the receiving watercourse and impacting on ecology.

A modelling process was therefore agreed with the Environment Agency and undertaken for all three housing growth scenarios. The key results were that:

- the WwTW serving Soham, Burwell, Bottisham, Whittlesey and Doddington cannot achieve required water quality conditions for all three growth scenarios within the limits of conventional treatment[1] and without affecting the ability of receiving watercourses to meet future targets under the Water Framework Directive (WFD) – an alternative solution is therefore required in the detailed WCS for growth in these locations; however, Bottisham WwTW could accept approximately 30% of planned growth before targets would be unachievable;

[1] A description of the treatment processes considered to be normal before advanced (and more energy intensive) technology is required to treat to higher standards.

- the watercourses downstream of the discharges points of the WwTW serving Soham, Burwell, Bottisham, Whittlesey and Doddington have been shown to be unable to meet Good Status under the WFD, but additional modelling is needed to demonstrate whether it is the growth that is preventing the watercourse from achieving Good status or whether the growth could be accommodated under the No deterioration aspect of the WFD. This will be carried out during the Phase 2 WCS;
- all other WwTW and growth locations have a theoretical solution to increase permitted discharge volumes of discharge to a higher quality and hence can be considered at this stage to be able to accept growth from all three scenarios, either because growth can be accepted within permitted discharge volumes or because the quality conditions of the consent can be revised to ensure compliance with downstream water quality targets. The feasibility of doing so (and timing implications) needs to be confirmed in the detailed WCS, once it is known where preferred growth sites will be located. In particular, growth at Haddenham, Littleport and Witcham is likely to be difficult as limits will be very close to the limits of conventional treatment; and
- although the capacity assessment for the Ely WwTWs shows there to be sufficient capacity to accept wastewater from growth within existing consents, consideration is being given to the location of a new WwTW to the north of Ely. A meeting was held between AWS, Cambridgeshire County Council and ECDC to discuss the relocation of Cresswells Lane STW on 4th October. AWS is open to such a move but it is too early to make any commitments and scheme viability is expected to be a key issue. The benefits will need to be weighed against the costs when options for serving Ely North are evaluated. The policy position in LDF documents will also be a consideration. AWS has therefore left the option of relocation to Ely North open in the Minerals and Waste LDF evidence and intends to continue this position at Public Examination. It is recommended that the technical feasibility of this option (from a water environment perspective) is considered in the detailed study.

In addition, the Middle Level Commissioners have stated that further increases in discharges will not be permitted from WwTW discharging into watercourses under their jurisdiction. An alternative solution is therefore required in the detailed WCS for growth at Whittlesey and Doddington.

Sewer network capacity

A high level assessment of capacity in the sewer network has been undertaken to determine whether there is likely to be sufficient capacity to transmit additional wastewater flow generated to the various treatment works within existing infrastructure.

The following key conclusions were drawn:

a. Growth in the following locations is likely to be accommodated in existing infrastructure i.e. no new trunk mains or upgrades are likely to be required and hence there is unlikely to be any impact on phasing of development at these locations:

- Little Downham;
- Newmarket Fringe;
- Stretham;
- Wilburton;
- Sutton;

- Benwick;
- Whittlesey.

b. Growth in the following catchments is relatively small; however, the system is reliant on pump capacity and hence, modelling is required to determine if a new trunk main, upgrade to a pumping station or upgrade to a trunk main is required once sites are known. Development in these towns will require further investigation before it can be determined whether there is likely to be an impact on phasing and the requirement for developer contribution to new infrastructure:

- Bottisham;
- Isleham;
- Manea Town;
- Parsons Drove (& Church End).

c. Growth in the following catchments is relatively small, but AWS have indicated existing capacity/flooding problems which will make use of existing infrastructure unlikely – modelling is required to determine if (and when) a new trunk main, upgraded pumping station or upgrades to an existing main will be required once sites are known:

- Burwell;
- Haddenham; and
- Doddington (& Wimblington).

d. Growth in the following catchments is greater than 10% upstream of key pumping stations and sewer discharge points. New or upgraded infrastructure at a strategic level (trunk mains or pumping stations) will be required and modelling is required to define where and when once sites are known:

- Ely;
- Soham; and
- March.

e. Growth in the following catchments is significant. Some development will be possible within existing sewer capacity; however existing flooding or pump capacity problems will limit growth and hence modelling is required to determine where and when upgrades to (or provision of new) trunk mains will be required once sites are known:

- Littleport;
- Chatteris; and
- Wisbech.

The requirement to provide wastewater network infrastructure solutions will impact upon development phasing as opposed to absolute housing numbers and will be assessed in more detailed during the Detailed Study once growth locations are known.

Water Supply Strategy

Future Water demand following growth proposed in all three housing scenarios (and employment targets) has been calculated for both districts. For each housing scenario, five different water demand projections have been calculated based on different rates of water use for new homes that could be implemented through potential future policy.

Available Water Resources

Available Water Resources have been assessed according to the final Water Resource Management Plan (WRMP) as published by AWS in March 2010.

AWS has undertaken an assessment to calculate if there is likely to be a surplus of available water or a deficit in each of there supply areas in the study area by 2035, once additional demand from growth and other factors such as climate change are taken into account.

The results show that there are adequate water resources within Fenland to cater for growth; however, the majority of growth in East Cambs cannot be catered for within existing resources (with the exception of growth in the fringes of Newmarket, Burwell, Chippenham & Bottisham which are in a zone with surplus supply).

AWS has therefore proposed solutions to the deficits in the affected planning zones. The solutions identified would remove the deficits in the supply and demand balance for East Cambridgeshire. However, it is important to note that the solutions rely on transfer of resources to the zone in an area which is reliant on finite groundwater abstractions. The Environment Agency's assessment of water availability[2] suggests that the chalk aquifer is at its limit of available resources without causing adverse impact on rivers and ecosystems that rely on it; hence further abstraction and transfer is unlikely in the future.

The assessment has shown that the higher growth scenario in East Cambridgeshire is unlikely to be fully catered for by the provision of supply as set out in AWS's WRMP. Higher growth in the district will therefore be required to consider alternative supply options and this will be investigated in the Detailed WCS. In considering the higher growth scenario for the district, it is also prudent to promote higher levels of water efficiency in new homes and commercial buildings to reduce the additional demand and make supply of water more sustainable. The outline WCS has therefore assessed of feasibility of achieving Water Neutrality in the study area.

Water Neutrality

The Water Neutrality concept is to aim to ensure that there is no net increase in water demand for a planning area, once new development has occurred. It requires demand from new housing and employment development to be minimised as far as practicable and to offset the remaining additional demand by reducing demand in existing homes and businesses.

An assessment of the likelihood of achieving water neutrality at the end of the plan period (2031) has been undertaken in the Outline WCS for both districts as a whole.

[2] The Catchment Abstraction Management Strategies (CAMS)

The assessment combined potential future water demand projections based on different water use levels for new homes[3] and combined these with different options for installing water demand management measures in existing properties, ranging from installation of water meters (in unmetered properties) to retrofitting of low water use taps and shower heads.

Water Neutrality is theoretically feasible in East Cambridgeshire for the low and medium growth scenarios only. It is not possible if the higher growth scenario is promoted. For Fenland, neutrality can theoretically be achieved for all housing growth scenarios.

An initial policy pathway to achieving neutrality has been set out in the Outline study. A detailed water efficiency and water neutrality policy pathway will be undertaken in the Detailed WCS once preferred growth sites and locations are known.

Water Supply Infrastructure

The study area is well interconnected in terms of man supply trunk sewers and water treatment works with treatment capacity.

Strategic upgrades are required between 2010 and 2015 to ensure that the new transfer scheme proposed for the Ely area can be delivered in time for growth; but this will not impact on early phasing.

Once growth sites are known, a more detailed assessment of localised upgrades to pumping stations and trunk mains that might be needed to serve development can be undertaken in the detailed study.

Ecological Assessment

Designated ecological sites that have the potential to be affected by growth and its impact on the water environment have been considered. In the main, the majority of growth is unlikely to alter conclusions already drawn in the production of AWS's WRMP and the Review of Consents[4] process for wastewater undertaken for wastewater discharges. However, several key sites will warrant further assessment in the detailed WCS once preferred development sites are known:

The following key points can be made regarding ecological impact of WwTW discharges:

- Wicken Fen Ramsar site, The Cam Washes SSSI, the New River and Monks Lode may be affected by the increase in flow required at Burwell STW;
- the Cam Washes may also be affected by the increase in flow likely to be required (above consent conditions) at Bottisham and needs to be considered in the Detailed WCS;
- the Ouse Washes may be impacted by increases in flow from Mepal, Witcham, Wilburton, and Manea Town Lots WwTWs; and
- the River Nene County Wildlife Site may be affected by additional discharge at Whittlesey WwTW and West Walton WwTW.

[3] Using the 5 future demand calculations from the water resources assessment
[4] Undertaken as part of the requirements under the Habitats Directive

Flood Risk and Surface Water Management

Flood Risk to Development

The following key flood risk issues have been identified:

- The study area has significant areas which lie within the fluvial and/or tidal flood zone, with only the settlements of Wisbech, March, Whittlesey, Chatteris, Ely, Littleport, Little Downham, Witchford, Stretham, Haddenham and Sutton located on 'islands' of high ground above the floodplain.
- The study area is mostly pump drained, and is reliant on flood defences to minimise flood risk to the existing development both from fluvial and tidal flood risk and surface water drainage channels. Due to the historical drainage of the area, the majority of the land lies below the levels of the channels, creating a significant residual risk if defences were to be breached or overtopped.
- Surface water flooding from the managed drainage system is a key flood risk that needs to be considered as capacity of this pumped system is finite.

The Strategic Flood Risk Assessments for each district have been used in this Outline WCS to inform the assessment of flood risk to potential development locations at a strategic level. Development at Benwick is the key location where growth options are likely to be constrained by flood risk to development. Development areas immediately outside of the current urban extent of each of the major towns are also likely to be significantly constrained by flood risk.

The Management of Surface Water Runoff

Surface water management is a key flood risk consideration in the study area due to the fact that the majority of land put forward for development will be within areas where surface water runoff is managed via complex pumping systems. These systems are designed to ensure that surface water flooding does not inundate generally low lying urban areas and high grade agricultural land.

New development must consider the impact of further urbanisation on the existing pumped system, and discharge of surface water must be mitigated within the pumped limitations of the drained system. The incorporation of Sustainable Drainage Systems (SuDS) into development footprints at an early stage is therefore essential to meeting the aspiration of sustainable water management in the study area.

In order to give an indication of SuDS suitability for the Outline WCS, the likely capacity for infiltration type SuDS for the growth towns has been considered. The majority of the study area is not suitable for infiltration SuDS (with the exception of the southern section of East Cambridgeshire) and will therefore be reliant on surface attenuation and runoff restriction, which will require sites to make land provision for this mitigation. Once growth locations are known, further advice on types of suitable SuDS and opportunities for linking to green infrastructure will be provided in the detailed study.

Key Constraints and Next Steps

Key constraints have been identified for Wastewater Treatment and Flood Risk at the following locations and a solution needs to be identified in the Detailed WCS:

- Whittlesey – wastewater treatment;

- Burwell – wastewater treatment;
- Benwick – flood risk;
- Bottisham – wastewater treatment; and
- Doddington – wastewater treatment.
- Soham – wastewater treatment.

Once growth locations and numbers are confirmed, other locations will require more detailed assessments into sewer capacity, surface water management and water supply in order to determine the impact of infrastructure on phasing of growth in these locations. This Outline assessment has been undertaken at a strategic level based on best estimates of where growth is likely to occur on a settlement by settlement basis. A Detailed study will therefore be undertaken once more clarity is available on likely site allocations; this Outline study has provided a list of additional work required in the Detailed WCS phase.

1 Introduction

1.1 Growth in East Cambridgeshire and Fenland

1.1.1 The districts of East Cambridgeshire and Fenland are expected to experience a significant increase in housing and employment provision over the period to 2031. The Regional Spatial Strategy (RSS) for the East of England[5] (the East of England Plan or EEP) stated that a minimum of 11,000 houses and 11,000 jobs are to be provided in the administrative area of East Cambridgeshire District Council (ECDC) and a minimum of 11,000 new houses and 8,600 new jobs in the administrative area of Fenland District Council (FDC). Both councils are considering a higher growth scenario to that proposed in the EEP which the Government intends to be revoke through the Localism Bill.

1.1.2 This growth represents a challenge to both districts in ensuring that both the water environment and water services infrastructure have the capacity to sustain this level of proposed growth and development.

1.1.3 It is therefore key that the East Cambridgeshire and Fenland Water Cycle Study (WCS) identifies any constraints on housing and employment growth planned for the study area up to 2031 that may be imposed by the water cycle and how these can be resolved i.e. by ensuring that appropriate water infrastructure is provided to support the proposed development. Furthermore, it should provide a strategic approach to the management and use of water which ensures that the sustainability of the water environment in the region is not compromised.

1.2 Study History

1.2.1 The East Cambridgeshire and Fenland WCS is being undertaken in three stages, as recommended by the Environment Agency guidance for Water Cycle Studies[6].

1.2.2 The Scoping report was completed in October 2009[7] as a joint WCS and Strategic Flood Risk Assessment (SFRA) scoping report. Its aim was to define the study area, establish the WCS steering group and to determine the key water infrastructure and water environment constraints that have the potential to impact on growth during the plan period for the administrative area of the two authorities.

1.2.3 The Scoping study concluded that although no 'showstoppers' were identified, there are significant potential constraints on housing growth in the study area requiring more detailed assessment in an Outline and Detailed phase of the WCS. In particular, management of drainage, wastewater treatment and control of demand for potable water.

1.2.4 This Outline Water Cycle Strategy was therefore commissioned for planned growth in the East Cambridgeshire and Fenland Districts.

[5] http://www.gos.gov.uk/goee/docs/Planning/Regional_Planning/Regional_Spatial_Strategy/EE_Plan1.pdf
[6] Environment Agency (2009), *Water Cycle Study Guidance*.
[7] Entec (2009), Cambridgeshire Horizons, East Cambridgeshire and Fenland District Councils: Water Cycle Study and Strategic Flood Risk Assessment Scoping Report

1.3 Water Cycle Study Reporting

1.3.1 The undertaking of a WCS requires a significant amount of technical assessment work and use of confidential data. This technical work requires agreement by all stakeholders involved such that the findings of the study can be agreed and signed up to by all parties to give an approved strategy.

1.3.2 It is important that the methodology, process and outputs of each of the WCS assessments is documented and reported. However, as an evidence base to the authorities' Local Development Frameworks (LDF) and associated Local Development Documents (LDD), the WCS reports should primarily be planning based documents. Therefore, this Outline WCS has been undertaken and reported as follows:

- **The Main Planning Report** – this report presents the Outline Water Cycle Strategy as a planning summary of the study process, assessments and findings, with full conclusions of the Outline strategy and policy recommendations. Its aim is to be a planning based document used as the main reference point for the Water Cycle Study (including an Executive Summary) which represents the published document for the study;
- **Technical Assessments –** full details of all the technical assessments undertaken, including: calculations, data used, and full modelling results have been shared with the various stakeholders; however, owing to data confidentiality, these separate assessments have not been included in the appendices of the Main Planning Report.

1.3.3 This report presents the Main Planning Report with associated appendices.

1.4 Study Contributors

Steering Group

1.4.1 This Outline Study has been carried out with the guidance of the Steering Group, comprising the following organisations:

- Cambridgeshire Horizons;
- East Cambridgeshire District Council;
- Fenland District Council;
- Cambridgeshire County Council;
- Anglian Water Services Ltd;
- Environment Agency;
- Natural England;
- Middle Level Commissioners and associated drainage boards; and
- Ely Group of IDBs.

Consultation Strategy

1.4.2 The WCS aims to influence, and is influenced by, a wide range of stakeholders in addition to those included on the Steering Group. This ranges from groups who have an influence on

decisions relating to solutions (e.g. North Level IDB) to groups directly affected by policy recommendations, such as water efficiency measures on developers and the wider public.

1.4.3 Various stakeholders, including the Steering group, were therefore considered as part of a consultation strategy. The frequency and level of consultation and communication was agreed with the stakeholder group.

1.5 Outline Study – Aims and Objectives

1.5.1 The overall aim of the project is to identify a clear programme of required water services infrastructure and its implementation to support the delivery of sustainable growth up to 2031.The WCS tests the impact of the proposed development on the water cycle, defines the existing baseline capacity for growth without the need for new infrastructure and determines where new infrastructure or further investigation is required to overcome constraints that may limit the required growth levels in the study area, all within the context of limiting CO_2 emissions as a result of new water services infrastructure.

Project Vision

1.5.2 The high level vision for the project is:

'…to aspire towards water neutrality for new developments (residential and commercial), meeting EU Water Framework Directive targets and ensuring sustainable flood risk management'

1.5.3 Therefore, the key driver behind the WCS is the concept of sustainability. The WCS will help to ensure that future development can be delivered in a manner which does not place unsustainable demands on water resources, water infrastructure, water companies or the wider environment.

1.5.4 The WCS will therefore not only considers impacts of the proposed development on the water environment but also the wider environment, by considering issues such as carbon emissions and impact of providing infrastructure solutions on climate change. This will be particularly pertinent when comparing different infrastructure options as whilst different options may all be technically feasible and provide for the requirements of water based standards and legislative drivers, some may have a greater environmental impact than others.

Stakeholder Aims

1.5.5 The stakeholders' key requirements were identified early on in the study and helped to shape the focus of the technical assessments undertaken:

Cambridgeshire Horizons

- Provision of infrastructure timelines up to 2031;
- Policy Pathway for achieving Water Neutrality; and
- Identification of local solutions for proposed development.

Fenland District Council

- Strong Evidence Base to support Core Strategy submission.

Anglian Water Services

- Mitigation for downstream control of surface water discharge and the identification of the responsibility for funding and maintenance of control mechanisms and structures; and
- Identification of constraints to growth and potential solutions - strategic at Phase 1, detailed site specific at Stage 2.

Environment Agency

- The WCS must meet with WFD and Habitats Directive policy; and
- Focus on Water Neutrality and practicalities of how it can be achieved.

Natural England

- Protection of designated sites and measures to maintain and improve (where possible) biodiversity (NE); and
- Integration with blue/green infrastructure.

Outline Study Scope

1.5.6 The key aim of the Outline study is to define the baseline capacity of both the water environment and the water services infrastructure in relation to each growth area. This will identify the key environmental and infrastructure constraints and identify approximately how many new dwellings and jobs can be provided at each development area before new infrastructure or mitigation is required. Where there is insufficient capacity, the Outline Study then provides an Outline strategy for providing solutions or mitigation to allow development to proceed in a sustainable way.

1.5.7 At the time of completing the Outline WCS, specific growth locations in each district were not available at a level detailed enough to assess specific location capacity. Hence, the Outline study has been undertaken at a strategic growth location level, based on numbers of new dwellings per existing urban area. For some technical water cycle elements, this has necessitated a higher level assessment as explained in subsequent sections of this report.

1.5.8 Where more than one solution is possible, or further information is required to determine the solution, this will be undertaken in the Phase 2 Detailed WCS. The Detailed WCS phase is dependent on the determination of favoured growth option locations, as until it is known where development is to be located; there will remain a number of permutations of how development areas can be brought forward which could change the requirement on site specific infrastructure such as sewerage connections and water supply pipes.

1.6 Study Area

1.6.1 The administrative areas of East Cambridgeshire and Fenland are shown Figure 1-1 below. Whilst the geographic scope of the Outline Study is limited to growth within the East Cambridgeshire and Fenland Districts, the wider area will be considered where it has the capacity to impact on growth within the study area. For example, the town of Wisbech is served by West Walton Wastewater Treatment Works (WwTW), which lies outside of the study area boundary and also serves growth in the district of West Norfolk, in an area where growth of approximately 656 new houses is proposed. The increased wastewater flows from the proposed

growth in West Norfolk will therefore need to be included in the assessment of WwTW capacity as part of this WCS.

1.6.2 Similarly, the East Cambridgeshire housing projections include the area of 'Newmarket Fringe' and while Newmarket lies outside of the study boundary, to ensure this growth can be accommodated within the East Cambridgeshire area, Newmarket WwTW and other growth within its catchment will be assessed within this WCS.

1.6.3 Other large towns and settlements upstream of the study area will also be considered, as the large upstream catchments of the major watercourses within the study area mean that wastewater discharges and water supply demands from towns such as Peterborough and Cambridge can impact upon the East Cambridgeshire and Fenland Districts.

1.6.4 Due to the shared wastewater catchment and locality of Wisbech in relation to West Norfolk District Council, growth in Wisbech has also been considered in the Water Cycle Study being undertaken for Kings Lynn and West Norfolk. During preparation of this Outline Study, the Outline Study for Kings Lynn and West Norfolk was completed and liaison has been undertaken with the authors of the study to ensure consistency of approach to the assessment of growth in Wisbech. This study has assessed Wisbech in addition to the Outline Kings Lynn and West Norfolk study, as additional information on likely growth numbers was available for this study than was available at the time for the West Norfolk study, hence a more in depth assessment on constraints could be undertaken. At the time of completing this Outline WCS, a Detailed WCS for West Norfolk (including Wisbech) has been undertaken; it is recommended that the Stage 2 West Norfolk WCS is used as the basis for more detailed assessment of Wisbech in the Stage 2 Fenland WCS.

WISBECH

PETERBOROUGH

WHITTLESEY

MARCH

Fenland District

CHATTERIS

LITTLEPORT

ELY

East Cambridgeshire District

SOHAM

Job Title
EAST CAMBRIDGESHIRE & FENLAND OUTLINE WCS

Drawing Title
EAST CAMBRIDGESHIRE DISTRICT & FENLAND DISTRICT STUDY AREA

Figure 1-1

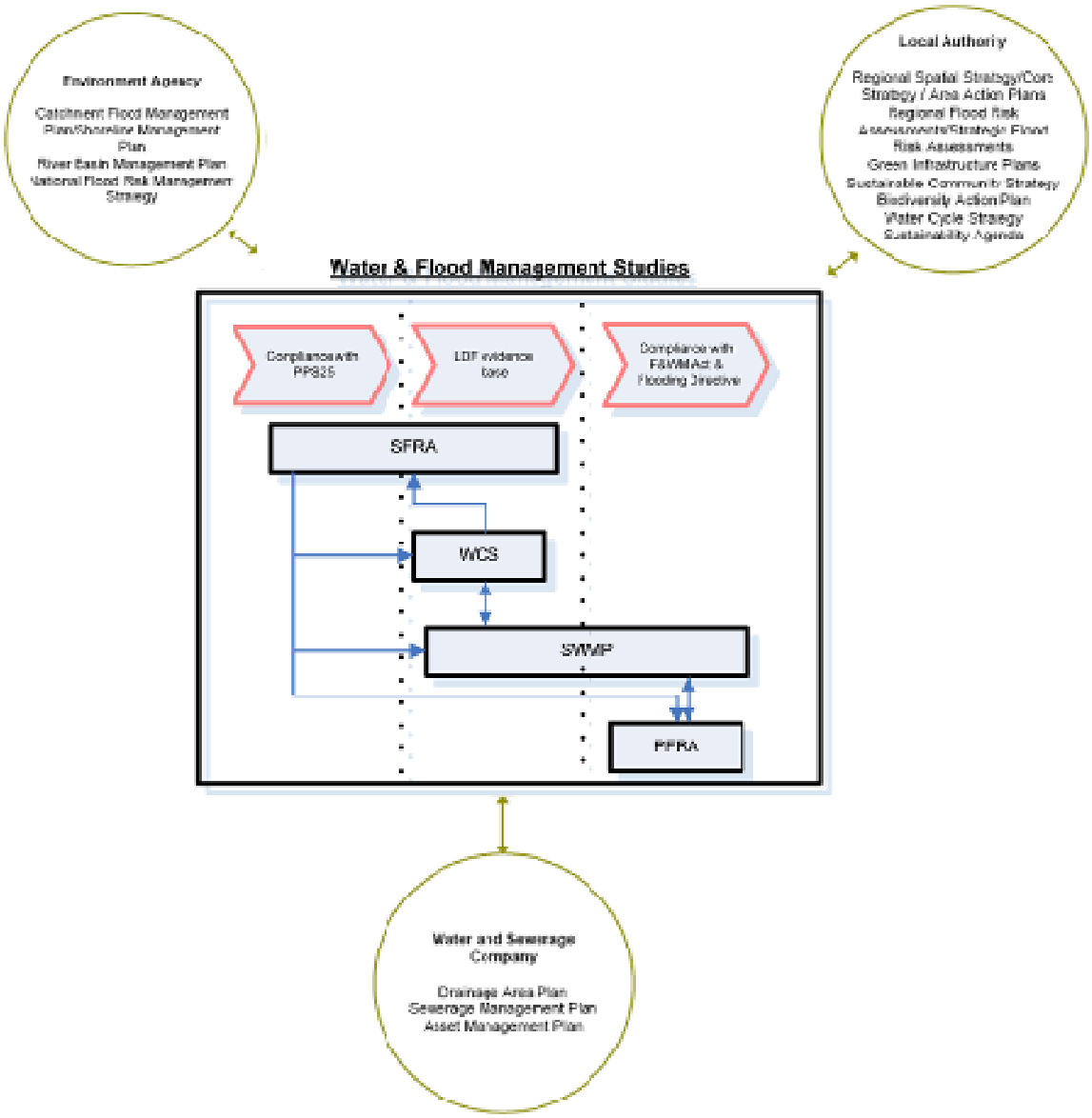
Scale at A3:	1:180,000		
Drw SK	App CP	Rev SK	
Chk CP	Date 18/06/2010	Date 01/10/2010	

Scott Wilson
www.scottwilson.com

1.7 Cambridgeshire Flood & Water Management Studies

1.7.1 In line with policy and legislation requirements, there are several flood and water management studies either completed or ongoing in the study area that are interlinked with the WCS. Figure 1-2 shows the inter-linkages between these study reports and the WCS

Figure 1-2: Linkages between water and flooding management studies[8]



[8] Adapted from Surface Water Management Plan Technical Guidance, DEFRA 2010

Studies Progress

1.7.2 The SWMP for Cambridgeshire Council is due to commence upon completion of the Outline WCS (Sept 2010). This Outline WCS will therefore inform the initial stages of the county wide SWMP, whereas the Stage Detailed WCS will both inform and be informed by the ongoing SWMP. The Level 1 SFRA for East Cambs and Fenland is due for completion at the same time as the Outline WCS (Sept 2010). The Outline WCS has been informed by the developing SFRA in terms of flood risk to development areas and management of surface water. The Level 1 SFRA will feed into the initial stages of the SWMP.

2 Policy and Supporting Information

2.1.1 National, regional, sub-regional and local planning policy and guidance documents provide requirements guidance for delivering sustainable development. The following is a summary of the legislative, policy and guidance drivers which have informed and shaped the development of this WCS and its deliverables, and have been considered at all stages in the WCS process.

2.2 Legislation and Policy

International and National

Table 2-1: Water Related European and National Legislation, Policy and Guidance

Directive/Legislation/Guidance	Description
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 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. The Code sets out a minimum water demand per person as a requirement for different code levels. CLG is currently in consultation on proposals to make certain code levels mandatory for all new homes. At present, only affordable homes must reach a certain code.
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 the Government's vision for water in England to 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.
Groundwater Directive 80/68/EEC	To protect groundwater against pollution by 'List 1 and 2' Dangerous Substances.
Habitats Directive 92/44/EEC	To conserve the natural habitats and to conserve wild fauna and flora with the main aim to promote the maintenance of biodiversity taking account of social, economic, cultural and regional requirements. In relation to abstractions and discharges, can require changes to these through the Review of Consents (RoC) process if they are impacting on designated European Sites.
Making Space for Water, 2004	Outlines the Government's 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 in the UK is set by Planning Policy Statements (PPSs).

Directive/Legislation/Guidance	Description
Planning Policy Statements	These explain statutory guidelines and advise local authorities and others on planning policy and operation of the planning system. 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. A WCS helps to balance the requirements of various planning policy documents, and ensure that land-use planning and water cycle infrastructure provision is sustainable. The most relevant PPSs to WCS are: PPS1 – Delivering Sustainable Development; PPS3 – Housing; PPS4 – Planning for Sustainable Economic Growth PPS9 – Biodiversity and Geological Conservation PPS12 – Local Development Frameworks; PPS23 – Planning and Pollution control; and PPS25 – Development and Flood Risk
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 Industry Act 1991	Sets of the duties and and powers of Water and Sewerage Companies
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, or by 2027 if there are grounds for derogation. The WFD, for the first time, combines 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 has been adopted. It effectively supersedes all water related legislation which drives the existing licensing and consenting framework in the UK. The Environment Agency is the body responsible for the implementation of the WFD in the UK. The Environment Agency have been supported by UKTAG[9], an advisory body which 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[10]. These have recently been finalised and issued within the River Basin Management Plans (RBMP).
Natural Environment & Rural Communities Act 2006	Covering Duties of public bodies – recognises that biodiversity is core to sustainable communities and that Public bodies have a statutory duty that states that "every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity
Water Resources Act 1991	Protection of the quantity and quality of water resources and aquatic habitats. Parts have been amended by the Water Act 2003.

[9] 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.
[10] UK Environmental Standards and Conditions (Phase I) Final Report, April 2008, UK Technical Advisory Group on the Water Framework Directive.

Directive/Legislation/Guidance	Description
Land Drainage Act 1991	Sets out the statutory roles and responsibilities of key organisations such as Internal Drainage Boards, local authorities, the Environment Agency and Riparian owners with jurisdiction over watercourses and land drainage infrastructure.
Flood & Water Management Act 2010	The Flood and Water Management Act 2010 is the outcome of a thorough review of the responsibilities of regulators, local authorities, water companies and other stakeholders in the management of flood risk and the water industry in the UK. The Pitt Review of the 2007 flood was a major driver in the forming of the legislation. Its key features relevant to this WCS are: • To give the Environment Agency an overview of all flood and coastal erosion risk management and unitary and county councils the lead in managing the risk of all local floods. • To encourage the uptake of sustainable drainage systems by removing the automatic right to connect to sewers and providing for unitary and county councils to adopt SUDS for new developments and redevelopments. • To widen the list of uses of water that water companies can control during periods of water shortage, and enable Government to add to and remove uses from the list. • To enable water and sewerage companies to operate concessionary schemes for community groups on surface water drainage charges. • To make it easier for water and sewerage companies to develop and implement social tariffs where companies consider there is a good cause to do so, and in light of guidance that will be issued by the SoS following a full public consultation.

Local

Local Development Frameworks

2.2.1 East Cambridgeshire and Fenland District councils are at different stages in the development of their Local Development Frameworks.

East Cambridgeshire

2.2.2 East Cambridgeshire District Council submitted its Core Strategy in May 2008. The Inspector's report on the Core Strategy concluded that the Core Strategy is sound, subject to a number of required changes. The revised Core Strategy document was adopted by Council on the 20th October 2009. The adoption of the Core Strategy means that most of the policies in the East Cambridgeshire District Local Plan (adopted in 2000) have been superseded. However, a number of policies are still 'saved' until adoption of the site-specific documents. The East Cambridgeshire District Council Core Strategy includes the following water-related policies, extracts from which are given below:

- **Policy CS 6 – Environment:** All new development should contribute to the delivery of sustainable development, by being designed and located to minimise carbon emissions and the use of non-renewable resources, mitigate/adapt to future climate change, provide attractive and safe places for people, and protect and enhance the quality of the natural and built environment. Opportunities to minimise air, land and water pollution and improve water

quality should be taken wherever possible, and development will be encouraged to make maximum use of renewable energy sources. New development will also be expected (but not required) to minimise the exposure of people and property to flooding.

- **Policy CS 7 – Infrastructure:** There should be appropriate infrastructure and community services and facilities in place to serve the needs of new development schemes and to deliver the objectives of the Core Strategy. Key requirements include improvements, extensions and relocations of sewage treatment facilities across the district as required. In the case of infrastructure, permission for development will not be granted unless there is sufficient capacity in existing infrastructure to meet the additional requirements arising from the new development, or suitable arrangements having been put in place for necessary improvements.
- **Policy CS 9 – Ely:** Improvements to the sewage treatment facilities in the city will be required in order to facilitate development on new greenfield sites. Improvements may also be required to facilitate change of use on large brownfield sites, if a scheme would result in a significant increase in discharge to the sewer. Anglian Water will seek to ensure that the required improvements to sewage treatment facilities in Ely are completed by 2015.
- **Policy CS 10 – Soham:** Improvements to the sewage treatment facilities in Soham will be required in order to facilitate development on new greenfield sites. Improvements may also be required to facilitate change of use on large brownfield sites, if a scheme would result in a significant increase in discharge to the sewer. Anglian Water will seek to ensure that the required improvements to sewage treatment facilities in Soham are completed by 2015.
- **Policy CS 11 – Littleport:** Improvements to the sewage treatment facilities in Littleport will be required in order to facilitate development on new greenfield sites. Improvements may also be required to facilitate change of use on large brownfield sites, if a scheme would result in a significant discharge to the sewer. Anglian Water will seek to ensure that improvements to sewage treatment facilities in the town are completed by 2015.
- **Policy EN 7 - Flood risk:** The sequential test and exception test will be strictly applied across the district, and new development should preferably be located in Environment Agency Flood Risk Zone 1. The modelled flood risk zones as identified in the SFRA and the Environment Agency Flood Maps will inform the application of the Sequential Test. In areas not covered by the SFRA, the Environment Agency Flood Maps will be used to apply the test. Development will not be permitted where:
  - it would intensify the risk of flooding during the lifetime of the development taking into account climate change allowances, unless suitable flood management and mitigated measures can be agreed and implemented; or
  - it would increase the risk of flooding of properties elsewhere during the lifetime of the development, taking into account climate change allowances, by additional surface water run-off or by impeding the flow or storage of flood water; or
  - it would have a detrimental effect on existing flood defences or inhibit flood control and maintenance work; or
  - safe access is not achievable from/to the development during times of flooding, taking into account climate change allowance (as this would endanger peoples lives).

  A site-specific Flood Risk Assessment, appropriate to the scale and nature of the development and the risks involved, and which takes account of future climate change, will be required for all development proposals in Flood Zones 2 and 3 and 'Modelled Zone 3'

including Rapid Inundation Zone and development proposals on sites of 1 hectare or greater in Flood Zone 1. All applications for new development must demonstrate that appropriate surface water drainage arrangements for dealing with surface water run-off can be accommodated within the site and that issues of ownership and maintenance are addressed. The use of SuDS will be required for all new developments unless, following an assessment of character and context, soil conditions and/or engineering feasibility dictate otherwise. SuDS may be incorporated within the Flood Risk Assessment.

- **Policy EN 8 – Pollution:** All development proposals should minimise, and where possible, reduce all emissions and other forms of pollution, and ensure no deterioration in water quality. All applications for development where pollution is suspected must contain sufficient information to enable the Council to make a full assessment of potential hazards.
- **Policy 167:** The Council will require developers to prepare and agree, prior to development taking place, a detailed design brief demonstrating how they intend to develop the areas of land identified for housing in Policy 11. Particular attention will have to be paid to issues relating to the attenuation and discharge of surface water run-off from housing developments on the western side of Ely in order to maintain the land drainage status quo.

2.2.3 The Council is now preparing site-specific documents which will allocate sites to meet the aims of the Core Strategy. The Ely Area Action Plan and the Site Allocations Development Plan Document (covering the rest of the district) will identify sites for housing, employment, retail and other types of development.

2.2.4 The submission of the Fenland District Council's Core Strategy and Development Policies document is currently uncertain; however, a shaping Fenland Study is due to commence in the summer of 2010 which will inform the latter stages of the WCS through development of the Core Strategy. The submission of the Site Specific Allocations document is intended to follow the Core Strategy, approximately six months later.

2.2.5 Other studies supporting the Core Strategy, such as retail, and employment land availability are currently underway and are intended to inform the broad locations for growth as are currently proposed. This Outline WCS will also inform the identification of broad locations for growth.

Fenland

2.2.6 Fenland District Council is currently preparing a 'Shaping Fenland Study' and along with the Fenland District Council Planning Policy team will be developing policies that will supersede water-related policies previous developed as part of the Core Strategy Preferred Options document submitted in 2007.

Water Company Planning

Financial and Asset Planning

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

2.2.8 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, this is a two way process between the Environment Agency and Water Companies and is conducted through the National Environment Programme;
- The Drinking Water Inspectorate (DWI) - who determine through a two way process with the Water Companies where investment is required to assets 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.

2.2.9 The outcome is a Business Plan which is produced by each water company setting out the required asset investment over the next 5 year period, the justification for it and the price increase required to fund it.

2.2.10 OFWAT determines how much a water company can charge its customers and considers views of the Water Company, regulators (Environment Agency and DWI) and consumer groups (Consumer Council for Water). This process is known as the Price Review and is undertaken on a 5 year cycle. This review allows OFWAT to determine the price limits for the proceeding 5 years that allow the Water Company to raise funds required for necessary investment into asset management (the AMP period).

2.2.11 At the time of undertaking the East Cambridgeshire and Fenland WCS, the Strategic Business plans had already been submitted for the Price Review 2009 (PR09) and OFWAT had determined the price limits for the AMP5 period (2010 to 2015), which dictates the investment that AWS will be able to undertake over the next five years. A review of AWS's final Business Plan has identified that there is over £2 billion to be spent during the period up to March 2015 across the AWS area[11].

2.2.12 Where significant water cycle infrastructure requirements are not included within PR09, funding cannot be sought until the next Price Review towards the end of AMP5 (PR14). Only in exceptional circumstances will Water Companies seek to deviate from their Water Resource Management Plan and submit an interim determination within the 5 year AMP cycle to provide funding for unforeseen investment requirements.

Water Resource Planning

2.2.13 Water companies 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. The statutory WRMPs will be updated in 5 yearly cycles to coincide with the PR and AMP process. AWS's current WRMP was finalised in March 2010 and has been used in this WCS.

[11] http://www.anglianwater.co.uk/news/general/9768FEF46C9541749367618E431BF588.aspx

Drainage Operating Authorities & IDB Policies

2.2.14 The three main drainage operating authorities within the study area have policies enabling them to carry out their statutory duties. The MLC, the North Level District IDB and the EGDB have statutory responsibilities for the watercourses and drains in the Districts that are not designated as Main River and as such consents to discharge to these watercourses or consents to undertake work in or near these watercourses require approval by the relevant IDB or drainage authority.

2.2.15 Full reference to policies of the main drainage authorities and IDBs can be found using the following websites, at:

- http://www.elydrainageboards.co.uk;
- http://www.middlelevel.gov.uk/index.aspx; and
- www.northlevelidb.org

2.3 Guidance

2.3.1 The Environment Agency has issued a National Guidance (The Water Cycle Study Manual[12]) document to ensure that water cycle studies are carried out in a consistent way. The approach set out in the guidance forms current best practice and the basis for the methodology followed in this WCS.

2.3.2 This WCS has also drawn on the principles laid out in the Cambridgeshire Horizon's document Cambridgeshire Quality Charter for Growth. This sets out a series of basic principles, divided into four themes, which are intended to ensure that, amongst other aims, infrastructure is upgraded in a timely manner to match the programme of new development. The three basic aims of the Charter are:

- to inspire innovation;
- to provide a simple common framework; and
- to support a cooperative approach for stakeholders and developers.

2.3.3 These aims have been considered when developing the methodology for this WCS, which is intended to reflect the vision of Cambridgeshire Horizons.

2.3.4 Although a County-wide Surface Water Management Plan (SWMP) is to be undertaken by CCC, the WCS has utilised guidance on the development of SWMP and management of surface water as issued by DEFRA[13].

2.4 Supporting Documents

2.4.1 In addition to the legislation and guidance set out in Tables 2.1 and 2.2 and above, the following studies and reports are relevant and, where available, have been used within the East Cambridgeshire and Fenland WCS:

[12] http://publications.environment-agency.gov.uk/pdf/GEHO0109BPFF-e-e.pdf
[13] DEFRA (2010), Surface Water Management Plan technical Guidance - http://www.defra.gov.uk/environment/flooding/documents/manage/surfacewater/swmp-guidance.pdf

- Water Cycle Studies for:
  - East Cambridgeshire & Fenland Water Cycle Strategy – Scoping[14]
  - Huntingdonshire[15]
  - King's Lynn & West Norfolk[16]
  - Forest Heath & St. Edmundsbury[17]
  - Major sites in and around Cambridge: Phase 2 of a Water Cycle Strategy (being project managed by Cambridgeshire Horizons)[18]
- East Cambs SFRA (2005)[19] & Fenland SFRA (2005)[20]
- Level 2 SFRA for Wisbech (2009)[21] due for revision in 2010
- Draft Infrastructure Investment Strategy for East Cambs (commissioned Summer 2009)
- East of England Capacity Delivery Study: Phase One[22]
- Great Ouse Catchment Flood Management Plan (Consultation Draft)[23]
- The Cam and Ely Ouse Catchment Abstraction Management Strategy[24]
- Whittlesey Studies FSR
- Cranbrook/Counter Drain FRM Strategy
- Nightlayers IDBs Catchment Study
- The Commissioners Strategic Study
- The Commissioners Strategic Water Study – Feasibility of Winter Storage
- The Environment Agency Groundwater Protection Policy[25]
- The Environment Agency Review of Consent Process
- The Great Ouse Tidal River Strategy
- Cambridgeshire and Peterborough Minerals and Waste Plan (including Earith & Mepal Area Action Plan)[26]
- Cambridgeshire Horizons' Green Infrastructure Strategy[27]
- Cambridgeshire Biodiversity Action Plan (BAP)
- Wetland 50 Year Vision
- The Great Ouse Wetland Vision

[14] http://www.cambridgeshirehorizons.co.uk/documents/to%20be%20filed/ecf_wcs_final_151009.pdf
[15] http://www.huntingdonshire.gov.uk/Environment%20and%20Planning/Planning/Planning%20Policy/Pages/Monitoring%20and%20Research.aspx
[16] http://www.west-norfolk.gov.uk/pdf/Intro%20and%20Contents.pdf
[17] http://www.forest-heath.gov.uk/NR/rdonlyres/6CE666F1-7D27-4DA0-9CEB-0B51798225F9/0/5000BM01397BMR05FinalStage1WCSandLevel1SFRA.pdf
[18] http://www.cambridgeshirehorizons.co.uk/documents/publications/reference/water_cycle_strategy_phase_1.pdf#
[19] East Cambridgshire District Council, level 2 SFRA, Atkins, 2005
[20] Fenland District Council, SFRA, Bullen Consultants, 2005
[21] http://www.fenland.gov.uk/ccm/content/development-policy/ldf/evidencedocs/wfra/wisbech-fra.en;jsessionid=aduTu0mYSoN9
[22] Halcrow Group Ltd on behalf of Environment Agency, EERA and GO-East, Dec 2006
[23] http://publications.environment-agency.gov.uk/pdf/GEAN1105BJWL-e-e.pdf
[24] http://publications.environment-agency.gov.uk/pdf/GEAN0207BLUY-e-e.pdf
[25] http://publications.environment-agency.gov.uk/pdf/GEHO1006BLMW-e-e.pdf
[26] http://www.cambridgeshire.gov.uk/environment/planning/mineralswasteframework/mineralswasteplan/
[27] http://www.cambridgeshire.gov.uk/NR/rdonlyres/DFC9B030-E462-47B4-8365-12454D0B01AC/0/GreenInfrastructureStrategy.pdf

- Wicken Fen Vision
- Ouse Washes Habitat Creation Project
- Anglian Region River Basin Management Plan[28]
- Anglian Water Services' Water Resources Management Plans and Supplementary Report[29]
- The SuDS Manual (Ciria C697)[30]

2.4.2 In addition to the data sources listed above, Scott Wilson undertook a Level 1 SFRA for Fenland and East Cambridgeshire Councils in parallel to the Outline WCS. Outputs from the SFRA have been used to inform and develop the Outline WCS. For further details and outputs from the SFRA please refer to Section 7 – Flood Risk Management.

2.5 Data Summary

2.5.1 The undertaking of a Water Cycle Study requires a large amount of data collection, much of which is reliant on the willingness of third parties to supply in order to allow the study to be progressed. This study has built on data collated as part of the Scoping Study and further detailed information has been requested where required. A catalogue of the data collected, identifying the data provider in each case, is included in Appendix A: Outline Study Data Register.

2.6 Status of Key Data and Reports

Water Framework Directive

2.6.1 Since the completion of the East Cambridgeshire and Fenland Scoping WCS, the Environment Agency published the Final River Basin Management Plans (RBMP) for England and Wales as required under the Water Framework Directive (WFD). The final plans were published in December 2009, following sign off from the Secretary of State for the Environment. The Final Anglian RBMP has been used within the Outline WCS to inform the water quality and wastewater assessments.

Habitats Directive & the Review of Consents

2.6.2 Specific mention is given in this section to the Habitats Directive as it has a significant influence on both the wastewater and waste supply strategies, owing to an ongoing review process that has been undertake by the Environment Agency and Natural England over several years.

2.6.3 The review process is referred to as the Review of Consents (RoC). The process requires the Environment Agency to review all of the existing consents and licences it has issued for both discharges and abstractions to and from rivers and/or groundwater. The review is to determine whether, when used to their maximum permitted level, the current licences and consents are likely to be impacting on the integrity of ecologically designated sites which became protected under the Habitats Directive. The licences and consents being reviewed were issued prior to

[28] http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/anglian/Intro.aspx
[29] http://www.anglianwater.co.uk/environment/water-resources/resource-management/
[30] http://www.ciria.org/service/AM/ContentManagerNet/Default.aspx?template=/TaggedPage/TaggedPageDisplay.cfm&TPLID=19&ContentID=10559&TPPID=4334&AspNetFlag=1&Section=content_by_themes

sites becoming designated, so the review is a retrospective process necessitated by the new legislative requirements brought in by the Habitats Directive and is transposition into UK law as the Habitats Regulations.

2.6.4 The potential effects of the consents and licences are considered in isolation and in combination with others. In relation to consents to discharge, the pollutant load of these discharges is considered as well as the impact of the volume of discharge on habitat integrity; whilst for abstraction licences, the direct impact of reduced water availability in a groundwater or river system is determined for impact on any protected habitat reliant on the river or groundwater.

2.6.5 If the conclusion is to revoke or modify any permission, the Environment Agency must work with the licence or consent holder to ensure that they are compensated by considering alternatives for replacing the lost permission.

3 Proposed growth

3.1 Introduction

Housing

3.1.1 Three possible housing growth scenarios have been calculated for the proposed growth in each District. The scenarios have been developed such that a range of potential growth outcomes is assessed for impact on the water cycle.

3.1.2 The initial scenario (Scenario 1) for each district is based on the growth targets as set out in the 2008 EEP. Two further scenarios were developed based on the additional growth requirements of the review of the EEP. Whilst the initial growth planning period was until 2026, all three scenarios have been extended to 2031 to reflect that the later review of the EEP, which examined growth up to 2031.

3.1.3 At the time of undertaking the Outline WCS, neither authority had the required level of certainty regarding preferred development sites for growth. Therefore, the Outline WCS has assessed growth on a strategic level according to housing targets within key settlements as a whole. For each of the three growth scenarios, numbers of dwellings per settlement have been assessed at a strategic level (as opposed to site specific) to identify capacity constraints in the water services infrastructure serving each settlement (i.e. trunk sewer capacity) and the impact this will have on the water environment.

3.1.4 The housing scenarios and the broad locations for where the growth will occur were agreed with each of the planning authorities prior to commencing baseline assessments. It is worth noting that the methodology for deriving the three housing scenarios for East Cambridgeshire was taken from the Infrastructure Investment Strategy.

Employment Land

3.1.5 Employment growth scenarios have been calculated for the proposed employment growth in Fenland and East Cambridgeshire, based on the requirements of the EEP and the review of the EEP. These scenarios also relate to the period 2009-2031 and for the purposes of the WCS have been converted into job numbers to allow an assessment of impact on infrastructure capacity.

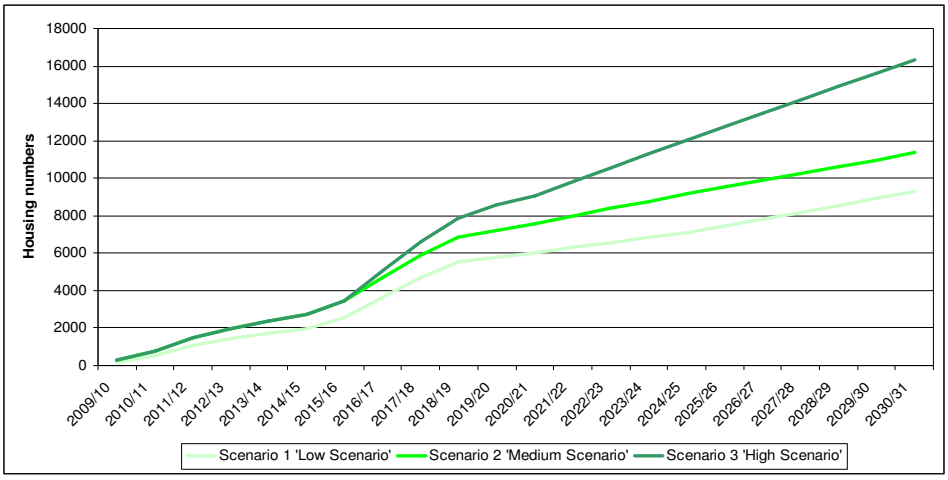
3.1.6 It should be noted that the growth figures have been agreed with the LPAs based on best available knowledge at the time of undertaking the Outline WCS. They are subject to change and should be reviewed as the study progresses into the Detailed Phase.

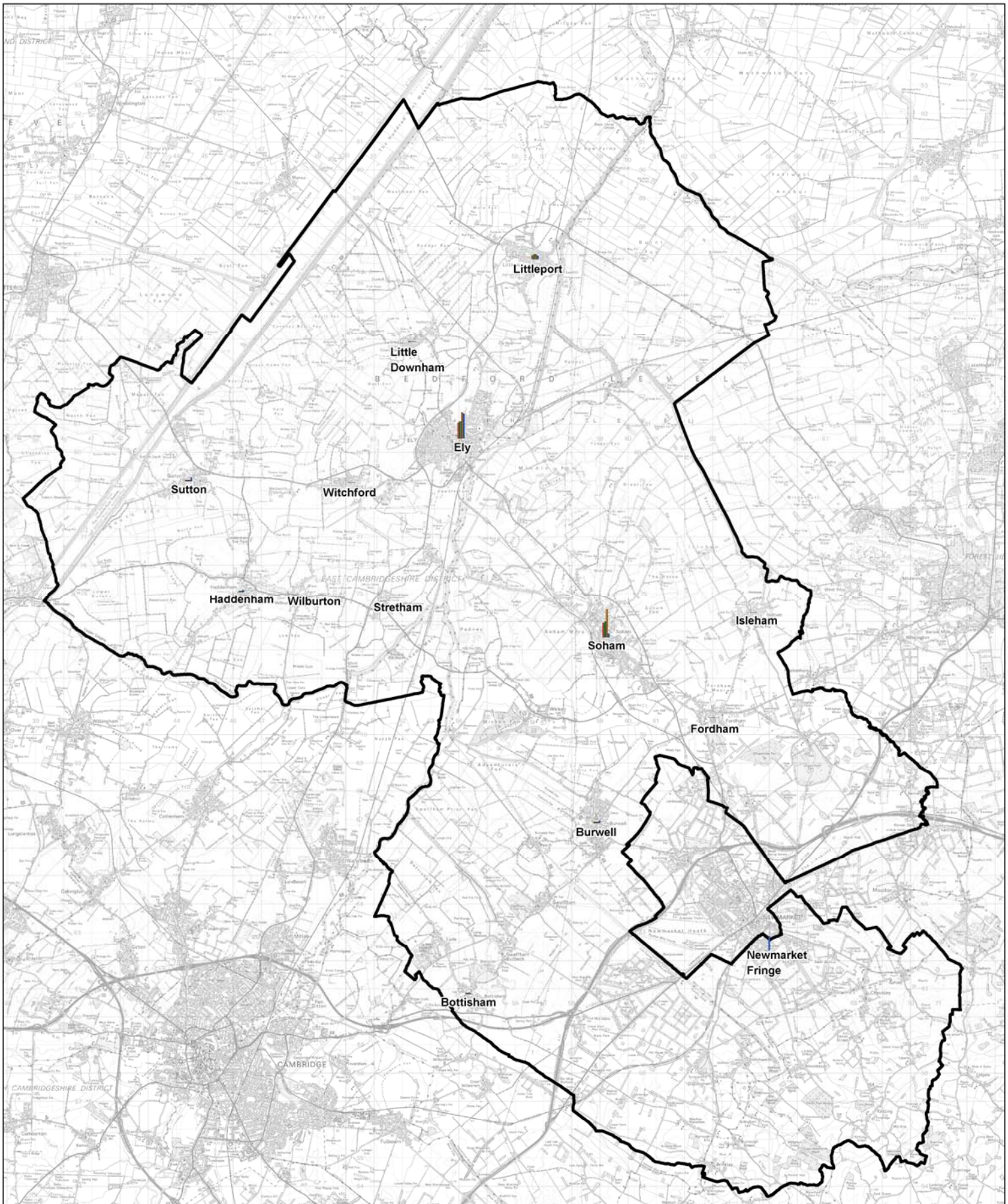
3.1.7 The housing and employment figures are presented for each authority area, including targets per settlement, annual trajectories over the planning period and a spatial proportional representation of where growth is proposed to occur across each district in the following summaries.

Table 3-1: Growth scenarios per settlement in East Cambridgeshire

	'Low Scenario'	'Medium Scenario'	'High Scenario'	Employment Land Area (ha)	Proportion of total area (%)	Job Numbers
Ely	3538	3746	6371	52.36	47.7	5816
Soham	3344	3584	6209	8.36	7.62	929
Littleport	895	975	975	7.92	7.21	880
Bottisham	152	200	200	1.1	1	122
Burwell	252	300	300	3.96	3.61	440
Haddenham	108	188	188	-1.54	-1.4	-171
Newmarket Fringe	55	87	87	5.94	5.41	660
Sutton	171	315	315	28.38	25.85	3,153
Fordham	75	123	123	6.82	6.21	758
Isleham	56	120	120			
Little Downham	41	73	73			
Stretham	51	99	99			
Wilburton	42	90	90			
Witchford	57	121	121			
Other areas	208	480	480	-2.64	-2.4	-293
District-wide	234	858	858	-0.88	-0.8	-298
Total	9279	11359	16329			
Total	**11229**	**12095**	**15485**	**109.78**	**100**	**12,195**

Figure 3-1: Housing growth trajectory for East Cambridgeshire to 2031





Job Title
EAST CAMBRIDGESHIRE & FENLAND OUTLINE WCS

Drawing Title
EAST CAMBRIDGESHIRE DISTRICT GROWTH DISTRIBUTION

Housing and Employment Growth Scenarios

6,300

- Housing Scenario 1
- Housing Scenario 2
- Housing Scenario 3
- Employment (No. Jobs)

Figure 3-2

Scale at A3: 1:125,000		
Drw EB	App CP	Rev SK
Chk CP	Date 16/06/2010	Date 01/10/2010

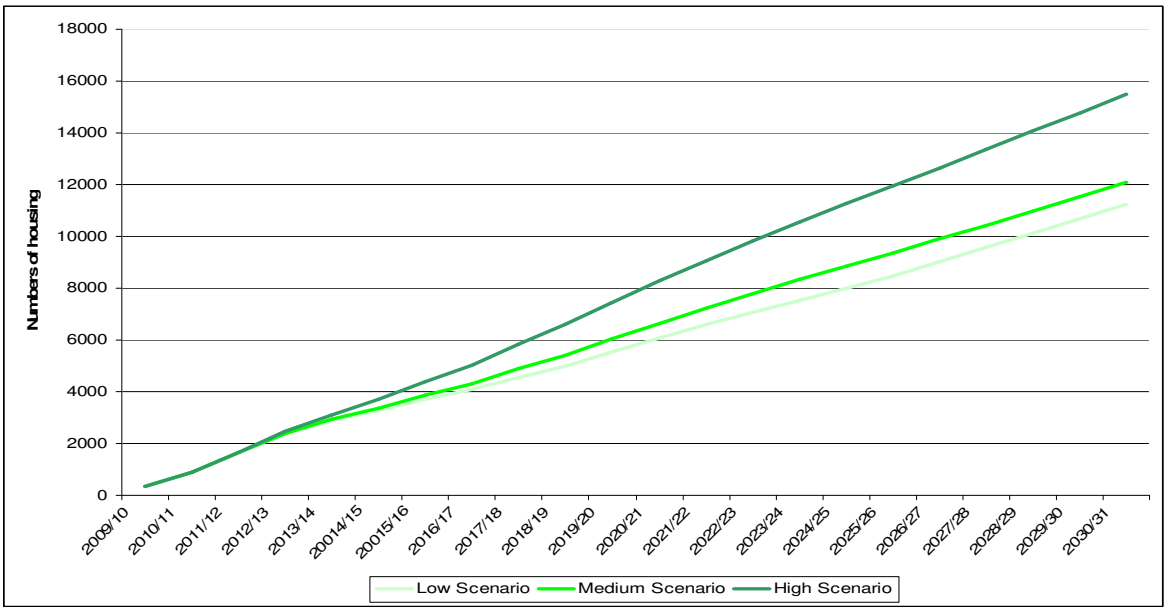
Scott Wilson

www.scottwilson.com

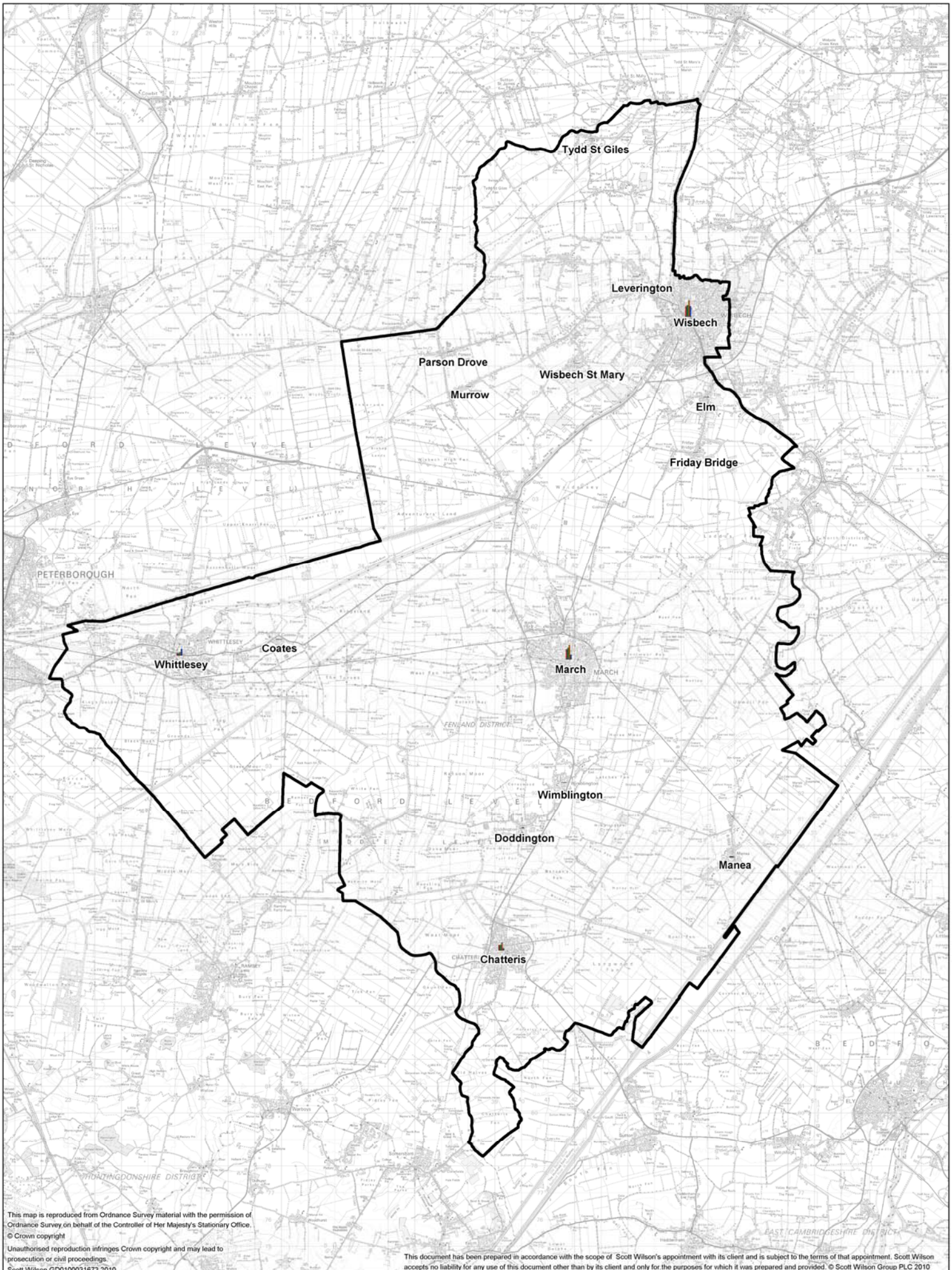
Table 3-2: Housing & employment growth scenarios per settlement Fenland

	'Low Scenario'	'Medium Scenario'	'High Scenario'	Employment Land Area (ha)	Proportion of total area (%)	Job Numbers
Chatteris	1564	1723	2294	9.42	8.03	577
Doddington	112	126	164			
Manea	183	197	235			
March	2960	3278	4409	23.1	19.7	1414
Whittlesey	775	754	1071	30.8	26.27	1886
Wimblington	103	117	155			
Wisbech	3376	3696	4827	54.12	46.15	3313
Wisbech St. Mary	98	106	127			
Other growth areas[31]	668	708	813			
District-wide[31]	1390	1390	1390			
Total	**11229**	**12095**	**15485**	**117.26**	**100**	**7179**

Figure 3-3: Housing growth trajectory for Fenland to 2031



[31] Only settlements with 100 or more proposed new dwellings are summarised in this table. Settlements with less than 100 houses are included in this table as 'other growth areas'. All of these houses have been assessed according to their location in the proceeding assessment chapters.



Job Title
EAST CAMBRIDGESHIRE & FENLAND OUTLINE WCS

Drawing Title
FENLAND DISTRICT GROWTH DISTRIBUTION

Bar Chart of FDC_Housing_Employment_Growth
4,900
Housing Scenario 1
Housing Scenario 2
Housing Scenario 3
Employment (No. Jobs)

Figure 3-4

Scale at A3:	1:125,000		
Drw EB	App CP	Rev SK	
Chk CP	Date 16/06/2010	Date 01/10/2010	

Scott Wilson
www.scottwilson.com

4 Wastewater Strategy

4.1 Introduction

4.1.1 The wastewater assessment addresses two key areas for wastewater:

- the baseline with respect to treatment of wastewater and how much 'spare' capacity is available in existing wastewater treatment facilities; and
- the baseline with respect to wastewater or sewer network and whether there is scope to use the existing and/or planned network system before upgrades are required.

4.1.2 An important aspect of the spare capacity of the existing wastewater treatment facilities is the assessment of the environmental capacity of the receiving watercourses. Discharge of additional treated wastewater from new development could have a detrimental impact on: the water quality of receiving waters; the hydrological/hydraulic regime of receiving waters and associated habitats; and, potential increase in flood risk downstream of the discharge[32].

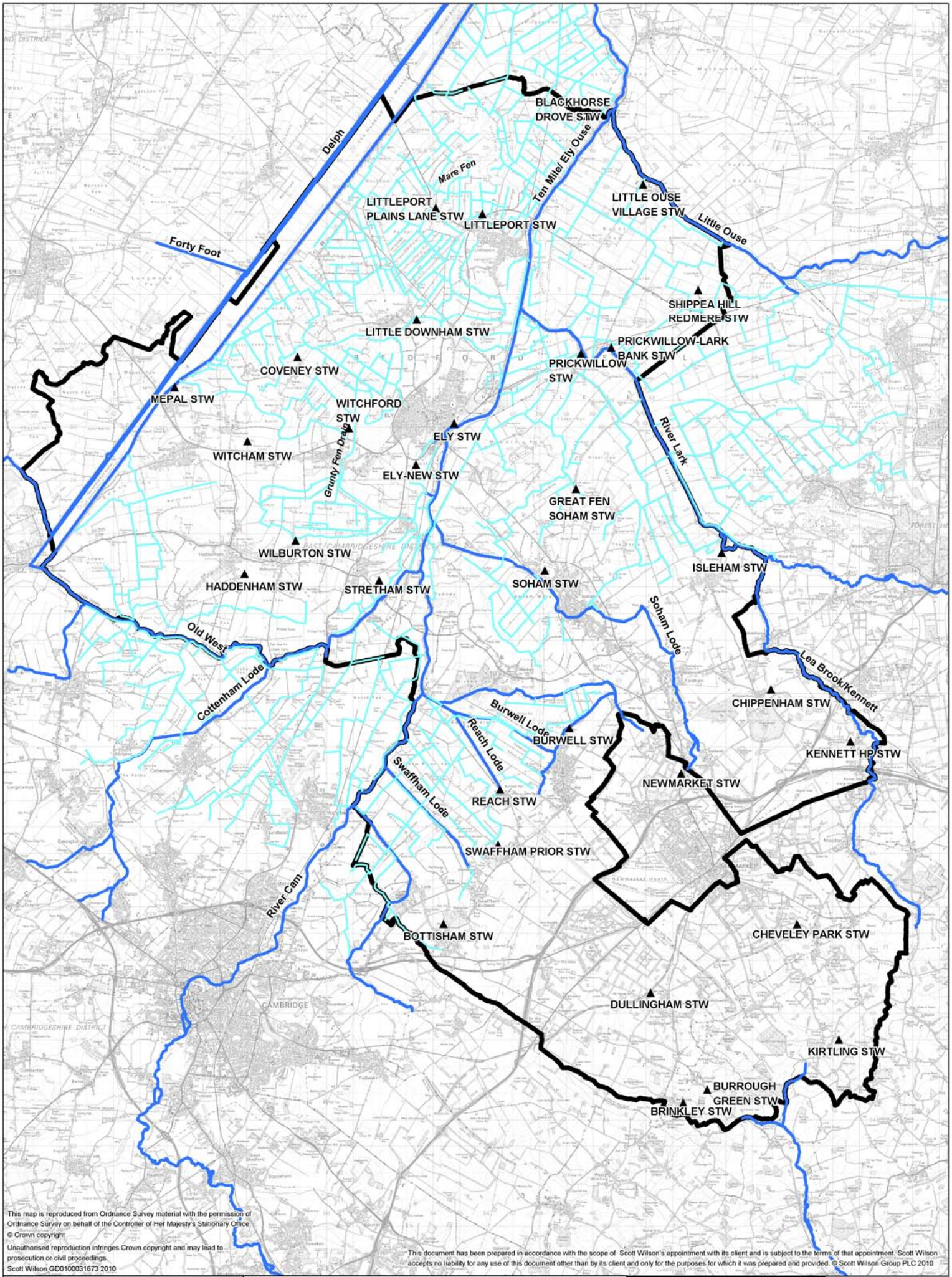
4.1.3 This section presents a summary of the methodology for, and the results of developing, the outline wastewater strategy.

4.2 Wastewater Treatment in the Study Area

4.2.1 There are numerous WwTW within the study area in the main due to the flat topography of the area, which results in it not being possible to drain catchments by gravity to a large, central treatment works. It has therefore been the policy of AWS (and the preceding water boards), to build numerous small treatment works which can drain small, discrete villages and catchments by gravity. To drain to larger works in rural areas would require large volumes of wastewater to be pumped over long distances, with the resulting energy demands making the process inefficient.

4.2.2 Full details of all WwTW are shown in table B1: Appendix B: WwTW Details. The location of each WwTW relative watercourses is included in Figure 4-1 and Figure 4-2.

[32] NB: the hydraulic capacity issues will be addressed as part of the Stage 2 Detailed study once it is known which of the WwTW would require an increase in flow consent to accommodate growth. Water quality modelling only is undertaken at Outline stage to determine the feasibility of using existing WwTW as the preferred solution to wastewater treatment requirements for growth.



Job Title
EAST CAMBRIDGESHIRE & FENLAND OUTLINE WCS

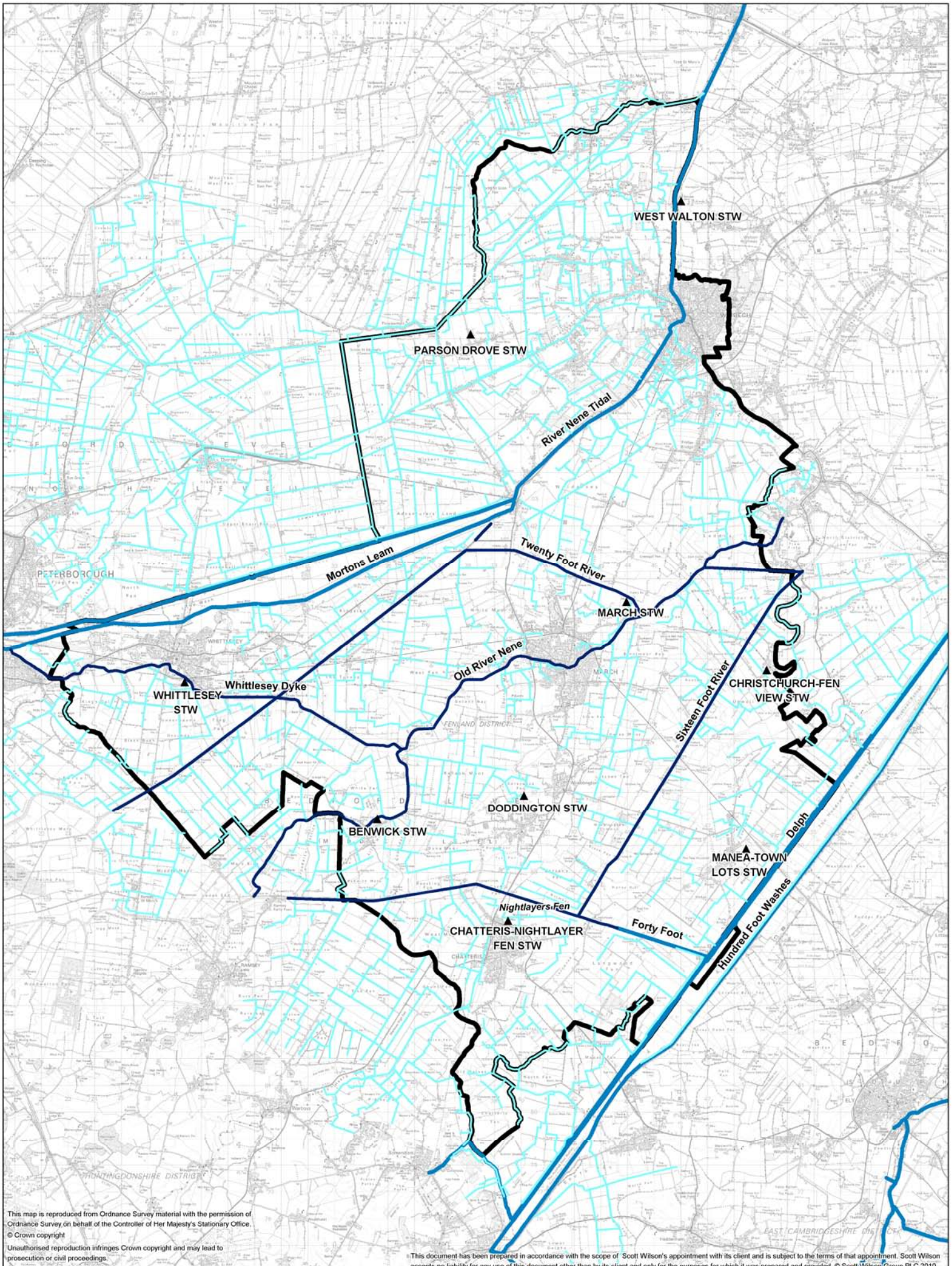
Drawing Title
EAST CAMBRIDGESHIRE WwTW AND WATERCOURSES

▲ Wastewater Treatment Works
Main River
IDB Drains

Figure 4-1

Scale at A3:	1:125,000		
Drw EB	App CP	Rev SK	
Chk CP	Date 17/06/2010	Date 01/10/2010	

Scott Wilson
www.scottwilson.com



Job Title
EAST CAMBRIDGESHIRE & FENLAND OUTLINE WCS

Drawing Title
FENLAND DISTRICT WwTW AND WATERCOURSES

▲ Wastewater Treatment Works
Main River
Main Drains
IDB Drains

Figure 4-2

Scale at A3:	1:125,000		
Drw EB	App CP	Rev SK	
Chk CP	Date 17/06/2010	Date 01/10/2010	

Scott Wilson
www.scottwilson.com

4.3 Wastewater Treatment Capacity

Assessment Methodology Overview

4.3.1 The assessment methodology for this WCS is based discussions with the Environment Agency. It should be noted that, a number of WwTWs have received revised consents in the study area due to changes in the way flows from the WwTWs are measured and consented. The implications are that some WwTW in the study area were treating more flow than they were previously consented to discharge and hence increased flow consents had to be agreed between the Environment Agency and AWS. For these WwTW, the increase in consented flow allowance is only to cater for the discrepancies in flow measurement and consenting and does not allow headroom for additional wastewater flow as a result of growth. As a result, further increases in flow will need to be consented in order to allow growth to proceed at these WwTWs. The WwTW affected are identified in subsequent sections.

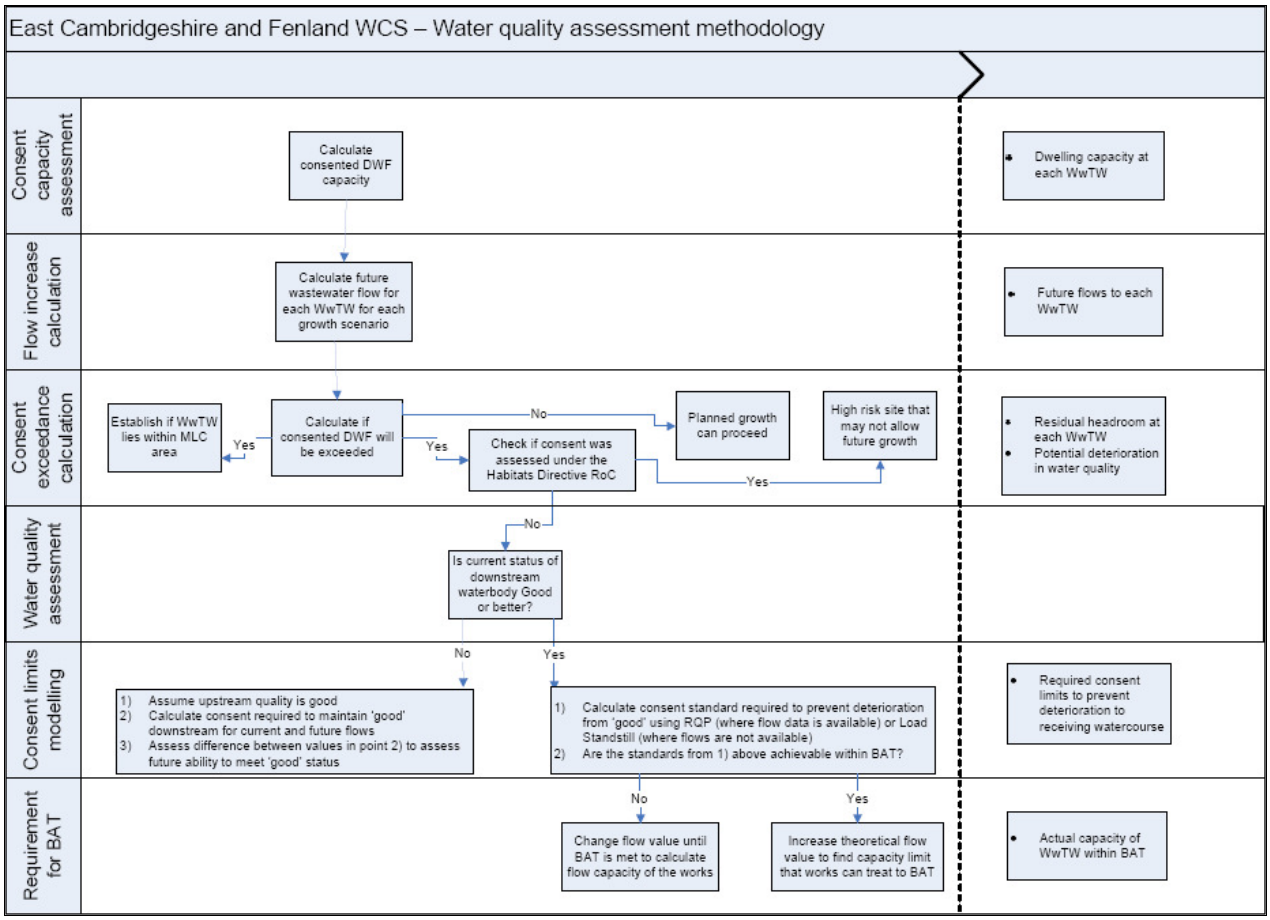
4.3.2 The steps undertaken were as follows:

- **Step 1** - the proposed growth locations within the study area were assessed and using wastewater network information from AWS, the wastewater catchments that each settlement falls into were mapped[33].
- **Step 2** – the capacity of each WwTW to accept further flow from growth was calculated using industry standard calculations for each growth scenario. This was undertaken for each growth scenario in each district.[34]
- **Step 3** - if the flow could be accepted by the WwTW without requiring an increase in the flow it is consented to discharge, then growth is considered to have a solution for that catchment.
- **Step 4 -** if flow would exceed the flow permitted for discharge at the WwTW as a result of growth, a water quality modelling exercise was then undertaken to determine whether the increase in flow would result in deterioration in water quality of the receiving watercourse or would impact on ecological sites linked to the receiving watercourse. This exercise therefore determined what quality conditions would have to be applied to each WwTW in order to meet legislative water quality targets and whether these are achievable within the limits of conventional treatment processes and technology.
- **Step 4a –** in addition to the above, if the consented DWF will be exceeded and the WwTW discharges to a watercourse which lies within the area controlled by the MLC IDB, then growth cannot proceed as the MLC will not consent any increases in flow from WwTW due to the increased flood risk that this would pose.
- **Step 5** – if the quality conditions that would have to be applied are within the limits of conventional treatment, then a solution is considered to be available and the improvements required to deliver these standards is to be investigated in Phase 2 of the WCS. If the conditions cannot be met within the limits of conventional treatment and technology, then a solution with existing infrastructure is not available and requires further study in the Phase 2 Detailed WCS.

[33] West Walton and Newmarket WwTWs do not lie within study area, but as parts of their catchments are located within the East Cambridgeshire and Fenland area they will be affected by the proposed growth and were therefore assessed
[34] It should be noted that method for determining Dry Weather Flow (DWF) has recently changed. As a result, a number of WwTW have received revised consents. These make no provision for growth.

4.3.3 A summary process diagram is provided in Table 4-1.

Table 4-1: Diagrammatic representation of the water quality assessment methodology



Capacity Assessment Results – Steps 1 to 3

4.3.4 Several WwTW currently do not have current capacity to accept and treat any further wastewater from growth without requiring an increase in the volumes that they consented to discharge. The catchments for these WwTW (and the towns they drain) are mapped as red in Figure 4-3 and Figure 4-4. Any growth in these areas will require the consent parameters of the discharge to be reviewed and altered.

4.3.5 Several of the growth locations are affected by this limitation; however, the following major growth towns are the key concern:

- Whittlesey;
- Wisbech;
- Littleport; and
- Soham.

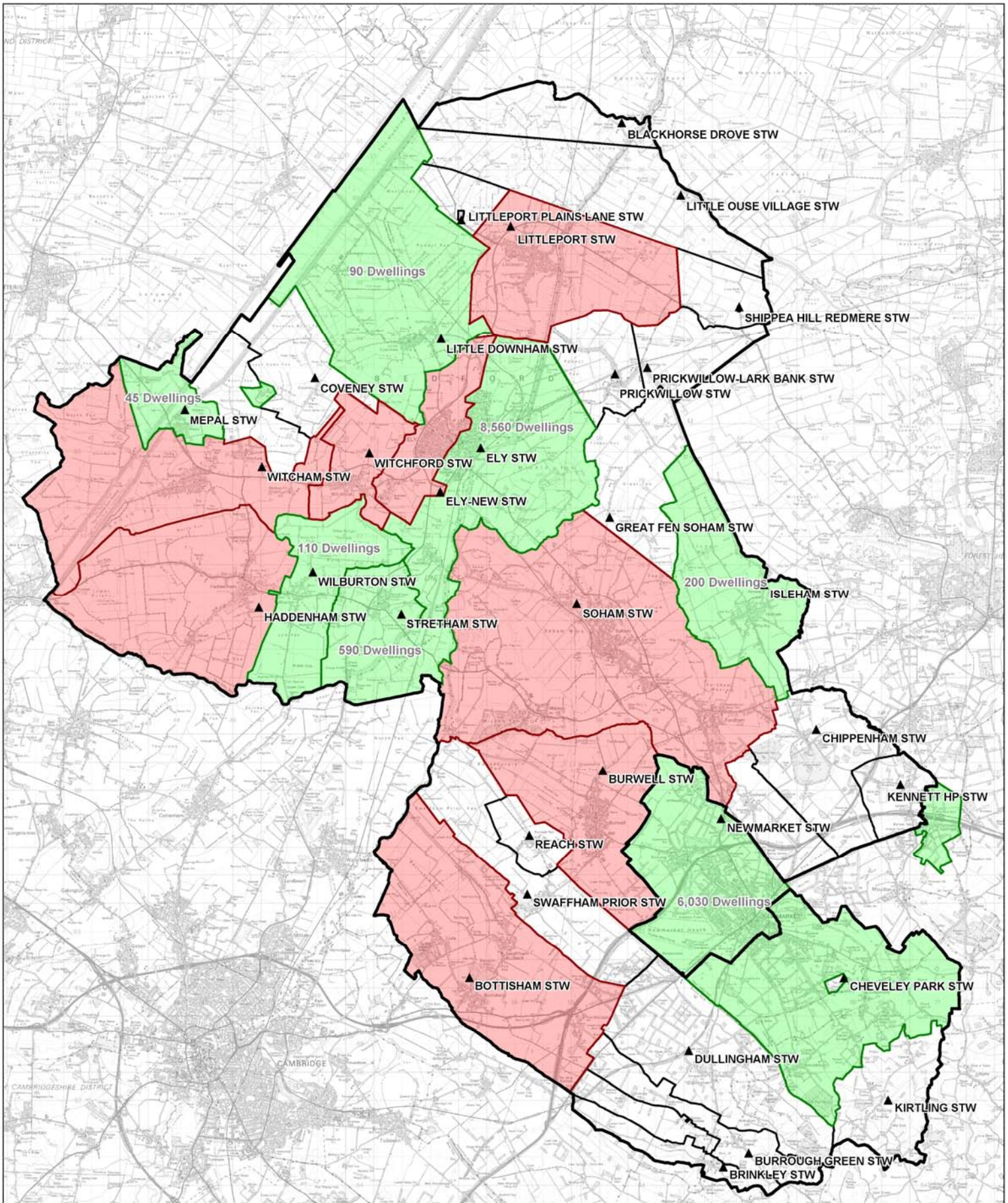
4.3.6 During the consultation process with the various IDBs that have control over the study area, the MLC IDB stated that it would not consent any increases in flow at WwTW discharging into waterbodies they control. Of the works within the MLC area, Whittlesey and Doddington will require increases to the consented DWF to accommodate the proposed growth. These works should therefore be considered to have no capacity for growth beyond their current consented DWF.

4.3.7 When growth from employment and all three housing scenarios is added to the assessment, the following conclusion can be drawn: Where there is currently capacity at a WwTW, growth from all three scenarios in both districts does not result in any further WwTW exceeding their consented discharge limit – therefore, growth in catchments shown as green in Figure 4-3 and Figure 4-4, can be accepted within current consented limits for all three proposed growth scenario.

4.3.8 It is important to note that these catchments are indicative based on coverage of AWS's drainage infrastructure. Many developments do not discharge to 'adopted' systems and instead utilise cess pools, septic tanks and private waste treatment plants; however, based on the assumption that new development would initially look to connect to the existing 'adopted' system, these figures represent the best assessment of wastewater treatment capacity at any given location within the study area.

4.3.9 For growth located within catchments marked as red, it was necessary to move to Step 4 in the process, and determine whether a solution to increase consented discharges exists which is both feasible (within the limits of conventional treatment) and can ensure downstream WFD and Habitats Directive water quality targets and ecological site requirements can be met.

4.3.10 Although the capacity assessment for the Ely WwTWs shows there to be sufficient capacity to accept wastewater from growth within existing consents, consideration is being given to the location of a new WwTW to the north of Ely. A meeting was held between AWS, CCC and ECDC to discuss the relocation of Cresswells Lane WwTW on 4th October. AWS are open to such a move but it is too early to make any commitments and scheme viability is expected to be a key issue. The benefits will need to be weighed against the costs when options for serving Ely North are evaluated. The policy position in LDF documents will also be a consideration. AWS has therefore left the option of a relocation to Ely North open in its Minerals and Waste LDF evidence and intend to continue this position at Public Examination. It is recommended that the technical feasibility of this option (from a water environment perspective) is considered in the Detailed study.



Job Title

EAST CAMBRIDGESHIRE & FENLAND OUTLINE WCS

Drawing Title

EAST CAMBRIDGESHIRE WwTW BASELINE CAPACITY ASSESSMENT

WwTW Capacity

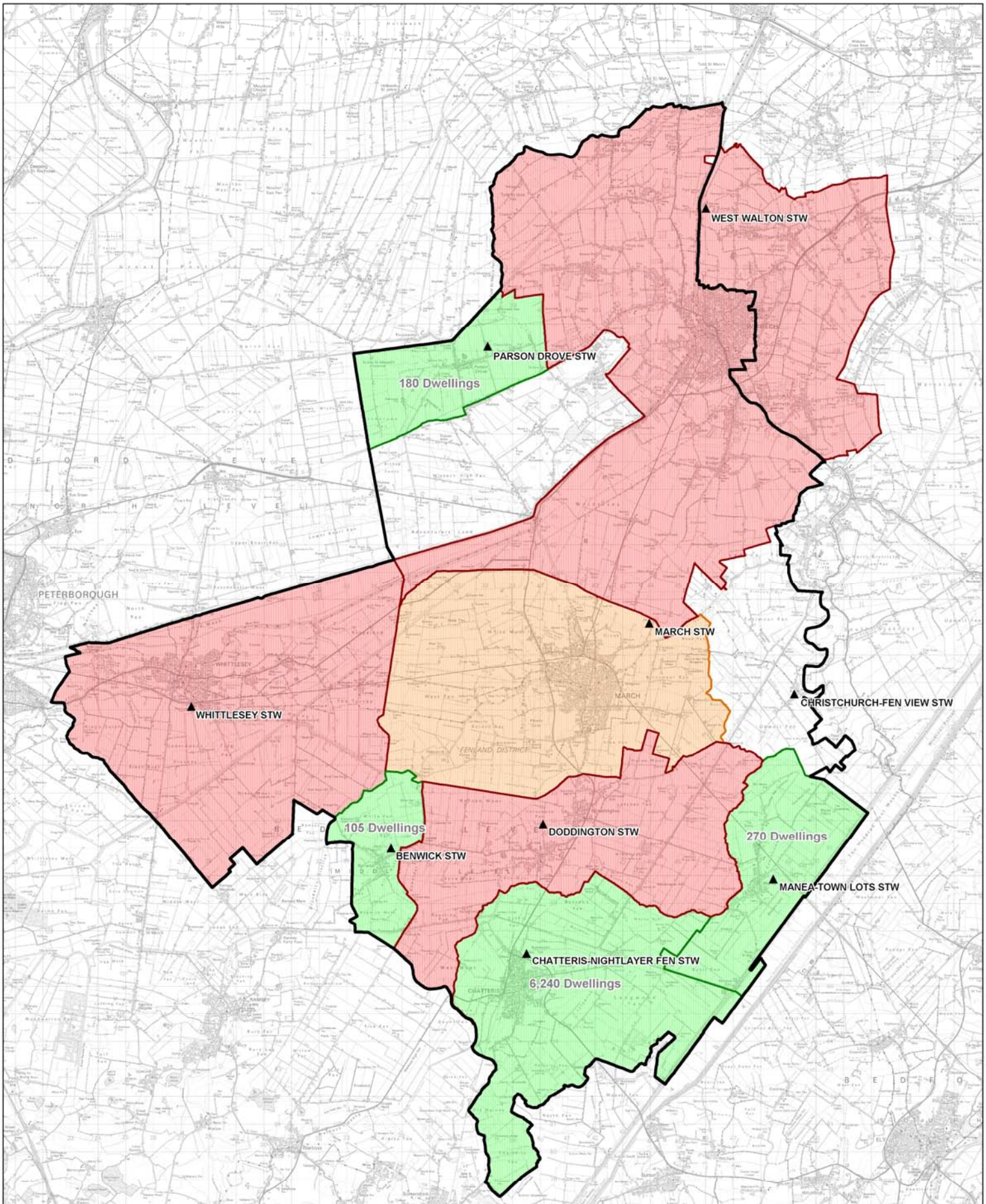
- Capacity at WwTW
- No Capacity at WwTW
- Not Assessed

Figure 4-3

Scale at A3:	1:125,000		
Drw SK	App CP	Rev SK	
Chk CP	Date 11/06/2010	Date 01/10/2010	

Scott Wilson

www.scottwilson.com



Job Title
EAST CAMBRIDGESHIRE & FENLAND OUTLINE WCS

Drawing Title
FENLAND WwTW BASELINE CAPACITY ASSESSMENT

WwTW Capacity
- Capacity at WwTW
- Limited Capacity at WwTW
- No Capacity at WwTW
- Not Assessed

Figure 4-4

Scale at A3:	1:125,000		
Drw SK	App CP	Rev SK	
Chk CP	Date 11/06/2010	Date 01/10/2010	

Scott Wilson
www.scottwilson.com

Capacity Assessment Results – Steps 4 & 5

4.3.11 Before the modelling required for Steps 4 & 5, it was important to define the targets that need to be met downstream to meet legislative water quality requirements and to ensure downstream ecological sites were not adversely affected.

4.3.12 A review of ecological sites in the study areas was undertaken to determine which of these sites are hydrologically linked or hydrologically dependent on groundwater or surface water systems in the study area. A further screening assessment was then undertaken to determine if any of the groundwater resources or surface water systems linked to sites were likely to be altered as a result of abstractions for supply or discharges of treated wastewater or surface water. These sites were then assessed for potential impact as a result of abstractions or discharges likely to occur as a result of growth in the study area.

4.3.13 This screening process has used the Environment Agency's RoC process and conclusions from the WCS Scoping report.

Ecological Site Assessment

Habitats Directive sites

4.3.14 There are five hydrologically sensitive internationally important sites either within or linked to the study area that could be affected by additional wastewater discharges from WwTW as a result of growth. Chippenham Fen Ramsar site is considered in the subsequent section on SSSIs in order to avoid repetition; the other four sites are described subsequently. The location of all ecological sites (including national, regional and local) are shown in Figure 4-5 and Figure 4-6. These conclusions have been drawn from the Habitats Directive RoC reports and information included in the East Cambridgeshire and Fenland WCS scoping report:

- Wicken Fen Ramsar site (part of Fenland SAC) – The Scoping report[35] identifies that Burwell WwTW, Reach WwTW and Swaffham Prior WwTW all may be hydrologically linked to the fen, which is particularly susceptible to elevated phosphate. However, the RoC process (see section 2.6.2 onwards) does not identify any current problems with discharges from these WwTW.
- The Ouse Washes SAC, SPA & Ramsar site – The Scoping report[7] identifies that water quality problems (principally phosphate) are adversely affecting the site. However, these will be addressed through amendments to existing consents/licences. The Scoping report identifies that the WwTWs which were considered by the RoC to be having a significant effect are located outside Fenland & East Cambridgeshire. However, there is a potential 'in combination' impact pathway if discharges were to lead to elevated phosphate. This would apply to Mepal WwTW, Witcham WwTW, Wilburton WwTW, and Manea Town Lots WwTW, as these all discharge to watercourses that ultimately drain to the Ouse Washes. The scoping report also identifies that Littleport WwTW may be indirectly connected to the Ouse Washes during the winter as a result of the pumping of water from IDB drains into the Hundred Foot River. In addition to water quality, WwTWs can also contribute cumulatively to excessive flooding of the washes (although they are probably not the major contributor) which can adversely affect the breeding bird interest by leaving nesting habitat unusable.

[35] http://www.cambridgeshirehorizons.co.uk/documents/to%20be%20filed/ecf_wcs_final_151009.pdf

- The Nene Washes SAC, SPA & Ramsar site – The Scoping report[26] identifies that water quality problems (principally phosphate) and drawdown due to abstraction are adversely affecting the site. However, these will be addressed through amendments to existing consents/licences. It also identifies that the WwTWs which were considered by the RoC to be having a significant effect are located outside Fenland & East Cambridgeshire. From reviewing the catchment plan for the Nene CAMS document it appears that the catchment of the Nene Washes is almost entirely to the north of the site. This would exclude the whole of the study area with the exception of Parson Drove WwTW and West Walton WwTW; however, both of these discharge to watercourses that join the River Nene downstream of the Nene Washes, which implies that they are unlikely to affect water quality in that site.

- The Wash & North Norfolk Coast SAC/The Wash SPA & Ramsar site - The Scoping report[26] indicates that the RoC does not identify any current water quality issues. Studies indicate that The Wash embayment is P-limited system with a N:P ratio of >10 and that freshwater species predominate in The Wash estuaries. In its Regulation 33 advice for the site, Natural England indicates that most features are moderately sensitive to nutrient enrichment, but only intertidal sand and mud are moderately vulnerable. There are no highly vulnerable features. However, the Environment Agency RoC process undertaken for The Wash SPA and Wash & North Norfolk Coast SAC identifies that The Wash estuaries and Wash embayment are not eutrophic. Although hypernutrified, there is no evidence that hypernutrification and seasonally high production of algae in the tidal freshwaters or brackish waters of the estuaries is adversely affecting the ecological functioning of The Wash system. An assessment of trends in nutrient loading and modelling of future risks does not suggest that these waters were at risk of becoming eutrophic. Although fluvial nutrient inputs have been high, patterns/temporal trends have been stable for over 25 years stable (and more recently are in decline due to the Urban Wastewater Treatment Directive). Moreover, the marine environment is very turbid with limited light availability, which limits build up of algae. As such, there is no evidence that hypernutrification and seasonally high production of algae in the tidal freshwaters or brackish waters of the estuaries is adversely affecting the ecological functioning of The Wash system and thereby having any undesirable disturbance to the balance of organisms and deterioration of water quality. Conclusions on the potential impact of discharges are reinforced by the fact that background sources of P and N dominate the nutrient loading to the site. Estimates for the embayment indicate that the vast proportion of the nutrient flux (in excess of 99%) occurs across the seaward boundary due to the extent of the bay closing line and the large tidal volumes involved. Marine influences rather than fluvial inputs and discharges therefore dominate nutrient dynamics in the embayment as a whole. Despite the high marine nutrient input, the high turbidity, tidal range and flushing rates appear to prevent serious biological response to nutrient enrichment. It may therefore ultimately prove possible to conclude that adverse effects on The Wash SPA/Ramsar site and Wash & North Norfolk Coast SAC are unlikely.

Sites of Special Scientific Interest (SSSI)

4.3.15 There are four nationally important SSSI sites in the study area (other than those already mentioned) that have hydrological links or dependencies on groundwater or surfaced water systems, and which may be affected by discharges. These are described below, along with the WwTWs that may impact on the sites as a result of additional wastewater discharge; in most cases the sites can be ruled out as potentially being impacted by additional discharges:

- Chippenham Fen & Snailwell Poor's Fen SSSI (Chippenham Fen is also a Ramsar site) – the RoC has identified no pathway connecting WwTWs to this site.

- Ely Pits & Meadows SSSI – Ely WwTW may be connected to this site.
- Cam Washes SSSI -. Burwell WwTW, Reach WwTW and Swaffham WwTW all discharge to watercourses that ultimately drain either into or immediately upstream of the SSSI.
- Soham Wet Horse Fen SSSI - none of the WwTW's within the study area discharge to watercourses that drain into or through this SSSI.

Local Sites

4.3.16 There are two Local Nature Reserves (LNRs) in Fenland:

- Rings End LNR – this site includes wetland habitats but there is no indication of any link to WwTWs or to abstraction.
- Lattersey Field LNR – this site does contain wetland habitats but it is a former clay pit so should be sealed from sources of public water supply (and not linked to any WwTWs).

4.3.17 There are three LNRs in East Cambridgeshire:

- Wicken Fen and Chippenham Fen LNRs are both covered by international designations and are not considered again here.
- Little Downham LNR has 2 ponds (one is seasonal), although it is not linked to any WwTWs.

4.3.18 There are fifteen non-statutory County Wildlife Sites in East Cambridgeshire which are fluvial systems (or connected to fluvial systems) and therefore potentially vulnerable to water quality changes due to treated effluent discharged upstream.

4.3.19 The following have the potential to be affected by discharges from WwTW identified as accepting wastewater effluent from growth in the study area:

- New River & Monk's Lode – this feature may be influenced by discharges from Burwell WwTW.
- River Cam – this feature may be affected by discharges from Burwell WwTW and Bottisham WwTW.
- River Lark – this feature may be influenced by discharges from Isleham WwTW.
- Forty Foot Drain (East) – this feature may be influenced by discharges from Chatteris – Nightlayer Fen WwTW.
- Goosetree Heronry – this site is linked to the River Nene and therefore possibly be influenced by discharges from Whittlesey WwTW.
- Guyhirn Reedbed – this site is linked to the River Nene and therefore possibly be influenced by discharges from Whittlesey WwTW.
- River Nene – this site may possibly be influenced by discharges from Whittlesey WwTW, Parson Drove WwTW and West Walton WwTW.

The wider ecological context

4.3.20 In addition to impacts on designated sites, the following Cambridgeshire BAP and Norfolk BAP species are of relevance to the WCS, even when they occur outside a specifically designated

site. All could be adversely affected (directly or indirectly) by poor water quality or by drawdown due to abstraction.

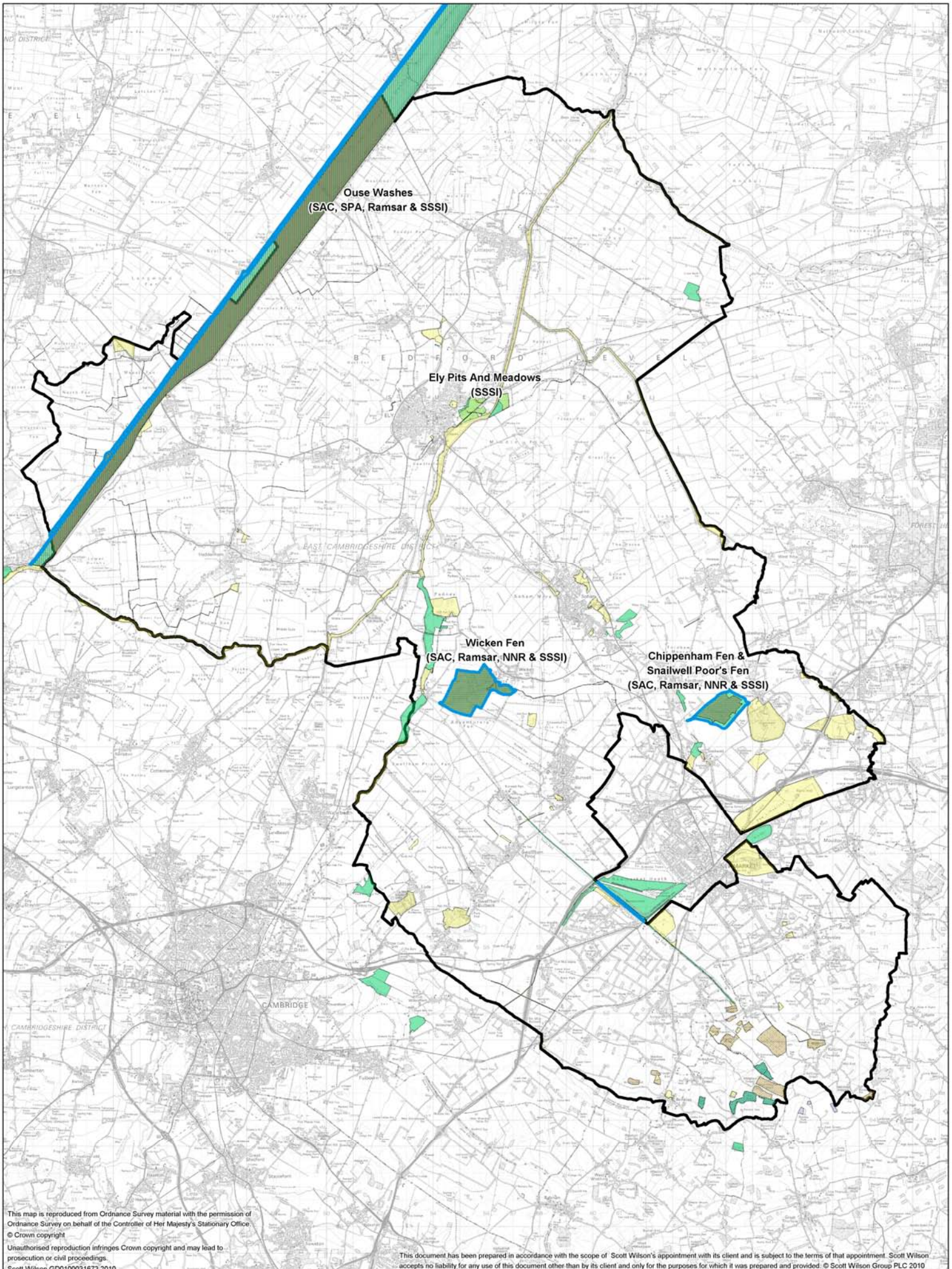
4.3.21 Norfolk BAP habitats present (or possibly present) in Fenland are coastal and floodplain grazing marsh, fens, mesotrophic lakes, ponds and reed beds as well as the following BAP species: otter, reed bunting, great crested newt, Desmoulin's whorl snail, greater water parsnip and crucian carp.

4.3.22 Cambridgeshire BAP habitats present (or possibly present) in East Cambridgeshire are Fenland drainage ditches, fens, rivers & streams, floodplain grazing marsh and reed beds, as well as the following BAP species: bittern (particularly Wicken Fen and Woodwalton Fen), white-clawed crayfish, Desmoulin's whorl snail (at Wicken Fen), otter (particularly in the Cam catchment) and water vole.

Ecological Site Summary

4.3.23 The following key points can be made regarding ecological impact of WwTW discharge:

- Although the RoC identifies that Burwell WwTW is not impacting on the Wicken Fen Ramsar site under its current consent, the assessment for this Outline WCS has shown that an increase in treated volumes is required at Burwell WwTW as a result of growth, therefore Habitats Directive targets need to be considered as well as WFD water quality targets at this WwTW. The Cam Washes SSSI and the New River and Monks Lode will also need to be considered for impact as a result of potential increases in discharge from Burwell WwTW.
- The Cam washes may also be affected by the increase in flow likely to be required (above consent conditions) at Bottisham and needs to be considered at Stage 2.
- Mepal WwTW, Witcham WwTW, Wilburton WwTW, and Manea Town Lots WwTW may impact on the Ouse Washes if increases in discharge are proposed at these WwTW. Witcham WwTW is the only WwTW were the existing discharge volume will be exceeded as a result of growth and therefore Habitats Directive targets need to be considered as well as WFD water quality targets at this WwTW.
- The Outline WCS identifies that increases in discharge (over consented volumes) at Whittlesey WwTW may be required. This will be of relevance to the River Nene County Wildlife Site and possibly to the connected Guyhirn Reedbed and Goosetree Heronry County Wildlife Sites and needs to be considered at Stage 2.
- The Outline WCS identifies that increases in discharge (over consented volumes) at West Walton WwTW may be required. This will be of relevance to the River Nene County Wildlife Site and needs to be considered at Stage 2.



Job Title

EAST CAMBRIDGESHIRE & FENLAND OUTLINE WCS

Drawing Title

EAST CAMBRIDGESHIRE DISTRICT DESIGNATED ECOLOGICAL SITES

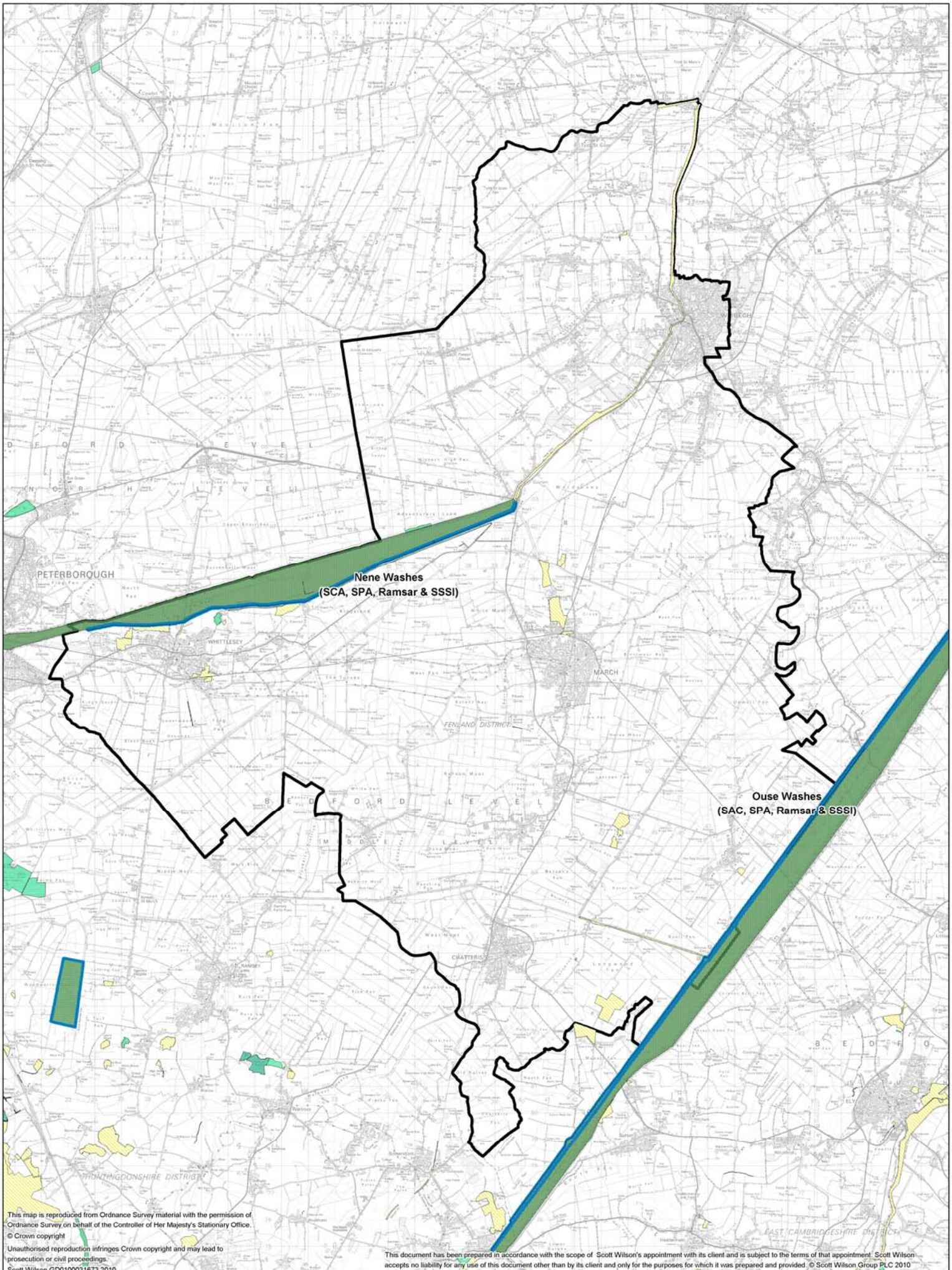
- Special Area of Conservation (SAC)
- Ramsar Site
- Country Wildlife Site (CWS)
- Site of Special Scientific Interest (SSSI)
- Special Protection Area (SPA)
- National Nature Reserve (NNR)
- Ancient Woodland

Figure 4-5

Scale at A3:	1:125,000		
Drw EB	App CP	Rev SK	
Chk CP	Date 16/06/2010	Date 01/10/2010	

Scott Wilson

www.scottwilson.com



Job Title
EAST CAMBRIDGESHIRE & FENLAND OUTLINE WCS

Drawing Title
FENLAND ECOLOGICAL ASSESSMENT

- Special Area of Conservation (SAC)
- Ramsar Site
- Country Wildlife Site (CWS)
- Site of Special Scientific Interest (SSSI)
- Special Protection Area (SPA)
- National Nature Reserve (NNR)

Figure 4-6

Scale at A3:	1:125,000		
Drw SK	App CP	Rev SK	
Chk CP	Date 11/06/2010	Date 01/10/2010	

Scott Wilson
www.scottwilson.com

Water Framework Directive targets

4.3.24 For all the WwTWs where growth will exceed current flow capacities, an assessment of the downstream water quality targets required to meet at least Good Status[36] as set out in the RBMP was undertaken.

4.3.25 One scenario has been modelled for the Outline Stage which is to determine whether all watercourses are capable of meeting at least 'Good Status' when growth is taken into account[38]. This gave the targets shown below in Table 4-2.

4.3.26 Discussions also need to be held with the relevant drainage authority where an increase in flow constraint is required to a non Environment Agency watercourse. Table 4-2 summarises the target 'status' of the receiving watercourse required to prevent downstream deterioration.

[36] Or High Status if the watercourse is currently meeting High

Table 4-2: Downstream waterbodies and quality targets used for Outline modelling purposes

WwTW	Actual receiving watercourse	Downstream WFD waterbody	Target status used for Outline Study modelling
Soham WwTW	Soham Lode	Soham Lode GB105033042860	Good (BOD and NH4) Good (P)
Burwell WwTW	Catchwater Drain - Burwell Lode	Burwell Lode GB105033042720	High (BOD) Good (NH4 and P)
Bottisham WwTW	Swaffham-Bulbeck Lode	Swaffham-Bulbeck Lode GB105033042710	High (BOD) and Good (NH4 and P)
Haddenham WwTW	Aldreth Canal	Ten Mile River GB105033047850	Good (BOD, NH4 and P)
Ely New WwTW	Ely Ouse	Ten Mile River GB105033047850	Good (BOD, NH4 and P)
Witchford WwTW	Grunty Fen Drain	Ten Mile River GB105033047850	Good (BOD, NH4 and P)
Littleport WwTW	Mare Fen Drain	Ten Mile River GB105033047850	Good (BOD, NH4 and P)
Witcham WwTW	Witcham Catchwater, River Ouse	Ten Mile River GB105033047850	Good (BOD, NH4 and P)
Whittlesey WwTW	Whittlesey Dyke	Mortons Leam GB105032050382	Good (BOD, NH4 and P)
Doddington WwTW	Ransonmoor Drain	Floods Drain GB105033047711	Good (BOD, NH4 and P)
West Walton WwTW	Nene	Nene GB30503200200	Good (BOD, NH4 and P)

4.3.27 For some of the WwTWs listed above, the receiving watercourse is not a designated Main River and does not have a WFD classification, for example Haddenham WwTW discharges to the Aldreth Canal, which is a tributary of the Ten Mile River. In such cases, where a WFD classification is not available for the receiving waterbody, the nearest downstream waterbody's WFD classification has been used as a surrogate water quality indicator.

WwTW within the Middle Level Commissioners' area

4.3.28 During the consultation process with the various IDBs that have control over the study area, MLC stated that it would not consent any increases in flow at WwTW discharging into waterbodies they control. Seven WwTW lie within the MLC area:

- Whittlesey;
- Benwick;
- Doddington;
- Christchurch;
- March;
- Manea; and
- Chatteris.

4.3.29 Of the above works, Whittlesey and Doddington will require increases to the consented DWF to accommodate the proposed growth. Until further work has been undertaken to determine whether the impacts of additional discharge can be mitigated, these works should therefore be considered to have no capacity for growth beyond their current consented DWF.

Water Quality Modelling Results

4.3.30 For WwTW catchments (and hence growth towns) where capacity is currently exceeded (as mapped in red in Figure 4-3 and Figure 4-4, a solution is required to treat additional wastewater generated as a result of growth.

4.3.31 The outline solution for these WwTW is to preferentially determine if the WwTW can increase the volume they are permitted to discharge without deteriorating downstream water quality of the receiving watercourse (and hence meet Water Framework Directive standards) as well as not adversely impacting on designated ecological sites downstream. This solution is preferential because it is the least cost and least energy use option compared to building a new facility.

4.3.32 The Outline WCS therefore undertook a modelling process for the WwTW that would exceed capacity, to determine what 'quality' conditions would need to apply to the increase in permitted (or consented) volumes of discharge consent to maintain downstream quality in the receiving watercourse.

4.3.33 In theory, WwTW can treat wastewater to any quality required (i.e. drinking water quality); however, the better the quality (and tighter the standard met), the more energy is required and the more expensive it becomes.

4.3.34 There is a point at which the energy used or the cost involved makes the treatment process unsustainable in some cases and this is termed 'within the limits of conventional treatment'[37]. Therefore, the modelling process considered whether the quality conditions that would need to be applied to the increase in discharge were achievable within the limits of conventional treatment.

4.3.35 If the required standards are achievable within the limits of conventional treatment, then it is considered that a solution is feasible in theory and the Detailed WCS needs to confirm whether the improvements in treatment process required at each are achievable given:

- available land space in which to increase treatment processes; and
- whether the increase in discharge volume is acceptable to the EA or relevant IDB from a flooding and ecological point of view.

4.3.36 It also needs to consider at what point in the planning period these improvements can be in place (thus affecting development phasing) based on preferred development locations.

4.3.37 Where the quality conditions required are not achievable within the limits of conventional treatment, an alternative solution needs to be defined as part of the Detailed WCS; this could be one of the following:

- a new or upgraded WwTW facility;
- a reduction in proposed growth in this location, or redistributed to a catchment with capacity;
- an alternative location for discharging treated wastewater, i.e. where downstream water quality standards required are less stringent or to groundwater; or
- a reduction in the volume of wastewater generated by growth (through stricter water use policy for new builds and reduction in existing household water use – i.e. water neutrality);

4.3.38 The modelling process was agreed with the Environment Agency and undertaken for all three housing growth scenarios. The key results were:

- the WwTW serving Soham, Doddington, Whittlesey, Burwell or Bottisham cannot achieve required water quality conditions for all the growth scenarios within the limits of conventional treatment and still achieve 'Good Status' in the downstream watercourse as required under the WFD[38] – further modelling or an alternative solution is therefore required in the Detailed WCS for growth in these locations to meet future WFD targets;
- of these locations, Soham and Bottisham could accept some growth and still achieve High Status in the watercourse, but WwTW at Doddington and Burwell cannot receive any level of growth without preventing Good Status from being achieved[39];
- Whittlesey and Doddington cannot increase their consented DWF due to limits placed on discharge volumes by the MLC; investigations are therefore required to determine whether the impact of further discharge can be mitigated;

[37] For audit purposes, the technical definition of 'limits of conventional treatment' in this context is a limit of 5mg/l of BOD, 1mg/l of NH4 and 1mg/l of P.
[38] Or 'High status' where the current status is High
[39] For Doddington & March, neither the Ammoniacal N, nor the Phosphate consent could be achieved. For Burwell the Phosphate condition could not be met.

- Bottisham WwTW could accept approximately 30% of planned growth before targets would be unachievable within the limits of conventional treatment for Ammoniacal Nitrogen; and
- all other WwTW have a theoretical solution to increase consented volumes of discharge (but treated to a higher quality) and hence can be considered at this stage to be able to accept growth from all three scenarios and still meet WFD targets. The feasibility and timing implications of doing so need to be confirmed in the Detailed WCS, once it is known where preferred growth sites will be located. In particular growth at: Littleport, Witcham and Haddenham is likely to be difficult as limits will be very close to the limits of conventional treatment and will require energy intensive technology such as stripping of Phosphorus from the final discharge.

4.3.39 A full list of the 'indicative' consents required to meet Good Status (or High were currently High) are included in

Further Modelling (Detailed WCS)

4.3.40 Prior to considering alternative treatment options in the Detailed WCS, additional modelling will be required for Soham, Doddington, Whittlesey, Burwell and Bottisham, as it is possible that failure to meet future 'Good Status' under the WFD for the receiving watercourses is for reasons other that growth (e.g. limited capacity in the watercourse). In this scenario, consent standards would only be required that would ensure 'no deterioration' from the current status under the WFD, which for many of the watercourses is less then Good Status. This additional modelling will be undertaken as part of Phase 2 and is described further in section 11.3.

Initial Process Capacity Assessment – East Cambridgeshire

4.3.41 In advance of the Detailed study, AWS's response to East Cambridgeshire's Core Strategy provides information on likely phasing constraints relating to the need to update treatment processes at several key WwTWs. This will need to be considered further in the Detailed WCS, once exact development locations are known.

4.3.42 AWS's response identified several settlements where there is either limited or no process capacity at existing WwTWs. AWS stated that brownfield sites could potentially be brought forward in these settlements if the proposed wastewater flow rate is no greater under the current situation; but any additional housing to be built on greenfield sites would need to be phased so that development does not occur ahead of improvements to those works with limited capacity. Relevant extracts from AWS's comments on the Core Strategy Submission DPD are given below:

- ***Littleport*** *– It is anticipated that extensions at the WwTWs can be implemented in a reasonable timescale. It is therefore requested that new greenfield allocations should be phased to come forward post-2011. This will also apply to large brownfield allocations with a significant change of use if discharges to sewer are to be increased.*
- ***Soham*** *– Existing Local Plan allocations will take up any remaining capacity at the WwTW. Anglian Water will be including for provision of extra treatment capacity in Soham within the PR09 Business Plan, and will seek to complete construction by 2015. It is requested that new greenfield allocations (including for housing and employment purposes) are phased to come forward post-2015. This will also apply to large brownfield allocations with a significant change of use if discharges to sewer are to be increased.*
- ***Bottisham*** *– The sewage treatment works is at capacity and improvement works are required to accommodate growth. The discharge consent is at capacity and will require re-*

negotiation with the Environment Agency. This may impact on the phasing of development. If an increase in treated effluent quality is required, the scale of improvement works may require a considerable design and construct timescale. It is requested that new allocations are phased to come forward post-2015.

- ***Burwell*** *- The sewage treatment works is at capacity and improvement works are required to accommodate growth. The discharge consent is at capacity and will require re-negotiation with the Environment Agency. This may impact on the phasing of development. If an increase in treated effluent quality is required, the scale of improvement works may require a considerable design and construct timescale. It is requested that new allocations are phased to come forward post-2015.*
- ***Haddenham*** *– The sewage treatment works at Witcham is at capacity and improvement works are required to accommodate growth. The discharge consent is at capacity and will require re-negotiation with the Environment Agency. This may impact on the phasing of development. If an increase in treated effluent quality is required, the scale of improvement works may require a considerable design and construct timescale. It is requested that new allocations are phased to come forward post-2015.*
- ***Newmarket Fringe*** *– Minor improvement works are required at Newmarket WwTW to cater for predicted levels of growth. It is requested that new allocations are phased to come forward post-2010.*
- ***Sutton*** *– The sewage treatment works at Witcham is at capacity and improvement works are required to accommodate growth. The discharge consent is at capacity and will require re-negotiation with the Environment Agency. This may impact on the phasing of development. If an increase in treated effluent quality is required, the scale of improvement works may require a considerable design and construct timescale. It is requested that new allocations are phased to come forward post-2015.*
- ***Fordham*** *(employment land adjacent to the A142) – Improvements may be required to the WwTW. It is requested that allocations should be phased to come forward post-2011*.'

Other Process Capacity Issues

4.3.43 It should also be noted that whilst West Walton WwTW has capacity to accept growth (subject to altered quality consent conditions), the Environment Agency have advised that the capacity to treat additional flow will need to be assessed against existing concerns over odour from the treatment works.

Ecological Enhancement Opportunities

4.3.44 This section is intended to describe ecological enhancement opportunities to which the initiatives developed within the WCS could contribute.

4.3.45 There are considerable opportunities available to enhance the biodiversity of Fenland and East Cambridgeshire through initiatives associated with the WCS. As a first step towards identifying these opportunities the Cambridgeshire Green Infrastructure (GI) Strategy was reviewed in order to determine which, if any, WwTWs are physically close to any of the green corridors initiatives identified on Drawing 050406/31 of the Strategy. Two WwTWs were identified as being located within or immediately adjacent to GI initiatives:

- Chippenham WwTW is identified as being within the Icknield Way Enhancement Corridor; and

- Reach WwTW is identified as being within the Devils Dyke Extension (Restoration) Project area.

4.3.46 These would potentially be the WwTWs that could contribute most directly to initiatives within the GI Strategy. However, both initiatives involve terrestrial 'dry' habitats such as calcareous grassland and there would appear to be little opportunity for the creation of wetland green infrastructure, such as the expansion of WwTW infrastructure could deliver (e.g. the provision of SuDS features, particularly the creation of ponds and reedbeds both of which are UK BAP priority habitats or using treated effluent to supply new water features).

4.3.47 There may be opportunities for treated effluent to be used at a greater distance to supplement wetland habitat creation initiatives such as the Great Fen Project, although this would be subject to confirmation of acceptable water quality standards and non-prohibitive costs of infrastructure delivery.

4.3.48 Reach WwTW, Burwell WwTW, Swaffham Prior WwTW and Bottisham WwTW all discharge into watercourses that flow through the Wicken Fen Vision area[40]. The Wicken Fen Vision is a long-term plan (up to 100 yrs) to create a new nature reserve covering around 53 square kilometres between Cambridge and Wicken Fen Ramsar site. These WwTWs could contribute through enhanced water supply to the Vision area, aiding the conversion of farmland to fen habitat, although only where they will not also contribute to adverse water quality.

4.3.49 In addition to water quality effects, discharges from WwTWs can also contribute cumulatively to flooding of the Ouse Washes, which could adversely affect the breeding bird interest by leaving nesting habitat unusable. One major contribution WwTW expansion could therefore make is the provision of water supply for the creation of new areas of flooded meadow through the re-routing of discharges away from the Ouse Washes. This new meadow could provide breeding habitat for waders, as reflected in the Ouse Washes Habitat Creation Scheme being supervised by the Environment Agency. On the face of it Mepal WwTW, Witcham WwTW, Wilburton WwTW and Manea Town Lots WwTW would be the most appropriate WwTWs to contribute since they all currently discharge to tributaries of the Ouse Washes. This would also meet the need to conserve and enhance the area of 'lowland fen' and 'grazing marsh' (both UK BAP habitats) within the study area and improve habitat for Norfolk and/or Cambridgeshire BAP species such as otter, water vole and great crested newt.

4.4 Wastewater Network Assessment

4.4.1 A high level assessment of capacity in the sewer network has been undertaken to determine whether there is likely to be sufficient capacity to transmit additional wastewater flow generated to the various treatment works within existing infrastructure. Full details and results are included in **Appendix C: Wastewater Network Assessments**.

4.4.2 A full assessment of capacity would require knowledge of potential site development locations, as capacity to connect is a site specific issue. However, capacity in trunk sewers within areas (or towns of major growth) can be undertaken to determine where strategic upgrades are likely to be required, or where growth is likely to be possible without such upgrades.

4.4.3 The high level assessment determined capacity by:

[40] http://www.wicken.org.uk/vision_arearesearch.htm

- discussing network layout and issues with AWS's drainage engineers;
- assessing frequency of current sewer flooding incidents, which highlight current incapacity at key locations in the network;
- assessing location and size of pumping stations which have a finite capacity;
- calculating where growth will result in a greater than 10% increase in population upstream of a key pumping station or sewer discharge point (CSO), which is considered to be a threshold where more detailed modelling would be required to determine impact.

4.4.4 The following key conclusions were drawn:

4.4.5 Growth in the following locations is likely to be accommodated in existing infrastructure i.e. no new trunk mains or upgrades are likely to be required (TBC in detailed study):

- Little Downham;
- Newmarket Fringe;
- Stretham;
- Wilburton;
- Sutton;
- Benwick; and
- Whittlesey[41].

4.4.6 Growth in the following catchments is relatively small; however, the system is reliant on pump capacity and hence, modelling is required to determine if a new trunk main, upgrade to a pumping station or upgrade to a trunk main is required once sites are known:

- Bottisham;
- Isleham;
- Manea Town; and
- Parsons Drove (& Church End).

4.4.7 Growth in the following catchments is relatively small, but AWS have indicated existing capacity/flooding problems which will make use of existing infrastructure unlikely – modelling is required to determine if (and when) a new trunk main, upgraded pumping station or upgrades to an existing main will be required once sites are known:

- Burwell;
- Haddenham; and
- Doddington (& Wimblington).

4.4.8 Growth in the following catchments is greater than 10% upstream of key pumping stations and sewer discharge points. New or upgraded infrastructure at a strategic level (trunk mains or pumping stations) will be required and modelling is required to define where and when once sites are known:

[41] Including Coates & Eastrea

- Ely;
- Soham; and
- March.

4.4.9 Growth in the following catchments is significant. Some development will be possible within existing sewer capacity; however existing flooding or pump capacity problems will limit growth and hence modelling is required to determine where and when upgrades to (or provision of new) trunk mains will be required once sites are known:

- Littleport;
- Chatteris; and
- Wisbech[42].

Further work

4.4.10 Due to the flat topography of the study area, the sewer system relies on pumping (rather than free flowing gravity) to transmit wastewater flow and in many cases, the wastewater system is combined with surface water drains. This means capacity is not just about the number of connected properties; but also about capacity to transmit rainwater during heavy storms. More detailed, site specific assessment of capacity therefore needs to be undertaken using modelling to simulate storm events as well as to calculate pump capacities, and it is proposed that this be undertaken by AWS in conjunction with Scott Wilson for locations where the Outline Study has identified likely capacity constraints.

4.5 Wastewater Strategy: Recommendations

4.5.1 The Outline WCS has highlighted several areas of work that needs to be undertaken in the Phase 2 Detailed study once further clarification is available on preferred locations and numbers for housing and employment growth. Recommendations for this further work are set in the subsequent section, along with an indication of stakeholder's involvement.

4.5.2 Recommendations on Outline phasing implications are provided in Section 8 (Growth Town Assessments) for those towns where a known constraint or potential future constraint has been highlighted. Recommendations on initial Outline policy for wastewater are included in Section 10.

Wastewater Treatment

- For Whittlesey & Doddington, which require an increase in consented flow to watercourses, within the MLC jurisdiction, no additional wastewater from growth would be permitted to be discharged; therefore, further investigation is required including:
    - details of discussions between AWS and MLC on the position with regards to allowing further discharges. AWS have a statutory requirement under the Water Industry Act to supply wastewater treatment services unless other legislative drivers restrict it;
    - determining whether the increase in flow is likely to affect water levels or capacity in the drainage system in conjunction with the MLC;

[42] Including Elm, Friday Bridge, Gorefield, Leverington, Leverington Common, Tydd St Giles, Wisbech St Mary

  - determining whether there are likely to be adverse ecological impacts as a result of increases in discharges in conjunction with MLC and NE;
  - considering whether alternative discharge location options are available in conjunction with MLC, AWS and potentially the Environment Agency;
  - considering whether changes in per capita consumption (water efficiency and achieving water neutrality), occupancy rate and changing population may free up headroom at the WwTW to allow development to proceed without the need to increase consented flow.

- For Soham, Burwell, Bottisham, Whittlesey and Doddington, quality consents beyond the limits of conventional treatment are required when growth is considered in order to meet future downstream WFD water quality targets for 'Good Status' and ecology targets. Therefore, further modelling is required.
- Where the receiving watercourse for these WwTWs is currently less than Good Status, the detailed WCS will model the current flows at these works to see if Good Status can be achieved within the limits of conventional treatment without growth included. If Good status can be achieved without growth, then it can be concluded that the growth is the factor limiting the attainment of future Good Status and therefore a solution is required. If Good status cannot be achieved with current flows as they are (before growth is considered), then growth should not be unduly penalised and hence the current status should be modelled (with growth flows included) as the target and the consents determined to meet current status in order to ensure the no deterioration policy of the WFD.
- Only if the current status cannot be maintained within the limits of conventional treatment is growth considered not achievable and therefore a new solution required.
- Therefore, where a WwTW requires consent limits beyond the levels of conventional treatment in order to ensure attainment of 'Good Status' or 'No Deterioriation' under the WFD, then further investigation is required including:
  - determining whether going beyond the limits of conventional treatment is a sustainable solution in terms of energy use and cost in conjunction with the stakeholder group (using a sustainability appraisal);
  - considering whether changes in per capita consumption (water efficiency and achieving water neutrality), occupancy rate and changing population may free up headroom at the WwTW to allow development to proceed without the need to increase consented flow;
  - considering whether alternative discharge location or technology options are available in conjunction with MLC, AWS and the Environment Agency, including discharge to ground;
  - determining whether the increase in flow is likely to affect water levels, flood risk or capacity in the drainage system in conjunction with the MLC and the EA; and
  - considering whether wastewater flow can be transferred to a different WwTW catchment where there is available capacity.
- For WwTW that require an increase in flow above consented volumes but which can meet water quality targets within the limits of conventional treatment, the Detailed study needs to:

  - in conjunction with AWS, determine whether process capacity upgrades are technically and physically possible at site, and determine what impact the timing of upgrades have on phasing of development; and
  - in conjunction with AWS, the Environment Agency and the IDBs, determine if an increase in flow will have an impact on flood risk (water levels) or drainage capacity.

- The Detailed study needs to determine the impact that delivering such solutions will have on:
  - phasing for key growth towns;
  - sustainability in terms of energy usage; and
  - deliverability of sites and infrastructure (cost and practicality).

Wastewater Transmission

- Modelling of network capacity is required at several key locations (once development locations are known) to determine if upgrades to sewer mains, pumping stations or new sewer provision is necessary. It is recommended that this is carried out by AWS using their existing Infoworks CS models for Littleport, Ely, Soham, Chatteris, March and Wisbech for use in the Detailed study.
- A semi-quantitative assessment of capacity and likely requirement for upgrades and new sewers should be undertaken in conjunction with AWS for Bottisham, Isleham, Manea Town, Parson Drove, Burwell, Haddenham and Doddington. Largely this will be determining impact on pumping station capacity and required upgrades once development locations are known.

5 Water Supply Strategy

5.1 Water Demand Calculations

Methodology

5.1.1 The future water demand following proposed growth has been calculated for both districts for all three housing scenarios (and employment targets). For each housing scenario, five different water demand projections have been calculated based on different rates of water use for new homes that could be implemented through potential future policy[43]. In undertaking the calculations, it has been assumed that there will be an overall decrease in occupancy rates (from 2.3 to 2.1 people per home) in new homes to reflect changing demographics and that there will be movement of individuals within the study area as well as inward migration.

5.1.2 The projections were derived as follows:

- **Projection 1** – New homes would use AWS average metered consumption (Reference 8) of 142 l/h/d, this should be considered to be the 'business as usual' projection (assuming new homes will have the same level of water consumption as for metered properties currently);
- **Projection 2** – New homes would conform to Part G of the Building Regulations requirement (in force as of the 6th April 2010) of 125 l/h/d (equivalent to the Code for Sustainable Homes (CfSH) Level 1/2 rating of 120 l/h/d plus 5 l/h/d for outdoor use);
- **Projection 3** – New homes would meet the Thames Gateway Water neutrality study[44] recommendation of 95 l/h/d;
- **Projection 4** – New homes would achieve CfSH Level 5/6 rating of 80 l/h/d; and
- **Projection 5** – the suggested policy projection.

5.1.3 Projection 5 is intended to represent water use as policy changes in the future, reflecting the application of minimum ratings under the CfSH for all new homes, which will be achieved in a stepped approach in line with government aims set out in Building a Greener Future: Towards Zero Carbon Development. Discussions with the Environment Agency have indicated that whilst the plans for mandatory targets for all homes under the CfSH are only at consultation stage and currently only affordable homes have to meet the code levels, the Environment Agency supports increasing water efficiency in new homes to help meet DEFRA's aspiration and would wish to see these levels applied to all new developments. It is therefore the Environment Agency's vision that new homes will require a CfSH Level 3 rating from 2010, Level 4 by 2013 and to be aiming to achieve Level 5/6 by 2016.

Calculated water demand

5.1.4 Table 5-1 and Table 5-2 summarise the range of future additional demand (in Millions of litres or Mega litres per day) for each housing scenario in each district. Figure 5-1 and Figure 5-2 show this information a trajectory over the plan period.

[43] NB – employment demand remains constant at 28 litres per job created
[44] NB – the Thames Gateway Study has been used here as a reference here as it the first major study of the feasibility of achieving water neutrality in the UK and hence sets out likely requirements for water efficiency in new homes in order to attain water neutrality.

Table 5-1: East Cambs - additional future water demand ranges:

Housing Scenario	Future Demand (Ml/d)	
	Max[45]	Min[46]
1 – low scenario	3.11	1.9
2 – medium scenario	3.73	2.25
3 – high scenario	5.21	3.08

Table 5-2: Fenland - additional future water demand ranges:

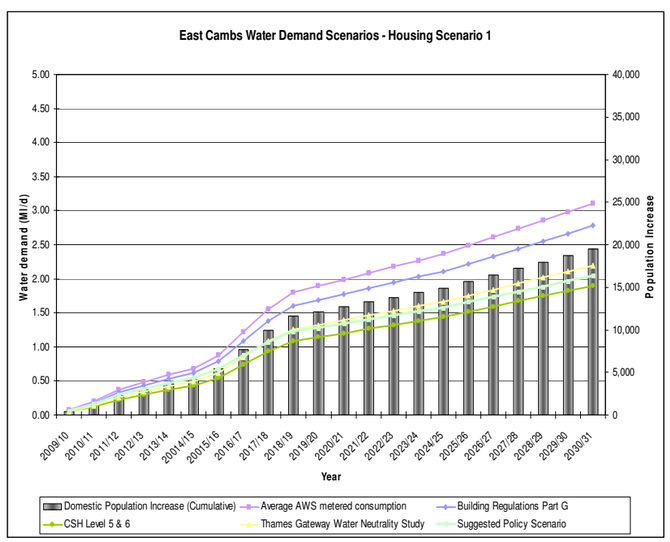
Housing Scenario	Future Demand (Ml/d)	
	Max[47]	Min[48]
1 – low scenario	3.55	2.09
2 – medium scenario	3.81	2.23
3 – high scenario	4.82	2.8

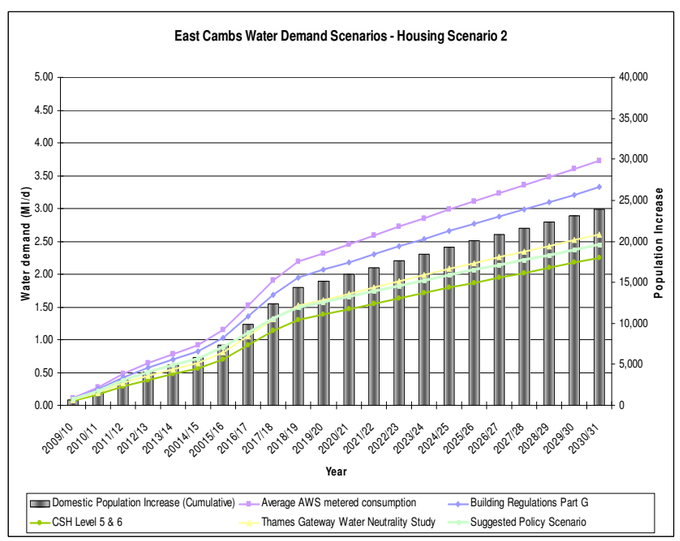
5.1.5 The results show that demand for water in East Cambridgeshire can be reduced by up to 2.13 Ml/d by 2031 by adopting more stringent water consumption approaches (Projections 2-5). The suggested policy projection gives a saving of between 1.07 and 1.93 Ml/d by 2031.

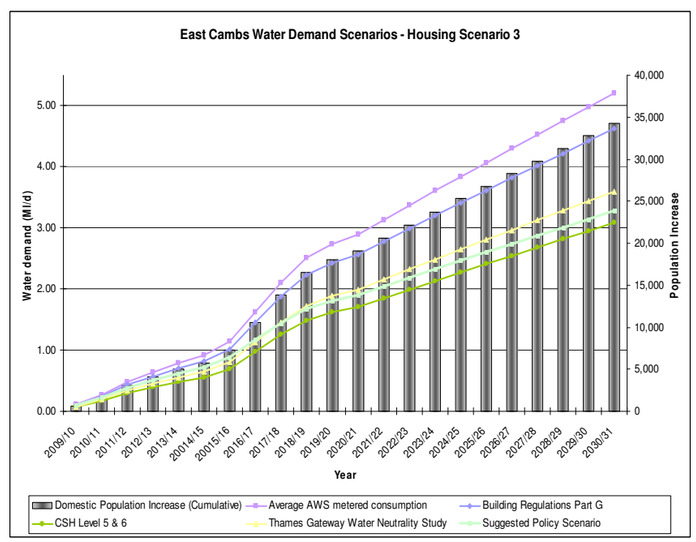
5.1.6 For Fenland, demand for water can be reduced by up to 2.02 Ml/d by 2031and the suggested policy projection gives a saving of between 1.25 and 1.77 Ml/d by 2031.

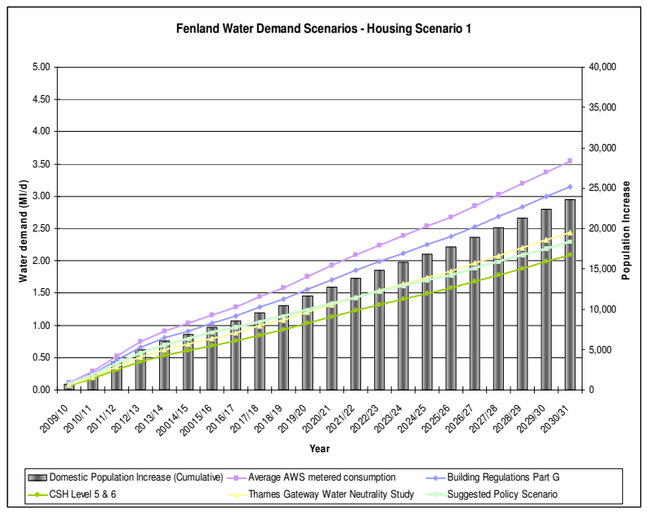
[45] based on current demand from metered homes in Anglian Water supply area of 142l/h/d
[46] based on demand if new homes meet code levels 5/6 under Code for Sustainable Homes (80l/h/d)
[47] based on current demand from metered homes in Anglian Water supply area of 142l/h/d
[48] based on demand if new homes meet code levels 5/6 under Code for Sustainable Homes (80l/h/d)

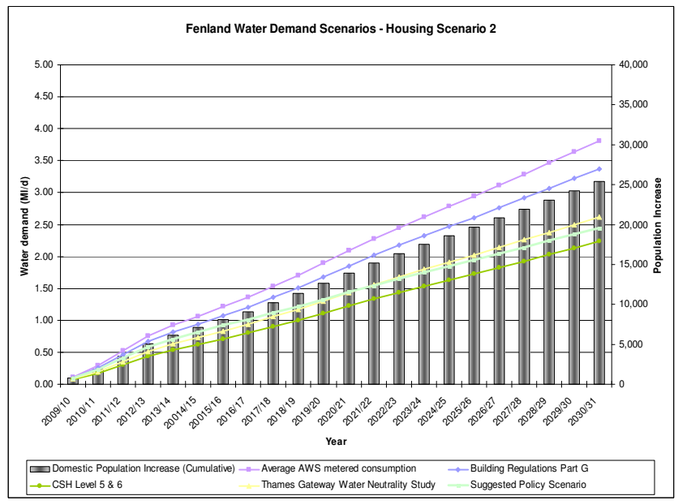
Figure 5-1: Cumulative predicted demand for water in each district by 2031

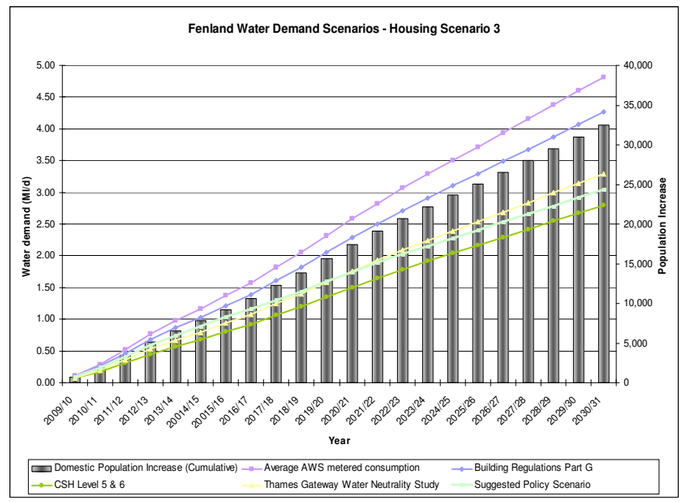












5.2 Water Resource Availability

5.2.1 The Scoping study has already completed an assessment of the existing baseline with respect to locally available resources in the chalk aquifers to the south of the study area and the main river systems. This assessment was based on the Environment Agency's Catchment Abstraction Management Strategies (CAMS) for the Nene and Great Ouse and is not repeated in this Outline WCS. Instead, the Outline study has used the final version of AWS's Water Resources Management Plan (WRMP) to determine available water supply against predicted demand.

5.2.2 A full assessment of the available water resources in the study area has been undertaken and is included in **Appendix D: Water Resource Availability**. This section of the planning report provides the key findings with respect to available water supply against projected water demand with growth.

5.2.3 AWS manages available water resources within key zones, called Water Resource Zones (WRZ). These zones share the same raw resources for supply and are interconnected by supply pipes, treatment works and pumping stations such that customers within these zones share the same available 'surplus of supply' of water when it is freely available; but also share the same risk of supply when water is not as freely available during dry periods (i.e. deficit of supply). The population within the study area falls into three WRZs:

- Fenland WRZ to the north of the study area – covering Wisbech and surrounds;
- Ruthamford WRZ – covering the rest of Fenland, including Whittlesey, March, Doddington & Chatteris; and
- Cambs & West Suffolk WRZ – all of East Cambs is in this zone

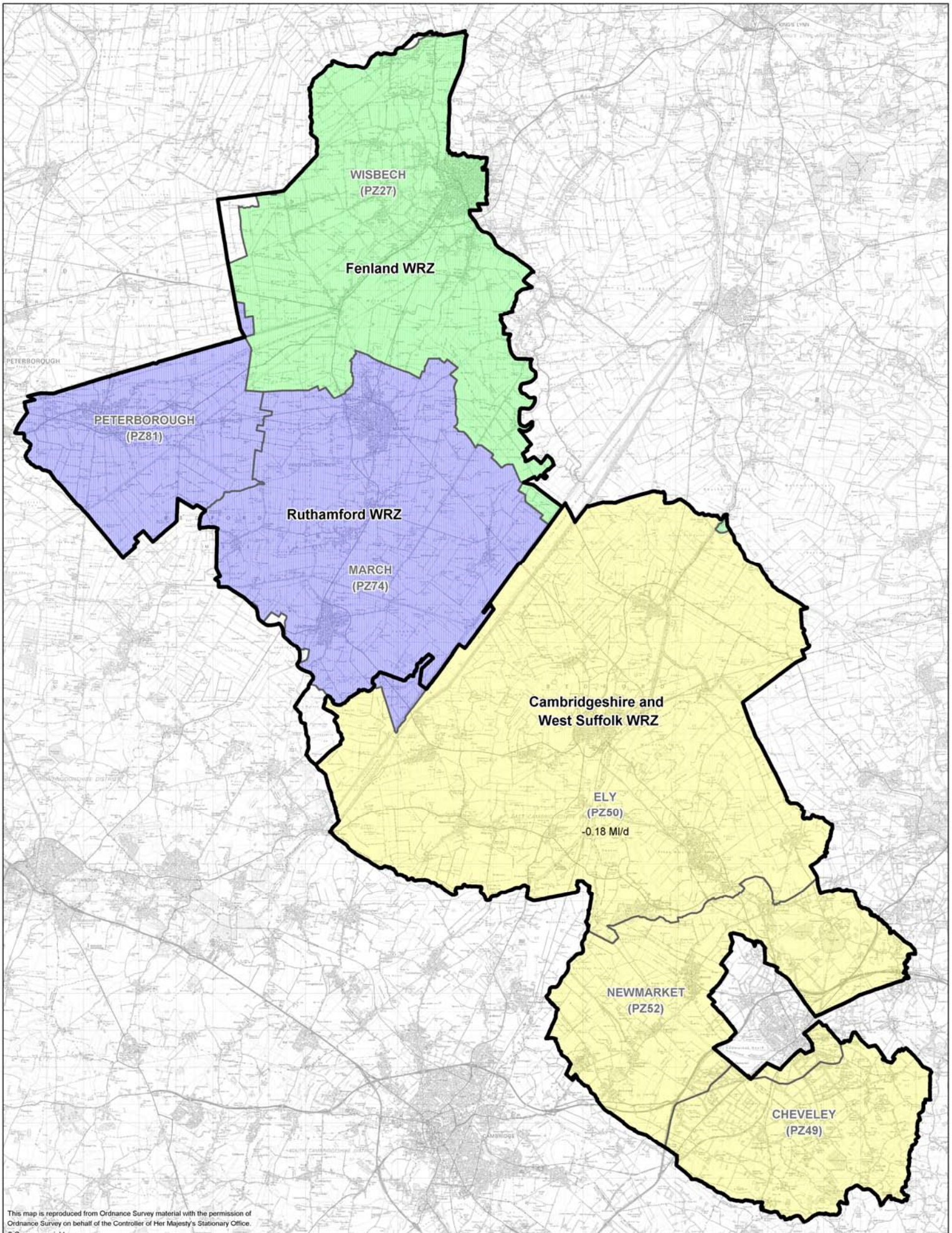
5.2.4 This is further illustrated in Figure 5-2.

5.2.5 The WRZs are further broken down into Planning Zones (labelled as PZs), where supply and demand for water is calculated at a local level. Anglian Water have undertaken resource modelling to calculate if there is likely to be a surplus of available water or a deficit in each Planning Zone by 2035, once additional demand from growth and other factors such as climate change are taken into account. They do this calculation for two different outcomes:

- based on demand and supply on average conditions; and
- based on demand and supply during peak demand[49].

5.2.6 The result is a supply/demand balance for each Planning Zone and this is displayed graphically in Figure 5-3. Red indicates a deficit by 2035, whereas green indicates a surplus (NB: this is without any proposed scheme solutions in place).

[49] Usually peak conditions are during dry years, at the peak point in the week when demand is highest



Job Title
EAST CAMBRIDGESHIRE & FENLAND OUTLINE WCS

Drawing Title
ANGLIAN WATER WATER RESOURCE AND PLANNING ZONESS

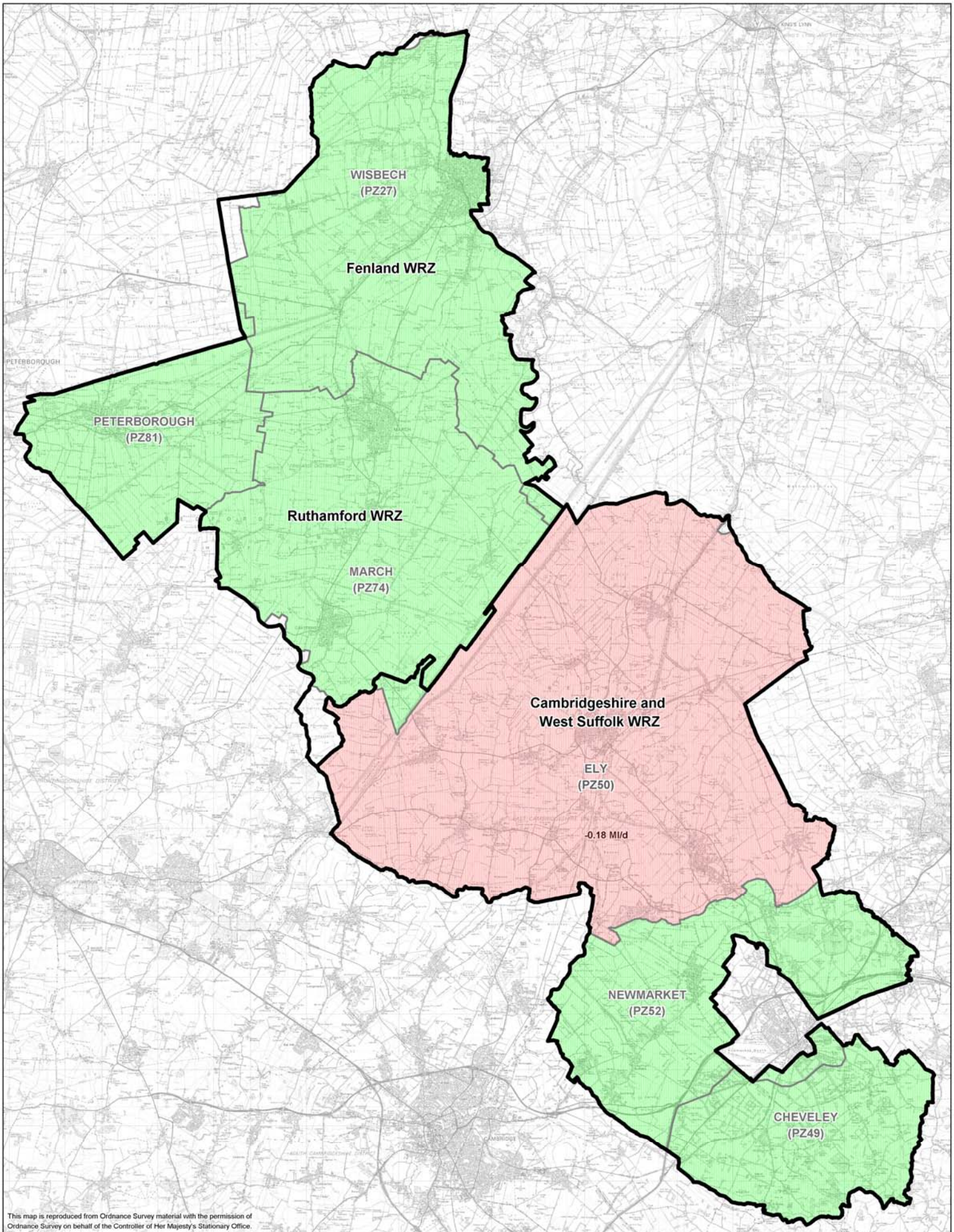
Water Resource Zone (WRZ)
- Cambridgeshire and West Suffolk WRZ
- Fenland WRZ
- Ruthamford WRZ

Planning Zones

Figure 5-2

Scale at A3:	1:180,000		
Drw SK	App CP	Rev SK	
Chk CP	Date 27/05/2010	Date 01/10/2010	

Scott Wilson
www.scottwilson.com



Job Title
EAST CAMBRIDGESHIRE & FENLAND OUTLINE WCS

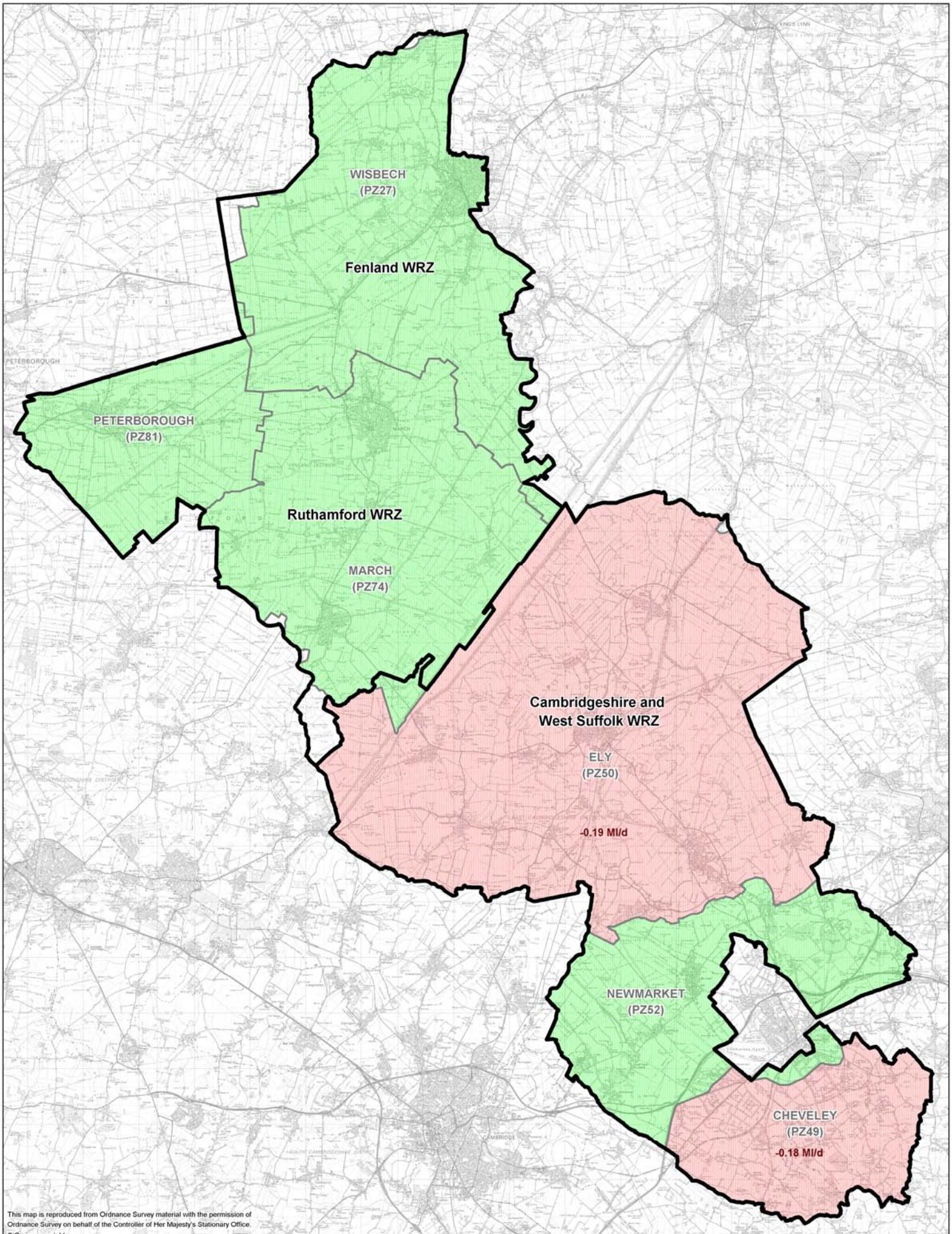
Drawing Title
ANGLIAN WATER WATER RESOURCE AND PLANNING ZONES: FORECASTED AVERAGE DEFECIT 2036-2037

Planning Zone
No Forecasted Deficit
Forecasted Deficit

Figure 5-3a

Scale at A3:	1:180,000		
Drw EB	App CP	Rev SK	
Chk CP	Date 17/06/2010	Date 01/10/2010	

Scott Wilson
www.scottwilson.com



Job Title
EAST CAMBRIDGESHIRE & FENLAND OUTLINE WCS

Drawing Title
ANGLIAN WATER WATER RESOURCE AND PLANNING ZONES: FORECASTED PEAK DEFECIT 2036-2037

Forecasted Defecit
No Forecasted Defecit
Planning Zones

Figure 5-3b

Scale at A3:	1:180,000		
Drw EB	App CP	Rev SK	
Chk CP	Date 17/06/2010	Date 01/10/2010	

Scott Wilson
www.scottwilson.com

5.2.7 The results show that there are adequate water resources within Fenland to cater for growth; however, the majority of growth in East Cambridgeshire cannot be catered for within existing resources (with the exception of growth in the fringes of Newmarket, Burwell, Chippenham and Bottisham which are in a WRZ with surplus supply).

5.2.8 AWS has therefore proposed solutions to the deficits in the affected planning zones as follows[50]:

Ely Zone (deficit during average and peak demand conditions):

- increasing the number of existing properties with a meter to lower existing demand (and offset future demand) - to take place between 2010 to 2015[51];
- further control of water lost through leaking supply pipes – to take place between 2010 and 2020[52];
- water efficiency measures in existing homes, such as installation of flush reduction devices for toilets to lower existing demand (and offset future demand) – to take place between 2010 and 2015; and
- transfer of water from nearby new source (Barnham Cross) which has a surplus of supply - to take place between 2010 and 2015.

Cheveley Zone (deficit only during peak demand conditions):

- gradual reduction in pressure across supply population (within acceptable ranges as set by the regulator) to increase availability of water more widely during peak demand - will occur between 2015 and 2040; and
- transfer of surplus from planning zones within the wider Cambs and East Suffolk WRZ between 2020 and 2030.

5.2.9 The solutions identified by AWS would remove the deficits in the supply and demand balance for East Cambridgeshire. However, it is important to note that the solutions rely on transfer of resources to the WRZ in an area reliant on finite groundwater abstractions. The Environment Agency's assessment of water availability[53] suggests that the chalk aquifer is at its limit of available resources without adverse impact on rivers and ecosystems that rely on it; hence further abstraction (beyond those proposed in the WRMP) and transfer is unlikely in the future. It is also important to note the requirement for water in the study area to be used for maintaining statutory water levels for navigation and heavy agricultural use. Water availability within the districts is therefore unlikely to be available for use for public supply, without specific management and mitigation measures to make use of excess river flows or rainfall where it is available.

5.2.10 An assessment of additional abstraction (as proposed or considered in the WRMP) on ecological sites has been undertaken and is included in **Appendix D: Water Resource Availability**.

5.2.11 The assessment concludes that, whilst the three WRZs that supply the study area are hydrologically linked to European sites (particularly the Ruthamford WRZ which is connected to

[50] It should be noted that there is a private water supply company in the Ely Planning Zone
[51] This period of time is referred to in the Water Industry as AMP5 (Asset Management Period 5). An AMP reflects the 5 year planning periods over which water companies can plan to increase charges for water to invest in new, and management of existing, assets (in this case water resource schemes).
[52] This period of time covers AMPs 5 & 6
[53] The Catchment Abstraction Management Strategies (CAMS)

the Nene Washes SAC/SPA & Ramsar site and Ouse Washes SAC/SPA & Ramsar site), the information provided in the WRMP indicates that abstractions within the WRZs that supply the study area are not likely to lead to a significant effect on European sites, following limited sustainability reductions that may be required following the completion of the RoC process.

5.2.12 There are a total of sixteen non statutory County Wildlife Sites in East Cambridgeshire and Fenland as detailed in Appendix D: Water Resource Availability. These sites all fall within AWS's WRZ09 or WRZ05. WRZ05 is predicted to be in surplus throughout the plan period. WRZ09 is predicted to be in surplus until the last five years of the WRMP period. Although there is predicted to be a deficit in the last five years this will be addressed through mechanisms other than the development of new resources in the WRZ. Existing abstraction licences are already subject to evaluation for their impact on nature conservation interests, sustainability reductions will have already been factored into the WRMP and no new licences are proposed for these WRZs in relation to development in East Cambridgeshire or Fenland. As such, there is no reason to conclude that there should be any adverse impact on these sites related to the delivery of the WRMP.

5.2.13 It is noted that AWS states in its adopted WRMP that the Review of Consents process is not completed and that further sustainability reductions may be put forward; if so, this conclusion may have to be revised but the implication of the WRMP is that AWS has taken these possible sustainability reductions into account.

5.2.14 In addition to ecological considerations, it should be noted that pressure reduction solutions to supply and demand deficits can only occur to a certain level as regulated by OFWAT and are also therefore considered to be a finite solution.

5.2.15 In order to cater for the higher levels of growth proposed in the district, it is therefore prudent to promote water efficiency in new homes and commercial buildings to reduce the additional demand and make supply of water more sustainable. The Outline WCS has therefore undertaken an assessment of feasibility of achieving Water Neutrality in the Study Area, as described in Section 6 of this planning report.

5.3 Water Supply Infrastructure

5.3.1 AWS has stated that

> *'there is good connection between Planning Zones and so local surpluses and deficits can be shared. However, there are bottlenecks in any water supply and distribution system and we have reflected these in our allocation of the peak and average deployable output between the 21 Planning Zones.'*

5.3.2 The current level of housing and population growth forecast for the East Cambridgeshire and Fenland area in the East of England Regional Spatial Strategy has been incorporated into AWS's demand forecast. AWS has stated that some infrastructure enhancement may be required, depending on the final housing allocations and their locations, but it anticipates that the level of infrastructure required will falls into the "business as usual" category, to be discussed with developers prior to the acquisition of a site and be funded by developer's contributions. AWS does not anticipate any impact on the timing or phasing of housing as a result of potable mains supply. This would remain true if growth was to be higher than that currently proposed.

5.3.3 It should be noted that the majority of the proposed developed in the study area is anticipated to be either infill or adjoining existing settlements.

5.3.4 It should also be noted that West Norfolk DC are proposing to allocate land for at least 500 dwellings on the east side of Wisbech in their draft Core Strategy.

5.3.5 It is therefore likely that little entirely new infrastructure will be required and the remainder could be supplied through the existing network. However, as discussed above, the three WRZs are not entirely integrated and the opportunities to transfer water around the network could present a limitation to growth. The phasing of potable water infrastructure could therefore be considered to be a constraint to development within East Cambridgeshire and Fenland and should be further assessed in the detailed WCS once preferred development sites are known.

5.4 Water Supply Recommendations

5.4.1 The Outline WCS has highlighted several areas of further work that need to be undertaken in the detailed study once further clarification is available on preferred location and numbers for housing and employment growth. Recommendations for this further work related to water supply are set in the subsequent section, along with an indication of stakeholder's involvement.

5.4.2 Recommendations on initial Outline policy for wastewater are included in Section 10.

- For East Cambridgeshire District, water resource availability towards the end of the plan period (2031) is reliant on inter zone transfer, metering and water efficiency measures. It is therefore essential that if the higher growth scenarios are proposed, that these levels are compared to the growth figures used by AWS in the production of their 2010 WRMP to determine whether additional resources are required to support growth
- If additional resources are required, it will be necessary to determine if sustainable solutions for local abstraction are available for developers to allow future growth to occur in conjunction with the Environment Agency and AWS.
- Once preferred development locations are known, the detailed study will be required to determine resilience in water supply trunk mains, pumping stations and WTWs in key locations with AWS, to determine when upgrades need to be phased in and what impact this will have on development phasing.

6 Water Neutrality

6.1.1 The Outline WCS has identified that meeting demand for water in some parts of the study area towards the end of the plan period is reliant on strategic transfers of water into the area. In the case of Fenland, AWS has indicated that sufficient resources are likely to be made available for growth up to the end of the plan period; however, water resources in the study area are close to their sustainable limit and may require further sustainability reductions in the future.

6.1.2 Demand in East Cambridgeshire is predicted to be greater than supply towards the end of the plan period and further transfer of water is required for some parts of the district. Higher growth scenarios (medium and high) are likely to exacerbate the predicted supply and demand imbalance and require further transfer of water.

6.1.3 It is therefore essential to consider how demand for water in new housing and employment provision can be managed by making new homes as efficient as possible and taking measures to reduce demand from existing population and employment provision.

6.2 Water Efficiency in the study area

6.2.1 Water neutrality is a concept whereby the total demand for water within a planning area after development has taken place is the same (or less) than it was before development took place. In order for the water neutrality concept to work, the additional demand created by new development needs to be offset by reducing the demand from existing population and employment. If this can be achieved, the overall balance for water demand is 'neutral'.

6.2.2 The likelihood of achieving water neutrality can be enhanced by maximising water efficiency within new developments (housing and employment) by introducing a water neutrality concept at a development wide level. It is an aim for any development, (new housing or new employment), to use no more water than is absolutely necessary and re-use as much water as is practical.

6.2.3 The first step of any water efficiency plan in East Cambridgeshire and Fenland should be to look at water efficiency measures being undertaken by AWS.

AWS Future Water Efficiency Plan

6.2.4 A summary of AWS's water efficiency measures and targets included in the WRMP (2010) are as follows:

- AWS is promoting a consistent message to be 'Waterwise' to all customers, by offering advice through its website and billing literature.;
- Ofwat's report on Security of Supplies, Leakage and Water Efficiency periodically has confirmed that AWS's 'Watertight' promise to repair or replace customers' supply pipes, at no or reduced cost was the most effective of AWS's initiatives;
- AWS is looking at the feasibility of assuming the ownership of customers' supply pipes;
- AWS carries out water efficiency audits for some 200 non-household customers each year;
- AWS supplies over 20,000 cistern displacement devices to customers each year and promotes the sale of water butts;

- AWS's Business Customer Services team offers a service to larger water users through 'Optimiser' scheme for on-site leakage detection and advice on process engineering;
- AWS has carried out a number of local trials in fitting variable flush devices to WCs and in controlling flows using flow regulators and aerator heads, including the trial in retrofitting water-efficient devices as part of the enhanced metering project in the Ipswich area;
- AWS sponsors Peterborough Environment City Trust's 'Sustainable Communities Project' which has linked the 'Waterwise' message to those of saving energy and recycling and will continue to promote these messages; and
- AWS supports the East of England Development Agency's 'Water Delivery Group' and 'Waterwise East' to improve water efficiency across the East of England, by working with them to produce web-based guides for developers and planners.

Water Efficiency Targets

6.2.5 AWS has been notified by OFWAT of the requirement to introduce a Water Efficiency Target (WET) as a measure the company's obligation to promote water efficiency as a base service for water efficiency (BSWE) to customers. The WET will be trialled during 2009-10 and used during the AMP5 period. It is based on carrying out activities aimed at increasing water savings by household and non-household customers and is set at one litre per property per day for each year, which equated to 1.9 Ml/d for Anglian Water. The WET specifically excludes savings from free repair to customers' supply pipes and metering. AWS has included its WET in the baseline demand forecast.

6.2.6 Specifically, AWS is introducing an enhanced metering scheme in the Ely WRZ in order to minimise the supply and demand balance.

Water Efficiency in New Homes

6.2.7 New homes can be fitted with a range of fittings to reduce demand, in addition, new developments can have community wide measures to reduce the demand in water, this can range from rainwater harvesting to grey water recycling – the use of wash water from showers and sinks in toilets after on site treatment.

6.2.8 The CSH sets six levels of sustainability for new build housing. Each level includes mandatory requirements for energy performance and water usage. Level 1 is entry level above building regulations, and Level 6 is the highest, reflecting exemplary developments in terms of sustainability. This provides a flexible outline for improving the overall sustainability of a house. Table 6-1 outlines the water use that must be achieved to reach each of the CSH levels.

Table 6-1: Code for Sustainable Homes – Water consumption targets for the different code levels and examples of how these targets can be attained in new build

CSH levels.	Litres/person/day)	Examples of how to achieve water efficiency level.
1	120	Install efficient equipment within the home – 18l max volume dishwasher and 60l max volume washing machine. Install 4/6l dual flush toilets. Install 6-9l/min showers. Educate users about how to be efficient water users. Installation of water meters.
2	120	
3	105	As above. In addition, install water butts and equipment to use rainwater in the garden. Install aerating fixtures into bathrooms and kitchens. Include surface water management in the surrounding development.
4	105	
5	80	As above, in addition: Grey water recycling, reduction of surface water from the development. Provide water audits for people to show them where they can reduce water usage.
6	80	

6.2.9 The examples of water efficiency measures included in Table 6-1 are an outline of the possible ways to improve water efficiency. There are many more possibilities that are site specific. Other steps which should be considered in new builds include: rainwater harvesting from roofs and paved areas (through the use of permeable surfaces); grey water recycling (with some mains support) which can provide enough water to run all toilets, a washing machine and outside taps. These recommendations will be discussed further in the Detailed study at a site specific level, including a high-level assessment of the possible cost and energy use implications of rainwater harvesting and greywater recycling.

Water Efficiency in Existing Homes

6.2.10 There are possibilities within existing development to achieve significant savings and to improve efficiency and reduce the baseline water consumption, thereby theoretically freeing up water availability for new homes. Existing homes can be retrofitted with a range of fixtures to increase efficiency in these homes.

6.2.11 The Environment Agency pioneered the concept of water neutrality in order to respond to the issue of water stress across the Thames Gateway and South Essex area, by producing the 'Towards water neutrality in the Thames Gateway Summary report'[54]. This document focused on water efficiency measures for installation in new developments and also for retrofitting in existing assets in order to reduce the demand for water resources. It recommended that new residential development should achieve demand of less than 95 litres/head/day, which is in excess of CSH Level 4 but below the requirement for Levels 5 and 6. It also suggested that non-residential development should score maximum points for water in the BREEAM, achieving an excellent rating overall. Buildings should achieve the maximum number of water credits in accordance with the requirements of the relevant BREEAM scheme, with the exception of credits awarded for greywater/rainwater systems. These systems should only be installed where cost-effective and the system is designed to ensure that energy use and carbon emissions are minimised.

6.2.12 Measures such as spray taps, water efficient showers and appliances, low flush toilets and outdoor water butts can achieve the water efficiency levels specified above. These add a minimal cost to development of £275-£765 per house. Water meters should also be installed by water

[54] Towards water neutrality in the Thames Gateway Summary report, Science report: SCHO1107BNMC-E-P, HMSO, http://www.environment-agency.gov.uk/research/library/publications/40737.aspx

companies. Increased water efficiency will directly reduce consumer water and energy bills and reduce carbon dioxide emissions.

6.2.13 All developments should aspire to incorporate community water harvesting and reuse systems which are needed to achieve water use of less than 95 litres/head/day; however the overall costs and benefits of such systems should be considered. Also these systems might not be appropriate where low flow rivers rely on surface water run-off for flow maintenance. Non-residential developments often offer the greatest opportunities for the use of these options and should form part of such proposals.

6.3 Water Neutrality Feasibility Assessment

Water Neutrality Policy Pathway

6.3.1 Achieving water neutrality is a key sustainability aim of the WCS for the study area. A water neutrality policy pathway is to be developed as part of the Detailed WCS.

Feasibility Assessment

6.3.2 In order to determine the Outline feasibility of achieving water neutrality in each district, a high level assessment of the likelihood of achieving water neutrality at the end of the plan period (2031) has been undertaken in the Outline WCS for both districts as a whole.

6.3.3 The assessment combined potential future water demand projections based on different water use levels for new homes[55] and combined these with different options for installing water demand management measures in existing properties, as described in the following section

Water Neutrality – Measures for Existing Homes

6.3.4 In assessing the feasibility of water neutrality, the first step is to consider whether the savings created by installing meters into existing unmetered homes would be sufficient to offset the increase in water demand from the new development. This is because metering is a specific water management strategy proposed by AWS in its WRMP and is a generally accepted as a management measure which brings immediate tangible benefits.

6.3.5 On average, the savings created per person as a result of installing a water meter is 12 litres a day.

6.3.6 There are further possibilities within existing development to achieve significant savings through improving efficiency and reducing the baseline water consumption, thereby theoretically freeing up water availability for new homes. Existing homes can be retrofitted with a range of fixtures to increase efficiency in these homes, this can include:

- Water efficient fixtures and fittings – for example, flow restrictors or aerating fixtures;
- Low flush or dual flush toilets;
- Water efficient dishwashers and washing machines
- Installation of water butts for garden use; and

[55] Using the 5 future demand calculations from the water resources assessment

- Additionally, education of the existing population about water efficiency and in particular about water efficient fixtures, fittings and appliances can help to reduce water demand. This can be achieved through, for example, water audits or community education programmes.

6.3.7 Based on findings from the Environment Agency report Water Efficiency in the South East of England[56] some of these measures have been considered as a guide to potential reductions in water demand through the use of water efficient measures in existing homes (Table 6-2).

Table 6-2: Water Saving Methods

Water Saving Method	Potential Saving	Comments/uncertainty.
Ultra Low Flush replacement Scheme	50-55l/hhold/d	4.5l toilet assumed to be used. Need incentive to replace old toilets with low flush toilets.
Variable flush retrofit device	21-29l/hhold/d	Need incentive to buy equipment and install the equipment. Potential problems with operation particularly if installed incorrectly.
Low flow shower head scheme	12-14l/hhold/day	Cannot be used with electric, power or low pressure gravity fed systems.
Metering Scheme	5-10% reduction. = 33.5/hhold/d saved	This can be implemented through compulsory metering or through metering on change of occupancy.
Low use fittings	49.9l/hhold/day (conservative est.)	This includes fitting low use taps, low flow showerhead and a variable flush device.

6.3.8 The water savings in Table 6-2 for litres per household were converted into savings per person using the occupancy rate of 2.3[57]. These were then included to one of two retrofitting options for new homes in the study area as detailed in Table 6-3.

Table 6-3: Retrofitting Options for existing homes

Retrofit Option	Potential Saving	Measures Included
High Intervention	27 l/h/d	Low flush toilet and a low flow shower.
Low Intervention	21.7 l/h/day	Low use fittings.

6.3.9 Finally, the retrofitting options were combined with reductions achieved from metering properties that are not currently metered, to give five demand option scenarios with the following potential savings as shown in Table 6-4.

[56] Water Efficiency in the South East of England, Retrofitting existing homes, Environment Agency 2007, http://publications.environment-agency.gov.uk/pdf/GEHO0407BMNC-E-E.pdf
[57] 2.3 is used for existing properties as opposed to 2.1 for new properties – the latter reflects changes in population over time. This figure was discussed and agreed with AWS prior to the assessment.

Table 6-4: Demand Management Options for Existing Homes

Demand Option	Description	Potential Saving	Measures Included
1	Metering only	14.5 l/h/d	Meters in all non metered properties, no retrofitting
2	Low intervention retrofit only	21.7 l/h/d	No metering, installation of low use fixtures and fittings in all existing properties
3	High Intervention retrofit only	27 l/h/d	No metering, installation of low flush toilets and low flow shower head
4	Metering and low intervention retrofit	36.3 l/h/d	Meters in all non metered properties, installation of low use fixtures and fittings in all existing properties
5	Metering and high intervention retrofit	41.50 l/h/d	Meters in all non metered properties, installation of low flush toilets and low flow shower heads

Assessment Results

6.3.10 This section of the planning report summarises the key findings and the key results of the water neutrality assessment.

East Cambridgeshire

6.3.11 The proportion of unmetered houses in the Anglian region is approximately 40%, so assuming 35,500 existing properties in East Cambridgeshire; approximately 14,200 will not have a meter. Using an occupancy rate of 2.3 (for existing properties), introducing meters could lead to a potential saving of 0.47 Ml/d. Calculations of demand from new housing presented in this WCS suggest that, even if new homes are built to CSH Level 5 or 6 (80 l/h/d), demand for water from new properties (and employment) would be 1.9 Ml/d.

6.3.12 This shows that the necessary savings to achieve neutrality in East Cambridgeshire as a result of 100% metering of existing properties cannot be achieved. This is a consequence of the already high levels of water metering in the Anglian Region (assumed to be around 60%) and the significant levels of housing which are proposed for the district. Therefore a wider programme of measures to improve water efficiency may be required for both homeowners and businesses within East Cambridgeshire in order to meet the extra demand from new development. The key points are:

- neutrality can only be achieved for the low and medium growth scenarios – even with 100% of existing homes being retrofitted at a high intervention level, all unmetered homes being installed with a meter and all new homes meeting CSH Level 5/6, it will not be possible to achieve neutrality if the high growth target occurs;
- for the low housing scenario, in order to achieve neutrality, water use in new houses must achieve better than the Building Regulations minimum of 125 l/h/d;
- for the low scenario, assuming the 95 l/h/d target[58] is met for all new homes, it is theoretically possible to achieve neutrality; but only by undertaking a high level of intervention in all existing homes for retrofitting e.g. installing low flow shower heads and low flush toilets,

[58] EA target for water neutrality – see Thames Gateway Water Neutrality Study

- for the medium scenario, neutrality can only be achieved if new homes meet 95 l/h/d, all existing unmetered homes are installed with a meter, and all existing properties are retrofitted with either low flush toilets & showers or water efficient fixtures and fittings.

Table 6-5: Water Neutrality Achievability Assessment – East Cambs District

(a) – Housing Scenario 1 – low scenario

New homes & employment demand Projections	New demand (Ml/d)	Demand Management Option				
		1	2	3	4	5
Projection 1	3.11	-2.64	-1.34	-0.91	-0.86	-0.43
Projection 2	2.78	-2.31	-1.01	-0.58	-0.53	-0.10
Projection 3	2.19	-1.72	-0.42	0.01	0.06	0.49
Projection 4	1.90	-1.43	-0.13	0.30	0.35	0.78
Projection 5	2.04	-1.57	-0.27	0.16	0.21	0.64

(b) - Housing Scenario 2 – medium scenario

New homes & employment demand Projections	New demand (Ml/d)	Demand Management Option				
		1	2	3	4	5
Projection 1	3.73	-3.26	-1.96	-1.53	-1.48	-1.05
Projection 2	3.32	-2.85	-1.55	-1.12	-1.07	-0.64
Projection 3	2.61	-2.14	-0.84	-0.41	-0.36	0.07
Projection 4	2.25	-1.78	-0.48	-0.05	0.00	0.43
Projection 5	2.45	-1.98	-0.68	-0.25	-0.20	0.23

(c) - Housing Scenario 3 – high scenario

New homes & employment demand Projections	New demand (Ml/d)	Demand Management Option				
		1	2	3	4	5
Projection 1	5.21	-4.74	-3.44	-3.01	-2.96	-2.53
Projection 2	4.63	-4.16	-2.86	-2.43	-2.38	-1.95
Projection 3	3.60	-3.13	-1.83	-1.40	-1.35	-0.92
Projection 4	3.08	-2.61	-1.31	-0.88	-0.83	-0.40
Projection 5	3.25	-2.78	-1.48	-1.05	-1.00	-0.57

Fenland

6.3.13 The proportion of unmetered houses in the Anglian region is approximately 40%, so assuming 41,800 existing properties in Fenland; approximately 16,720 will not have a meter. Using an occupancy rate of 2.3, introducing meters could lead to a potential saving of 0.56 Ml/d. Calculations of demand from new housing presented in this WCS suggest that, even if new homes are built to CSH Level 5 or 6 (80l/h/d), demand for water from new properties (and employment) would be 2.09 Ml/d.

6.3.14 This shows that the necessary savings to achieve neutrality in Fenland as a result of 100% metering of existing properties cannot be achieved. This is a consequence of the already high levels of water metering in the Anglian Region (assumed to be around 60%) and the significant levels of housing which are proposed for the district. Therefore a wider programme of measures to improve water efficiency may be required for both homeowners within Fenland in order to meet the extra demand from new development. The key points are:

- neutrality can, in theory, be achieved for all housing growth scenarios – for the high growth scenario, it would require all new homes to meet CSH Level 5/6 and for all existing

properties to have a high level of retrofitting intervention and all unmetered properties to be fitted with a water meter;

- it is possible for neutrality to be achieved, if new homes are built to Building Regulations requirements of 125 l/h/d; but only for the low growth scenario, and only by undertaking a high level of intervention in all existing homes for retrofitting e.g. installing low flow shower heads and low flush toilets and installing meters in all unmetered properties;
- for the low scenario, assuming the 95 l/h/d target[59] is met for all new homes, it is theoretically possible to achieve neutrality without the need to install meters in unmetered homes and only installing low intervention retrofitted devices in all existing properties.

Table 6-6: Water Neutrality Achievability Assessment – Fenland District

(a) – Housing Scenario 1 – low scenario

New homes & employment demand Projections	New demand (Ml/d)	Demand Management Option				
		1	2	3	4	5
Projection 1	3.55	-2.99	-1.46	-0.95	-0.90	-0.40
Projection 2	3.15	-2.59	-1.06	-0.55	-0.50	0.00
Projection 3	2.44	-1.88	-0.35	0.16	0.21	0.71
Projection 4	2.09	-1.53	0.00	0.51	0.56	1.06
Projection 5	2.30	-1.74	-0.21	0.30	0.35	0.85

(b) – Housing Scenario 2 – medium scenario

New homes & employment demand Projections	New demand (Ml/d)	Demand Management Option				
		1	2	3	4	5
Projection 1	3.81	-3.25	-1.72	-1.21	-1.16	-0.66
Projection 2	3.38	-2.82	-1.29	-0.78	-0.73	-0.23
Projection 3	2.61	-2.05	-0.52	-0.01	0.04	0.54
Projection 4	2.23	-1.67	-0.14	0.37	0.42	0.92
Projection 5	2.45	-1.89	-0.36	0.15	0.20	0.70

(c) – Housing Scenario 3 – high scenario

New homes & employment demand Projections	New demand (Ml/d)	Demand Management Option				
		1	2	3	4	5
Projection 1	4.82	-4.26	-2.73	-2.22	-2.17	-1.67
Projection 2	4.27	-3.71	-2.18	-1.67	-1.62	-1.12
Projection 3	3.29	-2.73	-1.20	-0.69	-0.64	-0.14
Projection 4	2.80	-2.24	-0.71	-0.20	-0.15	0.35
Projection 5	3.05	-2.49	-0.96	-0.45	-0.40	0.10

Water Neutrality Summary

6.3.15 The key points of the initial water neutrality assessment are:

- East Cambridgeshire can only achieve water neutrality aspirations if growth is restricted to levels within the low and medium scenarios. Fenland District can theoretically attain neutrality for all growth scenarios;
- in order to attain neutrality, both districts would be required to facilitate a programme of retrofitting in all existing homes in their district. For East Cambridgeshire, this would require

[59] EA target for water neutrality – see Thames Gateway Water Neutrality Study

universal metering of all existing homes and a significant programme of installing high intervention water efficiency devices such as dual flush toilets. For Fenland, a lower intervention would be feasible (low flow taps etc), as long as all new homes are restricted to 95 l/h/d water consumption; and

- policy would need to be set for all new homes in East Cambridgeshire to achieve better than the Building Regulations requirement of 125 l/h/d water consumption for new homes (closer to 95 l/h/d) in order to attain neutrality. Fenland could achieve neutrality at 125 l/h/d for new development, but would require universal metering and high intervention of retrofitting water efficient devices in existing homes.

6.3.16 It is recommended that a detailed pathway to neutrality is developed in the detailed WCS to determine the exact requirements for achieving neutrality in terms of policy, developer contributions, funding implications, community involvement and what is technically required from new development. This will include:

- a list of recommended policies that are required to deliver water neutrality;
- the technical requirements of new development and requirement of retrofitting measures in order to deliver the policies;
- high level estimates of costs to deliver water efficiency savings in new homes and existing homes;
- options for funding water efficiency programmes as a solution to growth; and
- the evidence base behind the suggested policies, and where the evidence base does not exist, what is required to procure it.

7 Flood Risk Management

7.1.1 It is important for the WCS to include an assessment of the constraints of flood risk, and the infrastructure required to mitigate it as a result of proposed growth. Both flood risk to, and flood risk from development needs to be considered in the overall assessment of growth as proposed in of the each authorities LDFs.

7.2 Flood Risk to development

7.2.1 A level 1 SFRA has been undertaken for the districts of East Cambridgeshire and Fenland in parallel to the Outline WCS[60]. The SFRA considers and maps the sources of flood risk to potential development throughout the authority areas according to the requirements of PPS25.

Key Flood Risk issues

7.2.2 The following key flood risk issues have been taken from the final draft SFRAs.

- The study area has significant areas which lie within the fluvial and/or tidal flood zone, with only the majority of settlements situated on 'islands' of high ground above the floodplain.
- The study area is mostly pump drained, and is reliant on flood defences to minimise flood risk to the existing development both from fluvial and tidal flood risk and surface water drainage channels. Due to the historical drainage of the area, the majority of the land lies below the levels of the channels, creating a significant residual risk if defences were to be breached or overtopped.
- Surface water flooding from the managed drainage system is a key flood risk that needs to be considered as capacity of this pumped system is finite.

7.2.3 The final draft SFRAs have been used in this Outline WCS to inform the assessment of flood risk to potential development locations at a strategic level; this assessment is included within Section 8 of this report where the water environment and water infrastructure constraints for each key growth location are summarised.

7.3 Flood Risk from Development – Surface Water Management

7.3.1 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 of 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.

7.3.2 Surface water management is a key consideration in the study area due to the fact that the majority of land put forward for development will be within areas where surface water runoff is managed via complex pumping systems to ensure that surface water flooding does not inundate

[60] A Level 2 SFRA covering Wisbech was also completed prior to the commencement of this study; however, the study used incomplete LiDAR data and required revision in key areas and has not been used in this study. An update to the Level 2 SFRA was being commissioned at completion of this Outline Study.

generally low lying urban areas and high grade agricultural land. New development must consider the impact of further urbanisation on the existing pumped system, and discharge of surface water must be mitigated within the pumped limitations of the drained system.

7.3.3 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 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.

7.3.4 It is therefore essential that surface water drainage is managed separately from wastewater, both to reduce impact on the existing combined system and to meet the requirements of national and regional policy. It is also important to ensure that SuDS are as multifunctional and incorporated as part of the overall provision of green infrastructure as far as possible. SuDS can provide opportunity for access, biodiversity enhancement, recreation, and food production.

7.3.5 A Defra funded SWMP is to be produced for the entire county of Cambridgeshire starting in October 2010. The initial phases of the SWMP will indentify 'wet spots' where more detailed SWMPs will be produced as funding becomes available. Until the SWMP is completed, this WCS should consider site specific limitations on proposed development sites.

7.3.6 At the present point in the planning process, it has not been possible to determine outline requirements of the SuDS features that could be possible at each of the growth areas. This is because specific site details are not known and hence it is not possible to consider potential sizes of surface water attenuation features or specific topographic/geological constraints at each site. However, a strategic scale SuDS suitability assessment has been undertaken for growth towns.

SuDS suitability

7.3.7 In order to give an indication of SuDS suitability for the Outline WCS, the likely capacity for infiltration type SuDS for the growth towns has been considered. A high level assessment has therefore been made based on the geological conditions of the main growth areas as a whole. In summary the assessment has been made on the following criteria:

- the presence of an aquifer underneath the site;
- the rate at which water is able to pass through the soil and underlying geology (referred to as its permeability); and
- the requirement to protect groundwater used as potable supply underneath sites from the effects of pollution as a result of different types of above ground development.

7.3.8 Due to the reliance of the southern area of the study area on abstractions from groundwater, consideration of the protection of groundwater from pollution as a result of above ground development is a key consideration and hence the SuDS suitability assessment has used information on 'Source Protections Zones' and areas of 'Groundwater Vulnerability'.

7.3.9 The final draft SFRAs have been used in this Outline WCS to inform the assessment of SuDS type and this assessment is included within Section 8 of this report where the water environment and water infrastructure constraints for each key growth location are summarised.

7.3.10 The following information on geology and groundwater vulnerability in each district has been used in the assessments and has been taken from the draft SFRAs. The site suitability mapping is shown below in Figures 7-1 and 7-2, as taken from the draft SFRAs.

East Cambridgeshire

Solid Geology

7.3.11 Within the Council boundary the solid geology comprises the Upware Limestone Member, which in turn is overlain by the West Walton & Ampthill Clay Formations, Kimmeridge Clay Formation, Woburn Sands Formation (Lower Greensand), Gault Formation (clay) and the Chalk.

7.3.12 The Chalk is present at outcrop over much of the southeast of the area. BGS sheet 188 indicates that the Chalk is around 150 m thick in the southeast of the area, thinning in a northwest direction owing to the dip of the Chalk. At Burwell, the Chalk is only around 25 m thick and terminates in a southwest - northeast trending outcrop boundary that passes near Soham.

7.3.13 The majority of the remaining area is underlain by clays of the Gault Formation (central), Kimmeridge Clay Formation (north and northwest) and West Walton and Ampthill Clay Formation (northwest border). However, there are also minor outcrop areas of Woburn Sands Formation (near Ely, Stretham and Haddenham) and Upware Limestone Member. According to BGS sheet 188, the Woburn Sands are around 10 m thick in the Haddenham area.

Drift Geology

7.3.14 There are significant drift deposits within the East Cambridgeshire District Council area, which overlie the solid geology. At lower elevations within the northwest, north and central parts of the Council area there are substantial peat deposits. Issues regarding peat shrinkage / wastage are described in greater detail below, which have implications for surface water flood depths. At higher elevations and particularly in the southeast there are deposits of glacial till. There also exist sand and gravel, alluvium (clay, silt, sand & gravel) lacustrine (peat & mud) and head (clay, silt, sand & gravel) deposits within the Council area.

Hydrogeology

7.3.15 The ability of the geology types in East Cambridgeshire to transmit or hold water (i.e. as an aquifer) is described in Table 7-1.

Table 7-1: Geological Units in the East Cambs and Hydrogeological Significance

Type	Geological Unit	Hydrogeological Significance
Drift Geology	Peat	Variable (but probably an aquitard)
	Tidal Flats	Variable (but probably an aquitard)
	Alluvium	Variable
	Lacustrine Deposits (peat & mud)	Variable (but probably an aquitard)
	Till (diamicton)	Variable (but probably an aquitard)
	Head (clay, silt, sand & gravel)	Variable
	Sand & Gravel	Aquifer
Solid Geology	Chalk (Undifferentiated)	Principal Aquifer
	Woburn Sands	Principal Aquifer
	Upware Limestone Member	Secondary Aquifer
	Gault Formation	Aquiclude
	West Walton & Ampthill Clay Formations	Aquiclude
	Kimmeridge Clay Formation	Aquiclude

Fenland

Solid Geology

7.3.16 Within the Fenland area the solid geology comprises the Oxford Clay, which is in turn overlain by the West Walton Formation (mudstone and siltstone) and the West Walton and Ampthill Clay Formations (undifferentiated).

7.3.17 The BGS[61] geological cross section for the area suggests that the Oxford Clay at Whittlesey in the west of the district is approximately 30 m thick and dips to the east. Geological sheet 159 indicates that in the Wisbech area to the northeast of the district, the West Walton and Ampthill Clay Formations are approximately 30-40 m thick and underlain by around 50 m of Oxford Clay.

Drift Geology

7.3.18 The majority of the district is covered by drift deposits with the exception of a few exposed areas of solid geology on higher ground in the south. The majority of the lowlands are blanketed by tidal flat deposits (clay and silt) and / or peat. There also exist significant deposits of sand and gravel and till in the areas of Whittlesey, March, Doddington and Chatteris.

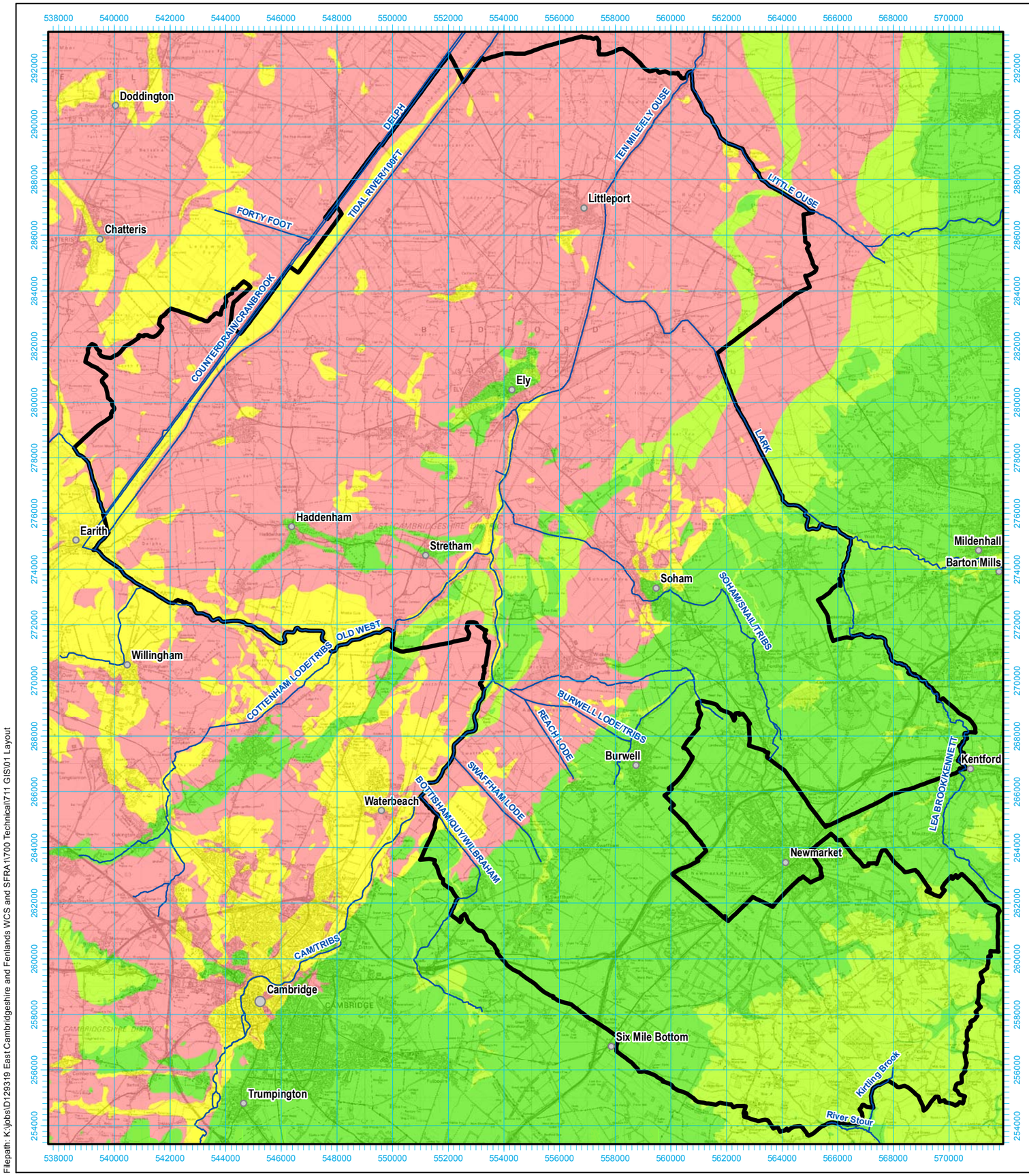
Hydrogeology

7.3.19 The ability of the geology types in Fenland to transmit or hold water (i.e. as an aquifer) is described in Table 7-2.

[61] British Geological Survey sheet 158

Table 7-2: Geological Units in Fenland and Hydrogeological Significance

Geology	Geological Unit	Hydrogeological Significance
Drift Geology	Tidal Flats	Variable (but probably an aquitard)
	Peat	Variable (but probably an aquitard)
	Till (diamicton)	Variable (but probably an aquitard)
	Head (clay, silt, sand & gravel)	Variable (but probably an aquifer)
	Sand & Gravel	Aquifer
Solid Geology	Oxford Clay Formation	Aquiclude
	West Walton & Ampthill Clay Formations	Aquiclude
	West Walton Formation (mudstone and Siltstone)	Aquiclude



THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED

Legend

- East Cambridgeshire Council
- Main River

Estimated Infiltration Potential*

- Solid (and Drift if present): Medium to high
- Drift: Low, Solid: Medium to high
- Drift: Medium to high, Solid: Low
- Solid (and Drift if present): Low

*NOTES
This map considers infiltration potential based on drift and solid geology descriptions only. Investigation is required to understand local geological and groundwater conditions as part of an FRA.

Drawing Status
FINAL

Job Title
EAST CAMBRIDGESHIRE AND FENLAND OUTLINE WCS

Drawing Title
ESTIMATED INFILTRATION POTENTIAL MAP

Scale at A3: 1:150,000

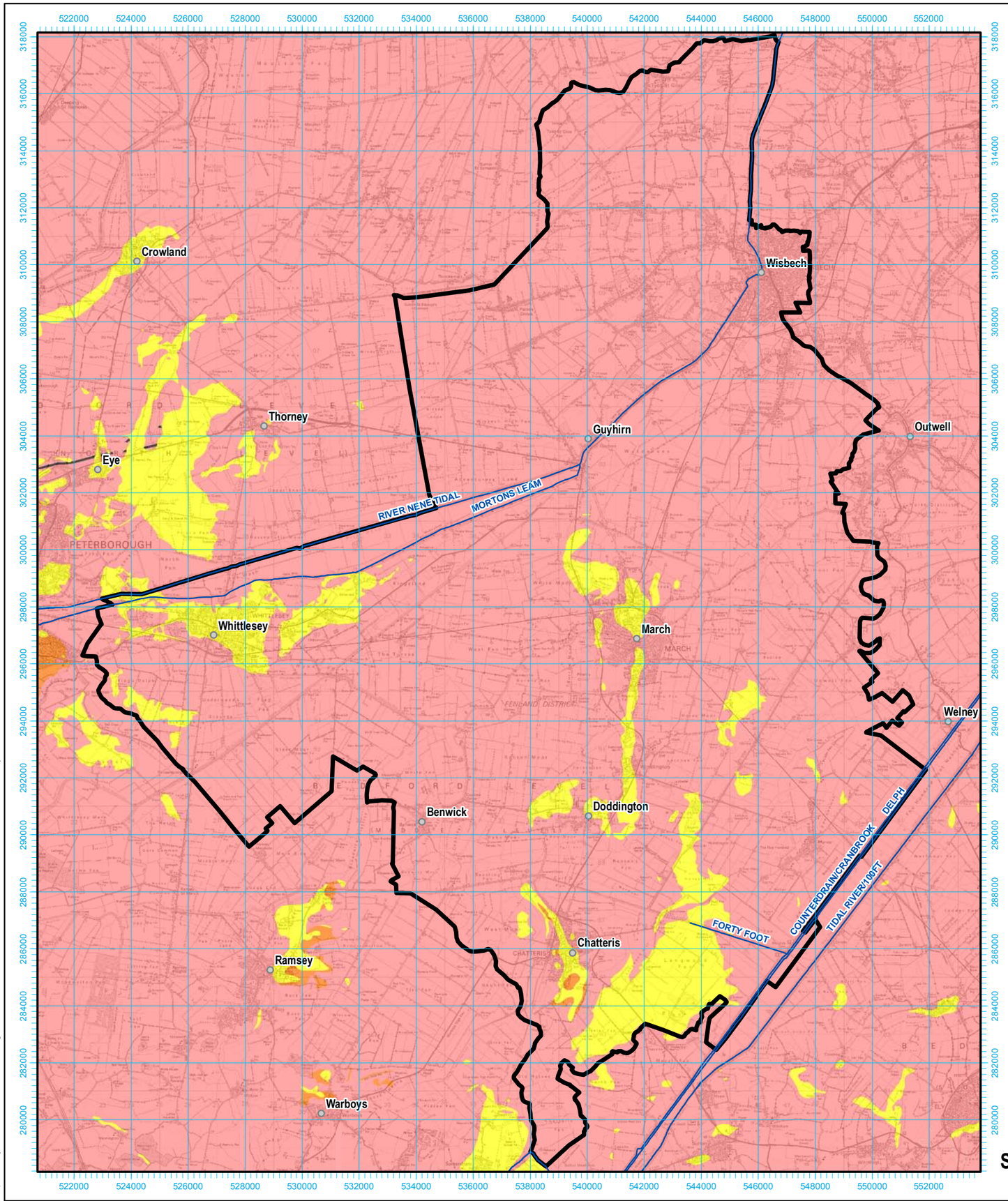
Drawn by	Date	Approved	Date
RAC	AUG 2010	SJC	AUG 2010

Scott Wilson
Scott House, Alencon Link,
Basingstoke, Hants, RG21 7PP
Telephone (01256) 310 200
www.scottwilson.com

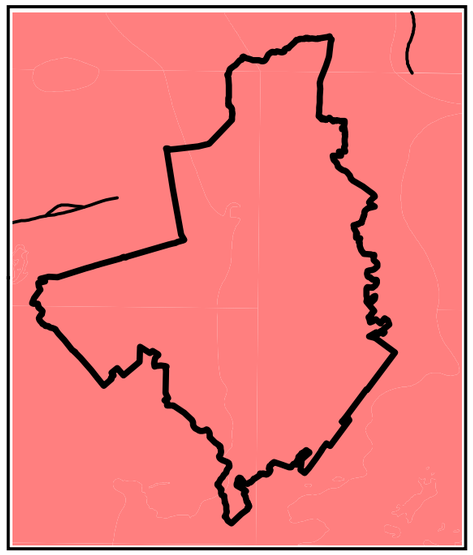
Base Map Details
Projection: Transvers Mercator
Scale Factor: 0.999601
Origin: 2° West, 49° North
Coordinates: 400000,-100000
Units: metres
Datum: OSGB 1936

FIGURE 7-1

Filepath: K:\jobs\D129319 East Cambridgeshire and Fenlands WCS and SFRA1\700 Technical\711 GIS\01 Layout



Solid & Drift Geology



Solid Geology

Base Map Details
Projection: Transvers Mercator
Scale Factor: 0.999601
Origin: 2° West, 49° North
Coordinates: 400000,-100000
Units: metres
Datum: OSGB 1936

THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED

Legend

- Fenland Council

Estimated Infiltration Potential*

- Expect high infiltration potential
- Expect medium infiltration potential
- Expect low infiltration potential

*NOTES
This map considers infiltration potential based on drift and solid geology descriptions only. Investigation is required to understand local geological and groundwater conditions as part of an FRA.

The solid Geology is considered to have a low infiltration potential. Therefore, the areas shown as having high or medium potential are representative of drift deposits only.

Drawing Status

FINAL

Job Title

EAST CAMBRIDGESHIRE AND FENLAND OUTLINE WSC

Drawing Title

ESTIMATED INFILTRATION POTENTIAL MAP

Scale at A3: 1:150,000

Drawn by	Date	Approved	Date
RAC	MAY 2010	SJC	MAY 2010

Scott Wilson
Scott House, Alencon Link,
Basingstoke, Hants, RG21 7PP
Telephone (01256) 310 200
www.scottwilson.com

FIGURE 7-2

Filepath: K:\jobs\D129319 East Cambridgeshire and Fenlands WCS and SFRA1\700 Technical\711 GIS\01 Layout

8 Growth Town Assessments

8.1 Introduction

8.1.1 The WCS report has identified constraints in terms of proposed growth within East Cambridgeshire and Fenland Districts in relation to the six key 'water cycle' areas:

- water resources;
- wastewater treatment;
- wastewater transmission;
- ecology;
- flood risk; and
- surface water management.

8.1.2 The resultant outcome was the formulation of a constraints matrix for each of the key development areas. The matrix has been designed so that the amount of subjective interpretation of the data is minimised, and hence the traffic lights allocated are based on factual and quantitative data where possible.

8.1.3 The most relevant and important constraints have been identified to aid in the assessment of development within East Cambridgeshire and Fenland Districts. For the purpose of the constraints matrices these were amalgamated and put into generic colour coded categories, as outlined in the following town assessments.

8.1.4 In relation to above colour coding, it is important to note that a colour coding of red does not necessarily mean that the proposed development cannot take place, merely that if development where to take place here greater, more significant, and potentially costly constraints would have to be overcome which would likely involve a higher level of infrastructure investment or greater strategic planning.

8.1.5 The constraints matrix and traffic light colour coding has been applied to each of the major settlements in the East Cambridgeshire and Fenland Districts where significant levels of growth are proposed, as described further in the subsequent sections.

8.2 Initial Phasing Recommendations

8.2.1 Due to the lack of detail on preferred development sites, it has not been possible to develop a likely overall Outline Strategy for provision of infrastructure within the study area. However, key constraints have been identified for each development town location, and hence initial recommendations on likely impact of these constraints on phasing of development has been provided, along with interim advice on how applications for development should proceed until the Detailed WCS is completed.

8.3 East Cambridgeshire

Isleham

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Isleham is located within AWS's Ely Planning Zone for water resources. This zone is forecast to have a surplus of available against target headroom until the last five years of the planning period. Solutions are proposed to this deficit, but the medium and higher growth scenarios towards the end of the plan period may require more stringent standards for water use in new homes when considered in combination with other development areas in the Ely planning zone	**Treatment -** The development can be accommodated within existing available headroom at WwTW and in wastewater network. **Transmission –** pump stations capacity will need to be reviewed when development sites are known	No ecological constraints were identified or development levels are considered sufficiently small that they are unlikely to materially increase impacts on European sites.	The site lies within FZ1 and hence flood risk is reasonably low. Flood Risk assessments should be carried on a site specific basis for proposed development once the precise locations have been established	The site has permeable underlying geology but there are areas of Groundwater Source Protection Zones 1, 2 and 3 in and around Isleham. The suitability for infiltration SuDS is therefore variable and will need to be assessed on a site-by-site basis; however, other surface attenuation techniques may still be viable.

Development Phasing and Interim planning Implications

8.3.1 If pursing the high growth strategy, limitations on numbers of new dwellings may be necessary towards the end of the planning period due to lack of available water resources towards 2031; however the Detailed WCS should identify potential solutions which may include the requirement for high levels of water efficiency in new homes and contributions towards achieving water neutrality across the district

8.3.2 The sewer network may be limited by pumping station capacity. Until the capacity is assessed in full in the detailed study, planning permission for development should not be granted until the developer has sought clarification from AWS that capacity is available to connect. It is recommended that the requirement to undertake pre-development enquiry into sewer capacity with AWS forms part of a section 106 planning condition to consent.

8.3.3 Any proposal for infiltration SuDS as part of development should be conditioned with a requirement to consult with the Environment Agency over suitability of runoff types due to the presence of SPZs. Site investigations may be required to inform the decisions on infiltration relating to ground contamination, and infiltration testing may be required as part of any SuDS approval. Advice should be sought from CCC as Lead Local Flood Authority under the Floods & Water Management Act and as the designated SuDS Approving Body under that Act.

Soham

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Soham is located within AWS's Ely Planning Zone for water resources. This zone is forecast to have a surplus of available against target headroom until the last five years of the planning period. Solutions are proposed to this deficit, but the medium and higher growth scenarios towards the end of the plan period may require more stringent standards for water use in new homes when considered in combination with other development areas in the Ely planning zone	**Treatment -** Capacity shortfall of between 1,391 and 2,139 m^3/day following the proposed growth. Additional flow will require a tighter consent which is not achievable within the limits of conventional treatment to meet WFD standards **but would be feasible under current EA less stringent targets**. Process capacity and targets to be investigated and agreed in Stage 2 of the WCS **Transmission -** Growth is greater than 10% upstream of several pumping stations and CSOs – modelling is required to determine where and when strategic upgrades to sewer capacity and pumping stations is required	No ecological constraints were identified as a result of abstraction or discharge	The site lies within FZ1, although there is an area of FZ2 and 3 to the west of the town, development should be sequentially placed away from the higher flood risk areas according to PPS25	The development area is over Groundwater Source Protection Zone 3 (therefore more suitable for infiltration SuDS) and has permeable underlying geology

Development Phasing and Interim planning Implications

8.3.4 If pursing the high growth strategy, limitations on numbers of new dwellings may be necessary towards the end of the planning period due to lack of available water resources towards 2031; however the detailed WCS should identify potential solutions which may include the requirement for high levels of water efficiency in new homes and contributions towards achieving water neutrality across the district

8.3.5 A revised flow consent with tighter water quality conditions is required at the WwTW and hence process upgrades may be required before all proposed development can be accommodated. It is likely that early phasing of development will therefore need to be minimised until the Detailed WCS has determined the timeframe required to complete any necessary upgrades.

8.3.6 The sewer network may be limited by potential impact on CSO discharges. Until the capacity is assessed in full in the detailed study, planning permission for development should not be granted until the developer has sought clarification from AWS that capacity is available to connect. It is recommended that the requirement to undertake pre-development enquiry into sewer capacity with AWS forms part of a section 106 planning condition to consent.

8.3.7 If development sites are located in Flood Zones 2 or 3, a Level 2 SFRA will be required to show that these sites can meet with Exception Test under PPS25. Developers promoting development in flood zones 2 or 3 prior to a Level 2 SFRA being completed should undertake a Level 2 (and possibly) Level 3 site specific FRA to demonstrate that the site meets with PPS25 including the Exception Test where necessary.

Newmarket Fringe

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
The Newmarket Fringe is located largely within AWS's Newmarket Planning Zone for Water Resources. This zone has forecasted supply surplus for the planning period, hence sufficient resources are available. Medium and higher growth levels will require more stringent water use requirements in order to maintain this position.	**Treatment -** The development can be accommodated within existing available headroom at WwTW (including for growth outside the study area) **Transmission –** growth is of a scale such that it can largely be accommodated within existing infrastructure	No ecological constraints were identified as a result of abstraction or discharge	The site lies within FZ1 and hence flood risk is reasonably low. Flood Risk assessments should be carried on a site specific basis for proposed development once the precise locations have been established	The site has permeable underlying geology but there are areas of Groundwater Source Protection Zones 1, 2 and 3 in and around Newmarket. The suitability for infiltration SuDS is therefore variable and will need to be assessed on a site-by-site basis; however, other surface attenuation techniques may still be viable.

Development Phasing and Interim planning Implications

8.3.8 Development phasing is unlikely to be limited; however, any proposal for infiltration SuDS as part of development should be conditioned with a requirement to consult with the Environment Agency over suitability of runoff types due to the presence of SPZs. Site investigations may be required to inform the decisions on infiltration relating to ground contamination, and infiltration testing may be required as part of any SuDS approval. Advice should be sought from CCC as Lead Local Flood Authority under the Floods & Water Management Act and as the designated SuDS Approving Body under that Act.

Burwell

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Burwell is located within AWS's Newmarket Planning Zone for Water Resources. This zone has forecasted supply surplus for the planning period, hence sufficient resources are available. Medium and higher growth levels will require more stringent water use requirements in order to maintain this position.	**Treatment -** Capacity shortfall at the WwTW of between 388 to 401 m^3/day following the proposed growth. Downstream WFD for Phosphate are not achievable within the limits of conventional treatmen and this is also the case when considering less stringent EA current targets - growth would also need to be assessed for impact on HD sites due to an increase in consented flow above that which was assessed in the HD RoC process **Transmission –** Growth is relatively small, but existing sewer flooding or capacity problems in the area will make use of existing infrastructure unlikely for all growth. Modelling is therefore required to determine where and when new trunk sewers may be required	Site is hydraulically linked to Wicken Fen Ramsar site, Cams Washes SSSI and New River/Monks Lode and surface water runoff as well as treated wastewater treatment may impact upon the sites if not mitigated.	The east of the town lies within FZ1, although there is an area of FZ2 and 3 to the west of the town, development should be sequentially placed away from the higher flood risk areas according to PPS25	The site is Groundwater Source Protection Zone 3 (therefore more suitable for infiltration SuDS) and has permeable underlying geology

Development Phasing and Interim planning Implications

8.3.9 Alternative options for wastewater treatment at this location are required to meet European legislative requirements and protect downstream ecological sites. Until the Detailed WCS has determined the timeframe required to provide a new solution or complete any necessary upgrades, development phasing should be limited until the start of the new water company asset planning ground in 2015. Individual developments coming forward before 2015 should be referred to AWS for confirmation of capacity via a pre-development enquiry as small numbers of housing or employment could be accommodated with water efficiency measures and separated foul and surface water drainage.

8.3.10 The sewer network may be limited by capacity owing to existing sewer flooding issues. Until the capacity is assessed in full in the detailed study, planning permission for development should not be granted until the developer has sought clarification from AWS that capacity is available to connect. It is recommended that the requirement to undertake pre-development enquiry into sewer capacity with AWS forms part of a section 106 planning condition to consent.

8.3.11 If development sites are located in Flood Zones 2 or 3, a Level 2 SFRA will be required to show that these sites can meet with Exception Test under PPS25. Developers promoting development in flood zones 2 or 3 prior to a Level 2 SFRA being completed should undertake a Level 2 (and possibly) Level 3 site specific FRA to demonstrate that the site meets with PPS25 including the Exception Test where necessary.

8.3.12 Proposals for runoff management from sites should require mitigation to ensure downstream water quality effects do not impact on ecological sites.

Bottisham

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water & SuDS Potential Management
Bottisham is located within AWS's Newmarket Planning Zone for Water Resources. This zone has forecasted supply surplus for the planning period, hence sufficient resources are available. Medium and higher growth levels will require more stringent water use requirements in order to maintain this position.	**Treatment -** Capacity shortfall of between 269 to 281 m^3/day following the proposed growth. Downstream WFD water quality targets for Ammonia and Phosphate are not achievable within the limits of an alternative solution is therefore required in the detailed WCS for growth in these locations; however, with lower EA targets a solution within conventional treatment is possible. Process capacity and targets to be investigated and agreed in Stage 2 of the WCS **Transmission -** pumping stations capacity will need to be reviewed when development sites are known	The Cam washes has the potential be affected by the increase in flow likely to be required (above consent conditions) at Bottisham and needs to be considered at Stage 2.	The site lies within FZ1 and hence flood risk is reasonably low. Flood Risk assessments should be carried on a site specific basis for proposed development once the precise locations have been established	The site is Groundwater Source Protection Zone 3 (therefore more suitable for infiltration SuDS) and has permeable underlying geology

Development Phasing and Interim planning Implications

8.3.13 If all the planned development goes ahead, alternative options for wastewater treatment at this location are required to meet European legislative requirements and protect downstream ecological sites. Until the Detailed WCS has determined the timeframe required to provide a new solution or complete any necessary upgrades, development phasing should be limited so that only 60% of planned growth goes ahead before the start of the new water company asset planning ground in 2015.

8.3.14 The sewer network may be limited by pumping station capacity. Until the capacity is assessed in full in the detailed study, planning permission for development should not be granted until the developer has sought clarification from AWS that capacity is available to connect. It is recommended that the requirement to undertake pre-development enquiry into sewer capacity with AWS forms part of a section 106 planning condition to consent.

Stretham

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Stretham is located within AWS's Ely Planning Zone for water resources. This zone is forecast to have a surplus of available against target headroom until the last five years of the planning period. Solutions are proposed to this deficit, but the medium and higher growth scenarios towards the end of the plan period may require more stringent standards for water use in new homes when considered in combination with other development areas in the Ely planning zone	**Treatment -** The development can be accommodated within existing available headroom at WwTW **Transmission –** growth is of a scale such that it can largely be accommodated within existing infrastructure	No ecological constraints were identified or development levels are considered sufficiently small that they are unlikely to materially increase impacts on European sites.	The site lies within FZ1 and hence flood risk is reasonably low. Flood Risk assessments should be carried on a site specific basis for proposed development once the precise locations have been established	Source Protection Zone 3 (therefore more suitable for infiltration SuDS) but has variably permeable underlying geology. The suitability for infiltration SuDS is therefore variable and will need to be assessed on a site-by-site basis; however, other surface attenuation techniques may still be viable.

Development Phasing and Interim planning Implications

8.3.15 If pursing the high growth strategy, limitations on numbers of new dwellings may be necessary towards the end of the planning period due to lack of available water resources towards 2031; however the detailed WCS should identify potential solutions which may include the requirement for high levels of water efficiency in new homes and contributions towards achieving water neutrality across the district

8.3.16 Surface water discharge from development will largely rely on surface water attenuation. Due to the limitations on capacity of the managed surface water systems, a condition on all significant development (not captured by PPPS25) should be applied that runoff rates and SuDS types are agreed with the relevant drainage authority prior to permission being granted.

Haddenham

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Haddenham is located within AWS's Ely Planning Zone for water resources. This zone is forecast to have a surplus of available against target headroom until the last five years of the planning period. Solutions are proposed to this deficit, but the medium and higher growth scenarios towards the end of the plan period may require more stringent standards for water use in new homes when considered in combination with other development areas in the Ely planning zone	**Treatment -** Capacity shortfall of between 144 and 165 m^3/day following the proposed growth. Additional flow will require a tighter consent (including 1mg/l for P) but is achievable within the limits of conventional treatment and WFD standards. Process capacity to be investigated in Stage 2 of the WCS **Transmission -** Growth is relatively small, but existing sewer flooding or capacity problems in the area will make use of existing infrastructure unlikely for all growth. Modelling is therefore required to determine where and when new trunk sewers may be required	Possibility of 'in combination' effect on the Ouse Washes SAC, SPA & Ramsar site	The site lies within FZ1 and hence flood risk is reasonably low. Flood Risk assessments should be carried on a site specific basis for proposed development once the precise locations have been established	The site is Groundwater Source Protection Zone 3 (therefore more suitable for infiltration SuDS) and has permeable underlying geology

Development Phasing and Interim planning Implications

8.3.17 If pursing the high growth strategy, limitations on numbers of new dwellings may be necessary towards the end of the planning period due to lack of available water resources towards 2031; however the detailed WCS should identify potential solutions which may include the requirement for high levels of water efficiency in new homes and contributions towards achieving water neutrality across the district.

8.3.18 A revised flow consent with tighter water quality conditions is required at the WwTW to protect downstream water quality and ecology and hence process upgrades may be required before all proposed development can be accommodated. It is likely that early phasing of development will therefore need to be minimised until the Detailed WCS has determined the timeframe required to complete any necessary upgrades.

8.3.19 The sewer network may be limited by capacity owing to historical flooding issues. Until the capacity is assessed in full in the detailed study, planning permission for development should not be granted until the developer has sought clarification from AWS that capacity is available to connect. It is recommended that the requirement to undertake pre-development enquiry into sewer capacity with AWS forms part of a section 106 planning condition to consent.

Wilburton

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Wilburton is located within AWS's Ely Planning Zone for water resources. This zone is forecast to have a surplus of available against target headroom until the last five years of the planning period. Solutions are proposed to this deficit, but the medium and higher growth scenarios towards the end of the plan period may require more stringent standards for water use in new homes when considered in combination with other development areas in the Ely planning zone	**Treatment -** The development can be accommodated within existing available headroom at WwTW **Transmission –** growth is of a scale such that it can largely be accommodated within existing infrastructure	No ecological constraints were identified or development levels are considered sufficiently small that they are unlikely to materially increase impacts on European sites.	The site lies within FZ1 and hence flood risk is reasonably low. Flood Risk assessments should be carried on a site specific basis for proposed development once the precise locations have been established	The site is Groundwater Source Protection Zone 3 (therefore more suitable for infiltration SuDS) but has variably permeable underlying geology. The suitability for infiltration SuDS is therefore variable and will need to be assessed on a site-by-site basis; however, other surface attenuation techniques may still be viable.

Development Phasing and Interim planning Implications

8.3.20 If pursing the high growth strategy, limitations on numbers of new dwellings may be necessary towards the end of the planning period due to lack of available water resources towards 2031; however the detailed WCS should identify potential solutions which may include the requirement for high levels of water efficiency in new homes and contributions towards achieving water neutrality across the district.

8.3.21 Surface water discharge from development will largely rely on surface water attenuation. Due to the limitations on capacity of the managed surface water systems, a condition on all significant development (not captured by PPPS25) should be applied that runoff rates and SuDS types are agreed with the relevant drainage authority prior to permission being granted.

Ely

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Ely is the principal town within AWS's Ely Planning Zone for water resources. This zone is forecast to have a surplus of available against target headroom until the last five years of the planning period. Solutions are proposed to this deficit, but the medium and higher growth scenarios towards the end of the plan period may require more stringent standards for water use in new homes when considered in combination with other development areas in the Ely planning zone	**Treatment -** There are two WwTW within Ely (Ely New and Ely Old). Ely Old has spare DWF capacity of 2,809 m^3/day, but Ely New has a capacity deficit of -1,404 m^3/day for Scenario 1, -1,458 for scenario 2 and -2,147 m^3/day for Scenario 3. However, as the proposed growth locations within Ely are not known, it cannot be determined at this point which of the two Ely works would receive the additional flows, but capacity limits should be considered when selecting development locations. **Transmission -** Growth is greater than 10% upstream of several pumping stations and CSOs – modelling is required to determine where and when strategic upgrades to sewer capacity and pumping stations is required	No ecological constraints were identified as a result of abstraction or discharge	The majority of the town lies within FZ1, although there is an area of FZ2 and 3 to the east of the town, development should be sequentially placed away from the higher flood risk areas according to PPS25	The site is Groundwater Source Protection Zone 3 (therefore more suitable for infiltration SuDS) and has permeable underlying geology

Development Phasing and Interim planning Implications

8.3.22 If pursing the high growth strategy, limitations on numbers of new dwellings may be necessary towards the end of the planning period due to lack of available water resources towards 2031; however the detailed WCS should identify potential solutions which may include the requirement for high levels of water efficiency in new homes and contributions towards achieving water neutrality across the district.

8.3.23 The sewer network may be limited by potential impact on CSO discharges and pumping station capacity; strategic new infrastructure is likely to be required for larger Greenfield sites. Until the capacity is assessed in full in the detailed study, planning permission for development should not be granted until the developer has sought clarification from AWS that capacity is available to connect. It is recommended that the requirement to undertake pre-development enquiry into sewer capacity with AWS forms part of a section 106 planning condition to consent.

8.3.24 If development sites are located in Flood Zones 2 or 3, a Level 2 SFRA will be required to show that these sites can meet with Exception Test under PPS25. Developers promoting development in Flood Zones 2 or 3 prior to a Level 2 SFRA being completed should undertake a Level 2 (and possibly) Level 3 site specific FRA to demonstrate that the site meets with PPS25 including the Exception Test where necessary.

Witchford

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Witchford is located within AWS's Ely Planning Zone for water resources. This zone is forecast to have a surplus of available against target headroom until the last five years of the planning period. Solutions are proposed to this deficit, but the medium and higher growth scenarios towards the end of the plan period may require more stringent standards for water use in new homes when considered in combination with other development areas in the Ely planning zone	**Treatment -** Capacity shortfall of between 223 and 240 m^3/day following the proposed growth. Additional flow will require a tighter consent but is achievable within the limits of conventional treatment and WFD standards. Process capacity to be investigated in Stage 2 of the WCS **Transmission –** growth is of a scale such that it can largely be accommodated within existing infrastructure	No ecological constraints were identified or development levels are considered sufficiently small that they are unlikely to materially increase impacts on European sites.	The majority of the town lies within FZ1, although there is an area of FZ2 and 3 to the east of the town, development should be sequentially placed away from the higher flood risk areas according to PPS25	The site is in Groundwater Source Protection Zone 3 but has underlying impermeable geology. New development will need to be connected to the closest surface watercourse and confirmation should be sought from the IDB as to the available capacity or preferred runoff rates.

Development Phasing and Interim planning Implications

8.3.25 If pursing the high growth strategy, limitations on numbers of new dwellings may be necessary towards the end of the planning period due to lack of available water resources towards 2031; however the detailed WCS should identify potential solutions which may include the requirement for high levels of water efficiency in new homes and contributions towards achieving water neutrality across the district.

8.3.26 A revised flow consent with tighter water quality conditions is required at the WwTW to protect downstream water quality and hence process upgrades may be required before all proposed development can be accommodated. It is likely that early phasing of development will therefore need to be minimised until the Detailed WCS has determined the timeframe required to complete any necessary upgrades.

8.3.27 If development sites are located in Flood Zones 2 or 3, a Level 2 SFRA will be required to show that these sites can meet with Exception Test under PPS25. Developers promoting development in flood zones 2 or 3 prior to a Level 2 SFRA being completed should undertake a Level 2 (and possibly) Level 3 site specific FRA to demonstrate that the site meets with PPS25 including the Exception Test where necessary.

8.3.28 Surface water discharge from development will largely rely on surface water attenuation. Due to the limitations on capacity of the managed surface water systems, a condition on all significant development (not captured by PPPS25) should be applied that runoff rates and SuDS types are agreed with the relevant drainage authority prior to permission being granted

Littleport

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Littleport is located within AWS's Ely Planning Zone for water resources. This zone is forecast to have a surplus of available against target headroom until the last five years of the planning period. Solutions are proposed to this deficit, but the medium and higher growth scenarios towards the end of the plan period may require more stringent standards for water use in new homes when considered in combination with other development areas in the Ely planning zone	**Treatment -** Capacity shortfall of between 1,268 and 1,289 m^3/day following the proposed growth. Additional flow will require a tighter consent but is achievable within the limits of conventional treatment and WFD standards. Process capacity to be investigated in Stage 2 of the WCS. **Transmission –** growth in the town is significant, and whilst some development can make use of existing infrastructure, new strategic mains will be required for the majority of growth	Slight risk of adverse effects during the winter as a result of increased flows from Littleport WwTW.	The majority of the town lies within FZ1, although there is an area of FZ2 and 3 to the north of the town, development should be sequentially placed away from the higher flood risk areas according to PPS25	The site is in Groundwater Source Protection Zone 3 but has underlying impermeable geology. New development will need to be connected to the closest surface watercourse and confirmation should be sought from the IDB as to the available capacity or preferred runoff rates.

Development Phasing and Interim planning Implications

8.3.29 If pursing the high growth strategy, limitations on numbers of new dwellings may be necessary towards the end of the planning period due to lack of available water resources towards 2031; however the detailed WCS should identify potential solutions which may include the requirement for high levels of water efficiency in new homes and contributions towards achieving water neutrality across the district.

8.3.30 A revised flow consent with tighter water quality conditions is required at the WwTW to protect downstream water quality and ecology and hence process upgrades may be required before all proposed development can be accommodated. It is likely that early phasing of development will therefore need to be minimised until the Detailed WCS has determined the timeframe required to complete any necessary upgrades.

8.3.31 The sewer network is unlikely to have sufficient capacity to accept all growth owing to the size of proposed development relative to the existing urban area; strategic new infrastructure is likely to be required for larger Greenfield sites. Until the capacity is assessed in full in the detailed study, planning permission for development should not be granted until the developer has sought clarification from AWS that capacity is available to connect. It is recommended that the requirement to undertake pre-development enquiry into sewer capacity with AWS forms part of a section 106 planning condition to consent.

8.3.32 If development sites are located in Flood Zones 2 or 3, a Level 2 SFRA will be required to show that these sites can meet with Exception Test under PPS25. Developers promoting development in flood zones 2 or 3 prior to a Level 2 SFRA being completed should undertake a Level 2 (and possibly) Level 3 site specific FRA to demonstrate that the site meets with PPS25 including the Exception Test where necessary.

8.3.33 Surface water discharge from development will largely rely on surface water attenuation. Due to the limitations on capacity of the managed surface water systems, a condition on all significant development (not captured by PPPS25) should be applied that runoff rates and SuDS types are agreed with the relevant drainage authority prior to permission being granted.

Little Downham

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Little Downham is located within AWS's Ely Planning Zone for water resources. This zone is forecast to have a surplus of available against target headroom until the last five years of the planning period. Solutions are proposed to this deficit, but the medium and higher growth scenarios towards the end of the plan period may require more stringent standards for water use in new homes when considered in combination with other development areas in the Ely planning zone	**Treatment -** The development can be accommodated within existing available headroom at WwTW **Transmission –** growth is of a scale such that it can largely be accommodated within existing infrastructure	No ecological constraints were identified or development levels are considered sufficiently small that they are unlikely to materially increase impacts on European sites.	The site lies within FZ1 and hence flood risk is reasonably low. Flood Risk assessments should be carried on a site specific basis for proposed development once the precise locations have been established	The site is in Groundwater Source Protection Zone 1 and has underlying impermeable geology. New development will need to be connected to the closest surface watercourse and confirmation should be sought from the IDB as to the available capacity or preferred runoff rates.

Development Phasing and Interim planning Implications

8.3.34 If pursing the high growth strategy, limitations on numbers of new dwellings may be necessary towards the end of the planning period due to lack of available water resources towards 2031; however the detailed WCS should identify potential solutions which may include the requirement for high levels of water efficiency in new homes and contributions towards achieving water neutrality across the district.

8.3.35 Surface water discharge from development will largely rely on surface water attenuation. Due to the limitations on capacity of the managed surface water systems, a condition on all significant development (not captured by PPPS25) should be applied that runoff rates and SuDS types are agreed with the relevant drainage authority prior to permission being granted.

Mepal

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Mepal is located within AWS's March Planning Zone for Water Resources. This zone has forecasted supply surplus for the planning period, hence sufficient resources are available. Medium and higher growth levels will require more stringent water use requirements in order to maintain this position.	**Treatment -** The development can be accommodated within existing available headroom at WwTW **Transmission –** growth is of a scale such that it can largely be accommodated within existing infrastructure	No ecological constraints were identified or development levels are considered sufficiently small that they are unlikely to materially increase impacts on European sites.	The majority of the town lies within FZ1, although there is an area of FZ2 and 3 to the northwest of the town, development should be sequentially placed away from the higher flood risk areas according to PPS25.	The site is in Groundwater Source Protection Zone 3 but has underlying impermeable geology. New development will need to be connected to the closest surface watercourse and confirmation should be sought from the IDB as to the available capacity or preferred runoff rates.

Development Phasing and Interim planning Implications

8.3.36 If development sites are located in Flood Zones 2 or 3, a Level 2 SFRA will be required to show that these sites can meet with Exception Test under PPS25. Developers promoting development in flood zones 2 or 3 prior to a Level 2 SFRA being completed should undertake a Level 2 (and possibly) Level 3 site specific FRA to demonstrate that the site meets with PPS25 including the Exception Test where necessary.

8.3.37 Surface water discharge from development will largely rely on surface water attenuation. Due to the limitations on capacity of the managed surface water systems, a condition on all significant development (not captured by PPPS25) should be applied that runoff rates and SuDS types are agreed with the relevant drainage authority prior to permission being granted.

Witcham

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Witcham is located within AWS's Ely Planning Zone for water resources. This zone is forecast to have a surplus of available against target headroom until the last five years of the planning period. Solutions are proposed to this deficit, but the medium and higher growth scenarios towards the end of the plan period may require more stringent standards for water use in new homes when considered in combination with other development areas in the Ely planning zone	**Treatment -** Capacity shortfall of 578 m^3/day following the proposed growth. Additional flow will require a tighter consent but is achievable within the limits of conventional treatment and WFD standards. Process capacity to be investigated in Stage 2 of the WCS. **Transmission –** growth is of a scale such that it can largely be accommodated within existing infrastructure	Possibility of 'in combination' effect on the Ouse Washes SAC, SPA & Ramsar site	The site lies within FZ1 and hence flood risk is reasonably low. Flood Risk assessments should be carried on a site specific basis for proposed development once the precise locations have been established	The site is in Groundwater Source Protection Zone 3 but has underlying impermeable geology. New development will need to be connected to the closest surface watercourse and confirmation should be sought from the IDB as to the available capacity or preferred runoff rates.

Development Phasing and Interim planning Implications

8.3.38 If pursing the high growth strategy, limitations on numbers of new dwellings may be necessary towards the end of the planning period due to lack of available water resources towards 2031; however the detailed WCS should identify potential solutions which may include the requirement for high levels of water efficiency in new homes and contributions towards achieving water neutrality across the district.

8.3.39 A revised flow consent with tighter water quality conditions is required at the WwTW to protect downstream water quality and ecology and hence process upgrades may be required before all proposed development can be accommodated. It is likely that early phasing of development will therefore need to be minimised until the Detailed WCS has determined the timeframe required to complete any necessary upgrades.

8.3.40 Surface water discharge from development will largely rely on surface water attenuation. Due to the limitations on capacity of the managed surface water systems, a condition on all significant development (not captured by PPPS25) should be applied that runoff rates and SuDS types are agreed with the relevant drainage authority prior to permission being granted.

8.4 Fenland

Manea

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Manea is located within AWS's March Planning Zone for Water Resources. This zone has forecasted supply surplus for the planning period, hence sufficient resources are available. Medium and higher growth levels will require more stringent water use requirements in order to maintain this position.	**Treatment -** The development can be accommodated within existing available headroom at WwTW **Transmission -** pump stations capacity will need to be reviewed when development sites are known	No ecological constraints were identified or development levels are considered sufficiently small that they are unlikely to materially increase impacts on European sites.	The village of Manea lies within Flood Zone 1, but is immediately surrounded by Flood Zones 2 and 3. Development should be sequentially placed away from the higher flood risk areas according to PPS25.	The site is in Groundwater Source Protection Zone 3 but has underlying impermeable geology. New development will need to be connected to the closest surface watercourse and confirmation should be sought from the IDB as to the available capacity or preferred runoff rates.

Development Phasing and Interim planning Implications

8.4.1 The sewer network may be limited by pumping station capacity. Until the capacity is assessed in full in the detailed study, planning permission for development should not be granted until the developer has sought clarification from AWS that capacity is available to connect. It is recommended that the requirement to undertake pre-development enquiry into sewer capacity with AWS forms part of a section 106 planning condition to consent.

8.4.2 If development sites are located in Flood Zones 2 or 3, a Level 2 SFRA will be required to show that these sites can meet with Exception Test under PPS25. Developers promoting development in flood zones 2 or 3 prior to a Level 2 SFRA being completed should undertake a Level 2 (and possibly) Level 3 site specific FRA to demonstrate that the site meets with PPS25 including the Exception Test where necessary.

8.4.3 Surface water discharge from development will largely rely on surface water attenuation. Due to the limitations on capacity of the managed surface water systems, a condition on all significant development (not captured by PPPS25) should be applied that runoff rates and SuDS types are agreed with the relevant drainage authority prior to permission being granted.

Chatteris

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Chatteris is located within AWS's March Planning Zone for Water Resources. This zone has forecasted supply surplus for the planning period, hence sufficient resources are available. Medium and higher growth levels will require more stringent water use requirements in order to maintain this position	**Treatment -** The development can be accommodated within existing available headroom at WwTW **Transmission –** growth in the town is significant, and whilst some development can make use of existing infrastructure, new strategic mains will be required for the majority of growth	Nightlayers Fen is failing its water quality objective , hence discharges from Chatteris WwTW may need to be reviewed	The majority of the town lies within FZ1, although there is an area of FZ2 and 3 to the north and west of the town, development should be sequentially placed away from the higher flood risk areas according to PPS25.	The site is Groundwater Source Protection Zone 3 (therefore more suitable for infiltration SuDS) and has permeable underlying geology. Existing drainage of surface water to the combined drainage system has led to incidents of sewer flooding. Separation of surface water drainage and foul drainage is essential for new development. Options for surface water disposal must be discussed with the relevant drainage operating authority

Development Phasing and Interim planning Implications

8.4.4 The sewer network is unlikely to have sufficient capacity to accept all growth owing to the size of proposed development relative to the existing urban area; strategic new infrastructure is likely to be required for larger Greenfield sites. Until the capacity is assessed in full in the detailed study, planning permission for development should not be granted until the developer has sought clarification from AWS that capacity is available to connect. It is recommended that the requirement to undertake pre-development enquiry into sewer capacity with AWS forms part of a section 106 planning condition to consent.

8.4.5 If development sites are located in Flood Zones 2 or 3, a Level 2 SFRA will be required to show that these sites can meet with Exception Test under PPS25. Developers promoting development in flood zones 2 or 3 prior to a Level 2 SFRA being completed should undertake a Level 2 (and possibly) Level 3 site specific FRA to demonstrate that the site meets with PPS25 including the Exception Test where necessary.

8.4.6 Existing drainage of surface water to the combined drainage system has led to incidents of sewer flooding. Separation of surface water drainage and foul drainage is essential for new development. Options for surface water disposal must be discussed with the relevant drainage operating authority

Whittlesey (Includes Coates, Eastrea)

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Whittlesey is located within AWS's Peterborough Planning Zone for Water Resources. This zone has forecasted supply surplus for the planning period, hence sufficient resources are available. Medium and higher growth levels will require more stringent water use requirements in order to maintain this position	**Treatment -** Capacity shortfall of between 867 and 952 m^3/day following the proposed growth. Downstream WFD water quality targets for 'good' Phosphate are not achievable within the limits of conventional treatment; however, further modelling is required in Stage 2 to determine whether achievement of just no deterioiration is a potential solution. MLC have stated that no increases in flow will be permitted from WwTW which drain to watercourses within their area of control – a solution is therefore required in Phase 2. **Transmission** – although growth is relatively significant, the existing infrastructure is such that growth is likely to be able to be accommodated within existing infrastructure; however, this should be reviewed on a case by case basis	The Outline WCS identifies that increases in discharge (over consented volumes) at Whittlesey WwTW may be required. This will be of relevance to the River Nene County Wildlife Site and possibly to the connected Guyhirn Reedbed and Goosetree Heronry County Wildlife Sites and needs to be considered at Stage 2.	The centre of Whittlesey lies within Flood Zone 1, but is immediately surrounded by Flood Zones 2 and 3. Development should be sequentially placed away from the higher flood risk areas according to PPS25. There is concern regarding potential development to the North of the town and impact on the flood storage washland. Measures must ensure that there is no additional impact on the washland storage and hence on flood risk to existing properties	The site is Groundwater Source Protection Zone 3 (therefore more suitable for infiltration SuDS) and has permeable underlying geology Existing drainage of surface water to the combined drainage system has led to incidents of sewer flooding. Separation of surface water drainage and foul drainage is essential for new development. Options for surface water disposal must be discussed with the relevant drainage operating authority

Development Phasing and Interim planning Implications

8.4.7 Alternative options for wastewater treatment at this location may be required as additional discharge to the receiving watercourse has been restricted by the MLC. Until the Detailed WCS has determined the timeframe required to provide a new solution or complete any necessary upgrades, development phasing should be limited until the start of the new water company asset planning ground in 2015. Individual developments coming forward before 2015 should be referred to AWS for confirmation of capacity via a pre-development enquiry as small numbers of housing or employment could be accommodated with water efficiency measures and separated foul and surface water drainage.

8.4.8 If development sites are located in Flood Zones 2 or 3, a Level 2 SFRA will be required to show that these sites can meet with Exception Test under PPS25. Developers promoting development in flood zones 2 or 3 prior to a Level 2 SFRA being completed should undertake a Level 2 (and possibly) Level 3 site specific FRA to demonstrate that the site meets with PPS25 including the Exception Test where necessary.

8.4.9 Existing drainage of surface water to the combined drainage system has led to incidents of sewer flooding. Separation of surface water drainage and foul drainage is essential for new development. Options for surface water disposal must be discussed with the relevant drainage operating authority.

March

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
March is the principal town within AWS's March Planning Zone for water resources. This zone is forecast to have a surplus of available against target headroom until the last five years of the planning period. Solutions are proposed to this deficit, but the medium and higher growth scenarios towards the end of the plan period may require more stringent standards for water use in new homes when considered in combination with other development areas in the Ely planning zone	**Treatment -** AWS has indicated that there is DWF capacity at the works, although there is no information regarding the numeric value for this headroom. This should be investigated further at the Detailed stage. MLC have stated that no increases in flow will be permitted from WwTW which drain to watercourses within their area of control. a solution is therefore required in Phase 2. **Transmission -** Growth is greater than 10% upstream of several pumping stations and CSOs – modelling is required to determine where and when strategic upgrades to sewer capacity and pumping stations is required	No ecological constraints were identified as a result of abstraction or discharge; However, the BAP submerged water plant species, Grass Wrack pond weed (*Potamogeton Compressus)* has previously been identified within the Twenty Foot River at the outfall from March WwTW	March lies within Flood Zone 1, but is immediately surrounded by Flood Zones 2 and 3. Development should be sequentially placed away from the higher flood risk areas according to PPS25.	The site is Groundwater Source Protection Zone 3 (therefore more suitable for infiltration SuDS) and has permeable underlying geology

Development Phasing and Interim planning Implications

8.4.10 AWS have indicated that there is some capacity at the WwTW for additional flow, although accurate flow figures were not available at the time of undertaking the Outline study. It is unlikely that all development will be able to be accommodated in the existing WwTW consent, however initial modelling has shown that a solution is likely to be possible within the limits of conventional treatment. Therefore, early phasing of development is likely to be ok; but the Detailed WCS will need to determine the timeframe required to complete any necessary upgrades (particularly to protect BAP species in the receiving watercourse).

8.4.11 The sewer network is unlikely to have sufficient capacity to accept all growth owing to the size of proposed development relative to the existing urban area; strategic new infrastructure is likely to be required for larger Greenfield sites. Until the capacity is assessed in full in the detailed study, planning permission for development should not be granted until the developer has sought clarification from AWS that capacity is available to connect. It is recommended that the requirement to undertake pre-development enquiry into sewer capacity with AWS forms part of a section 106 planning condition to consent.

8.4.12 If development sites are located in Flood Zones 2 or 3, a Level 2 SFRA will be required to show that these sites can meet with Exception Test under PPS25. Developers promoting development in flood zones 2 or 3 prior to a Level 2 SFRA being completed should undertake a Level 2 (and possibly) Level 3 site specific FRA to demonstrate that the site meets with PPS25 including the Exception Test where necessary.

Parson Drove (Includes Church End)

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Parson Drove is located within AWS's Wisbech Planning Zone for Water Resources. This zone has forecasted supply surplus for the planning period, hence sufficient resources are available. Medium and higher growth levels will require more stringent water use requirements in order to maintain this position	**Treatment -** Capacity shortfall of following the proposed growth. Additional flow will require a tighter consent but is achievable within the limits of conventional treatment and WFD standards. Process capacity to be investigated in Stage 2 of the WCS. **Transmission -** pump stations capacity will need to be reviewed when development sites are known	No ecological constraints were identified or development levels are considered sufficiently small that they are unlikely to materially increase impacts on European sites.	The village of Parson Drove lies within Flood Zone 1, but is immediately surrounded by Flood Zones 2 and 3. Development should be sequentially placed away from the higher flood risk areas according to PPS25.	The site is in Groundwater Source Protection Zone 3 but has underlying impermeable geology. New development will need to be connected to the closest surface watercourse and confirmation should be sought from the IDB as to the available capacity or preferred runoff rates.

Development Phasing and Interim planning Implications

8.4.13 A revised flow consent with tighter water quality conditions is required at the WwTW to protect downstream water quality hence process upgrades may be required before all proposed development can be accommodated. It is likely that early phasing of development will therefore need to be minimised until the Detailed WCS has determined the timeframe required to complete any necessary upgrades.

8.4.14 The sewer network may be limited by pumping station capacity. Until the capacity is assessed in full in the detailed study, planning permission for development should not be granted until the developer has sought clarification from AWS that capacity is available to connect. It is recommended that the requirement to undertake pre-development enquiry into sewer capacity with AWS forms part of a section 106 planning condition to consent.

8.4.15 If development sites are located in Flood Zones 2 or 3, a Level 2 SFRA will be required to show that these sites can meet with Exception Test under PPS25. Developers promoting development in flood zones 2 or 3 prior to a Level 2 SFRA being completed should undertake a Level 2 (and possibly) Level 3 site specific FRA to demonstrate that the site meets with PPS25 including the Exception Test where necessary.

8.4.16 Surface water discharge from development will largely rely on surface water attenuation. Due to the limitations on capacity of the managed surface water systems, a condition on all significant development (not captured by PPPS25) should be applied that runoff rates and SuDS types are agreed with the relevant drainage authority prior to permission being granted.

Benwick

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Benwick is located within AWS's March Planning Zone for Water Resources. This zone has forecasted supply surplus for the planning period, hence sufficient resources are available. Medium and higher growth levels will require more stringent water use requirements in order to maintain this position	**Treatment -** The development can be accommodated within existing available headroom at WwTW **Transmission –** growth is of a scale such that it can largely be accommodated within existing infrastructure	No ecological constraints were identified or development levels are considered sufficiently small that they are unlikely to materially increase impacts on European sites.	The site lies within Flood Zone 3 - it will have to be demonstrated that there are over-riding sustainability reasons as to why development should be located in Benwick and significant flood risk mitigation will be required for development in this location to meet with part c of the PPS25 Exception Test.	The site is in Groundwater Source Protection Zone 3 but has underlying impermeable geology. New development will need to be connected to the closest surface watercourse and confirmation should be sought from the IDB as to the available capacity or preferred runoff rates.

Development Phasing and Interim planning Implications

8.4.17 a Level 2 SFRA will be required to show that development sites in Benwick can meet with Exception Test under PPS25. Developers promoting development in flood zones 2 or 3 prior to a Level 2 SFRA being completed should undertake a Level 2 (and possibly) Level 3 site specific FRA to demonstrate that the site meets with PPS25 including the Exception Test where necessary.

8.4.18 Surface water discharge from development will largely rely on surface water attenuation. Due to the limitations on capacity of the managed surface water systems, a condition on all significant development (not captured by PPPS25) should be applied that runoff rates and SuDS types are agreed with the relevant drainage authority prior to permission being granted.

Doddington (Includes Wimblington)

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Doddington is located within AWS's March Planning Zone for Water Resources. This zone has forecasted supply surplus for the planning period, hence sufficient resources are available. Medium and higher growth levels will require more stringent water use requirements in order to maintain this position	**Treatment -** Capacity shortfall of between 80 and 108 m^3/day following the proposed growth. Downstream WFD water quality targets for Phosphate are not achievable within the limits of conventional treatment. This is also the case when lower EA current targets are considered. MLC have stated that no increases in flow will be permitted from WwTW which drain to watercourses within their area of control. **Transmission -** Growth is relatively small, but existing sewer flooding or capacity problems in the area will make use of existing infrastructure unlikely for all growth. Modelling is therefore required to determine where and when new trunk sewers may be required	No ecological constraints were identified or development levels are considered sufficiently small that they are unlikely to materially increase impacts on European sites.	The site lies within FZ1 and hence flood risk is reasonably low. Flood Risk assessments should be carried on a site specific basis for proposed development once the precise locations have been established	The site is Groundwater Source Protection Zone 3 (therefore more suitable for infiltration SuDS) and has permeable underlying geology

Development Phasing and Interim planning Implications

8.4.19 Alternative options for wastewater treatment at this location are required to meet European legislative requirements, protect downstream ecological sites and to meet with the MLC requirement for no further discharge to their controlled watercourses. Until the Detailed WCS has determined the timeframe required to provide a new solution or complete any necessary upgrades, development phasing should be limited until the start of the new water company asset planning ground in 2015. Individual developments coming forward before 2015 should be referred to AWS for confirmation of capacity via a pre-development enquiry as small numbers of housing or employment could be accommodated with water efficiency measures and separated foul and surface water drainage.

8.4.20 The sewer network may be limited by capacity owing to existing sewer flooding issues. Until the capacity is assessed in full in the detailed study, planning permission for development should not be granted until the developer has sought clarification from AWS that capacity is available to connect. It is recommended that the requirement to undertake pre-development enquiry into sewer capacity with AWS forms part of a section 106 planning condition to consent.

Wisbech & surround[62]

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Wisbech is the principal town within AWS's Wisbech Planning Zone for water resources. This zone is forecast to have a surplus of available against target headroom until the last five years of the planning period. Solutions are proposed to this deficit, but the medium and higher growth scenarios towards the end of the plan period may require more stringent standards for water use in new homes when considered in combination with other development areas in the Ely planning zone	**Treatment -** Capacity shortfall of between 1715 and 2126 m^3/day following the proposed growth. Additional flow will require a tighter consent (including a 1mg/l P limit) but is achievable within the limits of conventional treatment and WFD standards. Process capacity to be investigated in Stage 2 of the WCS. **Transmission –** growth in the town is significant, and whilst some development can make use of existing infrastructure, new strategic mains will be required for the majority of growth	Increases in flow have the potential to impact on the River Nene County Wildlife site and needs to be considered at Stage 2.	The majority of the town lies within FZ1, although there is an area of FZ2 and 3 to the west of the town, development should be sequentially placed away from the higher flood risk areas according to PPS25.	The site is in Groundwater Source Protection Zone 3 but has underlying impermeable geology. New development will need to be connected to the closest surface watercourse and confirmation should be sought from the IDB as to the available capacity or preferred runoff rates.

Development Phasing and Interim planning Implications

8.4.21 A revised flow consent with tighter water quality conditions is required at the WwTW to protect downstream water quality hence process upgrades may be required before all proposed development can be accommodated. It is likely that early phasing of development will therefore need to be minimised until the Detailed WCS has determined the timeframe required to complete any necessary upgrades.

8.4.22 The sewer network is unlikely to have sufficient capacity to accept all growth owing to the size of proposed development relative to the existing urban area; strategic new infrastructure is likely to be required for larger Greenfield sites. Until the capacity is assessed in full in the detailed study, planning permission for development should not be granted until the developer has sought clarification from AWS that capacity is available to connect. It is recommended that the requirement to undertake pre-development enquiry into sewer capacity with AWS forms part of a section 106 planning condition to consent.

8.4.23 Development sites in Flood Zones 2 or 3, require a Level 2 (or Level 3 FRA) to be undertaken building on information in the updated Wisbech Level 2 SFRA. Developers promoting development in flood zones 2 or 3 prior to the Level 2 SFRA update being completed should undertake a Level 2 (and possibly) Level 3 site specific FRA to demonstrate that the site meets with PPS25 including the Exception Test where necessary.

8.4.24 Surface water discharge from development will largely rely on surface water attenuation. Due to the limitations on capacity of the managed surface water systems, a condition on all significant development (not captured by PPPS25) should be applied that runoff rates and SuDS types are agreed with the relevant drainage authority prior to permission being granted.

[62] (Includes Elm, Friday Bridge, Gorefield, Leverington, Leverington Common, Tydd St Giles, Wisbech St Mary

9 Climate Change

9.1 Introduction

Scoping WCS Context

9.1.1 The Scoping WCS undertook a high level assessment of climate change sensitivity and impacts for the East Cambridgeshire and Fenland study area based on the 2002 UK Climate Change Predictions (UKCIP02). The study identified that due to the low lying nature of the study area and its location in the East of England it is susceptible to changes in sea level, higher winter flows, lower summer flows and changes in aquifer recharge. In addition to this, warmer temperatures will also mean a lower natural oxygen carrying capacity for watercourses resulting in a greater impact of larger discharges of wastewater.

Outline WCS Assessment

9.1.2 The Outline WCS builds on the work undertaken for the Scoping Study and, incorporating the recently published 2009 UK Climate Projections (UKCP09) identifies the potential impacts on the flood risk, surface water management, water supply, wastewater management and water environment elements of the water cycle.

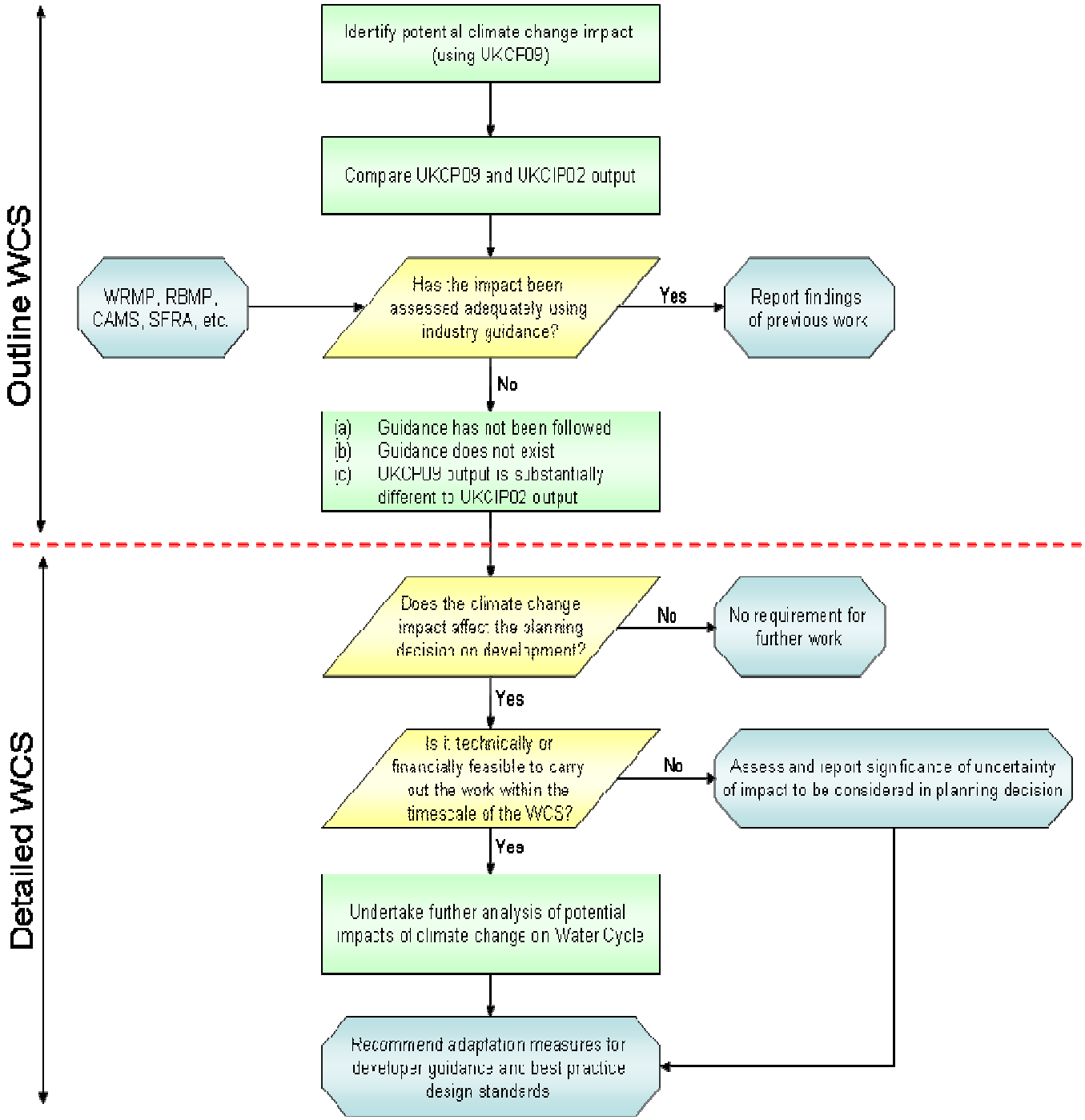
9.1.3 Specifically, the assessment identifies:

- key differences between the UKCIP02 and UKCP09 projections and the impacts of these on published and draft guidance and plans already undertaken by regional bodies (e.g. Environment Agency and Anglian Water Services);
- the impact of projected changes on water cycle elements and infrastructure; and
- the planning considerations required as a result of these.

9.1.4 **Figure 9-1** illustrates the climate change assessment methodology for the East Cambridgeshire and Fenland WCS for both the Outline and Detailed WCS.

9.1.5 The key findings of the climate change assessment are summarised in this section of the Planning report.

Figure 9-1: Climate Change Methodology (adapted from East Cambridgeshire and Fenland WCS Scoping Report)



9.2 Outline Assessment Findings

UKCIP02 vs. UKCP09 Projections

9.2.1 The climate change projections in UKCP09 supersede the scenarios from UKCIP02, reflecting advances in the understanding and modelling of the climate system, in computing power, and in the ability to analyse the modelled outputs. UKCP09 provides probabilistic projections of climate change based on quantification of known sources of uncertainty; the first time uncertainty has been quantified. Previously, UKCIP02, used a deterministic projection of climate change to produce a single value for a specific variable at a location.

9.2.2 Although many of the projected changes are of a broadly similar nature, UKCP09 incorporates scientific advances that may have significant implications for the specifics of the projected climate change[63]. However, there are many existing projects and/or decisions that are based on UKCIP02 scenarios, and as such it is recommended that the robustness of previous studies and reports are reviewed in light of the new UKCP09 projections.

Key Differences between UKCIP02 and UKCP09 Projections

9.2.3 Fundamental changes to the underlying modelling methodologies, and results generated, make it difficult to directly compare UKCP09 with earlier UKCIP02 projections. However, for the purposes of this study, a comparison between corresponding grid cells within the study area has been undertaken to compare the temperature, precipitation and sea level rise projections for the two datasets.

9.2.4 In terms of planning for and adapting to proposed climate change impacts the main differences between the scenarios are:

- **Mean Summer Temperature**: both UKCIP02 and UKCP09 are projecting warmer summer temperatures. The comparison shows that UKCP09 is projecting **smaller long term summer temperature increases than previously estimated**.
- **Mean Winter Temperature**: both UKCIP02 and UKCP09 are projecting milder winter temperatures. The comparison shows that UKCP09 is projecting **milder winter temperatures than previously estimated,** i.e. greater increases in winter temperatures than previously estimated.
- **Mean Summer Precipitation**: both UKCIP02 and UKCP09 central estimates are predicting a decrease in summer precipitation. The comparison shows that UKCP09 is projecting a **smaller reduction in summer rainfall than previously estimated**.
- **Mean Winter Precipitation**: both UKCIP02 and UKCP09 central estimates are projecting an increase in rainfall during the winter. The **UKCIP02 and UKCP09 central estimates are broadly similar** up to 2080.
- **Sea Level Rise**: both UKCIP02 and UKCP09 (95% frequency) are broadly similar in relative sea level rise, with UKCP09 projecting a **slightly smaller rise than previously estimated**.

[63] UK Climate Impact Programme website (http://ukclimateprojections.defra.gov.uk/content/view/12/689/)

9.2.5 The overall message from the comparison of UKCIP02 and UKCP09 projections is that, as far as is possible given the different methodologies and models used to derive the projections and outputs, the projections are broadly similar (i.e. the UKCIP02 estimates lies within the 'very likely' (10% to 90%) probability range for the UKCP09 estimates), and in most cases, the UKCP09 projections present less extreme predictions for temperature, precipitation and sea level rise. In terms of policy, planning and guidance documents produced using the UKCIP02 projections, these are based on projections that appear to be providing a worst case than the UKCP09 projections and therefore many of the recommendations and findings of these are for beyond the requirements of the more recent projections.

Impact on Published and Draft Guidance

9.2.6 The UKCIP02 scenarios were widely adopted and formed the basis of climate change information in many projects and decisions including:

- Flood Risk Planning:
  - *Planning Policy Statement 25: Development and Flood Risk*[64] states that development must be designed for:
    - 10% to 20% increase in peak river flow (fluvial);
    - 5% to 10% increase in extreme wave height;
    - 5% to 30% increase in peak storm intensity; and,
    - 2.5mm to 15mm annual sea level rise.
- Water Resources Planning:
  - Environment Agency guidance requires climate change to be built into 'headroom ' of supply;
  - Water Companies model lower river flows and different aquifer recharge on their licensed abstractions (ground and surface water); and,
  - Water Companies must provide enough water to allow for losses from climate change.
- Wastewater Planning:
  - Increased storm intensity modelled for wastewater networks.
- Sustainable Development:
  - *Planning Policy Statement: Climate Change Planning*[65] supplement to *Planning Policy Statement 1: Delivering Sustainable Development* sets out how planning, in providing for the new homes, jobs and infrastructure needed by communities, should planning should contribute to reducing emissions and stabilising climate change and take into account the unavoidable consequences.

[64] Planning Policy Statement 25: Development and Flood Risk, Communities and Local Government, March 2010 (http://www.communities.gov.uk/documents/planningandbuilding/pdf/planningpolicystatement25.pdf)
[65] Planning Policy Statement: planning and Climate Change; Supplement to Planning Policy Statement 1, Communities and Local Government, December 2007(http://www.communities.gov.uk/documents/planningandbuilding/pdf/ppsclimatechange.pdf)

9.2.7 Although the UKCIP02 scenarios have now been superseded by UKCP09, it may not be necessary for these studies to be repeated or updated, but it is important to consider the implications of the new scenarios on future planning policy and decisions to ensure that robust evidence is in place to plan for and adapt to climate change in the future.

9.2.8 It is therefore important to assess the robustness of the previous findings in light of the new projected climate projections available in UKCP09 and consider the following key aspects in the decision making process:

- *Is the policy/guidance/decision 'sensitive' to the wider range of possible climate outcomes in the UKCP09 distributions?*

- *How do UKCIP02 values compare with the UKCP09 distributions for key climate variables?*[66]

9.2.9 There are a number of studies already underway by research bodies, Government, Environment Agency and water companies to assess the impacts of the UKCP09 projections on existing guidance, policy and planning documents. These studies will provide the evidence base for the next round of planning documents and adaptation measures for developers, water companies, asset managers etc. going forward.

9.2.10 A summary of some of the studies being undertaken and potential changes to existing documents that have the potential to impact the East Cambridgeshire and Fenland WCS are provided in Figure 9-2. This list is not exhaustive and will be updated as part of the Detailed WCS.

[66] Assessing the differences – UKCIP02 & UKCP09, UK Climate Impacts Programme and the Scottish Climate Change Impacts Partnership (SCCIP) (http://ukclimateprojections.defra.gov.uk/images/stories/Tech_notes/Assessing_UKCIP02_UKCP09.pdf)

Table 9-1: Summary of key planning and research reports being undertaken in, or affecting development within, East Cambridgeshire and Fenland Study Area (with relation to Climate Change)

Key Data/Reports	Climate Change Assessment			Planned Assessments/Update	• WCS Element
	UKCIP02	UKCP09	Details		
Anglian Water Final Water Resource Management Plan (February 2010)	✓	×	UKCP09 was published too later for incorporation into current WRMPs Assessed impacts of climate change in calculation of deployable output and forecast demand.	UKWIR/Environment Agency – 2 projects in 2010 – new guidance expected from Environment Agency Review of WRMP end 2010 with potential interim determination if significant 'Rapid Assessment' (2009), central assessments not much difference	Water Resources
Anglian River Basin District Final River Basin Management Plan (RBMP) (December 2009)	✓	× (Headline messages only)	Draft RBMP used UKCIP02. Final RBMP only assesses risk of failure but does include review of UKCP09 in Appendix H: Adapting to Climate Change.	Programme of Measures will be reviewed if risk of failure is expected to increase with climate change.	Wastewater, Water Quality & Ecology
PPS25	✓	×	Reviewed by Defra and EA	Annex B may change in 2010 Practice Guide states 50% scenario = very little difference	Flood Risk Management and Drainage
Environment Agency Research	×	✓	Proposed assessment of impact of Climate Change on river flows and groundwater levels Proposed revised guidance to Water Companies Impacts of Climate Change on river water quality (SC070043/SR) Impacts of Climate Change on water temperature (SC060017/SR) Preparing for climate change impacts on freshwater ecosystems (SC030300)	Production of new guidance relating to Climate Change	Water Quality, Wastewater, Water Resources, Ecology
East of England Climate Change Partnership (EECP)	✓	✓	The partnership is managed by a small group representing East of England Regional Assembly (EERA), East of England Development Agency (EEDA), Environment Agency and GO-East and has a larger corresponding group of regional stakeholders.	Anglian Water Services are working with the EECCP to implement water efficiency measures from the Climate Change Action Plan for the East of England (CAPE).	Water Resources
United Kingdom Water Industry Research (UKWIR)	×	✓	Research project on Projections on River Flows and Groundwater recharge Research project on Projections on the Demand for Water	N/A	Water Resources, Water Quality, Wastewater
Anglian Water	×	✓	Developed an adaptation strategy to prepare for Climate Change on its assets Change and the hydraulic design of sewerage systems (UKWIR CL/10)	N/A	Wastewater, Water Resources and Supply

Climate Change Projections and Impacts on the Water Cycle Elements and Infrastructure

9.2.11 Table 9-2 shows the likely effects of climate change on key parameters affecting the water environment in the East of England from the latest UKCP09 projections

Table 9-2: UKCP09 Projections for East of England (High Emissions Scenario)

Climatic Variable	Year	Projected Change (compared to 1961-1990 baseline under high emissions scenario)		
		10% (very unlikely to be less than)	50% (central estimate)	90% (very unlikely to be greater than)
Winter Mean Temperature	2020s	0.5ºC	**1.3ºC**	2.6ºC
	2050s	1.4ºC	**2.5ºC**	3.8ºC
	2080s	2 ºC	**3.7 ºC**	5.7 ºC
Summer Mean Temperature	2020s	0.5ºC	**1.4ºC**	2.5ºC
	2050s	1.3ºC	**2.9ºC**	4.8ºC
	2080s	2.4 ºC	**4.5 ºC**	7.5 ºC
Annual Mean Precipitation	2020s	-5%	**0%**	6%
	2050s	-5%	**0%**	6%
	2080s	-6%	**1%**	8%
Winter Mean Precipitation	2020s	-2%	**7%**	16%
	2050s	3%	**16%**	35%
	2080s	7%	**26%**	57%
Summer Mean Precipitation	2020s	-21%	**-4%**	15%
	2050s	-40%	**-18%**	8%
	2080s	-53%	**-27%**	4%

Planning for Climate Change Projections

9.2.12 Figure 9-2 illustrates the potential climate change impacts on East Cambridgeshire and Fenland water cycle elements based on the projected climate change for the region. Table 9-3 provides a summary of the potential adaptation and mitigations options that should be considered for the East Cambridgeshire and Fenland WCS. This list is not exhaustive and will be expanded as part of the Detailed WCS once development locations have been confirmed to enable location specific adaptation/mitigation considerations.

Figure 9-2 : Potential Climate Change Impacts on East Cambridgeshire and Fenland Water Cycle Elements

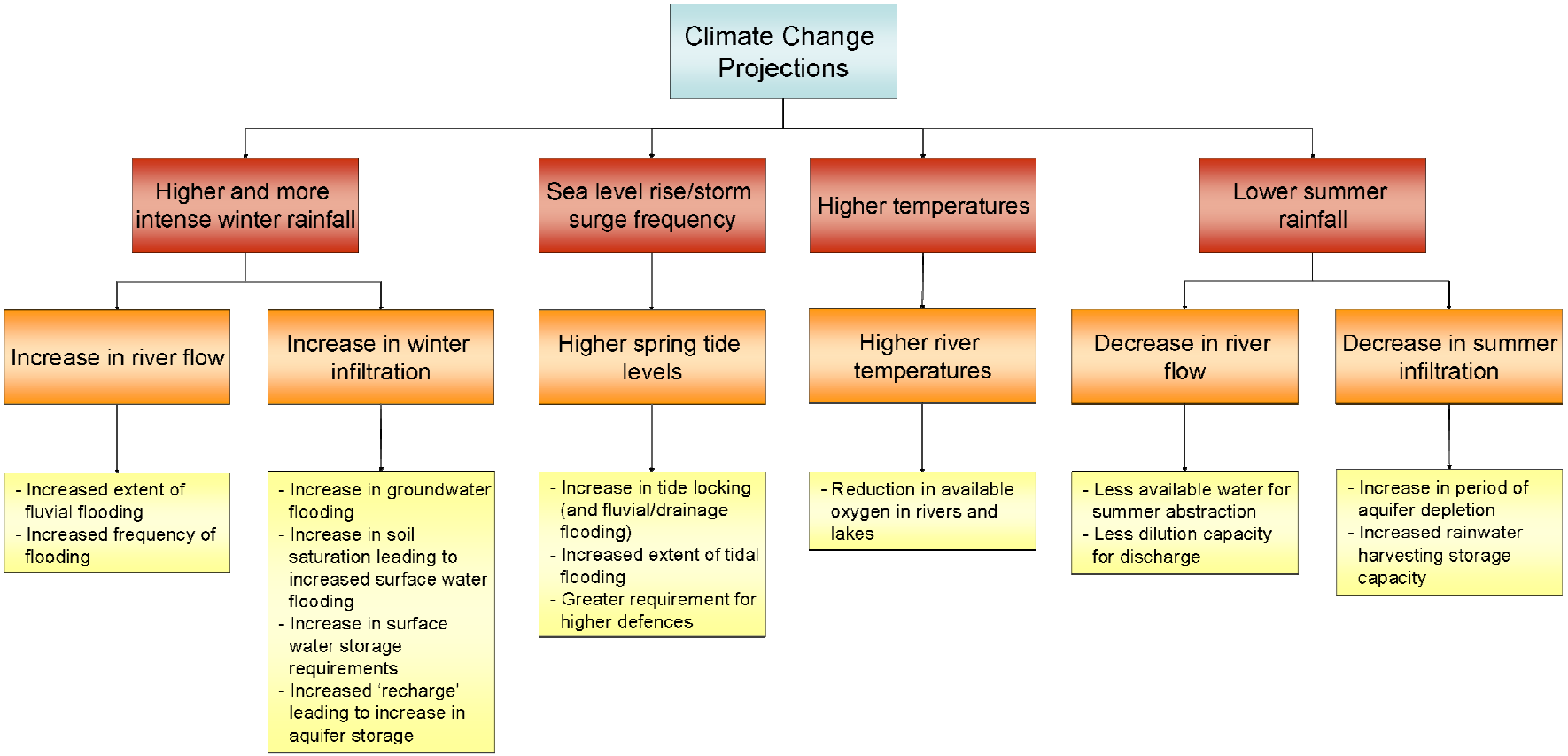


Table 9-3: Summary of adaptation/mitigation considerations for East Cambridgeshire and Fenland WCS

Water Cycle Element	Impact of Climate Change	Adaptation and Mitigation Measures
Water Resources & Supply	Hotter, drier summers will affect water supply and demand	Ensure regional drought plans take into account the impacts of climate change
		Contribute to managing water demand through increased water efficiency in homes, businesses, industry and agriculture
	Low river flows and groundwater levels will increase water pollution	Ensure that water abstraction is sustainable through monitoring
		Improve river basin management plans through the Water Framework Directive
Flood Risk	Increased flood risk will pose a greater threat to property and infrastructure	Regional flood risk strategies to account for rising sea levels and climate change
		Ensure Local Authorities are advised on appropriate locations for new development
		Engage communities in managing flood risk
Wastewater Collection & Treatment		
Water Quality, Ecology & Biodiversity	Changes in temperature, rainfall and sea level rise will affect species and habitats	Ensure climate change mitigation strategies are in place for species and habitats at risk, e.g. Biodiversity Action plans
	Warmer summer temperatures may increase tourism	Continually monitor bathing waters
	Hotter, drier summers and extreme weather events may increase soil erosion and therefore cause increased runoff/pollution from agricultural runoff to receiving watercourses	

Recommendations for Detailed WCS

9.2.13 It is recommended that, once preferred development sites are known, the Detailed WCS builds on the work undertaken in the Outline WCS to provide:

- Sensitivity assessment of the predicted climate change impacts including:
  - impact of summer flows on dilution of wastewater discharges by altering flow assumptions in the RQP modelling; and
  - impact of different rates of sea level rises on flood risk (where feasible).
- Guidance on Mitigation and Adaptation measures for new development (to effects of climate change), e.g.
  - design of water management systems (e.g. larger storage volumes for rainwater harvesting during lower rainfall periods in the summer);
  - design of SuDS and drainage systems; and

    - consider impact of infrastructure solutions on CC (as part of Sustainability Analysis).

- Climate Change Impacts Timeline and impacts/considerations for water cycle elements.

10 Outline Policy Guidance

10.1 Introduction

10.1.1 The following policy recommendations are made to ensure that the emerging Core Strategy for Fenland and the Site Allocations DPD for East Cambridgeshire considers potential limitations (and opportunities) presented by the water environment and water infrastructure on growth, and phasing of growth. The policy is also recommended as a starting point to the replacement of the regional WAT (water based) policies of the EEP.

10.1.2 This policy guidance should be revisited and revised upon completion of the Phase Detailed 2 WCS and the completion of the overall Water Cycle Strategy.

10.2 Water Cycle Policy

10.2.1 This section draws on the various assessments undertaken in this Outline WCS study. It summarises the key issues and suggests direction for policies to be included in the LDFs of both authorities, to help to ensure that the aims of this WCS and a sustainable water environment are achieved.

General

Policy Recommendation 1: Development Phasing

10.2.2 New homes should not be built until agreement has been reached with the water and wastewater provider that sufficient capacity in existing or future water services infrastructure is available in accordance with the East Cambridgeshire and Fenland Outline WCS, or measures are taken to mitigate any concerns or objections.

10.2.3 *Reason: The WCS has demonstrated some capacity within existing infrastructure; however this capacity is limited and upgrades (or new) infrastructure is required in some places to deliver full housing requirements up to 2031. Development must not be permitted to develop until the water services infrastructure is in place to service it.*

Wastewater treatment and transmission

Policy Recommendation 2: Strategic Wastewater Network

10.2.4 Recognition is made that the provision of new strategic wastewater mains will be required in several locations to connect new development areas and transfer much of the wastewater generated to the WwTW for treatment.[67]

10.2.5 Reason: The LDFs need to ensure that the provision of wastewater mains is fully supported.

[67] It is noted that East Cambridgeshire District already have a similar Core Strategy Policy (CS7); however, this recommendation remains for Fenland

Policy Recommendation 3: Strategic Wastewater Treatment

10.2.6 Recognition is made that expansion of wastewater treatment facilities at the following WwTWs in each district is required in order for demands of future growth to be met. Expansion of these works may be required.

- Soham, Burwell, Bottisham, Haddenham, Ely New, Witchford, Littleport, Witcham, Whittlesey, March, Doddington, and West Walton

10.2.7 Reason: The WCS has demonstrated that some of the WwTW will need to add process streams or expand the capacity of processes in order to treat the additional flow or to higher standards to meet current and future water legislation (WFD and HD standards). The LDF needs to ensure that the expansion of some WwTW sites is fully supported.

Water Resources & Supply

Policy Recommendation 4: Protection of Water Resources

10.2.8 New development will not be permitted in source protection zones unless the Environment Agency is satisfied that the risk is acceptable.

10.2.9 Reason: The WCS has highlighted that water supply in the study area is highly dependent on groundwater abstraction and as such, it is important to continue to protect the areas that recharge the groundwater through suitable management of surface activities. Several development locations are likely to over or close to source protection zones around abstraction boreholes and hence Environment Agency agreement will need to be achieved for some development types in these areas.

Policy Recommendation 5: Water demand management

10.2.10 New development should aim to achieve the water use target under Code Levels 3 & 4 of the Code for Sustainable Homes, and where possible achieve the Environment Agency target for water neutrality of 95 litres per head per day.

10.2.11 Reason: The WCS has highlighted that higher levels of growth will require new development to use less water than current policy or legislative requirements and in order to achieve the aspiration of water neutrality, all new development must be as efficient as possible

Flood risk and drainage

Policy Recommendation 6: Site drainage

10.2.12 All new development, including that on brownfield sites, where feasible should be served by separate surface water and wastewater drainage. No new development will be permitted to discharge surface runoff to foul drainage connections.

10.2.13 *Reason: The WCS has highlighted that sewer flooding and Combined Sewer Overflows are an existing concern in several growth areas in both districts and that with climate change, capacity will be limited. Therefore further discharges of surface water to foul or combined drainage should not be permitted to prevent exacerbation of existing problems.*

Policy Recommendation 7: Surface Water Management

10.2.14 All new development, including that on brownfield sites, should not be constructed until sufficient surface water management and attenuation has been provided to ensure that flood risk from the development as a result of surface water runoff can be managed in line with PPS25 both during construction and the design life of the development.

10.2.15 *Reason: The WCS has determined that management of surface water is key to preventing downstream flood risk as a result of development. Therefore, design of runoff attenuation (through SuDS design) needs to be built into developments as part of the master plan and as part of the Environmental Management Plan for construction for major developments. The detailed WCS will provide advice on the size, location and type of SuDS that will be suitable in each development location when these are known*

Policy Recommendation 8: Greenfield runoff rates

10.2.16 SuDS should be implemented to ensure that runoff from the site (post development) is to greenfield runoff rates for all previously undeveloped sites (in keeping with PPS25) and for developed sites (where feasible). This should include space set-aside within the confines of the site to accommodate SuDS;

10.2.17 *Reason: The management of surface water is a key flood risk concern in the study area and volumes of runoff must not increase above the current land usage conditions, and in the case of previously developed sites, betterment should be sought to decrease the burden on the managed drainage system of the study area.*

Policy Recommendation 8: SuDS application

10.2.18 In the application of SuDS techniques in the majority of the study area (with the exception of the south of East Cambridgeshire) it is recommended that attenuation techniques are given priority, due to largely impermeable nature of the superficial and underlying bedrock geology.

10.2.19 *Reason: Allowance for surface attenuation SuDS should be made at development masterplanning stage. The detailed WCS will consider more location specific SuDS guidance once details of development locations are determined.*

Policy Recommendation 9: SuDS and water management

10.2.20 Developments should look to incorporate water re-use and minimisation technology for example green roofs and rainwater harvesting. This will aid developments in the adoption of source control SuDS as part of PPS25 requirements;

10.2.21 *Reason: Although such measures have a more limited role in attenuation for large rainfall events, incorporation of the water management and conversation techniques as part of the SuDS strategy allows PPS25 requirements to be met, for Best Practice SuDS train ideology to be met and for water conservation to be built into development design assisting with the aspiration for attaining water neutrality.*

Policy Recommendation 10: SuDS and Water Quality

10.2.22 Development should not have a detrimental impact on the water environment through changes to water chemistry or resource and this should be ensured through the use of drainage systems which limit the occurrence of pollution to the water environment.

10.2.23 *Reason: Management of surface water drainage needs to consider quality of discharge in addition to quantity. Several hydrologically linked statutory and non statutory ecological sites have been identified downstream of key development centres and need to be protected from deterioration in water quality.*

11 Recommendations & Phase 2 Scope

11.1.1 This Outline Water Cycle Study has identified the key constraints to growth in the districts of East Cambridgeshire and Fenland for three different growth strategies. It has identified:

- where there are solutions to utilise existing infrastructure;
- where more detailed solutions will need to be investigated in the Detailed WCS;
- where the are potential phasing implications;
- the feasibility of achieving water neutrality and what measures might be needed; and
- the outline implications of climate change impacts and adaptation

11.1.2 The study has demonstrated that there are some potential limitations to achieving growth as proposed in each district, largely focused on wastewater treatment works and their potential impacts on designated sites that need to be investigated further in order to determine if there is a potential infrastructure solution.

11.1.3 Furthermore, the study has shown that higher levels of growth may exceed the limit of growth catered for in AWS's current water resource planning and that stringent targets for water use, and a push towards water neutrality, are likely to be required to deliver higher growth levels.

11.1.4 This Outline assessment has been undertaken at a strategic level based on best estimates of where growth is likely to occur on a town or village basis. At the time of undertaking the study, neither authority was in a position to provide a preferred list of development sites to allow a more detailed site specific assessment. The following recommendations are therefore made for the Stage 2 Detailed WCS:

11.2 Stage 2 approach

11.2.1 Following completion of the Outline study, it is recommended that the Detailed Stage for the districts is reported separately at a different level of detail. FDC are in the process of defining a preferred growth strategy through the Shaping Fenland Study and hence, sufficient detail on the likely location and numbers of housing and employment land provision is uncertain. It is therefore not possible to proceed with the development of a full costed detailed water cycle strategy owing to uncertainties around the need for more site specific infrastructure requirements such as new wastewater mains, and water supply infrastructure.

11.2.2 The Detailed WCS for Fenland will therefore be undertaken in an initial 'Stage 2a' which will determine the detailed water requirements for water infrastructure which serves growth towns as opposed to the individual development sites. This will utilise broad areas for growth being considered in the Shaping Fenland study and will include phasing information for water neutrality requirements, wastewater treatment and generalised SuDS requirements. Detailed information on phasing and costing of site specific water and wastewater infrastructure such as new wastewater mains will be developed in a Stage 2b WCS once a preferred growth strategy has emerged.

11.2.3 At the time of completing this Outline WCS, a Detailed WCS for West Norfolk including Wisbech has been undertaken; it is recommended that the Stage 2 West Norfolk WCS is used as the basis for more detailed assessment of Wisbech in the Stage 2 Fenland WCS.

11.2.4 ECDC have a degree of certainty on likely development sites in the district, and hence development of a full detailed WCS (and water cycle strategy) will be commenced upon completion of the Outline Study.

11.3 Wastewater Approach

a) For Whittlesey & Doddington, which require an increase in consented flow to watercourses, within the MLC jurisdiction, no additional wastewater from growth would be permitted to be discharged; therefore, further investigation is required including:

   i. details of discussions between AWS and MLC on the position with regards to allowing further discharges. AWS have a statutory requirement under the Water Industry Act to supply wastewater treatment services unless other legislative drivers restrict it;

   ii. determine whether the increase in flow is likely to affect water levels or capacity in the drainage system in conjunction with the MLC;

   iii. determine whether there are likely to be adverse ecological impacts as a result of increases in discharges in conjunction with MLC and NE;

   iv. consider whether alternative discharge location options are available in conjunction MLC, AWS and potentially the Environment Agency;

   v. consider whether changes in per capita consumption (water efficiency and achieving water neutrality), occupancy rate and changing population may free up headroom at the WwTW to allow development to proceed without the need to increase consented flow.

b) For Soham, Burwell, Bottisham, Whittlesey and Doddington, quality consents beyond the limits of conventional treatment are required when growth is considered in order to meet future downstream WFD water quality and ecology targets. Therefore, further modelling is required.

c) Where the receiving watercourse for these WwTWs is currently less than Good Status, the detailed WCS will model the current flows at these works to see if Good Status can be achieved within the limits of conventional treatment without growth included. If Good status can be achieved without growth, then it can be concluded that the growth is the factor limiting the attainment of future Good Status and therefore a solution is required. If Good status cannot be achieved with current flows as they are (before growth is considered), then growth should not be unduly penalised and hence the current status should be modelled (with growth flows included) as the target and the consents determined to meet current status in order to ensure the no deterioration policy of the WFD.

d) Only if the current status cannot be maintained within the limits of conventional treatment is growth considered not achievable and therefore a new solution required.

e) Therefore, where a WwTW requires consent limits beyond the levels of conventional treatment in order to ensure attainment of ‘Good Status’ or ‘No Deterioriation’ under the WFD, then further investigation is required including:

   i. determining whether going beyond the limits of conventional treatment is a sustainable solution in terms of energy use and cost in conjunction with the stakeholder group (using a sustainability appraisal);

ii. considering whether changes in per capita consumption (water efficiency and achieving water neutrality), occupancy rate and changing population may free up headroom at the WwTW to allow development to proceed without the need to increase consented flow;

iii. considering whether alternative discharge location or technology options are available in conjunction with MLC, AWS and the Environment Agency, including discharge to ground;

iv. determining whether the increase in flow is likely to affect water levels, flood risk or capacity in the drainage system in conjunction with the MLC and the EA; and

v. considering whether wastewater flow can be transferred to a different WwTW catchment where there is available capacity.

f) An agreement must be reached between the Environment Agency and AWS as to whether the less stringent current targets can be used in Phase 2 to determine solutions. This would mean that only Burwell and Doddington WwTWs would require a solution beyond the limits of conventional treatment.

g) For WwTW that require an increase in flow above consented volumes but which can meet water quality targets within the limits of conventional treatment, the detailed study needs to ensure that:

i. in conjunction with AWS, determine whether process capacity upgrades are technically and physically possible at site, and determine what impact the timing of upgrades have on phasing of development;

ii. in conjunction with AWS, the Environment Agency and the IDBs, determine if an increase in flow will have an impact on flood risk (water levels) or drainage capacity.

h) The detailed study needs to determine the impact that delivering such solutions will have on:

i. phasing for key growth towns;

ii. sustainability in terms of energy usage; and

iii. deliverability of sites and infrastructure (cost and practicality).

i) Modelling of network capacity is required at several key locations (once development locations are known) to determine if upgrades to sewer mains, pumping stations or new sewer provision is necessary. It is recommended that this is carried out by AWS using their existing Infoworks CS models for Littleport, Ely, Soham, Chatteris, March and Wisbech for use in the detailed study.

j) A semi-quantitative assessment of capacity and likely requirement for upgrades and new sewers should be undertaken in conjunction with AWS for Bottisham, Isleham, Manea Town, Parson Drove, Burwell, Haddenham and Doddington. Largely this will be determining impact on pumping station capacity and required upgrades once development locations are known.

k) It is recommended that options for a new WwTW discharge north of Ely is considered in the Detailed study for environmental feasibility e.g. acceptable discharge.

11.4 Water Supply

l) For East Cambridgeshire District, water resource availability towards the end of the plan period (2031) is reliant on inter zone transfer, metering and water efficiency measures. It is therefore essential that if the higher growth scenarios are proposed, that these levels are compared to the

growth figures used by AWS in the production of their 2010 WRMP to determine whether additional resources are required to support growth;

m) If additional resources are required, it will be necessary to determine if sustainable solutions for local abstraction are available for developers to allow future growth to occur in conjunction with the Environment Agency and AWS;

n) Once preferred development locations are known, the detailed study will be required to determine resilience in water supply trunk mains, pumping stations and WTWs in key locations with AWS, to determine when upgrades need to be phased in and what impact this will have on development phasing; and

o) that a detailed pathway to neutrality is developed in conjunction with CH, ECDC, FDC and CCC, in the detailed WCS to determine the exact requirements for achieving neutrality in terms of policy, developer contributions, funding implications, community involvement and what is technically required from new development.

11.5 Flood Risk Management

p) More detailed SuDS requirements should be provided for preferred development sites when known, including deriving values for permitted runoff rates and options for linkage with green infrastructure; and

q) policy recommendations need to be provided in the study to set out how sustainable drainage will be achieved by developers and how the aspiration to move to 100% separation of surface water runoff and foul water drainage can be achieved and supported.

11.6 Infrastructure Solutions and Phasing

r) A suitable sustainability assessment, incorporating carbon counting will be developed in order to produce a preferred, but sustainable overall water cycle strategy;

s) measures to achieve water neutrality should be investigated further and costed to be considered as an option for potential solutions to wastewater treatment and provision of sustainable water supply; and

t) infrastructure phasing timelines should be produced for each growth town to determine impact of infrastructure and mitigation provision on housing delivery.

11.7 Climate Change Assessment

u) It is recommended that, once preferred development sites are known, the Detailed WCS builds on the work undertaken in the Outline WCS to provide:

- Sensitivity assessment of the predicted climate change impacts including:
  - Impact of summer flows on dilution of wastewater discharges by altering flow assumptions in the RQP modelling; and
  - Impact of different rates of sea level rises on flood risk (where feasible).

- Guidance on Mitigation and Adaptation measures for new development (to effects of climate change), e.g.
    - design of water management systems (e.g. larger storage volumes for rainwater harvesting during lower rainfall periods in the summer);
    - design of SuDS and drainage systems; and
    - consider impact of infrastructure solutions on CC (as part of Sustainability Analysis).
- Climate Change Impacts Timeline and impacts/considerations for water cycle elements

Appendix A: Outline Study Data Register

Request No.	Data Type	Required for	Stakeholder	Priority (see key in comment)	Notes	Requested When	Received	Format	Notes
1	Final Water Resource Management Plan	WCS	AWS	Essential	Awaiting publication - end of January 2010	20/01/2010	Yes	Any	Saved from website
2	NGRs for WwTW locations and outfalls	WCS	AWS	Essential	required to map WwTW and discharge points	20/01/2010	Yes	GIS layer preferable	Excel sheet provided at Stg Gp meeting 2 (Feb 2010)
3	Measured (or calculated where not available) dry weather flow for each WwTW affected by growth	WCS	AWS	Essential	required to calculate consented volumetric headroom	20/01/2010	Yes	Any	Excel sheet provided at Stg Gp meeting 2 (Feb 2010)
4	Consent details for each WwTW for both flow (DWF and FFT) and quality conditions for BOD, Amm-N and P	WCS	AWS	Required	required to calculate consents and undertake RQP modelling for watercourse capacity; **however, scoping report lists consent details. If AWS can confirm that this data is correct, we can use Appendix C directly without the consents themselves being issues**	20/01/2010	Yes	Any	Excel sheet provided at Stg Gp meeting 2 (Feb 2010)
5	PE figures for each WwTW, broken down into domestic, trade and holiday, with estimate of trade flow for each WwTW	WCS	AWS	Required	required to calculate consented volumetric headroom - **Overall PE for WwTW would suffice**	20/01/2010	Yes	Excel format preferable	Excel sheet provided at Stg Gp meeting 2 (Feb 2010)
6	assumptions used on water consumption rates for current and future populations in each WRZ, broken down into metered, unmetered and average of the two	WCS	AWS	Required	required to calculate consented volumetric headroom - **breakdown into metered and unmetered not essential**	20/01/2010	Yes	Any	Take from WRMP
7	assumptions used on current and future occupancy rates in each WRZ	WCS	AWS	Required	required to calculate consented volumetric headroom - **breakdown into WRZ is not essential**	20/01/2010	Part	Any	Set up a separate meeting to discuss this - **or need growth assessment undertaken by AWS 9see request 39)**
8	calculated headroom capacity at each WwTW (only if other more detailed info isn't available)	WCS	AWS	Required	**only needed if data request items 2-7 are not available.**	20/01/2010	N/A	Any	All base data supplied so this can be calculated for the study
9	Wastewater network layer, including pipe sizes, pumping station locations, and CSO outfall locations	WCS	AWS	Essential	required to map wastewater catchments, and make assessment of potential capacity in absence of network model coverage	20/01/2010	Yes	GIS layer preferable	Still waiting
10	Further information on wastewater capacity constraints, particularly pumping station constraints	WCS	AWS	Ideal	To further inform sewer network capacity assessments	20/01/2010	Part	Any	**Meeting to be set up a separate meeting to discuss this**
11	confirmation of network model coverage	WCS	AWS	Essential	Network models not required, but information on coverage of modelling is required to determine where modelling assessments on capacity will not be possible	20/01/2010	Yes	GIS layer preferable	Via meeting with Paul Maxwell
12	Confirmation on NEP wastewater schemes going ahead in AMP5 following final determination	WCS	AWS	Required	required to inform the baseline of wastewater treatment, **although this is not essential**	20/01/2010	N/A	Any	**CAN BE AGREED AT A LATER DATE IN THE STUDY - CHECK NEP DATABASE FIRST**
13	Abstraction licence details, including limit on abstraction	WCS	AWS	Ideal	required to calculate capacity in existing licences - **a statement from AWS would suffice, stating available capacity or not with respect to Defra instruction on security**	20/01/2010	N/A	Any	AGREED TO USE WRMP
14	Information on current capacity in abstraction licences	WCS	AWS	Ideal	required to calculate capacity in existing licences - **a statement from AWS would suffice, stating available capacity or not with respect to Defra instruction on security**	20/01/2010	N/A	Any	AGREED TO USE WRMP
15	Information of growth forecasts already catered for in AWS' planning	WCS	AWS	Ideal	what growth figures have been used by AWS for the water supply zone/WRZ - ideal to make a comparison with RSS target which is being assessed in the WCS as an evidence base, and to compare against RSS review levels	20/01/2010	Part	Any	TAKE FROM WRMP - **May need to refer to**

Request No.	Data Type	Required for	Stakeholder	Priority (see key in comment)	Notes	Requested When	Received	Format	Notes
16	Location of WTW - and information relating to capacity constraints	WCS	AWS	Required	required to determine supply issues to growth locations. It is acknowledged that there are limitations on the data that can be supplied under Defra instruction, **therefore a statement from AWS on capacity limits at WTW would suffice**	20/01/2010	Yes	Any	Still waiting
17	Water Supply network	WCS	AWS	Required	ideally, a GIS layer with pipe sizes to allow assessment of capacity; **however, It is acknowledged that there are limitations on the data that can be supplied under Defra instruction, therefore a statement from AWS on capacity limits on key water supply mains would suffice**	20/01/2010	Yes	GIS layer preferable	Still waiting
18	stakeholder event report (June 2009)	WCS	Cambridgeshire Horizons	Essential	Taken from CH website	N/A	Yes	Any	
22	Cam & Ely Ouse CAMS (2007), and 2008 annual update	WCS	EA	Required	Taken from EA website	N/A	Yes	Any	
23	Nene CAMS (2005)	WCS	EA	Required	Taken from EA website	N/A	Yes	Any	
24	Old Bedford and Middle Level catchment CAMS (2006), and 2008annual update	WCS	EA	Required	Taken from EA website	N/A	Yes	Any	
25	Upper Ouse & Bedford Ouse CAMS (2005), and annual update 2008	WCS	EA	Required	Taken from EA website	N/A	Yes	Any	
30	Stage 3 (and Stage 4 where available) RoC reports for Ouse Washes SAC/SPA; Chippenham Fen and Snailwell Poor's Fen SSSI/SAC; Nene Washes SAC/SPA and Wicken Fen SSSI/SAC	WCS	EA	Essential	required for HRA of solutions	20/01/2010	Yes	Any	OW - Stage 3 (AA) & 4 CF/WF (fens SAC combined) Stage 3 & 4 NW - Stage 3, & 4 WF SSSI - Stage 3 CF SSSI - Stage 3
32	Growth figures to use, broken down into proposed allocations	WCS	East Cambs	Essential	Assessments cannot be made on future WwTW capacity as a result of growth if it is not known where growth is likely to be allocated	20/01/2010	Yes	Excel format preferable	TBC after planning meetings
33	Confirmation on the RSS review target scenarios, including whether the growth is pro rata'd in each allocation, or growth increased at different locations	WCS	East Cambs	Essential	Essential if a review of RSS review growth is to take place	20/01/2010	Part	Excel format preferable	TBC after planning meetings
39	study of catchment scale impacts of housing growth to support the RSS review	WCS	AWS	Required	Page 10 of scoping study says that AWS is undertaking this and recommends that this is used for the Outline study	20/01/2010	Part	Any	Print out's provided at meetignm wioth Paul Maxwell - need breakdown of pcc and OR assumptions to calcuate how OR changes oevr time
41	Details of Multi Criterion Analysis used in Cambridge Study for assessing solutions in relation to climate change	WCS	Cambridgeshire Horizons	Ideal	Mentioned at the meeting	20/01/2010	Yes	Any	
45	Cross sections of the watercourses in proximity to WwTW discharge locations	WCS	EA	Ideal	Useful for assessing hydraulic capacity for additional wastewater discharge	20/01/2010	Yes	DWG	
46	Confirmation on the coverage of national SIMCAT models for watercourses in study areas	WCS	EA	Ideal	Useful for determining of more detailed modelling might required to assess impact of wastewater discharges	20/01/2010	No	Any	Still waiting

Request No.	Data Type	Required for	Stakeholder	Priority (see key in comment)	Notes	Requested When	Received	Format	Notes
49	Urban Capacity studies or SHLAA information	WCS	East Cambs	Ideal		20/01/2010	No	Any	TBC after planning meetings
50	Employment Land Reviews	WCS	East Cambs	Ideal	if available	20/01/2010	No	Any	TBC after planning meetings
51	Location of regional, county and local wildlife/ecology sites including RNR, LNR, SNCI	WCS	East Cambs	Ideal	Provided by email (jason Littleboy - 9th Feb 09)	20/01/2010	Yes	GIS provided	
52	Annual Monitoring Reports for 2009	WCS	Fenland	Ideal	Link to website provided - but not for 2008/09	20/01/2010	Yes	Any	
55	Contact for Entec undertaking the Wisbech WCS study	WCS	Cambridgeshire Horizons	Required	Required in order to ensure capacity issues linking both studies are addressed	20/01/2010	Yes	Any	details given
56	Green Infrastructure Study	WCS	Cambridgeshire Horizons	required	Available on website, **but a complete CD version would be preferable**	20/01/2010	Yes	CD version preferable	Link on website
57	East of England Capacity Delivery Study	WCS	Cambridgeshire Horizons	required	Already held from other studies in area	N/A	Yes	Any	
63	River Flows (mean and 95%ile for period 2004-2009) fro receiving watercourse upstream of each WwTW	WCS	EA	Required	Required to Run RQP for water quality capacity of receiving watercourses - Gauged data preferred, followed by national SIMCAT data, or flow estimates	20/01/2010	Yes	Excel format preferable	Provided where available
64	Water Quality monitoring data (2004-2009) upstream and downstream of each WwTW for BOD, Ammonia (as N), Phosphate (as orthophosphate), DO and Suspended Solids	WCS	EA	Required	Required to Run RQP for water quality capacity of receiving watercourses - **Summary data would suffice**	20/01/2010	Yes	Excel format preferable	Now received via Project Space
65	Nene CAMS (2008-present consultation docs)	WCS	EA	Required	2005 strategy obtained. Cycle commenced again in 2008, EA to provide any draft/consultation documents available**, EA confirmed no further information available.**	20/01/2010	Yes	Any	
71	Confirmation of employment types for each employment area envisaged	WCS	East Cambs	Required	Important as it affects wastewater generation and water supply requirements (although not essential)	20/01/2010	Part	Any	TBC after planning meetings
72	Confirmation of the housing numbers broken down into a) already built, b) granted permission but not built, and c) residual target to meet RSS requirements	WCS	East Cambs	Required	RSS target figures already built affects baseline of assessment as this is already accounted for in measured flow and supply	20/01/2010	Yes	Excel format preferable	Provided via Paul Mumford - Project Space
73	Core Strategy documents (draft)	WCS	Fenland	Required		20/01/2010	Yes	Any	Link to website
74	Annual Monitoring Report for 2009	WCS	East Cambs	Ideal	RECEIVED, 22/01/2010	20/01/2010	Yes	pdf	
76	Standard Text on Water Resources and WFD	WCS	AWS	required	Mentioned at Inception meeting. **Position statements unlikely to be signed off in time for use in study.**	20/01/2010	No	Any	Waiting
77	Core Strategy & Draft proposals Map	WCS	East Cambs	Required	RECEIVED, 22/01/2010	20/01/2010	Yes		
91	Confirmation on the RSS review target scenarios, including whether the growth is pro rata'd in each allocation, or growth increased at different locations	WCS	Fenland	Essential	Info in AMR (not yet provided) - numbers indicated but not lcoations	20/01/2010	Part	Excel format preferable	TBC after planning meetings
96	Employment Land Reviews	WCS	Fenland	Ideal	if available	20/10/2010	No	Any	TBC after planning meetings
98	Confirmation of employment types for each employment area envisaged	WCS	Fenland	Required	Important as it affects wastewater generation and water supply requirements (although not essential)	20/01/2010	Part	Any	TBC after planning meetings
99	Confirmation of the housing numbers broken down into a) already built, b) granted permission but not built, and c) residual target to meet RSS requirements	WCS	Fenland	Required	RSS target figures already built affects baseline of assessment as this is already accounted for in measured flow and supply	20/01/2010	Part	Excel format preferable	TBC after planning meetings
102	East cambs infrastructure study	WCS	East Cambs	Ideal		N/A - provided to us	Yes	pdf	Final draft
110	East Cambs CS representations	WCS	AWS	Ideal	Received via Hannah by planning investigations	N/A	Yes	Word	

Appendix B: WwTW Details

Table B1: WwTW taken forward in capacity assessments

Council Area	WwTW	Consented DWF (m3/d)	Measured flow (m3/d)	BOD (mg/l)	TSS (mg/l)	NH4 (mg/l)
East Cambs	Isleham WwTW	423	231	45A	65	8
East Cambs	Soham WwTW	2,894	715	17A	35	8
N/A	Newmarket WwTW	6,100	1,270	12A	20	4
East Cambs	Burwell WwTW	1,373	777	14A	27	9
East Cambs	Bottisham WwTW	1,046	850	20A	40	5
East Cambs	Stretham WwTW	500	206	20A	35	20
East Cambs	Haddenham WwTW	749	484	20A	35	5
East Cambs	Wilburton WwTW	225	189	20A	50	-
East Cambs	Ely Old WwTW	4,350	2,315	25A	50	15
East Cambs	Ely New WwTW	1,604	1,148	25A	50	10
East Cambs	Witchford WwTW	730	400	20A	40	12
East Cambs	Littleport WwTW	2,314	1,900	15A	30	5
East Cambs	Little Downham WwTW	431	402	15A	30	10
East Cambs	Mepal WwTW	180	165	40A	60	25
East Cambs	Witcham WwTW	1,328	944	12A	20	6
Fenland	Manea Town Lots WwTW	320	233	15A	20	5
Fenland	Chatteris Nightlayer Fen WwTW	3,800	2,242	15A	30	6
Fenland	Whittlesey WwTW	3,487	3,113	15A	30	8
Fenland	March WwTW	5,148	2,230	10A	20	3
Fenland	Parson Drove WwTW	100	41	15A	30	10
Fenland	Benwick WwTW	180	52	15A	30	17
Fenland	Doddington WwTW	640	490	20A	24	-
Fenland	West Walton WwTW	14,894	11,700	40	120	20

Appendix C: Wastewater Network Assessments

stations as opposed to gravity to transfer flow to the treatment works. Most of the key WwTWs considered have Settled Storm Sewage Discharge Consents (SSSDC) (see C1 below) and their sewer networks are combined systems (i.e. they transmit both foul wastewater and surface water).

In addition, most of the wastewater drainage catchments have records of sewer flooding incidents as recorded in the DG5 register to OFWAT.

Table C1: Catchment Settlement Areas with SSSDC & DG5

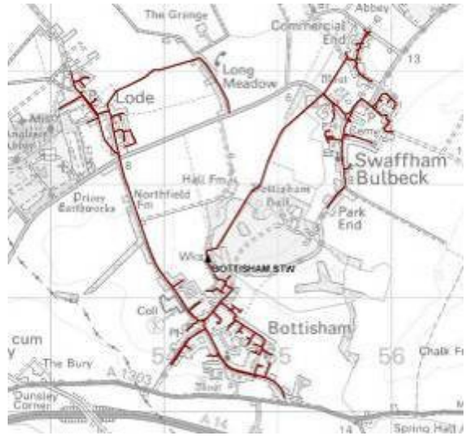
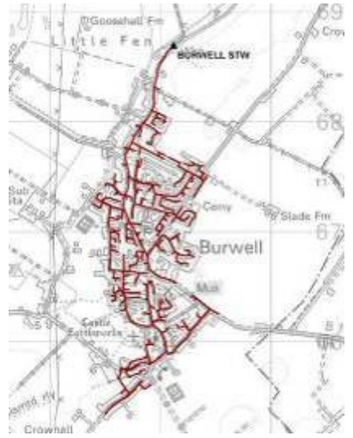
Catchment Names[68]	Settlements within catchment	SSSDC	DG5
Benwick	Benwick	X	X
Bottisham	Bottisham, Lode, Swaffham Bulbeck	✓	X
Burwell	Burwell	✓	X
Chatteris	Chatteris	✓	✓
Doddington	Doddington, Eastwood End & Wimblington	✓	✓
Ely (old & new)	Ely	✓	✓
Haddenham	Haddenham	X	✓
Isleham	Isleham	X	X
Little Downham	Little Downham & Pymoor	✓	✓
Littleport	Littleport	✓	✓
Manea	Manea	✓	X
March	March	✓	✓
Parson Drove	Parson Drove, Church End	X	X
Soham	Soham, Fordham & Wicken	✓	✓
Stretham	Stretham	✓	✓
Whittlesey	Whittlesey, Coates & Eastrea	✓	X
Wilburton	Wilburton	unknown	X
Witcham	Witcham & Sutton	✓	X
Witchford	Witchford	✓	X
Wisbech/West Walton	Wisbech, Wisbech St Mary, Tydd St Giles, Gorefield, Leverington, Leverington Common, Elm, Friday Bridge & others outside district	✓	✓

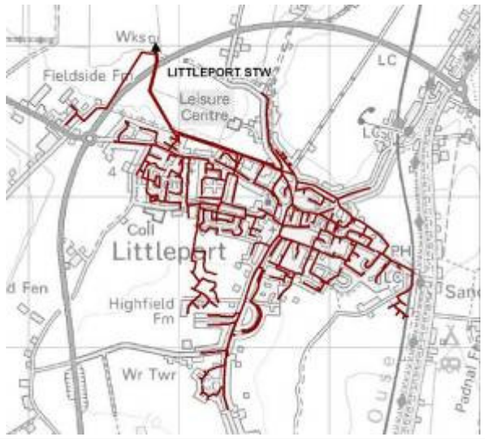
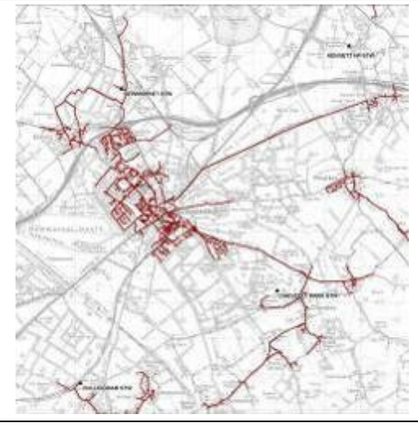
In order to fully assess capacity within a combined system, inputs from detailed hydraulic network modelling would be required in order to take into consideration the effect of rainfall on hydraulic capacity by modelling flow from the boundary of preferred development sites. However, development site locations are not available at this point in the production of the LDFs and network modelling would be too detailed at this strategic stage of developing the Outline Strategy. Therefore, a high level of assessment of potential capacity in the catchment networks draining to the key WwTWs has been carried out with the benefit of discussions with AWS network engineers.

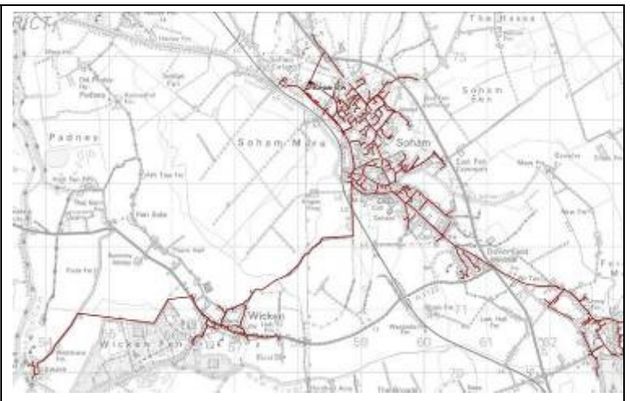
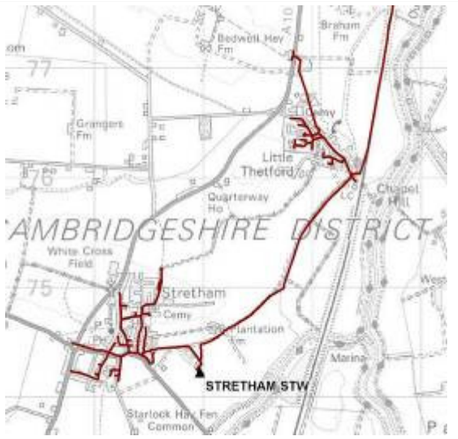
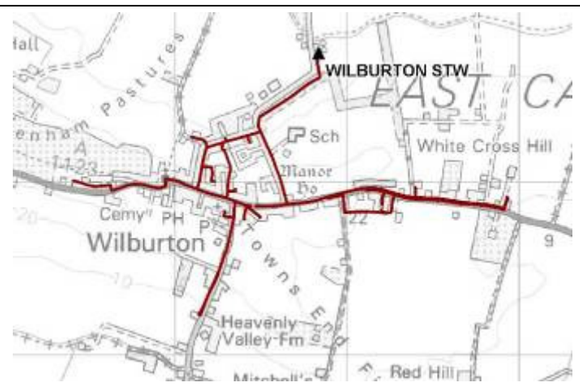
[68] Catchment name reference refers to WwTW it is connected to.

The network layout, including pipe sizes and locations of pumping stations was used in conjunction with records of sewer flooding and AWS feedback on problem drainage areas to determine which catchments are likely to have more capacity than others. The assessments have been carried out where there is significant growth proposed. The detail of this assessment, are summarised in the following tables.

Table C2: : East Cambridgeshire District Wastewater Network Assessment

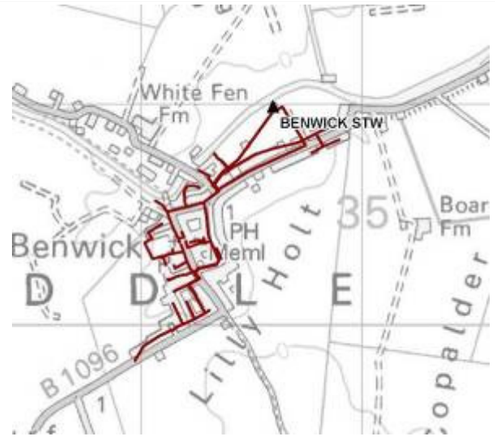
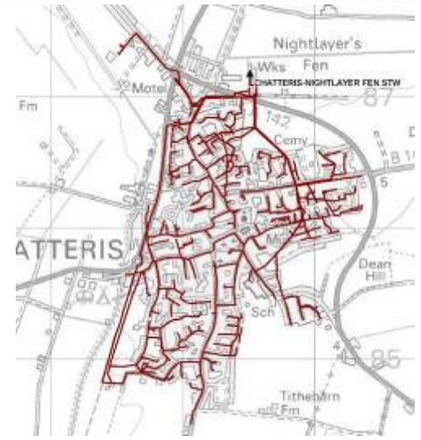
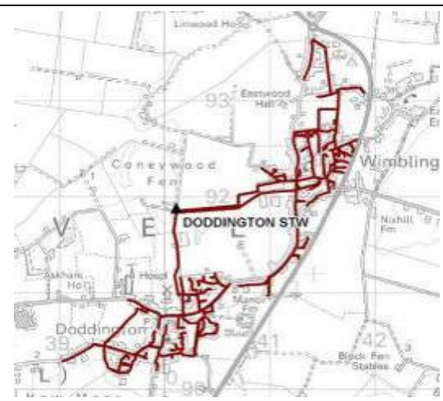
Town	STW	Catchment Description	Location
Bottisham	Bottisham STW	The sewerage network from Lode, Swaffham Bulbeck and Bottisham settlement area is mainly a combined system, which drains into Bottisham STW located south west of East Cambridgeshire District. This catchment is dependant on a network of wastewater pumping stations. The main sewers leading to the STW are pumping mains; further study would be required in order to determine the possibility of whether new development areas could be connected to the existing system. According to AWS, there is no network model available for this catchment. The new connections will need to be investigated in detail at the next stage of the WCS once precise development locations are known.	
Burwell	Burwell STW	The sewerage network is mainly a combined system, which drains into Burwell STW located in the mid south-east of the East Cambridgeshire District. This catchment is dependant on a network of wastewater pumping stations. AWS has stated that there are major issues within the catchment network, which may limit capacity for future development connection. The existing catchment area is a densely populated area with CSOs and pumping stations. AWS records indicate that network has higher measured flow (entering STW) than consented or estimated flows, which may limit spare capacity in existing sewer network. More information on the network (especially gravity sewers leading to the STW) catchment would be required, along with the network modelling input to assess the network capacity at the detailed WCS stage.	
Ely	Ely Old STW Ely New STW	The sewerage network is mainly a combined system, which drains into Ely Old and Ely New STWs located in the mid north of the East Cambridgeshire District. This catchment is dependant on a network of wastewater pumping stations. An old network model for exists for the Ely catchment, but an updated model will be required for network capacity assessment to assess the possibility of new connections. The Local Development Framework targets indicate that additional flow from new development could be between 20% and 35% to the existing flow, which is a significant discharge into existing sewer network. As such, the new development may need new or upgraded infrastructure to cater for the increased flows.	

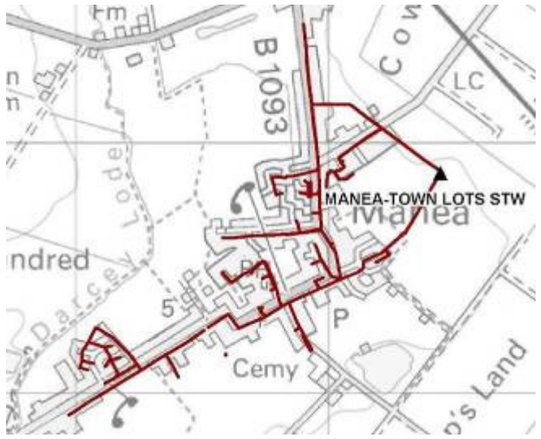
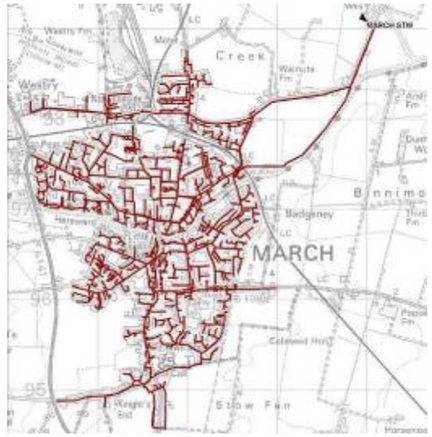
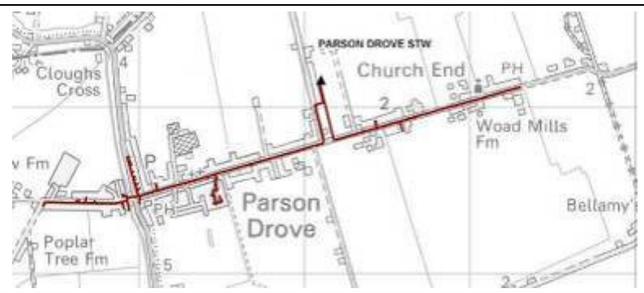
Littleport	Littleport STW	The sewerage network is mainly a combined system, which drains into Littleport STW located north of East Cambridge District. This catchment is dependant on a network of wastewater pumping stations. There are a significant number of DG5 records and CSOs within this catchment area. Minimal information was available at the time of this assessment on existing main sewer leading to STW, but in view of the current issues with the existing network there might be a need for new infrastructure to serve any new development. The proposed development is expected to discharge an additional flow up to 12% of existing flow, but any new connections will need to be investigated in detail at the next stage of the WCS when development locations are known. This should include an assessment of the updated sewer model.	
Mepal	Mepal STW	Only one new dwelling is proposed in Mepal, which will not have a significant effect on the capacity of the network.	
Newmarket	Newmarket STW	The Newmarket catchment largely lies outside the study area and has therefore not been fully assessed. However, the proposed development is small compared with actual catchment DWF flow and further study should be carried out when the precise development location is known.	

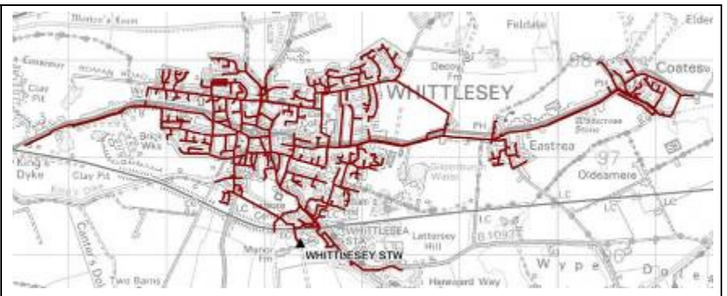
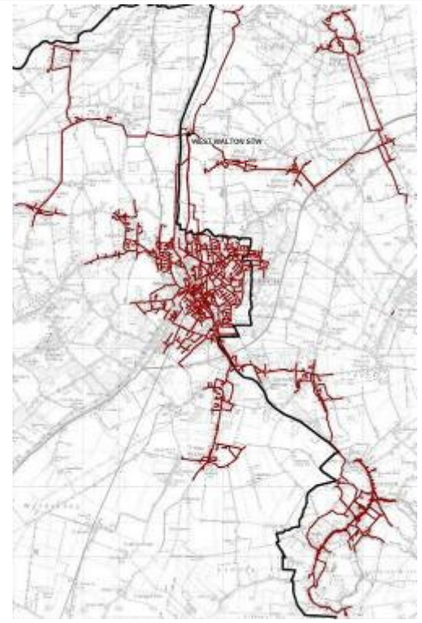
Soham	Soham STW	The sewerage network from the Soham, Fordham and Wicken areas is mainly a combined system, which drains into Soham STW located in the centre of the East Cambridgeshire District. This catchment is dependant on a network of wastewater pumping stations. AWS has highlighted that the network has a number of DG5 records and CSOs and the network also suffers from infiltration, all of which need to be considered when assessing the network capacity. In order to carry out this assessment, a new hydraulic model will be needed, which will need to include infiltration. Further detail on sewer network (pumping/gravity mains and pumping station) leading to STW would also be required in order to assess network capacity. As part of the LDF, proposed development on greenfield sites will cause a significant increase in sewage volumes and there will be a need to build new sewer network infrastructure to cater for the new development. Furthermore, the existing network pumping stations are located very close to STW, which suggests the presence of low lying flat areas which will require new infrastructures (such as pumping stations) to facilitate sewage transfer. The proposed development will increase flows from 38% to 70.3%; the existing network will not have the capacity to cope such significant flow increase.	
Stretham	Stretham STW	The sewerage network from Stretham is mainly a combined system, which drains into Stretham STW. This catchment is dependant on a network of wastewater pumping stations. This is a small catchment area and the final sewer main is pumped into STW. When the precise location of development is known, further study would be required in order to determine the possibility of connecting new development to the existing system, or whether new or upgraded infrastructure will need to be considered.	
Wilburton	Wilburton STW	The sewerage network drains into Wilburton STW, which is located in the west of the East Cambridgeshire District. This catchment is dependant on a network of wastewater pumping stations. This is a small catchment area and the final sewer main is pumped into STW. More information would be required to assess the network capacity and once the precise locations of development is confirmed, further study should be carried out to determine the possibility of connecting new development to the existing system or whether new or upgraded infrastructure is required. Depending on the location of new development, new development within the village of Wilburton could also be connected to the nearby treatment works at Haddington or Stretham, subject to a full assessment of network capacity.	

Witcham, Sutton and Wentworth	Witcham STW	The sewerage network from Witcham, Sutton and Wentworth areas is mainly a combined system, which drains into Witcham STW located in the west of the East Cambridgeshire District. This catchment is dependant on a network of wastewater pumping stations. The majority of the sewage flow is from Sutton, although this should be confirmed by further study once the precise location of the proposed development is known. The study would be required in order to determine whether new development areas could be connected to the existing system; one possible location for connection would be the Sutton pumping station to Witcham STW.	

Table C3: Fenland District Wastewater Network Assessment

Town	STW	Catchment Description	Location
Benwick	Benwick STW	The sewerage network from Benwick is mainly a combined system, which drains into Benwick STW. This catchment is dependant on a network of wastewater pumping stations. Small catchment area with scattered pumping stations; depending location of new development capacity assessment should be carried out and additional information sought on pumping stations.	
Chatteris	Chatteris-Nightlayer Fen STW	The sewerage network is mainly a combined system, which drains into Chatteris STW located in the south of the Fenland District. This catchment comprises a network of wastewater pumping stations at various locations in the catchment. There is limited information on main sewers network leading to Chatteris Nightlayers Fen STW and AWS has highlighted that there are CSOs in the catchment area. An initial assessment of existing sewer network indicates that the additional flow of between 13.5% to 20.0% from new development is most likely require new strategic infrastructure or upgrades to pumping station capacity. Any new connections will need to be investigated in detail at the next stage of the WCS when development locations are known, including network modelling.	
Doddington (Including Wimblington)	Doddington STW	The sewerage network from Doddington and Wimblington is mainly a combined system, which drains into Doddington STW located middle of Fenland District. This catchment is dependant on a network of wastewater pumping stations. According to AWS there are structural and hydraulic issues related to this catchment network, in addition to flooding issues (one DG5 record exists in the south east of the catchment). The main sewers leading to Doddington STW are sewer pumping mains; for connection purpose network modelling input would be required to consider storm flow conditions. The additional flow from proposed development is estimated to be between 6% and 8.3% of the existing flow. Preliminary assessment of existing network indicates that new development in Doddington and Wimblington may need new or upgraded infrastructure, to resolve the current issues with the existing network.	

Manea	Manea Town Lots STW	The sewerage network is mainly a combined system, which drains into Manea Town Lots STW located in the south east of the Fenland District. This catchment is dependant on a network of wastewater pumping stations. Proposed development will have significant discharge into the existing network, and the estimated additional flow ranging from 18% to 25% of existing flow. The new development may need new infrastructure or an upgrade to pumping stations would be required to cater for sewage. Further study is recommended and consideration should be given to any CSOs and storm flow event in the catchment network as well.	
March	March STW	The sewerage network is mainly a combined system draining by gravity to a terminal Pumping station, onwards to March STW located in the centre of the Fenland District. Information received from AWS indicates that this catchment area has a significant number of DG5 records and CSOs. An assessment of the hydraulic modelling inputs for the network capacity assessment will be required, once the precise locations of the development are known. The proposed new development will increase flows by between 20.3% and 30.5%, which will have a significant impact for the sewer network, given the current issues. There will be a need for new strategic infrastructure or upgrades to pumping station capacity, however, new connections will need to be investigated in detail at the next stage of the WCS when development locations are known.	
Parson Drove (Including Church End)	Parson Drove STW	The sewerage network is mainly a combined system, which drains into Parson Drove STW. This catchment is dependant on a network of wastewater pumping stations. This is a small catchment and it is likely that new infrastructure will be required as significant flow is predicted from the new development. Proposed development at Church End is very like to be able to connect to existing sewer subject to site conditions.	

Whittlesey (Including Coates and Eastrea)	Whittlesey STW	The sewerage network from Whittlesey, Coates and Eastrea is mainly a combined system, which drains into Whittlesey STW located in the west of the Fenland District. This catchment is dependant on a network of wastewater pumping stations. It is estimated that the proposed development could increase existing flows by between 7% and 10% of existing levels. AWS records did not indicate any DG5 records for this catchment and it is likely that the proposed development at Eastrea will be able to connect to existing sewer network (subject to site conditions), although the proposed new development at Whittlesey may need new or upgraded infrastructure to cater for additional flows. The proposed development in Eastrea is small and connection to existing sewer network is possible, subject to further assessment, including site condition. The above conclusions should be confirmed, to include hydraulic modelling results, when the precise location of the proposed development is confirmed.	
Wisbech (Including Elm, Friday Bridge, Gorefield, Leverington, Leverington Common, Tydd St Giles, Wisbech St Mary)	West Walton STW	This is a large sewerage catchment which encompasses Tydd Giles, Gorefield, Leverington, Leverington Common, Wisbech, Wisbech St Mary, Elm, Friday Bridge and others settlements outside the Fenland District (in West Norfolk district). The network is mainly a combined system, which drains into West Walton STW located to the north east of Fenland district. The catchment is dependant on a network of wastewater pumping stations; as the catchment area is large, pumping stations are connected in the network (from one settlement to another) in order to transfer to STW downstream. AWS has stated that an updated network model is available for this catchment; the inputs of the modelling would be required to assess the network capacity. Depending on the precise location of proposed development infrastructure upgrades may be required. Development located in the south of the catchment (Friday Bridge & Elm area) may require new infrastructure, as it is located at the far end of the catchment to STW. For the proposed development at Tydd St Giles & Gorefield, there is need to evaluate flow capacity for downstream pumping stations. General network model data will be required for the proposed connection for the new development from Leverington Common and Leverington. Further study would be required in order to determine the possibility of connecting new development areas.	

Appendix D: Water Resource Availability

Data sources

The following sources of information have been used in this Water Resources assessment:

- Cambridgeshire Horizons, East Cambridgeshire and Fenland District Councils Water Cycle Study and Strategic Flood Risk Assessment Scoping Report[69];
- Anglian Water's Water Resource Management Plan[70];
- Environment Agency's Catchment Abstraction Management Strategies (CAMS)[71]:

  Cam and Ely Ouse,

  Nene,

  Old Bedford,

  Welland,

  Upper and Bedford Ouse,

  North Essex,

  East Suffolk,

  Broadland Rivers,

  North Norfolk, and

  North West Norfolk.
- Anglian Region River Basin Management Plan[72];
- regional policy outlined in the East of England Plan[73];
- The Anglian Region Water Resources Strategy[74];
- The Environment Agency's 'Identifying areas of water stress' consultation[75];
- East of England Capacity Delivery Study: Phase One, Halcrow Group Ltd on behalf of EA, EERA and GO-East[76]; and
- Water cycle studies in neighbouring districts[77, 78, 79, 80].

[69] http://www.cambridgeshirehorizons.co.uk/documents/to%20be%20filed/ecf_wcs_final_151009.pdf
[70] http://www.anglianwater.co.uk/environment/water-resources/resource-management/
[71] http://www.environment-agency.gov.uk/business/topics/water/119931.aspx
[72] http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/anglian/Intro.aspx
[73] http://www.gos.gov.uk/goee/docs/Planning/Regional_Planning/Regional_Spatial_Strategy/EE_Plan1.pdf
[74] Water resources strategy for Anglian Region, Environment Agency, 2009
[75] Identifying areas of water stress, consultation document, January 2007
[76] Halcrow Group Ltd on behalf of Environment Agency, EERA and GO-East, Dec 2006
[77] http://www.cambridgeshirehorizons.co.uk/documents/to%20be%20filed/ecf_wcs_final_151009.pdf
[78] http://www.huntingdonshire.gov.uk/Environment%20and%20Planning/Planning/Planning%20Policy/Pages/Monitoring%20and%20Research.aspx
[79] http://www.forest-heath.gov.uk/NR/rdonlyres/6CE666F1-7D27-4DA0-9CEB-0B51798225F9/0/5000BM01397BMR05FinalStage1WCSandLevel1SFRA.pdf
[80] http://www.cambridgeshirehorizons.co.uk/documents/publications/reference/water_cycle_strategy_phase_1.pdf#

Water Resources in the Study Area

The climate within the East Cambridgeshire and Fenland area is typified by low rainfall with little variation in the average amount throughout the year, averaging about 600 mm. The annual evapotranspiration averages 380 mm. 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.

Geology and Hydrogeology

The underlying geology of the study area is largely clay of the Oxford and Amphill series, although to the south of the district this is overlain by chalk on the higher ground and there is a strip of greensand between Ely and Newmarket. The low-lying fens have predominantly alluvial drift geology to the north and peat and till in the central areas.

To the southeast of Cambridge and Newmarket, corresponding with area of the chalk, the groundwater vulnerability is classed as a major aquifer, with soils of either high or intermediate leaching potential. To the north west of Cambridge and Newmarket the groundwater vulnerability is largely a non-aquifer (negligibly permeable), although there are areas of minor aquifer interspersed. The low-lying fens to the west of the study area are non-aquifer. (NRA Groundwater Vulnerability Map series, sheets 32 and 25, North Essex and West Norfolk).

Hydrology

The River Nene flows from its source in Northamptonshire to its outfall in the wash, with a catchment area of approximately 631 square miles (1,630 km^2). The Nene is used to maintain water levels in Middle Level Internal Drainage Board area through Stanground Lock on the eastern outskirts of Peterborough, in order to maintain navigation levels that may be adversely affected by agricultural abstraction. Other losses from the Nene include releases to the Nene Washes via Moretons Leam for habitat maintenance and flood storage, abstraction to Rutland Water at Wansford upstream of the study area, release of irrigation water to the Northern Levels and maintenance of flows to the tidal river.

The River Ouse also has its source in Northamptonshire and flows out to the wash at Kings Lynn. The river enters the study area at Earith where flow is directed into the tidal Hundred Foot River that takes the flow down to King's Lynn and The Wash. During flood conditions, flood waters are directed to the Old Bedford River and the Ouse Washes, for release to the tidal Ouse at Denver at low tide. Earith Sluice directs the water into the Old Bedford River which overtops and fills to Ouse Washes and stores the flood water for release at low tide to the tidal Ouse at Denver.

The River Cam joins the Ely Ouse at Upware and discharges to the tidal Ouse at Denver, along with the River Snail (or Soham Lode), River Lark and Little River Ouse. Under flood conditions water is released from the Ely Ouse into the Flood Relief Channel at Denver, which transfers flood flows toward The Wash. The Ely Ouse Transfer Scheme transfers water from the Ely Ouse at Denver, downstream of the study area, to the River Stour via the Cut Off Channel.

There are a large number of artificially drained and pumped channels throughout the study area; due to the very flat and low lying topography few of the smaller watercourses flow and drain naturally by gravity.

Water Resources Management Plan

AWS is the sole supplier of water in the study area. AWS's Final WRMP was issued in 2010; and this Outline study builds on the Scoping study findings which were completed prior to the final WRMP being

published. The WRMP sets out how the Company intends to balance supply and demand over the next 25 years up to 2031, taking account of expected levels of per capita consumption and forecast population at a zonal level.

Water Resource Zones

As described in the Scoping study, the study area is supplied with water from three water resource zones (WRZ):

- the northern area around Wisbech is supplied by water resources in the Fenland WRZ (WRZ5);
- the southern half of Fenland local authority area, including March, Whittlesey, and Chatteris is supplied by water resources in the Ruthamford WRZ; and
- the whole of East Cambridgeshire local authority area is supplied by water resources from the chalk aquifer in the Cambridgeshire and West Suffolk WRZ.

These WRZ are sub-divided into smaller Planning Zones (PZ) (see Figure G1 below). The Fenland, and Cambridgeshire and West Suffolk WRZ are supplied by groundwater via boreholes in the Chalk aquifer, although AWS also uses the water resources of the sandstone and limestone aquifers in the north. The Ruthamford WRZ is largely underlain by clay and surface water is taken from the large storage reservoirs (Rutland, Grafham, and Pitsford), filled by abstraction from the rivers Nene, Welland and Great Ouse.

Water Resource Zone Forecast Supply-Demand Balance

In order to assess the potential environmental constraints within which future growth needs to be accommodated, it is necessary to identify the baseline situation (i.e. to identify any deficits in the forecast supply-demand balance) in each water resource zone.

<u>WRZ 5 – Fenland</u>

Despite the superficial abundance of water in the Fens, the area has limited reliable water resources and the Fenland WRZ is supplied from a range of sources around its periphery. The central area of the Fens is supplied from the Chalk aquifer either directly by abstractions from borehole sources on the thinning edge of the aquifer outcrop or indirectly from the Chalk-fed rivers of the Wissey and Nar before they enter the Fens. In the north, the thickening Chalk aquifer is again able to provide secure water resources. The Sandringham Sands aquifer in northwest Norfolk was developed during the early 1990s for blending with the overlying high nitrate Chalk groundwater to ensure water quality compliance.

The Fenland WRZ as a whole is forecast to have a surplus of available against target headroom until well into the planning period. However more detailed analysis shows that two out of the five PZs are projected to have headroom deficits against dry year average and critical peak period forecasts by the end of the planning period. These are:

Table D1: Forecast deficit and preferred options in the Fenland WRZ

Planning Zone		Forecast deficit in 2036-37		Preferred water management option
		Average (Ml/d)	Peak (Ml/d)	
PZ23	Feltwell	-0.37	-1.19	Additional metering, Active leakage control, Denton Lodge WTW improvements, Stoke Ferry WTW extn, Intra WRZ transfers
PZ25	King's Lynn	0.22	-1.58	Intra WRZ transfers

WRZ 9 - Cambridgeshire and West Suffolk

There are environmental concerns over the impact of abstraction at a small number of conservation sites, notably on the edge of the Chalk outcrop in the west of the WRZ. The need to investigate concerns on low flows in the upper and lower reaches of the River Lark was included in the AMP3 WREP and further work is proposed during AMP5.

The Cambridgeshire and West Suffolk WRZ is forecast to have a surplus of available against target headroom until the last five years of the planning period. More detailed analysis shows four out of the nine PZs are projected to have headroom deficits against dry year average and critical peak period forecasts by the end of the planning period. These are:

Table D2: Forecast deficit and preferred options in the Cambridgeshire and West Suffolk WRZ

Planning Zone		Forecast deficit in 2036-37		Preferred water management option
		Average (Ml/d)	Peak (Ml/d)	
PZ48	Bury St Edmunds	-3.64	-3.47	Active leakage control, Water efficiency measures, Enhanced metering Barnham Cross transfer, Great Ouse groundwater scheme south
PZ49	Cheveley	0.04	-0.18	Pressure reduction, Intra WRZ transfer
PZ50	Ely	-1.86	-0.19	Active leakage control, Water efficiency measures, Enhanced metering Barnham Cross transfer
PZ59	Haverhill	-1.23	-0.97	Active leakage control, Enhanced metering, Pressure reduction, Intra WRZ transfer

WRZ 11 - Ruthamford

The Ruthamford system is a net exporter of water with bulk supplies to Veolia Water central (formerly Three Valleys Water Services) and to Severn Trent Water. Both of these bulk supplies are under long-standing statutory agreements. It has been agreed with both companies that these arrangements will remain as at present for the WRMP.

The Ruthamford WRZ is forecast to have a surplus of available against target headroom at the start of the planning period as a result of investment in additional output from Rutland Water's WTW during the AMP4 period. However, it is forecast that a deficit will develop in individual PZs during the AMP6 period. The analysis of target deficits is complex as there is good connection between PZs and so surpluses and deficits can be shared. However, there are bottlenecks in any water supply and distribution system, which AWS reflected in the allocation of the peak and average DO between the 21 PZs. The detailed analysis with the FORWARD model shows that 15 of the PZs are projected to have headroom deficits against dry year average and/or critical peak period forecasts by the end of the planning period. These are:

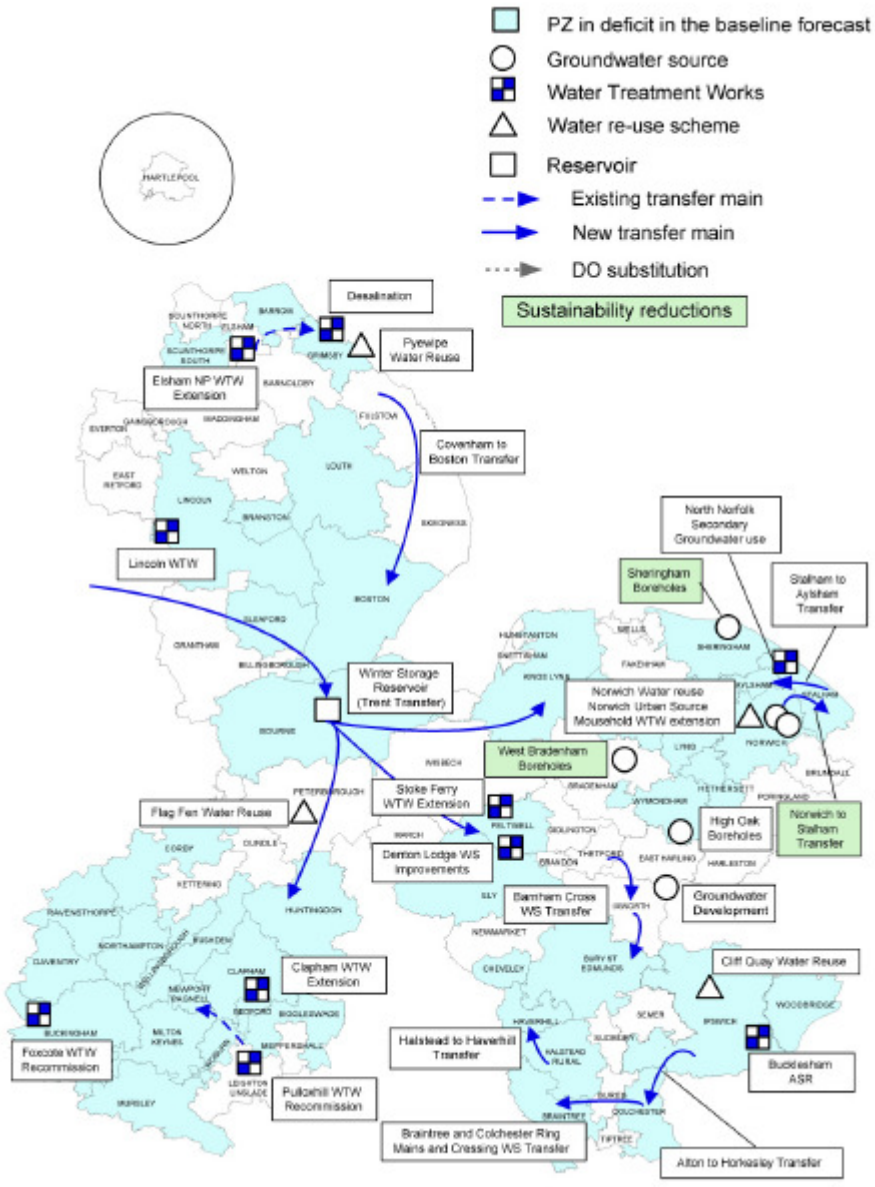
Table D3: Forecast deficit and preferred options in the Ruthamford WRZ

Planning Zone		Forecast deficit in 2036-37		Preferred water management option
		Average (Ml/d)	Peak (Ml/d)	
PZ65	Bedford	-4.69	-2.04	Intra zonal transfer
PZ66	Biggleswade	-6.28	-8.27	Intra zonal transfer
PZ67	Buckingham	-0.93	1.79	Intra zonal transfer, Foxcote WTW refurbishment
PZ68	Clapham	-0.56	0.93	Intra zonal transfer, Clapham WTW extension
PZ69	Corby	-0.65	3.36	Intra zonal transfer
PZ70	Daventry	-8.16	-16.01	Intra zonal transfer
PZ71	Huntingdon	-5.24	-5.87	Intra zonal transfer
PZ73				Pulloxhill WTW refurbishment
PZ76	Milton Keynes	-38.00	-42.99	Intra zonal transfer
PZ77	Mursley	-0.52	0.52	Intra zonal transfer
PZ78	Newport Pagnell	-0.39	-0.33	Intra zonal transfer
PZ79	Northampton	-23.68	-28.05	Intra zonal transfer
PZ81				Flag Fen re-use
PZ82	Ravensthorpe	-1.59	3.34	Intra zonal transfer
PZ83	Rushden	-4.98	-6.17	Intra zonal transfer
PZ84	Wellingborough	-2.07	0.7	Intra zonal transfer
PZ85	Woburn	-0.75	-0.43	Intra zonal transfer

The following figures show geographically where there is a forecast supply/demand deficit up to 2035, both for the average and peak demand.

The above tables also indicate measures identified by AWS for demand management and resource development, as shown in the schematic Figure G4 below:

Figure D4: AWS Selected Resource Development options[81]



[81] Taken from AWS Water Resources Management Plan 0 March 2010

Ecological Considerations of further demand

To avoid potential future deficits in water supply AWS will need to develop additional water resources or reduce demand for water from its customers. This section considers the environmental capacity to provide water resources in the study area, by considering the environmental impact of the resource development options listed above in Tables 6-1 to 6-3 and Figure 6-1.

The total demand for water from households is high and the Environment Agency has assessed that this area is under serious water stress. This is defined as:

> "*an area where the current household demand for water is a high proportion of the current effective rainfall or, the future household demand for water is likely to be a high proportion of the effective rainfall available to meet that demand. When the demand for water is high or growing, this can result in a serious level of stress on the available water resources" (Environment Agency, 2007).*

The EA also states that:

> "*in areas of serious water stress, water abstraction is already close to or above acceptable limits"* and *"that that in some areas to provide more water may not be sustainable and could increase the risk to the environment, people and business in future. The highest levels of water efficiency activities should take place in the areas of serious water stress".*

The water stress methodology was developed by the Environment Agency in 2007. It provides an indication of relative water stress using a formula that scores each water company area according to the following criteria:

- current per capita consumption (pcc) for water;
- forecast growth in per capita consumption (pcc) for water;
- forecast population growth;
- current water resource availability; and
- forecast resource availability.

Ecological Constraints on Abstraction

As discussed above, the study area is supplied with water from three water resource zones:

- the northern area around Wisbech is supplied by water resources in the Fenland WRZ (WRZ05);
- the southern half of Fenland local authority area, including March, Whittlesey, and Chatteris is supplied by water resources in the Ruthamford WRZ (WRZ11); and
- the whole of East Cambridgeshire local authority area is supplied by water resources from the chalk aquifer in the Cambridgeshire and West Suffolk WRZ (WRZ09).

The Fenland and Cambridgeshire & West Suffolk WRZ are supplied by groundwater via boreholes in the Chalk aquifer, although Anglian Water also uses the water resources of the sandstone and limestone aquifers in the north. The Ruthamford zone is largely underlain by clay and surface water is taken from the large storage reservoirs (Rutland, Grafham, and Pitsford), filled by abstraction from the rivers Nene, Welland and Great Ouse.

AWS's adopted Water Resource Management Plan[82] identifies those WRZ for which the Environment Agency has imposed sustainability reductions in order to avoid an adverse effect on European sites. The sites in question are both parts of The Broads SAC and Broadland SPA & Ramsar site - Sheringham and Beeston Commons SSSI and Upper Thurne Broads & Marshes SSSI. Both of these are in WRZ6 (North Norfolk Coast). The WRMP also identifies those WRZs for which the Environment Agency has identified that further studies to investigate impacts on European sites are required - this applies to only one Water Resource Zone (WRZ7 – Norfolk Rural) with regard to further studies Cavenham & Icklingham Heath.

The study area is not linked to either WRZ6 or WRZ7 and therefore these issues can be dismissed. The following section reviews in detail each WRZ that supplies East Cambridgeshire & Fenland:

- **WRZ05** – The WRMP notes that there are some environmental concerns on the impact of abstractions on Chalk springflows into Foulden Common SAC. However, it also states that 'The Environment Agency has informed us that there is no requirement for sustainability changes to our licences in this WRZ'. In the north of the zone there is a theoretical impact of abstractions on the wetlands along the western end of the North Norfolk Coast SPA and SAC, although Anglian Water have made allowances for sustainability reductions that might arise from a future sustainability change. The WRZ as a whole is predicted to be in surplus during the plan period and no increases in existing abstraction volumes from sources connected with European sites is intended. As such, and following any sustainability reductions that will be introduced through the RoC process, no adverse effects on European sites are anticipated.
- **WRZ09** – The WRMP identifies that there are environmental concerns over the impact of abstraction at a small number of conservation sites, notably on the edge of the Chalk outcrop in the west of the WRZ. The need to investigate effects on low flows in the upper and lower reaches of the River Lark was included in the AMP3 WREP and further work is proposed during AMP5. The Cambridgeshire and West Suffolk WRZ is forecast to have a surplus of available against target headroom until the last five years of the planning period. Deficits will be met through maintaining demand management through leakage control, household metering and the promotion of water efficiency and no increases in existing abstraction volumes from sources connected with European sites is intended. As such, no adverse effects on European sites are anticipated.
- **WRZ11** - The Ruthamford system is a net exporter of water and is likely to remain so during the plan period. The environmental concerns in the zone have arisen from the management of surface water resources in The Wash, Nene Washes, Ouse Washes and Rutland Water SPAs. The Environment Agency RoC has since confirmed (according to the WRMP) that there is no significant risk to The Wash and the Ouse and Nene Washes from abstraction for this WRZ. This has also now been confirmed regarding increased output from Rutland Water (due to the inclusion of a package of habitat creation works that will protect the integrity of the reservoir as an SPA). Although it is anticipated that there will be a net deficit in many of the PZs of this WRZ this will be met by refurbishment of Foxcote WTW and Pulloxhill WTW, extending Clapham WTW and a mixture of leakage control, household metering and the promotion of water efficiency. As far as can be determined at this stage, no increases in existing abstraction volumes from sources connected with European sites are intended. If this is the case, then no adverse effects on European sites will be anticipated.

According to the scoping report, AWS is undertaking a study to investigate the potential abstraction impacts on Soham Wet Horse Fen SSSI but this will be completed in 2015 and impacts on the site cannot be evaluated further until that time.

[82] http://www.anglianwater.co.uk/environment/water-resources/resource-management/

Therefore, while the three WRZs that supply the study area are hydrologically linked to European sites (particularly the Ruthamford WRZ which is connected to the Nene Washes SAC/SPA & Ramsar site and Ouse Washes SAC/SPA & Ramsar site), and other wildlife sites, the information provided in the WRMP indicates that abstractions within the WRZs that supply the study area are not likely to lead to a significant effect on European sites, following limited sustainability reductions that may be required following the completion of the RoC process.

There are seven non-statutory County Wildlife Sites in East Cambridgeshire which are former quarries or other standing water that may be vulnerable to excessive abstraction from the underlying aquifer:

- Chippenham Gravel Pit;
- Mepal Gravel Pits;
- Burwell Brick Pit;
- Guppy's Pond & Hilton Hedges;
- Aldreth Ponds;
- Ely Beet Pits; and
- The Swamp

There are nine non-statutory County Wildlife Sites in Fenland which are former quarries (mainly gravel pits) or other standing water that are potentially vulnerable to excessive abstraction from the underlying aquifer:

- Block Fen Gravel Pits;
- Langwood Hill Pit;
- Manea Pit;
- Bedlam Hill Pit;
- Wimblington Common Gravel Pits;
- Whitemoor Pit and Nature Reserve;
- Graysmoor Pit;
- Eldernell Gravel Pits; and
- Kings Dyke reedbed and Nature Reserve

These sites all fall within AWS's WRZ09 or WRZ05. WRZ05 is predicted to be in surplus throughout the plan period and WRZ09 is predicted to be in surplus until the last five years of the WRMP period. Although there is predicted to be a deficit in the last five years this will be addressed through mechanisms other than the development of new resources in the WRZ. Existing abstraction licences are already subject to evaluation for their impact on nature conservation interests, sustainability reductions will have already been factored into the WRMP and no new licences are proposed for these WRZ's in relation to development in East Cambridgeshire or Fenland. As such, there is no reason to conclude that there should be any adverse impact on these sites related to the delivery of the WRMP.

Habitats Directive Review of Consents

The Environment Agency informed AWS in 2008 that reductions in resource output may be required to ensure no adverse impacts on European designated conservation sites. These were initially indicative reductions, to be reviewed following the Review on Consent process; carried out to meet the requirements of the EC Habitats Directive. In the WRMP[83], AWS converted the sustainability changes defined as 'definite' by the Environment Agency to sustainability reductions to be included in the supply-demand analysis. These were confirmed with the Environment Agency for the Final Business Plan as:

- Sheringham and Beeston Commons SAC (Sheringham Sourceworks in WRZ 6) requires a 2.81 Ml/d sustainability reduction; and
- Upper Thurne Broads & Marshes SAC (Ludham Sourceworks in WRZ 6) requires a 0.46 Ml/d sustainability reduction

In order to prevent disruption to water supply, alternative resources will need to be provided and the timing of sustainability reductions will be crucial.

It is noted that AWS stated in its adopted WRMP that the Review of Consents process is not completed and that further sustainability reductions may be put forward; if so, this conclusion may have to be revised but the implication of the WRMP is that Anglian Water has taken these possible sustainability reductions into account.

[83] http://www.anglianwater.co.uk/_assets/media/AW_WRMP_2010_main_Report.pdf

Appendix E: Indicative Consents for Good Status

Table E1 below shows the outcomes of the water quality modelling exercise and demonstrates that there are five works where the at least Good (or High) Status cannot be achieved within the limits of conventional treatment.

Table E1: Summary of modelling results & suggested DWF, BOD, NH3 and P consent limits

Treatment works	Development scenario	Flow	Suggested BOD consent limit (mg/l as 95%ile)	Suggested NH_3 consent limit (mg/l as 95%ile)	Suggested P consent limit (mg/l as 95%ile)
Soham	1	3,828	17	3*	Target not achievable within the limits of conventional treatment
	2	3,904	17	3*	
	3	4,576	16	3*	
Burwell	1	1,078	8	1	Target not achievable within the limits of conventional treatment
	2 & 3	1, 091	8	1	
Bottisham	1	1,089	5	Target not achievable within the limits of conventional treatment	Target not achievable within the limits of conventional treatment
	2 & 3	1,101	5		
Haddenham	1	774	16	4	1
	2 & 3	795	15	4	1
Ely New	1	3,008	25*	10*	7
	2	3,827	25*	10*	7
	3	3,751	25*	10*	6
Witchford	1	745	14	12*	8
	2 & 3	762	13	12*	8
Littleport	1	2,568	7	5*	2
	2 & 3	2,589	7	5*	2
Witcham	1, 2 & 3	1,397	7	5*	2
Whittlesey	1	3,752	15*	3	Target not achievable within the limits of conventional treatment
	2	3,748	15*	3	
	3	3,837	15*	3	
Doddington	1	696	6	Target not achievable within the limits of conventional treatment	Target not achievable within the limits of conventional treatment
	2	704	Target not achievable within the limits of conventional treatment		
	3	724			
West Walton	1	16,136	40	17	**
	2	16,228	40	17	**
	3	16,547	40	17	**

*NB: Where the modelling has indicated that a suitable consent standard for the proposed increased flows would be more relaxed than the current standard, the recommendation is to maintain the existing consented limit.

** No P limit has been proposed for West Walton, as this discharges to tidal waters where P is not a limiting nutrient.

The detailed outputs of the water quality modelling and proposed consent limits determination are given in Appendix E of this report'; a summary is given above in Table D7. The targets for the modelling are given above in Table D6.

Of the WwTW modelled, it can be seen from the summary table above that some of the flow increases requested to meet the requirements of the proposed new growth cannot be met within the limits of conventional treatment and ensure at least Good Status in downstream watercourses. The theoretical volumes which can be treated within the limits of conventional treatment and still achieve at least good status have been calculated, as shown below in Table E2

Table E2: Theoretical volumes which can be treated within the limits of conventional treatment and meet at least Good Ecological Status in downstream waterbody.

WwTW	Determinand	DWF	Consent limit
Burwell WwTW	Phosphate	not achievable with any flow volume	
Bottisham WwTW	Ammonia	300 m^3/day	1 mg/l
Whittlesey WwTW	Phosphate	1500 m^3/day	1.01 mg/l
Doddington WwTW	Ammonia	not achievable with any flow volume	
	Phosphate	not achievable with any flow volume	