EAST LINDSEY DISTRICT COUNCIL

WATER CYCLE STUDY

DRAFT NOVEMBER 2014

East Lindsey
DISTRICT COUNCIL

Executive Summary

Study purpose

As an advisable requirement of the Local Plan (LP) process, Local Planning Authorities (LPA's) should produce evidence based studies to support decisions relating to final growth targets and areas to be promoted for growth. The Water Cycle Study (WCS) is one such example of an evidence based study which specifically addresses the impact of proposed growth on the 'water cycle' and as such, will form an integral part of the evidence base to East Lindsey's emerging LP. Specifically, East Lindsey's WCS will sit alongside the Sustainability Appraisal, Strategic Environmental Assessment and Appropriate Assessment forming a key component of the LP. The Water Cycle Study will also inform the emerging East Lindsey Core Strategy document an integral part of an LP.

Whilst a relatively new approach to assessing the impact new development has with regards to the 'water cycle', a WCS for East Lindsey must be sufficiently robust such as to effectively act as part of the evidence base for the emerging LP.

Study area and context

East Lindsey is located in east Lincolnshire. The main population centres within the district are those of Skegness, Louth, Mablethorpe and Horncastle. The East Midlands Regional Spatial Strategy (RSS) adopted March 2009 raised concerns surrounding flood risk, these concerns led to the then Secretary of State requiring new housing growth be restricted to existing commitments only, pending the adoption of a Coastal Study. The then adopted RSS allowed for the construction of no more than 6,000 homes between 2006 and 2026.

As of the 6th of July 2010, the Secretary of State for Communities and Local Government announced the intended revocation of Regional Strategies with immediate effect. Following the Cala homes challenge however it was not until the 20th of March 2013 before the Secretary of State laid in Parliament the statutory instrument with which to revoke the RSS covering the East Midlands. This statutory instrument came into force on the 12th of April 2013 and as such the RSS no longer forms part of the development plan. The Council however, has taken forward the proposal to effectively split the District into coast and inland and is not proposing to allocated strategic housing growth in the coastal flood hazard zone.

Figure 1 – Administrative area of East Lindsey.

Scale
0 2 4 6 8 10 km

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Scale 1:400000

In order to establish the existing baseline condition of the Water Cycle, this study has taken the approach of breaking the water cycle into its component parts, providing an assessment of both the environmental and infrastructure capacity with respect to future development.

The study has identified sewerage as a key issue which, without additional investment may impact on the future delivery of development in some areas across the District. Many of these constraints can with increased investment be overcome through a number of mechanisms from increasing capacity where feasible at existing Sewage Treatment Works (STW), to improvements downstream of a works. However, the need for such investment will in some cases have cost and timing implications for potential new development. A more detailed technical study will be required to assess the feasibility, cost and timing implications to these solutions going forward, once both final numbers and locations for development have been produced.

From this scoping study the main areas of concern with regards to sewerage are the settlements of Alford, Manby, Sibsey, Woodhall Spa, Legbourne and Binbrook.

The availability of water resources is another important factor that needs to be considered in the planning of future development. Anglian Water have identified through a RAG analysis sufficient water resources being available to meet increased demand from future development, and indeed there is a duty upon them to provide such development with clean and safe water supplies. However it must be stated that the limiting factor will be the capacity of the existing water supply network to carry this additional increase in supply. Development located close to a trunk main will often be more easily accommodated than those on the periphery of the pipe network therefore until such time as allocations have been finalised further work looking into the networks capacity is not possible.

Due to the nature of windfall sites it has been impossible to assess the potential impact they will have on the supply of water. However, incremental infill developments are unlikely to have a major impact on the existing supply infrastructure within the District. Windfall developments will need to be modelled by Anglian Water as is currently the situation at the planning application stage to assess any possible supply issues or infrastructure improvements required.

Whilst this study therefore does not regard water resources as a limiting factor on the provision of new development it will still be

necessary to consider water demand in the planning of all new development.

The next stage of the Water Cycle Study will be to progress to outline stage in order to focus on the areas highlighted as a concern. The outline study will build upon the findings of this study and will consider the direct impacts new development will have on the water environment and infrastructure specific to the locations of concern, Alford, Manby, Sibsey, Woodhall Spa, Legbourne and Binbrook.

Acronyms

Abbreviation	Description
AEP	Annual Exceedance Probability
AMP	Asset Management Plan
AWS	Anglian Water Services
CAMS	Catchment Abstraction Management Strategy
CFMP	Catchment Flood Management Plan
CSH	Code for Sustainable Homes
CSO	Combined Sewer Overflow
CLG	Communities and Local Government
DEFRA	Department for Environment, Food and Rural Affairs
DPD	Development Plan Document
DWF	Dry Weather Flow
DWI	Drinking Water Inspectorate
EA	Environment Agency
FtFT	Flow to Full Treatment
GI	Green Infrastructure
GQA	General Quality Assessment
HRA	Habitats Regulation Assessment
IDB	Internal Drainage Board
LiDAR	Light Detection and Ranging
LP	Local Plan
LPA	Local Planning Authority
NVZ	Nitrate Vulnerable Zone
OFWAT	The Office of Water Services
PPS	Planning Policy Statement
PR	Periodic Review
RBMP	River Bain Management Plan
RSS	Regional Spatial Strategy
SA	Sustainability Appraisal
SAC	Special Area for Conservation
SEA	Strategic Environmental Assessment
SFRA	Strategic Flood Risk Assessment
SPA	Special Protection Area
SPZ	Special Protection Zone
SSSI	Site of Special Scientific Interest
SWMP	Surface Water Management Plan
SUDS	Sustainable Urban Drainage Systems
WCS	Water Cycle Strategy/Study
WFD	Water Framework Directive
WRMP	Water Resource Management Plan
WRMZ	Water Resource Planning Zone
WRZ	Water Resource Zone
WSI	Water Service Infrastructure
WwTw	Waste Water Treatment Works

1.0 Introduction

East Lindsey District Council (ELDC) is currently in the process of preparing its Local Plan (LP). The LP will comprise of both statutory (and optional) documents that translate national planning policy into a local level strategy.

The use of a Water Cycle Study (WCS) is an effective method of ensuring that water supply, water quality, sewerage and flood risk management issues can be addressed to enable growth to 2029 and beyond, whilst preserving and enhancing the water environment.

It should be noted that this WCS was carried out at a time when the Council had not yet decided upon final development options for their Core Strategy. Therefore, this WCS is intended to inform the Council of the possible constraints and opportunities to various development options. As such, additional work is likely to be required once final development options have been made.

1.1 Aims and Objectives

The objective of the East Lindsey WCS is to identify any constraints on housing and employment growth within the district up to and beyond 2029, 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 will provide a strategic approach to the management and use of water which ensures that the sustainability of the water environment in the District is not compromised.

The first stage of this study, the Scoping Report will provide an overview of the following specific items:

- Capacity issues with regards to water treatment works (WTWs), clean water network and water resources in East Lindsey.
- Wastewater treatment and network capacity issues.
- Potential impacts of future water abstractions and discharges,
- Water quality issues and;
- Flood risk

2.0 The East Lindsey Water Cycle Study

2.1 The Water Cycle

The water cycle includes the processes and systems that collect, store, and transport water into the environment. Water cycle processes exist both above and below ground level, and can be either natural or man-made.

In an undeveloped area, the water cycle includes rainfall landing on the ground, where it is either transferred into above ground streams, rivers, wetlands, floodplains, and estuaries to the sea, or is absorbed into the soil, ending up in groundwater storage aquifers. The cycle is completed by evaporation from these systems back into the atmosphere.

In a developed area, the natural processes and systems are often adapted for development or public health reasons. For example, water is taken from rivers, treated, and piped via water supply systems into urban areas. Wastewater produced by houses is collected in a below ground sewerage system, where it is transported to a wastewater treatment works before being discharged to the sea, rivers or to groundwater.

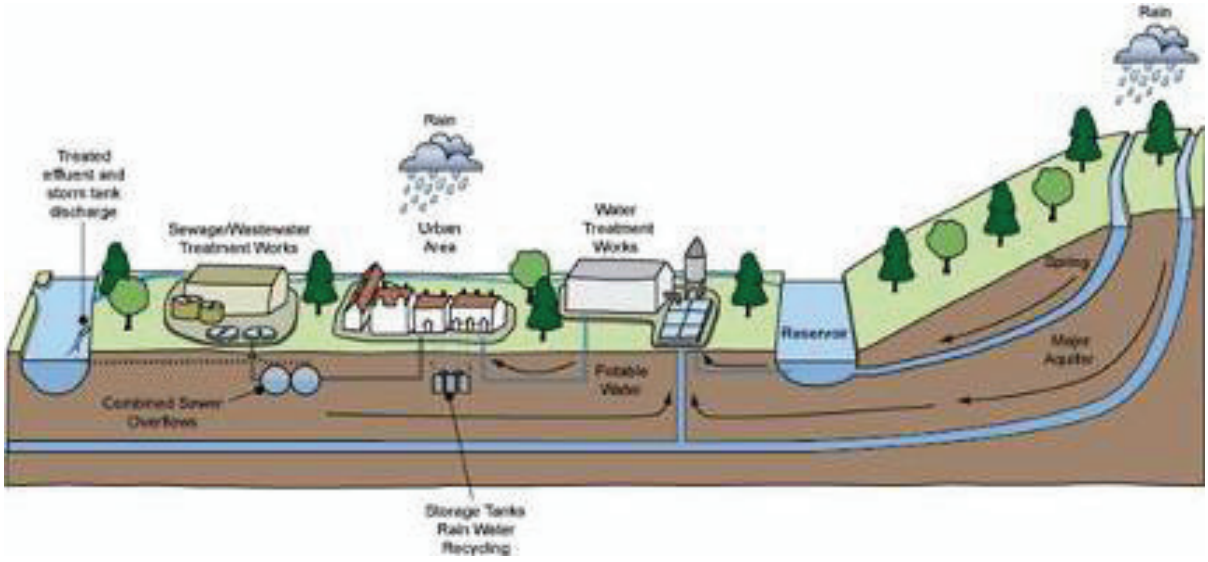


Figure 2 – The Water Cycle

Source (http://publications.environment-agency.gov.uk/pdf/GEHO0109BPFF-e-e.pdf)

2.2 Our Impact on the cycle

The water that we drink is abstracted from rivers and from aquifers and then treated to a very high standard before entering our water supply systems.

As population and demand for water grows, more water is taken from the environment, and this can have a significant impact on biodiversity, and on the recreational value of the water environment. Additionally, more energy is used to treat and transport the water as demand increases. Once it reaches the household, water is used in many different ways, including washing, flushing toilets, drinking and cooking before, discharging it into our drains.

Wastewater drains into the foul or wastewater network, from where it flows to wastewater treatment works (WwTWs) via sewers and pumping stations, again often using energy. At the WwTW, the waste is treated to a high standard to remove pollutants before its can be discharged to our rivers and seas.

The more water that is treated at a WwTW, the greater the potential impact of the treated wastewater discharged to the receiving watercourses may have. This in turn requires higher levels of treatment at the WwTWs to prevent further environmental deterioration, using additional energy and chemicals. Furthermore, increased flows from WwTW can also increase the risk of river flooding downstream of the works.

Sustainable water cycle planning policies, water cycle management for new developments and green infrastructure planning can all help ensure that development locations and water infrastructure not only prevent the deterioration of the water cycle environment, but actively improve it.

2.3 Implications for the future

Within many areas of the UK some elements of the natural water cycle are considered to be at or nearing the limit to which they can be manipulated. No more so than within the east of England where rainfall and thus water supply are some of the lowest in the UK. Future development will only exacerbate this issue further as demand for water supply increases. Along with the increased demand for water supply future development will also see an associated requirement for additional waste water treatment; in addition, flood risk may increase if development is not planned for in a strategic manner.

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

2.4 Stages of a Water Cycle Study

Current guidance provided by the Environment Agency (EA) surrounding the undertaking of a WCS suggests that they should generally be undertaken in three stages, depending on the status of the various Local Development Documents contained within the wider Local Plan process.

In general the three main stages (Figure 3) in undertaking and producing a WCS are those of scoping, outline and full/detailed.

A Scoping Study aims to gather all available information, data and reports in order to determine whether there are significant issues which require a further, more detailed WCS to be undertaken. An Outline Study determines the environmental capacity for changes to the natural water cycle and determines capacity and potential options for water supply and water treatment infrastructure specific to potential locations for development, while a Detailed Study assesses requirements of new infrastructure including where and when it is needed and how much it will cost to provide and who is required to provide it.

Figure 3 overleaf shows the three stages within the production of a WCS and the interrelationship with the processes involved in the production of a local plan.

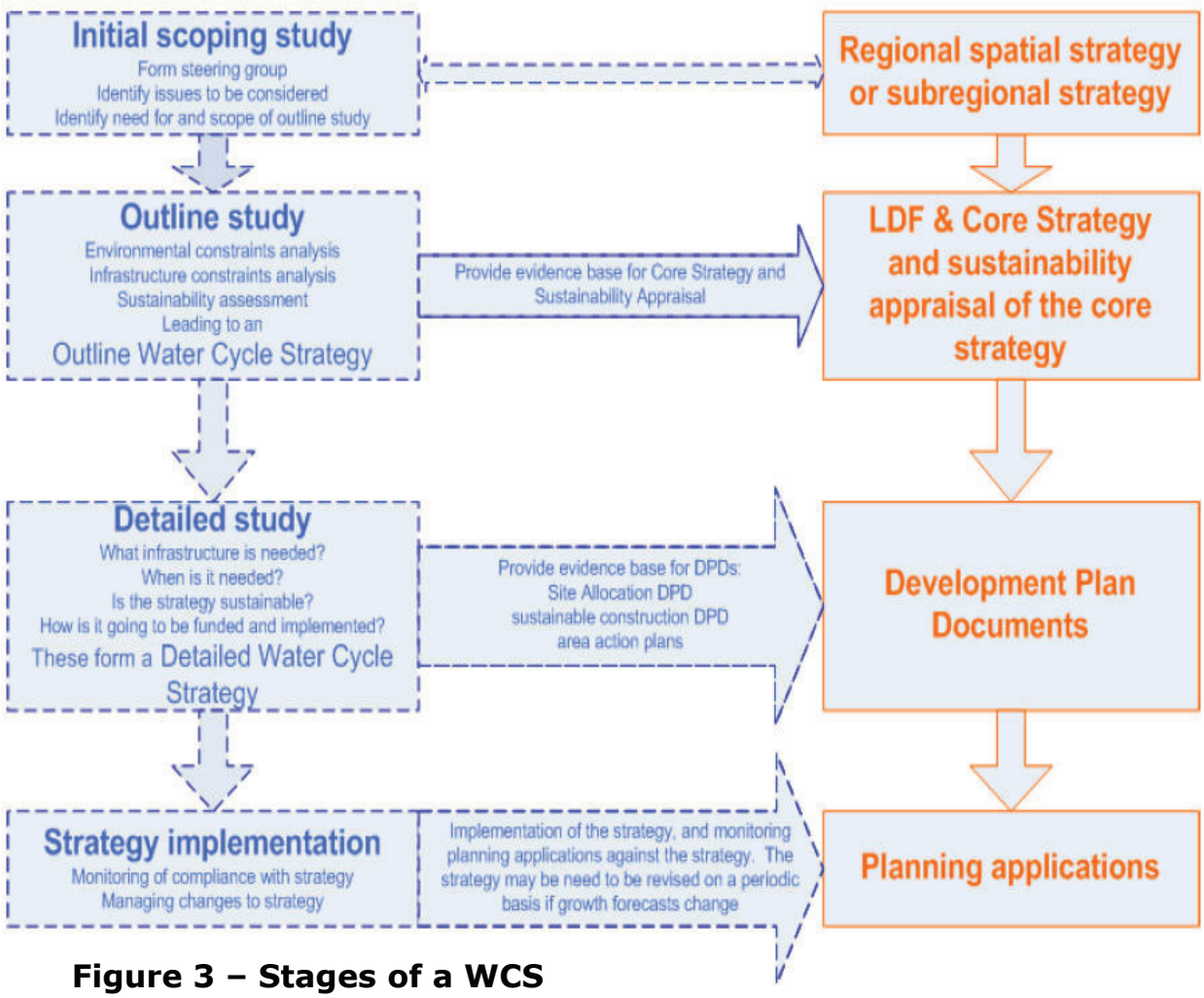


Figure 3 – Stages of a WCS

Source: http://www.environment-agency.gov.uk/commondata/acrobat/water_cycle__1760254.pdf

2.4.1 Scoping Water Cycle Study

It is the intention of a scoping study to highlight areas where development is likely to either impact on the water environment, or is likely to require significant investment in water infrastructure (waste water treatment works etc) to service new development.

Recent advice provided by the EA relating to the stages of a WCS states the primary purpose of a scoping study is to review and collate the existing information on the water environment whilst engaging key stakeholders including those of the Environment Agency, Water Companies and drainage boards. A scoping study should clarify the principles and objectives to be followed throughout the rest of the process.

2.4.2 Outline Water Cycle Study

The primary aim of an Outline WCS as previously stated is to identify potential environmental and water infrastructure constraints to development in order to provide an evidence base to support the Core Strategy and identification of preferred sites for development. The study should identify areas of uncertainty which may require further more detailed studies.

2.4.3 Detailed Water Cycle Study

It is the intention of a detailed study to resolve areas of uncertainty which may have arisen from previous stages. Along with highlighting what infrastructure is required, when, where and who is responsible for its provision will also need to be addressed.

2.5 WCS Stakeholders

An initial steering group has been set up, in line with the Environment Agency's guidance on the preparation of a Water Cycle Study. This Scoping Study has been prepared in house by East Lindsey District Council, with guidance from the Environment Agency and Anglian Water Services. The steering group therefore was made up of representatives from,

- East Lindsey District Council
- Environment Agency
- Anglian Water Services

In addition to the initial steering group, a wider stakeholder group was identified for future studies to ensure that the requirements of all stakeholders help to shape the requirements of the East Lindsey WCS and its recommendations. These were as follows:

- The Highways Agency
- Lincolnshire County Council
- Natural England
- Lindsey Marsh Internal Drainage Board
- Witham Third Internal Drainage Board
- Witham Fourth Internal Drainage Board

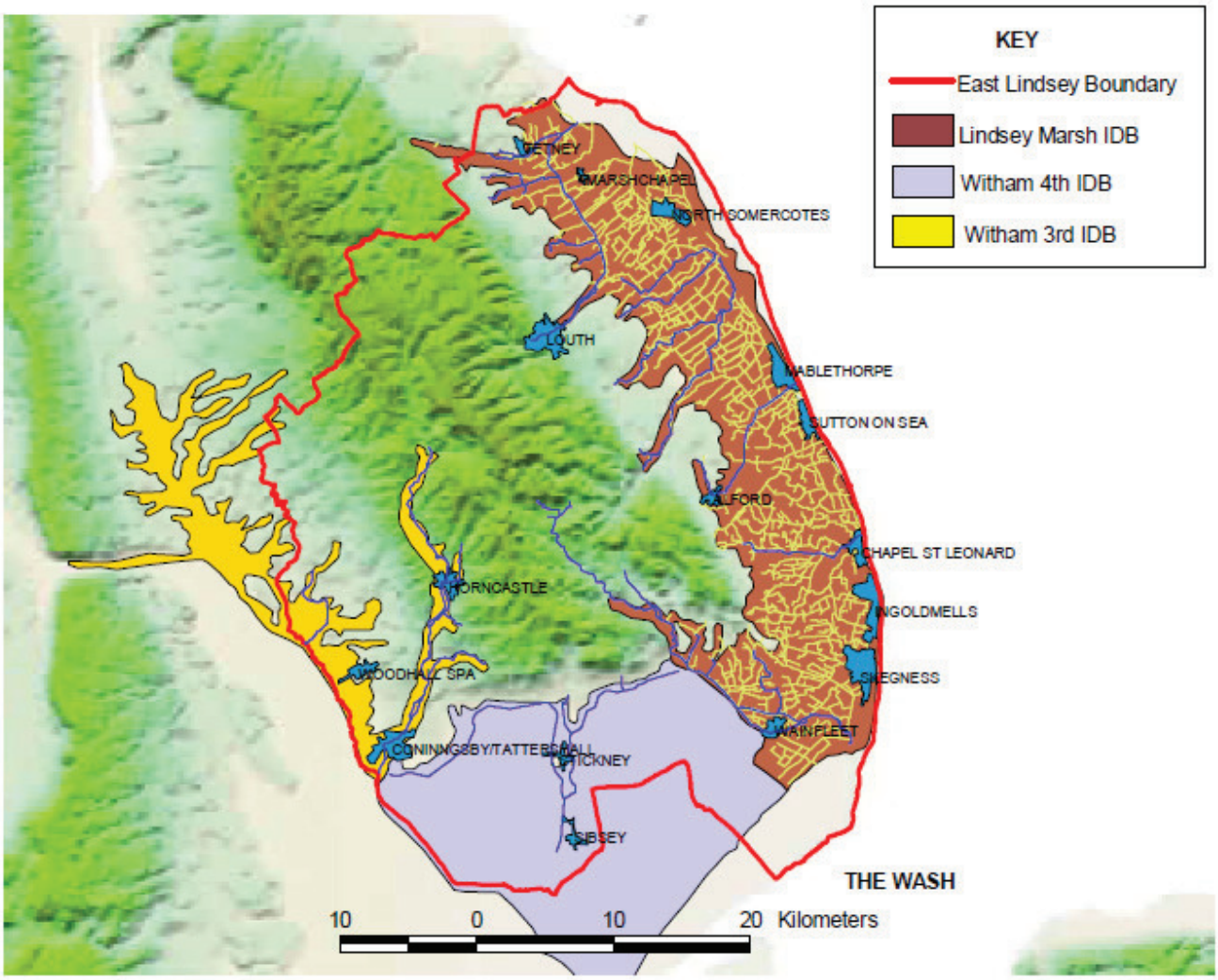


Figure 4 – Areas served by Internal Drainage Boards

Source:http://www.e-lindsey.gov.uk/NR/rdonlyres/18D0619B-68D0-41E0-B15F-8E31DD25A909/0/Volume1_sections19_main_report.pdf

2.6 Integration with the planning system

2.6.1 Local Authority

The Planning and Compulsory Purchase Act 2004 introduced the need for Local Authorities to produce a Local Development Framework (LDF) in order to replace the then system of Local Plans. It was expected that each LDF be supported by an evidence base, the Localism Act continues to advocate this approach of evidence based plans, though the LDF has now been replaced once again by a local plan system. A WCS is an important part of this evidence base, particularly as it is developed from information provided by key stakeholders within the planning and development process. A WCS represents the agglomeration of development planning and infrastructure planning, to achieve sustainable growth.

2.6.2 Water Company

It is important for the findings of this study to fit within the timescale proposed for the production of the Core Strategy, it is also important to consider the timeline of Anglian Water in relation to funding.

There are two key elements of Anglian Waters Services planning timeline which are pertinent to the East Lindsey WCS; firstly the Asset Management Plan (AMP) and secondly the Water Resource Management Plans (WRMP).

Asset Management Plan (AMP)

Investment plans of water companies are based on a five-year cycle, this five year period is known as an Asset Management Period (AMP). The Office of Water Services (OFWAT) is the economic regulator of the water and sewage industry in England and Wales, and regulates this overall process.

In order for the provision of new infrastructure and the undertaking of maintenance of existing assets, water companies raise the required funding through structured customer price rises inline with the level of investment required. The process for determining asset investment is undertaken in conjunction with OFWAT, the EA and finally the Drinking Water Inspectorate (DWI).

Whilst asset investment is undertaken in conjunction with the EA and DWI, ultimately the overall determination for how much Water Company's can charge lays with OFWAT. The consultation process whereby OFWAT liaise with the Government, EA and consumer organisation amongst others is known as the Periodic Review (PR). At the time of producing the East Lindsey WCS, Water Companies were working to the limits set in PR09 which determined investment for a five year period covering 2010 – 2015 or otherwise known AMP5.

With levels of investment being set out for the period covering 2010 – 2015 any further significant water cycle infrastructure requirements will not be included in this current price review. Therefore future funding is unlikely to be guaranteed until the end of AMP5 around 2014 with funding not being available until AMP6 covering the period 2015 – 2020.

Whilst companies can submit interim determinations within a 5 year AMP period it is generally accepted that large scale investments in

infrastructure provision should be planned for significantly in advance and be included in the price review.

Along with providing robust evidence for East Lindsey's Local Plan, the WCS is also therefore important for the unification of time frames.

Water Resource Management Plans

It is now a statutory obligation for water companies to produce a Water Resource Management Plan (WRMP) covering a period of 25 years. These plans were prepared on a voluntary basis up until the 1st of April 2007 when they became a statutory requirement under provisions contained within the Water Act 2003.

Within a WRMP water company's are intended to highlight how they wish to invest in existing along with new infrastructure and water efficiency measures etc to meet increases in potable supply as a result of development and population increases.

Consultation on the Draft WRMP occurred between May and July 2008 (Anglian Water, Water Resource Management Plan, Main Report, February 2010), with the final submission of the Statement of Response occurring in September 2009. Following final approval by DEFRA, the Anglian Water Resource Management Plan was published in February 2010 and can be found at: http://www.anglianwater.co.uk/_assets/media/AW_WRMP_2010_main_Report.pdf

After the final water resources management plan is published, it is intended that it should be reviewed annually by the water company; if there is a relevant material change in circumstances, then the water company must submit a revised plan within six months from when the change occurred.

Anglian Water is currently consulting upon the draft 2014 Water Resource Management Plan (WRMP) which is to cover the period from 2015 to 2040.

2.7 Data availability

The undertaking of a WCS is reliant on the willingness of stakeholders to provide a large amount of the data needed for further analysis. In some cases, the availability of data with respect to water cycle infrastructure and future expenditure has not been available within the time required to undertake the assessment or has been

commercially sensitive, requiring assumptions to be made to enable the study to progress.

3.0 Development in East Lindsey

3.1 East Lindsey

Extending over 1,762 square kilometres (over 680 square miles), East Lindsey is one of largest districts in the UK. It is also one of the most sparsely populated, with its population of 136,401 (source 2011 census) spread among some 200 settlements, only 41 having a population greater than 500 and only four having a population greater than 5,000 (Skegness – 19,579; Louth – 16,419; Mablethorpe – 12,531 and Horncastle – 6,815 (source: Office of National Statistics 2011 census data).

Due to the uncertainty in housing targets for the District, it is not possible for the Council to determine with any certainty either the numbers nor locations of likely development at this stage.

For this reason, it has not been possible for the Council to undertake an Outline WCS which would require an assessment of water environment and infrastructure capacity specific to potential development options. This report therefore considers the current water environment and infrastructure baseline conditions throughout the District, in order to better inform future decisions on development option locations and the Local Plan (LP) as a whole.

3.2 National, Regional and Local Drivers and Policies

3.2.1 National Drivers and Policies

Historically whilst growth within East Lindsey has been driven by regional planning policy, local priorities and drivers are now at the fore of the decision making process. One area however that has not changed is that growth which impacts on the environment needs to comply with both national and European directives, legislation and guidance on water as provided in Figure 5 overleaf.

Figure 5: Environmental directives, legislation and guidance relevant to a WCS

Directive/ Legislation/ Guidance	Description
Bathing Waters Directive 76/160/EEC	The main objective of the Bathing Water Directives (76/160/EEC and 2006/7/EC) is to protect public health and the environment from faecal pollution at bathing waters. It also seeks to maintain the aesthetic quality of inland and coastal bathing waters.
Groundwater Directive 80/68/EEC	Groundwater Directive (80/68/EEC) aims to protect groundwater from pollution by controlling discharges and disposal of 'List 1 and 2' Dangerous substances. In the UK, the directive is implemented through the Environmental Permitting Regulations (EPR) 2010.
Environmental Protection Act 1990	The Environmental Protection Act 1990:Part 1 introduced important new controls aimed at limiting and preventing pollution from a wide range of industries in Great Britain. Those industries with the greatest potential to discharge polluting substances to air, land and water (called Part A processes) are subject to Integrated Pollution Control (IPC) and are regulated by the Environment Agency.
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.
Land Drainage Act 1991	The Land Drainage Act 1991 sets out the statutory roles and highlights key responsibilities for those organisations with jurisdiction over land drainage infrastructure and watercourses. Key organisations in the context of the Land Drainage Act 1991 include the Internal Drainage Boards, Local Authorities, the Environment Agency as well as Riparian owners.
Habitats Directive 92/43/EEC	The Habitats Directive seeks 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 the Directive require changes to these through the Review of Consents (RoC) process if they are impacting on designated European Sites. In the UK, the Habitats Directive is implemented by the Conservation of habitats and species regulations 2010, more commonly known as the Habitats Regulations.
Environment Act, 1995	The Environment Act 1995 sets out the role and responsibility of the Environment Agency.
The Pollution Prevention and Control Act (PPCA), 1999	It is the role of The Pollution Prevention and Control Act 1999 to implement the IPPC Directive. It replaces IPC with a Pollution Prevention and Control (PPC) system, which while similar applies to a wider range of installations.

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, groundwater's, 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 UKTAG11, 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 status12. These have recently been finalised and issued within the River Basin Management Plans (RBMP). River Basin Management Plans are plans for protecting and improving the water environment, they contain the main issues for the water environment and the actions which need to be taken to deal with them.
Water Act 2003	The Water Act 2003 implements changes to the water abstraction management system and to regulatory arrangements to make water use more sustainable.
Making Space for Water, 2004	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.
Code for Sustainable Homes	The Code for Sustainable Homes has been introduced to drive a step change in sustainable home building practice, providing a standard for key elements of design and construction which affect the sustainability of a new home. It will become the single national standard for sustainable homes, used by home designers and builders as a guide to development, and by home-buyers to assist in their choice of home. It will form the basis for future developments of the Building Regulations in relation to carbon emissions from, and energy use in homes, therefore offering greater regulatory certainty to developers.
Future Water, 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.
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.
Planning Policy Statement (PPS) **PPS1** **PPS3**	The main body of UK planning policy was contained within Planning Policy Statements which set within, statutory guidelines and advise local authorities were intended to adhere to when producing development plans. The most relevant PPSs to the East Lindsey WCS are: Planning Policy Statement 1 – Delivering Sustainable Development produced by the Office of the Deputy Prime Minister (2005) set out within, the overarching planning policies with which the planning system was to deliver sustainable development. Planning Policy Statement 3 – Housing, 3rd Edition published 2010 underpinned the Government's response to the Barker Review of Housing Supply and introduced a more responsive approach to land supply at a local level. At a local level it was expected as stated within PPS3 that there should be a clear strategy for planned locations of new housing which contributed to achieving sustainable development. Local Planning Authorities were further expected to set out criteria for the identification of broad locations and specific sites factoring into account flood risk and the need to protect natural resources including water and biodiversity etc. PPS 3 also stated Local Authorities were expected to take account of assessments on the impact of development upon existing or planned infrastructure and of any new infrastructure required.

PPS9 **PPS23** **PPS25**	Planning Policy Statement 9 – Biodiversity and Geological Conservation produced by the Office of the Deputy Prime Minister (2005) set out the Governments overriding aim to promote development which where possible enhanced the levels of Biodiversity within an area. Planning Policy Statement 23 – Planning and Pollution Control produced by the Office of the Deputy Prime Minister (2004) advised that the planning system should play an important role in the determination of development which may give rise to pollution directly or indirectly. Planning Policy Statement 25 – Development and Flood Risk revised edition March 2010 aimed to ensure that flood risk was taken into account at all stages of the planning process in order to avoid inappropriate development in areas of high flood risk. Local planning authorities were to promote development which reduced the risk of flooding through its location, layout, design and the incorporation of sustainable drainage systems where appropriate.
National Planning Policy Framework (NPPF)	The National Planning Policy Framework (NPPF) which was published in March 2012 represents the Governments commitment to reducing the complexity of the Planning System. In effect the NPPF replaces the majority of the former Planning Policy Guidance and Statements covering a magnitude of areas. Along with the aforementioned NPPF document a further technical guidance document relating to flood risk and minerals was also issued in support of the NPPF. It is the intention of the NPPF that specific detailed requirements previously contained within PPG's and PPS's should now be set out within each individual Local Authorities Local Plan. Theses detailed requirements will be founded on a locally developed evidence base, including relevant technical studies such as Water Cycle Studies etc. The key themes in the NPPF most relevant to this Water Cycle Study are: • Delivering Sustainable Development and Climate Change; • Housing; • Biodiversity and Geological Conservation; • Planning and Pollution Control; and • Development and Flood Risk.
River Basin Management Plans (RBMP)	Implementation of the Water Framework Directive (WFD) is carried out through a process of River Basin Management Planning. The first draft RBMP's for England and Wales were published by the EA in December 2008 and were finalised in 2010. RBMP's are intended to highlight the pressures facing

	the water environment in a river basin district and the actions attended to address them. The main issues identified within the Anglian River Basin District (published December 2009) covering East Lindsey are; • Abstraction and other artificial flow regulation, • Non-native species, • Nitrates, • Organic pollution, • Pesticides, • Phosphate • Physical modification • Sediment; and • Urban and transport pollution

3.2.2 Regional Spatial Strategy (formally revoked on the 12th April 2013)

The East Midlands Regional Spatial Strategy (RSS) was published in March 2009 and set targets to guide the scale and broad location of growth within the District up to 2026. It is however to be noted that on the 6th of July 2010 The Secretary of State for Communities and Local Government announced the intended revocation of Regional Spatial Strategies with immediate effect. Following the Cala homes challenge however it was not till the 20th of March 2013 before the Secretary of State laid in Parliament the statutory instrument with which to revoke the RSS covering the East Midlands. This statutory instrument came into force on the 12th of April 2013 and as such the RSS no longer forms part of the development plan.

A Regional Action Plan for the Anglian Region.

Following the publication by the Environment Agency of the Water Resource Strategy for England and Wales in March 2009, Regional Action Plans were also produced which set out a number of actions set against the strategic objectives of the Water Resource Strategy for England and Wales. Set out within the Water Resource Strategy for England and Wales were four main strategic aims:

- Adapting to and mitigating climate change,
- A better water environment,
- Sustainable planning and management of water resources,
- And water and the water environment are valued.

In order to fulfil the above objectives the Regional Action Plan for Anglian Region published December 2009 set out a number of regional actions, those with particular relevance to local planning authorities are shown below:

- An 22 – Encourage local authority planners to considers carbon use as part of their work on water cycle studies especially when water companies are planning new water service infrastructure.
- An 36 – Work with planners, developers and water companies to guide, promote and ensure the implementation/retro-fit of strategic and local sustainable drainage systems wherever appropriate.
- An 45 – Work with developers, Local Delivery Vehicles and Frameworks, and local planning authorities to encourage that all new developments are built to Level 3 of the Code for Sustainable Homes, moving to more challenging targets in the longer term where appropriate.
- An 57 – Work with the voluntary sector, housing associations, local authorities and others to promote retro-fitting in existing homes in seriously water stressed areas.
- An 58 – Work with the Water Partnership Group and local authorities to advise where and when water cycle studies are necessary and where water efficiency should be targeted.

3.2.3 Local Planning Policy

East Lindsey District Council's statutory development plan following the revocation of the East Midlands Regional Spatial Strategy now consists of the saved policies contained within the 1995 Local Plan. The existing Local Plan is to be replaced in due course by a new Local Plan which will be made up of a number of important documents including:

- The Local Development Scheme which sets out what documents will be produced by the Council and when.
- The Statement of Community Involvement setting out how the Council intends to consult the community was formally adopted in June 2007 with a further revision approved on the 2nd February 2012 by Planning Policy Committee.
- Development Plan Documents setting out the policies with which development in the District is to be controlled and guided.
- Supplementary Planning Documents provide further information on the policies contained within a Development Plan Document.
- Annual Monitoring Reports will assess the implementation of the Local Development Scheme along with the extent to which policies are being achieved.
- Site allocations document.

Additional Information

In addition to the legislation and guidance set out in the above chapters, the East Lindsey Level 1 and Level 2 Strategic Flood Risk assessments (2012) have been used to support the findings of the East Lindsey Water Cycle Study.

4.0 Wastewater Baseline and Capacity Assessment

4.1 Introduction

The wastewater assessment addresses two key areas for wastewater, firstly that of the baseline, or simply put the 'spare' capacity available in the existing wastewater treatment works, and secondly the scope for using any existing and/or planned network system before upgrades are required.

With a general presumption towards maximising the use of existing facilities it is essential to establish evidence of capacity within treatment facilities along with the network. This in turn helps reduce costs, reduces the impact to existing communities and allows for the early phasing of new development which does not require the securing of funding for new infrastructure through the statutory water company planning processes.

Along with spare capacity of existing wastewater treatment works it is important to assess the environmental capacity of receiving watercourses. Additional treated wastewater from new development being discharged into a watercourse can have detrimental impacts upon,

- The overall quality of water contained within the receiving watercourse.
- The hydrological/hydraulic regime of receiving water's and their associated habitats, and
- Increase the risk of flooding downstream from the origin of the discharge.

It was hoped that this scoping study would enable an assessment of potential capacity in the wastewater network to be made showing the systems ability to accept future flows. Unfortunately however whilst a RAG analysis has been carried out by Anglian Water using indicative future housing figures it has not been possible to undertake further

detailed analysis as the system is reliant on pumping station capacity and the interconnectivity of drainage areas.

Without the detailed locations and phasing of development being known on each individual site proposed for allocation in the local plan process, the impact between drainage areas and the reliance upon pumping means that Anglian Water will not provide the information so that the Council can not tell how much spare capacity is in the network in order to allow for intense rainfall events and future climate change to be factored in. Once definite locations and numbers are finalised in relation to housing growth further discussions will be required with Anglian Water in order to assess network capacity more accurately.

4.2 Baseline

4.2.1 Wastewater Treatment Works Capacity Assessment

There are 46 Waste Water Treatment Works (WwTW's) within the District of East Lindsey; each with a numeric discharge consents (see Figure 6 overleaf for summary data and Figure 7 for area covered). All WwTWs are owned and operated by Anglian Water, the sewerage undertaker for the region.

Figure 6 Summery of WwTW within the Study Area

WwTW	Total Population Equivalent (PE)	Consented DWF (M3/d - consented dry weather flow)	Receiving Water Course
Alford	3648	1215	Wold Grift Drain NT
Anderby – Sea Road	215	90	Anderby Main Drain
Binbrook	1552	872	Thorganby Beck
Bucknall	451	80	Trib Catchwater Drain
Candleby	51	10	Lady Waths Beck
Coningsby	7172	1400	River Bain NT
Covenham Package	13		Navigation North Drain
Croft	111	17	Trib of Steeping River
Donington on Bain	297	63	River Bain NT
East Kirkby	826	200	Dyke trib of West Fen Catchwater
Friskney	814	205	Trib of Fodder Dyke
Frithville	127		Trib of West Fen Drain
Gipsy Bridge	483	169	River Witham
Hemingby – Main Road	118	122	River Bain
Holton le Clay	3440	1085	Humberstone Beck
Horncastle	7365	2315	River Bain
Ingoldmells	57629	10433	North Sea
Legbourne	708	157	The Beck (Long Eau)
Louth	20205	6000	Louth Canal
Ludford	357	46	River Bain
Mablethorpe	22553	8640	Wold Grift Drain
Manby	2113	894	The Cut, Long Eau
Mareham le Fen	810	214	West Fen Catchwater
Market Stainton	14	5	Trib of River Bain
Minting	125		Great Drain
New Leake	234	41	Fodder Dyke, Hobhole Drain
North Cotes	1508	450	Old Fleet Drain
North Cotes (RAF)	79	70	Old Fleet Drain
North Somercotes	1227	316	Severn Towers Sth Eau
North Thoresby	1079	260	Bond Croft Drain
Old Bolingbroke	229	50	Trib of Hagnaby Beck
Saltfleet	875	450	Saltfleet Haven T
Sibsey	1719	414	Mallows Drain
Skendleby	30	8	Trib of River Lymn
Spilsby	4148	1004	River Lymm/Steeping
Stickney	1274	395	East Fen Catchwater
Strubby	676	180	Trib of Wold Grift Drain
Tathwell	2	7.8	River Lud
Tetford	619	260	Double Dyke
Tetney-Newton Marsh	57951	23867	Tetney Haven
Toyton	276	49	Witham 4th IDB W'course 3/38
Wainfleet	2319	1200	Trib of River Steeping
Welton le Marsh	10		Trib of Welton Beck
Welton le Wold	56	5.9	River Lud
Woodhall Spa	5052	1406	Reeds Beck
Wragby	2054	537	Goltho Beck

The hydraulic capacity of wastewater infrastructure is a function of the physical / hydraulic capacity of assets (both the sewer network and wastewater treatment processes) to receive additional flows. A fundamental factor describing capacity is a sewage treatment work's 'Dry Weather Flow' (DWF). DWF is the measure of the flow influx to a WwTW derived from human activity both from domestic and commercial property, excluding any storm-induced flows.

The mechanism for deriving DWF's has evolved over recent years. The majority of WwTWs now have certified flow monitoring equipment which enables effluent flows to be accurately monitored. The DWF is calculated based on the 20th percentile flow on the basis of 12 months daily data (i.e. the flow that is exceeded 80% of the time). The design capacity of WwTW is generally governed by DWF.

For water quality planning and design purposes, dry weather flow can also be estimated based on the following equation:

Estimating Dry Weather Flow

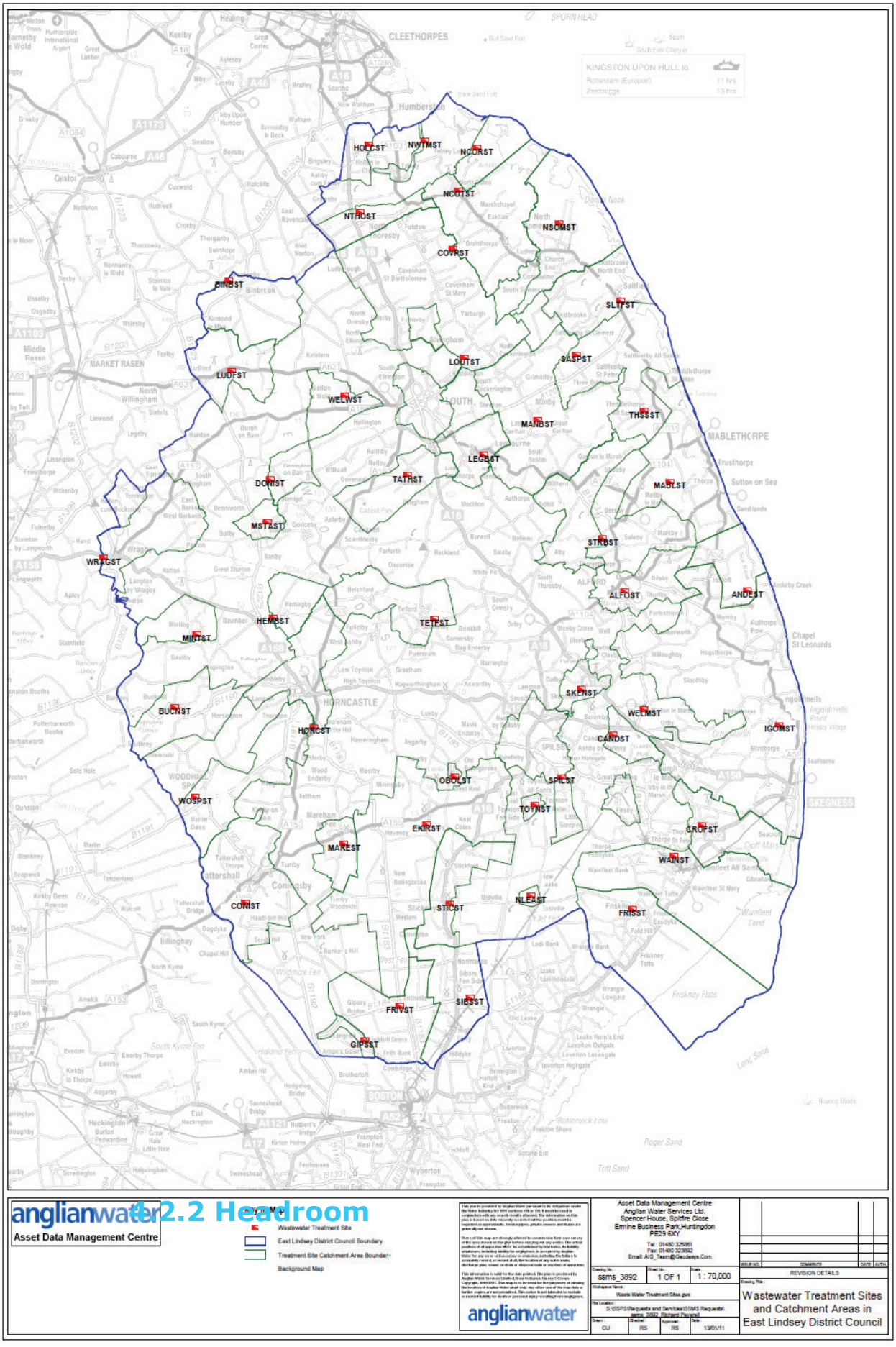
$$DWF = PG+I+E$$

Where:

P – Population served.
G – Water consumption per head per day.
I – Infiltration allowance.
E – Trade effluent flow to sewer as applicable.

Source: Wastewater Treatment Manuals, Preliminary Treatment (1995) Produced by the Environment Protection Agency.

Figure 7 Anglian Water WwTW catchment areas.



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Asset Data Management Centre

2.2 Headroom

Wastewater Treatment Site
East Lindsey District Council Boundary
Treatment Site Catchment Area Boundary
Background Map

anglianwater

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Workspace Name: Waste Water Treatment Sites.gws
File Location: S:\GSPS\Requests and Services\GSMS Requests\ssms_3892_Richard Pengelly\

Drawn	Checked	Approved	Date
CU	RS	RS	13/01/11

ISSUE NO	COMMENTS	DATE	AUTH
	REVISION DETAILS		

Drawing Title:
Wastewater Treatment Sites and Catchment Areas in East Lindsey District Council

Headroom within a sewage network or WwTw can in its simplest terms be defined as the capacity to accommodate additional sewage effluent load without exceeding the capacity of the network (resulting in unsatisfactory intermittent discharges or sewer flooding) or breaching the consent conditions.

As the population served by the network increases, there is generally a proportional increase in the amount of raw sewage. WwTW discharge consents are set to a certain design horizon and as a result there is commonly a population and flow headroom allowance available in the effluent consent. As the population increases this headroom is increasingly eroded and the risk of non-compliance, and thus the risk of failing to meet the water quality objectives in the receiving water, increases. It therefore must be stated; headroom is 'not' an absolute value but is defined as the difference between the assessed probability of failure (of a particular asset or level of service) and the maximum acceptable probability or risk of failure.

As flows approach or exceed the consented flow water companies are required to renegotiate consent conditions with the Environment Agency.

4.2.3 Limits to increased consents.

As has become the norm in recent times discharge consents in many locations have been reduced by the Environment Agency in order to fulfil the objectives set within the Water Framework Directive. The Water Framework Directive (WFD) came into force late in 2000, and was officially transposed into UK law in December 2003. Representing the most substantial piece of European water legislation of recent times it was introduced in order to help improve and integrate the management of water bodies. Under the WFD it is a statutory obligation of all members to:

- Prevent deterioration in the classification of aquatic ecosystems along with protecting and improving the ecological condition of waters.
- Aim to achieve at the least good status for all waters by 2015. Where this is not feasible it should be achieved by 2021 or 2027.
- Actively seek the sustainable use of water as a natural resource.
- Conserve habitats and species which are dependent directly on water.
- Progressively seek to reduce and eventually phase out releases of pollutants that present a significant threat to the aquatic environment.

- Seek to reduce groundwater pollution through the prevention of entry.
- Contribute to the mitigation of floods and droughts.

The overriding principle of the WFD is to prevent the further deterioration of our aquatic ecosystems. No deterioration must be met in all but very exceptional circumstances. Exceptional circumstances as outlined in the WFD are when deterioration is caused by the physical modification of a water body or as a result of sustainable new human development activities. Even in such cases there needs to be clear demonstration that no better option was available in order to achieve the desired development.

As previously highlighted due to the complexity of the wastewater network and lack of finalised housing figures and preferred sites, a RAG assessment using reworked 2010 population projections was used to asses any likely issues associated with growth across East Lindsey. The initial results of the RAG assessment produced by Anglian Water can be seen overleaf.

Location	Potential Housing Numbers	Wastewater Treatement Works (WWTW)	WWTW capacity	Foul Sewerage Network capacity	Surface Water Network capacity (see note 1)		Additional Comments
Alford	693	Alford STW	Red	Red	Red		AMP5 flow compliance scheme - could not accommodate 50+% increase in PE. May be more cost effective to connect to Ingoldmells catchment but would require significant enhancement to sewerage infrastructure. Some history of 2 in 10 flooding from FW network. Assume no provision for SW.
Coningsby	597	Coningsby STW	Amber	Amber	Red		Assume no capacity for an increase in SW catchment.
Tattershall	394	Coningsby STW	Amber	Amber	Red		
Horncastle	1411	Horncastle STW	Amber	Amber	Red		Some history of internal 1 in 20 flooding from FW network. Assume no capacity for and increase in SW catchment.
Louth	3347	Louth STW	Amber	Red	Red		Significant history of internal flooding from FW network. Assume no capacity on combined system for any increase in SW catchment. There is capacity at STW but this large number of houses would use up headroom.
Spilsby	634	Spilsby STW	Red	Amber	Red		AMP5 flow compliance scheme. Some history of 1 in 20 flooding from combined system. Assume no capacity for any increase in SW catchment
Binbrook	114	Binbrook STW	Red	Amber	Red		AMP5 flow compliance scheme. Assume no capacity for an increase in SW catchment.
Burgh le Marsh	295	Ingoldmells STW	Amber	Amber	Red		AMP5 flow compliance scheme but large works. History of 1 in 20 flooding from FW network. Assume no capacity for any increase in SW catchment.
Friskney	128	Friskney STW	Amber	Amber	Red		May exceed available headroom. Limited capacity in vacuum FW system. Assume no provision for SW flows.
Manby	87	Manby STW	Red	Red	Red		AMP5 flow compliance scheme. Significant 2 in 10 flooding from FW network. Assume no capacity for any increase in SW catchment
Grimoldby	107	Manby STW	Red	Amber	Red		AMP5 flow compliance scheme. Assume no provision for SW flows
Hogsthorpe	115	Ingoldmells STW	Amber	Amber	Red		AMP5 flow compliance scheme but large works. Assume no capacity for an increase in SW catchment.
Holton le Clay	406	Holton le Clay STW	Red	Red	Red		Potential to exhaust headroom at STW. Significant increase in FW catchment. Assume no capacity for an increase in SW catchment.
Legbourne	72	Legbourne STW	Red	Red	Red		AMP5 flow compliance scheme. Some 1 in 20 flooding history from FW network. Assume no provision for SW flows
Marshchapel	82	North Cotes STW	Green	Amber	Red		Assume no provision for SW flow
North Thoresby	137	North Thoresby STW	Amber	Amber	Red		May significantly reduce headroom at STW. Assume no provision for SW flow
Sibsey	231	Sibsey STW	Red	Red	Red		AMP5 flow compliance scheme. Assume no provision for SW flows
Stickney	113	Stickney STW	Amber	Red	Red		May exceed available headroom. Some history of 1 in 10 flooding from FW network. Assume no provision for SW flow
Tetney	186	Tetney Newton Marsh STW	Amber	Red	Red		Large development sites already allocated. History of 1 in 20 flooding from FW network. Assume no provision for SW flow

Wainfleet all Saints	184	Wainfleet STW	Amber	Red	Red		Some history of internal 1 in 20 flooding from FW network. Assume no capacity in partially combined system for any increase in SW catchment.
Woodhall Spa	473	Woodhall Spa STW	Red	Red	Red		AMP5 flow compliance scheme. Possible alternative is Coningsby. Limited capacity in FW. Assume no capacity for any increase in SW catchment
Wragby	212	Wragby STW	Amber	Red	Red		History of 1 in 20 flooding from FW network. Assume no capacity for any increase in SW catchment
Grainthorpe	67	North Cotes STW	Green	Red	Red		Significant history of 1 in 20 flooding from FW network. Assume no provision for SW flows
Mareham le Fen	101	Mareham le Fen STW	Red	Amber	Red		AMP5 flow compliance scheme. Alternative of Coningsby but with significant extra sewerage infrastructure. Assume no provision foe SW flow
Tetford	46	Tetford STW	Green	Amber	Red		Some areas within catchment are un-sewered - S101A may be required. Assume no provision for SW flows

From the initial assessment of the waste water infrastructure across the District it became clear that within the plan period significant infrastructure improvements would be required to accommodate the likely levels of development required to meet housing demands.

As the RAG assessment shown above looked at total delivery and included no phasing of delivery it shows the worst case scenario in terms of capacity issues within East Lindsey. However in order to understand the real level of capacity issue it was decided that another RAG analysis would be undertaken looking at sites submitted as part of the SHLAA (Strategic housing land availability assessment). It was hoped through looking at possible housing sites rather than simply high level numbers a truer picture would emerge. Shown in the tables below are the findings of the RAG analysis performed by Anglian Water Services on the non discounted sites submitted as part of the SHLAA call for land exercise.

Site Ref	Location	Site Area Ha	Potential Housing Numbers	Wastewater Treatement Works (WWTW)	WWTW capacity	Foul Sewerage Network capacity	Surface Water Network capacity (see note 1)	Additional Comments	Overall RAG rating
AL306	Alford, land adjacent to 9 Chauntry Road.	0.1	3	Alford STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
AL044	Alford, land adjacent to the Nurseries, Farlsthorpe Road.	0.2	5	Alford STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
AL204	Alford, Former Straven Factory site, West Street	1.1	41	Alford STW	Red	Amber	Red	AMP5 Flow consent. Localised network reinforcement may be required to connect FW.	Red
AL302	Alford, land off Spendluffe Avenue	6.8	90	Alford STW	Red	Amber	Red	AMP5 Flow consent. Localised network reinforcement may be required to connect FW.	Red
AL303	Alford, land east of Tothby Lane	4.2	43	Alford STW	Red	Green	Red	AMP5 flow consent.	Red
AL304	Alford, land to rear of Hunt's Depot	1.3	22	Alford STW	Red	Green	Red	AMP5 flow consent. Limited FW network capacity downstream of connection, may required reinforcement.	Red
AL312	Alford, land off Tothby Lane	9.8	200	Alford STW	Red	Amber	Red	AMP5 Flow consent. Localised network reinforcement may be required to connect FW.	Red
AL316	Alford, Land at Farlesthorpe Road	1.4	37	Alford STW	Red	Amber	Red	AMP5 flow consent. Limited FW network capacity downstream of connection, may required reinforcement.	Red
C&T304	Coningsby, land off Boston Road	2.5	65	Coningsby STW	Green	Green	Red		Amber
C&T305	Coningsby, Land off Park Lane	5.6	146	Coningsby STW	Green	Green	Red		Green
C&T306	Coningsby, Leagate Road	2.2	57	Coningsby STW	Green	Green	Red		Amber
HOR049	Horncastle, land to rear of Acacia, Southfield Place	0.1	1	Horncastle STW	Green	Green	Red		Green
HOR063	Horncastle, land adjacent to Greystones, Lincoln Road	0.3	7	Horncastle STW	Green	Green	Red		Green
HOR069	Horncastle, land adjacent to 4 Elmhirst Road	0.4	8	Horncastle STW	Green	Green	Red		Green
HOR080	Horncastle, land off Hamerton Lane	0.4	5	Horncastle STW	Green	Green	Red		Amber
HOR301	Horncastle, land east of Lincoln Road	38	870	Horncastle STW	Green	Amber	Red	Some reinforcement may be required to accommodate FW	Amber
HOR302	Horncastle, land of Wllow Close and Elmhirst Road	2.1	36	Horncastle STW	Green	Green	Red		Amber
HOR304	Horncastle, land on Northern side of Langton Hill	7.6	20	Horncastle STW	Green	Green	Red		Green
HOR307	Horncastle, land south of Langton Close	1.7	40	Horncastle STW	Green	Green	Red		Amber
HOR308	Horncastle, land off Station Lane/The Sidings	2.2	25	Horncastle STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
HOR313	Horncastle, land north of Mareham Road	13.3	233	Horncastle STW	Green	Green	Red		Green

HOR314	Horncastle, land south of Banovallum Gardens	7.8	169	Horncastle STW	Green	Green	Red		Green
HOR315	Horncastle, land south of Spilsby Road	2.6	60	Horncastle STW	Green	Green	Red		Green
HOR317	Horncastle, land west of Louth Road	2.9	74	Horncastle STW	Green	Green	Red		Amber
HOR320	Horncastle, Highways Depot, Hemingby Lane	1.7	43	Horncastle STW	Green	Green	Red		Amber
HOR323	Horncastle, land off Woodcock Lane	4.6	119	Horncastle STW	Green	Green	Red		Green
HOR324	Horncastle, land off Lincoln Road	0.9	24	Horncastle STW	Green	Green	Red		Amber
HOR326	Horncastle, Spilsby Road	4.6	93	Horncastle STW	Green	Green	Red		Green
LO002	Louth, land to rear of Chequergate House	0.2	4	Louth STW	Green	Green	Red		Green
LO020	Louth, land of Eve Street	0.4	9	Louth STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
LO044	Louth, Land off St Marys Lane (Close to Grimsby Road end)	0.3	4	Louth STW	Green	Green	Red		Green
LO046	Louth, Former Malt Kiln, Newbridge Hill	0.9	23	Louth STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
LO080	Louth, land to rear of Esso Garage, Newmarket	0.1	1	Louth STW	Green	Green	Red		Green
LO096	Louth, land to rear of property off Hortons Yard, Kidgate	0.1	2	Louth STW	Green	Green	Red		Green
LO134	Louth, land off London Road, adjoining cemetery	1.1	17	Louth STW	Green	Green	Red		Amber
LO301	Louth, land east of A16	2.3	30	Louth STW	Green	Green	Red		Amber
LO302	Louth, land of Grimsby Road	13.2	158	Louth STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
LO302a	Louth, land of Grimsby Road	5.9	117	Louth STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
LO305	Louth, land adjoining Greenways, Brakenborough Road	5	129	Louth STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
LO306	Louth, land between Keddington Road and Brackenborough Road	28.1	679	Louth STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
LO307	Louth, land off Ramsgate Road	0.4	11	Louth STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
LO312	Louth, Wallis House, Birch Road	1.5	38	Louth STW	Green	Green	Red		Amber
LO313	Louth, land to north east of Legbourne Road	33.9	600	Louth STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
LO316	Louth, corner of Newmarket/London Road	0.5	13	Louth STW	Green	Green	Red		Green
LO323	Louth, Keddington Road nurseries, Keggington Road	0.4	11	Louth STW	Green	Green	Red		Green
LO324	Louth, adjacent Shangri-la, Stewton Lane	0.2	1	Louth STW	Green	Green	Red		Green

LO325	Louth, land off Shearwater Close	2.1	54	Louth STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
LO329	Louth, land at Legbourne Road	3.4	89	Louth STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
LO330	Louth, land west of Legbourne Road	41.8	686	Louth STW	Green	Amber	Red	Significant off-site sewerage required to connect FW	Amber
LO339	Louth, land at Legbourne Road	2.1	55	Louth STW	Green	Green	Red		Green
LO340	Louth, land at Fulmar Drive and Kestrel Drive	6.2	160	Louth STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
LO343	Louth, 155 Newmarket	0.3	8	Louth STW	Green	Green	Red		Green
LO344	Louth, Louth Garden Centre, Legbourne Road	2.1	45	Louth STW	Green	Green	Red		Amber
LO345	Louth, land north of Kenwick Road	13.9	418	Louth STW	Green	Amber	Red	Significant off-site sewerage required to connect FW	Amber
LO462	Louth, land at Louth Golf Course	6.8	30	Louth STW	Green	Green	Red		Green
SPY022	Spilsby, land adjacent to 53 Ashby Road	0.1	4	Spilsby STW	Green	Green	Red		Green
SPY301	Spilsby, Post Office Lane	0.6	5	Spilsby STW	Green	Green	Red		Green
SPY302	Spilsby, land fronting and rear of 55 Ashby Road	1.8	47	Spilsby STW	Green	Green	Red		Amber
SPY303	Spilsby, east of Ashby Road	7.8	100	Spilsby STW	Green	Green	Red		Green
SPY305	Spilsby, land adjacent to Halton Road	5	129	Spilsby STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
BIN022	Binbrook, land adjacent to North House, Market Place	0.3	2	Binbrook STW	Amber	Green	Red	AMP5 flow consent	Amber
BIN301	Binbrook, Kirmond Road	0.2	4	Binbrook STW	Amber	Green	Red	AMP5 flow consent	Amber
BIN304	Binbrook, land off Mount Pleasant	0.5	5	Binbrook STW	Amber	Green	Red	AMP5 flow consent	Amber
BIN306	Binbrook, land north of Louth Road	2.3	21	Binbrook STW	Red	Green	Red	AMP5 flow consent	Red
BIN307	Binbrook, High Street	2.1	33	Binbrook STW	Red	Green	Red	AMP5 flow consent	Red
BLM302	Burgh le Marsh, land north of Station Road	8.3	136	Ingoldmells STW	Green	Green	Red		Green
BLM303	Burgh le Marsh, land at Orby Road	3.2	40	Ingoldmells STW	Green	Green	Red		Green
BLM305	Burgh le Marsh, land south of Hall Lane	8.6	164	Ingoldmells STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
BLM309	Burgh le Marsh, Station Road	2.3	29	Ingoldmells STW	Green	Green	Red		Green
BLM311	Burgh le Marsh, land adjacent to The Poplars, Common Lane	0.3	6	Ingoldmells STW	Green	Green	Red		Green
BLM313	Burgh le Marsh, land south of Wildshed lane	3.7	70	Ingoldmells STW	Green	Green	Red		Green
BLM316	Burgh le Marsh, The Chestnuts, Wainfleet Road	0.6	5	Ingoldmells STW	Green	Amber	Red	Significant off-site sewerage required to connect FW	Amber
FRIS319	Friskney, land to rear of Bramleys, Burgh Road	1.4	26	Friskney STW	Green	Green	Red		Amber

FRIS301	Friskney, land adjacent Beech Cottage, Church Road	0.3	6	Friskney STW	Green	Green	Red		Green
FRIS303	Friskney, Field Lane	0.4	8	Friskney STW	Green	Green	Red		Green
FRIS305	Friskney, Low Road, Fold Hill	3.9	74	Friskney STW	Green	Green	Red		Green
FRIS306	Friskney, land adjacent Fendale, Low Gate	1.3	10	Friskney STW	Green	Green	Red		Amber
FRIS309	Friskney, land south of Field Lane	0.8	14	Friskney STW	Green	Green	Red		Amber
FRIS311	Friskney, Church Lane, Yawling Gate	0.8	15	Friskney STW	Green	Green	Red		Amber
FRIS317	Friskney, The Avenue	0.1	2	Friskney STW	Green	Green	Red		Green
MAN003	Manby, land south of Manby House, Carlton Road	0.5	3	Manby STW	Red	Green	Red	AMP5 flow consent	Red
MAN305	Manby, Former Depot South of Manby Middlegate	2.4	45	Manby STW	Red	Green	Red	AMP5 flow consent	Red
MAN313	Manby, land next to Church, Carlton Road	1.2	23	Manby STW	Red	Green	Red	AMP5 flow consent	Red
MAN314	Manby, land at Carlton Road	4.9	50	Manby STW	Red	Green	Red	AMP5 flow consent	Red
MAN316	Manby, former caravan site	1.4	27	Manby STW	Red	Green	Red	AMP5 flow consent	Red
MAN21	Grimoldby, rear of Cloudbase, Mill Lane	0.2	3	Manby STW	Amber	Green	Red	AMP5 flow consent	Red
MAN301	Grimoldby, land west of Tinkle Street	1.3	19	Manby STW	Red	Green	Red	AMP5 flow consent	Red
MAN302	Grimoldby, land south of East filed Lane	0.7	10	Manby STW	Amber	Green	Red	AMP5 flow consent	Red
MAN320	Grimoldby, land off Church Close	0.6	9	Manby STW	Red	Green	Red	AMP5 flow consent	Red
HOG306	Hogsthorpe, land off West End	4.7	89	Ingoldmells STW	Green	Green	Red		Green
HLC301	Holton le Clay, land opp Jug and Bottle	17.7	337	Holton le Clay STW	Green	Amber	Red	Localised network reinforcement may be required to connect FW	Amber
HLC302	Holton le Clay, land off Church Lane	1.7	31	Holton le Clay STW	Green	Green	Red		Amber
HLC303	Holton le Clay, land east of Louth Road	15.4	292	Holton le Clay STW	Green	Amber	Red	Localised network reinforcement may be required to connect FW	Amber
HLC304	Holton le Clay, land north of Tetney Road	1	19	Holton le Clay STW	Green	Green	Red		Amber
HLC305	Holton le Clay, land north of Louth Road	4.8	91	Holton le Clay STW	Green	Green	Red		Green
LEG301	Legbourne, opp Queens Head PH	1.5	9	Legbourne STW	Amber	Green	Red	AMP5 flow consent	Amber
LEG302	Legbourne, Mill Lane	1	10	Legbourne STW	Amber	Amber	Red	AMP5 flow consent. Network capacity for FW is limited - localised reinforcement may be required	Amber
LEG303	Legbourne, extension to Househams Lane, Legbourne	3.5	66	Legbourne STW	Red	Green	Red	AMP5 flow consent	Red
LEG307	Legbourne, Station Road	0.7	13	Legbourne STW	Red	Green	Red	AMP5 flow consent	Red
MAR217	Marshchapel, end of Mill Lane	0.2	3	North Cotes STW	Green	Green	Red		Green
MAR227	Marshchapel, R/O The Sycamores, Seadyke Way	0.5	4	North Cotes STW	Green	Green	Red		Green

MAR304	Marshchapel, land off Mill Lane	0.3	6	North Cotes STW	Green	Green	Red		Green
NTH301	North Thoresby, Station Road	2.5	33	North Thoresby STW	Green	Green	Red		Amber
NTH307	North Thoresby, off High Street	0.5	10	North Thoresby STW	Green	Green	Red		Amber
NTH308	North Thoresby, east of A16	10.8	130	North Thoresby STW	Green	Amber	Red	Localised network reinforcement may be required to connect FW	Amber
NTH313	North Thoresby, land of High Street	1	20	North Thoresby STW	Green	Green	Red		Amber
NTH317	North Thoresby, land adj to Quidi Vidi	0.1	2	North Thoresby STW	Green	Green	Red		Amber
SIB302	Sibsey, West of A16	11.4	150	Sibsey STW	Red	Green	Red	AMP5 flow consent	Red
SIB303	Sibsey, land to rear of Sibsey House	24.7	127	Sibsey STW	Red	Green	Red	AMP5 flow consent	Red
STK013	Stickney, Millers Cottage & Farmyard, Main Road	0.5	10	Stickney STW	Green	Green	Red		Green
STK304	Stickney, land north of Halls Lane	3.9	50	Stickney STW	Green	Green	Red		Amber
STK312	Stickney, west of Main Road	2.1	39	Stickney STW	Green	Green	Red		Amber
STK305	Stickney, land adjacent to Holmes Road	0.4	7	Stickney STW	Green	Green	Red		Amber
STK306	Stickney, land west of A16	0.5	9	Stickney STW	Green	Green	Red		Green
STK313	Stickney, Richlieu Cottage, Main Road	0.1	2	Stickney STW	Green	Green	Red		Green
STK314	Stickney, land adjacent to Lynwood Main Road	0.1	1	Stickney STW	Green	Green	Red		Green
TNY303	Tetney, land west of Holton Road	1.5	14	Tetney-Newton Marsh STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
TNY311	Tetney, Humberston Road	1.7	32	Tetney-Newton Marsh STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
TNY313	Tetney, Humberston Road	12.1	101	Tetney-Newton Marsh STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
TNY314	Tetney, land off Station Road	1.5	27	Tetney-Newton Marsh STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
TNY315	Tetney, land opposite Golf Club, Station Road, Tetney	5.7	108	Tetney-Newton Marsh STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
TNY318	Tetney, Lammings Farm, Holton Road	1.2	19	Tetney-Newton Marsh STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
WAI305	Wainfleet All Saints, land south of Matt Pits Lane	1.1	22	Wainfleet STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
WAI308	Wainfleet All Saints, land off Church Lane	2.6	8	Wainfleet STW	Green	Green	Red		Green
WAI401	Wainfleet All Saints, land off Matt Pits Lane	0.7	9	Wainfleet STW	Green	Amber	Red	Limited FW network capacity downstream of connection, may require localised reinforcement.	Amber
WSP302	Woodhall Spa, land off Tower Drive	0.7	10	Woodhall Spa STW	Amber	Green	Red	AMP5 flow consent	Amber
WSP303	Woodhall Spa, land at the rear of 70 Horncastle Road	1.7	10	Woodhall Spa STW	Amber	Green	Red	AMP5 flow consent	Amber

WSP304	Woodhall Spa, land adjacent to St Hughs School	5.5	100	Woodhall Spa STW	Red	Green	Red	AMP5 flow consent	Red
WSP308	Woodhall Spa, land south of Witham Road	2.5	20	Woodhall Spa STW	Red	Green	Red	AMP5 flow consent	Red
WSP309	Woodhall Spa, land south of Witham Road	3.4	35	Woodhall Spa STW	Red	Amber	Red	AMP5 flow consent. Limited FW network capacity downstream of connection, may require localised reinforcement.	Red
WSP310	Woodhall Spa, land off Clinton Way	1.4	20	Woodhall Spa STW	Red	Green	Red	AMP5 flow consent	Red
WSP311	Woodhall Spa, land between Mill Lane/Abbey Drive	1	20	Woodhall Spa STW	Red	Amber	Red	AMP5 flow consent. Limited FW network capacity downstream of connection, may require localised reinforcement.	Red
WSP312	Woodhall Spa, land off Mill Lane	7.9	39	Woodhall Spa STW	Red	Amber	Red	AMP5 flow consent. Limited FW network capacity downstream of connection, may require localised reinforcement.	Red
WSP314	Woodhall Spa, land off Witham Road	13.8	262	Woodhall Spa STW	Red	Amber	Red	AMP5 flow consent. Limited FW network capacity downstream of connection, may require localised reinforcement.	Red
WSP315	Woodhall Spa, 196/198 Witham Road	0.7	13	Woodhall Spa STW	Red	Amber	Red	AMP5 flow consent. Limited FW network capacity downstream of connection, may require localised reinforcement.	Red
WSP316	Woodhall Spa, land west of Tattershall Road	8	22	Woodhall Spa STW	Red	Green	Red	AMP5 flow consent	Red
WSP318	Woodhall Spa, land east of Tattershall Road	23.2	440	Woodhall Spa STW	Red	Green	red	AMP5 flow consent	Red
WSP319	Woodhall Spa, land off Alexandra Road	1.1	21	Woodhall Spa STW	Red	Green	red	AMP5 flow consent	Red
WSP320	Woodhall Spa, land off King Edward Avenue	0.6	11	Woodhall Spa STW	Amber	Green	Red	AMP5 flow consent	Amber
WRA021	Wragby, land to rear of Conifers, Louth Road	0.3	5	Wragby STW	Green	Green	Red		Green
WRA024	Wragby, land to rear of Thornfield, Louth Road	1.7	32	Wragby STW	Green	Green	Red		Amber
WRA301	Wragby, land off Victoria Street	4.2	79	Wragby STW	Green	Green	Red		Amber
WRA304	Wragby, land off Bardney Road	2.2	42	Wragby STW	Green	Green	Red		Amber
WRA306	Wragby, south of Wire Hill Lane	1.5	28	Wragby STW	Green	Green	Red		Amber
WRA308	Wragby, land south of Horncastle Road	1.6	10	Wragby STW	Green	Green	Red		Amber
WRA309	Wragby, land off Archway Drive	2.3	44	Wragby STW	Green	Green	Red		Amber
GRA209	Grainthorpe, Poors Land	0.5	9	North Cotes STW	Green	Green	Red		Green
GRA302	Grainthorpe, land off Poors End	0.5	9	North Cotes STW	Green	Green	Red		Green
GRA303	Grainthorpe, land off Butts Lane	0.5	2	North Cotes STW	Green	Green	Red		Green
MLF021	Mareham le Fen, land adjacent to garage, Main Street	0.2	3	Mareham le Fen STW	Amber	Green	Red	AMP5 flow consent	Amber
MLF302	Mareham le Fen, Methodist Chapel, Chapel Lane	0.1	2	Mareham le Fen STW	Amber	Green	Red	AMP5 flow consent	Amber

MLF309	Mareham le Fen, Main Street	2.3	43	Mareham le Fen STW	Red	Green	Red	AMP5 flow consent	Red
MLF310	Mareham le Fen, Horncastle Road	1.5	29	Mareham le Fen STW	Red	Green	Red	AMP5 flow consent	Red
TEF008	Tetford, land south of Hamilton Hall, East Road	0.2	3	Tetford STW	Green	Green	Red		Green
TEF301	Tetford, corner of South Road	0.4	3	Tetford STW	Green	Green	Red		Green
TEF302	Tetford, land at South Road	0.7	14	Tetford STW	Green	Green	Red		Amber

From this more detailed analysis which looked at various sites of differing capacities across the District it can be seen in the main that with suitable phasing of development existing capacity is available within both the sewer network and treatment works to accommodate a level of growth. Whilst it is accepted that over the course of the plan period investment and improvements to the foul water systems will be required there are a few areas where further work and communication with Anglian Water will be required in the immediate future, these areas include the settlements of Alford, Manby, Sibsey, Woodhall Spa, Legbourne and Binbrook.

5.0 Water Quality

Water quality is governed by the Water Framework Directive (WFD) which requires that all surface and ground waters need to meet good status (or good potential for Heavily Modified Waterbodies) by 2027.

Good Status in relation to surface waters is best described as its overall status therefore consisting of both its chemical and ecological components. Heavily Modified Waterbodies due to their physical alterations either for flood defence purposes or navigation etc are unable to achieve near natural condition and are therefore measured against ecological potential rather than status.

Development can impact the status of a waterbody in various ways, such as through culverting, changing the flow characteristics, discharge of pollutants and changes to groundwater flow paths. Where a development may have an adverse impact upon the status of the water body a WFD assessment will be required. Development can also have beneficial impacts upon watercourses as often they require improvement to help them achieve good status, therefore development sites should aim to help deliver the mitigation measures for each catchment as identified within the River Basin Management Plan for the Anglian region produced by the Environment Agency.

Under the requirements of the WFD management plans for each river basin District are to be drawn up and reviewed and where necessary updated every six years. The first river basin management plan covering the Anglian region was published in 2009 and is currently being updated by the Environment Agency. From the latest results relating to water body quality based on surveys carried out between 2009 and 2011 there does not appear to have been significant change (deterioration or improvement) in the number of surface water bodies at good status in the UK.

The current overall status and objective for the waterbodies within East Lindsey can be seen overleaf.

Site	Receiving Water Course	Dissolved oxygen status	Phosphate status	Ammonia status	Waterbody Summary Data			
					Current Overall Status	Eco Status	Overall Objective	Ecological Objective
Alford STW	Wold Grift Drain	Poor	Bad	Moderate	Moderate	Moderate	Good Potential by 2027	Good Ecological Potential by 2027
Anderby - Sea Road STW	Anderby Main Drain	No data	No data	No data	Good	Good	Good Potential by 2015	Good Ecological Potential by 2015
Binbrook STW	Thorganby Beck	High	Good	High	No data	No data	No data	No data
Bucknall STW	Trib Catchwater Drain	Good	Moderate	High	Moderate	Moderate	Good Potential by 2027	Good Potential by 2027
Candlesby STW	R. Lymn/ Steeping	Poor	Good	Good	Moderate	Moderate	Good Potential by 2027	Good Potential by 2027
Coningsby STW	River Bain	High	Moderate	High	Moderate	Moderate	Good Potential by 2027	Good Ecological Potential by 2027
Covenham Package STW		No data	No data	No data	No data	No data	No data	No data
Croft STW	Trib of Steeping River	Poor	Poor	Poor	Moderate	Moderate	Good Potential by 2027	Good Ecological Potential by 2027
Donington on Bain STW	River Bain	High	Moderate	High	Moderate	Moderate	Good Potential by 2027	Good Ecological Potential by 2027
East Kirkby STW	Dyke, Trib of West Fen Catchwater	Moderate	Good	High	Moderate	Moderate	Good Potential by 2027	Good Ecological Potential by 2027
Friskney STW	Trib of Fodder Dyke	Good	High	Good	Good	Good	Good Potential by 2015	Good Ecological Potential by 2015
Frithville STW	Trib West Fen Drain	grouped so no data			No data	No data	No data	No data
Gipsy Bridge STW	River Witham	Good	Moderate	High	Moderate	Moderate	Good Potential by 2027	Good Ecological Potential by 2027
Hemingby - Main Road STW	River Bain	High	Moderate	High	Moderate	Moderate	Good Potential by 2027	Good Ecological Potential by 2027
Holton le Clay STW	Humberstone Beck	High	Good	High	No data	No data	No data	No data
Horncastle STW	River Bain	High	Moderate	High	Moderate	Moderate	Good Potential by 2027	Good Ecological Potential by 2027
Ingoldmells STW	North Sea	High	n/a	n/a	No data	No data	No data	No data
Legbourne STW	The Beck (Long Eau)	Good	Good	High	Poor	Poor	Good Potential by 2027	Good Ecological Potential by 2027
Louth STW	Louth Canal	High	High	High	Good	Good	Good Status by 2015	Good Ecological Status by 2015

Ludford STW	River Bain	High	Moderate	High	Moderate	Moderate	Good Potential by 2027	Good Ecological Potential by 2027
Mablethorpe STW	Wold Grift Drain	Poor	Poor	Good	Poor	Poor	Good Potential by 2027	Good Ecological Potential by 2027
Manby STW	The Cut, Long Eau	Good	Good	High	Poor	Poor	Good Potential by 2027	Good Ecological Potential by 2027
Mareham le Fen STW	West Fen Catchwater	Moderate	Good	High	Moderate	Moderate	Good Potential by 2027	Good Ecological Potential by 2027
Market Stainton STW	Trib of River Bain	grouped so no data	No data	No data	No data	No data	No data	No data
Minting STW	Great Drain	grouped so no data	No data	No data	No data	No data	No data	No data
New Leake STW	Fodder Dyke	Good	High	Good	Good	Good	Good Potential by 2015	Good Ecological Potential by 2015
North Coates STW	Old Fleet Drain	grouped so no data			No data	No data	No data	No data
North Cotes (RAF) STW	Old Fleet Drain	High	Good	High	No data	No data	No data	No data
North Somercotes STW	Severn Towers Sth Eau	No data	No data	No data	Good	Good	Good Potential by 2015	Good Ecological Potential by 2015
North Thoresby STW	Bond Croft Drain	grouped so no data			No data	No data	No data	No data
Old Bolingbroke STW	Trib of Hagnaby Beck	grouped so no data			No data	No data	No data	No data
Saltfleet STW	Saltfleet Haven	No data			No data	No data	No data	No data
Sibsey STW	Mallows Drain	Good	Moderate	Good	No data	No data	No data	No data
Skendleby STW	Trib of River Lymn	Poor	Good	Good	Moderate	Moderate	Good Potential by 2027	Good Ecological Potential by 2027
Spilsby STW	River Lymm/Steeping NT	Poor	Good	Good	Moderate	Moderate	Good Potential by 2027	Good Ecological Potential by 2027
Stickney STW	East Fen Catchwater	Moderate	High	High	No data	No data	No data	No data
Strubby STW	Trib of Wold Grift Drain	Poor	Poor	Good	Poor	Poor	Good Potential by 2027	Good Ecological Potential by 2027
Tathwell STW	River Lud	High	High	High	Good	Good	Good Status by 2015	Good Ecological Status by 2015
Tetford STW	Double Dyke	Poor	Good	Good	No data	No data	No data	No data
Tetney-Newton Marsh STW	Tetney Haven				No data	No data	No data	No data
Toynton STW	Maud Foster drain	Moderate	High	High	Moderate	Moderate	Good Potential by 2027	Good Ecological Status by 2027
Wainfleet STW	Trib of River Steeping	Poor	Poor	Poor	Moderate	Moderate	Good Potential by 2027	Good Ecological Potential by 2027
Welton le Marsh (WTW) STW	Trib Welton Beck	No data	No data	No data	No data	No data	No data	No data
Welton-le-Wold STW	River Lud	High	High	High	Good	Good	Good Status by 2015	Good Ecological Status by 2015
Woodhall Spa STW	Reeds Beck	Good	Moderate	High	No data	No data	No data	No data
Wragby STW	Goltho Beck	Good	Poor	High	Moderate	Moderate	Good Status by 2027	Good Ecological Status by 2027

As a result of tighter standards under the Water Framework Directive should a proposed development require an increase to the discharge consent for a STW, it is likely the Environment Agency would place stringent conditions on the discharge parameters. This would require in many instances additional capital investment by Anglian Water in order to meet the higher effluent standard requirements, particularly with regards to the level of phosphates discharged. The Urban Wastewater Treatment Directive is designed to make sure all wastewater in the EU is treated to the appropriate standard. An integral part of the Directive is that quality standards fall into categories dependent upon both the size of the treatment works but also the sensitivity of the receiving watercourse.

With increased demand due to population growth some sewage treatment works may exceed the Urban Wastewater Treatment Directive threshold that requires nutrient removal. In locations where households cannot be connected to existing established sewers this may result in additional septic tank discharges to water bodies in which levels of phosphates and nitrates are already high. Under the Water Resources Act 'consent to discharge' must be obtained from the EA before any polluting material is legally discharged into a watercourse.

All future development should seek to improve the quality of the water environment and limit any negative impact it has upon it if 'good' status is to be met. Anglian Water have taken the approach of requesting in all but exceptional circumstances that new development is served by separate foul and surface water sewers as a way of reducing our impact upon the environment. With increased levels of development there is a risk during heavy rainfall periods that combined sewers can be overloaded resulting in combined sewer overflow spillages as the existing network capacity is taken up with the increase in surface water entering the system.

6.0 Water Cycle Environment and Infrastructure

6.1 Introduction

Within this section an overview of the baseline water resources for the East Lindsey WCS scoping study has been provided. The main sources of the information used have been publicly available documents from both the Environment Agency along with Anglian Water. The current Anglian Water final WRMP published February 2010 has provided further detailed information which has been used within this scoping study and future updates will figure in greater detail in future work.

6.2 Water Resources and Supply

The water supply for East Lindsey is provided by Anglian Water Services which by geographic area is the largest provider within England and Wales covering a total area of some 27,500 Square kilometres. In order to supply such a vast area the company operate 1,257 water and water recycling treatment works which equates to around a quarter of all those in operation within England and Wales.

Anglian Water as a service provider operates its business under a heavily regulated system, one enforced by the Environment Agency, OFWAT and the Drinking Water Inspectorate. It is the responsibility of these three organisations to ensure Anglian Water operates in an efficient manner but also maintains and where required improves the wider environment within which it operates.

6.2.1 Climate

The average annual rainfall in East Lindsey is 600mm, less than the annual average rainfall for England of 897 mm. Annual average effective rainfalls in the Anglian Region can be as low as 147mm, and during long, dry summers, evaporation rates can exceed rainfall. (**Source**: The Witham Catchment Abstraction Management Strategy, March 2004).

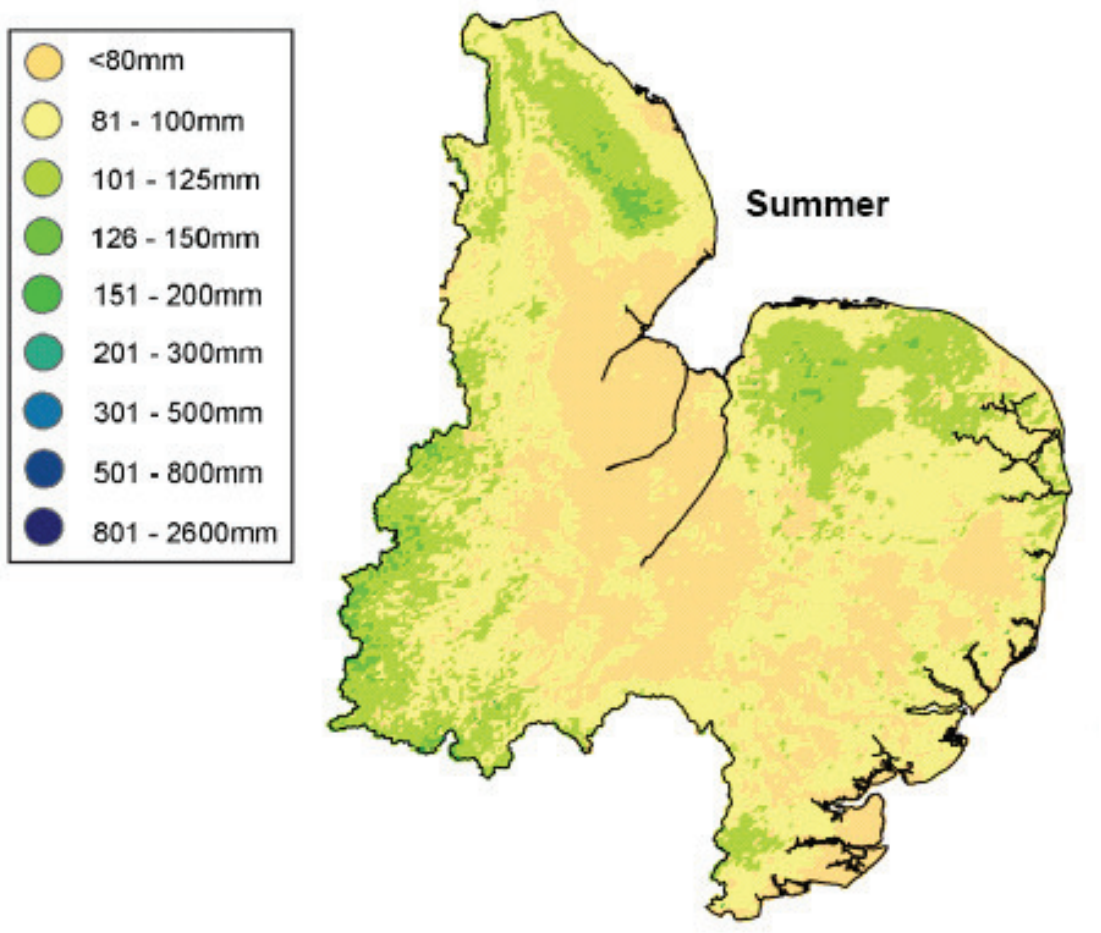


Figure 8 Summer effective rainfall for the Anglian Region.

Sourcehttp://webarchive.nationalarchives.gov.uk/20140328084622/http://cdn.environment-agency.gov.uk/geho1209brkw-e-e.pdf

6.2.2 Geology and Groundwater

Groundwater is exceptionally important within the Anglian Region, with opportunities for abstraction from rivers being comparatively limited (only 3% of potable water supplies comes from rivers), and reservoir supplies are also limited in comparison to other regions of the UK.

Within the Anglian Region 79% of supplies come from aquifers, with all major supplies within Lincolnshire originating from aquifers.

Due to the administrative boundaries used by Anglian Water within their WRMP, East Lindsey falls within a number of Water Resource Zones (WRZ). The majority however falls within what is referred to

as The Lincolnshire Coastal WRZ, which utilises the water resources of the Spilsby Sandstone and Southern Lincolnshire Chalk aquifers. Water is also imported from Covenham WTW which due to the administrative boundaries whilst within East Lindsey, actually falls within the South Humberside WRZ.

Both the Spilsby Sandstone and Southern Lincolnshire Chalk aquifers are what are referred to as confined, with the Chalk lying beneath glacial clays and the Sandstone being beneath the chalk and Lower Cretaceous silts and clays. As recognised in the Water Resource Management Plan (Main Report 2010) recharge to the Southern Chalk is complex with some instances of lateral flow occurring from the Northern Chalk.

During the 1990's following a series of groundwater models abstraction licences for the Spilsby Sandstone were increased. However as a result of the increased abstractions and therefore groundwater mining, groundwater levels became depressed. Due to this resulting downward trend in groundwater levels total licensed quantities for the Spilsby Sandstone have subsequently been reduced to a sustainable quantity. In order to replace the reduction in licensed quantity, reinforcement of trunk mains has occurred allowing the additional transfer of water from Covenham WTW to Skegness.

Whilst Covenham acts to replace the reduced licensed abstractions from the Spilsby Sandstone; the yield of the reservoir is very much dependent on the baseflow from springs issuing from the Southern Lincolnshire Chalk aquifers along with the treated wastewater from Louth to the Louth Canal. When necessary for instance during periods of low rainfall the yield of Covenham reservoir is augmented by the transfer of water from Anglian Waters Great Eau transfer scheme which provides a significant increase to the contributory catchment area.

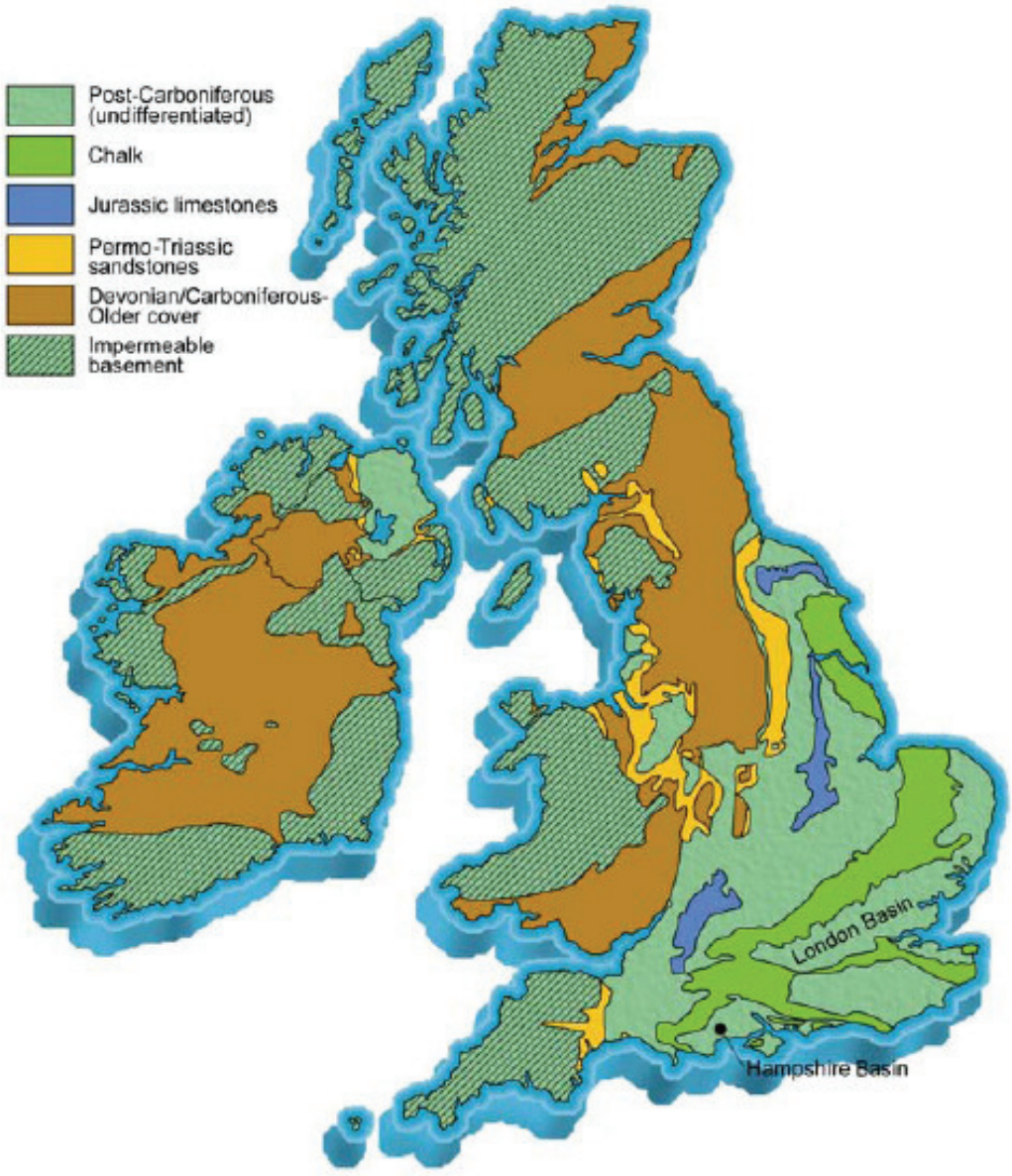


Figure 9 - Distribution of the principal aquifers in the Britain and Ireland.

Source:
http://www.groundwateruk.org/downloads/the_aquifers_of_the_uk.pd

6.3.3 Groundwater quality and vulnerability.

In order to preserve the quality of water supplied from ground water sources including those of aquifers and wells the Environment Agency have defined around 2000 source protection zones (SPZ's) nationally. The zones show the risk of contamination from all forms of activity which may result in pollution in that area. There are a cluster of three small SPZ's in the Alford area with linear catchments running from southwest to northeast. All three have compact zone 1 areas (inner source protection zones) surrounded by small zone 2 area (outer source protection zones). There is a similar SPZ around North Cotes with a catchment which follows loosely the line of Louth Canal. A further larger SPZ spans from the north of the district to as far as Humberside with small inner zones collecting along the coast surrounded by compact outer zones, the catchment extends back inland into the Lincolnshire Wolds area.

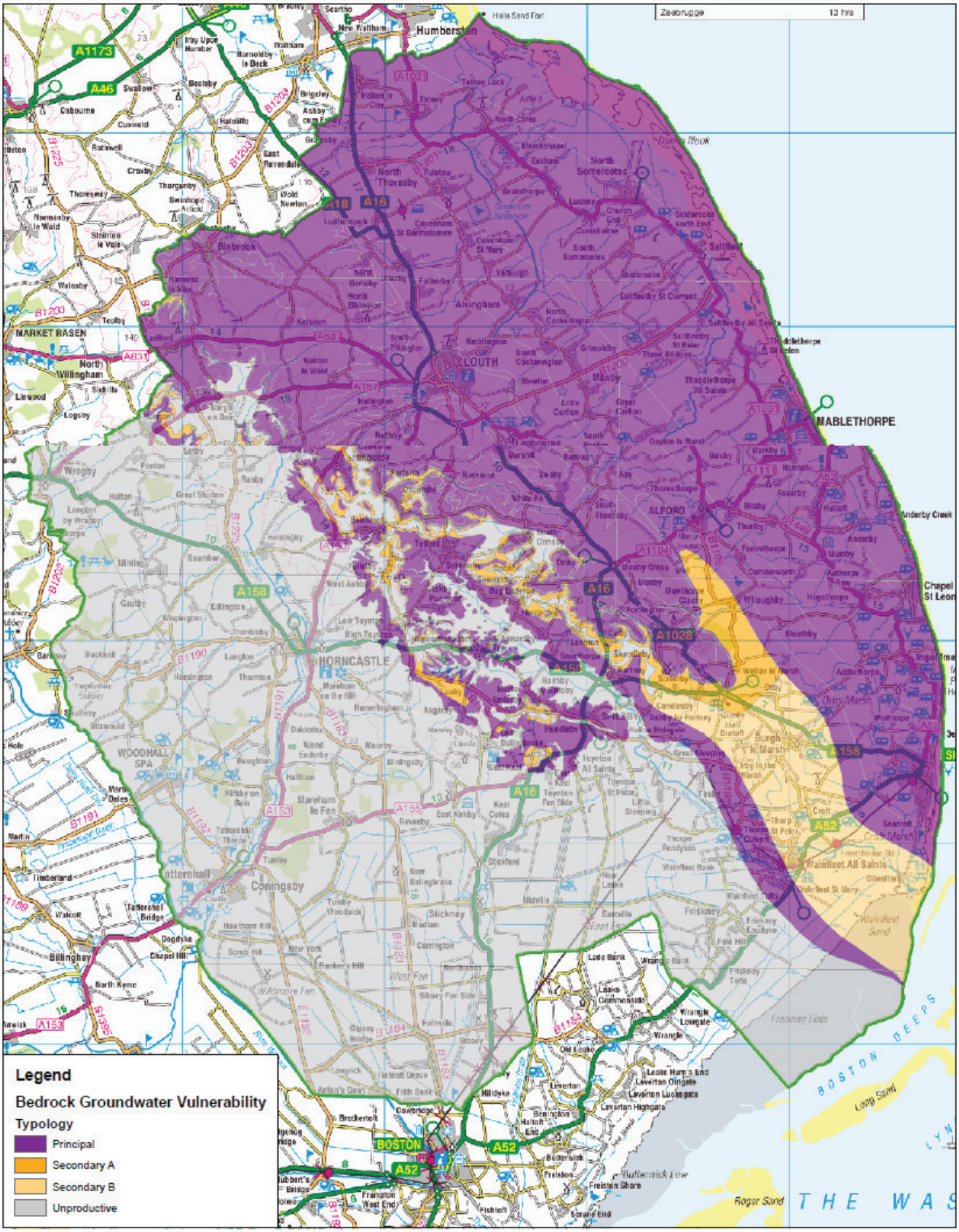
Source Protection Zones have been identified for sources located at Tetney, Marshchapel, Fulstow, Maltby le Marsh, Bilsby and Thurlby. Whilst within East Lindsey there are in the region of 219 private drinking water boreholes, few have been covered by SPZ's.

Source: http://www.e-lindsey.gov.uk/NR/rdonlyres/7C26DD06-7908-4043-A954-19FFB14C9F3E/0/core_strategy_sustainability_appraisal.pdf

While there are at present no significant environmental concerns about abstractions from the confined aquifers the Environment Agency assess the sustainability of licensed qualities through regional modelling work. The need for abstractions to be managed is in order to prevent the movement of connate saline water from the east and local dewatering. Due to the high percentage of available aquifer resources in use there is potential vulnerability to long term reductions as a result of reduced recharge through climate change.

The Spilsby Sandstone aquifer is regarded as poorly sorted being partially cemented. Older boreholes were designed to allow the pumping of sand, though newer ones are often fitted with screens designed to restrict any sediment being drawn into the submersible borehole pump to eliminate blockages and damage from occurring. As a result older boreholes have a relatively short asset life, with Anglian Water operating a programme of borehole rehabilitation and replacement along with seeking to licence new abstraction points within currently licensed quantities in order to maintain deployable outputs.

East Lindsey Groundwater Vulnerability - Bedrock Aquifers



Source: Environment Agency 2013

Principal Aquifers

- Principle aquifers are layers or drift deposits which have a high inter-granular and/or fracture permeability meaning that they usually provide a high level of water storage. In most cases, principal aquifers were previously designated as major aquifers.

Secondary Aquifers

Secondary aquifers include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage potential. Secondary aquifers are subdivided into two types, A and B:

- **Secondary A** – Secondary A aquifers consist of permeable layers which are capable of supporting water supply at a local rather than strategic scale, and in some cases form an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers;
- **Secondary B** – Secondary B aquifers predominantly store more limited amounts of water due to localised features such as fissures and are often the water bearing parts of former non-aquifers.

Where it has not been possible to attribute an aquifer to one of the above secondary types as a result of rock type it is referred to as a Secondary undifferentiated aquifer.

- **Secondary Undifferentiated** – Secondary undifferentiated aquifers are those which the layer in question has previously been designated as both a minor and non-aquifer in different locations due to the rock types variable characteristics.

6.3.4 Water Supply and Availability

East Lindsey is considered an area of Serious Water Stress as designated by Defra, therefore options to develop new resources are limited.

Anglian Water's Water Resource Management Plan (WRMP) outlines a strategy to secure water supplies over the next 25 years.

Within East Lindsey, Anglian Water regards the demand centres to be Skegness, Mablethorpe and Louth. Demand is characterised by mixed household and industrial customers with the addition of seasonal demands created by the tourist industry along the coast. The result of such a prevalent tourist industry along the coast results in exceptionally high peak demands during periods of hot dry weather when holidaymakers along with day-trippers flock to the coast. These periods are generally unpredictable and require large peak sourceworks output.

Within the Lincolnshire Coastal WRZ target headroom is below the regional average increasing from 3.3 to 12.3 per cent through the planning period recognised in the WRMP. It is almost entirely driven by demand uncertainties on population growth and domestic consumption.

Within the 2010 Water Resource Management Plan average demand for the District was assessed as unlikely to increase although reinforcement of the trunk main and distribution network was highlighted as necessary in order to ensure that new development did not affect the local supply-demand balance. Growth for the period covered by the 2010 WRMP was forecast at a rate of 600 dwellings a year in line with that of the now revoked Regional Spatial Strategy, however due to the economic downturn this figure has not been met with building rates across the district falling considerably short.

Using a forecasted building rate of 600 dwellings per year Anglian Water used the Forward model to asses which schemes would be needed to maintain the supply-demand balance whilst also allowing for target headroom at the Planning Zone level. The Forward model included generic demand management options for water efficiency along with the use of further targeted leakage control.

Due to the potential deficit against peak demands within the coastal centres of Skegness and Mablethorpe driven by the non-indigenous population one of the water management options proposed within the WRMP was for investment and improvements to be made to the internal transfer links and the more effective use of Covenham WTW water. The continued maintenance of the Spilsby Sandstone aquifer boreholes was also seen as a priority.

The use of additional water from Covenham was highlighted as an option as this would enable average abstraction from the Spilsby Sandstone to be reduced if required. The rolling five-year licences for the Spilsby Sandstone aquifer enable it to be used conjunctively with Covenham reservoir through the use of the confined aquifer storage during dry years.

6.3.5 Water Resource Management

Based on forecasts of annual average conditions in a dry year along with peak demand period if there is one, water companies plan how they will manage supply and demand. A dry year is simply one in which demand is recognised to be more than would be expected of a 'normal' year, with a peak period representing average daily demand during the hottest/driest point usually at the height of the summer. To remove the effects of intense demand over a few days, peak period is often based on demand trends over a larger period of time, usually a few weeks. As droughts are defined based on water resource trigger levels a peak period is not the same.

6.3.6 Catchment Abstraction Management Strategy

In order to mange water resources at a local level the Environment Agency use Catchment Abstraction Management Strategies (CAMS). East Lindsey lies within two CAMS areas, Grimsby, Ancholme and Louth CAMS area along with the Witham CAMS area.

Within these CAMS, the EA's assessment of the availability of water resources is based on a classification system which gives an availability status indicating:

- The relative balance between the environmental requirements for water and how much is licensed for abstraction;
- Whether there is water available for future abstractions; and
- Areas where levels of abstraction need to be adjusted or revoked.

The categories of resource availability status are shown in the table below. The classification is based upon an assessment of a river systems ecological sensitivity to abstraction related flow reduction. This classification can then be used to assess the potential for additional water resource abstractions.

Implications of Water resource availability colours

Water resource availability colour	Implications for licensing
High hydrological status	• There is more water than required to meet the needs of the environment. • Very little actual abstraction occurs and the river shows virtually undisturbed, or close to natural, flow conditions. • Due to the need to maintain the near pristine nature of the water body, further abstraction is severely restricted.
Water available for licensing	• There is more water than required to meet the needs of the environment. • New licences will be considered depending on local and downstream impacts.
Restricted water available for licensing	• Fully licensed (FL) flows fall below the EFI. • If all licensed water is abstracted there will not be enough water left for the needs of the environment. No new unconstrained consumptive licences will be granted. It may also be appropriate to investigate the possibilities for reducing fully licensed risks. • Water may be available if you can 'buy' (known as licence trading) the entitlement to abstract water from an existing licence holder.
Water not available for licensing	• Recent actual flows are below the EFI. • This scenario highlights water bodies where flows are below the indicative flow requirement to help support good ecological status (GES) (as required by the Water Framework Directive). Note: we are currently investigating water bodies that are not supporting GES / GEP (good ecological potential). • No further consumptive licences will be granted. Water may be available if you can buy (known as licence trading) the amount equivalent to that recently abstracted from an existing licence holder.

(Source: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289830/LIT7776_be21df.pdf)

As a result of the District size and the complex nature of river catchments there are two CAMS's documents relevant to East Lindsey, firstly that of the Witham Catchment Abstraction Management Strategy published February 2013 and then that of the Grimsby, Ancholme and Louth Catchment Abstraction Management Strategy again published February 2013.

These two documents provide the overarching strategy for the management of water resources at a more local level and set out the intended management of existing and also future abstractions. CAMS are intended to identify where water is available, and also where relevant where abstractions need to be reduced to balance demand for abstractions with environmental considerations.

Within Area D (Waithe Beck and Louth Canal), the Environment Agency within the 2013 Grimsby, Ancholme and Louth CAMS document state there is restricted water available for licensing at high flows, but no water available for licensing at medium to low flows.

The implications of this is that no new unconstrained licences within the area will be granted at any flows and that new consumptive licences will only be considered at extremely high flows (occurring less than 17% of the time) subject to a hands off flow condition set at 145.2ml/d at the Tetney assessment point for instance.

Within the Witham CAMS document, Area C covering the River Witham, Slea and Bain has been assessed as having water available for abstraction at high and medium flows but no water available for abstractions at low flows. A hands off flow condition has been set for the Tattershall assessment point at 40.8ml/d where it is expected water will be available for abstraction 222 days a year. The southern most part of the District is covered by Area D (Maud Foster and Witham Fourth level dependent management unit) where water has been assessed as being available for licensing at all flows.

For all abstractions over 20m³/day or 4,400 gallons from a 'source of supply' (river, stream, lake, well or groundwater aquifer etc) an abstraction licence must be sought from the Environment Agency. All new applications will be assessed to ensure the resultant river flows will maintain the ecology of the river and maintain the high hydrological regime of water bodies.

The assessment principles apply to both the water body the abstraction licence is sought but also to all downstream water bodies that may be affected by a reduction in abstraction related flows in order to maintain the water body status as reported with the River Basin Management Plans (2009) and to ensure compliance with the Water Framework Directive.

6.4 Potential Risks to Supply

With any natural resource there are potential risks associated with their continued supply, water is no acceptation. Climate change is one of the more obvious risk impacting the availability of water and this is an area Anglian Water have considered in both its current WRMP as well as the draft 2014 version. Anglian water has concluded in the 2014 draft WRMP that within the East Lincolnshire RZ that there are no significant climate change or levels of service sensitivities. Worst case scenario for the resource zone may see however a reduction in average daily source-works output of 2 Ml/d affecting abstractions from the Louth Canal.

6.4.1 Water Infrastructure

The infrastructure necessary to supply water throughout the District has the potential to influence the timing of development occurring depending upon its location. As part of Anglian Water's WRMP allowances for infrastructure improvements are an integral part of ensuring the continued supply of water and are based on projected development figures. Due to the uncertainties surrounding the precise locations and phasing of development, it is not feasible for Anglian Water to provide detailed costs for necessary improvements for hypothetical scenarios. AW services explained the process by which such improvements would be introduced and that they do not undertake costing calculations and design work until approached by a developer who would be required to pay an infrastructure charge before any upgrade necessary is put in place.

Whilst details relating to specific improvements required to supply future development was not available Anglian Water were able to provide details at a more strategic level based upon broad areas for growth.

RAG Analysis of Water Resource availability (Anglian Water)

Location	Potential Housing Numbers	Water Resource
Alford	693	Green
Coningsby	597	Green
Tattershall	394	Green
Horncastle	1411	Green
Louth	3347	Green
Spilsby	634	Green
Binbrook	114	Green
Burgh le Marsh	295	Green
Friskney	128	Green
Manby	87	Green
Grimoldby	107	Green
Hogsthorpe	115	Green
Holton le Clay	406	Green
Legbourne	72	Green
Marshchapel	82	Green
North Thoresby	137	Green
Sibsey	231	Green
Stickney	113	Green
Tetney	186	Green
Wainfleet All Saints	184	Green
Woodhall Spa	473	Green
Wragby	212	Green
Grainthorpe	67	Green
Mareham le Fen	101	Green
Tetford	46	Green

As can be seen from the RAG analysis of water resource availability produced by Anglian Water there are currently no issues in the future provision of raw resources for future developments. However it must be stated that the limiting factor will be the capacity of the existing water supply network to carry this additional increase in supply. Development proposed close to trunk mains will often be more easily accommodated than those on the periphery of the pipe network; until such time as allocations have been finalised further work looking into the networks capacity will not be possible.

Due to the nature of windfall sites it has been impossible to assess the potential impact they will have on the supply of water. However, incremental infill developments are unlikely to have a major impact on the existing supply infrastructure within the District. Windfall developments will need to be modelled by Anglian Water as is currently the situation at the planning application stage to asses any possible supply issues or infrastructure improvements required.

6.5 Water Resource Summary

Anglian Water's Water Resource Management Plan provides an overall assessment of the current and future reliability of the Anglian Water resource zone. WRMP's along with assessing the reliability of supply also provide management options to deal with any shortfalls, either through demand reduction measures, the introduction of new resource supplies/redeployment of existing or a combination of other measures in order to provide a balance between supply and demand.

Even in situations where water is available at a strategic level issues or bottle necks in the local water supply infrastructure can have a detrimental impact on the deliverability of development in a timely manner. Large developments on the margins of the network will often require significant investment and upgrade and given the lead in time associated with implementing necessary upgrades it is essential that the timing of upgrades are factored into the planning of new developments.

6.6 Next Stage

Future stages of the Water Cycle Study will include the following;

- A full assessment of locations that are raising concerns from the new growth both from the extra dwellings but also manufacturing and business uses.
- A detailed review of spare licensed quantities available at source level and the options for meeting any extra demand which may be required.
- An assessment of the required infrastructure required to support growth and the relative scale of investment required.

7.0 Flood Risk

7.1 Introduction

As and integral part of the Water Cycle Study it is important to consider the risks posed to both people and property by flooding of all types. It is imperative that flood risk issues have been suitably addressed across the District in order to effectively inform planning decisions and avoid inappropriate growth occurring in areas of high flood risk and the issue of increased risk to other areas. This chapter aims to present an overview of the current understanding of flood risk within East Lindsey.

As the District Council are currently in the process of working towards housing allocations and the proposed development sites have not been formally determined it has not been possible at this stage to asses the specific flood risk to individual sites. Therefore a baseline assessment of the flood risk situation for the entire District has been carried out, as given below.

7.1.1 Responsibilities

As a Local Planning Authority, there is a duty placed on the Council to limit certain types of development from areas of highest risk. Due to this precept a number of key documents and guidance on the issues of flood risk have been produced both nationally and within the council itself.

The Environment Agency (EA) under the Environment Act and Flood and Water Management Act take a supervisory role towards all flood, flood defence and coastal erosion matters. The extent of the Environment Agency's operational role greatly depends upon the designation of a watercourse as a Main River.

Internal Drainage Board's are responsible for providing a surface water drainage service to a large proportion of the domestic, commercial and agricultural lands with the District. Landowners also have a responsibility to maintain the proper flow of water within riparian watercourses which either border or flow through their land in order to reduce the risk of flooding occurring.

Anglian Water is the sewage undertaker and under the Flood and Water Management Act they are responsible for the effectual drainage of buildings and land within the properties cartilage, this is achieved through surface and foul water drainage networks.

There is also a duty placed upon them to receive water from approved SUDS. This is not an absolute responsibility, as sewage undertaker's funds are not unlimited and investment in sewers must be prioritised. SUDS located within private property boundaries are usually the responsibility of the property owner.

7.1.2 Existing documentation

Flood risk has been considered in a number of assessments undertaken across the study area; the EA's Catchment Flood Management Plan's (CFMP) represent high level strategic plans that provide policies for the sustainable management of flood risk over a period of 100 years. The overarching aim of CFMP's is to set the overall direction of flood risk management considering the whole catchment as a single unit, however due to East Lindsey's size and hydrological nature the district falls within two separate plan areas firstly that of the Louth Coastal CFMP and secondly that of the Witham CFMP.

Whilst CFMP's consider all types of inland flooding from rivers, ground water, surface water and tidal flooding they do not cover coastal flooding this issue is covered by Shoreline Management Plans (SMP's) of which there are two covering East Lindsey, firstly the Flamborough Head to Gibraltar Point SMP along with that covering the Wash.

Their aim is to identify along with understand the processes at work locally and how they might be managed in the future. They provide an assessment of flood defence infrastructure and the likely future policy with regards to maintenance and upgrade.

The Louth Coastal CFMP extends along the east of the district from Tetney in the north to Wainfleet in the South with the ridge of hills in the Lincolnshire Wolds forming the western boundary. The other CFMP covering East Lindsey, the Witham CFMP covers the remaining areas of the District including the settlements of Horncastle, Woodhall Spa along with Coningsby and Tattershall.

The Louth Coastal CFMP divides the area into seven distinct sub areas which are regarded as having similar physical characteristics, sources of flooding and level of risk, whilst the Witham CFMP covers eight distinct sub areas four of which are within East Lindsey. Through the subdivision of the district into sub areas the Environment Agency have been able to identify the most appropriate approach to managing flood risk for each of the fifteen areas of the

district each being allocated a generic management policy from a total of six options.

In order for the Environment Agency to select the most appropriate policy, each CFMP had to consider how social, economic and environmental objectives were affected by flood risk management activities under each policy option.

The CFMP prepared for the Witham catchment provides an assessment of how flood risk is expected to change in the mid to long term (up to 100 years). The Witham CFMP recognises that to the north of Horncastle the steeper nature of the upper Bain catchment alongside the narrow channel through the town does present some potential issues in the event of heavy rainfall. The Action plan proposes that new development is excluded from the areas identified as being at risk and the need for further investigation into surface and foul water flooding. Subsequently, proposals were put forward for a flood alleviation scheme in Horncastle which was to assist in mitigating against the threat of flooding in the established town centre.

To the north and east of the District in the areas covered by the Louth Coastal CFMP the water cycle sees flows running from the Wolds eastwards across the marsh along the Waith Beck, River Lud, the Great Eau to Saltfleet Haven, Willoughby High Drain and the Woldgrift Drain.

The CFMP for the area has identified a number of potential flood risk issues including;

- River flooding at Louth, Mablethorpe and Chapel St Leonards
- Tide locking at the main tidal outfalls including Louth Canal
- Potential embankment breaches from the main upland rivers across lower lying areas of the catchment.
- Surface water and sewer flooding.

The main area of concern raised by the Catchment Flood Management Plan covering Louth Coastal however was the issue of river flooding in Louth caused by periods of heavy rainfall, along with runoff from surrounding hills exceeding the capacity of the River Lud.

Along with the high level assessments carried out by the Environment Agency, East Lindsey District Council undertook in 2012 both a Level 1 SFRA covering the inland areas of the District and a Level 2 SFRA covering coastal reaches. Through the use of an SFRA, a strategic assessment of the sources of flood risk, East Lindsey District Council is able to undertake the Sequential Test on potential

development areas, as required in the NPPF. The Sequential Test is a method by which development areas are considered and selected on the basis of taking forward the areas of lowest flood risk. Where it can be shown that there are no reasonably available development sites within areas of lesser flood risk, and there are overriding sustainability reasons for considering higher risk options, the Exceptions Test is undertaken dependent on the development type. The Exceptions Test is a method of managing flood risk while still allowing necessary development to occur. Development is only permissible in areas at risk of flooding where it can be demonstrated that there are no reasonably available sites in areas of lower risk and that the benefits outweigh the risks from flooding.

7.1.3 Lincolnshire Coastal Study

With large areas at or below sea level, the Lincolnshire Coast is vulnerable to the impacts of climate change. The most vulnerable areas of coastline are currently well protected from flooding as a result of various flood defences being in place. However, future rises in sea level mean that it is necessary to understand the possible relationship between sea level rise and coastal flooding, economic regeneration, planning and housing provision, agricultural production, tourism, social deprivation, the natural environment, transport and health.

Following the Examination in Public (EiP) of the now revoked East Midlands Regional Spatial Strategy (RSS), the Government sought for more research to be carried out in preparation for the next RSS review set for 2011.

In response the Lincolnshire Coastal Study Group was consequently formed consisting of various partner organisations across the Region. The Group commissioned the Lincolnshire Coastal Study in order to make fresh assessments on the future needs of coastal areas and assist with providing a longer-term planning perspective.

The study set to address the issues of coastal flooding and put forward a set of Principles and Options for spatial development which would allow communities in the Study Area to develop and have viable futures.

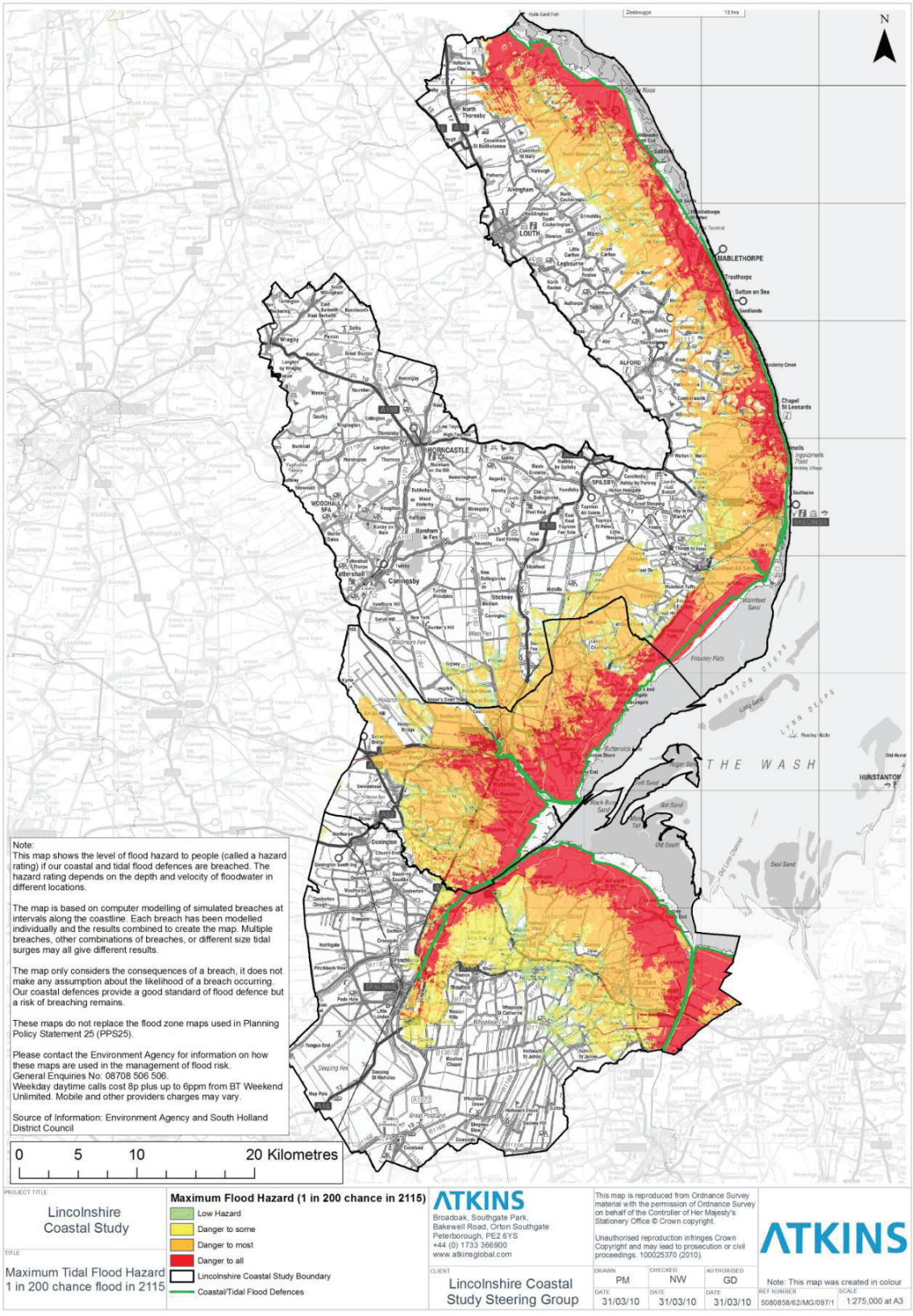
The study mapped residual flood risk, based on the following assumptions:

- Use of a 1 in 200 year return period event (0.5% annual probability event).

- Use of DEFRA's guidance of October 2006 on sea level rise, which for the Lincolnshire Coast was 1.13 rise in mean relative sea level between 2006 and 2115;
- Modelling based on breaches of defences occurring in the form of 100% defence failure at the 1 in 200 year water level.
- Use of modelling based on existing defences (despite the SMP policy, although the breach results would be similar whatever the defence standard of protection because they assume failure).

The map shown overleaf is the collective result of the Lincolnshire Coastal Study and shows the level of risk to coastal communities in the event that coastal and tidal flood defences are breached. The hazard ratings of danger to all, danger to most, danger to some and low hazard depend on the depth and velocity of floodwater in different areas. The mapping is based on the modelling commissioned by the Environment Agency which simulated breaches at intervals along the coastline. Breaches were modelled individually and the results combined to create the map, it should however be noted multiple breaches and differing sized surges will produce differing results to those shown. The map furthermore only considers the consequences of a breach and makes no assumption regarding the likelihood of one occurring.

Figure 12- The Lincolnshire Coastal Study Flood Hazard Map



7.2 Development and existing flood risk.

The NPPF seeks to direct new development towards areas of lowest risk of flooding typically those of Flood Zone 1. As part of this study critical infrastructure at risk of flooding has been assessed inline with the latest Flood Zone maps produced by the Environment Agency.

The main source of flood risk within East Lindsey is from tidal and coastal flooding, no more so than along the coastline effecting highly populated areas such as Skegness. Along with the tidal and coastal flood risk issue within East Lindsey many inland areas are at risk from fluvial flooding, particularly during periods of heavy rainfall on already saturated soils.

The District has a history of flood risk the most significant events in recent years occurred in June/July 2007 and resulted in river flooding and surface water flooding in areas such as Louth and Horncastle. During the 2007 summer floods a total of 722 properties were believed to have been effected.

Along with fluvial flooding events there have been a number of sewer and surface water drainage floods having occurred across the district. Surface Water drainage flooding whilst not exclusively can be the result of the sewer systems capacity being exceeded during periods of exceptional heavy rainfall or on occasions as a result of a blockage in the system hindering the free flow of water.

The DG5 flood register provided by Anglian Water indicates that over a five year period (2009-2014) there have been 19 postcode locations across the district which has been the subject of some form of sewer flooding.

Figure 13: DG5 Register, sewer flooding incidents (2009-2014) supplied by Anglian Water Services.

DG5 Flood register status			
Postcode	**Internal**	**External**	**Total**
DN36 5	3	16	19
LN10 5	0	1	1
LN10 6	1	7	8
LN11 0	14	26	40
LN11 7	1	20	21
LN11 8	9	30	39
LN11 9	2	2	4
LN12 2	6	6	12
LN13 0	0	1	1
LN13 9	5	17	22
LN8 5	0	6	6
LN9 5	0	4	4
PE22 7	2	3	5
PE23 5	2	3	5
PE24 4	1	0	1
PE24 5	6	9	15
PE25 1	1	2	3
PE25 2	6	3	9
PE25 3	1	9	10
	60	**165**	**225**

Due to the large geographical areas covered by the postcodes given in the above table they should be viewed as indicative only as they do not show that all properties within that postcode area were subject to sewer flooding nor addresses the severity of the flooding.

It is unlikely that the above information is a true reflection of the sewer flooding situation in the District. Due to the existence of combined sewers and relatively low lying land away from the Wolds there are likely to be more properties and locations at risk of sewer flooding than are shown in the table above.

7.3 The Impact of development on Flood Risk

The majority of the identified areas within the district for future growth are partially or wholly located in areas regarded as being at low risk of flooring. However, some areas are in close proximity to areas of greater risk often bordering flood zones 2 and 3. In these circumstances development must avoid future encroachment into the floodplain through the establishment of a buffer zone between the edge of the development and the flood risk zone. The scale and extent of a buffer is likely to vary greatly and be dependent upon the relative topography and elevation of each site in question. The use of

a flood buffer zone whilst limiting the risk of future flooding to a development also presents an opportunity for multi-functioning green infrastructure projects which can be used to increase the biodiversity offer and increase recreational potential within the area.

While development is to be located in Flood Zone 1 this does not mean opportunities to reduce the overall level of flood risk in the area and beyond through an effective layout of development form should be overlooked. All new development must ensure that flood risk is not increased elsewhere through achieving greenfield runoff rates for surface water where possible.

New developments within the district will be expected to be served by separated sewer systems in order to reduce the risk of foul sewer flooding. The risk of sewer flooding occurring is slightly greater within existing urban areas due to the affect of infill developments utilising existing combined sewer systems which may have limited residual capacity.

7.3.1 Increased discharge for WwTW

With increased discharges from WwTW as a result of increased levels of development there is a risk that the level of flood risk further downstream may increase. The NPPF requires that there is no increase in flood risk due to development, therefore mitigation measures may be required where either there is a quantifiable increase in the frequency of spill from storm storage tanks as a result of additional foul flows or the receiving watercourse and associated flood risk area is particularly sensitive to changes in flow.

The Environment Agency as part of the discharge consent determination process asses the risk of flooding downstream. It has been assumed within the East Lindsey Water Cycle Study that existing discharge consents granted for each of the WwTW within the study area have included an assessment of flood risk impact and that the results were considered to be acceptable before the grant of permission. It is however recognised that some of the older consents may not have been assessed with regards to flood risk impact at the time of issue but will have been considered as part of the work undertaken in the preparation of the Catchment Flood Management Plans.

With the granting of future consents or extension to existing etc , the Environment Agency are required to review the flood risk impact associated with increase discharges to ensure that there are no adverse impacts. Where the Environment Agency have considered

there to be potential problems associated with a planned increase in discharge flows compensatory measures will be introduced.

Anglian Water should work in partnership with the Environment Agency to identify locations where mitigation measures may be required and agree suitable methods to reduce the risk of flooding; one option for mitigating the increase of flows could be to provide additional storage in the floodplain or in a flood attenuation facility in the vicinity of a WwTW.

7.4 Surface Water Management.

The successful management of the surface water environment is critical for any new development or redevelopment of land, as failure to adequately consider surface water management during the design and planning process can result in flooding and hazard to members of the public, the environment or critical infrastructure after construction.

The NPPF much as PPS25 did requires that new development does not increase the risk of flooding elsewhere through the management of surface water generated as a direct result of development. The alteration of land through urbanisation can fundamentally alter the way in which rainfall drains into a watercourse, potentially increasing the risk of flooding due to increased rates and amounts of water entering a watercourse over a given period of time. In addition water quality can also be affected due to pollutants from built up areas being washed into a watercourse due to the lack of treatment of the water. One technique which can help reduce these problems is the use of Sustainable Urban Drainage Systems.

7.4.1 What are SUDS?

Sustainable Urban Drainage Systems (SUDS) are a technique for the controlling of surface water runoff before it enters a watercourse. They are designed to mimic natural drainage processes, along with treating the water in order to reduce the amount of pollutants entering into a watercourse.

Through the implementation of SUDS measures, multiple benefits can be achieved that include improved water quality, amenity value, reductions in storm overflows and the creation of habitats.

Infiltration techniques such as green roofs or permeable pavements are generally the preferred SUDS method as they provide source control close to the point of run-off generation. Due to the presence

of groundwater source protection zones for public water supply in the District infiltration techniques may be constrained in some areas. It is advised that site specific infiltration tests are undertaken during detailed planning application stage.

SUDS should wherever possible seek to perform multiple functions for instance act as green infrastructure and should never be considered in isolation as having a single (drainage) function. Whilst SUDS are now very much a recognised form of flood alleviation they should never be seen as a cure-all to flood prevention as there will be occasions during extreme rainfall events when the system capacity will be exceeded and overland flows will be generated. It is important this risk is recognised at an early stage in order for the route of overland flows to be determined and appropriate mitigation measures put in place.

7.4.2 Further Examples of the SUDS

- **Soakaways.**

Soakaways for areas less than 100m2 are traditionally built as square or circular pits, either filled with rubble or pre-cast perforated concrete pipes surrounded by a suitable granular backfill (their design and depth however will vary depending upon the area to be served). Their use is generally subject to full infiltration testing. There are various factors which should be considered prior to their inclusion in any drainage scheme, these include;

1. A gap of at least 5m should be provided between a soakaway and the foundation of any building (BRE Digest 365) Dependent on the layout of sites in relation to their topography, this building restriction could limit the use of soakaways on some terraces or blocks of dwellings.
2. In areas of steep topography, soakaways should be aligned perpendicular to the slop direction; and,
3. In areas with a steep gradient, allowing water to freely infiltrate into the surrounding ground could lead to issues such as ground slumping, soil creep or similar effects.

- **Swales.**

Swales are shallow ditches designed to channel and retain water whilst also facilitating infiltration where possible. Where ground conditions allow infiltration in most instances will occur either naturally or via a filter drain located beneath the swale base. This can be filled with granular material and if required a perforated or half perforated pipe. Swales are typically grass covered but can also contain large vegetation types most commonly of which is reed. This vegetation can aid water attenuation through encouraged evapotranspiration, uptake or infiltration; it can also reduce water velocity and filter particulate matter.

Their efficiency in terms of infiltrating water into underlying ground is dependant on full infiltration testing. Swales are most likely to be suitable for receiving surface water runoff generated from roads and communal parking areas, however in instances they could also be used to collate water from roofs in areas where soakaways are not available.

- **Permeable Surfacing**

Permeable surfacing involves the use of permeable materials in the place of more typical impermeable surfacing such as tarmac. This approach is typically used for roads or parking areas. Where ground conditions are deemed suitable, permeable surfacing allows for infiltration into the surrounding ground where a permeable sub base has been utilised. Where conditions are not suitable for infiltration permeable paving etc can act as a medium into a sub-surface attenuation tank beneath the paving from which it is discharged through to the sewer system where agreement has been sought.

There are various mediums that can be used in the attenuation facility including:

- Tanked systems whereby reinforced tanks situated beneath the permeable surfacing are located.
- Granular fill typically has a void ratio of 0.3 (30%) and is readily available as graded gravel fill; and
- Crate systems have a higher void ratio (up to 90% in some cases) but are often costly and may require complex maintenance.

Depending on potential adoption issues, permeable paving has the potential to be used for all access roads and parking areas. The choice of system is dependant on the permeability of the underlying ground and therefore upon full infiltration testing of the underlying ground.

- **Detention Basins and Retention Ponds**

Detention basins take the appearance of depressions in the ground often vegetated for landscaping purposes which are normally dry but allow storage of storm water to ease surface flows. Should ground conditions be suitable, infiltration will occur naturally.

Retention ponds are very similar to those of detention basins other than they retain a permanent level of water. If retention ponds are to be situated in permeable soil conditions, the base of the pond may require lining. Discharge from detention or retention ponds into a receiving watercourse can be through a pipe or overflow system. These features may have wider benefits beyond simply that of reducing flood risk such as helping reduce the level of pollutants or suspended material present in any potential outflows. In addition, they can also add to the amenity and biodiversity value of a development, this is particularly pertinent in the case of retention ponds.

7.4.3 Surface Water management potential within East Lindsey.

Whilst not an exhaustive list the following key criteria are all recognised as affecting the potential of successful surface water management options and must be considered during the design and planning of SUDS.

- Permeability of the underlying geology.
- Soil properties.
- Catchment topography
- Existence of source protection zones in the area.
- Presence of aquifers.
- Ground water levels (water table)
- Flood Risk.
- Contamination of soil.
- Available outfall such as a receiving watercourse.

8.0 Climate Change

8.1 Background

The impacts of climate change are likely to have increasingly direct effects on the water cycle in future years with changes in rainfall patterns and temperature/evaporation affecting water resources, increasing potential flood risks and the capacity for dilution within water bodies. Current climate change projections broadly indicate the potential for increasingly wetter warmer winters and drier hotter summers with some of these impacts becoming evident within the timescale for growth up to 2029.

8.2 Climate Change Modelling and UKCPO9

Past and current greenhouse emissions mean that we are already committed to some level of future climate change, so adaptation to address the resulting consequences are important.

UKCP09 represents the firth generation of climate change information for the UK, and its projections are based on a new methodology designed by the Met Office. Computer modelling and understanding of climate change has advanced significantly in recent years. UKCP09 reflects scientist's best understanding of how the climate system operates, how it may change, and allows a measure of uncertainty in future projections to be included.

The future climate will always be uncertain, no matter how good climate models are. UKCP09 is the first set of climate projections to make this uncertainty explicit. Having an indication of the range of uncertainty allows for risk-based decisions surrounding adapting for climate change.

8.3 Climate Change and potential impacts on the Study Area

The key finding of UKCP09 (UK climate projections 09) predicts changes in summer temperature, winter temperature, summer precipitation and winter precipitation. For the medium emissions scenario across the East Midlands for the 2020's the following changes are predicted:

- Under medium emissions, the central estimates of increase in summer mean temperature is 1.4ºC; it is very unlikely to

be less than 0.5ºC and is very unlikely to be more than 2.5ºC. A wider range of uncertainty is from 0.4ºC to 2.5ºC.

- Under medium emissions, the central estimates of increase in winter mean temperature is 1.3ºC; it is very unlikely to be less than 0.6ºC and is very unlikely to be more than 2.2ºC.

- Under medium emissions, the central estimate of change in summer mean precipitation is -6%; it is very unlikely to be less than -22% and is very unlikely to be more than 12%. A wider range of uncertainty is from -22% to 15%.

- Under medium emissions, the central estimate of change in winter mean precipitation is 5%; it is very unlikely to be less than -3% and is very unlikely to be more than 16%. A wider range of uncertainty is from -3% to 16%

Source:http://ukclimateprojections.defra.gov.uk/content/view/2163/499/

The result of possible decreased summer rainfall and increased rainfall during the winter will inevitably lead to water companies considering winter storage in order to conserve water when it becomes available, for dry periods in the summer months. Anglian Waters WRMP takes account of climatic change predictions in order to plan effectively for the effective management of resources.

Increased rainfall during the winter should be considered with regards to fluvial and surface water flooding, and the impacts on potential sewer overflows. Whilst current climate change predictions suggest a decrease of rainfall during summer months, there is potential for increased frequency of storms which could result in flash flooding during summer months.

8.3.1 Climate Change and the impacts upon Anglian Water assets

Source: Strategic Direction Statement 2010-2035 (Anglian Water)

With a collective coast line covering 1,238 kilometres, some 60 major assets are regarded as being vulnerable to a 0.4 metre rise in sea level with a number of these assets falling along the East Lindsey stretch of Coastline. Furthermore over a thousand pumping stations across the Anglian Water area are at risk of flooding. With such valuable assets at ever increasing danger from climate change a number of sites have received enhanced flood protection measures.

To reduce the level of risk further some £40m was spent within the AMP4 period on schemes to improve resilience with a further £40m being spent over the course of the AMP5 period.

8.4 Conclusion

Due to the low lying nature of the eastern part of the study area and the presence of pumped watercourses, there are large areas of the District which lie within areas of high flood risk, flood zones 2 and 3. In accordance with guidance contained within the NPPF and the Sequential Test, development should be directed away from areas of flood risk and new development should be located in Flood Zone 1.It would be expected that residential development only be directed to higher areas of flood risk in the event that there are no suitable sites in flood zone 1.

If there are no reasonably available sites located in flood zone 1, the flood vulnerability of proposed development (according to table 1 of the Technical Guidance to the National Planning Policy Framework) can be taken into account in locating development in Flood Zone 2 and Flood Zone 3.

Reference should be made to the mapping contained within the SFRA and the Lincolnshire Coastal Study in order to ensure planned development is located away from areas of flood risk.

In all parts of the District, consideration should be had to the issue of increasing flood risk caused by new development. Foul and surface water will be required to be separated wherever possible in order to reduce the flows to be treated at WwTW. Surface water should be attenuated and treated with SUDS and it will be expected that future maintenance needs along with the practicality of the system will be fully considered. Where run off to watercourses is proposed, consultation with the Environment Agency and/or relevant IDB should be undertaken on a sites specific basis in order to ensure the principle is both acceptable but also that it will not increase the risk of flooding elsewhere.

9.0 Ecology and Biodiversity.

The District of East Lindsey is home to a diverse range of wildlife and habitats, including internationally, nationally and locally important sites and allocations, some of which are afforded special protection as is the case with The Wash for instance which is a RAMSAR site. Not all of these sites are going to be dependent upon the water environment, though those linked to the river catchment system can potentially be affected by a number of water related impacts associated with increased development. Such impacts can include;

- **Over-abstraction**: Abstractions of groundwater can in cases lead to reductions in a watercourses flow rate to such a level that the river channels physical form changes and the habitats it supports are threatened. It may also lead to the drying out of ponds and other supported habitats during spells of warmer weather.
- **Flood Risk**: Development which does not give due consideration to the effective disposal of surface water is likely to increase the risk of flooding down stream during periods of intense rainfall, and
- **Water Quality**: The maintenance of good water and sediment quality is essential to maintaining a healthy water system. Increasing domestic and industrial effluent discharge resulting from additional development may lead to elevated concentrations of phosphorus that could result in a proliferation of algae or the disappearance of characteristic plants and animals. If coupled with falling water levels, the problem can be compounded as pollutants must be diluted in a lower volume of water.

A Habitats Regulation Assessment (HRA) as required under the Habitats Directive will need to be undertaken as part of the planning approval process in the event that the effects of development upon a internationally designated habitat cannot be screened out. A HRA will be required to assess the potential development sites as part of the emerging Core Strategy.

A HRA can effectively be broken down into four discrete stages, each of which culminates in a test. The stages are sequential, and it is therefore only necessary to progress to the following stage if a test is failed. The four stages are as follows:

Stage 1 – Screening: The first stage of a HRA is to identify a project/developments likely impact if any upon a European site, either alone or in combination with other plans and projects, and consider whether the impact is likely to be significant. If it can be

demonstrated that significant effects are unlikely, no further assessment is required.

Stage 2 – Appropriate Assessment: If it cannot be satisfactorily demonstrated that significant effects are unlikely, a full appropriate assessment will be required. An appropriate assessment is in many ways similar to an Ecological Impact Assessment, but is focussed entirely upon the designated interest features of the European site in question. An appropriate assessment will need to consider the impacts of development on the integrity of the designated site, either alone or in combination with other plans and projects, having regard to the sites structure, function and conservation objectives. Where there are adverse impacts, an assessment of mitigation options must be carried out in order to determine the level of impact. If after mitigation measures have been assessed the integrity of the site is still impacted upon consent will only be given if stages 3 and 4 are followed. Unlike standard Ecological Impact Assessment, compensation for significant adverse effects such as alternative habitats creation is not permitted at the Appropriate Assessment stage.

Stage 3 - Assessment of alternative solutions: At this stage it is about examining alternative ways of achieving the projects objectives to establish whether there are solutions available which would avoid or have a lesser impact upon the European designated site.

Stage 4 – Imperative Reasons of Overriding Public Interest (IROPI) Test: If a project will have a significant adverse effect upon a European site, and this effect cannot be either avoided or mitigated, the project cannot proceed unless it passes the IROPI test. In order to pass the test it must be objectively concluded that n other alternative solutions exist. The project must be referred to the Secretary of State on the grounds that there are IROPI as to why the plan should nonetheless proceed. The case will ultimately be decided by the European Commission. Every effort should be made to ensure this stage of a HRA is not reached. Below in figure 15 are those conservation sites within East Lindsey which are regarded as being water dependent and where special care in order to maintain there quality is required.

Figure 15: Water Dependent Conservation Sites within East Lindsey.

Site	Description
Sea Bank Clay Pits	The Sea Bank Clay Pits are comprised of a series of isolated flooded clay workings of varying size, depth and topography which now support uncommon aquatic plant communities' characteristic of the slightly brackish, eutrophic (nutrient-rich) water in addition to extensive reedbeds and a rich marginal wetland flora. The pits were excavated in 1953 to provide material for the repair of the sea wall between Mablethorpe and Chapel St. Leonards on the Lincolnshire Coast. The pits are also important for breeding, wintering and passage birds. They are known to support a rich aquatic invertebrate fauna, notably beetles, including several nationally scarce species and others new to the County: Source (www.naturalengland.org.uk)
Tattershall Old Gravel pits	Tattershall Old Gravel Pits support some of the best examples of the aquatic plant communities of nutrient-rich open water systems in Lincolnshire. The site comprises a series of isolated flooded old sand and gravel workings of varying size, depth and topography which, in addition to a rich aquatic flora, also supports a varied marginal community and extensive reedbeds.
Saltfleetby-Theddlethorpe dunes	This nationally important site includes flats, dunes, salt and freshwater marsh which together support an exceptionally rich flora and fauna. There are outstanding assemblages of vascular plants, invertebrates and breeding birds and it is the most north-easterly breeding site in Britain for the Natterjack Toad. The rapid accretion of dunes and saltmarsh makes this an important site for research into the processes of coastal development.
Humber Estuary	The Humber Estuary is a nationally important site with a series of nationally important habitats. These are the estuary itself (with its component habitats of intertidal mudflats and sandflats and coastal saltmarsh) and the associated saline lagoons, sand dunes and standing waters. The site is also of national importance for the geological interest at South Ferriby Cliff (Late Pleistocene sediments) and for the coastal geomorphology of Spurn. The estuary supports nationally important numbers of 22 wintering waterfowl and nine passage waders,

	and a nationally important assemblage of breeding birds of lowland open waters and their margins. It is also nationally important for a breeding colony of grey seals *Halichoerus grypus*, river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus*, a vascular plant assemblage and an invertebrate assemblage.
Gibralter Point (RAMSAR)	This is a nationally important site due to its sand dunes and other coastal habitats, and associated fauna, notably invertebrates and passage and breeding birds. Gibraltar Point is also of great importance for its coastal geomorphology. Key features include tidal sandbanks offshore, a well-developed ridge and runnel foreshore, a spit, sand dunes and saltmarshes in various stages of evolution. Gibraltar Point is particularly important for the dynamism of the coastal environment and also the relationships that can be studied over different timescales between landforms and the processes responsible for their evolution.
Tetney Blow Wells	Tetney Blow Wells consists of reedbeds together with base-rich fern and swamp vegetation associated with the calcareous water of four large artesian springs. These physiographic features, known locally as blow wells, were once numerous in East Lincolnshire, occurring where water under pressure escapes from the chalk through weakness in the overlying boulder clay to reach the surface. Ground water abstraction has led not only to the drying-out of many blow wells in the area but also the agricultural reclamation of their associated wetland habitats. The water plant communities of the blow wells are characterised by common duckweed Lemna minor, ivy-leaved duckweed L. trisulca, stoneworts Chara spp. and common water starwort Callitriche stagnalis. All of these species are typical of nutrient-rich, eutrophic waters. In addition, several other aquatic plants including canadian waterweed Elodea canadensis, mare's-tail Hippuris vulgaris, water-violet Hottonia palustris and water moss Fontinalis antipyretica are present. Large stands of common reed Phragmites australis occur around the margins of the open water and also under areas of willow Salix spp. scrub. Associated with the reedbeds are lesser pond-sedge Carex acutiformis, reed sweet-grass Glyceria

	maxima, great willowherb Epilobium hirsutum, meadowsweet Filipendula ulmaria, water figwort Scrophularia aquatica and bittersweet Solanum dulcamara. Additional interest is provided by areas of dense willow scrub and the neutral grassland surrounding the blow wells. The grassland becomes marshier in character where it merges with the emergent vegetation, supporting plants such as ragged robin Lychnis flos-cuculi, cuckoo flower Cardamine pratensis, tufted hair-grass Deschampsia cespitosa and both compact and hard rushes Juncus conglomeratus and J. inflexus.
Hundleby Pits	Hundleby Clay, an important part of the Lower Cretaceous sequence of eastern England. The Hundleby Clay is equivalent to the rock unit known further north in Lincolnshire as the Claxby Ironstone and provides evidence that deep-water marine conditions existed in south-eastern Lincolnshire during early Cretaceous times. The rocks seen here belong to the Ryazanian and Valanginian Stages of geological time, and the site is unique for the rock sequence which it exposes.
Mavis Enderby Valley	Mavis Enderby Valley has been formed by a beck cutting through the porous Spilsby Sandstone to the underlying impermeable Kimmeridge Clay. On the steeper sides species-rich unimproved grassland has been maintained by sheep grazing. The poorly-draining valley floor to the south has developed as a marsh alongside the beck. In the north, associated with the spring-line, is a series of alder carrs each with a different species composition. The dry acid grassland of the slopes is dominated by red fescue Festuca rubra, common bent Agrostis capillaris and sweet vernal grass Anthoxanthum odoratum. Typical herbs are mouse-ear hawkweed Hieracium pilosella, tormentil Potentilla erecta and sheep's sorrel Rumex acetosella with the locally scarce meadow saxifrage Saxifraga granulata a feature. The most abundant mosses of a well developed community are Rhytidiadelphus squarrosus, Pseudoscleropodium purum and Calliergon cuspidatum. Where sandstone is exposed, species

	scarce in the East Midlands have colonized. This is the only known Lincolnshire site for Racomitrium heterostichum and Lophocia ventricosa v ventricosa. On the spring-line the marsh is dominated by tufted-hair grass Deschampsia cespitosa, rushes Juncus spp. and flote grass Glyceria fluitans. These are associated with cuckooflower Cardamine pratensis, meadowsweet Filipendula ulmaria, ragged robin Lychnis flos-cuculi and brookline Veronica beccabunga with some opposite-leaved golden saxifrage Chrysosplenium oppositifolium adjacent to the stream. The common-spotted orchid Dactylorhiza fuchsii has spread since the area was fenced. Snipe breed and water rail visit this area. The series of woods along the stream are wet valley alder with acid valley alder on the higher slopes. Sand Hill Covert has an open canopy with sycamore Acer pseudoplatanus co-dominant with coppiced alder Alnus glutinosa. The ground flora is characterized by nettle Urtica dioica and great willow-herb Epilobium hirsutum and includes the opposite-leaved golden saxifrage and a variety of ferns. Burrows Hill Covert has alder together with pedunculate oak Quercus robur and crack willow Salix fragilis and large areas of the herb moschatel Adoxa moschatellina. Other woods are notable for marsh marigold Caltha palustris, tussock sedge Carex paniculata, giant horsetail Equisetum telmateia and narrow buckler fern Dryopteris carthusiana. The close juxtaposition of a number of habitats makes the site valuable for a wide range of fauna, small mammals, lepidoptera and dragonflies in particular. It is of County importance for its breeding birds, especially summer migrants and those associated with the woods – sparrowhawk, kestrel, woodcock, turtle dove, tawny owl, greater and lesser spotted woodpeckers and tree pipit.
New England Valley	This site contains one of the largest strands of wet valley alderwood in Lincolnshire. Nationally, woodland dominated by alder over a large area is rather scarce since many such stands have been lost through drainage. The woodland is situated in a deep glacial overflow

	valley which cuts through the porous Spilsby Sandstone to the impermeable Kimmeridge Clay beneath, producing a well-defined springline along the valley side. The ground below the springline is wet and largely dominated by alder Alnus glutinosa with scattered ash and a shrub layer of willows Salix spp. The field layer is essentially shaded marsh vegetation with characteristic species such as wild angelica Angelica sylvestris, marsh-marigold Caltha palustris, lesser pond-sedge Carex acutiformis, greater tussock-sedge C. paniculata, opposite-leaved golden-saxifrage Chrysosplenium oppositifolium, lady fern Athyrium filix-femina, red current Ribes rubrum and the uncommon black current R. nigrum. Above the springline, the dry acidic soil supports strands of scrubby woodland dominated by sycamore Acer pseudoplatanus, ash Fraxinus excelsior and much dead and dying wych elm Ulmus glabra, with bracken Pteridium aquilinum and bramble Rubus fruticosus beneath. A small side valley leading to the Blackhill Spring contains stands in more acidic alder woodland. Here birch, Betula spp. replaces ash in the canopy and the ground flora is dominated by creeping buttercup Ranunculus repens, opposite-leaved golden saxifrage and broad buckler fern Dryopteris dilatata.
Tattershall Carrs	These two sites are the most extensive examples in the county of ancient woodlands on fen edge sands and gravels dominated by alder Alnus glutinosa. Of the many other tree species present, birches Betula pendula and Betula pubescens are abundant with rowan Sorbus aucuparia, ash Fraxinus excelsior, holly Ilex aquifolium and hazel Corylus avellana locally common. Grey willow Salix cinerea is found in quantity in the wettest areas associated with a shrub layer which includes the typical alder carr species of raspberry Rubus idaeus and red currant Ribes rubrum. The woodland floor is locally dominated by brambles Rubus fruticosus or the many ferns present: bracken Pteridium aquilinum, lady fern Athyrium filix-femina and broad-buckler and male ferns Dryopteris dilatata and D. filix-mas. Beneath the bracken are greater stitchwort Stellaria holostea and climbing corydalis Corydalis claviculata. The

	stream, ditches and flushes are bordered by large patches of opposite-leaved gold saxifrage Chrysosplenium oppositifolium amongst which is the rare alternate-leaved golden saxifrage C. alternifolium. Other herbs present are yellow pimpernel Lysimachia nemorum, primrose Primula vulgaris, wood sorrel Oxalis acetosella, remote sedge Carex remota, moschatel Adoxa moschatellina and wood anemone Anemone nemorosa. The freely draining margin of the woods support a dry, acid pedunculate oak Quercus robur woodland type with foxglove Digitalis purpurea in the field layer. Notable breeding birds include Green and Greater Spotted Woodpecker and Woodcock.
Jenkins Carr	A species rich example of alder carr, a habitat now rare in the area, with stream and swamp communities of regional importance. The site is situated on Spilsby sandstone over Kimmeridge clay. The wooded slopes lead down to a narrow valley running north to south cut by a stream which widens at one point to form a small lake. The eastern area has strands of alder *Alnus glutinosa*, with a ground flora including lady fern *Athyrium filix-femina*, broad-buckler fern *Dryopteris austriaca*, marsh marigold *Caltha palustris* and alternate leaved golden saxifrage *Chrysosplenium alternifolium* which here reaches the eastern end of its range in Britain. The mixed woodland is dominated by willows *Salix* spp., but also has ash *Fraxinus excelsior* and alder *Alnus glutinosa*. It also contains isolated specimens of planted conifers. The scrub layer is dominated by hawthorn *Crataegus monogyna* and elder *Sambucus nigra*. In the drier parts the ground flora is characterised by extensive patches of bluebell *Hyacinthoides non-scripta* and bracken *Pteridium aquilinum* with moschatel *Adoxa moschatellina*, cuckoo pint *Arum maculatum*, foxglove *Digitalis purpurea* and greater tussock sedge *Carex paniculata*.

	The area of open water/swamp in the east and the stream sides have wetland species including water-plantain *Alisma plantago-aquatica*, wild celery *Apium graveolens* and lesser water parsnip *Berula erecta*. In different areas along the stream bushgrass *Calamagrostis epigejos*, reedmace *Typha latifolia* and reed sweet-grass *Glyceria maxima* dominate. The wet areas contain a variety of sedges with patches of hempagrimony *Eupatorium cannabinum*, water figwort *Scrophularia aquatica* and wild iris *Iris pseudacorus*.
Fulsby Wood	Fulsby supports a rich flora characteristic of ancient acidic oak woodlands on the fen-edge sands and gravels of mid-Lincolnshire, and is the largest wood of its kind in the county. Traditional management and a mosaic of dominant tree species on a wide range of soil types and drainage, together with several ponds, shaded gravely streams and marginal earthworks, have resulted in a great diversity of communities. The wood is notable as the only Lincolnshire site for a nationally rare member of the lily family and for the population of wood ants *Formica rufa*. Most of the woodland is of the lowland hazel-pedunculate oak type found in association with birch *Betula spp*., rowan *Sorbus aucuparia* and holly *Ilex aquifolium*. Abundant bluebell *Hyacinthoides non-scripta*, ramsons *Allium ursinum* and lily-of-the-valley *Convallaria majalis* are a feature of the herb layer. Dog's mercury *Mercurialis perennis* is associated with primrose *Primula vulgaris*. Apart from locally abundant bracken *Pteridium aquilinum* there are uncommon ferns. Four species of *Dryopteris* include scaly male fern *Dryopteris affinis* and hard fern *Blechnum spicant* is present. Where the sandy soils are flushed or seasonally wet, coppice alder *Alnus glutinosa* becomes dominant associated in places with ash *Fraxinus excelsior*, alder buckthorn *Frangula alnus* and the typical carr shrubs red currant *Ribes rubrum* and raspberry *Robus idaeus*. In wetter areas tufted hair-grass *Deschampsia cespitosa* and meadowsweet *Filipendula ulmaria* are abundant. Marginal patches of heavy clay soils support wych

	elm *Ulmus glabra* and field maple *Acer campestre*. Associated with broad rides and ditches are foxglove *Digitalis purpurea*, climbing corydalis *Corydalis claviculata*, yellow pimpernel *Lysimachia nemorum*, heath bedstraw *Galium saxatile* and purple moor grass *Molinia caerulea*.

Source: http://www.sssi.naturalengland.org.uk

9.1 Summary

Royal HaskoningDHV were commissioned in 2012 to carry out a plan level assessment of the East Lindsey Draft Core Strategy, considering any potential effects the plans implementation may have in respects of the Habitats Regulations.

From the initial screening assessment of the policies contained within the Draft Core Strategy it was agreed in consultation with Natural England that there were eight internationally designated sites pertinent to the assessment, and should be considered. The sites considered pertinent were;

- Humber Estuary SAC,SPA and Ramsar sites;
- Gibralter Point SPA;
- The Wash SPA and Ramsar Sites;
- Saltfleetby-Theddlethorpe Dunes and Gibraltar Point SAC; and
- The Wash and North Norfolk Coast SAC.

The first stage of the Habitats Regulations Assessment (HRA) of the the draft policy suite concluded that there would be no adverse effects upon the integrity of the identified internationally designated sites. Whilst the assessment carried out by Royal HaskoningDHV relates to the draft core strategy policies which have since been tweaked following consultation it is assumed at this stage and until such time the policies are assessed again that the findings of the screening report remain valid.

Further screening work will be required once site allocations have been worked up as to check there will be no adverse impacts upon the designated sites across the District.

However none the less as part of future work on the Water Cycle Study confirmation will be sought from Natural England when the following potential constraints will be need to be assessed:

- The impact urban runoff from new development could have upon ecological sites within East Lindsey, and the impact;

- Of reduced water quality as a result of increased discharges from sewerage treatment works has on SSSI's and downstream designated sites.

10.0 Progression of the Water Cycle Study

The next stage of the WCS will be to progress to outline stage which should focus on the areas highlighted for concern, these are Alford, Manby, Sibsey, Woodhall Spa, Legbourne and Binbrook. The Outline Study will build upon the findings of this scoping report and consider the direct impacts new development will have on the water environment and infrastructure specific to the areas of concern. There will also be consultation with Anglian Water and the Environment Agency on specific site allocations as a way of ensuring the Council takes water issues fully into account in the allocations process. This will also provide Anglian Water an evidence base with which to feed into there management plans etc.

If significant infrastructure or insurmountable damage was found likely to occur to the water environment at an Outline Stage a more detailed water cycle study would then need to be undertaken for each site specific allocation.