Suffolk Coastal and Waveney District Councils Level 1 Strategic Flood Risk Assessment

East Suffolk Councils

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Quality information

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Executive Summary

The National Planning Policy Framework (NPPF) and accompanying Planning Practice Guidance emphasise the responsibility of Local Planning Authorities (LPAs) to ensure that flood risk is understood and managed effectively and sustainably throughout all stages of the planning process.

This Strategic Flood Risk Assessment (SFRA) aims to facilitate this process by identifying the spatial variation in flood risk across Waveney District Council and Suffolk Coastal District Council, which combined comprise the study area of East Suffolk Councils (ESC). This allows an area-wide comparison of future development sites with respect to flood risk considerations.

There are several sources of flood risk across the area, including: tidal, fluvial, pluvial, groundwater, sewer and artificial. The most notable flood events have occurred when forces from pluvial, fluvial and tidal flood sources combine. Records of severe flooding from the Environment Agency (EA) and ESC have been noted in1953, the mid-1970s, the 1990s, 2013 and 2015.

The eastern boundary of the study area is formed entirely by coastline, with several major estuaries entering the North Sea from west to east. Tidal flooding is most commonly a result of a storm surge, which causes sea levels to rise to critical levels and breach local costal defences. This has previously occurred with devastating effects in 1953, 1993 and more recently in 2013. The urban centre of Lowestoft is located on the estuary of the River Waveney (Oulton Broad and Lake Lothing) and is particularly vulnerable to this source of flooding.

There are numerous Main Rivers within the study area which flow into the North Sea, some with large coastal estuaries. Typically, in the upper catchment of these watercourses the floodplain is confined to the river channel and there are only small areas of Flood Zone 2 and 3. Here, the land use is rural and there is limited flood defence. However, in downstream areas closer to the sea, the land flattens, giving rise to more extensive floodplains. As many of the major settlements are located along the coast, there have been multiple flood alleviation schemes undertaken to protect these areas.

The functional floodplain (Flood Zone 3b) is land classified as having a 5% Annual Exceedance Probability (AEP) (1 in 20 year return period or 1 in 25 year where this is not available) of flooding. Within ESC, the functional floodplain has been defined for tidal mechanisms and for the majority of the Main Rivers in the study area, with extensive functional floodplain present in Lowestoft, Kessingland, Halesworth, Blythburgh, Dunwich, Middleton, Wickham Market, Snape, Aldeburgh, Woodbridge, Ordford and Felixstowe. Detailed hydraulic modelling has not been undertaken for some smaller watercourses across ESC and therefore the functional floodplain for these fluvial sources has not been defined. Any site within close proximity to one of these watercourses will require consultation with the EA and ESC and a site-specific Flood Risk Assessment (FRA).

Surface water flooding occurs when high intensity rainfall generates runoff which flows and ponds in low-lying areas. It is generally associated with intense rain, saturated soils and insufficient drainage capacity of the surface water system. Surface water flooding is becoming an increasing issue due to urbanisation (increased impermeable area) and climate change (greater rainfall intensity). Typically, surface water flooding follows the natural topography of the land, accumulating in topographic low points. An example of this is found in Leiston, which has recently undertaken a Surface Water Management Plan (SWMP), exploring options to reduce currently high levels of surface water flood risk in this area. To reduce surface water flood risk across the study area developers and planners must consider the use of Sustainable Drainage Systems (SuDS).

Groundwater flooding is most likely to occur in low-lying areas which are underlain by permeable rock (aquifers) and more likely to appear after periods of sustained rainfall. Due to the nature of the geology in ESC, the vast majority of the study area has a designation of “Limited potential for groundwater flooding to occur”, aside from some concentrated areas surrounding the watercourses where the designation given is “Potential for groundwater flooding to occur at surface”, due to the permeable superficial alluvium being in hydraulic continuity with high river/tidal water levels.

There are numerous waterbodies in the study area that pose a risk of flooding from artificial sources, the most significant being Lowestoft Harbour. Although artificially constrained, this area is influenced

by pluvial, fluvial and tidal flood sources, thus making local flood risk management particularly complex. Over the years there have been several models created to assess the best flood defence option, which are summarised in the Lowestoft Flood Risk Management Strategy.

A spatial planning solution to flood risk management should be sought wherever possible. The maps and supporting information presented in this SFRA are intended to inform and facilitate the decision making process by ESC with regards to the NPPF risk-based approach to planning. This is based upon determining compatibility of various types of development within each Flood Zone, subject to the application of the Sequential Test and Exception Test (when needed). Guidance to undertaking these processes is included within the report.

The SFRA provides an overview of the risk of flooding across ESC and assists in the development of policy formulation, strategic planning, development control and flood risk management. It is recommended that policy options are expanded to include greater emphasis on floodplain management to promote appropriate use of the floodplain and making space for water. Existing corridors of land along the river frontage should be safeguarded and opportunities taken to set back development to enable sustainable and cost effective flood risk management, including upgrading of river assets. Flood awareness and robust emergency planning and response will additionally be critical to sustainable ongoing flood risk management.

In the future, climate change is anticipated to have an impact on all sources of flood risk within the study area. It is important that planning decisions recognise the potential risk that increased runoff poses to property and plan development accordingly so that future sustainability can be assured. The EA published updated climate change allowances in February 2016. The fluvial hydraulic models within the study pre-date these allowances; therefore there is a requirement for this data to be updated in order to build a more robust understanding of future fluvial flood risk in light of climate change. Recent hydraulic modelling of tidal flood risk includes the revised EA climate change allowances for certain areas and therefore illustrates an updated understanding of future tidal flood risk. Where updated data is not available, the previously modelled allowances have been used; however, it is recommended that applicants contact the EA for advice on how to consider climate change.

The report additionally contains specific recommendations for both District Councils and the Broads Authority as well as developers, for effectively managing and mitigating flood risk, including guidance on the requirements for site specific FRAs and the implementation of sustainable drainage.

For the avoidance of doubt, this SFRA covers the entire area of Waveney District Council including the part of the Broads Authority Executive Area within Waveney District.

Abbreviations

Acronym	Definition
AEP	Annual Exceedance Probability
AIMS	Asset Information Management System
AOD	Above Ordinance Datum
BGS	British Geological Survey
CDA	Critical Drainage Area
CFMP	Catchment Flood Management Plan
CIRIA	Construction Industry Research and Information Association
DEFRA	Department for Environment, Food & Rural Affairs
EA	Environment Agency
ESC	East Suffolk Councils
FCERM	Flood and Coastal Erosion Risk Management
FWMA	Flood and Water Management Act
FRA	Flood Risk Assessment
FWS	Flood Warning System
GIS	Geographical Information Systems
LFRMS	Local Flood Risk Management Strategy
LiDAR	Light Detection and Ranging
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
m AOD	Metres Above Ordnance Datum. Elevations use Ordnance Datum, Newlyn
NPPF	National Planning Policy Framework
PFRA	Preliminary Flood Risk Assessment
PPG	Planning Practice Guidance
RMA	Risk Management Authority
SCC	Suffolk County Council
SCDC	Suffolk Coastal District Council
SFRA	Strategic Flood Risk Assessment
SMP	Shoreline Management Plan
SoP	Standard of Protection
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan

Glossary

Term	Definition
Annual Exceedance Probability (AEP)	In flood risk terms, the AEP represents the probability of a particular return period event occurring in any given year. (e.g. 1 in 100 year return period event = 1% AEP – there is a 1% chance every year that this event will take place).
Aquifer	A source of groundwater comprising water-bearing rock, sand or gravel capable of yielding significant quantities of water.
Areas Benefiting from Defences	The area that is protected by a defence or defence system against flooding from a 1% (1 in 100) annual probability fluvial event and 0.5% (1 in 200) annual probability tidal event, assuming all defences remain intact and function perfectly.
Artificial Sources	Artificial sources of flood risk include waterbodies or watercourses that have been amended by means of human intervention rather than natural processes. Examples include reservoirs, docks and canals.
Asset Information Management System (AIMS)	The AIMS is an Environment Agency database, containing all assets relevant for flood risk management from main rivers, estuaries and the coast.
Brownfield Land	Previously developed land.
Catchment	The land (and its area) which drains (normally naturally) to a given point on a river, drainage system or other body of water.
Catchment Flood Management Plan	A high-level planning strategy through which the Environment Agency works with key decision makers within a river catchment to identify and agree policies to secure the long-term sustainable management of flood risk.
Critical Drainage Area	A discrete geographic area where multiple and interlinked sources of flood risk (surface water, groundwater, sewer, Main River and/or tidal) cause flooding during severe weather, affecting people, property or local infrastructure.
Culvert	A channel or pipe that carries water below the level of the ground.
Exception Test	The Exception Test is required for certain development sites following application of the Sequential Test. The Exception Test must demonstrate that the development provides wider sustainability benefits to the community that outweigh flood risk, and that the site is safe from flood risk for its lifetime.
Flood Defence	Flood defence infrastructure, such as flood walls and embankments, intended to protect an area against flooding to a specified standard of protection (SoP).
Flood Map	A map produced by the Environment Agency providing an indication of the likelihood of flooding within all areas of England and Wales, assuming there are no flood defences.
Flood Risk Assessment	A study to assess the risk to an area or site from flooding from all sources, now and in the future, and to assess the impact that any changes or development on the site or area will have on flood risk to the site and elsewhere. It may also identify, particularly at more local levels, how to manage those changes to ensure that flood risk is not increased.
Flood Risk Management	The activity of understanding the probability and consequences of flooding, and seeking to modify these factors to manage flood risk to people, property and the environment in line with agreed policy objectives.
Flood Warning	If a flood warning is issued in an area, it means flooding is expected and will cause disruption.
Flood Zone	A geographic area within which flood risk is within a particular range as defined by NPPF and its Practice Guidance.
Flood Zone 1	Land where flooding from rivers and the sea is very unlikely. There is less than a 0.1 per cent (1 in 1,000) chance of flooding occurring each year.
Flood Zone 2	Land which has between a one in 100 and one in 1,000 annual probability (chance) of river flooding (1% - 0.1%); or between a one in 200 and 1 in 1,000 annual probability (chance) of sea flooding (0.5% - 0.1%).

Term	Definition
Flood Zone 3	Land which has a greater than one in 100 annual probability (chance) of river flooding (>1%); or greater than one in 200 annual probability (chance) of sea flooding (>0.5%).
Flood Zone 3a (High probability)	This is a subset of Zone 3 (above), which is not within the Functional Floodplain (Flood Zone 3b), as defined below. Therefore this land is typically expected to have an annual probability of flooding between 1 in 20 and 1 in 100 or (from fluvial sources) or 1 in 200 (from tidal sources) in any year.
Flood Zone 3b (Functional Floodplain)	Land where water has to flow or be stored in times of flood. Specifically, this land would flood with an annual probability of 1 in 20 (5 %) or greater in any year, or as otherwise agreed by the Local Authority and the Environment Agency.
Flooding Hotspot	Also known as flood prone areas. These are locations where concentrations of flooding incidents within a limited geographical context have appeared over time.
Floodplain	Area of land that borders a watercourse, an estuary or the sea, over which water flows in time of flood, or would flow but for the presence of flood defences where they exist.
Flood Resilience	Flood resilience involves design and construction of buildings and structures to reduce the impact of flooding so that, although flood water may enter the building, its impact is minimised, structural integrity is maintained, and repair, drying and cleaning are facilitated.
Flood Resistance	Flood resistance involves design and construction of buildings or other structures to prevent entry of flood water or minimising the amount that may enter.
Functional Floodplain	Refer to Flood Zone 3b definition.
Greenfield Runoff Rate	The Greenfield runoff rate is the rate at which rainfall would runoff from an undeveloped, naturally permeable catchment.
Informal Flood Defence	A structure that has not been specifically built to retain floodwater, and is not maintained for this specific purpose but provides a level of flood protection.
Formal Flood Defence	A structure that has been specifically built to retain water during a flood and is maintained to continue to do so.
Main River	Main Rivers are a statutory type of watercourse in England and Wales, usually larger streams and rivers, but also include some smaller watercourses. The Environment Agency's powers to carry out flood defence works apply to Main Rivers only. In England Main Rivers are designated by DEFRA (Department for Environment, Food & Rural Affairs).
National Planning Policy Framework	The NPPF is a framework which aims to simplify and accentuate accessibility on current policy in planning of development of an area, particularly for local planning authorities and decision makers.
Ordinary Watercourse	All rivers, streams, ditches, drains, cuts, dykes, sluices, sewers (other than public sewers) and passages through which water flows which do not form part of a Main River. Local authorities and, where relevant Internal Drainage Boards, have similar permissive powers on Ordinary Watercourses as the Environment Agency has on Main Rivers.
Overtopping	The process of water rising over the top of a barrier intended to contain it (e.g. sea defence).
Pathway	A route that enables a hazard to move from a ‘source’ to a ‘receptor’, as in the ‘source-pathway-receptor’ concept. A pathway must exist in order for a hazard to be realised. Pathways can be constrained in order to mitigate the risks.
Planning Practice Guidance	This document provides additional technical guidance to ensure the effective implementation of the planning policy set out in the National Planning Policy Framework.
Reservoir	A large raised structure, raised lake or other area capable of storing at least 25,000 cubic metres of water above natural ground level, created artificially or enlarged. This is defined by the Reservoirs Act, 1975.
Residual Risk	The risk which remains after all risk avoidance, reduction and mitigation measures have been implemented.
Return Period	The long-term average period between events of a given magnitude which have the same Annual Exceedance Probability of occurring.
Run-off	The flow of water from an area caused by rainfall.

Term	Definition
Sequential Test	The aim of the Sequential Test is to steer new development toward areas with the lowest probability of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for that development in areas of lower probability of flood risk.
Site Allocation	Location identified by the Local Planning Authority as likely to experience change or development in the short to medium term.
Standard of Protection	The design event or standard to which a building, asset or area is protected against flooding, generally expressed as an Annual Exceedance Probability.
Strategic Flood Risk Assessment	An area-wide study, undertaken by one or more Local Authorities, to assess the risks that all sources of flooding pose to a Borough or District, both now and in the future. It incorporates the impacts of further land changes and climate change in the development of an area and if these factors impact the risk of flooding.
Surface Water Flooding	In this context, surface water flooding describes flooding from sewers, drains, groundwater, and runoff from land, small water courses and ditches that occurs as a result of heavy rainfall.
Sustainability Appraisal	An integral part of the plan-making process which seeks to appraise the economic, social and environmental effects of a plan in order to inform decision-making that aligns with sustainable development principles.
Sustainable Drainage Systems	A sequence of management practices and control structures, often referred to as SuDS, designed to drain water in a more sustainable manner than some conventional techniques.
Tidal Surge	A local high rise in sea level caused by climatic conditions, creating wind and low atmospheric pressure. Tidal flooding is of greatest risk when tidal surges combine with high tides.
Vulnerability Classes	The NPPF provides a vulnerability classification to assess which uses of land may be appropriate in each flood risk zone.

1 Introduction

1.1 Terms of Reference

The National Planning Policy Framework (NPPF) and accompanying Planning Practice Guidance[1] (PPG) emphasise the responsibility of Local Planning Authorities (LPAs) to ensure that flood risk is understood and managed effectively using a risk-based approach throughout all stages of the planning process. As such, LPAs are required to undertake Strategic Flood Risk Assessments (SFRAs) to support the preparation of their Local Plan.

Waveney District Council and Suffolk Costal District Council, jointly referred to as East Suffolk Councils (ESC), have commissioned AECOM to review and update the Level 1 SFRA for its administrative area, which was last completed in 2008. The methodology followed in the study has been designed to comply with the NPPF and the accompanying PPG as well as guidelines from the Environment Agency (EA). The SFRA has been carried out in collaboration with officers from ESC, the EA and Anglian Water. The results of this assessment are described in this report and are intended to inform strategic land use planning and decision making, from a flood risk perspective.

1.2 SFRA Aims and Objectives

The aim of this SFRA is to collate and analyse the most up-to-date flood risk information from all sources, to provide an overview of flood risk issues along the East Suffolk Coastline. The resulting report and mapping is intended to be used by the ESC and the Broads Authority as evidence to inform the emerging Local Plans. This aims to ensure flood risk is taken into account when considering development options, in the preparation of strategic land use policies and for decision taking in relation to planning applications. Local plan documents for the study area are in the process of renewal. Waveney District Council is currently preparing a new Local Plan for the District, which will cover the period up to 2036, with consultation on the First Draft of the Local Plan due to commence in late 2017. Suffolk Coastal District Council has recently completed an Issues and Options consultation with a First Draft Plan expected to be published in 2018. This plan will also cover the period to 2036. At the time of writing, the Broads Authority were preparing to consult on the publication version of their Local Plan.

In addition to providing an evidence base to support the Local Plan, the SFRA will enable ESC to:

- Determine the spatial variations in flood risk from all sources across the study area;
- Prepare broad policies for the management of flood risk;
- Steer development towards areas of lowest flood risk, through the application of the Sequential Test and, where necessary, the Exception Test;
- Assist the decision making process on flood risk issues;
- Consider opportunities to reduce flood risk to existing communities through better management of surface water, provision for conveyance and storage for flood water;
- Identify the level of detail required for site-specific FRAs; and
- Determine the acceptability of flood risk in relation to emergency planning capability.

Based upon EA guidance, the key objectives of this SFRA are to:

- Provide maps showing the LPAs' area including Main Rivers, Ordinary Watercourses and Flood Zones, including the Functional Floodplain (defined by the 5% AEP (1 in 20 Year) event or 4% AEP (1 in 25 Year) event where the 5% AEP is absent);
- Assess and map the distribution of flood risk from all sources across the study area, including an assessment of the potential implications of climate change;
- Identify relevant flood risk management measures, including the presence and coverage of flood protection systems and infrastructure;
- Undertake an assessment of the current and future flood policy;
- Provide advice on the preparation of site-specific FRAs for sites of varying risk across the Flood Zones, including information about the use of sustainable drainage techniques;
- Identify policies and practices required to ensure development satisfies the Exception Test;

[1] Flood Risk and Coastal Change, Planning Practice Guidance (2014); Available at: https://www.gov.uk/guidance/flood-risk-and-coastal-change

- Provide meaningful recommendations to inform policy, development control and technical issues; and
- Provide advice on appropriate mitigation measures, including the likely applicability of SuDS techniques for managing surface water run-off.

1.3 Using this SFRA

This SFRA is broadly divided into 5 sections, as described below:

- Chapter 1 (this chapter) includes an overview of the aims and objectives of the updated SFRA, provides contextual background information about the study area and summarises the methodology used to undertake this assessment;
- Chapter 2 provides a brief overview of the legislative as well as national, regional and local planning policy context relevant to East Suffolk and referenced in the preparation of this SFRA;
- Chapter 3 presents a broad overview of flood risk from all sources across the East Suffolk Coastline, including flood history and the anticipated impact of climate change;
- Chapter 4 summarises the NPPF risk-based approach to managing flood risk through planning, including step-by-step guidance on the application of the Sequential Test and the Exception Test. This is followed by specific recommendations to inform local planning policy, development control and emergency planning;
- Chapter 5 provides guidance to developers in undertaking site-specific FRAs and measures available for appropriately managing and mitigating flood risk; and
- Chapter 6 summarises the key findings of the SFRA, including the primary recommendations for flood risk management in East Suffolk.

A number of appendices are also attached within this SFRA, as summarised below:

- *Appendix A* contains mapping summarising contextual information for East Suffolk and illustrating the spatial variability of flood risk across the study area;
- *Appendix B* summaries the existing and outstanding modelling studies within the study area;
- *Appendix C* provides more detailed information on commonly utilised SuDS techniques and their applicability within the area;
- *Appendix D* provides a summary of the datasets collated throughout the SFRA preparation and describes each of the datasets contained within the SFRA maps; and ;
- *Appendix E s*ummarises the key aspects to be considered to ensure that the SFRA is kept up-to-date.

While it is generally recommended that this SFRA be considered holistically, the key sections deemed to be most relevant to various parties are summarised below.

1.3.1 Development Control

A key objective of the SFRA is to collate, assess and map all forms of flood risk across the ESC and use this information to steer new development towards areas of lowest flood risk, through the Sequential Test process. The spatial distribution of different sources of flood risk across the study area is illustrated in the mapping contained in Appendix A, and further described in Chapter 3. These sections will provide a broad indication of the sources of flood risk impacting on any potential development sites, and the Flood Zone in which they are situated.

Chapter 4 summarises the Sequential Test process to be followed when establishing the compatibility of certain developments types within each Flood Zone, describing how the mapping and associated information should be used to assess planning applications.

1.3.2 Strategic Planning

The maps contained within Appendix A illustrate the spatial distribution of flood risk across the ESC and are intended to inform strategic land use planning and development allocation. Greater detail on each source of flood risk is contained in Chapter 3.

1.3.3 Guidance for Developers

When considering proposed development, it is recommended that developers refer to the mapping contained in Appendix A to obtain an overall understanding of the different sources and level of flood risk which may affect their site. Further detail on any relevant sources of flooding can be found in Chapter 3.

Chapter 5 provides detailed guidance in undertaking site-specific FRAs, depending on the Flood Zone and the type of development. This chapter also describes common measures which are available for appropriately managing and mitigating flood risk. Further detail on the applicability and use of different types of SuDS is provided in Appendix C.

Developers should also refer to Chapter 4 in order to understand the compatibility between different types of development and levels of flood risk, and how the Sequential Test will be used by the ESC to assess planning applications.

1.4 Study Area

1.4.1 Location

The study area is defined by the administrative boundary of Waveney District Council and Suffolk Coastal District Council illustrated on Figure 01, Appendix A. The major population centres are Rushmere, Kesgrave, and Martlesham corridor to the east of Ipswich.

The study area lies within the Anglian River Basin District and is covered by the Anglian River Basin Management Plan and the East Suffolk Catchment Flood Management Plans (CFMP). It is located in the EA's East Anglia operational region. The water utility provider is Anglian Water Utilities Ltd.

Waveney District Council

Waveney District Council administers the northeast corner of Suffolk. Centred on the port of Lowestoft, Waveney has a population of 115,254 (according to the 2011 Census). The District borders Great Yarmouth District Council, Suffolk Coastal District Council, Mid Suffolk District Council and South Norfolk District Council. The main sources of flood risk in Waveney are tidal and fluvial from the **River Waveney, Hundred River** and **River Blyth**, as well as pluvial sources.

To the north of the Waveney District Council boundary is the widespread low-lying wetland area of the Broads, which is situated partly within Waveney and the county of Norfolk. The Broads stretch over 303 km^2 and include unique areas of rivers, broads (shallow lakes), marshlands and fens (un-drained marshlands). The lower valleys of the River Waveney are incorporated into the Broads.

Suffolk Coastal District Council

Suffolk Coastal District Council administers the southeast part of Suffolk. The largest settlement in the district is Felixstowe, with the second major population centre being the Kesgrave urban corridor to the east of Ipswich. The District also contains a number of market towns and numerous, smaller rural settlements. According to the 2011 Census, the population of the District is 124,300. The main sources of flood risk in Suffolk Coastal are tidal, fluvial and estuarine systems with associated creek networks and marshlands. Fluvial sources include the **River Alde-Ore** and **River Deben.**

There are also a number of smaller rivers in the Suffolk Coastal District that do not possess large estuaries, including the River Lark which drains into the Deben Estuary, the River Fromus which drains into the River Alde, and the Minsmere River which is located to the north of Leiston. The North Sea borders the east of the study area and is the main influence on the tidal sections of the above watercourses. This stretch of coastline is characterised by alternating areas of low sandy cliffs and natural shingle banks separating the sea from areas of salt marsh.

1.4.2 Land Use

The study area is predominantly rural; however there are areas of dense settlement and industry centred around the two main towns of Felixstowe and Lowestoft and the Ipswich Policy Area. In addition there are multiple Market Towns scattered throughout the area.

The coastline of Waveney and Suffolk Coastal is littered with Sites of Special Scientific Interest, National Nature Reserves, Special Areas of Conservation, Special Protection Areas and Ramsar Sites. In addition, the majority of the Suffolk coastline extending inland has been designated an Area of Outstanding Natural Beauty and is one of the 43 designated Heritage Coasts in England and Wales. The Broads protected landscape of national significance with a status equivalent to a National Park. This stretch of coastline is thus of huge importance and needs to be responsibly developed and protected.

The A12 runs south from Lowestoft in the northernmost extent of the study area though the major settlements of Southwold, Saxmundham, Wickham Market, Woodbridge and Felixstowe.

1.4.3 Topography

The general topography of the East Suffolk Coast is illustrated on Figure 02, Appendix A.

The western boundary of the study area is at highest elevation reaching over 60 mAOD in Otley. The topography slopes down towards the coastline which defines the eastern boundary. Here ground elevation is at sea level along the river estuaries, with slightly raised ground in Dunwich, Aldeburgh and Felixstowe.

1.4.4 River Network

There are numerous Main Rivers within the study area, with the most extensive being the River Waveney, Hundred, Blyth, Alde-Ore, Deben and Orwell, described below:

The **River Waveney** marks the northern border of the Waveney District. This Main River runs west to east for 40 km through the settlements of Diss and Bungay and becomes tidal downstream of Ellingham sluice.

The **Hundred River** catchment is approximately 71 km^2 and runs west to east, discharging into the sea adjacent to the south side of Kessingland, by the EA's Benacre pumping station. A number of tributaries join this Main River along its course. Around the lower reaches of the river, west of the sluice and east of the A12, are a number of marshlands, specifically Churchfarm Marshes and Beachfarm Marshes. A network of drainage channels drains these marshes.

The **River Blyth** catchment is approximately 97 km^2 and runs from west to east. Two stretches of this Main River make up the border between Waveney and Suffolk Coastal, one area east of Halesworth to Blyford, and the other area from Reydon Marshes to the mouth of the river. The river is joined by a number of tributaries, including the Walpole, Wissett, Spexhall, Chediston and Cookley Watercourses. This river is also host to a number of flood plains surrounding the lower reaches, including Reydon Marshes, Tinker's Marshes and Town Marshes.

The **River Alde-Ore** catchment is approximately 173 km^2. The Main Rivers Alde and Ore are situated within a catchment characterised by arable farming and horticulture. The River Fromus is a tributary of the River Alde which joins at Snape. There are a number of significant settlements in the catchment, the largest of which are Saxmundham and Framlingham.

The **River Deben** catchment is approximately 184 km^2 and the source can be found west of the town of Debenham in the district of Mid Suffolk. This Main River winds southeast to the town of Wickham Market and then changes direction and runs southwest to Woodbridge. From Woodbridge the river is estuarine in character with marsh areas and tidal mud flat areas on either side of the channel.

The **River Orwell** forms the southern limit of the Suffolk Coastal District. The River Gipping and Belstead Brook feed this river. The Gipping catchment is approximately 313 km^2 and outfalls to the Orwell Estuary. The main land use in the catchment is agriculture. There are a number of urban areas within the catchment including Ipswich. This Main River is joined by a number of tributaries including

the Rattlesden River, Earl Stonham watercourse and Somersham watercourse. The Belstead Brook catchment is approximately 49 km^2 and also outfalls into the Orwell Estuary. Again, this catchment is largely rural and used for arable cultivation or pasture. There is a significant area of Ipswich suburb in the lower part of the catchment, namely Chantry, Stoke Park and Maidenhall. Spring Brook is the only significant tributary and joins Belstead Brook just upstream of Washbrook.

The Main Rivers within the study area are illustrated within Figure 01 in Appendix A.

1.4.5 Geology

The underlying geology across East Suffolk as specified by the British Geological Survey (BGS) is illustrated on Figure 03, Appendix A.

Bedrock

The majority of the underlying bedrock geology along the East Suffolk coastline is Neogene and Quaternary Rocks (undifferentiated) – Gravel, Sand, Silt and Clay. Surrounding the River Deben and River Alde there are areas of Thames Group – Clay, Silt, Sand and Gravel.

Superficial Deposits

There are four main superficial deposits present in the study area, these are: Till – Diamicton, Glacial Sand and Gravel; Crag Group – Sand and Gravel; and Alluvium – Clay, Silt and Sand. The Alluvium substrate is found on the river flood plains, surrounded by the Crag group and then the Glacial Sand and Gravel. The Till deposit is located to the west of the study area, furthest from the coastline.

1.5 Methodology and Approach

This SFRA is a desk-based study undertaken using readily available information and existing datasets to enable the assessment of flood risk along the East Suffolk Coastline. The information is presented in a suitable graphical format to facilitate the decision making process by the ESC. The SFRA will be used to inform the application of the Sequential Test to local development sites and to identify if any require the application of the Exception Test.

The main activities undertaken in the preparation of this SFRA are summarised below:

- Organise and attend an inception meeting with the ESC as well as a steering group meeting with key stakeholder organisations to establish the main objectives of the study (from each organisation's perspective), aid collaborative working and discuss available information and datasets;
- Liaise with the ESC to request relevant datasets and information from stakeholders;
- Interrogate received data and review against the objectives of the SFRA to identify any gaps in the required information;
- Consult with key stakeholders to agree approach, and define datasets to be included within the SFRA;
- Assess flood risk from all sources, including sea (tidal), rivers (fluvial), land (surface water), groundwater, sewers and artificial sources;
- Produce strategic flood risk maps, GIS deliverables and a technical report.

The key datasets selected for inclusion within this SFRA are summarised in Appendix D.

1.5.1 Consultation

The following stakeholders were engaged to provide data and information during this SFRA.

Waveney and Suffolk District Councils (East Suffolk Councils) (ESC) are the LPAs for the study area, responsible for long term strategic planning of future development through the preparation of Local Plans, as well as for determining planning applications within the respective District.

The ESC should work with the LLFA (Suffolk County Council) to secure Local Plan policies compatible with the Local Flood Risk Management Strategy.

Suffolk County Council (SCC) is designated as the Lead Local Flood Authority (LLFA) under the FWMA, and has a duty to lead and coordinate the management of local flood risk, which includes flood risk from surface water, groundwater and ordinary watercourses. LLFAs are statutory consultees in planning for all major development in relation to the management of surface water drainage.

SCC, as the highway authority for the local road network, is also responsible for providing and managing highway drainage and roadside ditches, and must ensure that road projects do not increase flood risk.

Environment Agency (EA) has a strategic overview role for flood risk management associated with Main Rivers and the Sea in the Districts and is a statutory consultee for any development proposed within Flood Zone 3. The EA has a regulatory role and holds and determines Environmental Permits for any Flood Risk Activities on all Main Rivers and Tidal boundaries. The EA is continually improving and updating their flood map for Main Rivers and the Sea and has permissive powers to carry out flood defence works, maintenance and operational activities for Main Rivers and coastal defences. However, overall responsibility for maintenance lies with the riparian owner.

Anglian Water Services Ltd. (AW) has a duty as a statutory body to provide clean water and waste water services and is responsible for the management, maintenance and operation of flood control structures in the area. Water companies are defined as a Risk Management Authority (RMA) within the FWMA and are responsible for flood risk management functions in accordance with the Water Resources Act 1991 and the Land Drainage Act 1991. Anglian Water is responsible for surface water drainage from development via adopted sewers and for maintaining trunk sewers into which much of the highway drainage in the study area connects.

Highways England has responsibilities (under the Highways Act 1980) for the effectual drainage of surface water from motorways and major A roads insofar as ensuring that drains, including kerbs, road gullies, ditches and the pipe network which connect to the sewers (often Anglian Water assets), are maintained.

There are a number of other organisations that play a role in effectively managing flood risk across the study area. These include the neighbouring Districts and Boroughs, the Fire Brigade, Greater Anglia (rail network), Essex and Suffolk Water, the Highways Agency, Internal Drainage Boards, the Suffolk Resilience Forum, the Joint Emergency Planning Unit, Natural England and the Essex and Suffolk Rivers Trust, among others.

2 Legislative and Planning Policy

This section provides a brief overview of the legislative and national, regional and local planning policy context relevant to the study area and referenced in the preparation of this SFRA. Hyperlinks providing further detail on each of the described documents are contained in the footnote references where possible.

2.1 National Policy

2.1.1 Flood and Water Management Act (2010)

The FWMA was enacted in 2010, with the intention of enabling the provision of more comprehensive and effective flood risk management. The act formalises flood risk management responsibilities across a range of organisations including the EA, water companies and highways authorities, and requires cooperation across all groups. Unitary authorities are designated as LLFAs, which for the study area is SCC. Here SCC has the responsibility to lead and co-ordinate local flood risk management.

The Act further required the preparation of a number of other studies and strategies, as described in the following sections.

2.1.2 National Strategy for Flood and Coastal Erosion Risk Management

In accordance with the Act, the EA has developed a National Strategy for Flood and Coastal Erosion Risk Management (FCERM) in England. Developed around the notion of understanding risks, empowering communities and building resilience, this Strategy provides a framework for the work of all FCERM authorities.

2.1.3 National Planning Policy Framework and Guidance

The NPPF[2], published in March 2012, is a key part of the government's reforms to make the planning system less complex and more accessible. It presents a structure and context for planning within England, providing a framework for local authorities and residents to produce local and neighbourhood plans that reflect the needs and priorities of their communities. The PPG[3] supports the framework and is published online and regularly updated.

Within the core principles of NPPF, set out in Paragraph 17, it is stated that planning should: "*Support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change.*"

Section 10 of the NPPF, titled Meeting the Challenge of Climate Change, Flooding and Coastal Change, establishes the principles for assessing and managing flood risk through the planning and development process, which is supported by the PPG.

The overall approach of the NPPF to flood risk is broadly summarised in Paragraph 103:

"When determining planning applications, LPAs should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where, informed by a site-specific FRA following the Sequential Test, and if required the Exception Test, it can be demonstrated that:

- *Within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location, and*
- *Development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning; and it gives priority to the use of sustainable drainage systems."*

This is achieved by delineating the probability of flooding in any area into three main Flood Zones, as defined by the NPPF. Flood Zone 3 is additionally delineated into Flood Zone 3a (high probability

[2] NPPF; Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf
[3] PPG; Available at: https://www.gov.uk/government/collections/planning-practice-guidance

area) and Flood Zone 3b (the Functional Floodplain, where water has to flow or be stored in times of flood). Each of these Flood Zones is described in Table 2-1.

Table 2-1 Flood Zone Definitions (As described in the NPPF)

Flood Zone	Definition	Probability of Flooding
Flood Zone 1	At risk from flood event greater than the 1 in 1,000 year event (greater than 0.1% annual probability of flooding each year).	Low Probability
Flood Zone 2	At risk from a tidal flood event between the 1 in 200 and 1 in 1,000 year event (between 0.5% and 0.1% annual probability of flooding each year), or a fluvial flood event between the 1 in 100 and 1 in 1,000 year event (between 1% and 0.1% annual probability of flooding each year).	Medium Probability
Flood Zone 3a	At risk from a tidal flood event less than or equal to the 1 in 200 year event (greater than 0.5% annual probability of flooding each year), or a fluvial flood event less than or equal to the 1 in 100 year event (greater than 1% annual probability of flooding each year).	High Probability
Flood Zone 3b	At risk from a flood event less than or equal to the 1 in 20 year event or otherwise agreed between the LPA and the EA.	Functional Floodplain

Each LPA is responsible for preparing an SFRA to inform the allocation of development sites within their administrative areas in accordance with their established Sustainability Appraisal. The policy levels of this process in the context of flood risk and the position of the SFRA within the planning framework are shown in Figure 2-1 below.

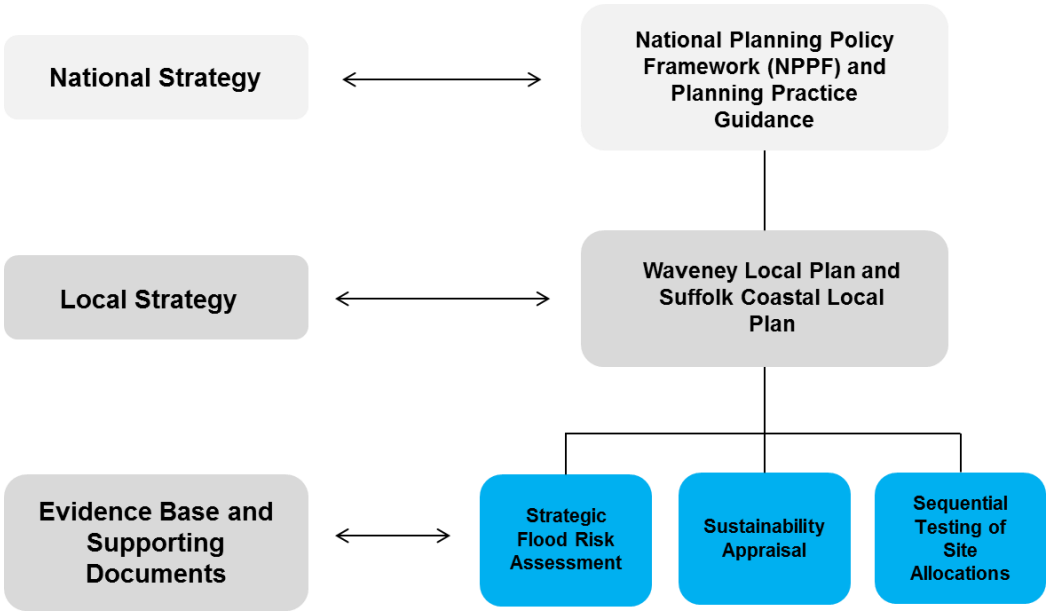


Figure 2-1 Overview of Policy Levels and Documents in the context of Flood Risk

The NPPF is supported by PPG, which provides additional information to facilitate the effective implementation of the planning policy, with specific sections relating to the management of flood risk.

Further detail regarding the application of the Sequential and Exception Tests is included in Section 4.1.

2.1.4 Flood Risk Standing Advice

The EA has published Flood Risk Standing Advice to be followed when undertaking flood risk assessment for all development classed as:

- A minor extension (household extensions or non-domestic extensions less than 250 m^2) in Flood Zone 2 or 3;
- 'more vulnerable' in Flood Zone 2 (except for landfill or waste facility sites, caravan or camping sites);
- 'less vulnerable' in Flood Zone 2 (except for agriculture and forestry, waste treatment, and water and sewage treatment); and
- 'water compatible' in Flood Zone 2.

Reference should be made to Table 2-1 and 4-2 for Flood Zone and development vulnerability classifications. It is understood that the EA is currently updating this Standing Advice, which will be made available online.

2.2 Regional Flood Risk Policy

2.2.1 Anglian River Basin Management Plan

Under the EU Floods Directive and UK Flood Risk Regulations, the EA is required to prepare River Basin Management Plans and CFMPs for all of England covering flooding from Main Rivers, the sea and reservoirs.

As such, the Anglian River Basin District Basin Management Plan[4] has been published by the EA. This document sets out the measures to manage flood risk in the Anglian River Basin District from 2015 to 2021. The purpose of a River Basin Management Plan is to provide a framework for protecting and enhancing the benefits provided by the water environment. Because water and land resources are closely linked, it also informs decisions on land-use planning. The measures for the East Suffolk catchment can be found within the Anglian River Basin Management Plan (2016).[5]

2.2.2 East Suffolk Catchment Flood Management Plan

CFMPs set out polices for the sustainable management of flood risk across particular catchments over the long-term (50 to 100 years) taking climate change into account. The study area is covered by the East Suffolk CFMP[6] and is split into four policy areas, including: Policy Sub-area 1 (East Anglian Plain), Sub-Area 4 (Framlingham), Sub-Area 5 (Halesworth), and Sub-Area 6 (Suffolk Coast & Heaths). The policies within these areas are summarised in Table 2-2.

[4] Anglian River Basin District River Basin Management Plan; Available at: https://www.gov.uk/government/publications/anglian-river-basin-district-river-basin-management-plan
[5] Environment Agency Anglian River Basin District River Basin Management Plan; Available at: https://www.gov.uk/government/publications/anglian-river-basin-district-river-basin-management-plan

Table 2-2 Summary of CFMP Policies for ESC

East Suffolk CFMP [6]

Sub-area 1: East Anglian Plain – Policy 2 "Areas of low to moderate flood risk where we can generally reduce existing flood risk management actions."

The issues in this sub-area

This sub-area is covered by the Natural England "East Anglian Plain Natural Area", which is predominately characterised by rural, undeveloped land where the rivers use their floodplain. Within this large sub-area there is low risk to people and property, located in small towns and villages or in isolated areas scattered throughout the sub-area. Currently 292 properties within this sub-area are at risk from the 1% AEP river flood. The properties at risk are in towns and villages such as Rattlesden, Coddenham, Laxfield, Walpole, Saxmundham, Kelsale and Carlton. There is approximately 5 km^2 of grade two agricultural land, 10 km^2 of grade three agricultural land and parts of the A14 and A12 at risk.

The Key Messages

- Where feasible, flood risk management activities will be reduced as the current activity to manage flooding is out of proportion with the level of flood risk.
- Reducing bank and channel maintenance will help naturalise rivers and improve the flow between the river and its floodplain.
- Maintain flood warning infrastructure (such as river flow gauging stations) to ensure that an effective flood warning service can be provided throughout the catchment.

Sub-area 4: Framlingham – Policy 3 "Areas of low to moderate flood risk where we are generally managing existing flood risk effectively."

The issues in this sub-area

Framlingham is a small town located in the headwaters of the Ore catchment at the confluence with Framlingham Gull. Framlingham Gull runs straight through the town which means its floodplain is developed mainly by small shops and local businesses. There are no formal flood defences in this sub-area. Currently 81 properties within the sub-area are at risk from the 1% annual probability river flood. There is some agricultural land, one electricity sub-station and one sewage treatment works at risk in the 1% annual probability river flood.

The Key Messages

- The current level of flood risk management should be continued.
- Continue current flood risk management activities.

Sub-area 5: Halesworth – Policy 3 "Areas of low to moderate flood risk where we are generally managing existing flood risk effectively."

The issues in this sub-area

This sub-area includes the small urban area of Halesworth which has a high population density. Halesworth lies on the Chediston watercourse in the upper parts of the River Blyth catchment. There are no formal flood defences in this sub-area. Currently, 45 properties within this sub-area are at risk from the 1% AEP river flood. There is some agricultural land, some railway, parts of the A144 and 1 electricity sub-station at risk during a 1% AEP river flood.

The Key Messages

- The current level of flood risk management should be continued.
- Continue current flood risk management activities.

Sub-area 6: Suffolk Coast and Heaths – Policy 2 "Areas of low to moderate flood risk where we can generally reduce existing flood risk management actions."

The issues in this sub-area

This sub-area contains a large area of low-lying coastal plain which is largely uninhabited, but there are small communities such as Knodishall, Wangford, Wrentham and Alderton. The rivers and streams of this sub-area are largely undefended. River flood risk to people and property is low. Currently 49 properties are at risk from the 1% AEP river flood. There is some agricultural land, some railway and parts of the A12 at risk in a 1% AEP river flood. Environmental sites are most vulnerable receptors to flooding in this sub-area. The majority of the environmental sites at risk are wetland habitats that could benefit from increased frequency of flooding. For many of the environmental sites at risk, the area affected by flooding is small and we do not expect any adverse effects. Tidal and coastal flooding within this sub-area is covered by the SMP.

The Key Messages

- Where feasible, flood risk management activities will be reduced as the current activity to manage flooding is out of proportion with the level of flood risk.
- Maintain flood warning infrastructure (such as river flow gauging stations) to ensure that an effective flood warning service can be provided throughout the catchment.
- The implementation of this policy must not cause adverse effects for internationally designated conservation areas.

[6] Environment Agency (December 2009) East Suffolk Catchment Flood Management Plan https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/288886/East_Suffolk_Catchment_Flood_Management_Plan.pdf

2.2.3 Shoreline Management Plans

The study area is covered by the Kelling to Lowestoft Ness (SMP 6) and Lowestoft Ness to Felixstowe Landguard Point (SMP 7) areas within the East Suffolk Shoreline Management Plan (SMP). These two SMPs were prepared to assess the risks posed by coastal change to local people and the built and historic environment. Each SMP predicts future coastal change during the next 100 years and outlines how the shoreline should be managed in the future. This is further discussed in Section4.2.3.

2.2.4 Suffolk Preliminary Flood Risk Assessment

Under the requirements of the EU Floods Directive[7] and UK Flood Risk Regulations every LLFA was required to prepare a Preliminary Flood Risk Assessment (PFRA) by 2011. This is a high level screening exercise that brings together, from a number of sources, easily available information on past and potential flooding to enable judgements to be made about local flood risk.[8]

2.2.5 Suffolk County Council Local Flood Risk Management Strategy (2016)

Under the EU Floods Directive and UK Flood Risk Regulations, LLFAs must prepare Local Flood Risk Management Plans (LFRMPs) in formally identified Flood Risk Areas where the risk of flooding from local sources is significant (i.e. surface water, groundwater, Ordinary Watercourses).

The Suffolk County Council Flood Risk Management Partnership[9] was created to co-ordinate the implementation of any actions required as a result of the Floods and Water Management Act 2010 and the Flood Risk Regulations 2009.

The Suffolk Flood Risk Management Strategy provides some context into flood management for Suffolk on a larger scale, including key links to and extracts from key national guidance documents. The strategy document has a number of appendices, as follows:

Appendix A - The local SuDS guide to assist in creating SuDS on their proposed sites.
Appendix B - A consenting policy which aims to provide clarification of the policy towards works affecting a watercourse, particularly culverts.
Appendix C - A protocol for advising local planning authorities (LPAs) exactly what is required from developers in terms of surface water drainage.
Appendix D - Guidance on S19 Flood Investigation Reports.

The strategy states that resources will be focused in areas where the risk of flooding is highest, such as along the coast, streams and other watercourses. Flood prevention work is also prioritised according to other factors including the level of population in an area and whether it contains valuable ecology which could be harmed by flooding.[10]

2.3 Local Plans

2.3.1 Waveney Local Plan

The Waveney District Council has a full suite of Local Plan Development Plan Documents in place, including a Core Strategy, Development Management Policies, Area Action Plan and Site Specific Allocations Document, together with supporting Supplementary Planning Documents.

The Council is now commencing a review of the Local Plan to cover the period to 2036. The Local Plan review will bring the District's planning framework up to date and in line with national planning policy. The Final Draft plan is expected to be published in Spring 2018.

[7] European Floods Directive; Available at: http://ec.europa.eu/environment/water/flood_risk/index.htm
[8] Suffolk County Council Preliminary Flood Risk Assessment Report (2011); Available at: https://www.suffolk.gov.uk/assets/suffolk.gov.uk/Emergency%20and%20Safety/Civil%20Emergencies/SUFFOLKPFRAREPORTFINAL.pdf
[9] SCC Guidance of Development and Flood Risk; Available at: https://www.suffolk.gov.uk/roads-and-transport/flooding-and-drainage/guidance-on-development-and-flood-risk/
[11] The Deben Estuary Plan (2015): Available at: http://www.debenestuarypartnership.co.uk/downloads/theplan.pdf

2.3.2 Suffolk Coastal Local Plan

The Suffolk Coastal District Council has a full suite of Local Plan Development Plan Documents in place including a Core Strategy, Felixstowe Peninsula Area Action Plan and a Site Allocations and Area Specific Policies Document, together with a number of "made" neighbourhood plans.

The Council is now commencing on a review of the Local Plan to cover the period to 2036. A First Draft Local Plan will be consulted on during 2018.

2.3.3 The Broads Local Plan

The Broads Authority had the following adopted documents at the time of writing:

- Core Strategy (2007);
- Development Management Policies Development Plan Document (2011);
- Sites Specifics Local Plan (2014); and
- Flood Risk Supplementary Planning Document (2017).

The Authority was preparing for pre-submission consultation at the time of writing.

2.3.4 Other Local Studies

The Deben Estuary Plan (2015) [11]

The Plan addresses the principle issue of flood risk management for the Deben Estuary, taking a more inclusive stance, reflecting the preferred Local Plan Strategy for an integrated approach to the coastal zone.

Suffolk Resilience Suffolk Flood Plan (2016)[12]

The Suffolk Flood Plan is a multi-agency response plan for flood events in Suffolk and is aimed at representatives of agencies and organisations within the Suffolk Local Resilience Forum and Government Departments. The purpose of this plan is to help ensure that the organisations within the Suffolk Local Resilience Forum can respond to flooding incidents that occur within Suffolk from a strategic, tactical and operational level, including providing support to neighbouring Local Resilience Forums. It provides information on the outline response, management and roles and responsibilities in the response to a major flood incident in Suffolk.

Alde & Ore Estuary Partnership and Estuary Plan (2016) [13]

Government agencies and the local community worked together to establish the Alde and Ore Estuary Partnership. The partnership prepared a local strategy to keep the integrity of the area and landscape, including new solutions for creating more resilient flood defences throughout the estuary.

Lowestoft Flood Risk Management Strategy (2016)[14]

This Strategy covers the areas of Lowestoft deemed to be at significant risk from tidal flooding between the Outer Harbour and the western end of Lake Lothing at Mutford Lock; from river flooding along Kirkley Stream, and from surface water flooding both adjacent to Kirkley Stream and other key areas identified to the north and south of Lake Lothing.

The study considers a number of options to manage flood risk. After consultation at the beginning of 2017, the preferred option (at the time of writing) for the future management of tidal flooding is Option 5: Improve Bascule Bridge Barrier and walls. As for pluvial flood risk the preferred option for the short term is to increase Property Level Protection combined with maintenance to ensure the conveyance of water through the existing drainage systems and through Kirkley Stream. At time of writing the

[11] The Deben Estuary Plan (2015): Available at: http://www.debenestuarypartnership.co.uk/downloads/theplan.pdf
[12] Suffolk Resilience Suffolk Flood Plan; Available at: http://www.suffolkresilience.com/assets/PDF-plans/Flooding/20150703-SRF-Flood-Plan-Issue-6.pdf
[13] Alde and Ore Estuary Partnership Plan; Available at: http://aoep.co.uk/index.php/estuary-plan/
[14] Lowestoft Flood Risk Management Strategy (2016); Available at: http://www.lowestoftfrmp.org.uk/latest-news/strategy-summary-document/

scheme was an Outline Business Case, with the options to be further developed. Flood risk in this area is likely to be different on completion of the scheme and should be revaluated at that stage.

3 Flood Risk in East Suffolk

3.1 Overview

The combined area of Waveney District and Suffolk Coastal District is substantial and supports coastal, fluvial and estuarine systems, including a wide distribution of creeks and marsh areas. These diverse fluvial and coastal systems pose different sources of potential flood risk to the surrounding areas.

Much of the Waveney and Suffolk Coastal areas are low lying, with some coastal areas below current sea level. These areas include the Blyth and Alde-Ore Estuaries[15]. There are many areas of marshland, such as Beccles Marshes and Barsham Marshes surrounding the River Waveney, Beachfarm Marshes around the Hundred River, Sudbourne Marshes and Gedgrave Marshes situated in the lower reaches of the River Alde-Ore, and Trimley Marshes located near the mouth of the River Orwell. Much of the coastal and estuary areas are protected by sea defences and river defences respectively. Higher ground exists at the sources of the rivers towards the westerly limits of the District boundaries.

Large sections of the Waveney and Suffolk Coastal areas are protected from tidal flooding by embankments and hard defences, including numerous floodgates and sluices. However, the December 2013 tidal surge flood event resulted in over 160 properties being affected and business brought to a standstill in Lowestoft, highlighting limitations in resilience and the impact it has on existing and potential growth for the town. This was further reinforced by the flooding in the Kirkley area of Lowestoft in July 2015 following an extreme rainfall event. This demonstrates the vulnerability areas of the coastline have to all forms of flooding from the sea, rivers and extreme rainfall.

3.2 Historic Flooding

Since 1883 a number of past flooding events have been monitored and recorded in the Suffolk area, affecting both Districts.

The EA's Historic Flood Map is shown in Figure 04, Appendix A. The EA Historic Flood Map includes past fluvial and tidal flood events in the study area. However, some of the recorded historical events might have been as a result of issues that have now been addressed and, therefore, an indication of historical flooding affecting a particular location does not necessarily mean that the locality affected remains prone to flooding.

The flood incidents displayed in Figure 04, Appendix A, also show recorded flood incidents provided by SCC, which include flood incidents from fluvial, tidal, sewer, groundwater, highway or surface water sources. A site specific FRA will be required to confirm whether any historical issues have been addressed and development in previously flooded sites can take place.

Notable events are summarised in Table 3-1.

[15] East Suffolk Catchment Flood Management Plan; Available: https://www.gov.uk/government/publications/east-suffolk-catchment-flood-management-plan

Table 3-1 Recorded Flood Incidents in East Suffolk (Source: ESC)

Date	Source	Location	Description (as recorded)
1888	Tidal	East Suffolk Coastline	Coastal flooding arising from the North Sea
1953	Tidal	East Suffolk Coastline	Coastal flooding from the North Sea following a full northwest gale and a swelling tide. Coastal flood defences were breached in 1,200 locations. 5 people were killed in Southworld and 39 in Felixstowe. There were 700 flooded properties in Felixstowe, 30 in Southwold and 400 in Lowestoft. Railway from Lowestoft to Norwich, main road in Aldeburgh and railway station in Woodbridge all closed/abandoned.
1976	Tidal	East Suffolk Coastline	Major tidal surges.
1978	Tidal	East Suffolk Coastline	Major tidal surges.
1979	Fluvial	Hundred and Alde Rivers	Snowmelt and rainfall falling on frozen ground caused flooding in the river valleys.
1981	Fluvial	Rivers Blyth, Alde, Deben and Hundred	Extensive fluvial flooding in these valleys. Pumping was initiated in attempt to limit flood levels.
Feb 1993	Tidal and Fluvial	East Suffolk Coastline	Combined flooding due to a number of low-pressure systems passing the area and generating runoff from saturated catchments, resulting in £250K of damage.
Oct 1993	Fluvial and Pluvial	East Suffolk Coastline	Pluvial and fluvial flooding in the area leading to the damage of 67 properties.
1995	Tidal	East Suffolk Coastline	£800K damage to the area due to widespread tidal flooding.
2006	Pluvial	Lowestoft	High intensity rainfall and high tides.
2007	Tidal	East Suffolk Coastline	Strong winds, high tide and a storm surge resulted in extensive flooding where six homes were flooded in Southwold Harbour.
2013	Tidal	Lowestoft	200 homes and businesses flooded as a result of a tidal surge. which resulted in breaches along the defences of the Alde and Ore.
2014	Pluvial and Sewer	Terry Gardens	At Terry Gardens, 5 properties experienced internal flooding; there was 50m of highway flooding at 450 mm and Anglian Water surface water assets surcharged. The rainfall event was a 1 in 30 to 1 in 40 year event over the Ipswich/Kesgrave area with 58 mm falling in 9 hours over saturated ground. The event likely exceeded the design capacity of the surface water drainage system which could have been exacerbated by lack of maintenance of the Anglian Water attenuation basin outlet pipe to the Mill River.
June 2015	Groundwater	Langer Road, Felixstowe	4 domestic properties flooded internally, the public highway flooded for approximately 50 m to a depth or around 200 mm and Anglian Water assets surcharged. Residents have reported flooded at this location since 2007 and SCC has records of highway flooding here since 2011. The likely cause of flooding is exceedance of the surface water sewer, blockage of some assets due to vegetation debris and a high water table under Langer Road.
July 2015	Pluvial	Aldwyck Way and Velda Close	Kirkley Stream flooded due to heavy rainfall where 82 mm (a 1 in 40 year event) fell, overwhelming the stream and local drainage system and flooding areas by up to 500 mm including 30 homes. An attenuation tank had been fitted to reduce drainage flooding; however, climate change and increasing development is likely to have increased the risk.

3.3 Flood Risk from all Sources

3.3.1 Flooding from Tidal Sources

The eastern boundary of the Waveney and Suffolk Coastal Districts is formed by the land-sea interface, from Corton Cliffs in the north, to the mouth of Harwich Harbour in the south. The tidal influences on coastal water level include:

- Daily tidal fluctuation, occurring when the freshwater from the rivers is met by the incoming tide from the North Sea; and
- Surge tides, which occur due to climatic conditions creating bands of low pressure in the Atlantic and North Sea. This causes a surge of water to move across the Atlantic, travelling southwards into the North Sea and becoming compressed as it travels towards and through the narrow English Channel, between Great Britain and mainland Europe. This causes a rapid rise in sea levels, which can be exacerbated by strong northerly winds.

Along the coastline there are several Main River estuaries and therefore the tidal conditions interact with fluvial mechanisms, caused by prolonged rainfall within the upper reaches of the river catchments.

Nonetheless, tidal flooding constitutes the main form of flood risk along this boundary, which comprises an exposed but defended coastline. When sea levels reach critical level, flood defences become vulnerable to breach or overtopping. These events are likely to have the greatest consequence as defences often protect areas of development which become rapidly vulnerable once flood waters inundate. A tidal breach or overtopping can have particularly significant consequences as the source of water is far greater than that of a fluvial source, and will only cease once tide levels reside.

Defences in this area come in the form of natural frontages of embankments, cliffs and natural shingle ridges, as well as ‘man-made’ defences, such as embankments and sea walls. The likelihood of breach or overtopping depends on the overall condition and crest height of the defences, many of which fall below the current 1 in 200 year flood level and subsequently considerably beneath climate change levels for this stretch of coastline. Current understanding of breach flood risk is limited in this region; however, it is understood (through correspondence with the EA) that ongoing hydraulic modelling of the Essex, Suffolk and Norfolk coastline will include six breach locations. The locations considered are based on understanding of areas at greatest vulnerability in the defence system. Once this data is available it should be incorporated within the SFRA and mapping to build a more robust understanding of tidal flood risk across the study area.

Tidal Flood Zones

The tidal Flood Zones within East Suffolk have been combined with the fluvial Flood Zones (as discussed below) and mapped in Figure 05 in Appendix A. This map delineates the probability of flooding into Zones of increasing flood risk, as defined by the EA and presented earlier in Table 2-1. Figure 05 illustrates that the majority of the coastline is formed of areas of Flood Zone 3. Flood Zone 3b (the Functional Floodplain), has been defined for tidal flood risk across the extent of the study area, using hydraulic modelling for the 5% AEP event.

3.3.2 Flooding from Rivers

The East Suffolk coastline is intersected by numerous rivers, as they drain towards the sea, often encompassing large estuaries surrounded by coastal salt marshes. Figure 01, Appendix A illustrates the river network within the study area. The key characteristics and flood behaviour or the Main Rivers in the study area are briefly outlined below.

Waveney District Council

River Waveney

The River Waveney has a relatively shallow gradient of 1:2100 and therefore its gentle profile creates a low carrying capacity and a limited ability to erode and alter its course during a flood event. Areas

surrounding the river are low-lying and flat, meaning when its banks are overtopped it spreads into an extensive floodplain. This subsequently drains slowly due to the low gradient and may be marshy in areas.

There are a multitude of sluices found along the non-tidal reaches of the river to regulate levels during low flow conditions, to assist in land drainage and to supply a limited amount of flood storage to the system.

River Blyth

The River Blyth discharges through Southwold Harbour, which is protected to the north side by the harbour pier, a structure that is considered to offer coastal protection. The town of Halesworth is situated in the Blyth catchment and has a history of flooding. One particularly challenging aspect of this river is that its large estuary, upstream of the marshland, discharges to the sea via a narrow outlet. There are four level gauges within the Blyth catchment, which showed the river responded quickly to the October 1993 flood event and that levels of flow remained high for a long period of time, due to the large number of tributaries.

The internal drainage network of the estuary is a brackish system with overtopping of the seawall and saline intrusion through flood defences. The area is drained by two sluices to the west, which then discharge into the River Blyth via Charity Sluice. There is a sluice present downstream of the confluence of Buss Creek across the main channel.

Hundred River

The Hundred River is a coastal draining river which flows through the low-lying Beachfarm Marshland before entering the sea. Unlike its neighbouring watercourses, it does not possess a large estuary. There are two sluices situated at Thorpeness, north of Aldeburgh, which discharge to the sea via two pipe sluices. Failure in either of the sluices could result in either tidal inundation or the backing up of fluvial water. This would put property upstream of the sluices in Thorpeness at risk of flooding, although this would not necessarily constitute a risk to life as flooding from this mechanism would be gradual.

Kirkley Stream

Flooding in July 2015 demonstrated the high risk associated with Kirkley Stream, which flows north to join the Inner Harbour at Lowestoft. Subsequent hydraulic modelling has identified a number of locations along the watercourse as at risk of river and surface water flooding. The stream survey shows that there is very little fall along its length, only a 1.4 m drop in height over a distance of 1,500 m. This means that a restriction in flow anywhere along the stream will quickly lead to rising water as the channel is essentially flat.

Suffolk Coastal District

River Alde

The River Alde has an extensive estuary, fed by the Rivers Ore and Butley, which combine elements of the typical coastal plain estuary with that of a bar-built estuary. In the upper area of the estuary, the main channel meanders through a broad area of inter tidal mudflat and saltmarsh. At Orfordness there are flood defences that act to restrict the width and alignment of the main channel, until the confluence of the River Butley. The tidal limit of the Butley River is adjacent to Butley Mills. Further downstream, the channel is increasingly restricted by man-made embankments which impacts on the channel flow.

There is good hydrometric and rain gauge coverage within the Alde-Ore catchment. This showed that the catchment responded quickly to the heavy rainfall during October 1993; however, the three separate rivers receded at varying speeds due to their differing sizes and catchment characteristics[16].

[16] East Suffolk Catchment Flood Management Plan; Available: https://www.gov.uk/government/publications/east-suffolk-catchment-flood-management-plan

River Deben

The River Deben rises to the west of Debenham, with a second, higher source flowing from the south of Bedingfield. The river passes through Woodbridge turning into a tidal estuary before entering the North Sea at Felixstowe.

Embankments are located along the river on the eastern side of Woodbridge and in downstream locations. There are also a number of floodgates found in the Woodbridge area; these are generally located where access and infrastructure intersect the line of flood defence.

River Orwell

A number of marsh areas are found on the peripheries of the River Orwell, with two sluices discharging water from the marshes. Dams are strategically positioned to maintain water levels in dykes during dry weather.

There is a sparse coverage of rainfall gauging stations across the catchment; however those present indicated the river responded quickly to the October 1993 event, due to the large number of tributaries flowing into the main watercourse and the presence of large urban areas. High flows have been significantly affected by flood relief schemes since the late1980s[15].

Fluvial Flood Zones

The fluvial Flood Zones within East Suffolk have been combined with the tidal Flood Zones (as discussed above) and mapped in Figure 05 in Appendix A. This map delineates the probability of flooding into Zones of increasing flood risk, as defined by the EA, and presented in Table 2-1, Chapter 2.

Figure 05 illustrates that, typically, in the upper catchment of the watercourses the floodplain is confined to the river channel and there are only small areas of Flood Zone 2 and 3. Here, the land use is rural and there is limited flood defence. However, in downstream areas closer to the sea, the land flattens, giving rise to more extensive floodplains, with wide areas of Flood Zone. Many of the more urban areas are located here, particularly around river estuaries, resulting in the exposure of vulnerable land uses to flood risk. In response, there has been greater investment in flood defence and much of the coastline has some degree of existing protection.

Flood Zone 3b (the functional floodplain), has been defined for the majority of the Main Rivers across the study area, using hydraulic modelling for the 5% AEP or 1 in 20 year return period event (or the 1 in 25 year where this is not available). Extensive areas of functional floodplain are present in Lowestoft, Kessingland, Halesworth, Blythburgh, Dunwich, Middleton, Wickham Market, Snape, Aldeburgh, Woodbridge, Ordford and Felixstowe. However, some smaller watercourses within the ESC have not been hydraulically modelled and therefore their functional floodplain has not been defined[17]. Notably, this includes an area of the River Waveney, covered by the “Broads BESL model”, which is anticipated to be updated and available in 2019 and the Rivers Fynn and Lark (tributaries of River Deben) whose model is expected for completion in 2018. It is recommended that this information is requested from the Environment Agency by the applicant when complete[18] .

Other smaller Main Rivers which have not been hydraulically modelled include:

- Mill River (tributary of River Deben);
- An unnamed tributary of River Minnsmere;
- The River Blyth;
- An unnamed tributary of River Blyth (near Blackheath);
- River Wang (tributary of River Blyth);
- An unnamed tributary of Hundred River; and
- The Beck (tributary of River Waveney).

A summary of the existing, ongoing and upcoming hydraulic modelling for the study area is included in Appendix B. The coverage of this hydraulic modelling across the Main Rivers in the study area is further illustrated in Figure 13, contained in Appendix A.

[17] For further detail refer to: http://www.broads-authority.gov.uk/__data/assets/pdf_file/0011/958286/SFRA-Position-Statement-9-May-2017.pdf
[18] For contact details refer to https://www.gov.uk/government/organisations/environment-agency#org-contacts

It is recommended that in areas where the Functional Floodplain has not been defined, a conservative approach is adopted, whereby the area covered by Flood Zone 3 is assumed to act as the Functional Floodplain, unless demonstrated otherwise by site specific hydraulic modelling or other appropriate means of justification within the FRA. Any site within Flood Zone 2 and 3 will require a site-specific assessment of flood risk, in consultation with the EA and the ESC.

3.3.3 Flooding from Surface Water

Pluvial flooding occurs when high intensity rainfall generates runoff which flows over the surface of the ground and ponds in low lying areas, before the runoff enters any watercourse or sewer. It is usually associated with high intensity rainfall events and can be exacerbated when the soil is saturated and natural drainage channels or artificial drainage systems have insufficient capacity to cope with the flow. This can be aggravated by lack of maintenance of assets owned by Risk Management Authorities (RMAs) and/or riparian owners. Furthermore, this source of flooding can be compounded when combined with impermeable sub-soils or vast areas of open grassland, which are abundant in East Suffolk given its predominant rural nature.

East Suffolk is mainly underlain by the Lowestoft Formation, which is found in the majority of inland non riverine areas. The dominant form of the Formaton is mainly chalky, pebbly, sandy clay (till), with variable permeability. There are also significant reaches of the permeable Kesgrave formation found in the southern areas of Suffolk Coastal, between the River Deben and the River Ore-Alde and south of the River Deben. Impermeable areas will encourage surface water runoff, potentially exacerbating surface water flood risk, whilst areas which are permeable will reduce the risk of surface water flooding by facilitating faster drainage of rainfall. As such, new development, and associated hard standing areas, can increase volumes of runoff. Ultimately this may lead to exceedance of the available pipe network capacity, resulting in surface water flooding.

The surface water flood mapping provided by the EA is displayed in Figure 06, Appendix A. It can be seen that there are numerous localised areas across the region shown to be at surface water flood risk, notably associated with local watercourses.

Leiston Surface Water Management Plan

Driven by surface water flooding in 2012 and 2013, the Leiston SWMP was produced in 2016 and provides a more detailed understanding of surface water flood risk in this area. This included production of a hydraulic model which considered rainfall / surface water and the impacts of urbanisation, as the two primary surface water flood risk drivers in Leiston. A more detailed model was being developed at the time of publication, which will be catchment-based in order to better identify and understand areas of flood risk and potential solutions.

The hydraulic modelling identified that flooding within Leiston is heavily influenced by the local topography. The town is situated in a topographic hollow with Main Street (B1122), the primary road in Leiston, leading to Valley Road, sitting at the base of a “valley”. Surface water flowing down this natural flood path impacts a number of properties along the route before giving rise to flooding at the lower end of the valley. Six flood hotspot areas of flooding were identified:

- Main Street (B1122) and its junction with Park Hill (B1069) and Waterloo Avenue (B1119);
- Valley Road and Leiston Sewage Treatment Works;
- King George’s Avenue, Sizewell Road and Sylvester Road;
- Urban Road;
- Haylings Road (B1069), Central Road and the High Street (B1122); and
- Seaward Avenue.

The modelling outputs indicated that a preferred flood mitigation option for Leiston would be achieved through the establishment of designated pathways to take flood water around vulnerable properties. In locations where flood water cannot practically be kept away, Property Level Protection (PLP) measures are recommended. Another output from the modelling of flood mitigation measures suggested the establishment of a flow exceedance route around the Leiston Sewage Treatment Works in order to protect this critical infrastructure during a flood event.

The detailed modelling will seek to determine the number of properties at risk of flooding for a range of rainfall events. The subsequent work will seek to reduce this number of properties and the associated flood risks. It is expected that the detailed modelling will be completed in early 2018.

A SWMP is additionally being produced for the Lowestoft area; however, there are no other areas within East Suffolk covered by SWMPs.

3.3.4 Flooding from Groundwater

Groundwater flooding is most likely to occur in low-lying areas which are underlain by permeable rock (aquifers), particularly after periods of sustained rainfall. Groundwater flooding tends to occur sporadically in both location and time, and tends to last longer than fluvial, pluvial or sewer flooding. Groundwater flooding can also interact with other flood sources, exacerbating the risk of pluvial, fluvial or sewer flooding by reducing rainfall infiltration or discharge to sewers.

Within East Suffolk, the primary mechanisms for elevated groundwater are associated with:

- Short period of above average rainfall in permeable superficial deposits;
- Permeable superficial deposits in hydraulic continuity with high river water levels;
- Interruption of groundwater flow paths; and
- Cessation of groundwater abstraction causing groundwater rebound.

As per the BGS Susceptibility to Groundwater Flooding map (Figure 07, Appendix A) the vast majority of the study area has a designation of “Limited potential for groundwater flooding to occur”, except in some concentrated areas surrounding the watercourses where the designation given is “Potential for groundwater flooding to occur at surface”. This is due to the permeable superficial alluvium being in hydraulic continuity with high water levels (river or tidal).

The areas intercepting groundwater flood risk are illustrated in Figure 07, Appendix A which corresponds with the underlying geology displayed in Figure 03, Appendix A.

The future risk from this source is more uncertain than other sources as climate change predictions indicate that, although sea levels will rise (thus possibly raising groundwater levels), overall summer rainfall will decrease, with a long-term effect of lowering the groundwater levels. However, long periods of wet weather, such as those experienced in the autumn and winter of 2000/01 are predicted to increase. These are the type of weather patterns that can cause ground water flooding to occur.

3.3.5 Flooding from Artificial Sources

The EA ‘Risk of Flooding from Reservoirs’ dataset identifies areas that could be flooded if a large[19] reservoir were to fail and release the water it holds. This is mapped in Figure 08, Appendix A. A list of the main waterbodies that are shown to pose potential flood risk within this mapping has been produced and presented in Table 3-2.

[19] A larger reservoir is one that holds over 25,000 cubic metres of water, equivalent to approximately 10 Olympic sized swimming pools

Table 3-2 Waterbodies with Potential Reservoir Flood Risk (Source: EA Risk of Flooding from Reservoirs)

Waterbody	
Lake in Sotterley Park	Waterbody at Sudbourn Great Wood
Reservoir adjacent to Benacre Wood	Waterbody east of Captain's Wood
Waterbody south of Benacre Park	Reservoirs at Gedgrave Marshes
Reservoir north east of Rushmere	Reservoir off The Tang
Wader's Way Lake south west of Kessingland	Waterbody at Sudbourne Hall
Waterbody at Keens Farm	Waterbody south of Kirton Creek
Waterbody at Bulcamp Marshes	Reservoir at Lower Farm
Waterbody at Heveningham Park	Reservoir off Saxtead Bottom
Reservoir in Cow Wood	Reservoirs at Ferry Hill
Reservoir at The Walks	Waterbody off River Fynn
Reservoir south west of Great Wood	Reservoir north of Bucklesham Wood
Waterbody east of Langham Road	Lake Lothing in Lowestoft

Reservoirs in the UK have a good safety record. The EA is the enforcement authority for the Reservoir's Act 1975 in England and Wales. All large reservoirs must be inspected and supervised by reservoir panel engineers. It is assumed that these reservoirs are regularly inspected and essential safety work is carried out. These reservoirs therefore present a minimal risk.

The ESC is responsible for working with members of Suffolk Resilience to develop emergency plans for reservoir flooding and ensuring communities are well prepared.

Lowestoft Docks

Lowestoft has several docks and harbours artificially contained by piers, jetties and quays. The Inner Harbour is west of Station Road with the Outer Harbour to the east. The Outer Harbour contains the Hamilton Dock, Waveney Dock, Trawl Basin and South Basin.

Although artificially constrained, this area is influenced by pluvial, fluvial and tidal flood sources; therefore, making local flood risk management particularly complex. Over the years there have been several models created (see Appendix B) to assess the best flood defence option, which are summarised in the Lowestoft Flood Risk Management Strategy[20]. Recent correspondence with Waveney District Council has confirmed that, following consultation, Option 5 has been selected as the preferred option, involving:

- The construction of the barrier across the channel entrance to Lake Lothing on the seaward side of the Bascule Bridge; and
- The construction of 1.5 km of floodwall along the north and south of Lake Lothing, as well as in front of the Royal Norfolk & Suffolk Yacht Club and along the perimeter of the Outer Harbour eventually tying into the barrier structure. The height of the proposed flood walls would vary between 0.4 m and 1.7 m.

At present this project is at Outline Business Case stage with construction due to commence in autumn 2018[21].

3.3.6 Flooding from Sewers

Anglian Water is responsible for management of sewage infrastructure within the study area. This is a system containing public surface water, combined and foul water sewage networks.

[20] Lowestoft Flood Risk Management Strategy (2016); Available at: http://www.lowestoftfrmp.org.uk/media/1050/consultation_lowestoft.pdf
[21] Correspondence with Waveney District Council (August, 2017)

Where systems are combined, there is a risk that surface water entering the network during heavy rainfall events may result in surcharge of both foul and surface water. Additionally, sewer outfalls linked to the harbour may become tide-locked during high tide; this has previously resulted in flooding of low-lying areas within Lowestoft (notably Station Square, Beven Street, Tonning Street and Norwich Road) north of the harbour. South of the harbour also experiences similar levels of flood risk as the area is dependent on storm water overflows into the harbour and Anglian Water's harbour pumping station which discharges towards Ness point.

As illustrated in Figure 04, the surface water sewer system is prone to reaching capacity and surcharging in some areas. This may be exacerbated by poor maintenance, subsequently contributing to blockages in the system.

During heavy rainfall, flooding from the sewer system may occur if:

1) *The rainfall event exceeds the capacity of the sewer system/drainage system*

   Sewer systems are typically designed and constructed to accommodate rainfall events with an annual probability of 3.3% (1 in 30 chance each year) or greater. Therefore, rainfall events with an annual probability less than 3.3% would be expected to result in surcharging of some of the sewer system. While Anglian Water, as the sewerage undertaker, recognises the impact that more extreme rainfall events may have, it is not cost beneficial to construct sewers that could accommodate every extreme rainfall event.

   Furthermore, as urban areas expand to accommodate growth, the original sewer system is rarely upgraded proportionately and so may become overloaded. This problem is likely to be compounded by climate change which is forecast to result in milder, wetter winters and increased rainfall intensity in summer months.

2) *The system becomes blocked by debris or sediment*

   Over time, road gullies and drains can become blocked due to fallen leaves, build-up of sediment and debris (e.g. litter), requiring regular maintenance.

3) *The system surcharges due to high water levels in receiving watercourses or tidal outlets:*

   Within the study area there is potential for surface water outlets to become submerged due to high river levels or high tides. When this happens, water is unable to discharge. Once storage capacity within the sewer system itself is exceeded, the water may overflow into streets and potentially into houses. Where this occurs in areas served by 'combined' sewers (i.e. containing both foul and storm water), surcharging and surface flooding may again occur; however, floodwaters may additionally contain untreated sewage.

3.4 Flood Defences

This section describes some of the key types of flood defence present in the study area. Figure 05 in Appendix A shows the locations of different types of defences, as recorded within the EA Asset Information Management System (AIMS) for the study area.

There are extensive man-made coastal defences around downstream estuarine sections of Main Rivers, including the Orwell, Deben, Alde-Ore and Blyth Estuaries, which respectively protect areas of Ipswich, Woodbridge, and Aldeburgh. The defences are generally in a good condition; however, some are not to a high specification and therefore there is a risk they may not withstand increased water depths as a result of climate change.

Comparatively, the majority of inland river channels in the study area are undefended, to promote frequent flooding of marshland and floodplain areas. The AIMS datasets shows that the inland river reaches of the Deben, Alde-Ore and Blyth catchments have a defence Standard of Protection (SoP) of 1 in 5 years or less, so will not offer adequate protection to the surrounding area under higher events.

The type and location of flood defences found in the study area are outlined in Table 3-3.

Table 3-3 Flood Defence present within the study area (Source: AIMS)

Type	Description	Locations
Earth Bunds	Common defence structures along estuary boundaries, often incorporating extra toe protection from scour and erosion.	Earth bunds can be seen as protection features around the River Deben estuary, Butley River and the River Alde-Ore estuary. Earth bunds can also be found along the River Blyth in Southwold.
River Walls	River walls (also known as seawalls when used along open coastline) are protective walls built along the bank/shoreline	Found around Woodbridge as flood protection defences and along the frontage at Aldeburgh and Felixstowe as sea walls, providing protection from erosion as well as tidal inundation. Sea walls with concrete block toe protection are present at Corton and Ness Point in Lowestoft.
Flood Gates	Flood gates are found where access is required through the flood defences	Present in Felixstowe, Lowestoft, Southwold and Woodbridge, where there are about 17 floodgates along the length of the defence.
Lock Gates	Lock gates act as a flood defence by separating river and seawater and by helping to regulate flow.	Lock gates are found at the interface between Lake Lothing, which leads to the North Sea and Oulton Broad. The gates, consisting of 2 x 2 lock gates, a lifting road bridge (A1117) and a control room, provide a gateway between the River Waveney and the Broads system and Lake Lothing.
Sluice	Flood control mechanism that regulates flow, and if necessary separates channel water and seawater. Water behind the sluice is then released under controlled conditions, ensuring the river level will never rise to dangerous flooding levels.	Examples include: sluices situated at Thorpeness on the Hundred Riverand south of Ellingham on the River Waveney.
Groynes	Groynes are used to impede erosion and promote deposition. In this way they can decrease flooding by reducing wave impact and thus overtopping.	There is an extensive stretch of groynes situated along the sandy beach stretching from north to south Lowestoft.

3.4.1 Flood Alleviation Schemes

In addition to individual flood defences, there are also a number of flood alleviation schemes that have taken place or are under appraisal within the study area. Previous and ongoing flood alleviation schemes, and associated studies, are summarised in Table 3-5.

Table 3-4 List of Flood Alleviation Schemes (FAS) in the study area (Source: Suffolk Coastal Councils)

Name	Details	Status
Felixstowe South (2008)	Installation of groynes and beach management works.	Complete
Minsemere Coney Hill Cross Bank (2012)	Managed realignment of the front line defences on North Marsh.	Complete
Alde and Ore Options Appraisal (2015)	Modelling of flood relief options suggested that localised raising of existing Snape village defences would protect a significant number of properties, whilst also being economically viable.	Appraisal complete, no works implemented to date
East Lane Bawdsey (2010,2012 and 2015)	Reinstatement of standard defence.	Complete
Slaughden rock revetment (2015)	Works to sustain existing standard of defence.	Complete

Name	Details	Status
Lowestoft Flood Risk Management Strategy (LoFRMS) (2016)	Lowestoft has limited existing flood defences; without future investment instances of flooding will increase in line with climate change. The Strategy has been developed through engagement with key stakeholders to produce the Project Advisory Group. Much of the focus is on Kirkley Stream, including survey and modelling to test the effectiveness of proposed improvements.[22]	Appraisal complete, no works implemented to date
Gorleston to Lowestoft Coastal Strategy (2016)	The strategy spans the Norfolk and Suffolk boarder and covers 12.5 km of the coast from Gorleston South Pier in the north to Pakefield, Lowestoft in the south.	Ongoing
Benacre – Shoreline Risk (2017)	The Benacre Pumping Station project is being led by Waveney, Lower Yare and Lothingland local Internal Drainage Board and is looking to realign the existing pumping station to a location further upstream in the Lothingland river valley, with the aim to manage flood risk to Kessingland and the Levels.	Ongoing
Leiston Surface Water Management Plan (2018)	The study identified five Flooding Hotspot areas. A key issue highlighted in the initial stage of SWMP was gaps in the pipe network data having a significant influence on pluvial flood risk. Pipe surveys have been conducted and the project is now moving to re-running the pluvial modelling to included newly available information, including Anglian Water modelling data. The study will produce a more accurate representation of flood risk in the town and help strengthen justification for capital investment.	Ongoing
Felixstowe (Langer Road) (2018)	Properties on Langer Road have a history of internal flooding and in 2015 a Section 19 investigation was undertaken by SSC. The surrounding area also suffers from surface water flooding, which has previously resulted in 800 m of highway flooding. As a result of the investigation SCC Highways, Anglian Water and Suffolk Coastal District Council (SCDC) have undertaken survey work and identified issues in the surface water drainage system. Various works have been undertaken and/or are planned in response. Once complete, the highway system will be clear of blockages and Anglian Water will have installed a “high level outfall” to improve flow during storm events and SCDC will have an enhanced maintenance regime in place. Conditions will continue to be monitored and funding will be sought to investigate the feasibility for a longer term, larger scale solution that could significantly reduce the risk of internal flooding.	Ongoing
Broadland Flood Alleviation Project (2012)	This is a long-term project providing flood defence improvements, maintenance of flood defences and emergency response services to the tidal areas of the Rivers Yare, Bure and Waveney and associated tributaries. The area was previously protected by ~240 km of flood banks, which were deteriorating, due to erosion and climate change. The aim of the project is to gradually increase current defence standards to the 1995 height (defined by the EA) with additional allowances for sea level rise. The EA appointed Broadland Environmental Services Ltd in May 2001 to work with the EA to deliver these services over a 20 year programme of works.	Ongoing
Southwold and Easton Bavents	Proposed seawall repair and beach management, being undertaken as a joint scheme, led by Waveney DC.	Future

[22] Lowestoft Flood Risk Management Strategy

The EA also carries out maintenance works to assets and structures yearly, this work includes:

- Delivering routine works (grass cutting, channel clearance, weed cutting, de-silting);
- Delivering small projects like clay and concrete bank repair works; and
- Ensuring public safety around structures by installing new warning signage, steps, etc.

These works are mainly carried out on existing assets and are classed as maintenance works. As such, this is additional to the Flood Alleviation Schemes undertaken by the EA in installing new defences or raising the bank height to further reduce the risk of flooding to the community.

3.5 Climate Change

Climate change is anticipated to have a significant impact on temperature, rainfall and sea level along the Suffolk Coast. The latest predictions are for warmer and drier summers, and wetter winters, with appreciable changes anticipated by the 2020s. The EA have provided guidance on the application of climate change allowances to be used in FRA in this area[23], as further described in Section 3.5.1.

The expected impacts of climate change on various sources of flooding across the study area are broadly described in Table 3-5.

Table 3-5 Anticipated Impact of Climate Change on Flood Risk within the study area

Source	Anticipated Impact within the ESC
Groundwater Flooding	Increased frequency and intensity of rainfall events is anticipated, which could lead to further groundwater flooding in the study area due to raised groundwater levels and associated spring flows.
Surface Water and Sewer Flooding	Increased storm intensity, frequency and duration are anticipated to further exacerbate pressure on existing drainage and sewer systems, potentially leading to more frequent localised flooding incidents. It is now widely accepted that one of the main effects of climate change in the South East will be a higher intensity rainfall and winter storms, which will increase the risk of flooding from surface water.
Fluvial Flooding	Changing rainfall patterns are likely to increase peak river flows, thereby resulting in higher levels of fluvial flood risk from the Main Rivers across the study area.
Tidal Flooding	It is expected that sea level will rise which will increase the rate of coastal erosion.

3.5.1 Climate Change Allowances

In February 2016, the EA updated national climate change allowances to be used in the assessment of future flood risk and support the NPPF risk based approach. The updated allowances covered the following aspects:

- Peak river flow by River Basin District;
- Peak rainfall intensity;
- Sea level rise; and
- Offshore wind speed and extreme wave height.

The range of allowances provided for river flow, rainfall intensity and sea levels are based on statistical percentiles, representing the range of possible climate change scenarios, which give rise to the central (50th percentile), higher central (70th percentile) and upper end (90th percentile) estimates of impacts.

The allowances provided are additionally based on a range of time periods, representing the anticipated impact over the next 100 years. The percentile and time period to be used are dependent on the proposed development location, vulnerability and design life. The range of different climate change scenarios should be considered in site-specific analysis of flood risk.

[23] http://www.eastsuffolk.gov.uk/assets/Planning/Waveney-Local-Plan/First-Draft-Local-Plan/Flood-risk-assessments-Climate-change-allowances.pdf

The EA has provided detailed online guidance on the use of these allowances for site specific FRAs and reference should be made to this source for the most up to date guidance. Table 3-6 indicates the climate change allowances for peak river flow for the Anglian Basin.

Table 3-6 Peak River Flow Allowances (using 1961 to 1990 baseline)

River Basin District	Allowance Category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Anglian	Upper End	25%	35%	65%
	Higher Central	15%	20%	35%
	Central	10%	15%	25%

Table 3-7 demonstrates which climate change allowance should be applied in each Flood Zone for each type of development.

Table 3-7 Climate Change Allowance for Development Classifications in each Flood Zone

NPPF Vulnerability Classification	Flood Zone 2	Flood Zone 3a	Flood Zone 3b
Essential Infrastructure	Higher Central and Upper End Allowances	Upper End	Upper End
Highly Vulnerable	Higher Central and Upper End Allowances	Not Permitted	Not Permitted
More Vulnerable	Central and Higher Central	Higher Central and Upper End	Not Permitted
Less Vulnerable	Central	Central and Higher Central	Not Permitted
Water Compatible	None	Central	Central

3.5.2 Climate Change in East Suffolk

Fluvial

A range of hydraulic models for fluvial flood risk have been produced across the area. The most recent of these is the fluvial model for the River Deben, which has been modelled incorporating the latest recommended climate change allowances for peak river discharge, as summarised in Table 3-6 above. For mapping purposes, only the Upper End 65% estimate has been shown for this watercourse, in Figure 09, Appendix A. Modelled outputs for the 20%, 25% and 35% events are additionally available from the Environment Agency.

Aside from the River Deben, the remaining existing fluvial modelling received during this study, incorporates the previous outdated climate change allowances, which typically range between 15% and 20% (depending on the individual model).Therefore, the majority of currently modelled outputs for fluvial flood risk including climate change are outdated.

Given the substantial discrepancy between the previously modelled and recommended climate change allowances, the 1 in 1,000 year event has been mapped for these models (Figure 09, Appendix A), providing a closer indication of the anticipated extent of the 1 in 100 year plus climate change event. This is based on a high level assessment, using a stage discharge relationship, to determine the validity of using the 1 in 1,000 year as a proxy event. This assessment, undertaken for the River Fromus, Waveney and Minsmere, concluded that the 1 in 1,000 year event was likely to provide a closer indication of the anticipated impact of climate change than the currently modelled allowances. This approach has been reviewed and approved by the EA and the ESC.

It is important to highlight that not all stage discharge relationships assessed in this way show that the 1 in 1,000 year flood event is suitable as a proxy for the climate change event. Therefore, this should only be used as a guide. In reality the effect climate change has on fluvial flood risk could be far greater, or indeed smaller, than what is predicted for the 1 in 1,000 year event. Any site-specific FRA will need to undertake further investigation to understand the impact of climate change on fluvial flood risk to the site.

The EA has prepared a Climate Change Fact Sheet which details how to apply climate change allowances to local development with specific considerations for East Anglia. This document is regularly updated and can be found on the East Suffolk website.

Tidal

The East Suffolk Coastline is covered by the EA Essex, Suffolk and Norfolk Coastal Modelling study, for which the outputs at Lowestoft, the River Alde and Ore, Kessingland, Leiston and the River Deben were available to inform this SFRA. This study simulated tidal flood scenarios using the NPPF Practice Guide climate change allowances for the 0.5% and 0.1% tidal flood events. The risk of flooding from Rivers and Sea with an allowance for Climate Change mapping presented in Figure 09 shows the tidal flood outline with the NPPF climate change allowance applied for the 5% AEP flood event.

At the time of writing, the modelling for the Stour/Orwell and Blyth areas within the Essex, Suffolk and Norfolk Coastal Modelling Study were still being completed. In the absence of this updated modelling, the previous Stour and Orwell Estuary (2011) and the Suffolk Estuaries Blyth (2012) model outputs were used to map tidal flood risk, with an allowance for climate change. The climate change allowance applied for the 2110 epoch in the Stour/Orwell model and the Blyth Estuary model was 1.05 m and 1.06 m respectively, as per the previous guidance published by DEFRA (2006).

4 Managing Flood Risk

4.1 Risk Based Approach to Planning

The NPPF approach aims to ensure that flood risk is considered at all stages of the planning process, and to avoid inappropriate development in areas of greatest flood risk; steering development towards areas of lower risk.

Development is only permissible in areas at risk of flooding in exceptional circumstances where it can be demonstrated that there are no reasonably available sites in areas of lower risk, the sustainability benefits outweigh flood risks and, the development will be safe for its lifetime without increasing flood risk elsewhere. Such development is required to include mitigation/management measures to minimise risk to life and property should flooding occur.

Building on these principles, the NPPF and PPG have established a process for the assessment of flood risk, with each stage building upon the previous assessment with a refinement of the evidence base. Utilising a Source – Pathway – Receptor approach, the source of flooding, the spatial distribution of flood risk and the vulnerability of development types are assessed to inform decision making through each of the key stages of the Flood Risk Management Hierarchy, as shown in Table 4-1 below.

Table 4-1 Flood Risk Management Hierarchy and the SFRA Process

Stage	Approach
Level 1 SFRA	Assessment (broad scale and comprehensive)
Sequential Test Across Planning Area	Avoidance
Level 2 SFRA (if required)	Detailed Assessment (Growth Area or Site Specific)
Sequential Approach at Site	Avoidance
Control and Improvement	Through Design (e.g. SuDS)
Mitigate Remaining Risks	Flood Resilient Design and Construction

4.1.1 Applying the Sequential Test

As described in the NPPF, the aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. As such, development should not be permitted in areas of flood risk, where there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding. The Sequential Test should be carried out on all development sites and can be applied at all levels and scales of the planning process, both between and within Flood Zones.

The approach seeks to prevent the allocation of sites that are inappropriate on flood risk grounds by considering the vulnerability of the type of development proposed and how compatible the intended use is with the level of flood risk at the site. Five vulnerability classifications are defined; as further listed in Table 4-2.

Table 4-2 Flood Risk Vulnerability Classifications (Source: NPPF Planning Practice Guidance)

Appropriate Use Classification	Examples of Classification
Essential Infrastructure	• Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons need to remain operational in times of flood. • Wind turbines.
Highly Vulnerable	• Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent.
More Vulnerable	• Hospitals. • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	• Police, ambulance and fire stations which are not required to be operational during flooding. • Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non–residential institutions not included in "more vulnerable", and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during times of flood. • Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).
Water Compatible Development	• Flood control infrastructure. • Water and Sewage transmission infrastructure and pumping stations. • Sand and gravel working. • Docks, marinas and wharves. • Navigation facilities. • Ministry of Defence, defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Table 4-3 illustrates the types of development that are considered as suitable within areas of varying perceived flood risk.

Table 4-3 Flood Zones and Development Compatibility (Source: NPPF Planning Practice Guidance)

Flood Zone	Description	Annual probability of river or sea flooding	Appropriate uses
Zone 1	Low Probability	1 in 1,000 (<0.1% AEP)	• All uses
Zone 2	Medium Probability	1 in 100 – 1 in 1,000 (river) (1-0.1% AEP) 1 in 200 – 1 in 1,000 (sea) (0.5-0.1% AEP)	• Water Compatible • Less Vulnerable • More Vulnerable • Essential Infrastructure • Highly Vulnerable*
Zone 3a	High Probability	1 in 100 or greater (river) (>1% AEP) 1 in 200 or greater (sea) (>0.5% AEP)	• Water Compatible • Less Vulnerable • More Vulnerable* • Essential Infrastructure*
Zone 3b	The Functional Floodplain	1 in 20 or greater (5% AEP) or land which is designed to flood in an extreme (0.1% AEP) flood.	• Water Compatible • Essential Infrastructure*

Note: *only if Exception Test is passed

This SFRA provides the tools to undertake the Sequential Test by presenting information to identify the variation in flood risk across the study area, allowing an area-wide comparison of future development sites with respect to flood risk considerations. The flow diagram presented in Figure 4-1 illustrates how the Sequential Test process should be applied to identify the suitability of a site for allocation, in relation to the flood risk classification.

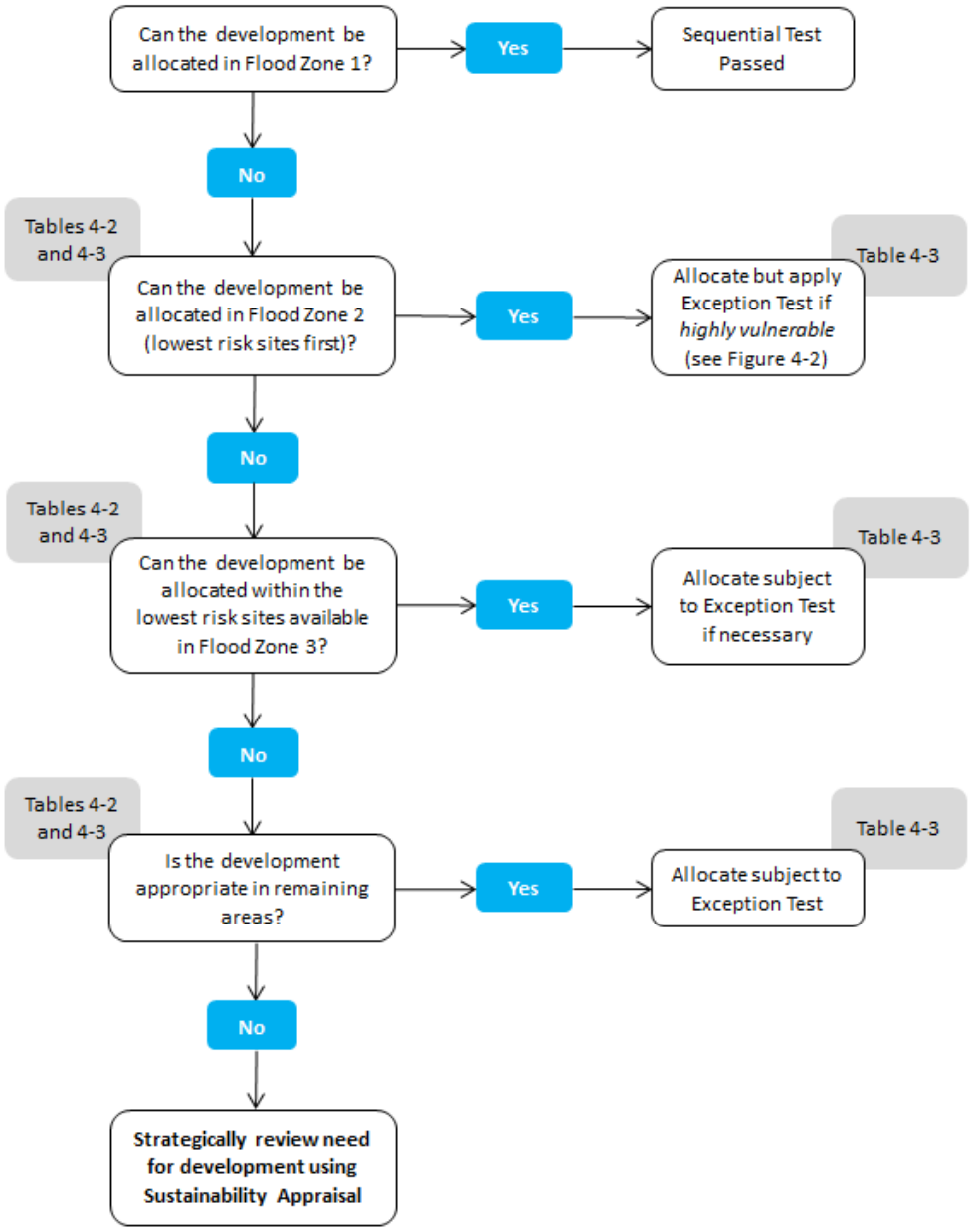


Figure 4-1 Sequential Test Process – Schematic (Adapted from PPG)

If, following the application of the Sequential Test, a proposed Site Allocation does not meet the criteria of acceptability, that site might qualify for the application of an Exception Test. This test considers both the development safety and the benefit of the site to the wider sustainability objectives of the study area in order to establish whether the development can be deemed acceptable. This test is further described below.

It should be noted that, while the focus of the Sequential Test is on tidal and fluvial flood risk (through use of the NPPF Flood Zones); some sections of the study area could be at risk of flooding from other sources. Consequently all sources of flooding must be considered in the location of new development. If the development is not deemed water compatible, and the site is found to be impacted by a recurrent flood source (other than fluvial or tidal), the site and flood sources should be investigated further irrespective of a requirement for the Exception Test.

4.1.2 Exception Test

The Exception Test is an additional test to be applied by decision-makers following application of the Sequential Test. The Exception Test has two elements as shown below, both of which must be satisfied for development in a flood risk area to be considered acceptable.

The Exception Test provides a method of managing flood risk while still allowing necessary sustainable development to occur. The test is only appropriate for use when there are large areas in Flood Zones 2, 3a and 3b, where the Sequential Test alone cannot deliver acceptable sites, but where some continuing development is necessary for wider sustainable development reasons. The flow chart presented in Figure 4-1 and Table 4-3 demonstrates the methodology to determine whether an Exception Test is required for proposed Site Allocations.

In order to pass the Exception Test, the NPPF and PPG identifies the following considerations that need to be demonstrated/fulfilled to the satisfaction of the LPA:

- The development must provide wider sustainability benefits to the community that outweigh flood risk, informed by a Sustainability Appraisal Report where one has been prepared; and
- A site-specific FRA must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, reducing flood risk overall.

Satisfying the Exception Test involves consideration of the reasons behind the selection of the site for development, from the sustainability appraisal, as well as consideration in planning and design, such that the site will remain safe and operational in the event of flooding. This may involve demonstrating:

- A sequential approach is taken to development site layout, such that within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
- Buildings are designed to be appropriately flood resilient and resistant, with essential services remaining functional in the event of flooding, and quick recovery following a flood;
- Provision of safe means of access and egress during a flood event; and
- Emergency evacuation procedures are developed, to be utilised following receipt of a flood warning.

Further detail on undertaking site specific FRAs, including measures to safely mitigate and manage flood risk, are provided in Chapter 5.1.

Both parts of the Exception Test must be satisfied in order for the development to be considered acceptable in terms of flood risk. There must be robust evidence in support of every part of the Test. The flow diagram presented in Figure 4-2 illustrates how the Exception Test process should be applied.

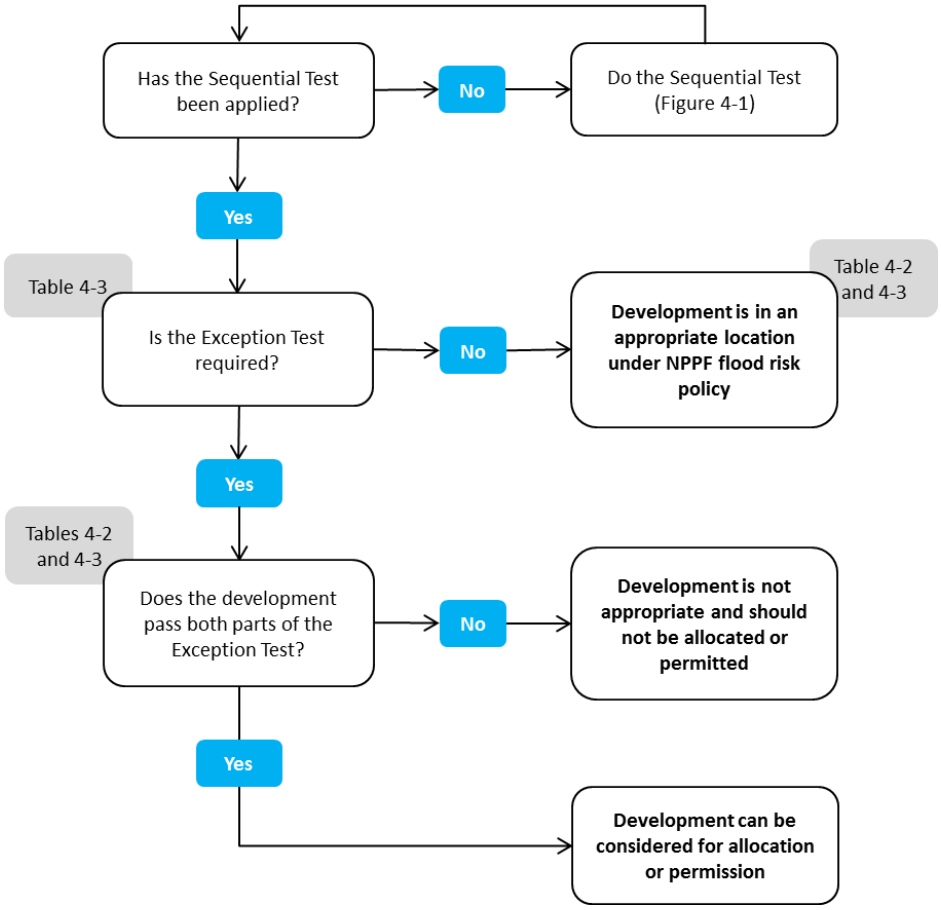


Figure 4-2 Exception Test Process – Schematic (Adapted from PPG)

4.2 Recommendations for Policy and Practice

Adopting a holistic approach to flood risk management should help ensure that flooding is taken into account at all stages of the planning process. To aid this holistic approach, it is recommended that all key recommendations set out in this report are considered and incorporated into the emerging East Suffolk Local Plan.

Future development and redevelopment, as set out in the Local Plan, offers the opportunity to reduce the current level of flood risk. This includes making the urban environment more resilient and with a layout that offers added options for managing future flood risk and the impacts of climate change. As such, it is recommended that policy options are expanded to include greater emphasis on active floodplain management. This may include promoting more appropriate use of floodplain areas (Flood Zone 3), making space for water, improved flood preparedness and enhanced emergency planning and response measures.

Specific recommendations for the ESC are detailed in the following sections.

4.2.1 Strategic Planning

When considering strategic spatial planning across the study area, flood risk should be an early and primary consideration. A sequential approach should be taken to allocating strategic development areas in regions of lowest flood risk, taking into account vulnerability of land use. Consideration should also be given to strategic allocation of open space and preserving and expanding river corridors to create space for flooding to be managed effectively.

In particular, the following specific recommendations are made:

- Ensure the Sequential Test is undertaken for all strategic land allocations and check that the vulnerability classification of the proposed land use is appropriate to the Flood Zone classification;

- Pursue potential opportunities to move existing development from within the floodplain to areas with a lower risk of flooding. This should include consideration of the vulnerability of existing developments and whether there is potential for land swap with lower vulnerability uses.
- Identify opportunities to create space for water through appropriate location, layout and design of development, in order to accommodate climate change and assist in managing future flood risk. This can be achieved by restoring floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for storage. Equally, existing flood storage areas should be identified, conserved and protected against loss through redevelopment.
- Safeguard existing corridors of land along the Main Rivers, their tributaries and the coastline and promote the setting back of development to enable sustainable and cost effective Flood Risk Management, including upgrading river walls and embankments. As a minimum, an 8 m buffer strip should be maintained along fluvial corridors and 16 m along coastlines.
- Consider opportunities to improve the riverside frontage and coastline to provide amenity space and environmental enhancement. Floodplain management could reduce the impact of flooding to existing properties and other assets located in the floodable areas on the river side.
- In some locations, reducing bank and channel maintenance will help naturalise rivers and improve the flow between the river and its floodplain.
- The consultation and initial investigation associated with detailed site specific FRAs should be undertaken at an early stage for major development locations to ensure opportunities to reduce flood risk are identified early and maximised wherever possible.
- Ensure that developments at risk of flooding are designed to be flood compatible and/or flood resilient and maximise the use of open spaces within these developments to make space for water during times of flooding. Opportunities should be sought to identify a safe route for any exceedance flow of floodwaters and a suitable storage or discharge location, to avoid any risk to people.
- Strategic development allocations should specifically consider the issues of water supply and drainage infrastructure to service development proposed, taking into account regional constraints. An early and integrated approach should be taken to holistically assessing and planning for flood risk, water supply and drainage requirements and constraints in these areas.

4.2.2 Development Control

In consulting on and determining development applications, the ESC must ensure that all new developments have considered flood risk management from the planning stage. In general, this means that:

- Development is located in the lowest possible risk area from a flood risk perspective;
- New development is flood-proofed to a satisfactory level/standard and does not increase flood risk elsewhere; and
- Surface water is managed effectively on site using the SuDS hierarchy and the latest guidance and best practice.

When a proposed development is located within an area perceived to be at risk of flooding, then a suitably detailed FRA should determine the level of risk to the development and identify options to mitigate the flood risk to the development, site users and surrounding area. In particular, development located adjacent to flood assets is required to demonstrate that these will be maintained over the lifetime of the development. The requirements for site specific FRAs and their contents are further detailed in Chapter 5. Planning applications should be considered and assessed in line with the sequential approach detailed in Section 4.1.1. Specific recommendations and considerations for development planning are provided below:

- If development is to be constructed with less vulnerable uses on the ground level, covenants need to be put in place to prevent future alteration of these areas to ‘more vulnerable’ uses without further consideration of the associated flood risk.
- Single storey residential development should not be considered in high flood risk areas as they offer no opportunity for safe refuge.

- NPPF does not permit basement dwellings to be located within Flood Zone 3a, and as such these should not be permitted in any areas at risk of flooding. This would include the excavation of basements under existing dwellings.
- Flood risk should be managed through emergency planning, site design and protection measures.
- Where development within flood risk areas is necessary due to wider sustainability or regeneration objectives, flood resistance and resilience practices should be followed in the construction and operation of the buildings to minimise the impact of flooding.
  In general, finished floor levels should be set to 300 mm above the design flood level with an appropriate allowance for climate change. Where applications do not have sufficient modelling or there is a lack of flood risk detail then a freeboard of 600 mm is generally required by the EA.
- Potential access and egress routes should also be considered and recommendations made for emergency response by occupants in the event of a breach occurring.
- Flood risk from all sources should be considered when identifying the perceived level of flood risk affecting a site. Robust consideration of surface water flood risk is particularly important in certain regions of the study area such as along the Kirkley Stream in Lowestoft, where recent flood events have highlighted high levels of risk.
- Opportunities should be taken to identify sites where developer contributions could be used to fund future flood risk management schemes, improvements to surface water drainage systems or flood assets in adjacent areas. However, it should be noted that developer installed defences should not wholly justify development in locations with inappropriate levels of flood risk.
- Existing flood storage areas within development areas should be identified, conserved and protected against loss through redevelopment.
- An 8 m buffer strip should be maintained along fluvial river corridors and 16 m along the coastal boundaries, to ensure maintenance of the channel/coastline defences can be undertaken. As such, any new development should be avoided in existing buffer areas. A pragmatic approach should be adopted for existing development in these areas. If development is adjacent to a Main River then an Environmental Permit for Flood Risk Activities[24] should be sought from the EA. If development affects an Ordinary Watercourse or culvert then the applicant will need to apply for a Land Drainage Consent. Further information can be found on the Suffolk County Council website[25].
- For developments adjacent to Main Rivers, particular consideration should be given to facilitating the recommendations of the East Suffolk CFMP in maintaining, enhancing and replacing flood assets, future flood risk management and safeguarding riverside land.

4.2.3 Flood Defence Policy

As discussed in Section 2.2, the study area is covered by both CFMPs and SMPs. The relevant policies that should be taken forward from these key documents are summarised in Table 4-4 below.

East Suffolk CFMP

Sub-area designations are shown in Map 3 of the East Suffolk CFMP[26].

[24] https://www.gov.uk/permission-work-on-river-flood-sea-defence
[25] https://www.suffolk.gov.uk/roads-and-transport/flooding-and-drainage/working-on-a-watercourse/apply-for-consent-for-works-affecting-ordinary-watercourses/
[26] East Suffolk Catchment Flood Management Plan (2009); Available at: http://www.eastsuffolk.gov.uk/assets/Planning/Suffolk-Coastal-Local-Plan/Document-Library/Environment/EastSuffolkCatchement.pdf

Table 4-4 Sub-areas and Flood Risk Management Policies

Sub-Area	Policy	Key Messages
East Anglian Plain	Areas of low to moderate flood risk where we can generally reduce existing flood risk management actions.	• Where feasible, flood risk management activities will be reduced as the current activity to manage flooding is out of proportion with the level of flood risk. • Reducing bank and channel maintenance will help naturalise rivers and improve the flow between the river and its floodplain. • Maintain flood warning infrastructure (such as river flow gauging stations) to ensure that an effective flood warning service can be provided throughout the catchment.
Framlingham	Areas of low to moderate flood risk where we are generally managing existing flood risk effectively.	• The current level of flood risk management should be continued. • Continue current flood risk management activities.
Halesworth	Areas of low to moderate flood risk where we are generally managing existing flood risk effectively.	• The current level of flood risk management should be continued. • Continue current flood risk management activities.
Suffolk Coast and Heaths	Areas of low to moderate flood risk where we can generally reduce existing flood risk management actions.	• Where feasible, flood risk management activities will be reduced as the current activity to manage flooding is out of proportion with the level of flood risk. • Reducing bank and channel maintenance will help naturalise rivers and improve the flow between the river and its floodplain. • Maintain flood warning infrastructure (such as river flow gauging stations) to ensure that an effective flood warning service can be provided throughout the catchment.

Shoreline Management Plans

The East Suffolk coastline is covered by two SMP: Kelling to Lowestoft SMP6[27] (subsequently updated by the Gorleston to Lowestoft Coastal Strategy) and Lowestoft to Landguard Point SMP7[28]. These subdivisions of coastline management are based on their unifying characteristics. Policies are allocated for each of three epochs: 2025, 2026 to 2055 and 2056 to 2105.

The SMPs are further broken down into areas of interest, each with their own action plan for the immediate, mid and long term timescales. In some cases the policy for a certain area may evolve over time to suit the long term economic and environmental needs of East Suffolk. The policy each location adopts will depend on the vulnerability and future needs of the surrounding area.

The description of each policy is given below:

- Areas covered by the **No Active Intervention** will have no investment in coastal defences or operations.
- Areas covered by **Advance the Line** require investment into new defences built further out in the sea in an attempt to reduce the stress on current defences with possible extension to the coastline.
- Areas covered by **Hold the Line** defences are maintained and upgraded or replaced in their current position where funding permits.
- Areas covered by **Managed Realignment** allow an area that was not previously exposed to flooding by the sea to become flooded by removing coastal protection.

[27] http://www.eacg.org.uk/docs/smp6/smp/kelling%20to%20lowestoft%20ness%20smp%20-%20final.pdf
[28] http://www.suffolksmp2.org.uk/actionplan/index.php

Gorleston to Lowestoft Coastal Strategy (2016)[29]

The SMPs provide the basis for the medium to long term framework; however, since the original development of these documents there have been changes in both the physical dynamics of the coast and potential funding streams. On this basis the SMP for the Gorleston to Lowestoft area was reassessed in the subsequently published Coastal Strategy, in order to maintain up to date policy.

The stretch of coastline between Corton and Pakefield in the study area is covered by this strategy. Table 4-5 below summarises the relevant original policies stated in the SMP along with the updated policy derived from the Gorleston to Lowestoft Coastal Strategy (GLCS).

Table 4-5 Updated Policy for the coastline between Corton to Lowestoft (Source: GLCS)

Location	SMP Policy	CLCS Updated Policy
Corton	**Short term:** hold the line **Medium-long term:** managed retreat	**Strategy policy:** hold the line
Gunton Warren	**Short term:** manage realignment **Medium-long term:** no active intervention	**Strategy policy:** no active intervention
Lowestoft North Denes	**Short term:** hold the line **Medium-long term:** hold the line	**Strategy policy:** hold the line
Lowestoft Ness	**Short term:** hold the line **Medium-long term:** hold the line	**Strategy policy:** hold the line
Lowestoft Harbour	**Short term:** hold the line **Medium-long term:** hold the line	**Strategy policy:** hold the line
Lowestoft South Beach (north)	**Short term:** hold the line **Medium term:** hold the line **Long term:** allow for some realignment	**Strategy policy:** hold the line but allow for some realignment
Lowestoft South Beach (south)	**Short term:** hold the line **Medium-long term:** hold the line	**Strategy policy:** hold the line
Pakefield North	**Short term:** hold the line **Medium-long term:** hold the line	**Strategy policy:** hold the line, although if necessary a beach structure is proposed which would help stabilise the beach
Pakefield South	**Short term:** hold the line **Medium term:** hold the line **Long term:** managed realignment	**Strategy policy:** hold the line with managed realignment in the long term. However, it is anticipated that natural growth of the beach will form defence in the long run.

Lowestoft to Landguard Point SMP7 (2015)

The action plans derived from the SMP7[30] for the 8 sub-divisions of this stretch of shoreline are detailed in Table 4-6 below.

[29] http://www.g2lcs.org/Docs/FinalStrategy/Gorleston%20to%20Lowestoft%20Main%20Strategy_StAR.pdf
[30] Shoreline Management Plan 7; Available at: http://www.suffolksmp2.org.uk/actionplan/index.php

Table 4-6 Action Plan Policies for SMP7

Location	SMP Action Description
Lowestoft to Pakefield	• Develop collaborative management strategy for defences with Associated British Ports to address risk of scour. • Scour protection to Hamilton seawall. • Management of Lowestoft South Beach.
Kessingland to Covehithe	• The flood defence line would be set back within Kessingland Levels. The south Kessingland Village defence line may need to be adjusted in the final epoch. • Beach control measures are envisaged to the south of the frontage. • Easton Broad Flood Management Project.
Southwold to Dunwich	• Southwold Town and Easton Marsh - works to improve groyne performance along Southwold frontage by creating a wider more stable beach. • Develop action and management plan for future sustainable use and regeneration of harbour entrance. • River bank renewal and maintenance at the estuary mouth and inner harbour. • Prepare response to threat of inundation of water abstraction points at the Blyth Inner Estuary. • Develop realignment plan for Easton Marsh, subject to long term defence and beach monitoring. • Southwold Frontage - Harbour North pier terminal groyne refurbishment. • Blyth Estuary Strategy Implementation.
Minsmere to Sizewell	• Improvements to defences in association with Sizewell.
Thorpeness to Ordford Ness	• Initiate discussion to develop sustainable management • Undertake Aldeburgh Town Frontage Project, which is a contingency against the future increase in erosion pressure at Fort Green shoreline.
Hollesley Bay	• Monitor revetment condition at East Lane. • Develop a local management plan for Shingle Street.
Bawdsey to Felixstowe North	• Manage the Lower Estuary as part of the Deben Estuary plan. • Monitoring of Sheet Piles and beach levels at Bawdsey Manor. • North Felixstowe Beach Management – phased improvements to groynes.
Felixstowe Central and South	• Review the need for beach recharge and flood wall improvements. • Implement Southern Felixstowe Beach Management Phase 1 and 2, which aims to maintain defences along this section of the shore, • To maintain defences along South Felixstowe the width needs to be maintained in the area of Mid terrace. • Implement Southern Felixstowe Wall Raising Project, which aims to maintain defences along this section of the shore.

Any development along the coastline will need to ensure that an appropriate approach to development is adopted in line with the stated preferred strategy policy.

4.2.4 Sustainable Drainage Systems

SuDS must be included in new developments as a way to manage surface water flood risk, improve water quality and increase amenity and biodiversity. This is relevant across the entire study area; however, particularly important where high levels of pluvial flood risk are anticipated to interact with more urbanised areas.

Runoff rates from new development must be restricted to greenfield runoff rates wherever possible. Where a site is previously developed, the proposed runoff rates should be restricted as close to the greenfield rates, or at the very minimum a betterment of at least 30% should be considered over the Brownfield runoff rates[31]. It should be noted that certain locations within the area may have more stringent requirements, including the Kirkley Stream catchment. It is recommended that the latest advice from the Lead Local Flood Authority at Suffolk County Council is sought when considering SuDS planning and design.

[31] Suffolk Surface Water Drainage (SuDS) Guidance, Standards and Information (2016); Available at: http://www.greensuffolk.org/assets/Greenest-County/Water--Coast/Suffolk-Flood-Partnership/19431E-FRM-SuDS-Guidance-Appendix-A-v12.pdf

Limiting the volume and rate of discharge for surface water entering the foul and combined surface water networks is of importance within the study area to help ensure the sewage network has the capacity to cater for population growth and the effects of climate change.

Presently, there is a tendency for required attenuation volumes to be accommodated below ground. However, preference should be given to the installation of blue-green surface infrastructure wherever possible, as opposed to hardscape or underground solutions, due to the wider benefits for biodiversity, amenity and microclimate.

The underlying geology within certain areas in East Suffolk is likely to impose constraints on the implementation of infiltration SuDS. This is likely to necessitate the installation of lined systems to provide attenuation and reduction of runoff rates, requiring reuse of runoff or discharge to local surface water bodies or drainage systems. Site specific assessment of geological conditions should be undertaken as a part of the drainage strategy for new developments. Figure 11 in Appendix A illustrates the likely infiltration conditions across the study area.

For further information see the CIRIA SuDS Manual C753[32].

Greater detail and recommendations for SuDS within the study area are contained in Section 5.3.

4.2.5 Emergency Planning

It is strongly recommended that emergency planning strategies are put in place in areas deemed at actual and/or residual risk of flooding to ensure adequate preparation and response during flood events. Where a new development or change of land use is proposed, flood response plans should be developed through liaison with emergency planners and the emergency services.

Additionally, following production of this SFRA, it is recommended that emergency planning strategies should be reviewed to determine the suitability of refuge centres and evacuation routes, based on the updated flood risk mapping produced.

Emergency planning can be broadly split into three phases, all of which should be considered in managing flood risk across East Suffolk:

- *Before a flood* – raising flood awareness, ensuring no inappropriate use of the floodplain/flow paths, preparing suitable flood emergency plans and communicating them to the wider community;
- *During a flood* – flood alerts and communication, rescuing occupants, providing safe refuge and alternative accommodation; and
- *After the flood* – providing support to help people recover and return to their homes and businesses.

Consideration of emergency planning is even more critical when it relates to vulnerable sites and essential infrastructure, as further described below.

Vulnerable Sites

Emergency service authorities responsible for hospitals, ambulance, fire and police stations as well as prisons should ensure that emergency plans, in particular for facilities in flood risk areas, are in place and regularly reviewed so that they can cope in the event of a major flood. These plans should put in place cover arrangements through other suitable facilities, if deemed needed.

The NPPF classifies police stations, ambulance stations, fire stations and command centres as Highly Vulnerable buildings. It is essential that all establishments related to these services are located in the lowest flood risk zones to ensure that in the event of an emergency those services vital to the rescue operation are not impacted by flood water. Furthermore, development control policies should seek to locate more vulnerable uses such as schools and care homes in areas at the lowest risk of flooding to minimise the impact of a flood on their vulnerable users.

[32] CIRIA SuDS Manual C753; Available at: https://www.ciria.org/Resources/Free_publications/SuDS_manual_C753.aspx

Allied to this, nominated rest and reception centres should also be identified within the study area and compared with the outputs of this SFRA to ensure that these centres are not at risk of flooding, so that evacuees will be safe during a flood event. Developments that would be suitable for such uses would include leisure centres, churches, schools and community centres.

On occasions where development of vulnerable sites within flood risk areas is unavoidable, necessary measures should be implemented to ensure the site is as safe as possible.

Critical Infrastructure

In the event of a flood incident, it is essential that the evacuation and rescue routes to and from any proposed development remain safe. Essential infrastructure located in Flood Zone 3a or 3b must be operational during a flood event to assist in the emergency evacuation process.

Relevant transport authorities and operators should examine and regularly review their infrastructure including their networks, stations, and depots, for potential flooding locations and to identify the need for flood risk reduction measures. For large stations and depots, solutions should be sought to store or disperse rainwater from heavy storms in a sustainable manner.

4.2.6 Water Environment

The Suffolk Coastal catchment is one of the driest parts of the country, with local rainfall typically only two-thirds of the national average. The importance of this coastal catchment for biodiversity is recognised by its many wildlife designations including Ramsar sites, Special Protection Areas, Special Areas of Conservation, National Nature Reserves in England and Special Sites of Scientific Interest. To maintain this diverse habitat and water quality it is recommended that a holistic approach to flood risk management is taken across the study area, within the wider context of the water cycle and local environment.

Additionally, it is anticipated that growing population numbers and changing climate patterns will place increased pressure on water resources across the UK. New development can assist in alleviating this by incorporating water efficiency measures such as grey water recycling, rainwater harvesting and water use minimisation technologies. This will also have a substantial benefit on the sewer system which will receive less wastewater from properties, potentially freeing up capacity during flood events.

Consideration should be given to maximising the benefits of surface water management infrastructure, enhance the urban environment for the benefit of communities and biodiversity. Through high quality design and installation, such infrastructure can contribute to multi-functional benefit in the following areas:

- *Provision of habitat and biodiversity* - when adequately planned, the delivery of diverse, high quality green spaces can provide valuable habitat to a range of flora and fauna.
- *Recreation and community* - provision of space for recreation and contribution to community health, wellbeing and social cohesion. Water features can create a sense of place.
- *Microclimate adaptation* - Reducing the impact of the urban heat island effect by providing shading to protect against radiations, reducing local temperatures through evapotranspiration and reducing heat absorbed and then released by surfaces.
- *Public realm* - street greening and the delivery of effectively landscaped open spaces can substantially improve the amenity value of neighbourhoods.

4.2.7 Consultation and Coordination

For future flood risk management within East Suffolk to be successful, it is essential that relevant partners and stakeholders, who have responsibility for flood risk management assets, work collaboratively to reduce flood risk.

The Suffolk Flood Risk Management Partnership was set up to take responsibility for co-ordinating the implementation of any actions required as a result of the FWMA 2010 and Flood Risk Regulations 2009. It includes associated Water utilities, Suffolk district and County Councils, the EA, the Broads Authority, Highways, Natural England, the National Farmers Union, Regional Flood and Coastal Committee and the Suffolk Resilience Forum. In 2016 the Suffolk Flood Risk Management Strategy

was produced as an important tool to help everyone understand flood risk within the county. This includes guidance on SuDS, consenting Policy, advice for LPAs and conducting Flood Investigation Reports.

This partnership is a good example of multi-stakeholder consultation to decrease flood risk across the county. This style of coordination should continue with the EA and others to ensure ongoing maintenance and improvement of watercourses. This will include ensuring that the recommendations of the relevant CFMPs and SMPs are implemented in all new and existing development, to keep communities safe from flooding in a changing climate, while improving the local environment.

It is further recommended that the ESC continue to collaborate with stakeholders to maintain and expand upon the existing understanding of flood risk across the study area and, in particular, confirm the impact of revised climate change allowances on understanding of fluvial flood risk.

5 Guidance for Developers

5.1 Site Specific Flood Risk Assessment

The aim of a site specific FRA is to assess the flood risk to and from a proposed development, and demonstrate that it will not be at risk of flooding during the design event during the lifetime of the development. This includes assessment of mitigation measures required to safely manage flood risk and demonstration that the proposed development will not increase flood risk elsewhere. All sources of flood risk will need to be considered.

This section presents the recommendations for site specific FRAs prepared for submission with planning applications to east Suffolk Councils, following the approach recommended by:

- The EA's Flood Zone 3 Factsheet which provides information to assist with the preparation of FRAs within the East Anglia Region. This document is regularly updated and can be found on the council's website;
- The EA's flood risk standing advice[33], which is relevant to development in Flood Zone 2 and minor extensions in Flood Zone 2 and 3;
- NPPF and Planning Practice Guidance[34];
- CIRIA C753 The SuDS Manual[35];
- CIRIA report 624[36], Development and Flood Risk: Guidance for the construction industry;
- Suffolk County Council Guidance on Development and Flood Risk[37]; and
- The Broads Authority has published a Flood Risk Supplementary Planning Document for application within the Broads area[38].

FRA reports are usually undertaken by the developer and submitted as part of the planning application process. However, there are instances where a LPA might wish to commission a detailed, site-specific FRA to further understand the level of risk associated with a strategic site, and to inform decision making. An example of this would be where new flood defences or improved SoP to existing assets is considered for a site, and the resultant flood reduction benefits, loss of floodplain storage and downstream implications need to be understood.

A site specific FRA is required in the following circumstances:

- Proposals of 1 hectare or greater in Flood Zone 1;
- Proposals for new development (including minor development and change of use) in Flood Zones 2 and 3;
- Proposals for new development (including minor development and change of use) in any critical drainage areas (as designated by the EA or the SCC); and
- Where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding.

A FRA should demonstrate that the proposed development is safe from flooding from all sources, including the provision of safe access and egress, and that the development does not increase flood risk elsewhere. The FRA should consider the latest climate change guidance and allowances.

Proposals for the sustainable management of surface water should also be presented through a suitable drainage strategy incorporating SuDS techniques and demonstrating betterment in terms of runoff rates, amenity and biodiversity, as further described in Section 5.3.

If a detailed FRA is required, it must be undertaken by a suitably qualified professional. Assessments should be on a site by site basis making use of local knowledge. However, an initial assessment of flood risk can be made by consulting the mapping section of this SFRA.

[33] Available at: https://www.gov.uk/guidance/flood-risk-assessment-standing-advice
[34] Available at: https://www.gov.uk/guidance/flood-risk-and-coastal-change
[35] Available at: http://www.ciria.org/Memberships/The_SuDs_Manual_C753_Chapters.aspx
[36] Available at: http://www.ciria.org/ProductExcerpts/C624.aspx
[37] Available at: https://www.suffolk.gov.uk/roads-and-transport/flooding-and-drainage/guidance-on-development-and-flood-risk/
[38] Available at: http://www.broads-authority.gov.uk/__data/assets/pdf_file/0008/823544/New-Broads-Flood-Risk-SPD-Draft-for-consultation.pdf

FRAs should also be appropriate to the scale, nature and location of the development. Table 5-1 presents the different levels of site-specific FRA (as defined in CIRIA publication C624) and identifies typical sources of information that can be used.

Table 5-1 Levels of Site Specific Flood Risk Assessment (CIRIA C624)

Level	Requirements	Typical Sources of Information
Level 1 Screening Study	The Level 1 FRA should identify whether there are any flooding or surface water management issues related to a development site that may warrant further consideration. This should be based on readily available existing information.	Typical sources of information include: • Suffolk Coastal and Waveney District Councils SFRA , SWMPs and the PFRA; • Flood Map for Planning (Rivers and Sea); • Local flood risk policy documentation (such as Suffolk Flood Risk Management Plan and the East Suffolk Catchment Flood Risk Management Plan); • EA Standing Advice; and • NPPF Tables 1, 2 and 3.
Level 2 Scoping study	The Level 2 FRA should be undertaken if the Level 1 FRA indicates that the site may lie within an area that is at risk of flooding, or the site may increase flood risk due to increased run-off. This study should confirm the sources of flooding which may affect the site. The study should include: • An appraisal of the availability and adequacy of existing information; • A qualitative appraisal of the flood risk posed to the site, and potential impact of the development on flood risk elsewhere; and • An appraisal of the scope of possible measures to reduce flood risk to acceptable levels. The scoping study may identify that sufficient quantitative information is already available to complete a FRA appropriate to the scale and nature of the development.	Typical sources of information include those listed above, plus: • Data request from the EA to obtain result of existing hydraulic modelling studies relevant to the site and outputs such as maximum flood level, depth and velocity; • Consultation with EA/ESC/sewerage undertakers and other flood risk consultees to gain information and to identify in broad terms, what issues related to flood risk need to be considered including other sources of flooding; • Historic maps; • Interviews with local people and community groups; • Walkover survey to assess potential sources of flooding, likely routes for floodwaters, the key features on the site including flood defences, their condition; and • Site survey to determine general ground levels across the site, levels of any formal or informal flood defences.
Level 3 Detailed study	To be undertaken if a Level 2 FRA concludes that further quantitative analysis is required to assess flood risk issues related to the development site. The study should include: • Quantitative appraisal of the potential flood risk to the development; • Quantitative appraisal of the potential impact of the development site on flood risk elsewhere; and • Quantitative demonstration of the effectiveness of any proposed mitigations measures.	Typical sources of information include those listed above, plus: • Detailed topographical survey; • Detailed hydrographic survey; • Site-specific hydrological and hydraulic modelling studies which should include the effects of the proposed development; • Monitoring to assist with model calibration/verification; and • Continued consultation with the ESC, EA and other flood risk consultees.

5.1.1 Flood Risk Assessments for Flood Zone 1

Site specific FRAs are required in Flood Zone 1, if a proposed development is:

- 1 hectare or greater in size;
- Within a Critical Drainage Area (CDA), as designated by the EA (East Suffolk currently has no defined CDAs); or
- Where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding.

The following recommendations are made for site specific FRAs in Flood Zone 1.

- The developer should check whether the site has been identified as at risk from other (non-river related) flood sources by referring to the relevant maps within this SFRA. If so, a more detailed assessment of this risk over the lifetime of the development must be made.
- Assess the flood risk from all sources, including an assessment of the effects of climate change over the lifetime of the development.
- A drainage impact assessment must be carried out by a suitable professional to identify the impact of the proposed development on surface water drainage and recommend the approach to controlling runoff to the required discharge rates, through the use of SuDS. Where possible, runoff should be reduced to Greenfield Rates, in accordance with the recommendations in the Suffolk SuDS guidance. If the development is adjacent to a river, it must be set back an appropriate distance from the watercourse and development must enhance the river form and habitat. If the development is adjacent to the sea, it must be set back an appropriate distance from any sea defences and development must enhance the area and habitat. If culverted, the development should not build over the culvert and the developer should seek opportunities to de-culvert the watercourse as part of the development.
- The FRA must show that flood risk will be reduced overall.

The NPPF and PPG confirm that all types of development are deemed suitable in Flood Zone 1.

If the site is on a 'dry island', surrounded by Flood Zone 2 or 3, the developer must also show that safe access and egress will be possible during a flood event.

5.1.2 Flood Risk Assessments for Flood Zones 2 and 3

A FRA must be undertaken for any proposed developments in Flood Zones 2 and 3. It is strongly recommended that the Sequential Test, and, depending on the vulnerability of the development (refer to Table 4-2), the first part of the Exception Test, be satisfied before the FRA is commenced.

If the development is within Flood Zone 2 or 3, the flood risk will be greater, and therefore the following recommendations and comments are made in addition to those that apply to sites in Flood Zone 1.

- Demonstrate, through the application of the Sequential Test, that there are no other suitable alternative sites in Flood Zone 1 for development.
- Show that flood risk will be reduced, and that suitable methods of mitigation will protect the development against the following (whichever are applicable):
    - 1% AEP fluvial event plus climate change over the lifetime of the development.
    - 0.5% AEP tidal event plus climate change over the lifetime of the development.
- Show that safe access can be provided to an appropriate level for the type of development.
- Show that flow routes are preserved and floodplain storage capacity is not reduced.
- The residents and occupiers of commercial buildings should be made aware their home / business is located in an area of flood risk. A Flood Response Plan should be created to mitigate this risk, incorporating residents signing up to EA Flood Warning System service (if available in this location).
- Any future development which includes or is immediately adjacent to a flood defence must additionally demonstrate that the flood defence will be fit for the lifetime of the development.

This may require a survey of defences, proposals for required remedial works and/or complete replacement of defences.

If in Flood Zone 3, the FRA must also confirm whether the development is located in Flood Zone 3a or 3b. It should be noted that only planning applications for essential infrastructure or water compatible development will be considered in Flood Zone 3b. Within Flood Zone 3b it must additionally be demonstrated that the development will:

- Remain operational and safe for users in times of flood;
- Result in no net loss of floodplain storage;
- Not impede water flows; and
- Not exacerbate flood risk elsewhere.

5.2 Reducing Residual Flood Risk

The minimum acceptable standard of flood risk mitigation for new property within flood risk areas is 1% AEP for fluvial flooding and 0.5% for tidal flooding, with allowance for climate change over the lifetime of the development. The measures chosen will depend on the nature of the flood risk. Some of the more common measures are broadly outlined in this section.

5.2.1 Reducing Flood Risk through Site Layout and Design

Flood risk should be considered at an early stage in determining the layout and design of a development, providing an opportunity to reduce flood risk within the site. The NPPF and PPG state that a sequential, risk-based approach should be applied in order to locate more vulnerable land uses (such as residential use) to higher ground, while more flood-compatible development (e.g. parking, recreational space) can be located in areas at the highest risk of flooding within the site.

Low-lying waterside areas, or areas along known surface water flow routes, can be used for recreation, amenity and environmental purposes, allowing the preservation of flow routes and flood storage, and at the same time providing valuable social and environmental benefits contributing to other sustainability objectives. Landscaping should ensure safe access to higher ground from these areas, while avoiding the creation of isolated islands as water levels rise.

5.2.2 Modification of Ground Levels

Modifying ground levels to raise land above the required flood levels may be a potential means of reducing flood risk at certain sites, particularly where the risk is entirely from tidal flooding and the land does not provide conveyance for flood waters. However, in most areas of fluvial flood risk, conveyance or flood storage would be reduced by raising land above the floodplain, thereby adversely impacting on flood risk downstream. As such, compensatory flood storage must be provided to account for any land raising in the floodplain. Where the site is entirely within the floodplain, it is not possible to provide compensatory storage at the maximum flood level so this will not be a viable mitigation option.

For proposed sites shown to be at risk of flooding from the 1 in 100 year plus climate change event, localised topography raising must be balanced with suitable floodplain compensation storage at another location (to be agreed with the EA). Such locations need to be sited in areas that currently do not flood (i.e. not part of the floodplain) and ideally within the red line application boundary.

Hydraulic modelling is likely to be required to demonstrate that the floodplain compensation design is technically robust, that there is no increase in flood risk off-site and that flood flow paths are not altered in such a way as to cause increase of flooding elsewhere. Consideration should also be given to surface water ponding, which may be increased due to changes in local topography.

5.2.3 Raised Defences

Construction of raised floodwalls or embankments can divert floodwaters away from new development or reduce the rate of flood inundation following a residual event. However, this should not be regarded as a preferred option for new development, as a residual risk of flooding will remain. Additionally, it is

essential to ensure that diversion of flood waters does not increase flood risk to people or properties in other areas. Compensatory storage must be provided where raised defences remove storage from the floodplain. Temporary or demountable defences are not acceptable flood protection for new development unless flood risk is residual only.

5.2.4 Upstream Storage

Flood storage areas can be an effective way of attenuating floodwater for management of flood risk in surrounding areas. The basic function of these techniques is increased flood storage, through installation of features including pools, ponds, ditches and river restoration schemes. These features can provide habitat for local wildlife, contributing to local ecology and biodiversity, while additionally providing open space for recreational and amenity benefit. It is important that ongoing maintenance of flood storage areas is considered at an early stage to avoid future exacerbation of flood risk to surrounding areas as a result of poor upkeep.

5.2.5 Developer Contributions to Flood Defence and Risk Management Infrastructure

Riparian developments are required to renew or otherwise adequately maintain flood defences to the required SoP, over the lifetime of the development, accounting for the effects of climate change. In some cases, it may be necessary for the developer to make a contribution to the improvement of flood defences, or flood alleviation schemes for the benefit of both the development and the local community. Developers should also assess other existing assets (e.g. bridges, culverts, embankments) and renew them to last (as a minimum) the lifetime of the development.

Proposed developments which are adjacent to Main Rivers must demonstrate that sufficient access is provided to existing river assets to enable ongoing maintenance and, where appropriate, improvement has been considered. Where possible, development should be set back from the edge of Main Rivers and watercourses to enable future sustainable and cost effective flood risk management, including upgrade of river walls and embankments.

5.2.6 Building Design and Finished Floor Levels

Where developing in flood risk areas is unavoidable, the most common method of mitigating flood risk to occupants is to ensure that habitable floor levels are raised above the estimated design flood level, with an allowance for freeboard. This significantly minimises the risk of damage to the building interior, furnishings and electrical installations during flood events.

Floor levels should ideally be raised by 300 mm above the known or modelled 1 in 100 annual probability (1% AEP) fluvial flood or 1 in 200 annual probability (0.5% AEP) tidal flood level, including an appropriate allowance for climate change. This additional height that the floor level is raised by is referred to as the ‘freeboard’. In areas where there is insufficient modelled flood risk data, this freeboard should be raised to 600 mm.

Making the ground floor use of a building water compatible (for example a garage), may also provide an effective means of raising living space above likely flood levels.

Constructing a building on stilts is not considered an acceptable means of flood mitigation for new development. However, this may be considered in special circumstances if replacing an existing solid building, as it can improve flow routes. In these cases, safe access and egress must be provided and covenants established to ensure the ground floor use is not changed at a later stage.

5.2.7 Flood Resistance and Resilience

There may be certain circumstances under which flood risk to a development is unavoidable, for example:

- Proposed water compatible uses;
- Alterations to existing buildings;

- Where building floor levels have been raised but there is still a remaining risk under the 0.1% AEP event.

In such cases (and for existing development in the floodplain), additional measures may be implemented to reduce damage during a flood and increase the speed of recovery. These measures should not be relied on as the only mitigation method.

Flood resistance measures aim to prevent floodwater from entering a property and causing damage. These measures may be temporary, such as demountable flood barriers and door flood guards for individual properties. If installed correctly and in advance of a flood event, these measures can provide effective protection. On a smaller scale, temporary snap-on covers for airbricks and vents can also be fitted to prevent entry of flood water. However complications can arise regarding the time for transportation and installation of defences and therefore a reasonable duration between flood warning and onset of flooding is generally required. This may be mitigated by the use of automatic barriers that do not require manual assembly.

The use of temporary resistance measures is considered appropriate for existing properties but is not recommended for new development. This is because most temporary measures require intervention to function effectively, along with continued maintenance, which cannot be guaranteed. Permanent flood resistance measures, such as the use of low permeability materials to prevent water ingress are therefore recommended for new development.

Flood resilience measures aim to reduce the consequences of flooding events and ensure that buildings can be swiftly returned to normal use. This means that design provision is made for conveyance of flood waters through the building, avoiding the risk of structural damage and allowing rapid re-occupancy.

This includes interior design to reduce damage caused by flooding and may include:

- Designing structural capability to handle levels of water pressure associated with anticipated depths of flooding.
- Use of appropriate construction materials for surfaces, walls and floors which retain structural integrity during flooding and have good drying and cleaning properties. This may include vinyl and ceramic tiles, pressure treated timber, glass block, or metal. Alternatively sacrificial materials can be used for internal and external finishes (such as gypsum plasterboard which may be removed and replaced following flooding).
- Consideration given for appropriate water entry points into properties including doors, windows and air bricks.
- Placement of electrical circuitry and appliances above predicted levels of flooding with power cables carried down from the ceiling (not up from the floor level).
- Appropriate design of plumbing fittings, including toilets, with non-return valves to minimise the risk of contamination of floodwaters.

Flood resilience measures are most appropriate for less vulnerable uses where temporary disruption is acceptable and suitable flood warning is received.

The measures implemented should be specific to the nature of flood risk and the type of development proposed and, as such, will be informed and determined by the FRA. Further detailed guidance on flood resilient construction techniques is provided within readily available publications from CIRIA (2010) and DCLG (2007)[39].

5.3 Sustainable Drainage Systems (SuDS)

Implementing SuDS aims to recreate more natural drainage systems within the urban environment. These features celebrate the presence of water, enriching the urban environment, while providing valuable function for flood alleviation and biodiversity enhancement. Within developments, SuDS

[39] Flood resilient construction of new buildings; Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7730/flood_performance.pdf

measures look to maximise permeable surfaces in an effort to increase the amount of water that is attenuated, treated and processed within the natural hydrological cycle.

Incorporating SuDS features will assist in absorbing runoff generated within development sites, reducing flooding, improving water quality, providing irrigation for vegetation and improve amenity. Such features can also contribute to a range of wider benefits, including provision of habitat for biodiversity, recreational opportunities, improved air quality and amelioration of the urban heat effect. All new developments within the study area must incorporate SuDS to provide attenuation and management of rainfall runoff unless there is a valid reason to justify that they are not suitable. SuDS features are also suitable for retrofit on many sites, with a number of well-regarded SuDS retrofit schemes installed across the study area. Sustainable drainage should be delivered in accordance with the SuDS Hierarchy, below:

- Store rainwater for later use;
- Use infiltration techniques, such as porous surfaces in non-clay areas;
- Attenuate rainwater in ponds or open water features for gradual release;
- Attenuate rainwater by storing in tanks or sealed water features for gradual release;
- Discharge rainwater direct to a watercourse;
- Discharge rainwater to a surface water sewer/drain;
- Discharge rainwater to the combined sewer.

Within ESC, sewer capacity is constrained in certain areas, and minimising the volume and rate of discharge entering the foul and combined surface water networks is of critical importance to help ensure ongoing capacity to cater for population growth and the effects of climate change. Where infiltration is not achievable, managed discharge of surface water to adjacent surface water bodies should also be considered. However, controls would need to be implemented to avoid any adverse harm to biodiversity and ecological habitat within receiving waters.

Runoff rates from new development should be restricted to greenfield runoff rates wherever possible. Where this is not achievable, robust justification will be required, and an alternative reduction in runoff agreed through consultation with ESC.

Appendix C provides a brief summary of the main SuDS techniques that could be suitable for implementation within East Suffolk. Detailed guidance on the selection, design, construction and maintenance of SuDS is provided in the Suffolk SuDS Guidance and the CIRIA SuDS Manual. However, it should additionally be noted that the field of sustainable drainage is rapidly developing; therefore reference should be made to the latest guidance and best practice in developing site drainage strategies.

The selected SuDS scheme will be dependent on various factors including (but not limited to) topography, geology (soil permeability), and available area. This should be based on a comprehensive understanding of the catchment hydrological processes (i.e. nature and capacity of the existing drainage system). The design, construction and maintenance regime of such a scheme must be carefully defined, including the need and responsibility for ongoing inspection and maintenance to avoid future exacerbation of flood risk as a result of poor upkeep.

Many SuDS measures are designed to promote infiltration of runoff into the ground beneath, promoting recharge of the water table and reducing runoff. However, implementation of infiltration SuDS within East Suffolk may be constrained by geological conditions. Site specific assessment of geological conditions should be undertaken to confirm that infiltration SuDS are suitable. Where sites lie within or close to Source Protection Zones further restrictions may apply, and guidance should be sought from the EA.

Figure 11, Appendix A contains information on the likely suitability of infiltration SuDS across the study area. This map delineates four subsurface categories across the study area, in which infiltration is likely to be of varying suitability, based upon a range of hydrogeological indicators. Further detail on the four categories is included in Table 5-2 below.

Table 5-2 SuDS Infiltration Suitability category descriptors

Category	Description
Highly suitable	The subsurface is likely to be suitable for free-draining infiltration SuDS.
Probably suitable	The subsurface is probably suitable for infiltration SuDS although the design may be influenced by the ground conditions.
Potentially suitable for bespoke designs	The subsurface is potentially suitable for infiltration SuDS although the design will be influenced by the ground conditions.
Unlikely to be suitable	There is a very significant potential for one or more geo-hazards associated with infiltration.

If subsurface conditions are not suitable to facilitate infiltration in a certain area, selected SuDS features will need to be focused on surface water storage and attenuation, and appropriately lined so as to transport water to an area where it can be safely disposed.

5.4 Managing Flood Risk from Other Sources

5.4.1 Surface Water and Sewer Flooding

New development should seek to improve on-site drainage infrastructure to reduce flood risk. The site FRA and drainage strategy should demonstrate that the development will not increase flood risk elsewhere, and that Suffolk County Council's drainage requirements regarding runoff rates and SuDS are met. SuDS are a highly effective way of managing surface water flood risk, as described in Section 3.3 and Appendix C, and should be incorporated on all development sites.

When redeveloping existing buildings, the installation of some flood-proofing and resilience measures can be used to protect against both surface water and sewer flooding. Non-return valves prevent water entering the property from drains and sewers. These valves can be installed within gravity sewers or drains, within the property's private sewer, upstream of the public sewer system. These need to be carefully installed and must be regularly maintained.

5.4.2 Groundwater

Groundwater flooding has a unique flooding mechanism, as it may emerge from below ground level and for this reason many conventional flood defence and mitigation methods are not suitable. Flood risk may be reduced through building design, by ensuring that floor levels are raised sufficiently above the water table. Site design would also need to preserve any flow routes followed by the groundwater overland and make sure flood risk is not increased downstream. Proposed basement areas are likely to be particularly susceptible to groundwater flooding in certain areas. This may be mitigated through waterproof construction; however, consideration should be given to the potential impact on subterranean flow or water tables. When redeveloping existing buildings, it may be acceptable to install pumps in basements as a resilience measure. However, for new development this is unlikely to be considered an acceptable solution.

Site specific ground investigation is also likely to be required in locations where below ground development is proposed or there is known groundwater flood risk.

5.4.3 Artificial Sources

The flooding mechanism associated with flood risk from artificial sources is primarily related to breach or failure of structures (reservoir, lake, canal, flood storage areas, etc.). Due to the nature of this mechanism, it is difficult to foresee the location or extent of these problems and therefore it is important that the site specific FRA takes into consideration the integrity and history any relevant artificial structures and makes recommendations/provisions aimed at reducing the level of risk from these sources where applicable.

5.5 Making Development Safe

5.5.1 Safe Access and Egress

Emergency access and egress is required for developments during times of flooding to enable the evacuation of occupants and facilitate the emergency response. An emergency access and egress route is a path that is 'safe' for use by occupiers without the intervention of emergency services or others. A route can only be completely 'safe' in flood risk terms if it is dry at all times.

The Defra/EA Flood Risks to People Report[40] provides requirements for maximum flood depth and velocity to quantify whether an evacuation route should be deemed safe, where the requirements for safe access and egress from new developments are as follows in order of preference:

- Safe, dry route for people and vehicles;
- Safe, dry route for people;
- If a dry route for people is not possible, a route for people where the flood hazard (in terms of depth and velocity) is low and should not cause risk to people; and
- If a dry route for vehicles is not possible, a route for vehicles where the flood hazard (in terms of depth and velocity) is low to permit access for emergency vehicles.

Provision of safe access and egress may involve raising access routes to a suitable level above flood levels. As with land raising, it is imperative that any assessment takes into consideration the volume of floodwater potentially displaced.

5.5.2 Flood Warning and Evacuation

Emergency and evacuation plans should be in place for all development at residual risk of flooding. Those developments which house vulnerable people (i.e. care homes and schools) will require more detailed plans.

Advice should be sought from the Suffolk Resilience Plan[41] and from the Emergency Planning Team when producing an emergency evacuation plan for developments as part of an FRA. Those preparing detailed emergency evacuation plans for vulnerable developments should undertake consultation not only with Suffolk's Flood Resilience Team but also the emergency services, so they know what is expected of them in the event of an emergency.

The EA operates a flood warning service in certain areas at risk of both fluvial and tidal flooding. The Flood warning system helps residents in these areas to prepare for flooding to minimise its potential consequences.

All homes and businesses within Flood Zone 2 and 3 are eligible for the EA's Flood Warning System service, and should be encouraged to sign up to it. It is recommended that the developers make new owners of the property aware of this service.

The areas of East Suffolk which are subject to flood warnings and alerts are illustrated in Figure 10 Appendix A.

5.6 Making Space for Water

5.6.1 Opportunities for River Restoration and Enhancement

All new development close to watercourses should consider the opportunity to improve and enhance the water environment. Developments should look at particular opportunities for river restoration and enhancement. Restoration can take place on various scales, from small enhancement measures to full river restoration. Options include backwater creation, de-silting, in-channel habitat enhancement, removal of in-stream structures (e.g. weirs), and restoration of banks among others.

[40] Flood Risks to People; Available at: http://randd.defra.gov.uk/Default.aspx?Module=More&Location=None&ProjectID=12016
[41] Suffolk Flood Plan; Available at: http://www.suffolkresilience.com/assets/PDF-plans/Flooding/20150703-SRF-Flood-Plan-Issue-6.pdf

These measures have the potential of reducing the costs of any hard engineering structures, reducing flood risk, improving water quality and increasing biodiversity. Social benefits are also gained by increasing green space and access to the river and coastline.

In particular, there should be a presumption against further culverting of watercourses and constructing over culverts. All new developments with culverts running through their site should seek opportunities to de-culvert rivers, for flood risk management and conservation benefit.

These measures are supported by the European Water Framework Directive (WFD) a comprehensive river basin management planning system which aims to protect and improve the ecological health of waterbodies across Europe. In the UK, the EA is the authority charged with implementation of the Directive, and must meet certain targets aimed at restoring water bodies towards good condition. In line with the objectives of the directive, opportunities for waterbody improvement must be considered across all development proposals incorporating watercourses.

5.6.2 Buffer Strips

Developers must aim to set back development from the edge of adjacent waterways and waterbodies, in order to provide a buffer strip to 'make space for water' and allowing additional capacity to accommodate the effects of climate change. This is also necessary in areas where flood defences or other engineered structures are present in order to provide a corridor for maintenance and improvement works. As a minimum, development should be set back:

- 5 metres from Ordinary Watercourses;
- 8 metres from fluvial Main Rivers; and
- 16 metres from the sea and tidal defences.

Under the Environmental Permitting Regulations[42], an Environmental Permit[43] may be required for any work in, under, over or within 8 metres of any fluvial main river, flood defence structure or culvert and within 16 metres of any tidal main river, flood defence structure or culvert. A permit may also be required for works on the floodplain beyond the 8/16 m distance if such work is likely to divert or obstruct floodwaters, damage any river control works or affect drainage. Works on an Ordinary Watercourses or culvert will require Land Drainage Consent and therefore it is essential that any developer contacts the LLFA (SSC) to obtain the necessary constant before works commence[44].

5.6.3 Designing for Exceedance

The capacity of existing drainage can be overwhelmed by rainfall events of intensity above the design capacity, possibly leading to surcharge and flooding. In order to manage and minimise the impacts of such events, developers should seek opportunities to identify a safe route for any exceedance flow and suitable storage or discharge location, so that this does not put people or property at risk.

As exceedance is expected to occur infrequently, such measures should ideally provide other benefits. An example of this is blue-green urban corridors, which provide ecological, recreational and functional benefits under the small rainfall events, whilst offering an effective and safe means of managing extreme events when these do occur.

[42] Environmental Permitting Regulations (England and Wales) 2016
[43] Flood risk activities: environmental permits; Available at: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits
[44] Working on a watercourse; Available at: https://www.suffolk.gov.uk/roads-and-transport/flooding-and-drainage/working-on-a-watercourse/

6 Summary

6.1 Overview

The NPPF and accompanying Guidance emphasise the responsibility of LPAs to ensure that flood risk is understood and managed effectively and sustainably throughout all stages of the planning process. This SFRA aims to facilitate this process by identifying the spatial variation in flood risk across the study area, allowing an area-wide comparison of future development sites with respect to flood risk considerations.

The eastern boundary of East Suffolk is entirely coastline, with several Main Rivers linking to the sea from the west, often with large coastal estuaries. Typically it is development at these locations which are at greatest flood risk. Previous flooding in these areas has been particularly devastating when pluvial, fluvial and tidal flood risk sources have combined. Additionally there are also elements of groundwater, sewer and artificial flood risk sources within the study area.

There are numerous proposed, ongoing and completed flood alleviation schemes across ESC, mainly associated with the Main River estuaries. Previous studies have explored future options for flood management in the area, which has become increasingly pressing in light of climate change predictions.

This SFRA identifies the floodplain areas associated with the Main Rivers and the Sea and presents Flood Zone Maps that delineate the Flood Zones outlined in the NPPF. These maps provide the necessary information to facilitate the NPPF risk-based approach to planning. This process determines the compatibility of various types of development within each Flood Zone, subject to the application of the Sequential Test and the Exception Test when required.

6.2 Key Recommendations and Next Steps

Adopting a holistic approach to flood risk management should help ensure that flooding is taken into account at all stages of the planning process. To aid this holistic approach, it is recommended that all key recommendations set out in this report are considered and incorporated into the emerging Local Plans for Suffolk Coastal and Waveney Districts.

Given the extent of the coastline and Main Rivers across the East Suffolk, future development must be considerate of flood risk and incorporate measures to ensure this is not increased. It is recommended that policy options are expanded to include greater emphasis on floodplain management to promote appropriate use of the floodplain and making space for water. Existing corridors of land along the river and tidal frontage should be safeguarded and opportunities taken to set back development to enable sustainable and cost effective flood risk management, including upgrading of existing flood defence structures as well as investment into future flood alleviation. Flood awareness and robust emergency planning and response will additionally be critical to sustainable ongoing flood risk management.

In the future, climate change is anticipated to have an impact on all sources of flood risk within the study area. It is important that planning decisions recognise the potential risk that increased runoff poses to property and plan development accordingly so that future sustainability can be assured.

6.3 Maintenance of this SFRA

In order for this SFRA to serve as a practical planning tool now and in the future, it is imperative that the SFRA is adopted as a ‘living document’ and is reviewed periodically in light of emerging policy directives and an improving understanding of flood risk within the study area, particularly as the remaining hydraulic models are completed producing updated flood outlines with an updated allowance for climate change.

Appendix E lists a series of recommendations ensuring that the SFRA is kept up-to-date and maintained. This will allow the SFRA to follow emerging best practice and developments in policy and climate change predictions.

Appendix A Flood Risk Mapping

List of Maps

Map Number	Map Title
Figure 01	River Network
Figure 02	Topography
Figure 03	Geology
Figure 04	Historic Fluvial Flood Map
Figure 05	Risk of Flooding from Rivers and Sea
Figure 06	Risk of Flooding from Surface Water
Figure 07	Susceptibility to Groundwater Flooding
Figure 08	Risk of Flooding from Reservoirs
Figure 09	Risk of Flooding from Rivers and Sea with an allowance for Climate Change
Figure 10	Infiltration SuDS Suitability
Figure 11	Flood Warning and Alert Areas
Figure 12	Proposed Development Site Locations
Figure 13	Main Rivers Covered by Detailed Hydraulic Modelling

Appendix B Existing and Ongoing Hydraulic Modelling Studies in Waveney and East Suffolk

Model	Flood Source	Aim	Climate Change	Scope	Outcome	Forecast Update	Mapped Status
East Suffolk Minor Watercourse Flood Risk Study (2006) JBA	Fluvial	Initial Model Build	20% and 30%	Produce floodplain mapping for the Minsmere River, Peasenhall Gull Cove Run, River Yox, and the Thorpeness Hundred watercourse.	Numerous properties at risk within Wrentham on Cover Run or Peasenhall on the River Yox. Several Flood Warning Flood Risk Areas and two Flood Warning Areas proposed.	Yox/Minsmere and Thorpeness model update due 2019/2020	Yes
Walpole Modelling (2011) JBA	Fluvial	Impact assessment and options testing	15%	Assesses the impact that sedimentation and vegetation growth occurring on the River Blyth at Walpole has on local flood risk in order update the river maintenance regime in the village.	There is sufficient capacity within the existing system to accommodate a reduction in channel capacity (resulting from vegetation growth or sedimentation) without causing flood risk to residential properties during a 1 in 100 year event.	Fluvial River Blyth model update due 2019	Yes
Stour & Orwell Estuary Model (2011)	Tidal	Model update	1.05 m sea level rise in 2110	The model upgrade was part of the SFRM2 framework to provide greater detail and accurate topographic data with revised extreme tidal levels which have been updated since the original model was constructed. A set of breach models were also constructed from the with-defence model and used to carry out hazard mapping for 10 breach locations.	The flood extents generated from the with-defences model show that in present day scenarios the current defences provide a good protection in urban areas, most of which are protected up until the 200 year event (0.5% AEP). However, once tide levels are raised to account for climate change, the defences are ineffective even during a 5 year event (20% AEP).	This model will be superseded by the new Essex Norfolk and Suffolk Coastal Modelling Study	Yes
Fluvial Alde, Ore and Fromus ISIS-TUFLOW Model (2012) JBA	Fluvial	Model update	15%	Hydraulic model improvements to update current flood maps and assess the maintenance options for various sluices at around the Alde and Fromus confluence.	Larger flood extents found at: Framlingham during the 1 in 1,000 year (River Ore), Great Glemham and Stratford St Andrew (River Alde) Smaller flood extents found at: Framlingham during the 1 in 100 year (River Ore), Badingham (River Alde) and Saxmundham (Fromus).	Alde, Ore and Fromus model update due 2018	Yes
Halesworth Modelling (2011) JBA	Fluvial	Initial Model Build		Hydraulic modelling of the Chediston Watercourse, Wisset Watercourse and River Blyth.		Fulvial Byth model update due 2019	Yes
Suffolk Estuaries Blyth (2012)	Tidal	Initial Model Build	1.06m sea level rise in 2110	To produce flood data and model outputs to revise tidal Flood Zones 2 and 3 for the Blyth estuary.	Revised tidal Flood Zones were marginally less extensive in the upper tidal catchment; however, flood affects more rural areas in the lower catchment. Generally, the results of this study have indicated that, with respect to still water levels, the SoP afforded by the coastal/tidal flood defences in the study area is high.	Essex, Norfolk & Suffolk Coastal Modelling – Blyth due 2017	Yes
Flood Risk Study of River Minsmere and Leiston Drain (Sizewell) (2013) JBA	Fluvial	Initial model build, including impact assessment and options testing	15%	Modelling of the complex drainage pathways of the River Minsmere and investigating their response to potential environmental change.	In order to minimise the flood risk in Middleton village and in the vicinity of the Sizewell Nuclear Power Stations, channel maintenance and the introduction of a third outfall structure are proposed.	Yox/Minsmere model update due 2019/2020	This area is now covered by the Essex, Norfolk and Suffolk Open Coast Modelling (2017)
Waveney Model (2013) JBA	Fluvial	Model update	15%	Updates made to the original 2005 hydraulic model.	Updated model shows that flood risk to Bungay is not as extensive as previously expected. Flood risk at Diss is greater than previously expected.	Waveney model update due 2019/2020	Yes
Debenham Village, Flood Mapping Extension Project (2014) JBA	Fluvial & Pluvial	Model update and options testing	15%	Hydraulic modelling of the Debenham area, including: the River Deben, The Gulls and Cherry Tree Brook and pluvial modelling of the village, with associated map outputs. Followed by exploration of flood alleviation options.	Increased flood outlines due to improved representation of structures. Options modelling demonstrated that construction of an impounding Reservoir on The Gulls watercourse near Aspall provides the greatest benefit in terms of properties protected.		No, outside of districts area.
Kirkley Stream (2014) CH2MHILL	Fluvial	Initial model build		Fluvial modelling of the Kirkely Stream		Now superseded by the new integrated surface water and fluvial model released in 2017.	No
Lowestoft Tidal Defences (2014) CH2MHILL	Tidal	Options testing	Climate change peak level water level of 4.35 mAOD	Flood defence options in Lowestoft were evaluated, to carry forward the most beneficial option for further more detailed analysis.	The greatest flood alleviation was provided by both the proposed tidal barrier and Mutford Lock remaining closed throughout the duration of an extreme surge event.		No
Broads Flood Risk Study (2014) CH2MHILL	Fluvial & Tidal	Model update	20%	Improvements to the original Broadlands Hydraulic Model in the Beccles area. This modelling study is ongoing; therefore, at the time of writing only outputs for the Beccles area were supplied by the EA for the SFRA.	Updated data, modelling, flood mapping in line with the EA's SFRM2 Framework.	New Broads Model Update to update this section in 2019/ 2020.	In part

Model	Flood Source	Aim	Climate Change	Scope	Outcome	Forecast Update	Mapped Status
Alde and Ore Model Update and Options Appraisal (2015) JBA	Tidal & Fluvial	Model update and options testing	Extreme Water Level for 2111	Update existing 2011 model to simulate tidal events, fluvial events, joint tidal/fluvial combination events and potential flood defence options.	Tidal flood risk is greater than fluvial; however, a joint tidal/fluvial event presents a significant danger to property and life. Localised raising of existing Snape village defences protects a significant number of properties and is the most economically viable.		This area is now covered by the Essex, Norfolk and Suffolk Open Coast Modelling (2017).
ENS Survey & Model Build – Friston (2015) JBA	Fluvial	Initial Model Build					Yes
Lowestoft Tidal Barrier – Outer Harbour Water Level Modelling Investigation (2016) CH2MHILL	Tidal	Options testing	UKCIP 09*	This report builds on the Lowestoft Tidal Defences (2014) study to assess the impact of the proposed flood gate and walled flood scheme.	The proposed tidal gate and defence scheme are likely to increase peak water levels in the outer harbour, however, increase levels are not expected to exceed water levels experienced outside the harbour wall. Flood risk around the harbour is actually reduced due to the presence of proposed defences.		No
Wrentham and Lothingland Hundred Modelling (2015) CH2M Hill and Halcrow	Fluvial	Initial model build and model review	20%	Produce a new hydraulic model for the Lothingland catchments. Evaluate the impact of removing 5 key structures. Review existing 1D ISIS model for Wrentham. Evaluate the impact of removing 3 key structures.	Removing 4 of the possible 5 structures in the Lothingland Model made no difference to properties at risk. Removal of the Benacre pumping station resulted in increased risk during low magnitude events and decreased risk at high. Removal of the 3 structures in the Wrentham model resulted in negligible difference to properties at risk.		Yes
Essex, Norfolk and Suffolk Open Coast Modelling (2017) JBA	Tidal	Updated modelling		Updated hydraulic modelling to include overtopping, breaching and hazard using the Extreme Tide Level and the Wave Transformation Model. Also to produce a tool to use for real time flood forecasting of a storm surge. Outputs have been provided for: Kessingland, Lake Lothing, Alde, Deben, Lowestoft and Leiston.	Outputs to be provided for Stour/Orwell and Blyth.	Essex, Norfolk & Suffolk Coastal Modelling – Blyth, Stour and Orwell expected 2018	In part
River Deben	Fluvial	Model Review		This modelling includes the Potsford Brook and the Melton Watercourse.	New modelling released late 2017.		Yes
Kirkley Stream (2017) JBA	Pluvial & Fluvial	New integrated model		Led by Waveney District Council.	New modelling released late 2017 which supersedes the previous fluvial Kirkley Stream modelling undertaken in 2014 by CH2M Hill.	Due to be finalised in 2018.	In Level 2 of this SFRA only.
Fynn & Lark CH2M Hill	Fluvial	Initial Model Build				New model expected in 2018	No

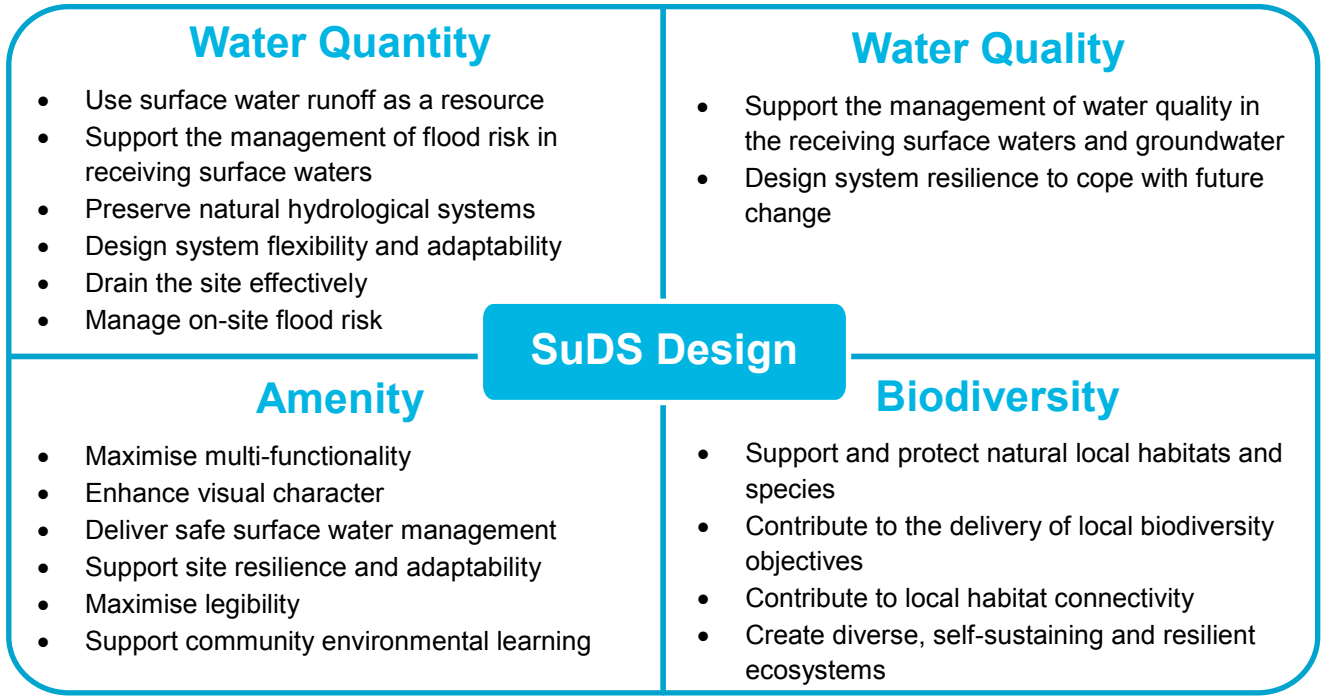
** The UKCIP 09 dataset reflects the Environment Agency's latest 'Adapting to Climate Change Guidance, September 2011'. As advised in the guidance the UKCIP Medium emission scenarios 95 percentile relative sea level rise values have been used to generate tidal boundaries for the 'Change Factor' boundaries.*

Appendix C Guidance for SuDS in East Suffolk

Introduction

Sustainable Drainage Systems (SuDS) are designed to maximise the opportunities and benefits of surface water management. This is particularly important in increasingly urban areas where there is less permeable ground available for natural infiltration and evapotranspiration, leading to increased rainfall runoff from impermeable surfaces and contributing to flooding, pollution and erosion. SuDS can counteract these impacts on the water cycle and additionally enhance urban spaces by making them more vibrant, attractive, sustainable and resilient, with improved air and water quality, microclimate and amenity.

There are four main categories of benefits which can be achieved through high quality SuDS design, as summarised below:



The installation of high quality and multi-functional SuDS is most likely to be achieved through early and multi-disciplinary consideration of surface water management. Ideally this should be integrated within the overall site planning and design, including early consultation with relevant stakeholders and consideration of ongoing operational and maintenance responsibilities. It should be noted that selection and design of SuDS systems is highly dependent on local ground conditions and environment.

SuDS design should be based around the general principles of:

- Harnessing surface water runoff as a resource;
- Managing rainfall close to where it falls;
- Managing runoff on the surface;
- Promoting infiltration of rainwater into the ground;
- Encouraging evapotranspiration;
- Attenuating runoff to mimic natural flow characteristics;
- Reducing contamination of runoff through pollution prevention and controlling the runoff at source; and
- Treating runoff to reduce the risk of urban contaminants causing environmental pollution.

The following sections provide an overview of common types of SuDS measures, which may be suitable for installation within ESC. Generally, SuDS should not be thought of as isolated features, but delivered as an interconnected sequential train of surface water management and treatment.

Developers within ESC should make reference to the East Suffolk Coastal Local Plan Review and the new Waveney District Local Plan for further requirements with regards to SuDS.

Further information on the philosophy of SuDS and detailed guidance on design, installation and maintenance, is provided in the CIRIA SuDS Manual (2015) and other sources described at the end of this document.

Swale

Swales are vegetated shallow depressions designed to convey and filter water. These can be ‘wet’ where water gathers above the surface, or ‘dry’ where water gathers in a gravel layer beneath the ground level. They have the ability to remove pollutants and can be used to channel surface water to the next stage of a treatment train. Check dams can be constructed along their route to control flow velocities, and promote infiltration and sediment deposition.

Advantages

- Encourages evapotranspiration and infiltration of runoff
- Provides attenuation to reduce peak run-off rates
- Relatively simple to incorporate into landscaping
- Effective removal of urban pollutants
- Minimal maintenance requirements
- Aesthetically pleasing
- Good community acceptability

Disadvantages

- Careful consideration of location and design is required to reduce potential health and safety hazards
- May limit opportunities to use trees in landscaping
- Blockages can occur in connecting pipe work
- Retrofitting opportunities are limited

Effective Locations

- Residential and commercial areas
- Contaminated sites
- Sites above vulnerable groundwater
- Alongside roadways
- Linear street garden areas
- Field boundaries

Ineffective Locations

- High density areas
- Steeply sloping areas

Performance Criteria	Rating
Ecological Advantages	Medium
Peak Flow Reduction	Medium
Amenity Potential	Medium
Water Quality Treatment Potential	High
Surface Water Volume Reduction	Medium

In the Community

Swales can be used to replace conventional drainage systems and are particularly effective when installed adjacent roadsides or transport links, to capture and re-route surface water. They are also suitable for residential and commercial areas and may be integrated with areas of open space and landscaping, or used to create informal barriers.

Design

Example

Filter Strip or Drain

Filter strips and drains can be used to manage runoff from impermeable areas, providing conveyance and filtration. Filter Strips allow water to flow across grass or dense vegetation; whereas filter drains are hardscape systems where runoff is temporarily stored in a shallow trench filled with stone or gravel.

Advantages

- Simple to design and can be incorporated into site landscaping for aesthetic benefit
- Minimal public safety risks
- Encourages evaporation and infiltration
- Important hydraulic and water quality benefits can be achieved
- Can be retrofitted into a site with ease
- Low construction cost

Disadvantages

- Vegetation must be light and can get damaged
- Loose gravel can be removed
- Drains relatively small catchments
- High cost to replace filter materials

Effective Locations

- Residential and commercial areas
- Between hard standing surfaces and grassland
- High density areas
- Contaminated sites
- Sites above vulnerable ground water

Ineffective Location

- Steeply sloping areas

Performance Criteria	Rating
Ecological Advantages	Low
Peak Flow Reduction	Medium
Amenity Potential	Low
Water Quality Treatment Potential	High
Surface Water Volume Reduction	Low

In the Community

Filter strips or filter drains are a suitable retrofitting option for heavily trafficked or spatially constrained areas as they cause no safety hazards and can be implemented into small spaces with ease. They can be simply implemented along the edges of pathways or pavements or integrated within site landscaping.

Design

Example

Bio-Retention Areas or Rain Gardens

Bio-retention areas or rain gardens are vegetated depressions with gravel and sand layers below, designed to collect, channel, filter and cleanse water vertically. Water can infiltrate into the ground or enter a piped drainage system. These systems can be integrated with site landscaping, including tree pits, planter areas or gardens. Treatment performance can be improved through engineered soils and enhanced vegetation.

Advantages

- Provides initial water treatment
- Aesthetically pleasing
- Provides ecological benefits
- Capability to be retrofitted in heavily paved areas or existing vegetation
- Effective pollutant removal
- Minimal ground take with spatially flexible layout

Disadvantages

- May be susceptible to clogging or blockage due to surrounding landscape
- Regular inspection and maintenance is required to maintain effectiveness

Effective Locations

- Residential and Commercial areas
- Contaminated sites
- Sites above vulnerable groundwater
- Seating areas
- Impermeable areas
- High density areas

Ineffective Locations

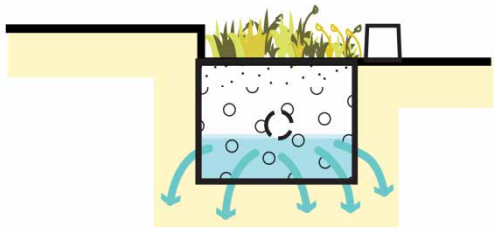
- Steeply sloping areas

Performance Criteria	Rating
Ecological Advantages	Medium
Peak Flow Reduction	Medium
Amenity Potential	Good
Water Quality Treatment Potential	High
Surface Water Volume Reduction	Medium

In the Community

Rain gardens and bio-retention systems can be planned as aesthetically pleasing landscaped features, providing critical green space within the urban areas. These measures can be retro-fitted around existing street infrastructure, such as seating areas, and incorporated within both paved and vegetated areas.

Design



Example

Rainwater Harvesting

Rainwater harvesting involves capturing rainwater and reusing it for purposes such as irrigation or toilet flushing. Rainwater is collected from building rooftops or other paved surfaces and stored in tanks for treatment and reuse locally.

Advantages

- Water can be used for variety of non-potable uses, such as toilet flushing and irrigation
- Reduces potable water demand
- Provides source control of storm-water run-off
- Rooftop or underground tanks can minimise land take and visual impact
- Can be retrofitted to existing buildings

Disadvantages

- Potentially complex installation and high capital cost, particularly for retrofit
- Ongoing energy requirement for pumping, if below ground storage is used
- Careful management required to manage any health risks associated with water reuse
- Above ground storage can be visually intrusive
- Regular maintenance is required

Effective Locations

- Residential and Commercial areas
- High density areas
- Contaminated sites
- Sites above vulnerable groundwater

Ineffective Locations

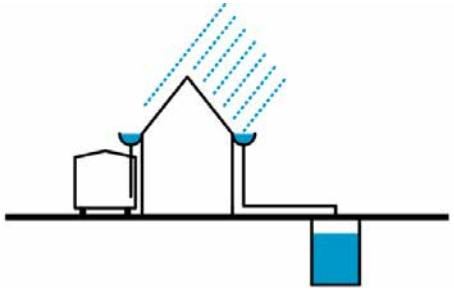
- Fields or large open space

Performance Criteria	Rating
Ecological Advantages	Low
Peak Flow Reduction	High
Amenity Potential	Low
Water Quality Treatment Potential	Low
Surface Water Volume Reduction	High

In the Community

Rain-water harvesting can be implemented on a variety of scales; however, is particularly suitable for implementation in buildings with large rooftop areas, significant water consumption and defined ownership and maintenance responsibilities. Installation is generally easier when integrated into the design of new buildings; however, water butts can provide a simple means of retrofit.

Design



Example

Ponds and Basins

Ponds or Basins can be used to store and to treat water. 'Wet' (retention) ponds have a constant body of water and run-off water is additional to this, whilst 'dry' (detention) ponds are empty during periods without rainfall. Ponds can be designed to allow infiltration through its base to ground or to store water for a period of time, before it is discharged via a soakaway to ground. They can support emergent and submerged vegetation, enhancing both treatment and biodiversity.

Advantages

- Pollutant removal through sedimentation and biological treatment mechanisms
- Effective accommodate of large storm events
- Good community acceptability
- Potential for biodiversity improvement
- Relatively simple construction
- Has the potential for supply of irrigation to other amenities
- Aesthetically pleasing
- Potential recreational benefit

Disadvantages

- Requires infiltration to achieve significant reduction in surface water runoff volumes
- Significant spatial requirements
- Requires control measures to prevent migration of invasive species
- Consideration of public safety may require control measures in certain settings
- Careful design is required to manage undesirable impacts associated with eutrophication and fluctuating water levels

Effective Locations

- Residential and Commercial areas
- Fields
- Parks or areas of open space
- Areas with feature requirements

Ineffective Locations

- High density areas
- Locations with vulnerable people

Performance Criteria	Rating
Ecological Advantages	High
Peak Flow Reduction	High
Amenity Potential	High
Water Quality Treatment Potential	High
Surface Water Volume Reduction	Low

In the Community

Ponds can be aesthetically pleasing, and can be used to support urban amenity, recreation and ecology. They can provide central features within areas of community space. However, careful design consideration is required to ensure they do not pose a health and safety risk to the public.

Design

Example

Soakaway

Soakaways and other infiltration systems collect and store runoff, allowing it to rapidly soak into permeable layers of soil. Constructed like a dry well, an underground pit is dug and then filled with gravel and rubble, or specially designed structures. Surface water can be directed into a soakaway using a number of above or below ground methods, with overlying vegetation and underlying soils providing treatment benefits.

Advantages

- Minimal land take
- Provides recharge of natural ground water levels
- Good storm volume reduction and peak flow attenuation
- Simple operation and maintenance
- Relatively simple to construct
- Effective retrofitting solution
- Good community acceptability

Disadvantages

- Not always practicable near to structural foundations
- Long term performance is uncertain and difficult to guarantee if property owner is responsible for maintenance
- Requires good subsurface drainage
- Infiltration rates need to be investigated

Effective Locations

- Residential and commercial areas
- High density areas
- Fields
- Small grassed/planted areas

Ineffective Locations

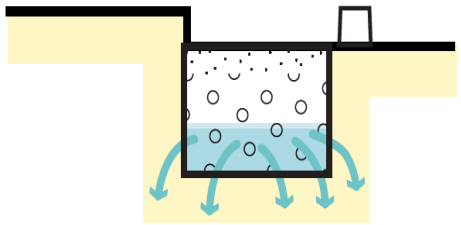
- Contaminated sites
- Sites above vulnerable groundwater
- Sites with shallow groundwater
- Sites underlain by impermeable ground

Performance Criteria	Rating
Ecological Advantages	Low
Peak Flow Reduction	High
Amenity Potential	Low
Water Quality Treatment Potential	Medium
Surface Water Volume Reduction	High

In the Community

Soakaways are effective in areas with good infiltration potential and where the water table is relatively low. Soakaways can be covered over by suitable permeable materials and be used for a variety of purposes at ground level. Caution should be taken when implementing these techniques in tightly constrained areas as they should not be built within a close proximity to structural foundations.

Design



Example

Living Roofs

A planted soil layer is constructed on the roof of a building to create a living medium. Following rainfall, water is stored in the soil layer and absorbed by planted vegetation. They may be designed to be accessible and landscaped to provide biodiversity and amenity benefit. Blue roofs can also be used to store water, without the use of vegetation.

Advantages

- High potential to reduce surface run off
- Suitable for high density development
- Can deliver building insulation and sound proofing
- Inaccessible to general public
- Can provide biodiversity benefits to the local area
- Improved air quality
- Assists in amelioration of the urban heat island effect
- Can be retrofitted

Disadvantages

- Additional structural loading to roof (compared with most traditional rooftops)
- Irrigation may be required during drought
- Replacement and maintenance of plants is required on a regular basis

Effective Locations

- Residential and Commercial areas
- High density areas
- Contaminated sites
- Sports centres

Ineffective Locations

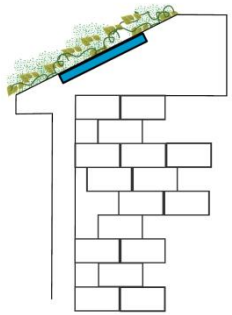
- Roofs with inadequate access
- Steep pitched roofs
- Rooftops with inadequate structural support

Performance Criteria	Rating
Ecological Advantages	High
Peak Flow Reduction	Medium
Amenity Potential	High
Water Quality Treatment Potential	High
Surface Water Volume Reduction	Medium

In the Community

Living roofs provide an opportunity to attenuate and store rainwater in spatially constrained areas, while providing potential benefits for local biodiversity, air quality, microclimate and amenity. They have controlled access, which means the associated risk of misuse or vandalism is low.

Design



Example

Permeable / Porous Paving

This is paving which allows water to soak into the underlying ground. It can be in the form of paving blocks with gaps in between or porous mediums where water filters through the paving itself. Water can be stored in the sub-base beneath or be allowed to infiltrate into the ground below.

Advantages

- Very efficient
- Good potential for water quality treatment
- High potential for surface water run off
- Good community acceptability
- Requires minimal maintenance
- Effectively requires no space, as it allows for a dual usage
- It can remove the need for manholes or gully pots

Disadvantages

- Requires closure of surfaced areas whilst SuDS are constructed
- Cannot be used where high sediment loads are likely to be washed across the surface
- Requires vegetation maintenance
- Regular inspection of the surfaces required to ensure effectiveness
- Can deflect if subject to heavy vehicular loads

Effective Locations

- Residential and Commercial areas
- Car Parks
- Low speed roads (below 30 mph)
- Pathways
- Residential pavements
- Hard courts

Ineffective Locations

- High speed roads

Performance Criteria	Rating
Ecological Advantages	Low
Peak Flow Reduction	High
Amenity Potential	Low
Water Quality Treatment Potential	High
Surface Water Volume Reduction	High

In the Community

Permeable surfaces offer effective drainage solutions that integrate within residential environments. Porous paving is effective at managing runoff from paved surfaces, and this low maintenance method is particularly useful in built up environments, including city centres. Replacing hard standing with permeable surfaces could improve drainage across a site whilst creating more aesthetically pleasing environments.

Design

Example

References

For detailed information on the design and delivery of SuDS, reference should be made to the CIRIA *SuDS Manual* (2015), which is freely available online at www.ciria.org.

A range of further resources on SuDS, including case studies, videos, presentations, fact sheets and links to research can be found on the Susdrain website at http://www.susdrain.org.

Additional supporting information is available from DEFRA (www.defra.gov.uk) and the Environment Agency (www.environment-agency.gov.uk).

Developers within ESC should also refer to the Suffolk *SuDS Guidance,* for detailed guidance on drainage strategies submitted with planning submissions.

Appendix D Mapping and Dataset Summary

A series of maps, and a geodatabase have been produced to accompany this study and assist the assessment of sites by ESC as part of their decision making process. A GIS based mapping system using the software package 'ArcGIS' was implemented to enable this. A summary of the figures created and the GIS layers used for each of the maps is included in the Table D-1 below.

Table D-1 - Summary of Maps Created

Figure Number	Figure Title	Layers Used
Figure 01	River Network	• Ordnance Survey Base-mapping* • Study Area Boundary* • Main River* • Ordinary Watercourse*
Figure 02	Topography	• Lidar (Elevation Data)
Figure 03	Geology	• Drift Geology • Solid Geology
Figure 04	Historical Fluvial Flood Map	• EA fluvial flood records • ESC local knowledge on flood incidents for all sources
Figure 05	Risk of Flooding from Rivers and Sea	• Flood Zone 2 • Flood Zone 3a • Flood Zone 3b (based on available hydraulic modelling • EA AIMS dataset • EA Areas Benefitting from Defences
Figure 06	Risk of Flooding from Surface Water	• Flood Map for Surface Water 30 year extent • Flood Map for Surface Water 100 year extent • Flood Map for Surface Water 1000 year extent
Figure 07	Susceptibility to Groundwater Flooding	• BGS dataset for Groundwater Vulnerability
Figure 08	Risk of Flooding from Reservoirs	• EA designated Reservoir flood extents
Figure 09	Risk of Flooding from Rivers and Sea with an Allowance for Climate Change	• Flood Zone 2 • Flood Zone 3a • Flood Zone 3b • The climate change allowance mapped for tidal flood is specific to each hydraulic modelling study. • For fluvial events, the flood outline with an allowance for climate change was not available during the production of this SFRA. Therefore the 1 in 1000 year flood event has been mapped as a surrogate for the climate change event.
Figure 10	Infiltration SuDS Suitability	• BGS dataset for SuDS Suitability
Figure 11	Flood Warning and Alert Areas	• EA Flood Warning Areas • Flood Alert Areas
Figure 12	Proposed Development Site Locations	• Proposed Site Allocations
Figure 13	Main Rivers Covered by Detailed Hydraulic Modelling	• Main Rivers covered by detailed hydraulic modelling

*Notes:*Included in all maps*

ArcGIS uses multiple datasets with associated attribution to present geo-located features from multiple sources. An overview of the information provided for mapping purposes by the various key stakeholders is shown below.

Table D-2 - Description of GIS Layers used to inform the assessment

	Dataset	Source	Format	Layer Description
Fluvial and Tidal	Detailed River Network	EA Geostore	GIS shapefile	Identification of the river network including Main Rivers and Ordinary Watercourses.
	Flood Map for Planning (Rivers and Sea) Flood Zones 2 and 3	EA Geostore	GIS shapefile	Shows areas at varying risk of flooding from rivers and the sea.
	Historic Flood Map	EA Geostore	GIS shapefile	Single GIS layer showing the extent of fluvial historic flood events.
	Asset Information Management System (AIMS)	EA	GIS shapefile	Shows where there are existing river assets (embankments and walls).
	Hydraulic Modelling Studies	EA	GIS shapefile	Report and GIS outputs summarising the flood modelling watercourses and the sea in the study area. More detail on each modelling study is given in Appendix B.
	Flood Warning and Alert Areas	EA Geostore	GIS shapefile	Shows areas benefitting from fluvial Flood Warning schemes in the Borough.
Pluvial	Risk of Flooding from Surface Water	EA Geostore	GIS shapefile	Provides an indication of the broad areas likely to be at risk of surface water flooding during a 1 in 30 year, 1 in 100 year and 1 in 1,000 year return period event.
Groundwater	Geology	EA Geostore	GIS shapefile	Illustrates bedrock and superficial geology across the study area.
	Infiltration SuDS Summary Map	British Geological Society	GIS shapefile	Dataset produced by BGS illustrating the likely suitability of the utilisation of infiltration SuDS techniques across the study area.
	Groundwater Vulnerability	British Geological Society	GIS shapefile	Dataset produced by BGS illustrating the likely suitability to groundwater flooding, based on geological indicators.
Reservoir	Area Deemed at of Risk of Flooding from Reservoirs	EA	GIS shapefile	Identifies areas which are at risk of flooding in the event of a Reservoir breach.
General	Ordnance Survey 25k Background	East Suffolk Councils	Raster file (.tiff)	Provides background mapping and indicates important features and street names in detail.
	LiDAR Data	EA	Raster file (.tiff)	Provides a useful basis for understanding local topography and the surface water flood risk in the area.

Appendix E SFRA Management Guide

The NPPF highlights the importance of maintaining SFRAs to ensure the decision making process by the Local Planning Authorities is based on the most up to date information and understanding of flood risk within the study area. A summary of the key aspects to be considered to ensure that the SFRA is kept up-to-date and maintained is provided in the table below.

Table E-1 - Summary of main aspects to be considered during maintenance of the SFRA

Area Covered	Source of Information	Provider	Comments	Next Review
Climate Change Scenarios	EA Guidance and Modelling	EA	For tidal events, climate change outputs were taken from the recent Essex, Suffolk and Norffolk coastal study where available. This modelling is understood to incorporate the most update to date EA climate change allowances. Where this was not available the previous models were used, which have incorporated the previous DEFRA climate change allowances. For fluvial events, the flood outline with the updated EA allowance for climate change was not available during the production of this SFRA. Therefore the 1 in 1000 year flood event has been used as a surrogate for the climate change event. The SFRA will need to be updated as and when this data becomes available. Any site-specific FRA will need to further interrogate the potential impact of climate change.	When updated hydraulic modelling becomes available, and during the next general review of the SFRA.
Flood Zones	Hydraulic modelling of Main Rivers and the sea	EA	A number of hydraulic modelling studies are understood to be proposed or ongoing within the study area. In particular, this may impact upon the illustration of Flood Zone 3b. Similarly, new information may arise with respect to residual flood risk through breach or overtopping. Should new Flood Zone or hydraulic modelling information become available, this data should be digitised and incorporated within the SFRA and mapping.	When further modelling is carried out and/or outlines reviewed by EA.
Surface Water Flood Outlines	EA Dataset	EA	The EA update the RofSW maps regularly with information provided by LPAs where discrete modelling has been completed. If additional modelling of surface water flood risk is undertaken then surface water flood outlines within this SFRA may need review / update.	When new relevant information becomes available.
Flood Defences and Areas Benefiting	EA Database	EA	If any new local flood defences or management structures are installed within ESC these should be added as a new point to the relevant GIS layer, including metadata and published within the report and mapping. EA datasets should be updated in their entirety to replace superseded layers.	When new relevant information becomes available.

Area Covered	Source of Information	Provider	Comments	Next Review
Flooding History	Stakeholder records	EA, ESC	When new flooding incidents are reported, these should be added as a new point to the relevant GIS layer, including metadata.	Next general review of SFRA.
Local Plan Information	Waveney District Local Plan and Suffolk Coastal Local Plan	ESC	This SFRA has been published to include sites and information contained within the Site Allocations for the study area if any updates are made the SFRA should be reviewed and updated as required.	On update to ESC Local Plans.
Groundwater Flood Risk	Geology and Groundwater Vulnerability	EA	The groundwater flood risk dataset used for this SFRA is understood to provide the best available representation of groundwater flood risk. Understanding of groundwater flood risk is still emerging and therefore it is recommended that the groundwater data contained within this report is reviewed if/when new BGS datasets become available.	Next general review of SFRA.
OS Background Mapping	Ordinance Survey	ESC	The SFRA has made use of OS digital mapping. Periodically these maps are updated. Updated maps are unlikely to alter the findings of the SFRA but should be reviewed as part of the SFRA maintenance.	Next general review of SFRA.
National and Regional Flood Risk Policy	NPPF and PPG	Gov (DCLG)	This SFRA was created using guidance that was current in 2018, principally the NPPF. Should new flooding policy be adopted nationally, regionally or locally, the SFRA should be checked to ensure it is still relevant and updates made if necessary.	When changes to relevant planning policy are adopted.
Local Flood Risk studies and Policy	Local Flood Risk Management Strategies and Surface Water Management Plans	Local Authorities	It is recommended that this SFRA is updated to incorporate the findings of ongoing or future flood risk studies and new local flood risk policy. In particular, the Lowestoft Flood Risk Management Strategy (2016) was being updated at the time of writing.	Upon publication of relevant local flood risk studies or policy.

It should be noted that, prior to any data being updated within the SFRA, it is important that the licensing information is also updated to ensure that the data used is not in breach of copyright. The principal licensing bodies relevant to the SFRA at the time of publishing were the EA (Anglian Region), Ordnance Survey and Anglian Water. Updated or new data may be based on datasets from other licensing authorities and may require additional licenses. Generally, when updating the GIS information associated with this SFRA, it is important that the meta-data is updated in the process. This is the additional information that lies behind the GIS polygons, lines and points.

It is recommended that an interim review of the SFRA is undertaken on an annual basis, in liaison with the EA, to assess any maintenance or update work required. In particular, this would include incorporation of any major changes in terms of flood management infrastructure and any recorded flooding incidents. An overall general review of the SFRA is recommended every 3 years, to re-evaluate flood risk and planning policies according to latest legislation.

Should Waveney District or Suffolk Coastal District decide any significant changes are necessary; the SFRA should be updated and re-issued. It is essential that any reviews and updates of the SFRA are recorded in a structured manner. To facilitate this task, the following register has been created:

STRATEGIC FLOOD RISK ASSESSMENT REVIEW

Type of Review Scheduled ☐ Interim ☐ **Date of Review:**

Reviewer Name: **Organisation:**

Area Reviewed	Source of Information	Provider	Maps Modified	Comments

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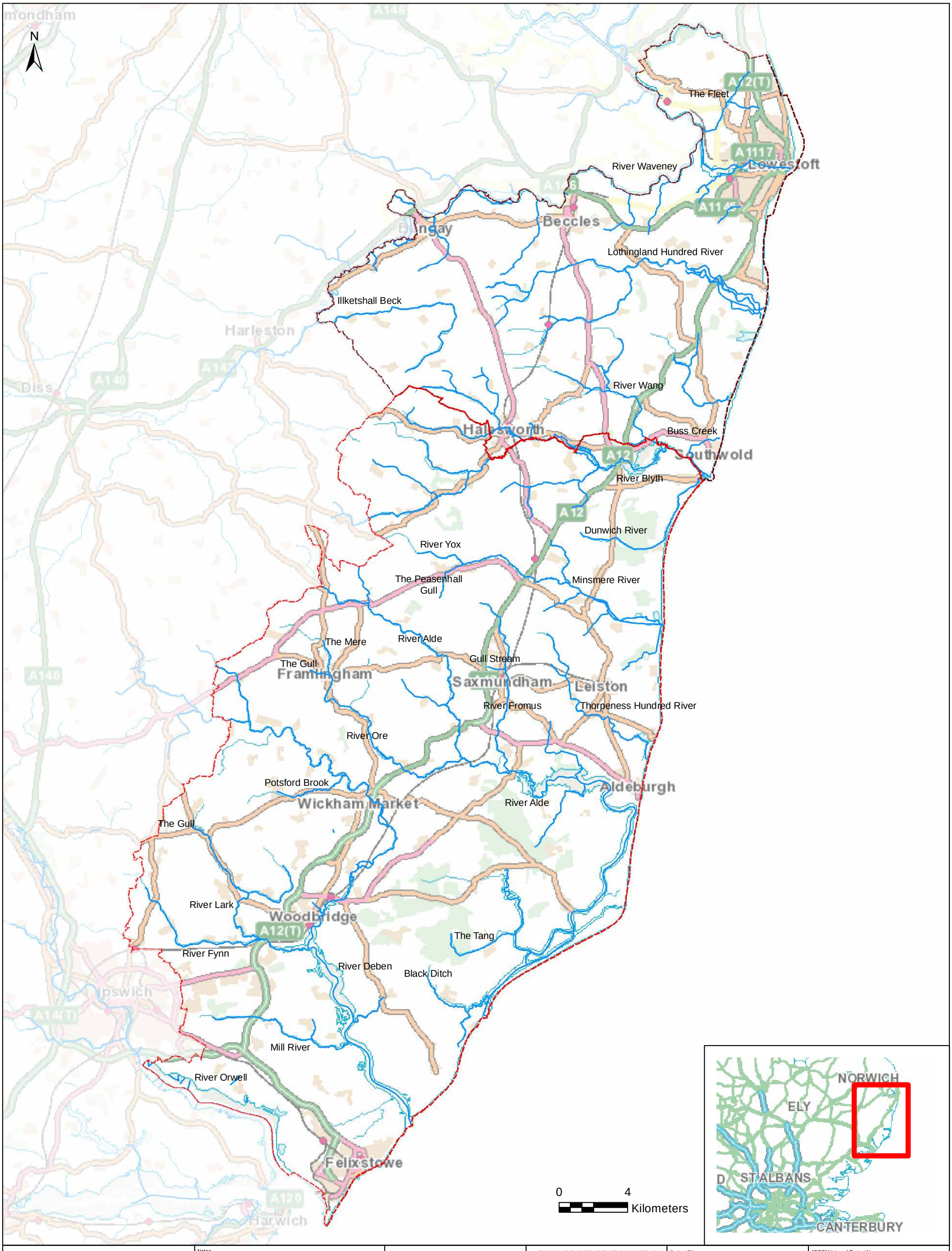

LEGEND

- Suffolk Coastal District
- Waveney District
- Main River

Notes

Ordinary Watercourses have not been shown on this figure due to scale. Refer to Figure 05 for the location of all Ordinary Watercourses.

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Revision Details	By / Check	Check Date	Suffix
River labels amended	LM / MD	10.04.18	3
No changes - Issued as final	LM / MD	23.11.17	2

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Approved: GP | Date: 10/04/2018
Purpose of Issue: FINAL

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RIVER NETWORK

AECOM Internal Project No. 60520248

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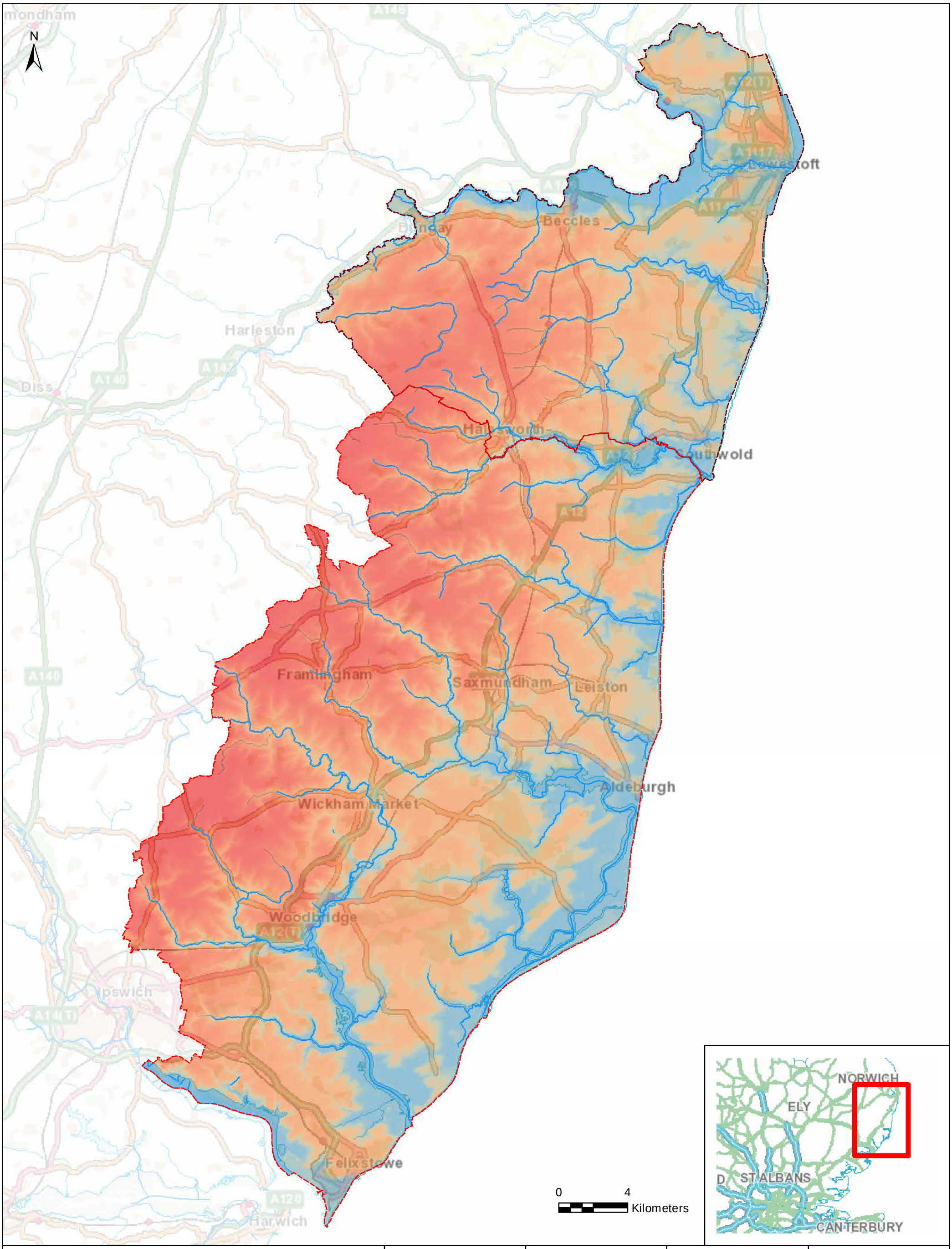

LEGEND

- Suffolk Coastal District
- Waveney District
- Main River

Topography (m AOD) 50m resolution

70m
60m
50m
40m
30m
20m
10m
0m

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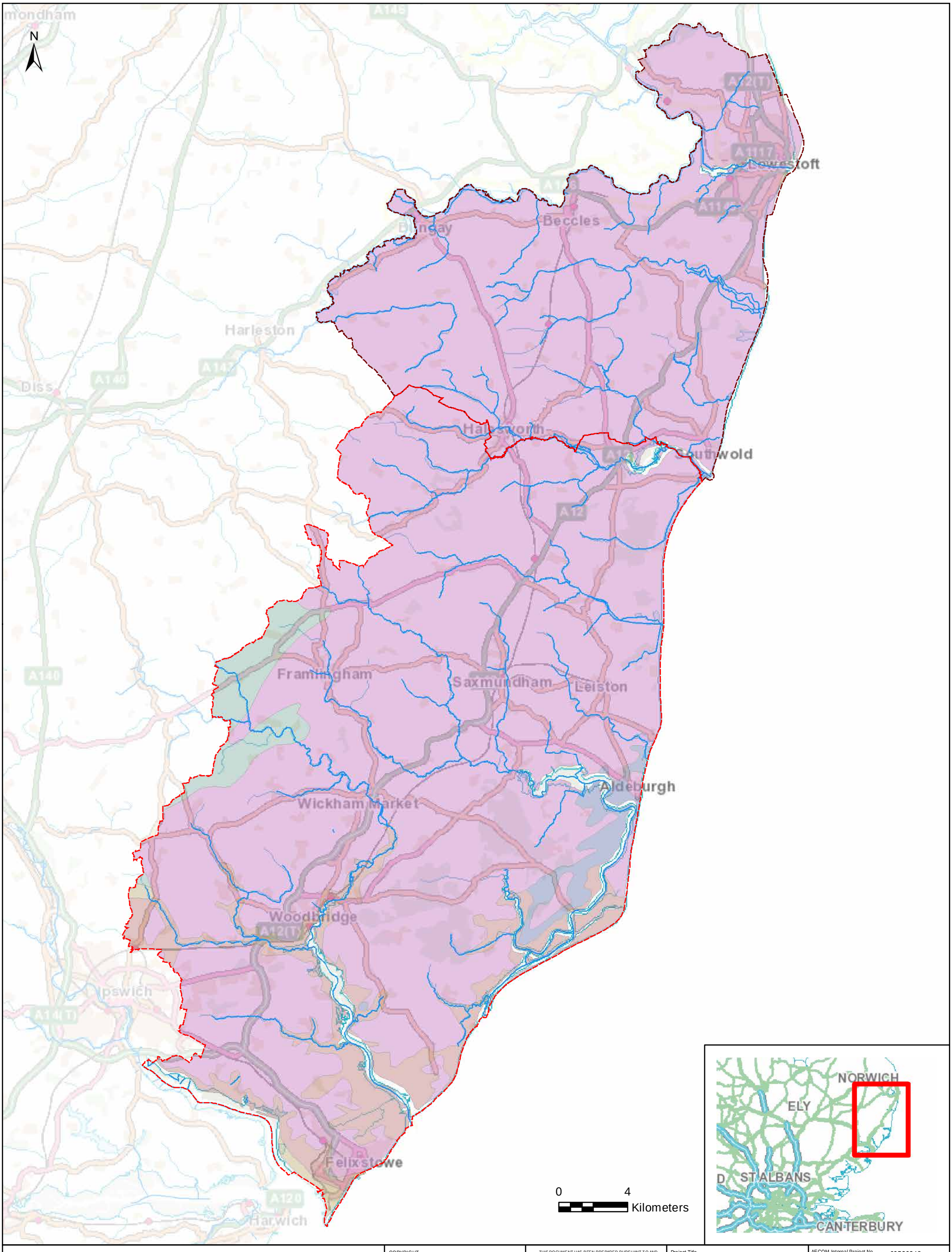

LEGEND

- Suffolk Coastal District
- Waveney District
- Main River

Bedrock Geology

- Lambeth Group
- Neogene Rocks (Undifferentiated)
- Neogene to Quaternary Rocks (Undifferentiated)
- Thames Group
- White Chalk Subgroup

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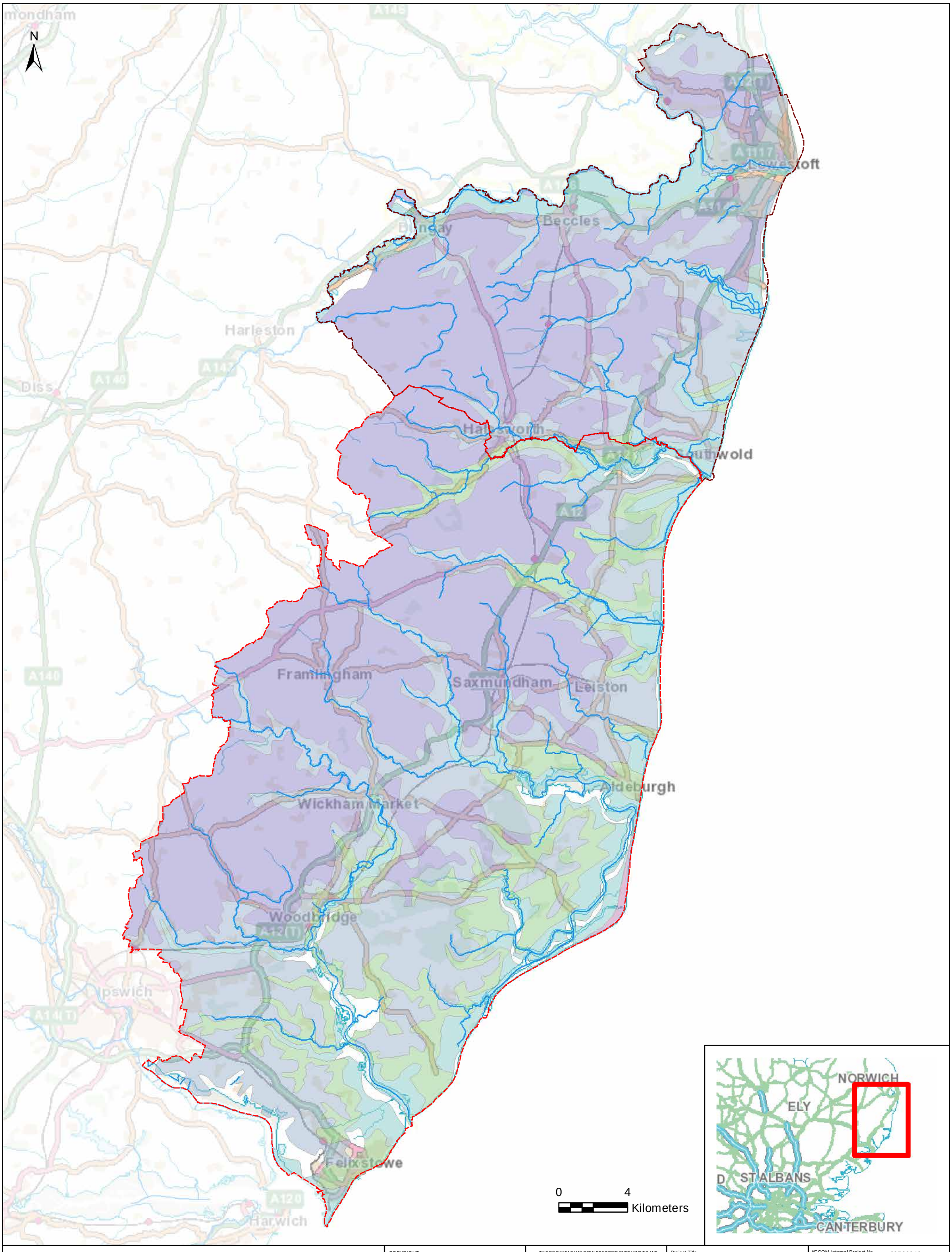

LEGEND

- Suffolk Coastal District
- Waveney District
- Main River

Superficial Geology

- Alluvium
- Blown Sand
- Crag Group
- Glacial Sand and Gravel
- Raised Marine Deposits (Undifferentiated)
- River Terrace Deposits (Undifferentiated)
- Till

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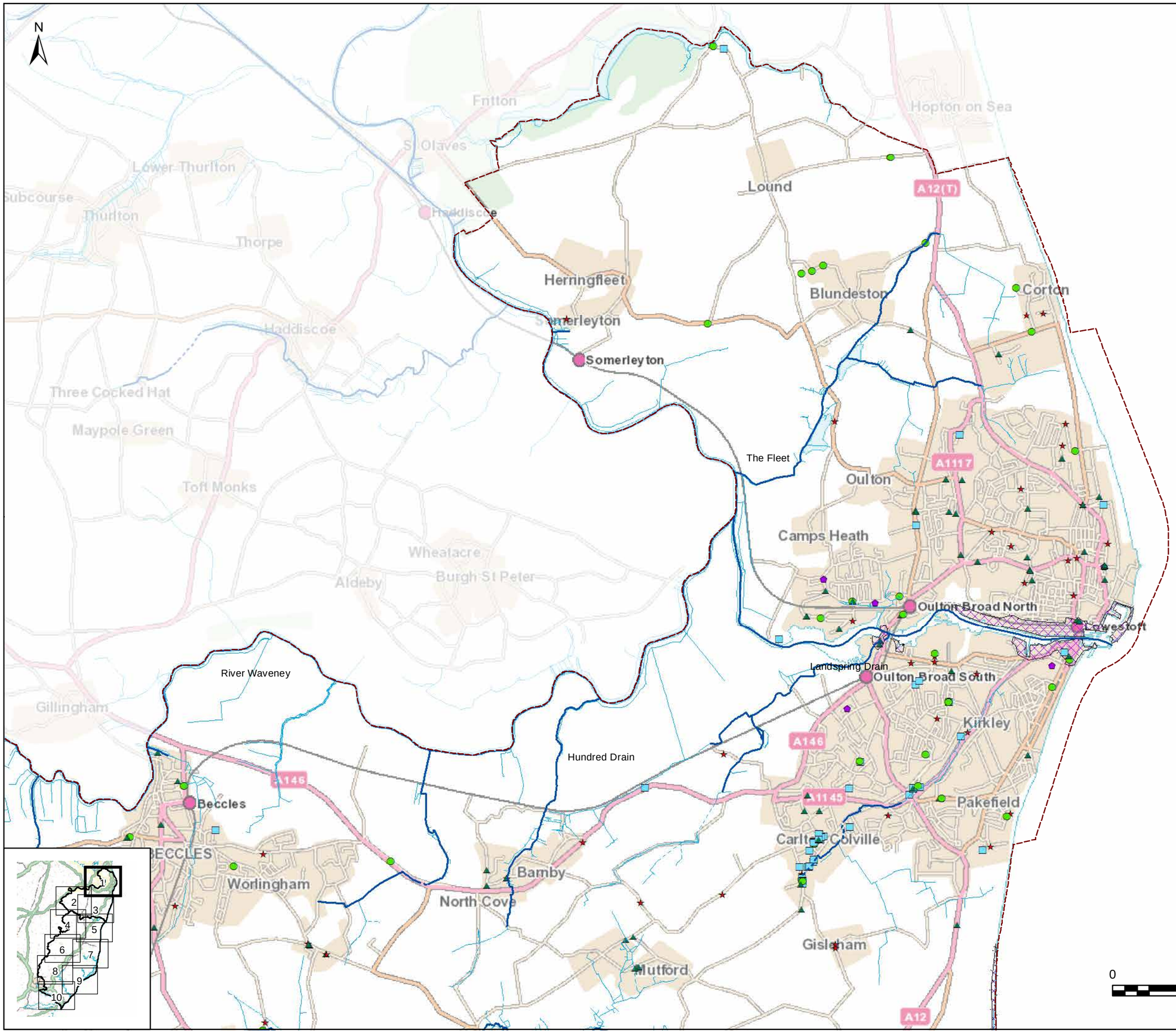

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Recorded Flood Outlines

Flood Incident Type

- Foul or Surface Sewer
- Groundwater
- Highways Drainage
- Other/Unknown
- Surface Water

Notes

This map shows the approximate location of historic records collected in the Suffolk County Council flood incidents database which identifies events where suface water, foul, land drainage, road drainage and river/tidal flooding has occurred.

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Fluvial/Tidal events removed	LM / MD	11.04.18	3
Note added	LM / MD	23.11.17	2
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Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: HISTORIC FLOOD RECORDS SHEET 1 OF 10

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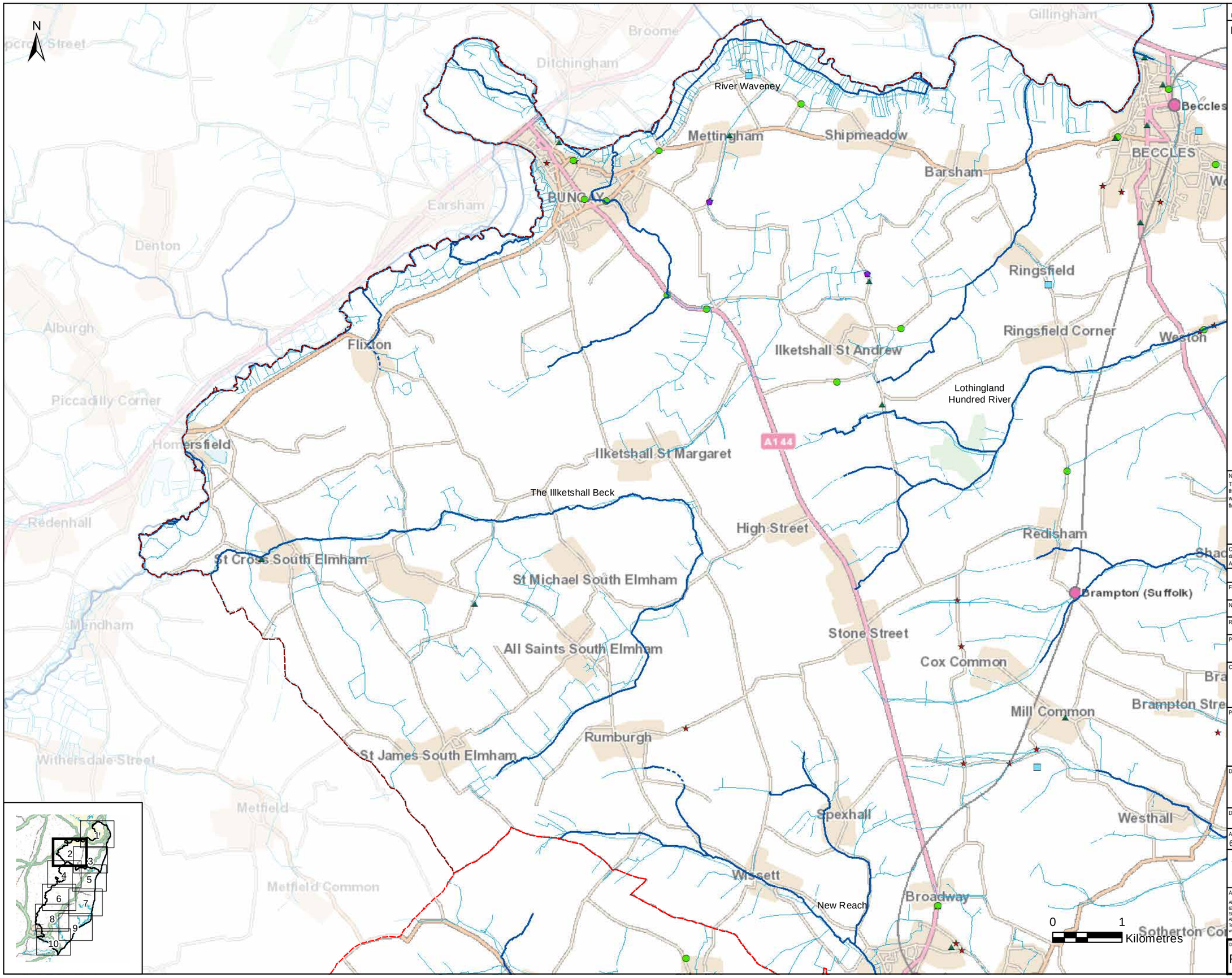
FIGURE 04.1	3



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Recorded Flood Outlines

Flood Incident Type

- Foul or Surface Sewer
- Groundwater
- Highways Drainage
- Other/Unknown
- Surface Water

Notes

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Note added	LM / MD	23.11.17	2

Purpose of Issue: FINAL

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Drawing Title: HISTORIC FLOOD RECORDS SHEET 2 OF 10

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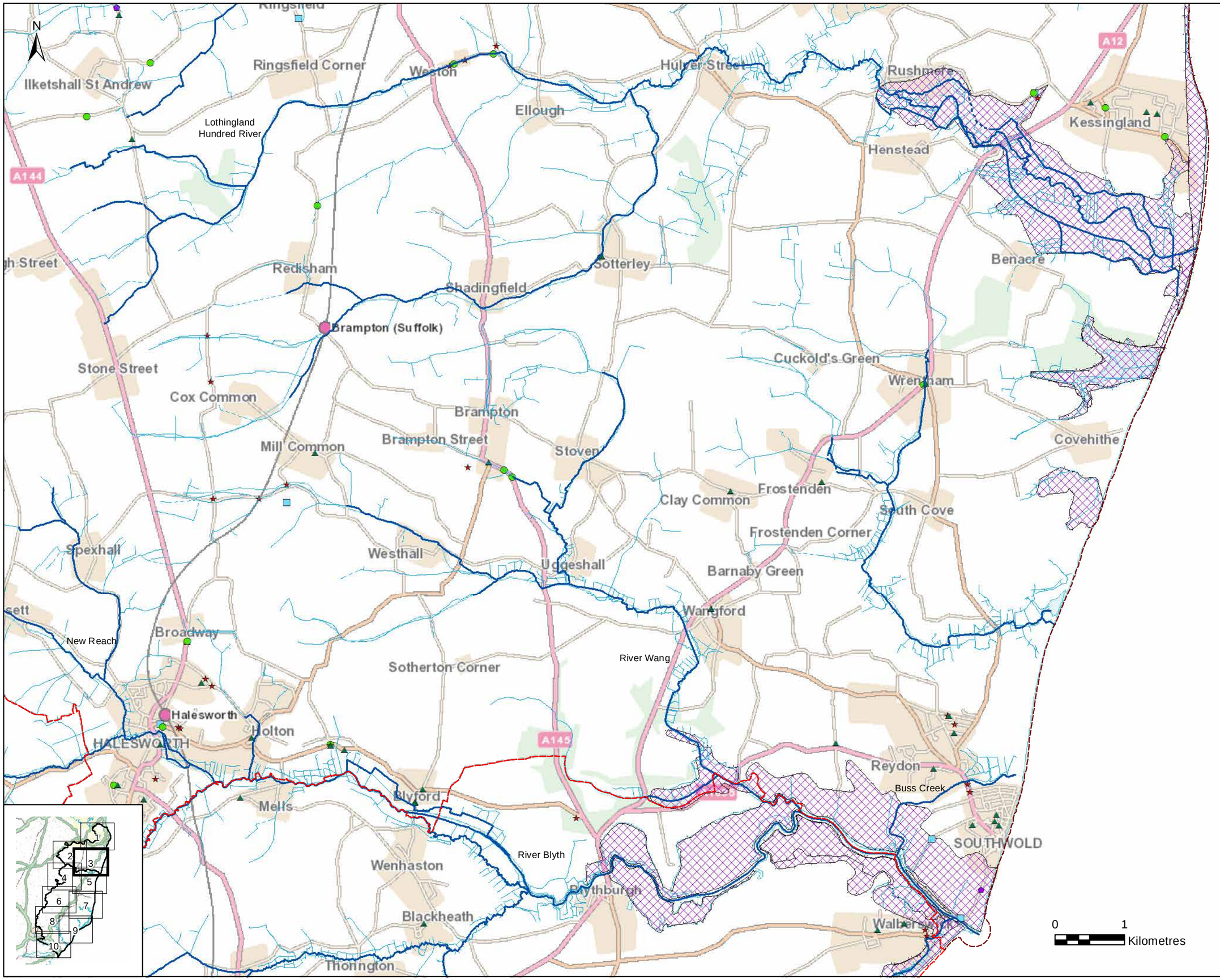

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Recorded Flood Outlines

Flood Incident Type

- Foul or Surface Sewer
- Groundwater
- Highways Drainage
- Other/Unknown
- Surface Water

Notes

This map shows the approximate location of historic records collected in the Suffolk County Council flood incidents database which identifies events where suface water, foul, land drainage, road drainage and river/tidal flooding has occurred.

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Fluvial/Tidal events removed	LM / MD	11.04.18	3
Note added	LM / MD	23.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: HISTORIC FLOOD RECORDS SHEET 3 OF 10

Drawn	Checked	Approved	Date
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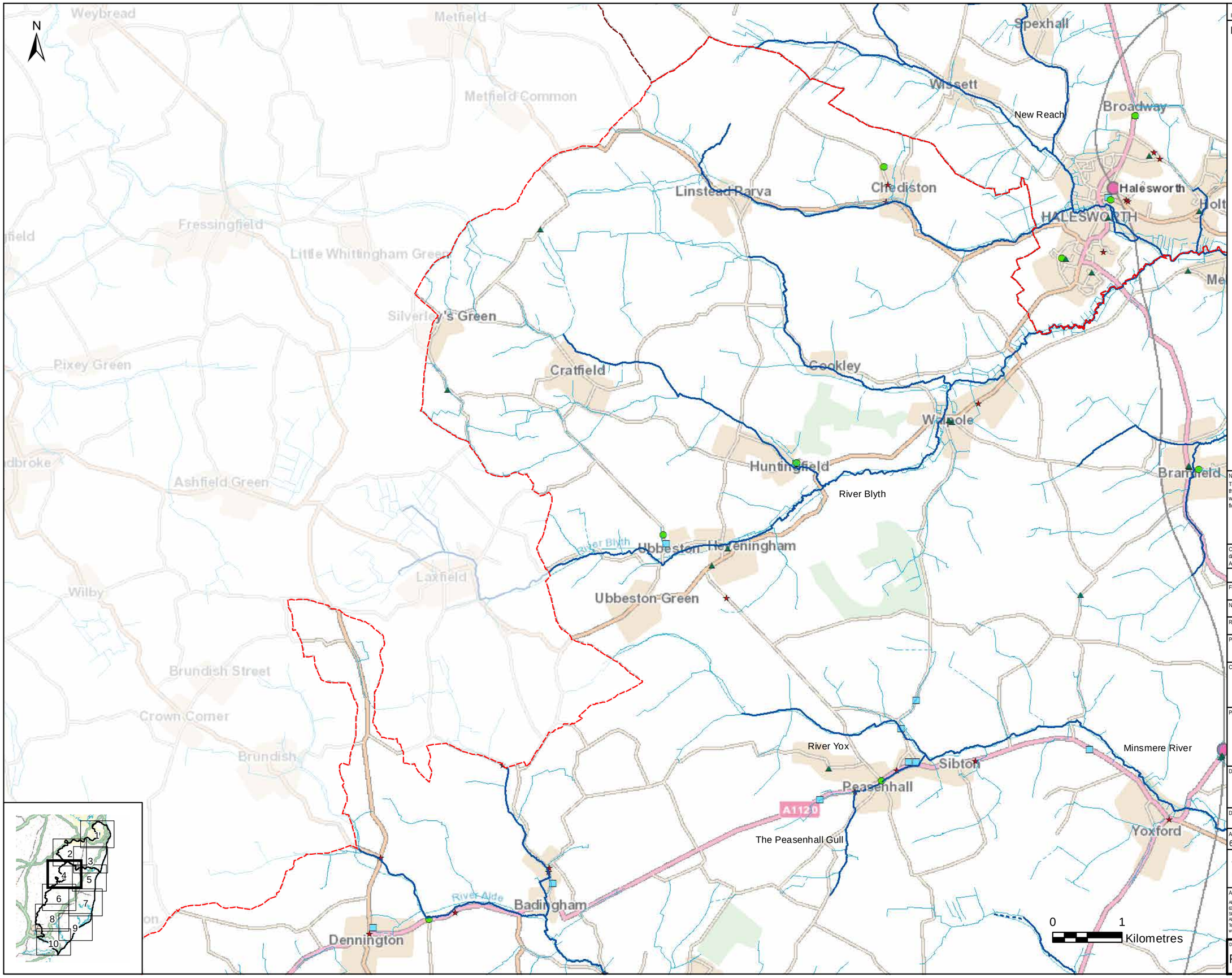

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Recorded Flood Outlines

Flood Incident Type

- Foul or Surface Sewer
- Groundwater
- Highways Drainage
- Other/Unknown
- Surface Water

Notes

This map shows the approximate location of historic records collected in the Suffolk County Council flood incidents database which identifies events where suface water, foul, land drainage, road drainage and river/tidal flooding has occurred.

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Fluvial/Tidal events removed	LM / MD	11.04.18	3
Note added	LM / MD	23.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: HISTORIC FLOOD RECORDS SHEET 4 OF 10

Drawn	Checked	Approved	Date
LM	MD	GP	11/04/2018

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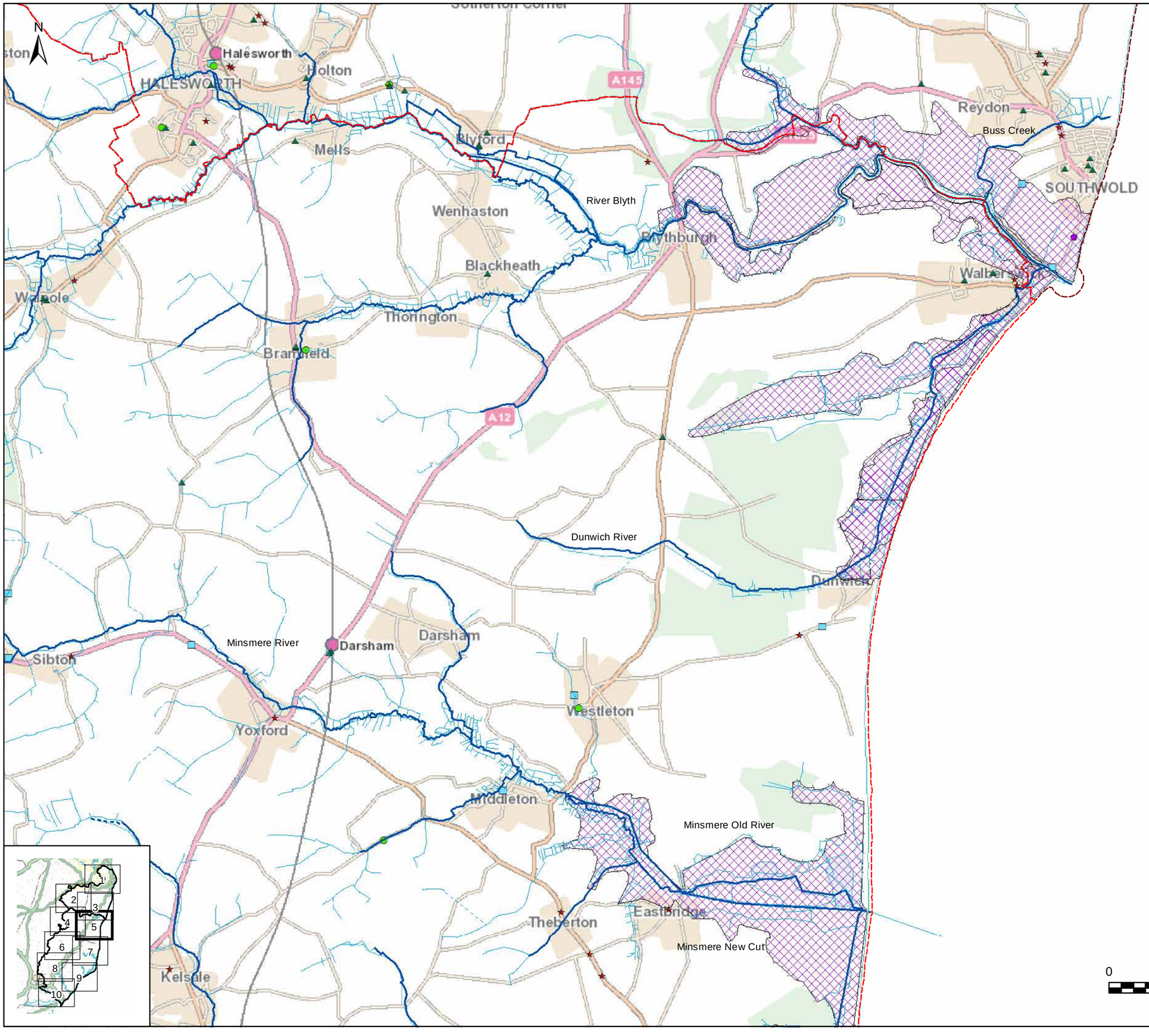

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Recorded Flood Outlines

Flood Incident Type

- Foul or Surface Sewer
- Groundwater
- Highways Drainage
- Other/Unknown
- Surface Water

Notes

This map shows the approximate location of historic records collected in the Suffolk County Council flood incidents database which identifies events where suface water, foul, land drainage, road drainage and river/tidal flooding has occurred.

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Fluvial/Tidal events removed	LM / MD	11.04.18	3
Note added	LM / MD	23.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: HISTORIC FLOOD RECORDS SHEET 5 OF 10

Drawn	Checked	Approved	Date
LM	MD	GP	11/04/2018

AECOM Internal Project No.: 60520248

Scale at A3: 1:50,000

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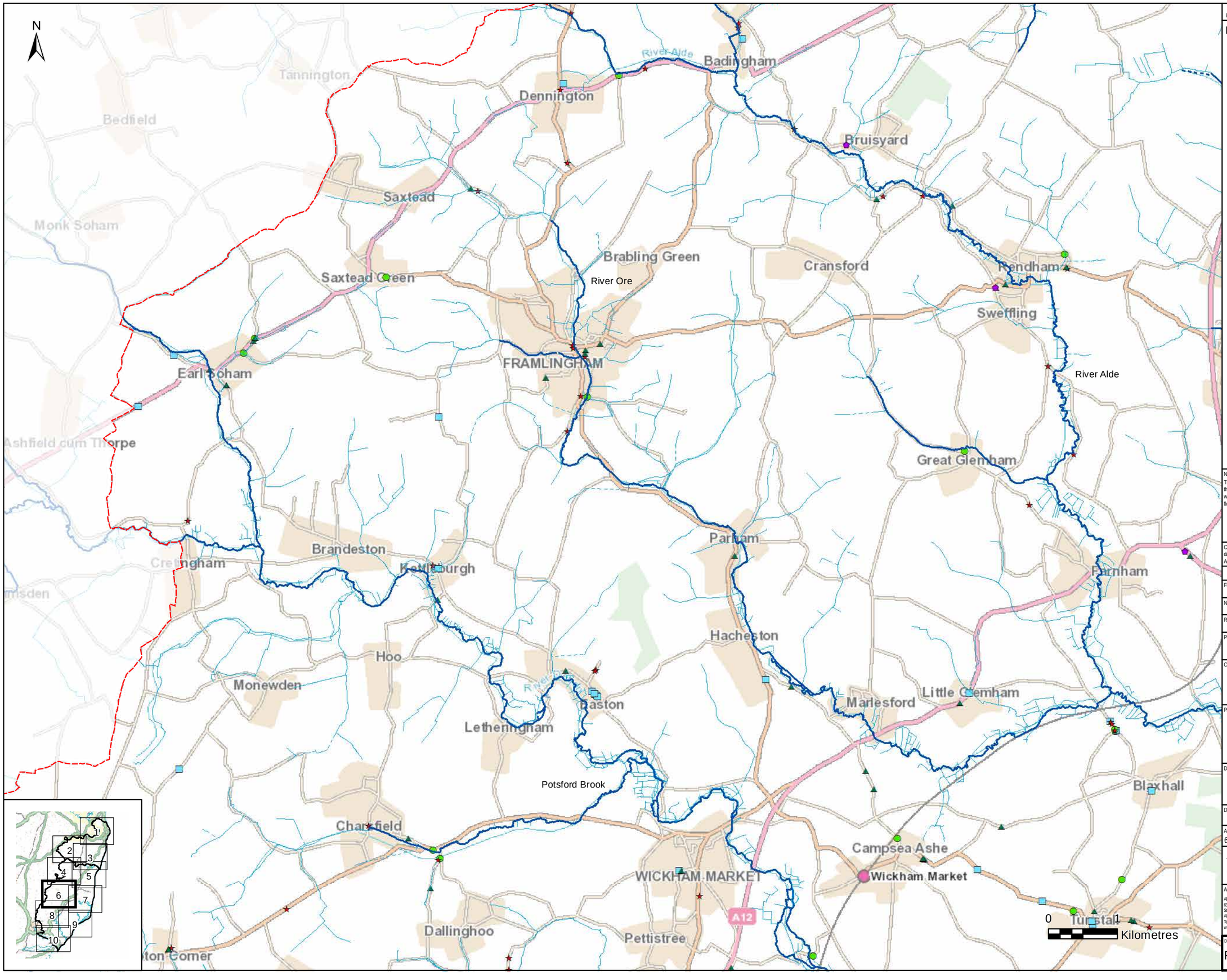
Drawing Number: FIGURE 04.5

Rev.: 3



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Recorded Flood Outlines

Flood Incident Type

- Foul or Surface Sewer
- Groundwater
- Highways Drainage
- Other/Unknown
- Surface Water

Notes

This map shows the approximate location of historic records collected in the Suffolk County Council flood incidents database which identifies events where suface water, foul, land drainage, road drainage and river/tidal flooding has occurred.

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Fluvial/Tidal events removed	LM / MD	11.04.18	3
Note added	LM / MD	23.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: HISTORIC FLOOD RECORDS SHEET 6 OF 10

Drawn	Checked	Approved	Date
LM	MD	GP	11/04/2018

AECOM Internal Project No.	Scale at A3
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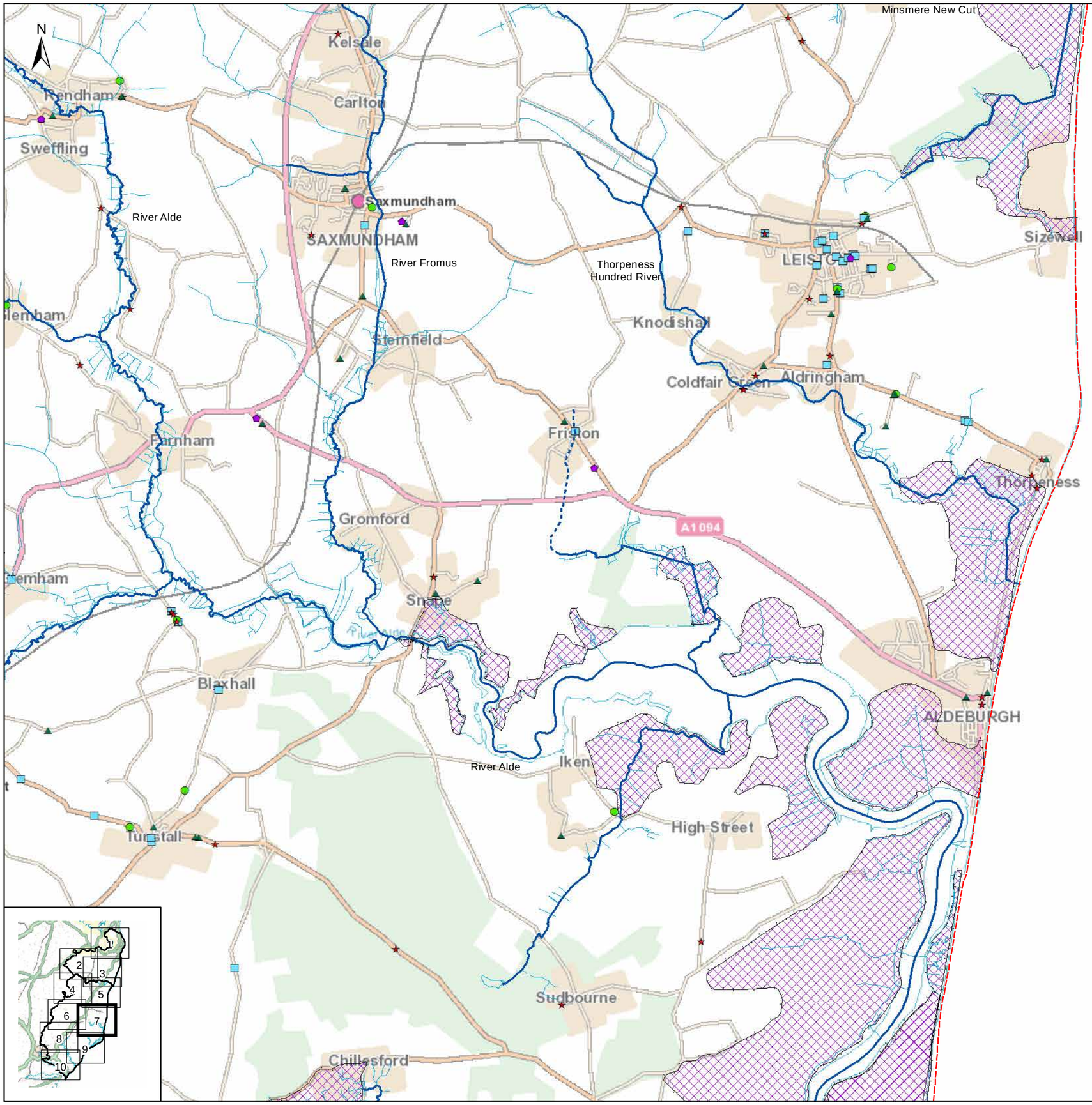
FIGURE 04.6	3



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Recorded Flood Outlines

Flood Incident Type

- Foul or Surface Sewer
- Groundwater
- Highways Drainage
- Other/Unknown
- Surface Water

Notes

This map shows the approximate location of historic records collected in the Suffolk County Council flood incidents database which identifies events where suface water, foul, land drainage, road drainage and river/tidal flooding has occurred.

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Fluvial/Tidal events removed	LM / MD	11.04.18	3
Note added	LM / MD	23.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council, Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: HISTORIC FLOOD RECORDS SHEET 7 OF 10

Drawn	Checked	Approved	Date
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Drawing Number: FIGURE 04.7

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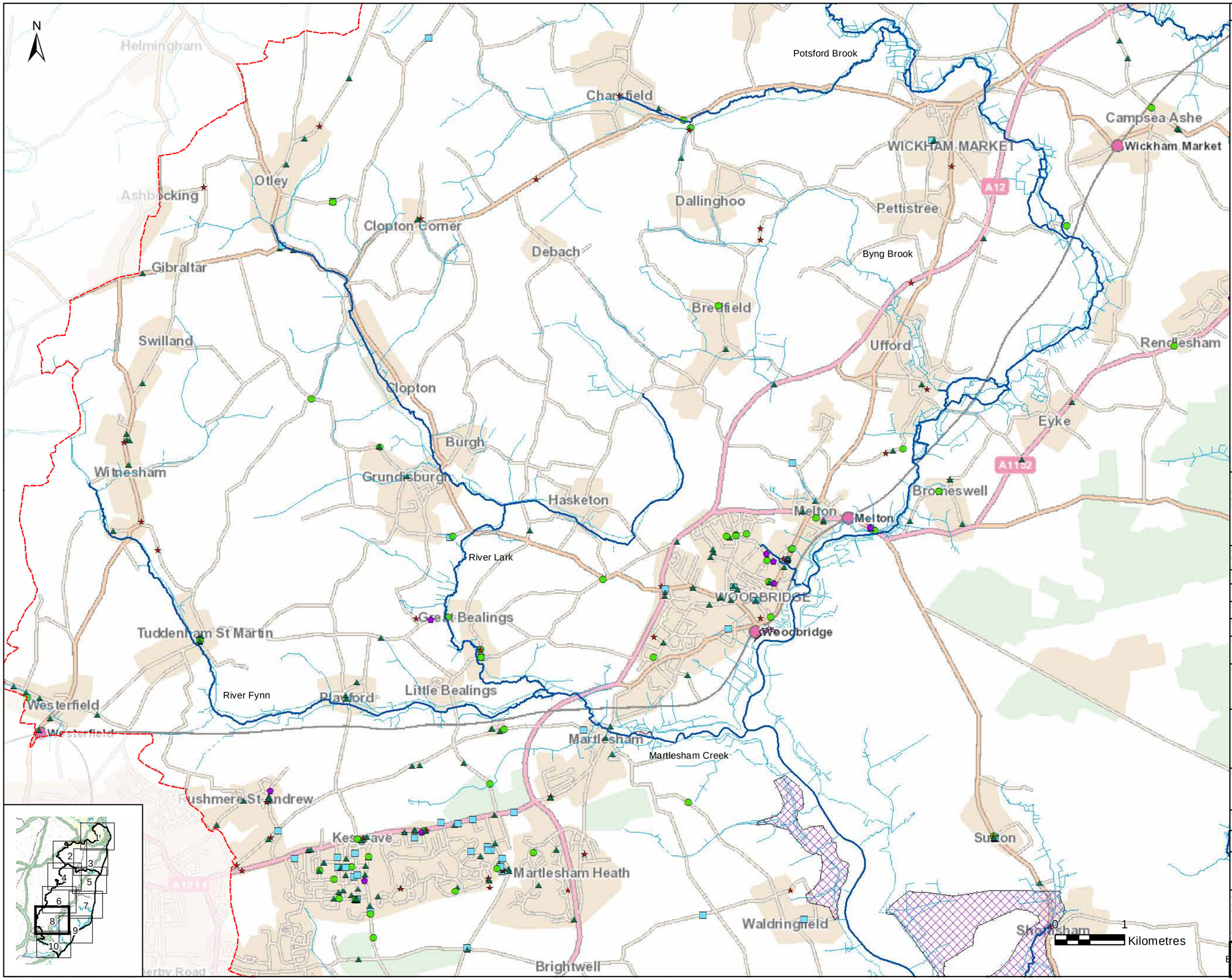

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Recorded Flood Outlines

Flood Incident Type

- Foul or Surface Sewer
- Groundwater
- Highways Drainage
- Other/Unknown
- Surface Water

Notes

This map shows the approximate location of historic records collected in the Suffolk County Council flood incidents database which identifies events where suface water, foul, land drainage, road drainage and river/tidal flooding has occurred.

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Fluvial/Tidal events removed	LM / MD	11.04.18	3
Note added	LM / MD	23.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Suffolk Coastal District Council; Waveney District Council, Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: HISTORIC FLOOD RECORDS SHEET 8 OF 10

Drawn	Checked	Approved	Date
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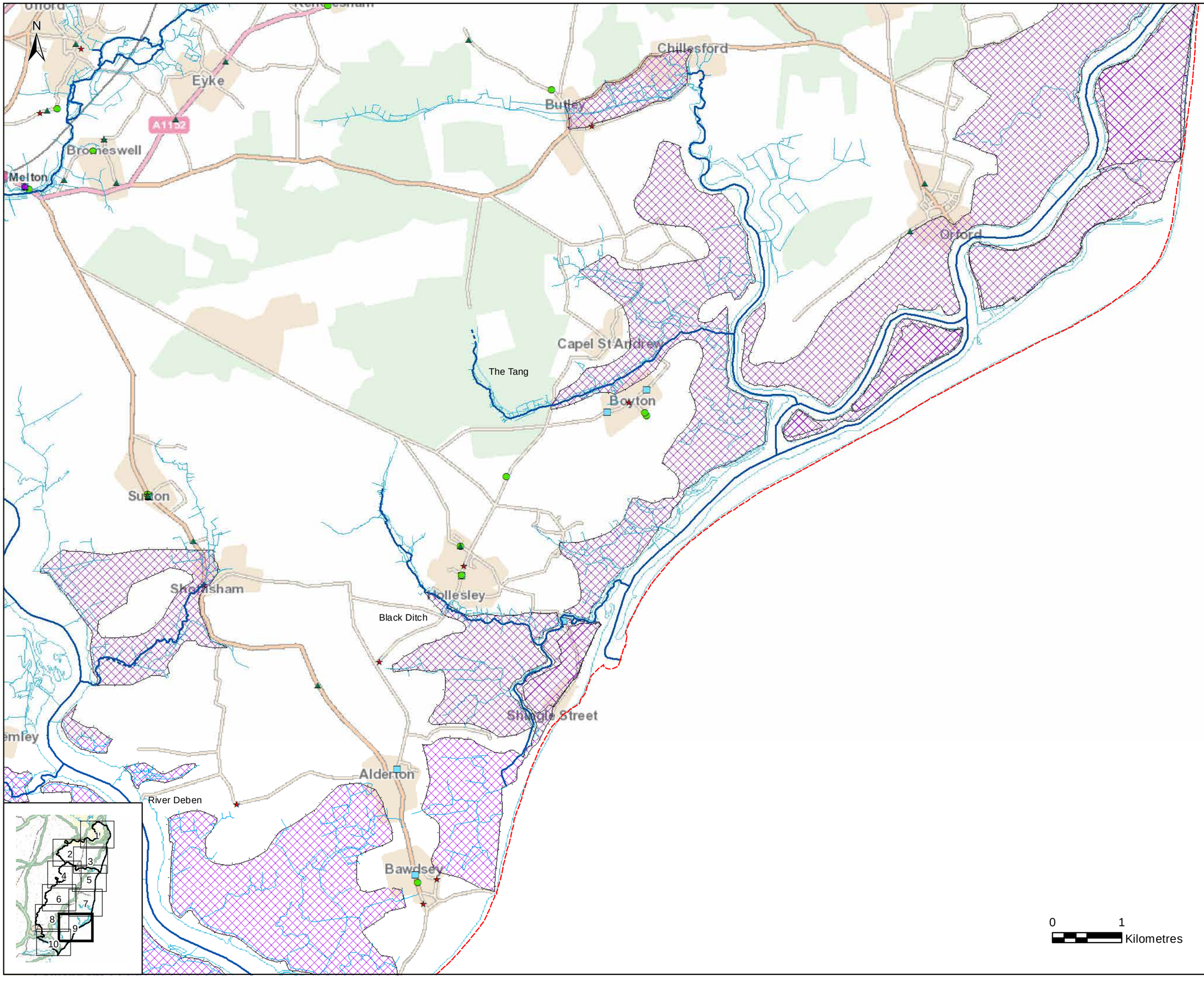
Rev.: 3



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Recorded Flood Outlines

Flood Incident Type

- Foul or Surface Sewer
- Groundwater
- Highways Drainage
- Other/Unknown
- Surface Water

Notes

This map shows the approximate location of historic records collected in the Suffolk County Council flood incidents database which identifies events where suface water, foul, land drainage, road drainage and river/tidal flooding has occurred.

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Fluvial/Tidal events removed	LM / MD	11.04.18	3
Note added	LM / MD	23.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: HISTORIC FLOOD RECORDS SHEET 9 OF 10

Drawn	Checked	Approved	Date
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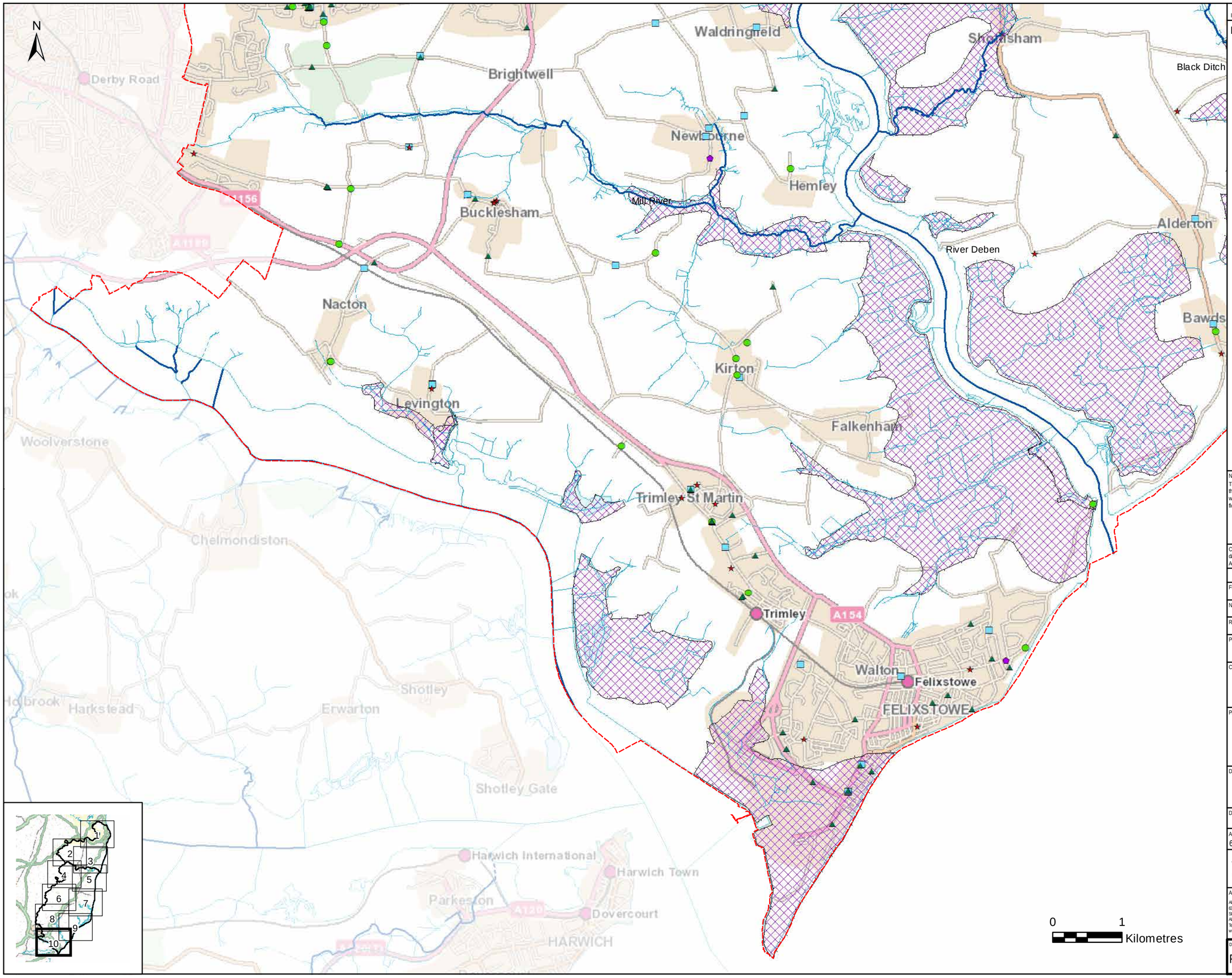
Drawing Number: FIGURE 04.9

Rev.: 3



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Recorded Flood Outlines

Flood Incident Type

- Foul or Surface Sewer
- Groundwater
- Highways Drainage
- Other/Unknown
- Surface Water

Notes

This map shows the approximate location of historic records collected in the Suffolk County Council flood incidents database which identifies events where suface water, foul, land drainage, road drainage and river/tidal flooding has occurred.

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Fluvial/Tidal events removed	LM / MD	11.04.18	3
Note added	LM / MD	23.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: HISTORIC FLOOD RECORDS SHEET 10 OF 10

Drawn	Checked	Approved	Date
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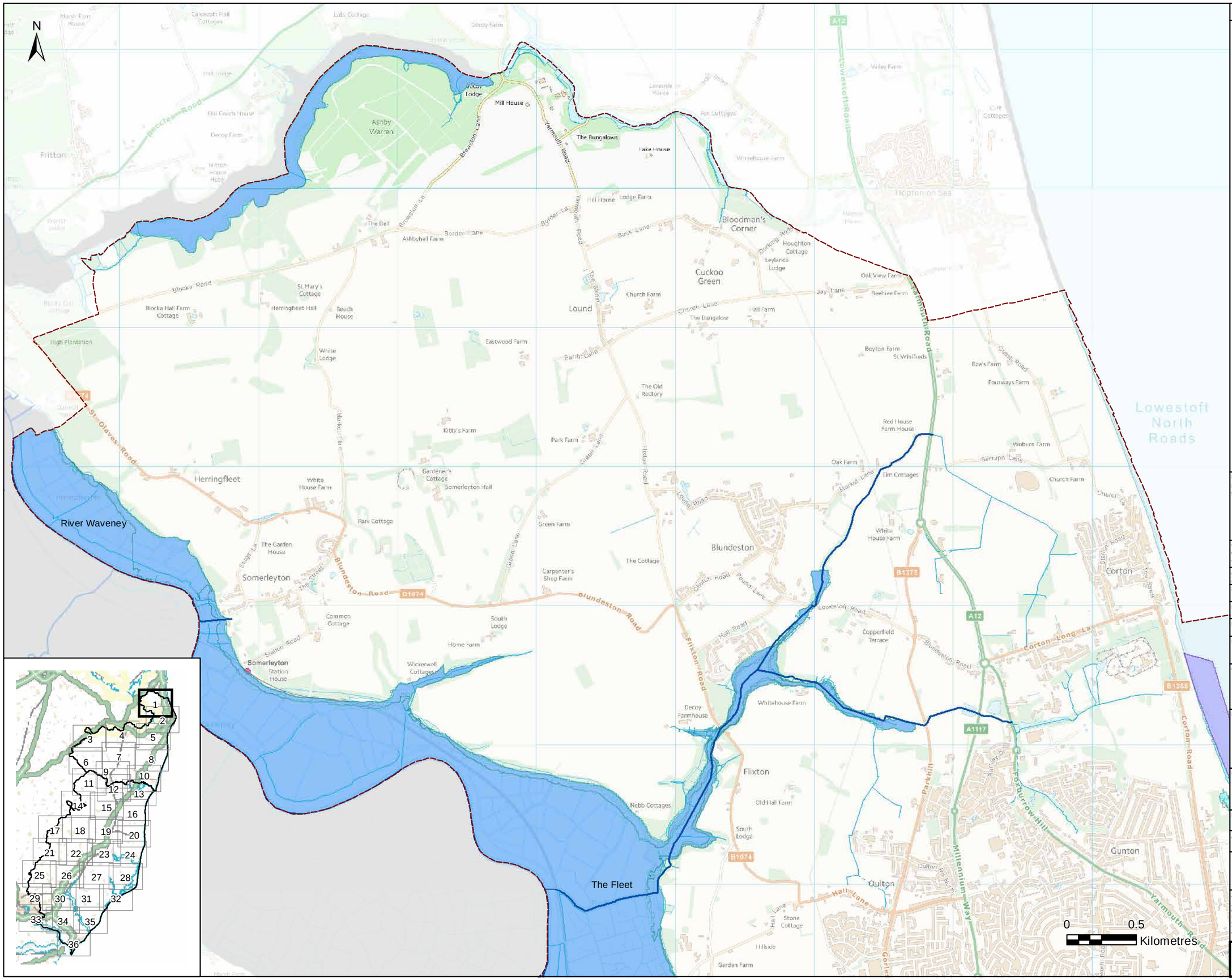

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefiting from Defences refer to flood-map-for-planning.service.gov.uk.

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Revision Details	By / Check	Check Date	Suffix
ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 1 OF 36

Drawn	Checked	Approved	Date
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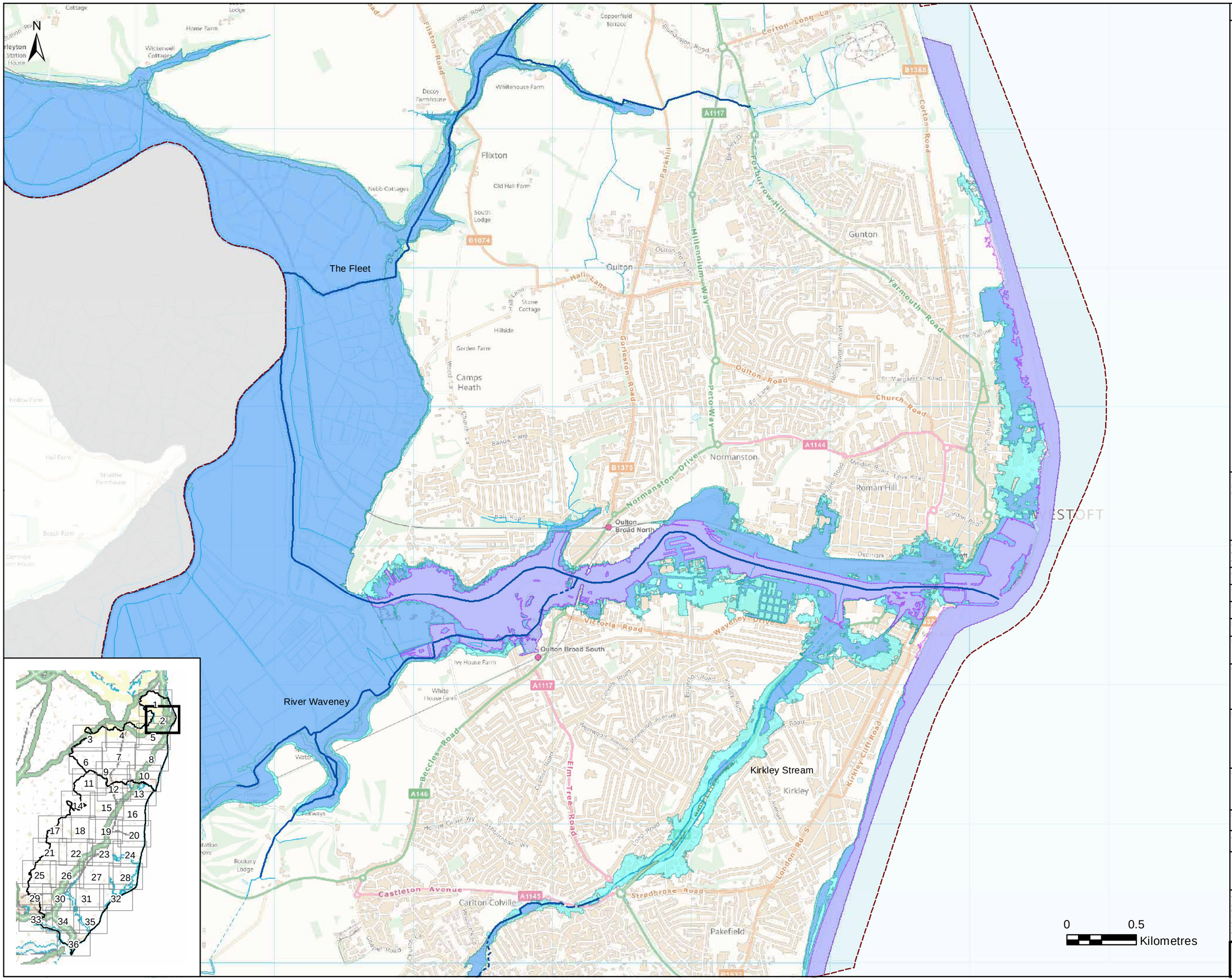

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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Revision Details	By	Check	Date	Suffix
ABDs removed. Blyth and Deben and Flood Zones amended.	LM	MD	18.04.18	4
New River Deben model added.	LM	MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM	MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 2 OF 36

Drawn	Checked	Approved	Date
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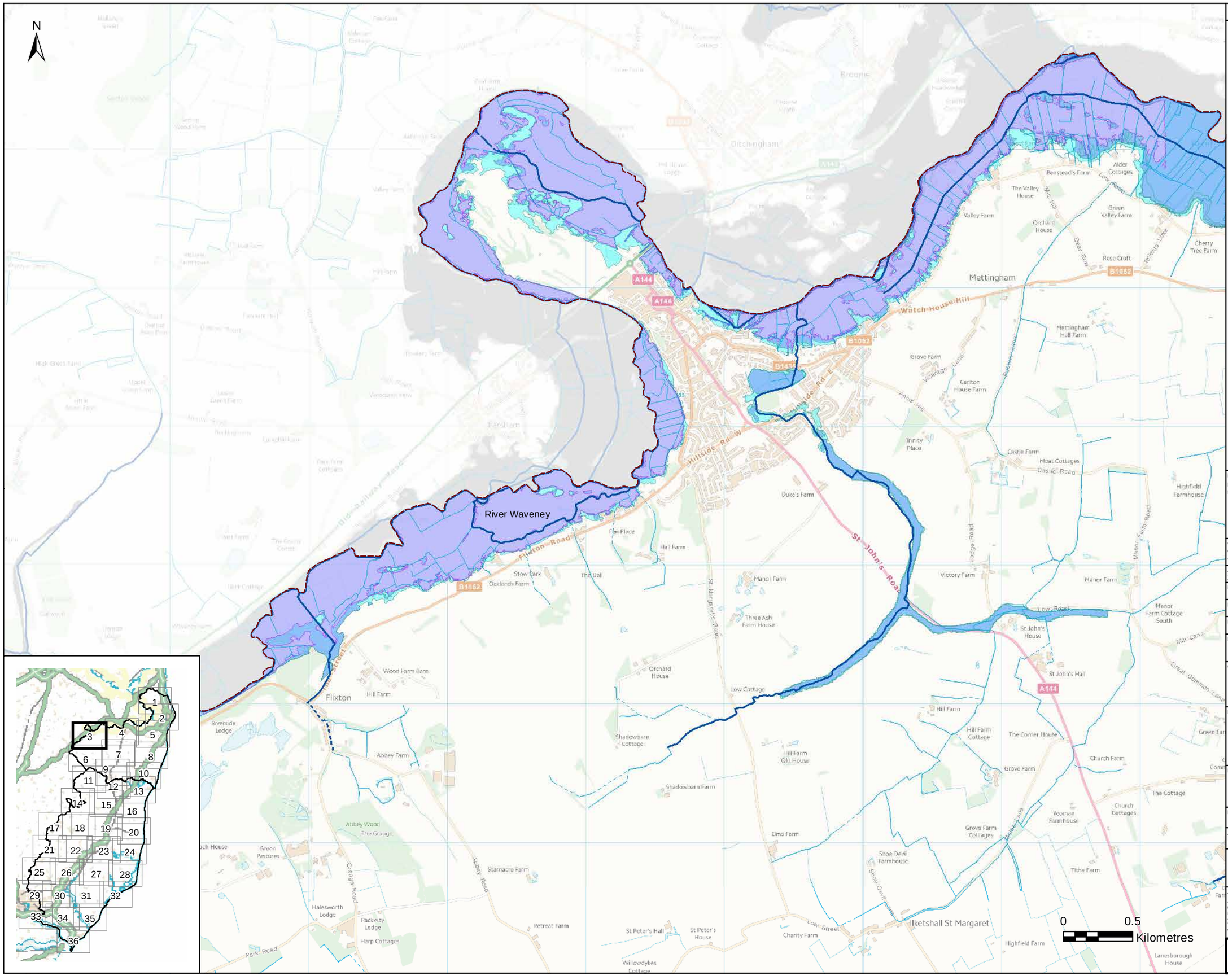

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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Revision Details	By / Check	Check Date	Suffix
ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 3 OF 36

Drawn	Checked	Approved	Date
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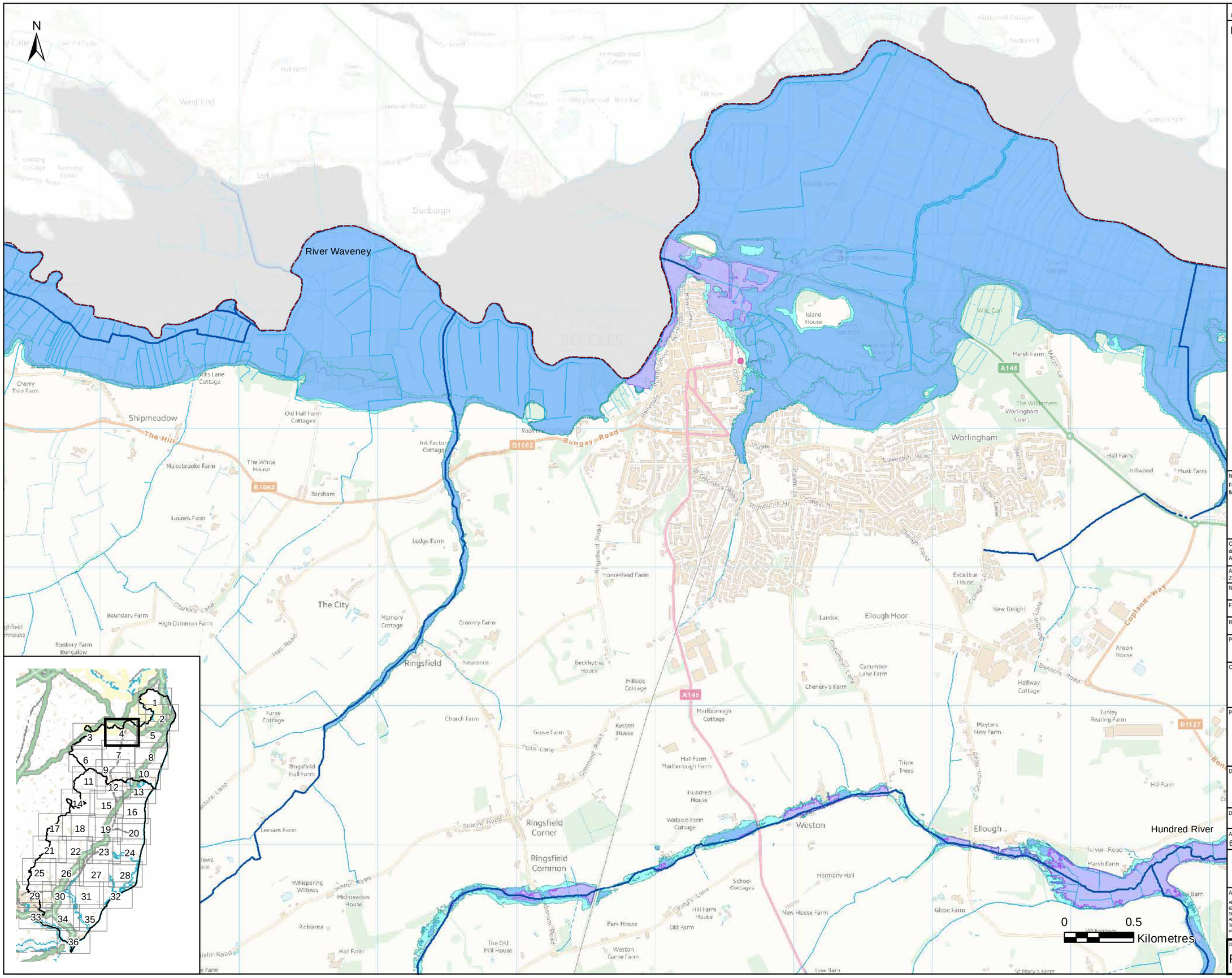

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 4 OF 36

Drawn	Checked	Approved	Date
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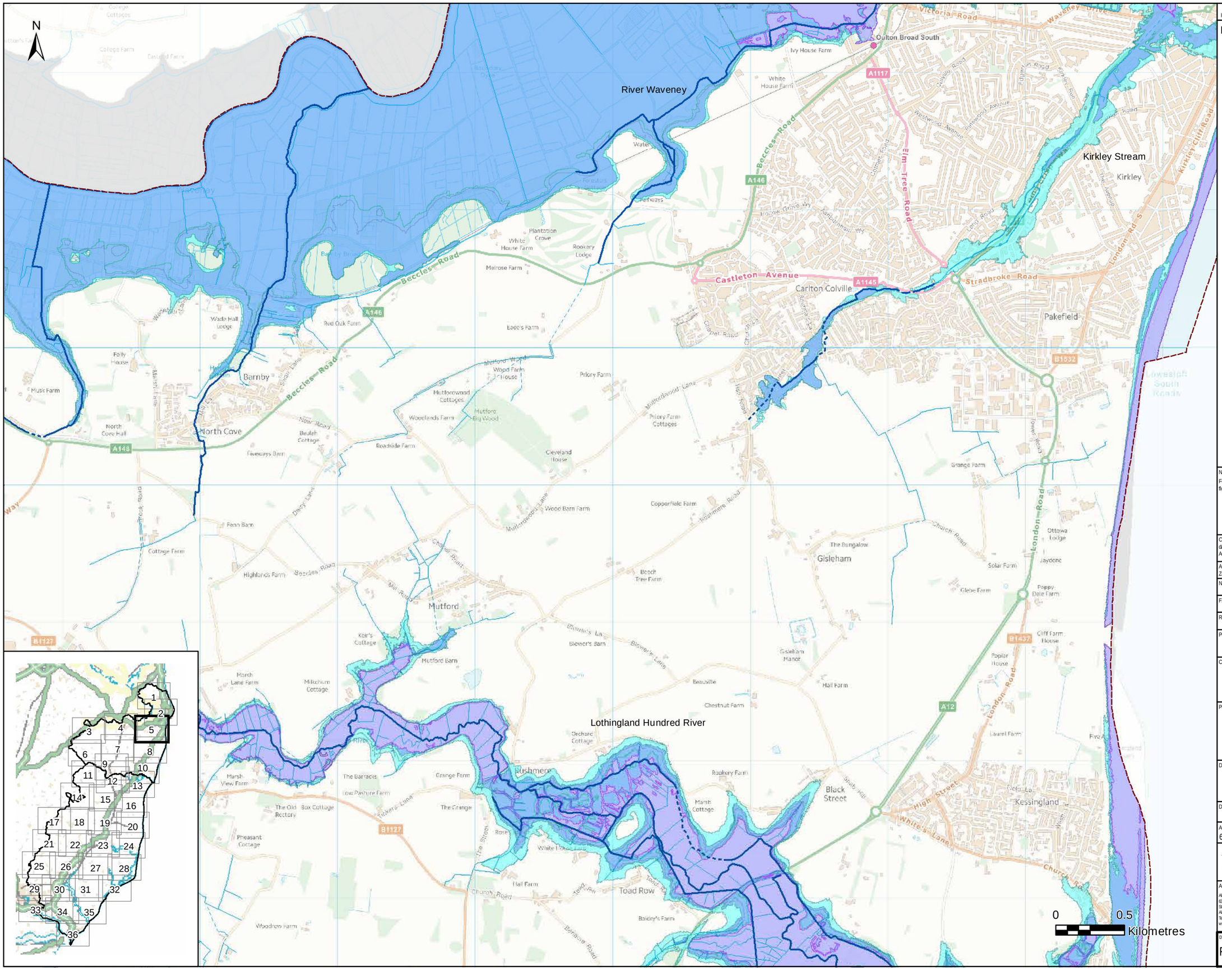

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 5 OF 36

Drawn	Checked	Approved	Date
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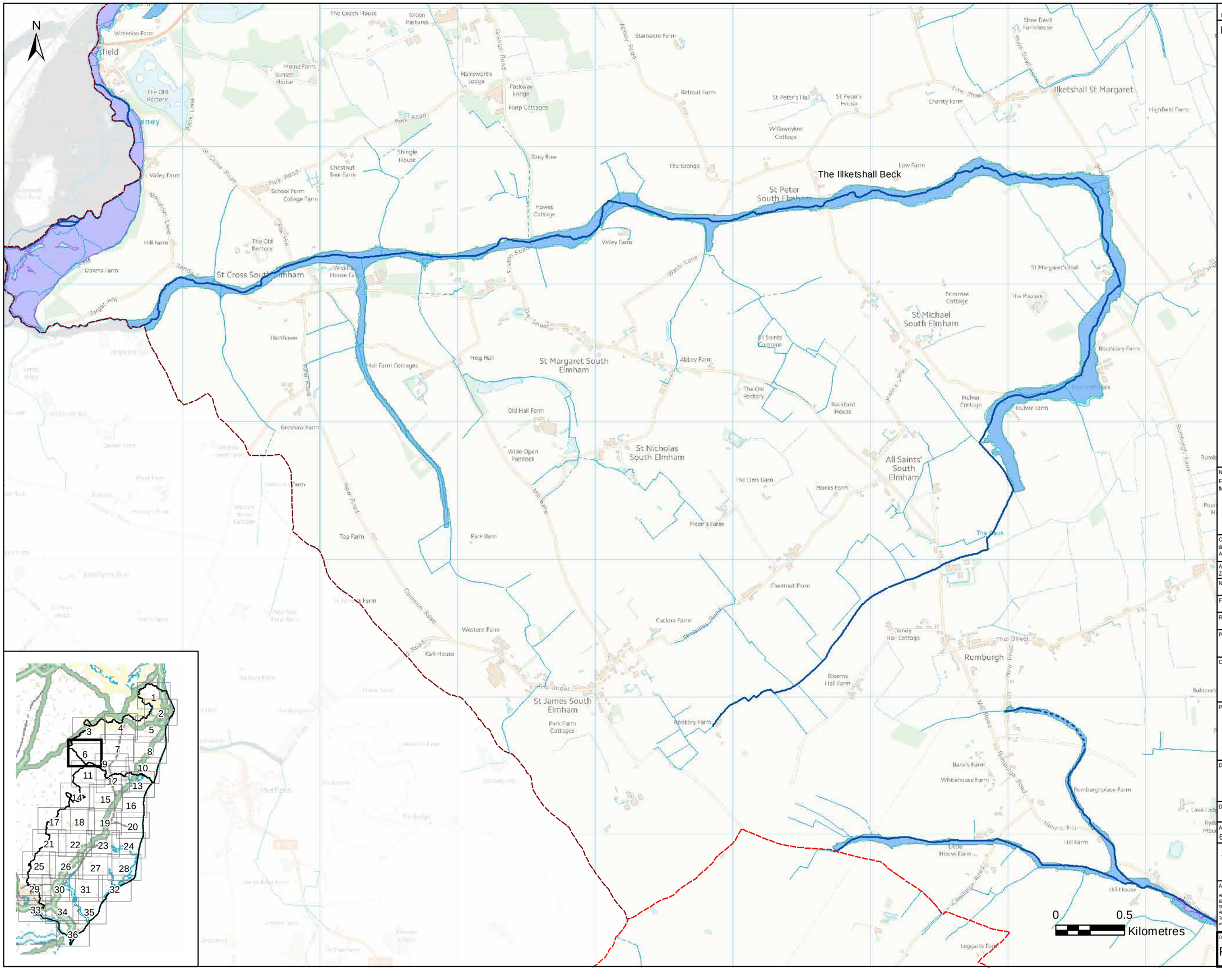

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 6 OF 36

Drawn	Checked	Approved	Date
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Drawing Number: FIGURE 05.6

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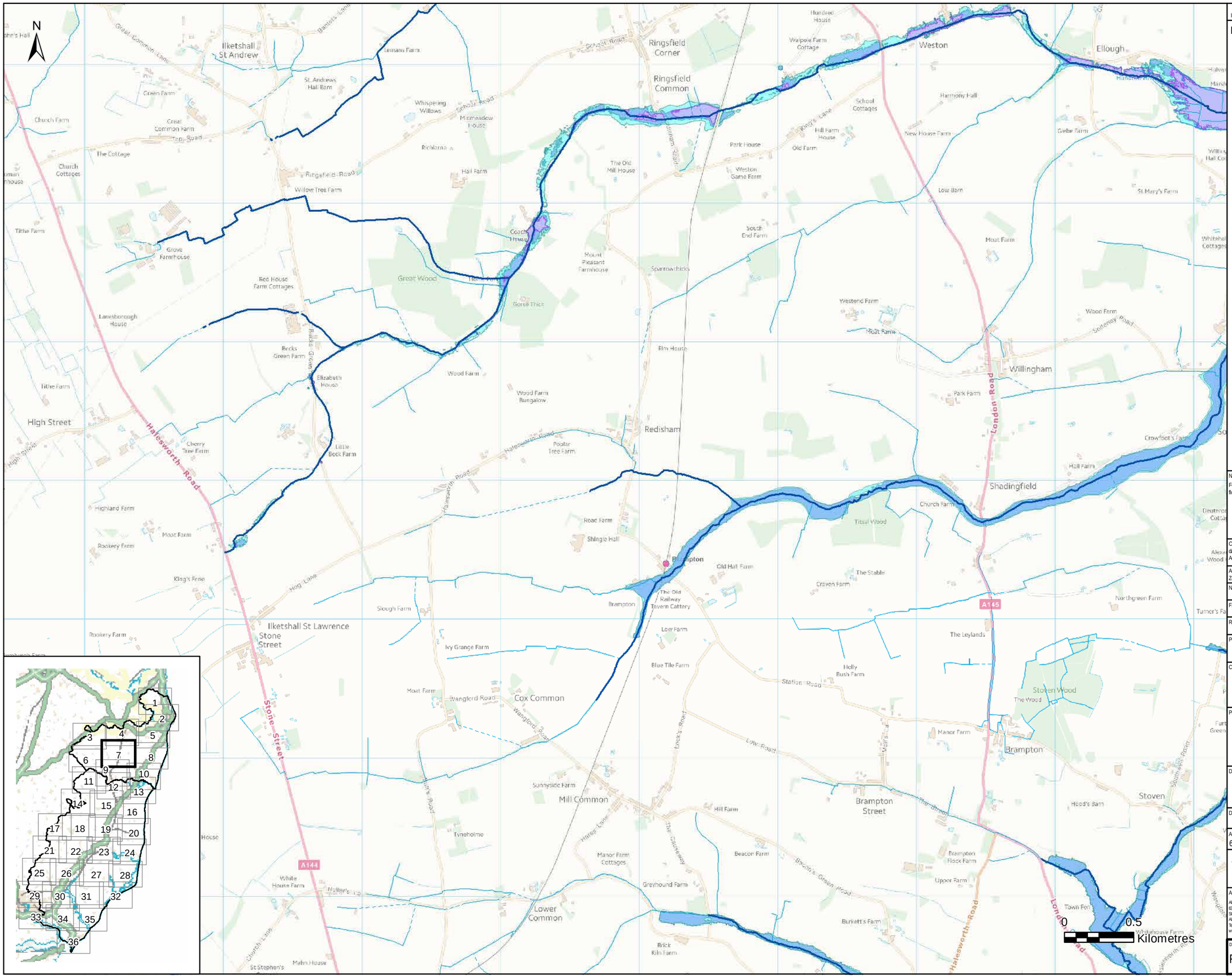

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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Revision Details	By / Check	Check Date	Suffix
ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 7 OF 36

Drawn	Checked	Approved	Date
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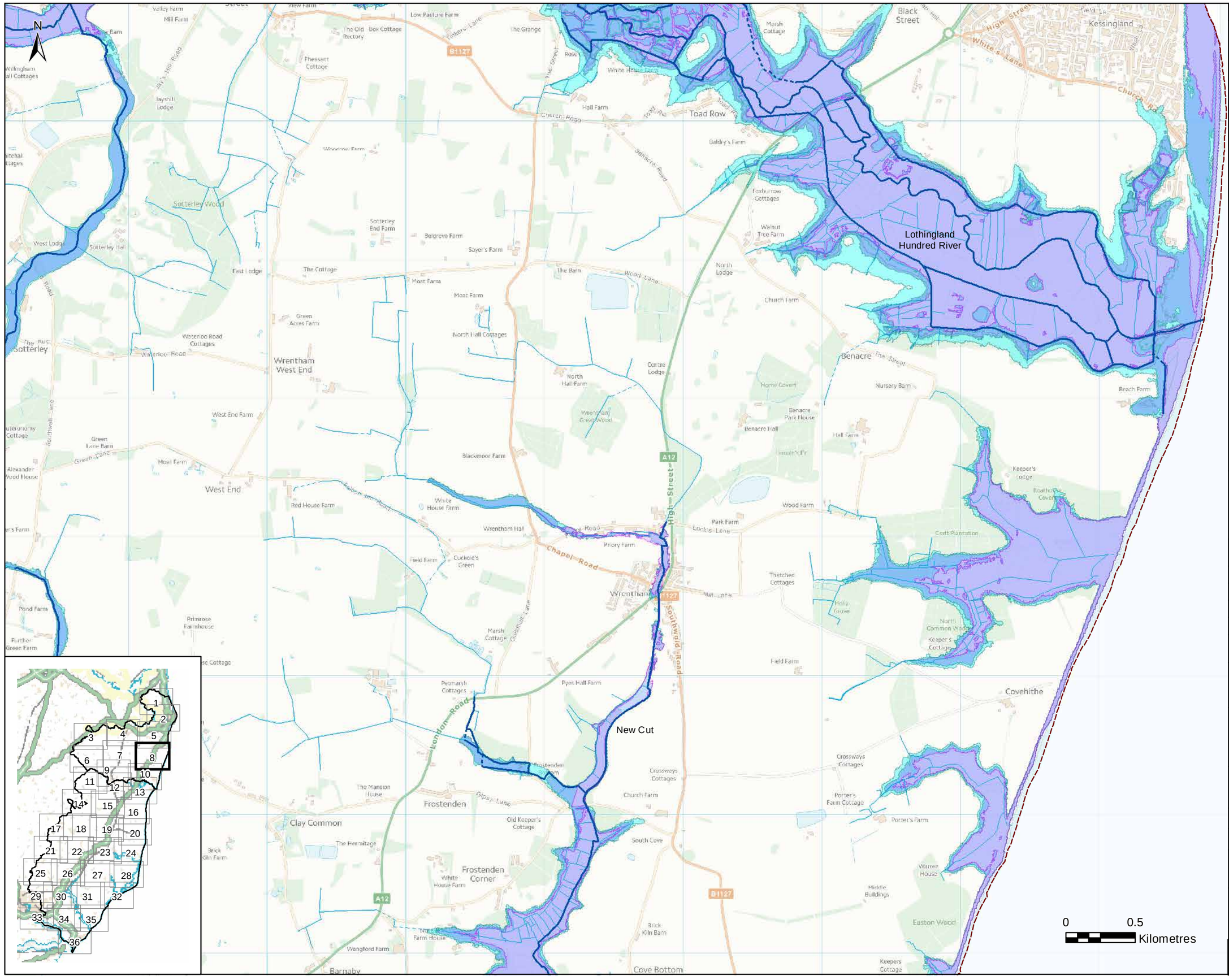

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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Revision Details	By / Check	Check Date	Suffix
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New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 8 OF 36

Drawn	Checked	Approved	Date
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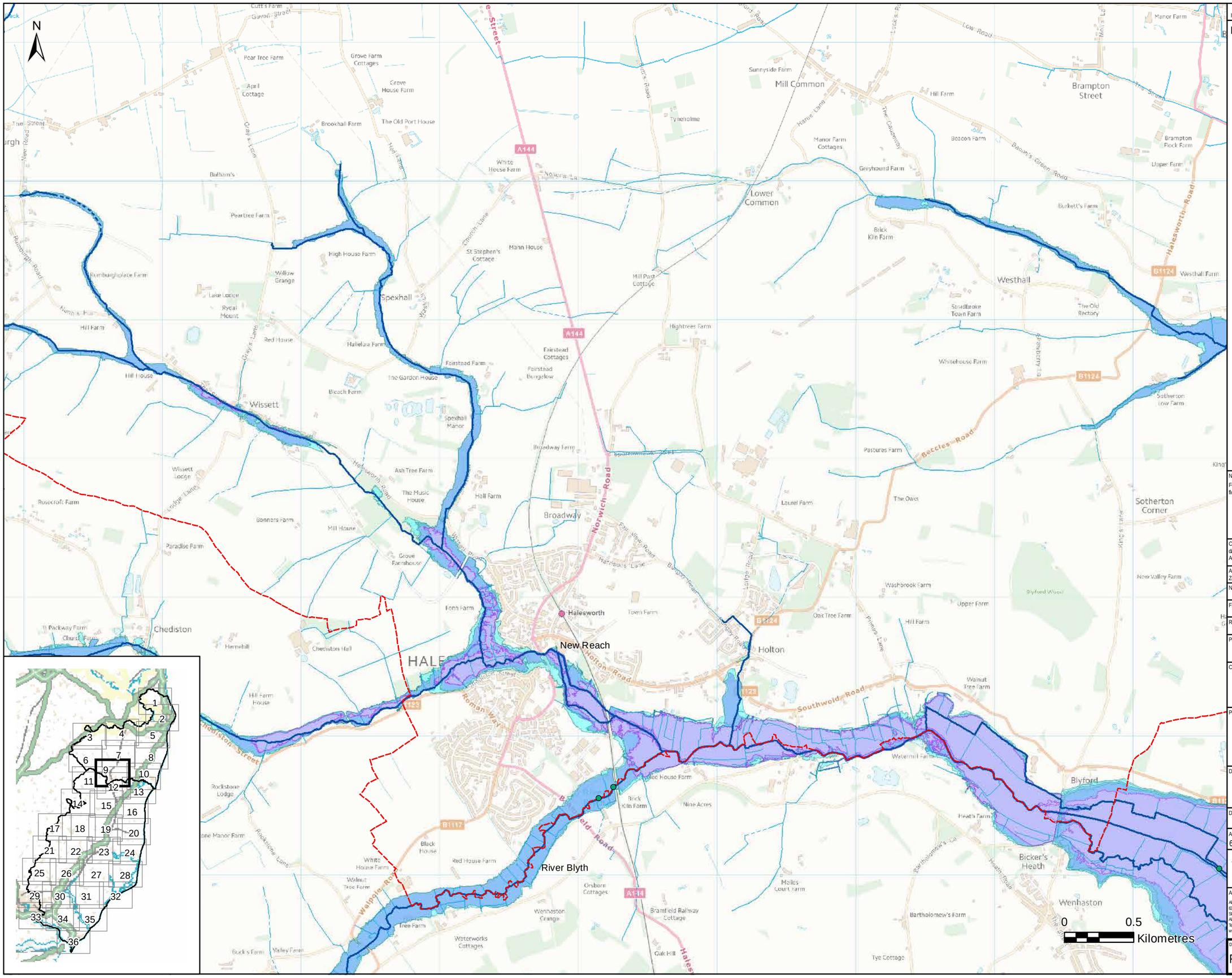

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 9 OF 36

Drawn	Checked	Approved	Date
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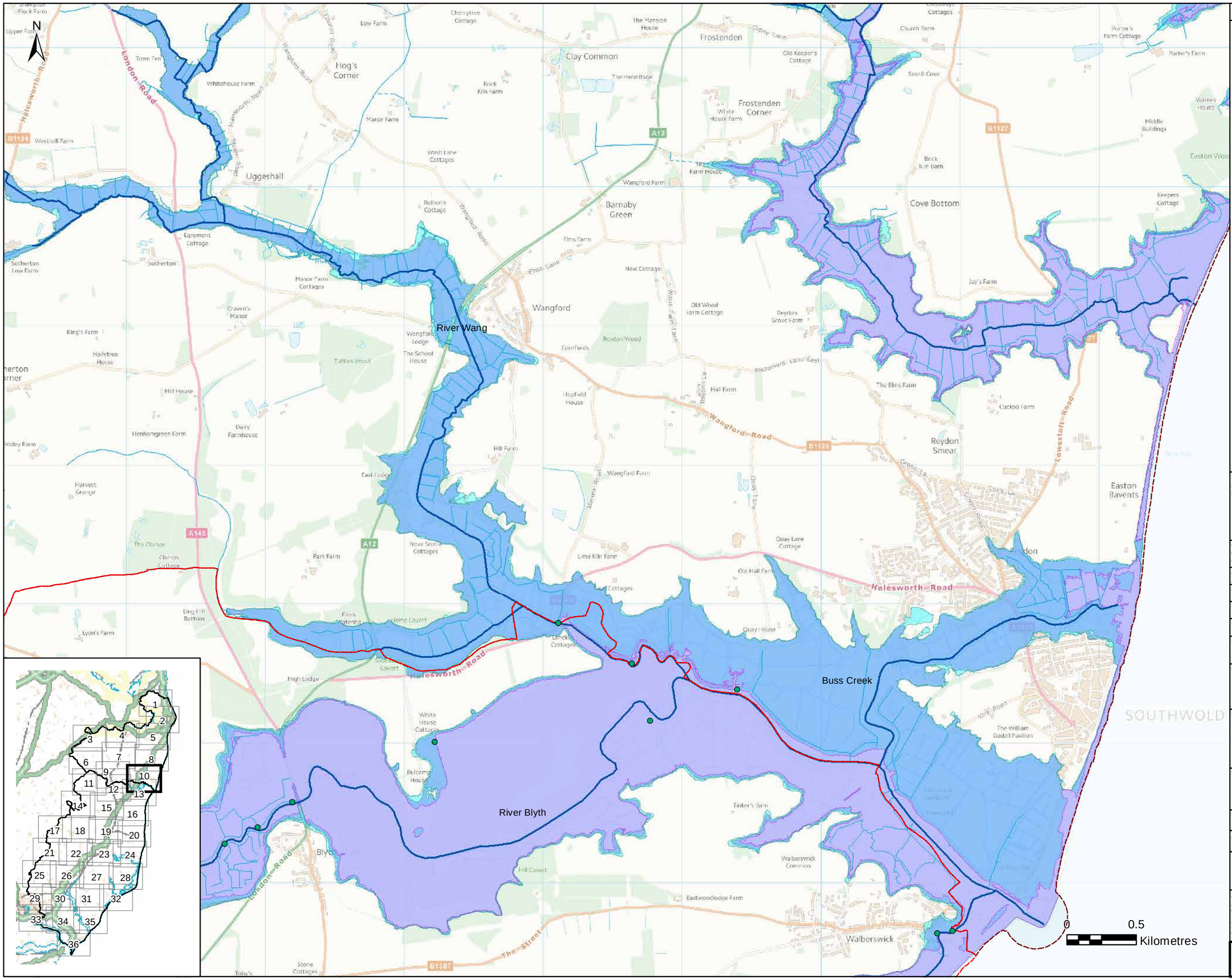

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 10 OF 36

Drawn	Checked	Approved	Date
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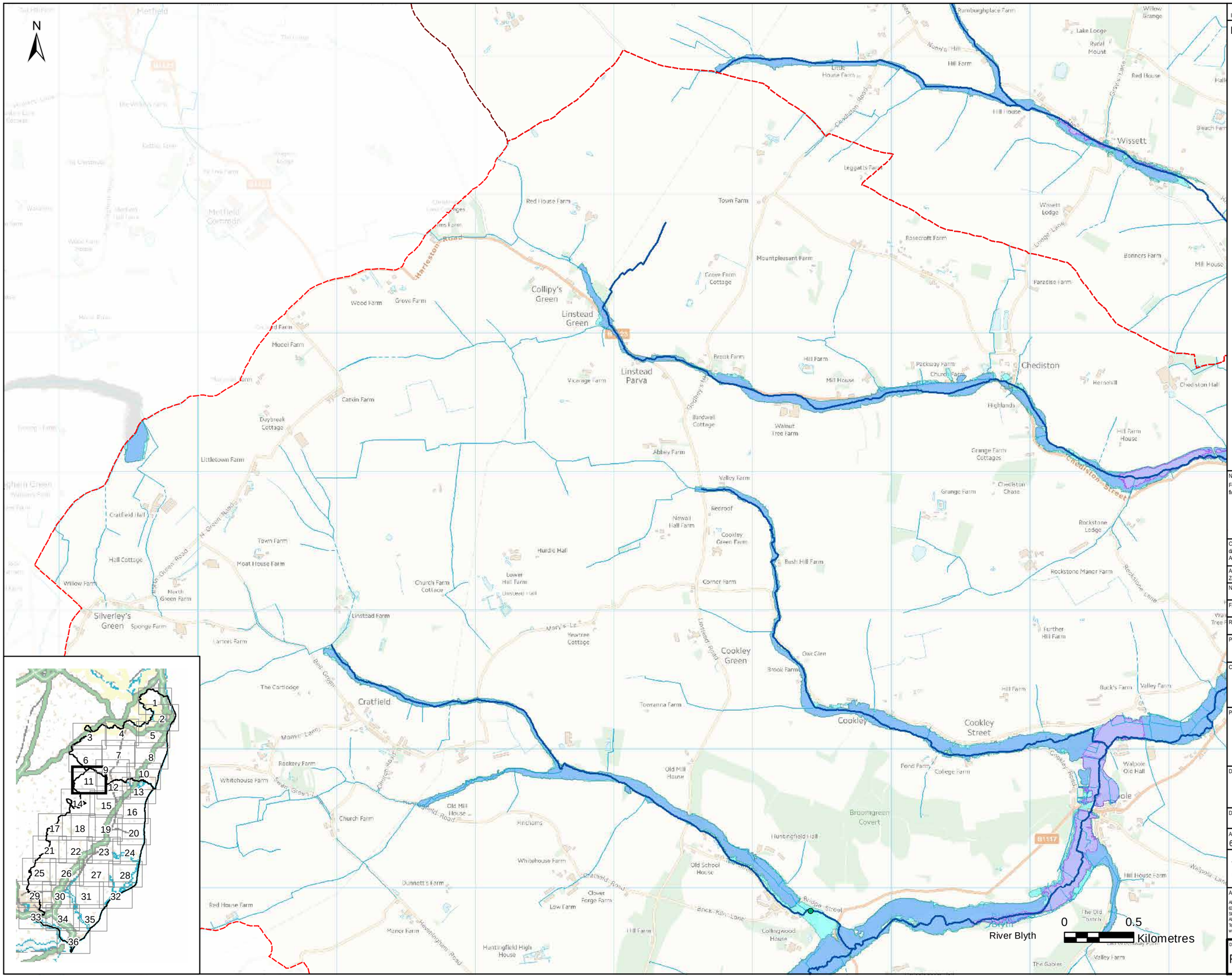

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.1117	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 11 OF 36

Drawn	Checked	Approved	Date
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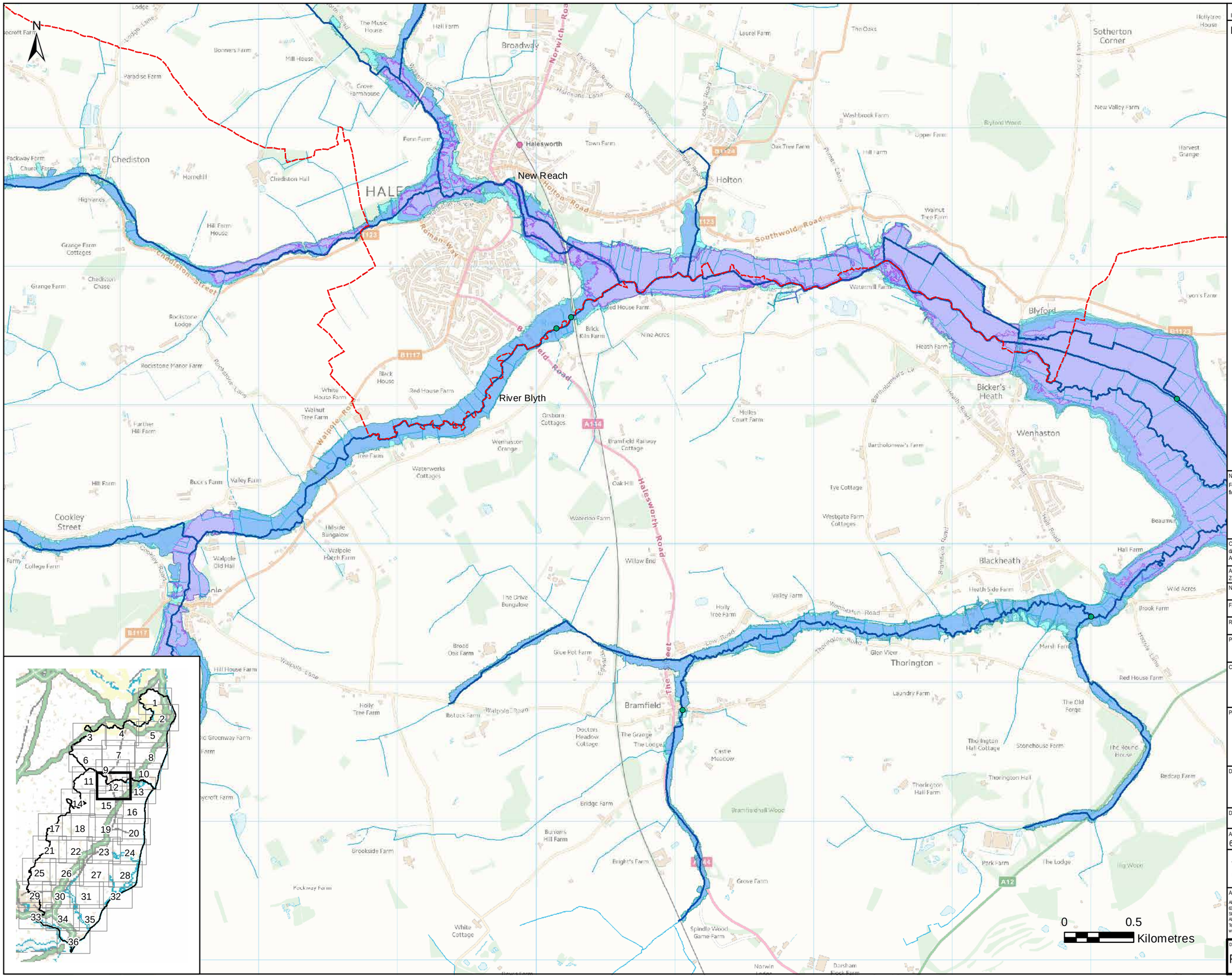

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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ABDs removed. Blyth and Deben and Flood Zones amended.	LM	MD	18.04.18	4
New River Deben model added.	LM	MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM	MD	27.11.17	2
Revision Details				

Purpose of Issue

FINAL

Client

Waveney District Council
Serving the Community

Project Title

EAST SUFFOLK COUNCILS
STRATEGIC FLOOD
RISK ASSESSMENT

Drawing Title

RISK OF FLOODING
FROM RIVERS AND SEA
SHEET 12 OF 36

Drawn	Checked	Approved	Date
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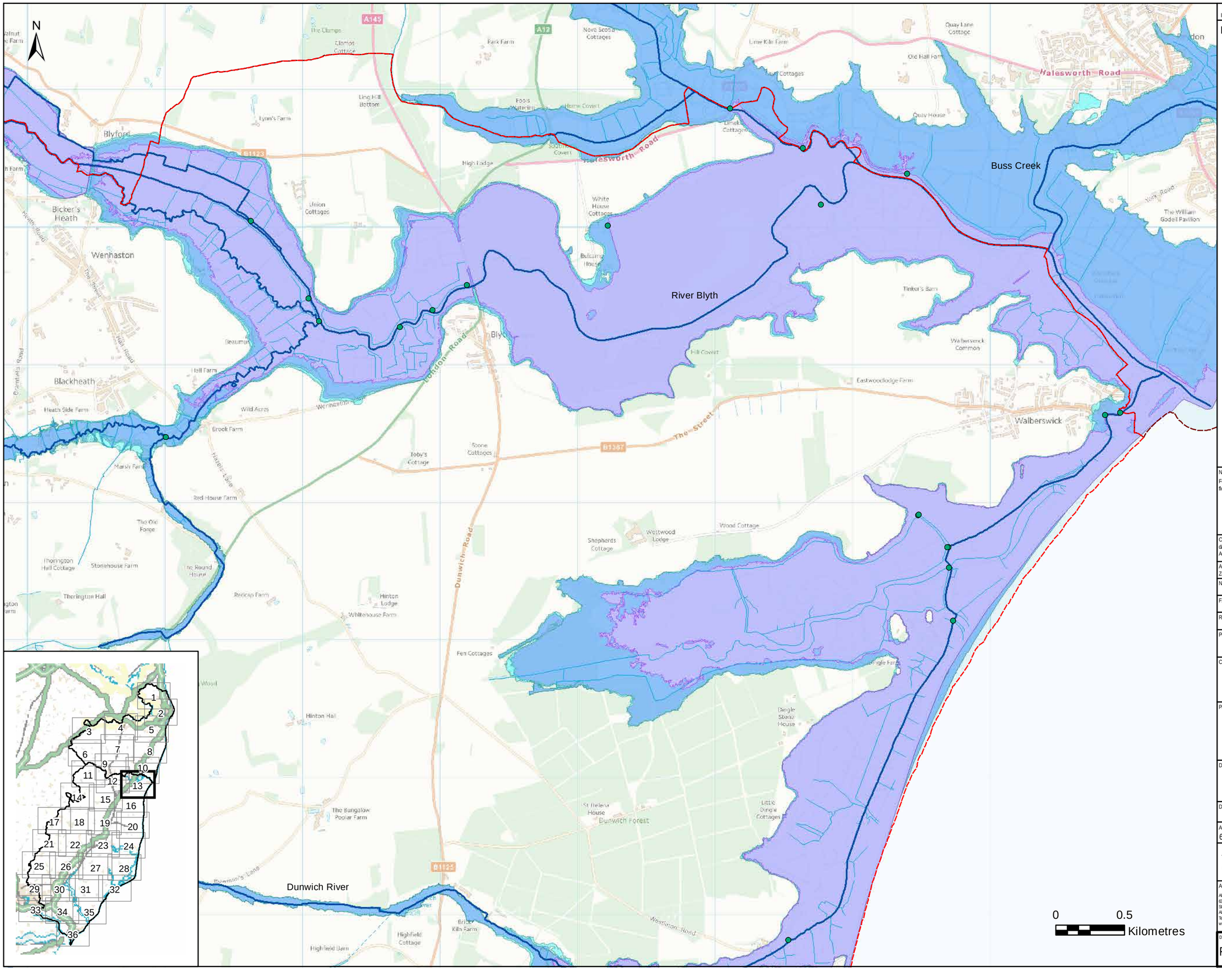

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

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ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 13 OF 36

Drawn	Checked	Approved	Date
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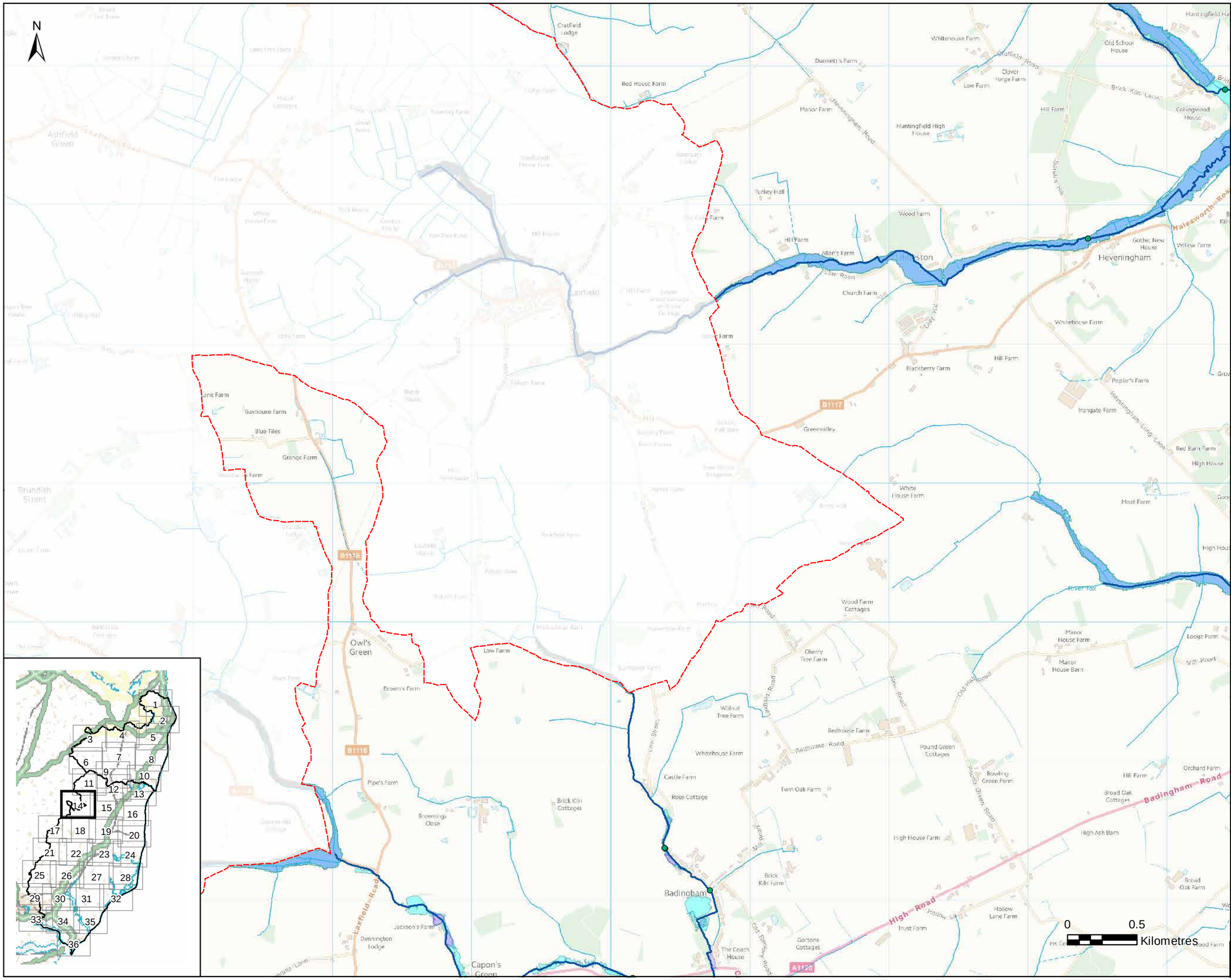

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

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ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 14 OF 36

Drawn	Checked	Approved	Date
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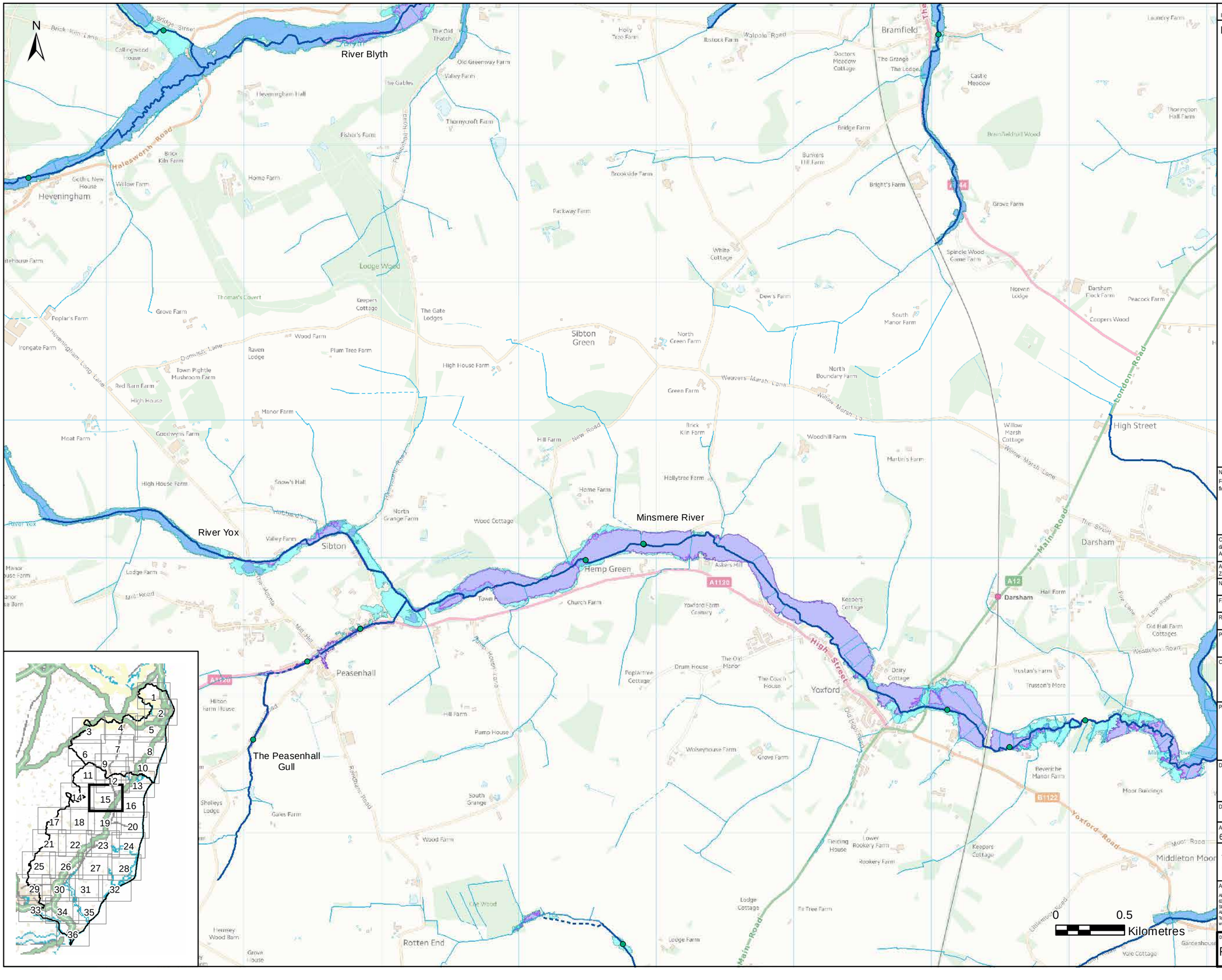

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

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New River Deben model added.	LM	MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM	MD	27.11.17	2
Revision Details				

Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 15 OF 36

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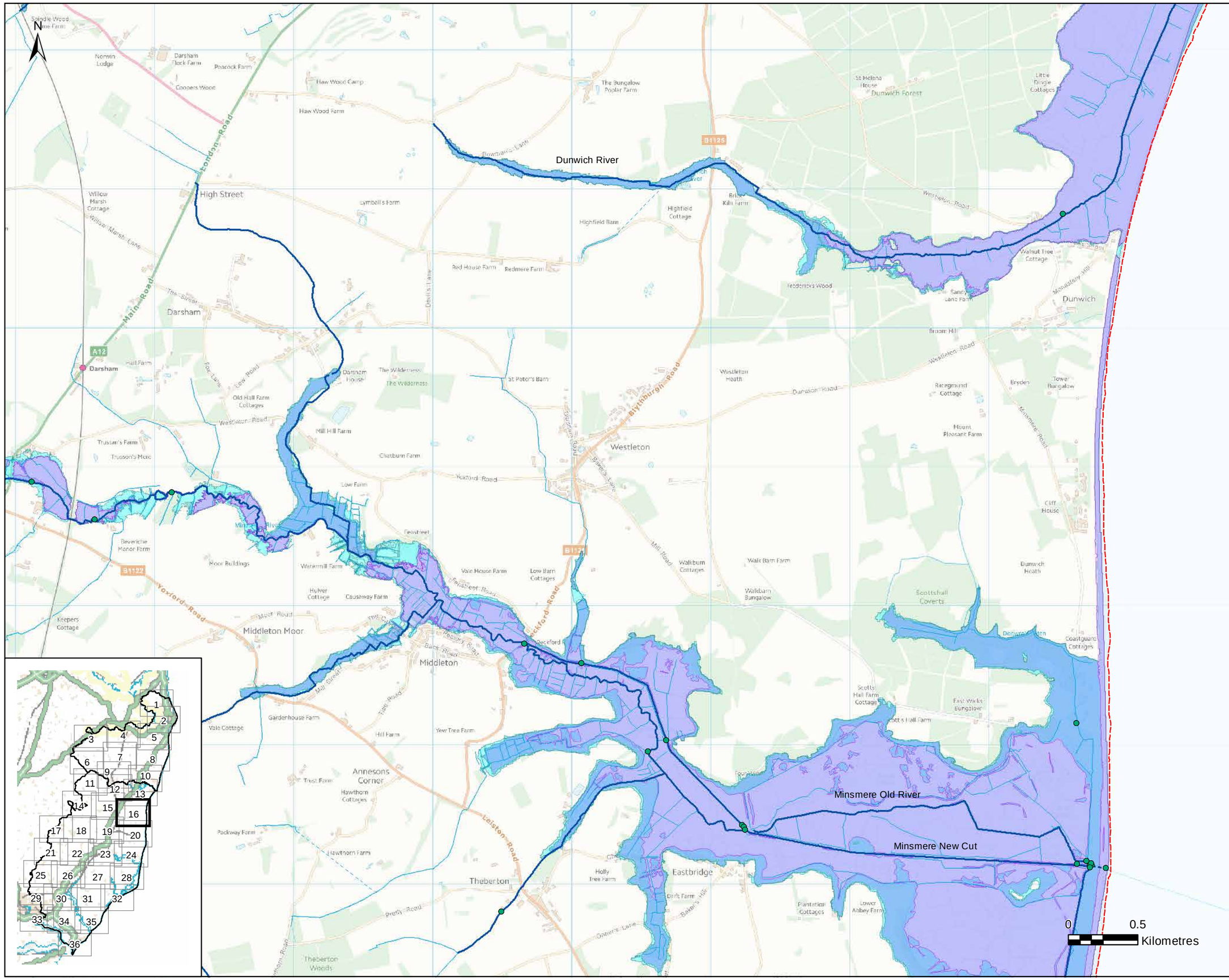

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

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New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 16 OF 36

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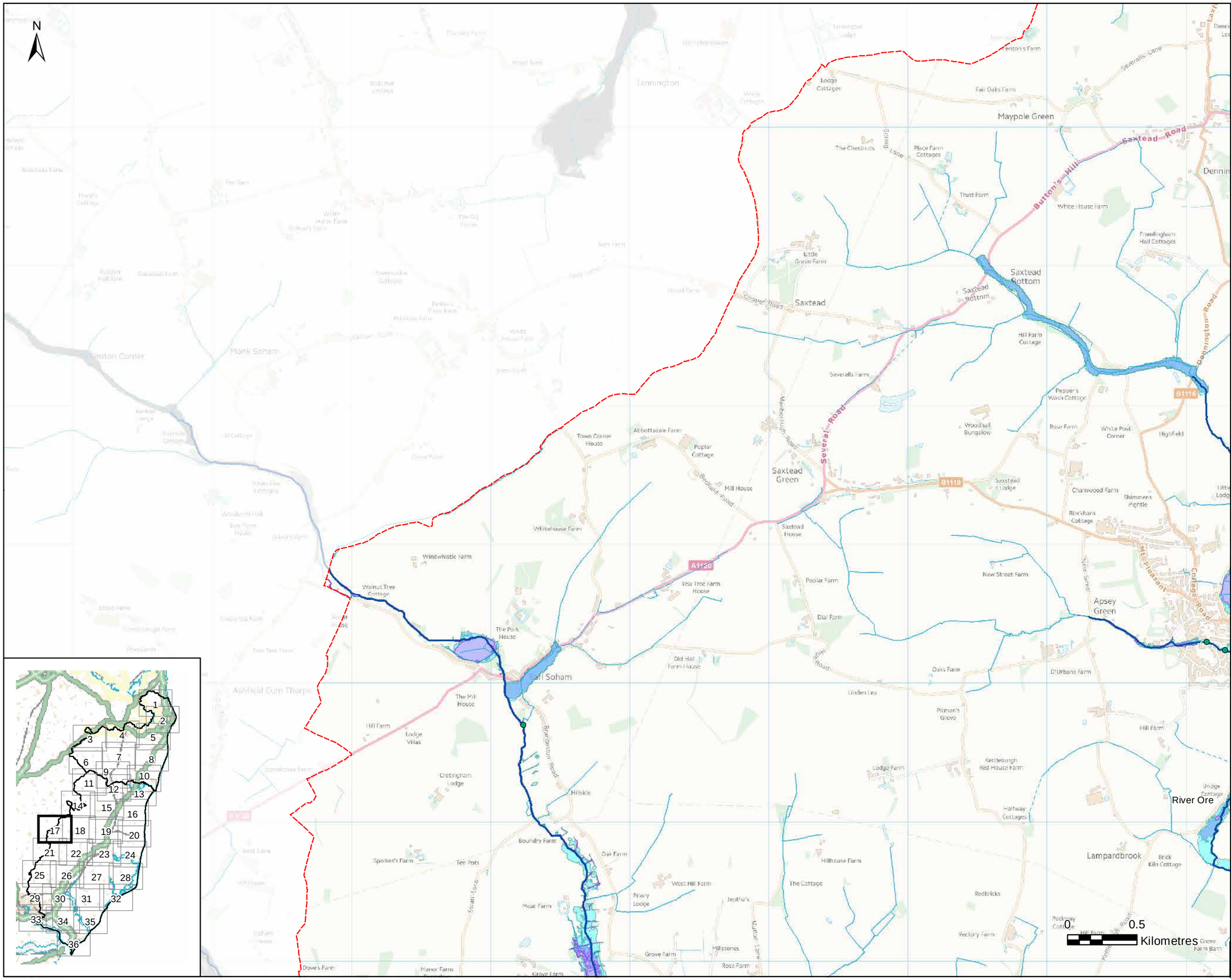

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

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ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
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FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council, Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 17 OF 36

Drawn	Checked	Approved	Date
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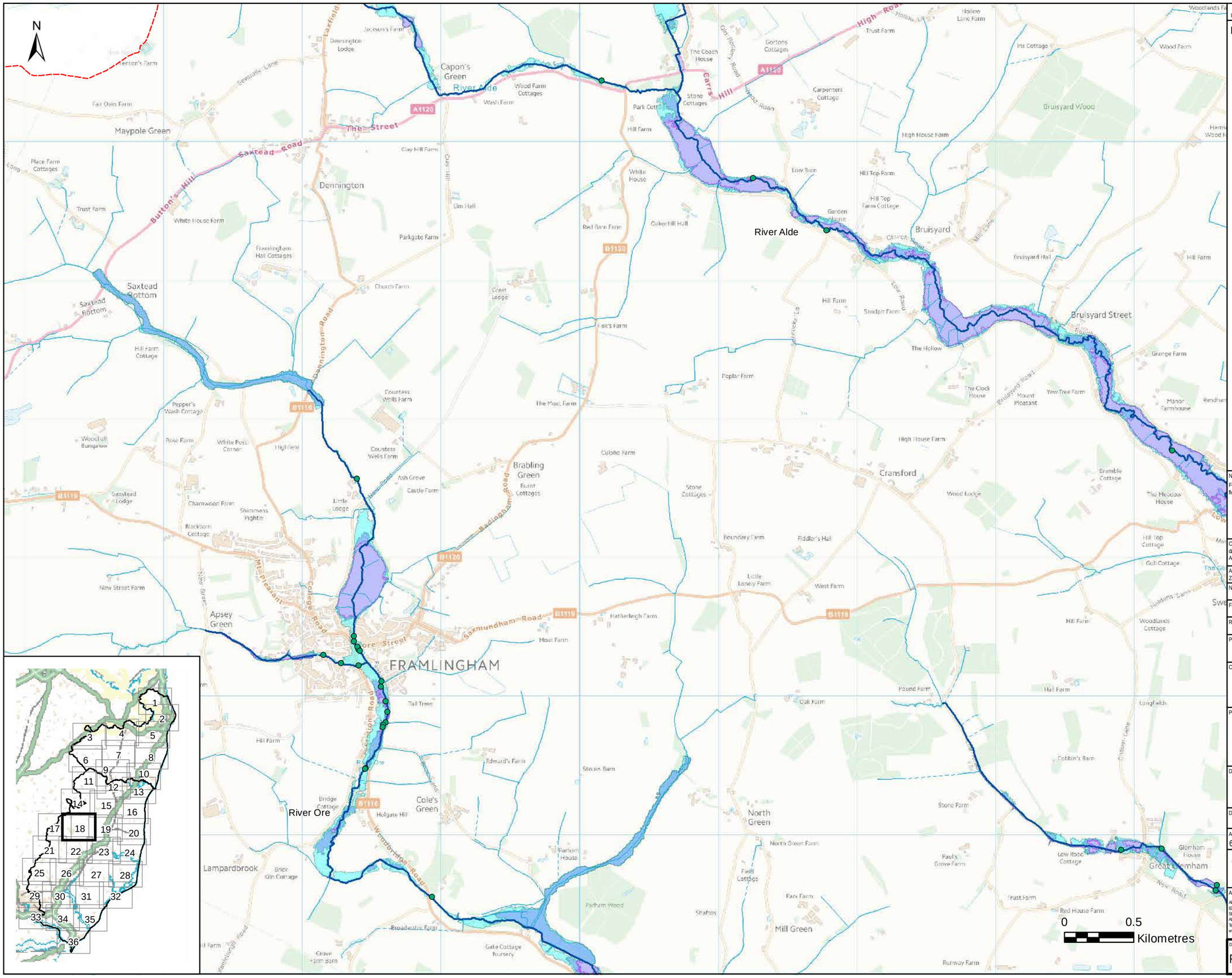

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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	By	Check	Date	
ABDs removed. Blyth and Deben and Flood Zones amended.	LM	MD	18.04.18	4
New River Deben model added.	LM	MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM	MD	27.11.17	2
Revision Details	By	Check	Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 18 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	18/04/2018

AECOM Internal Project No.: 60520248

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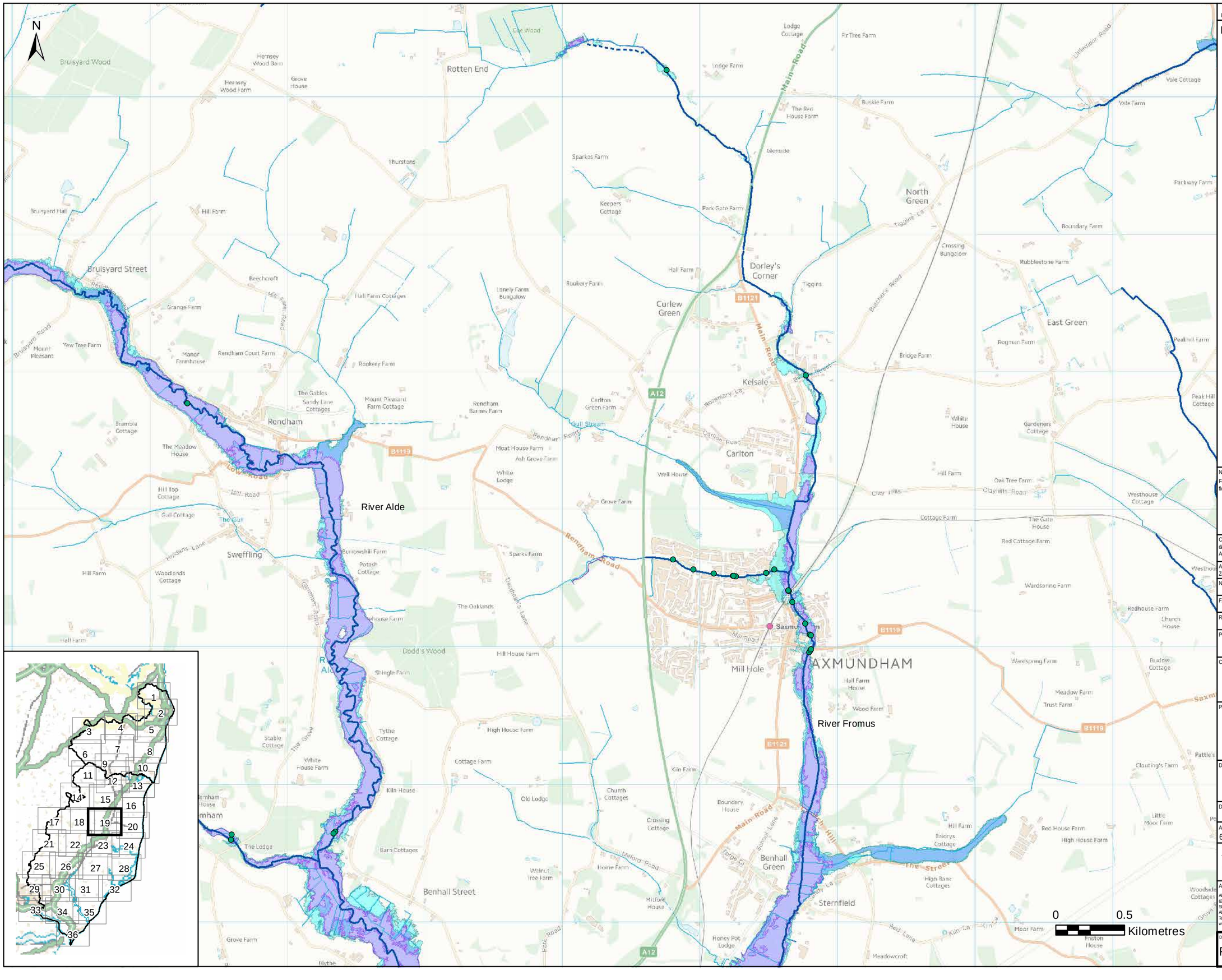

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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Revision Details	By / Check	Check Date	Suffix
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New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 19 OF 36

Drawn	Checked	Approved	Date
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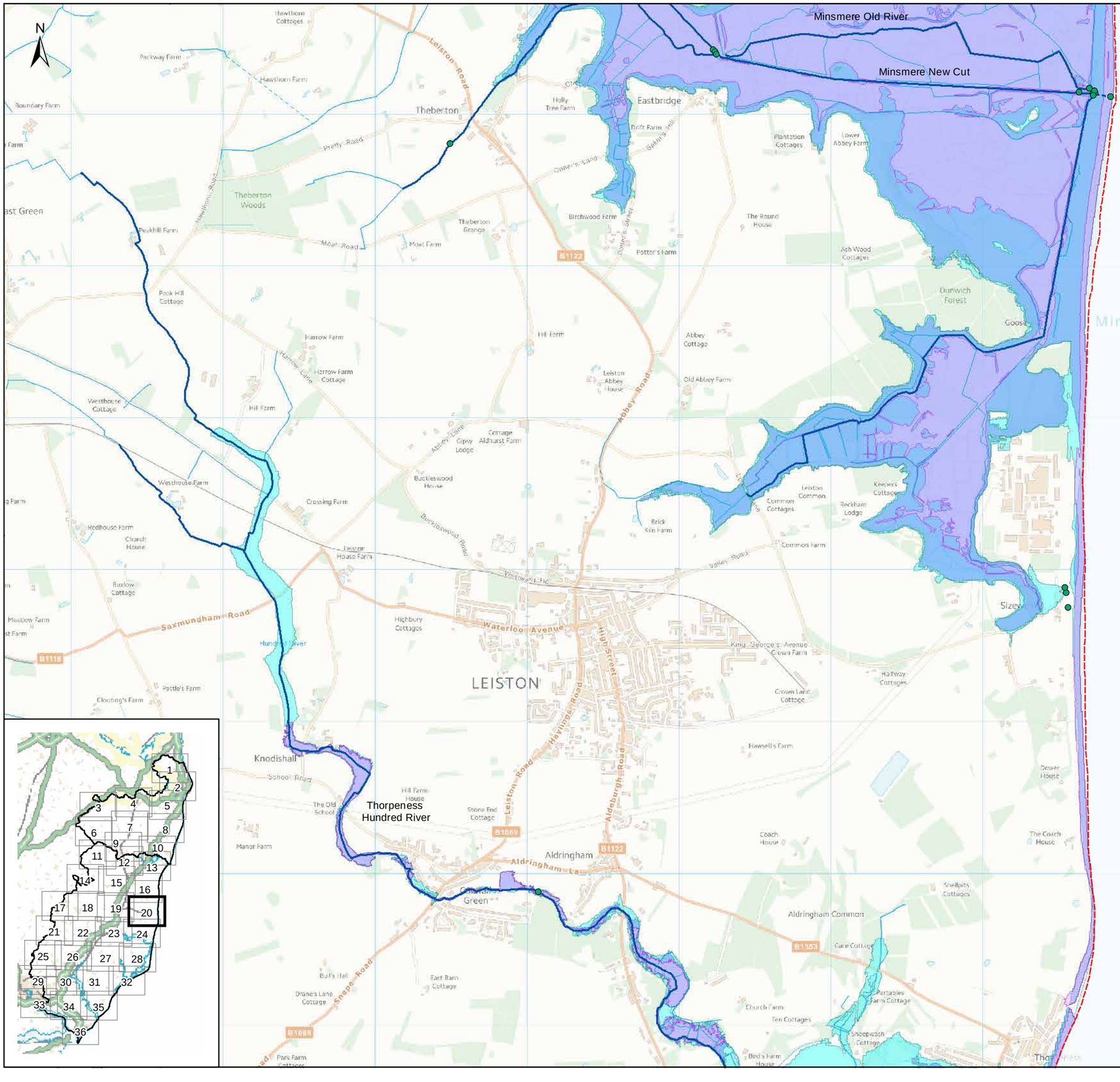

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
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FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 20 OF 36

Drawn	Checked	Approved	Date
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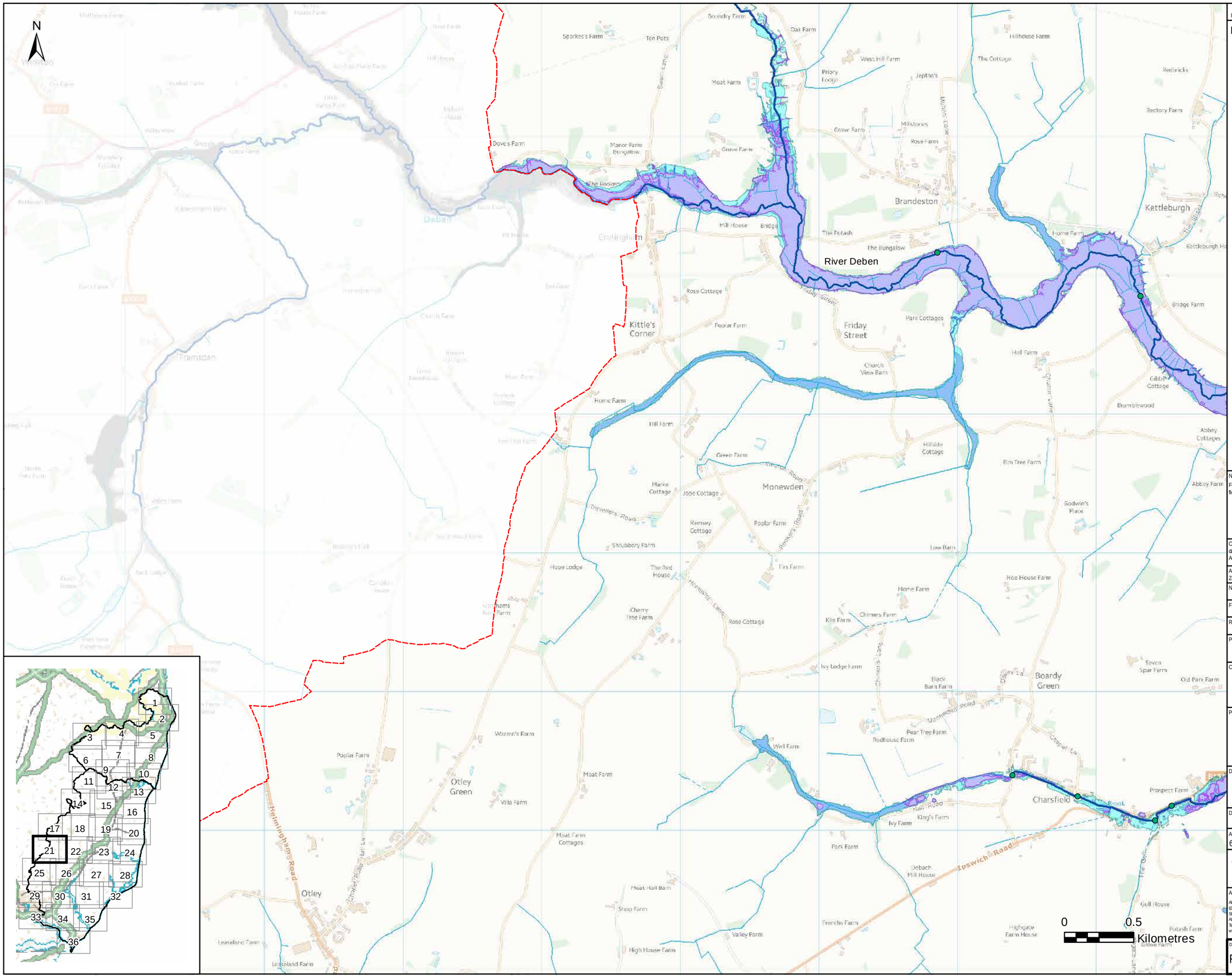

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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Revision Details	By / Check	Check Date	Suffix
ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 21 OF 36

Drawn	Checked	Approved	Date
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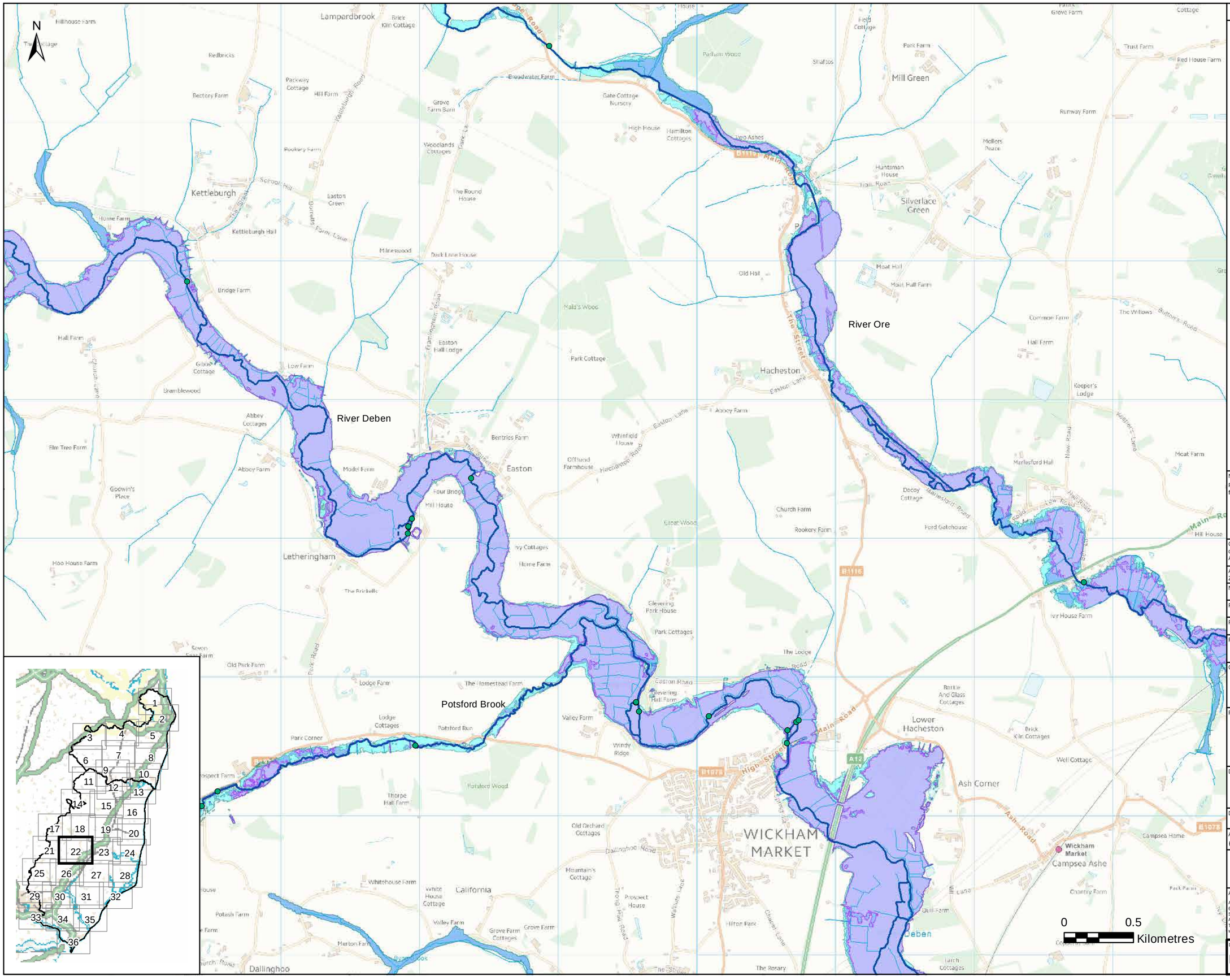

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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Revision Details	By / Check	Check Date	Suffix
ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 22 OF 36

Drawn	Checked	Approved	Date
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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

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FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 23 OF 36

Drawn	Checked	Approved	Date
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0 0.5 Kilometres

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

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Revision Details	By / Check	Check Date	Suffix
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New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Suffolk Coastal District Council; Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 24 OF 36

Drawn	Checked	Approved	Date
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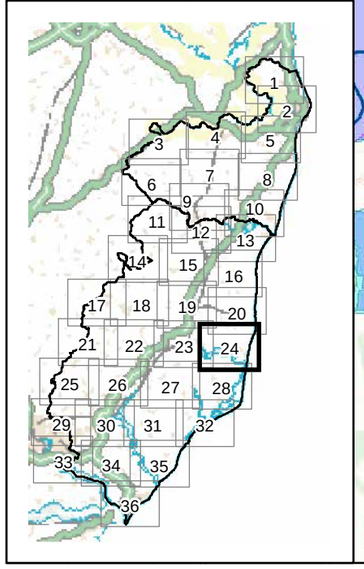

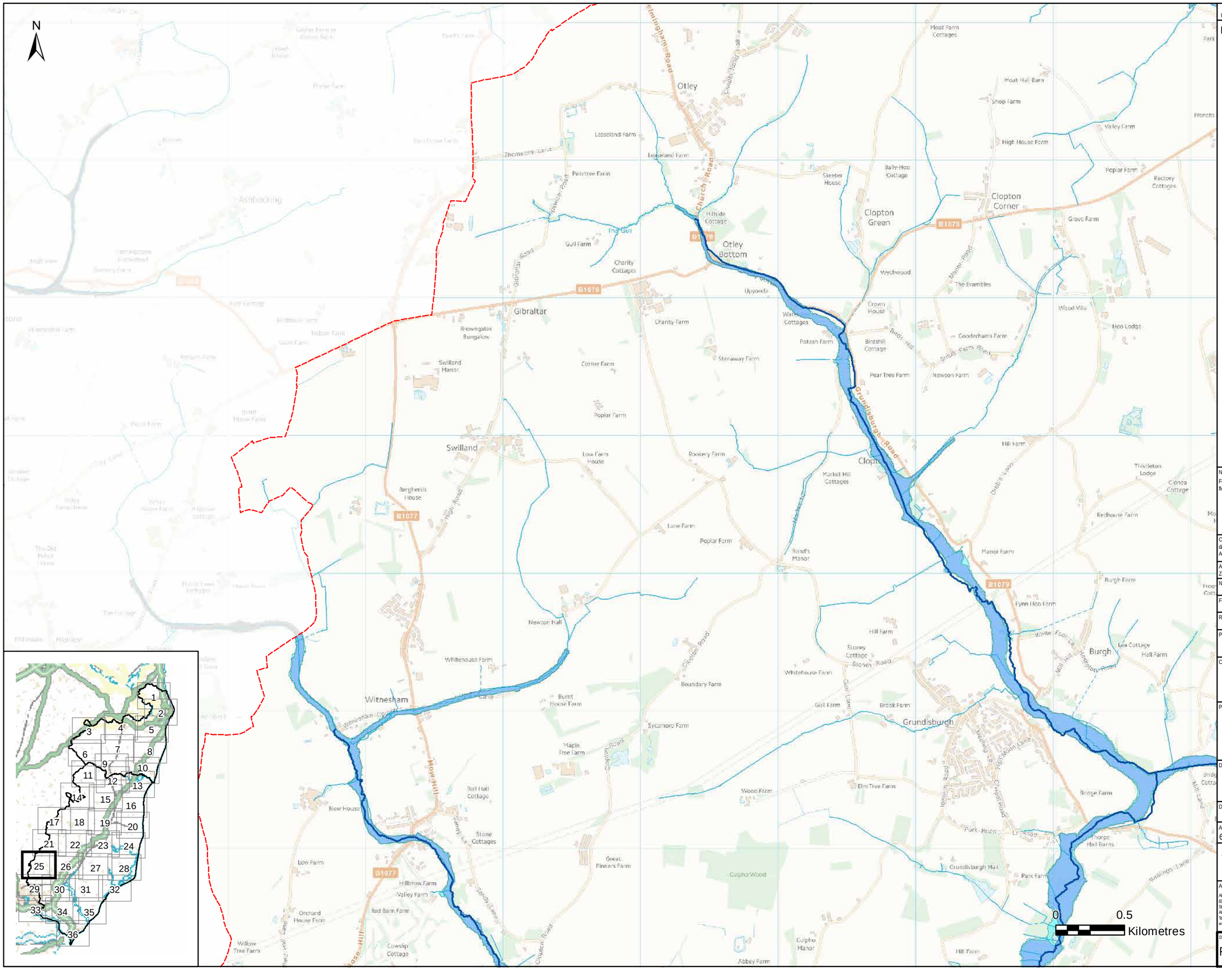

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

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FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 25 OF 36

Drawn	Checked	Approved	Date
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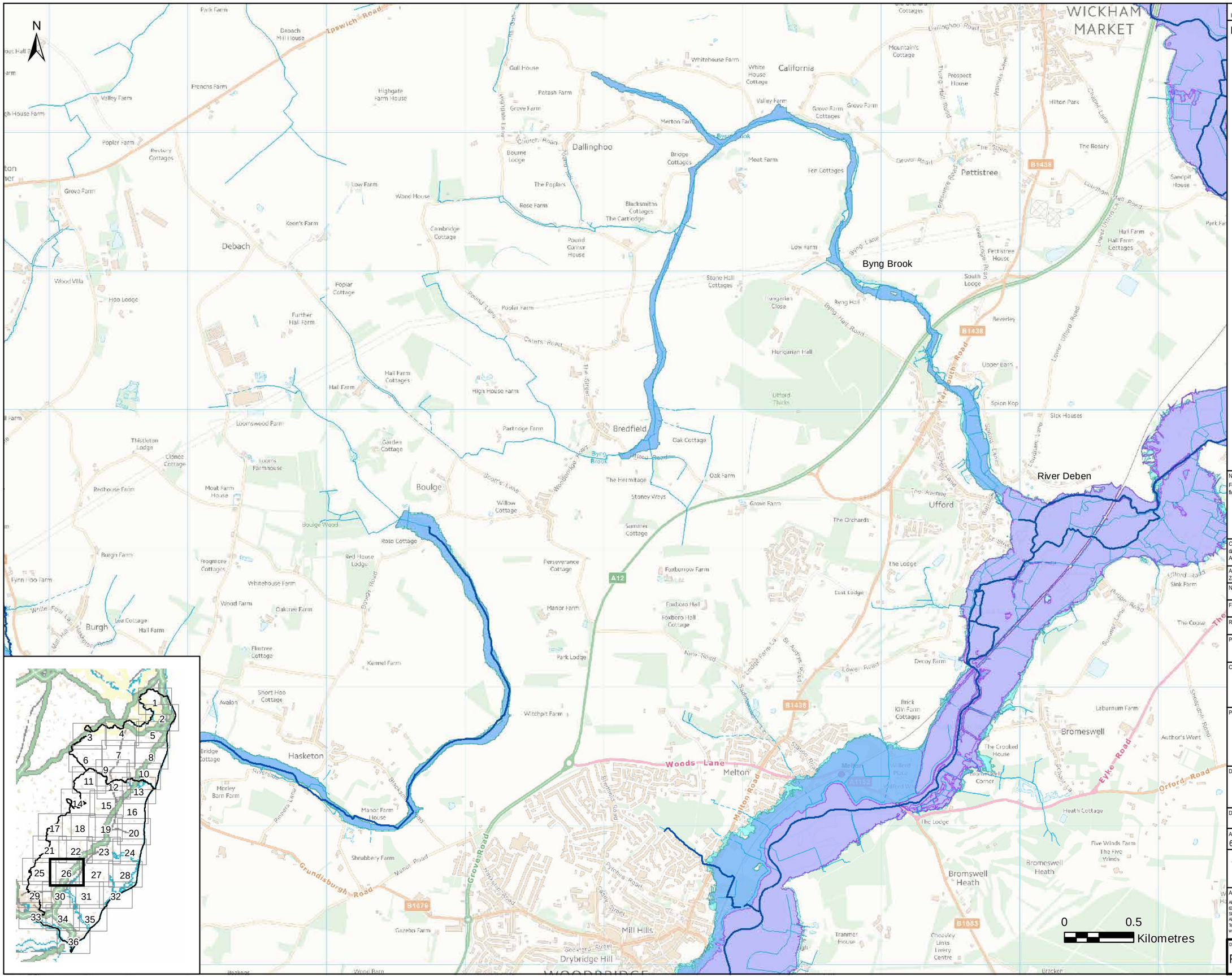

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 26 OF 36

Drawn	Checked	Approved	Date
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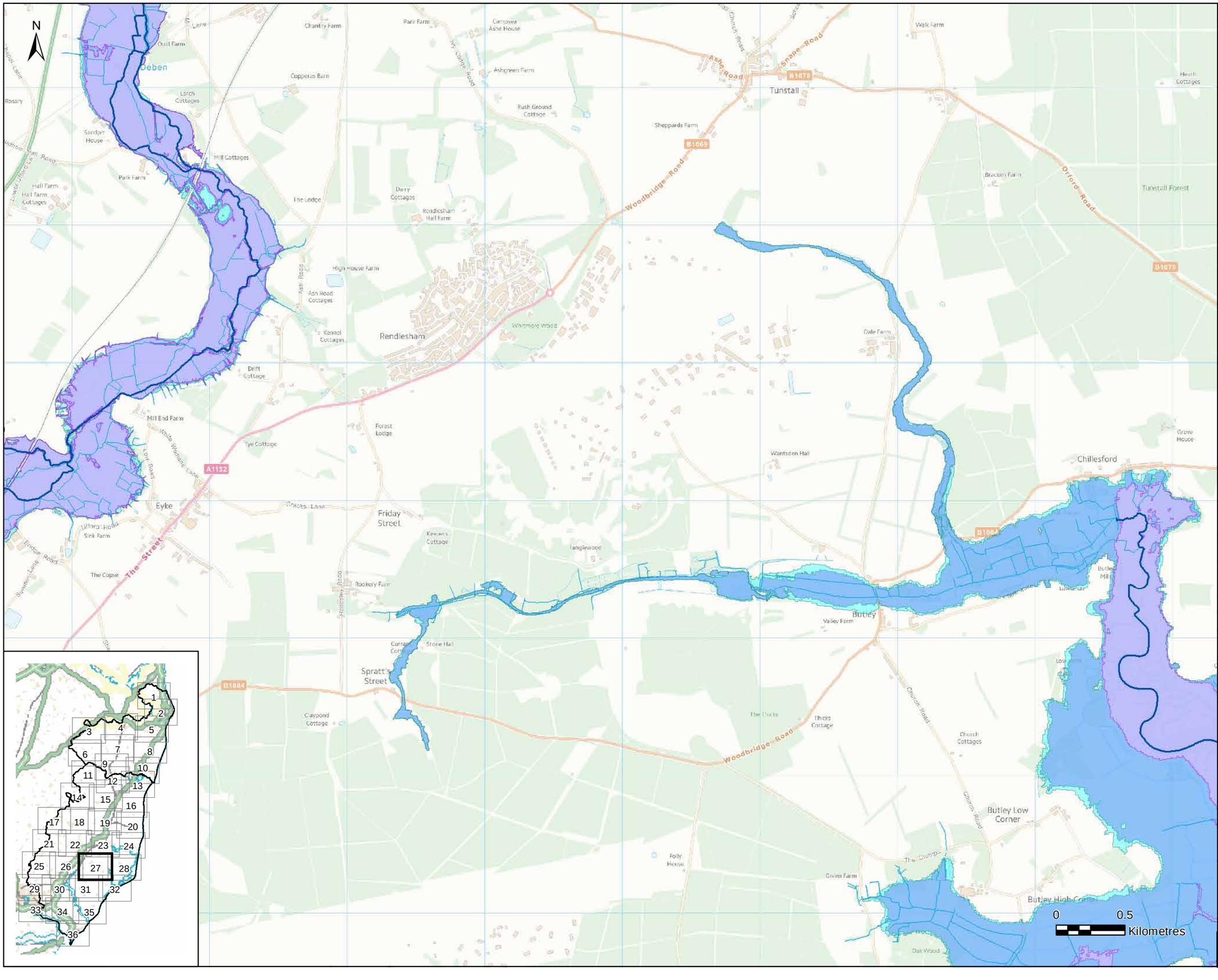

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

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FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 27 OF 36

Drawn	Checked	Approved	Date
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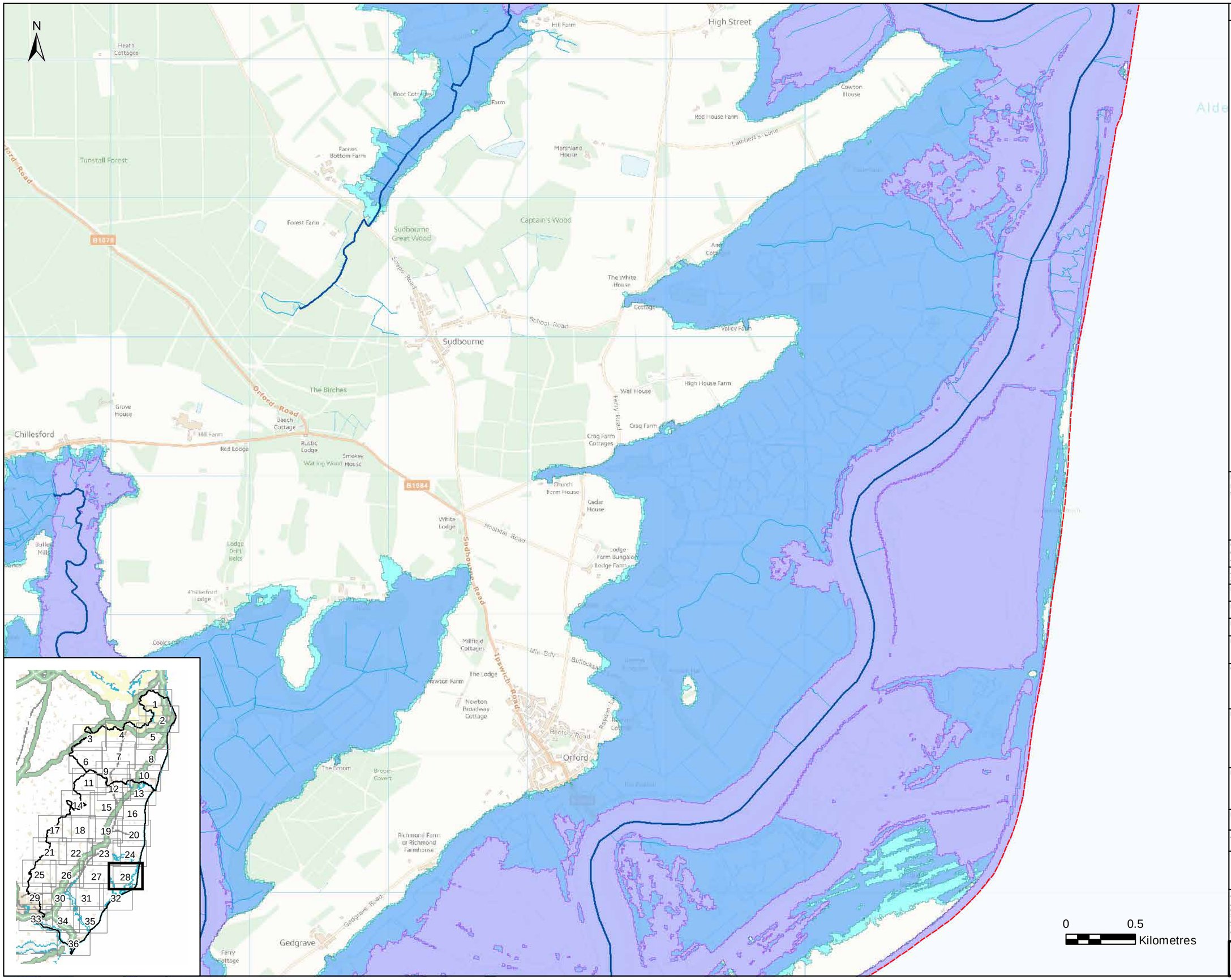

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 28 OF 36

Drawn	Checked	Approved	Date
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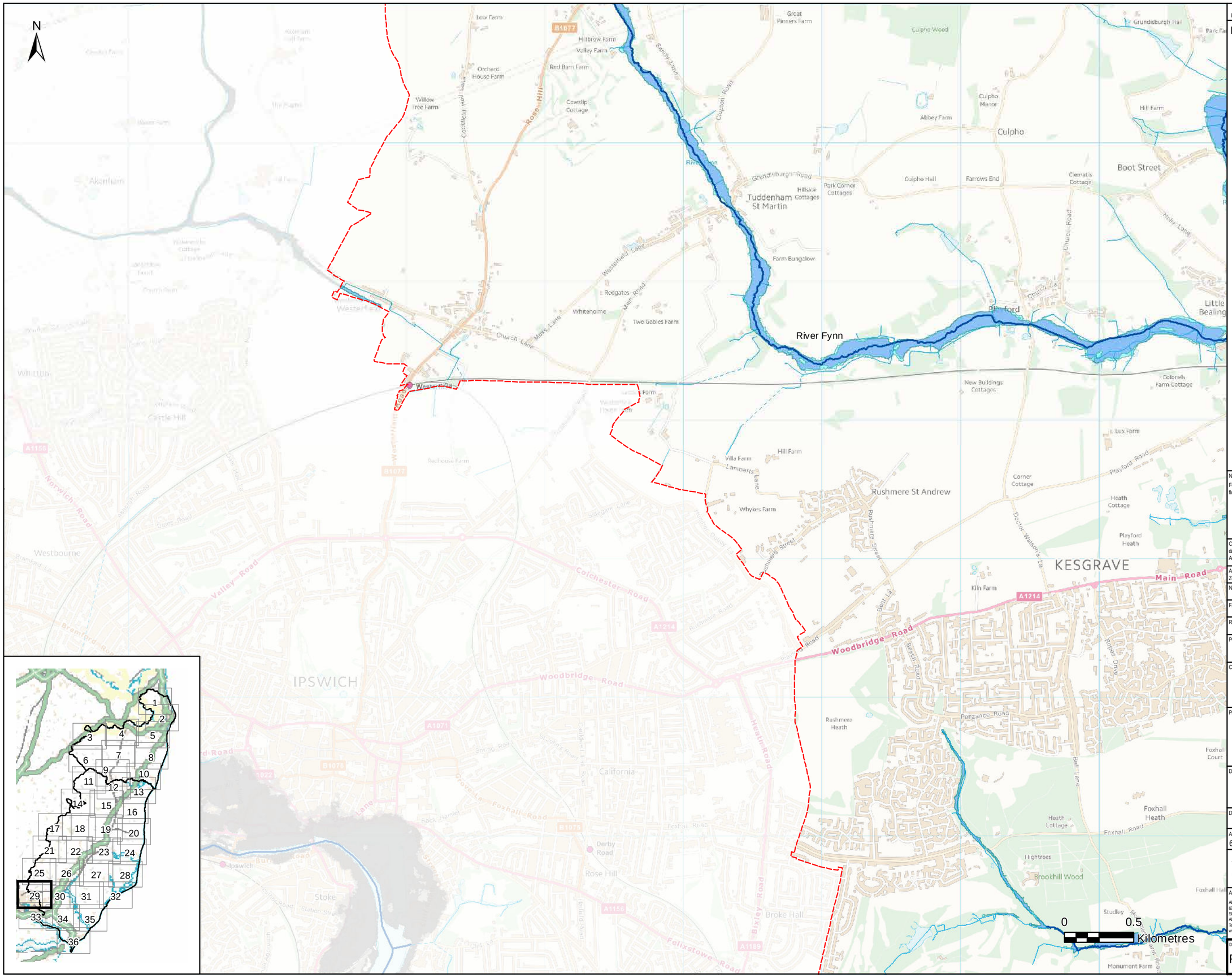

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

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Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 29 OF 36

Drawn	Checked	Approved	Date
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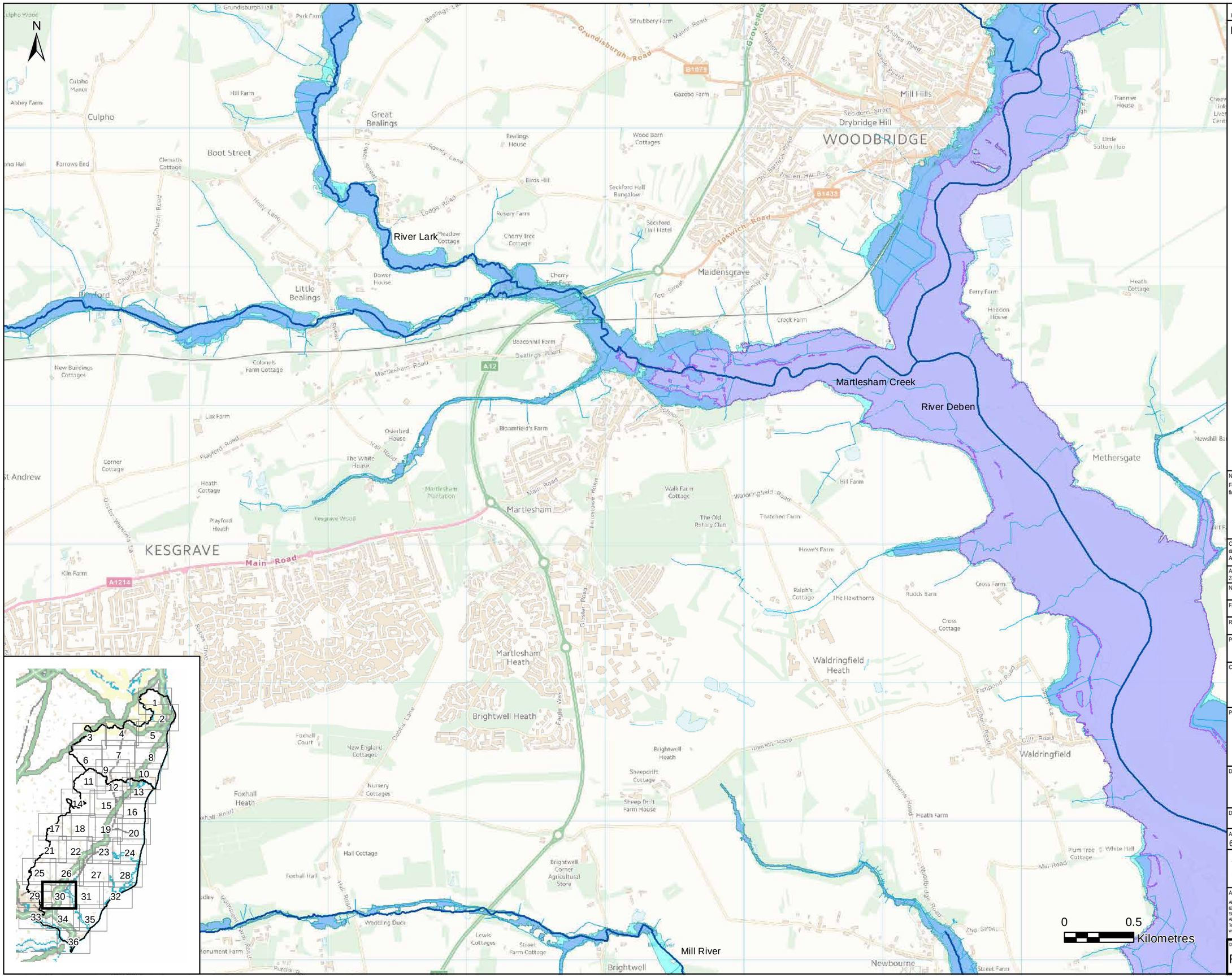
Drawing Number: FIGURE 05.29

Rev.: 4



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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Revision Details	By	Check	Date	Suffix
ABDs removed. Blyth and Deben and Flood Zones amended.	LM	MD	18.04.18	4
New River Deben model added.	LM	MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM	MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 30 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	18/04/2018

AECOM Internal Project No.: 60520248

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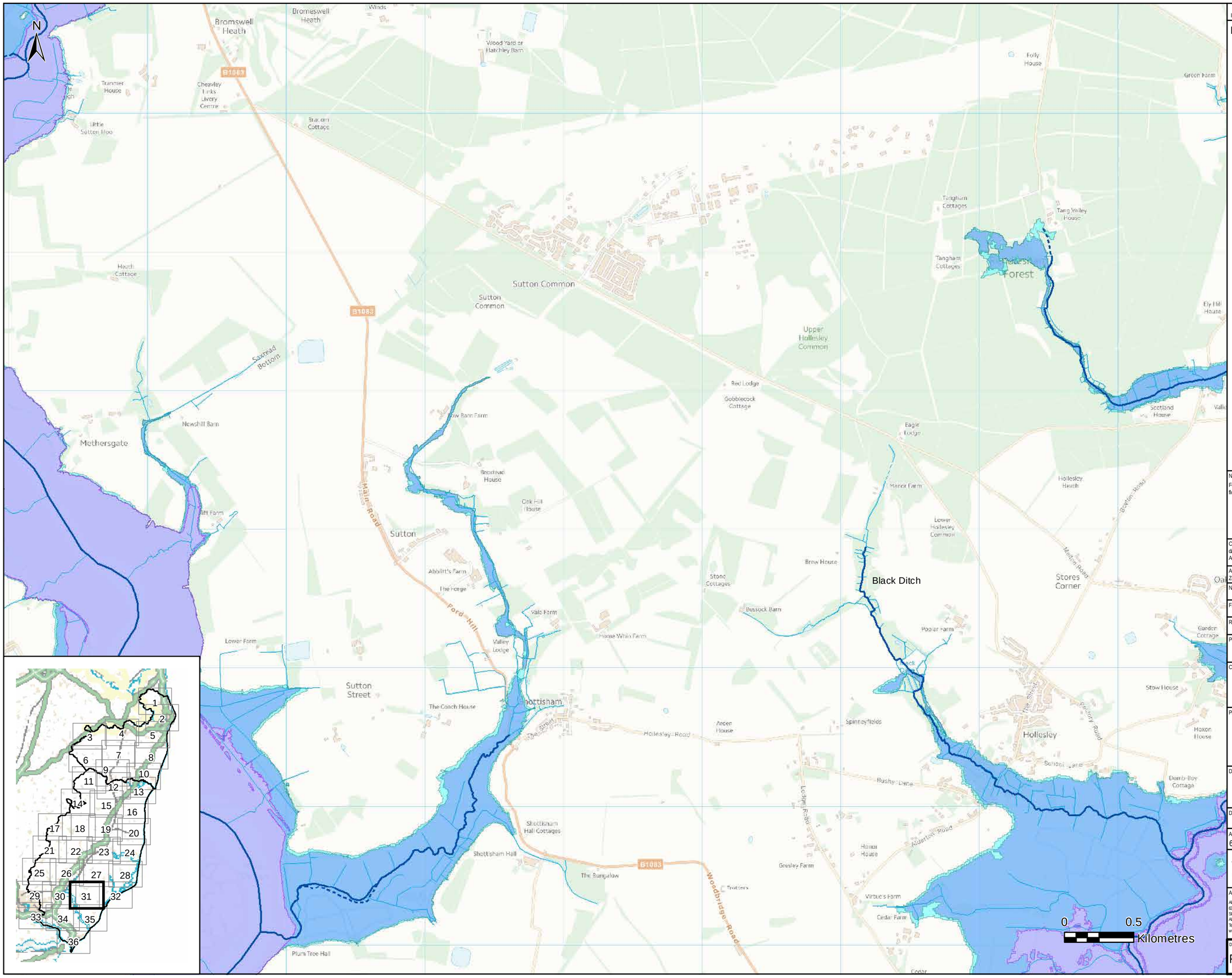

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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Revision Details	By / Check	Check Date	Suffix
ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 31 OF 36

Drawn	Checked	Approved	Date
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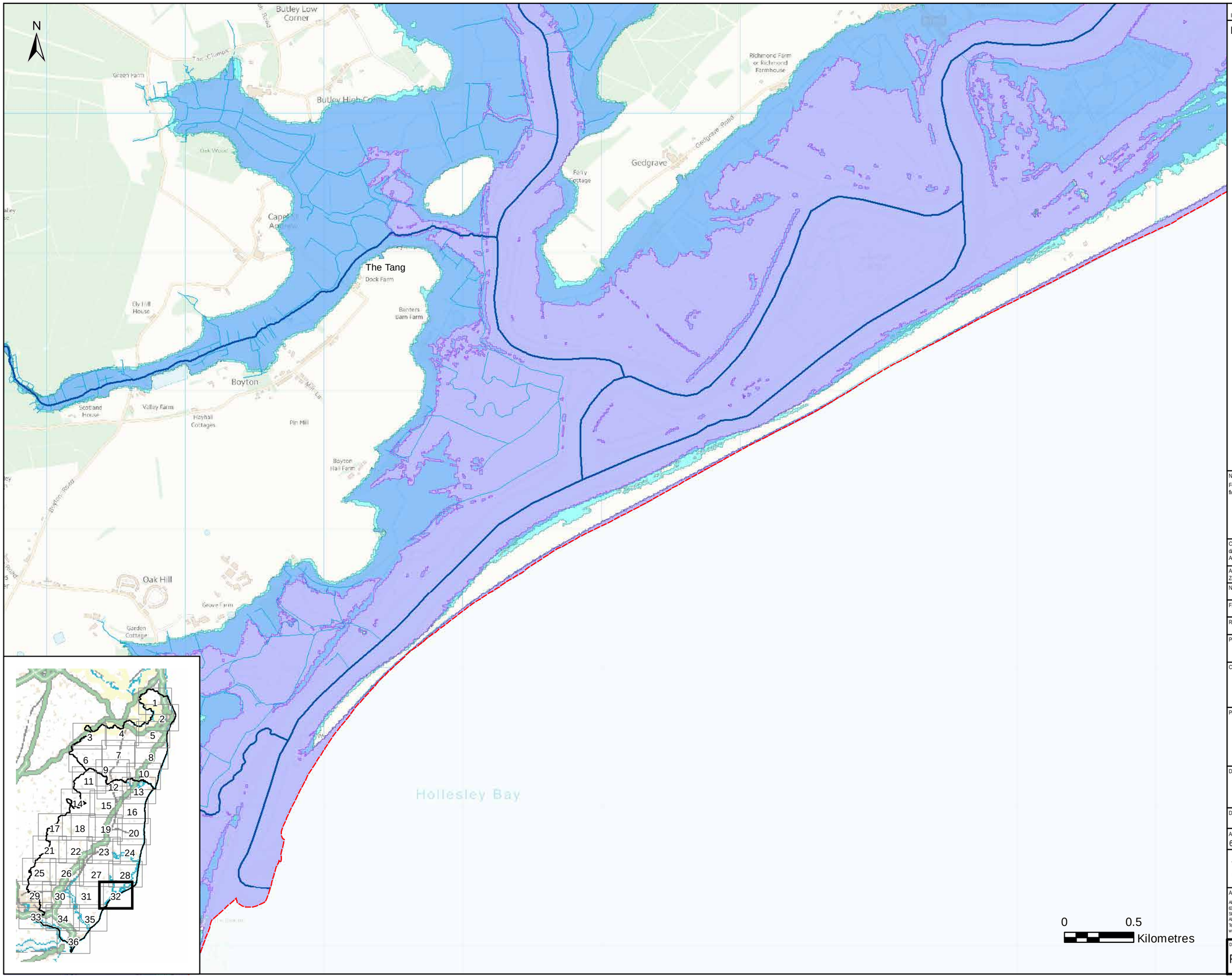

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Suffolk Coastal District Council; Waveney District Council, Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 32 OF 36

Drawn	Checked	Approved	Date
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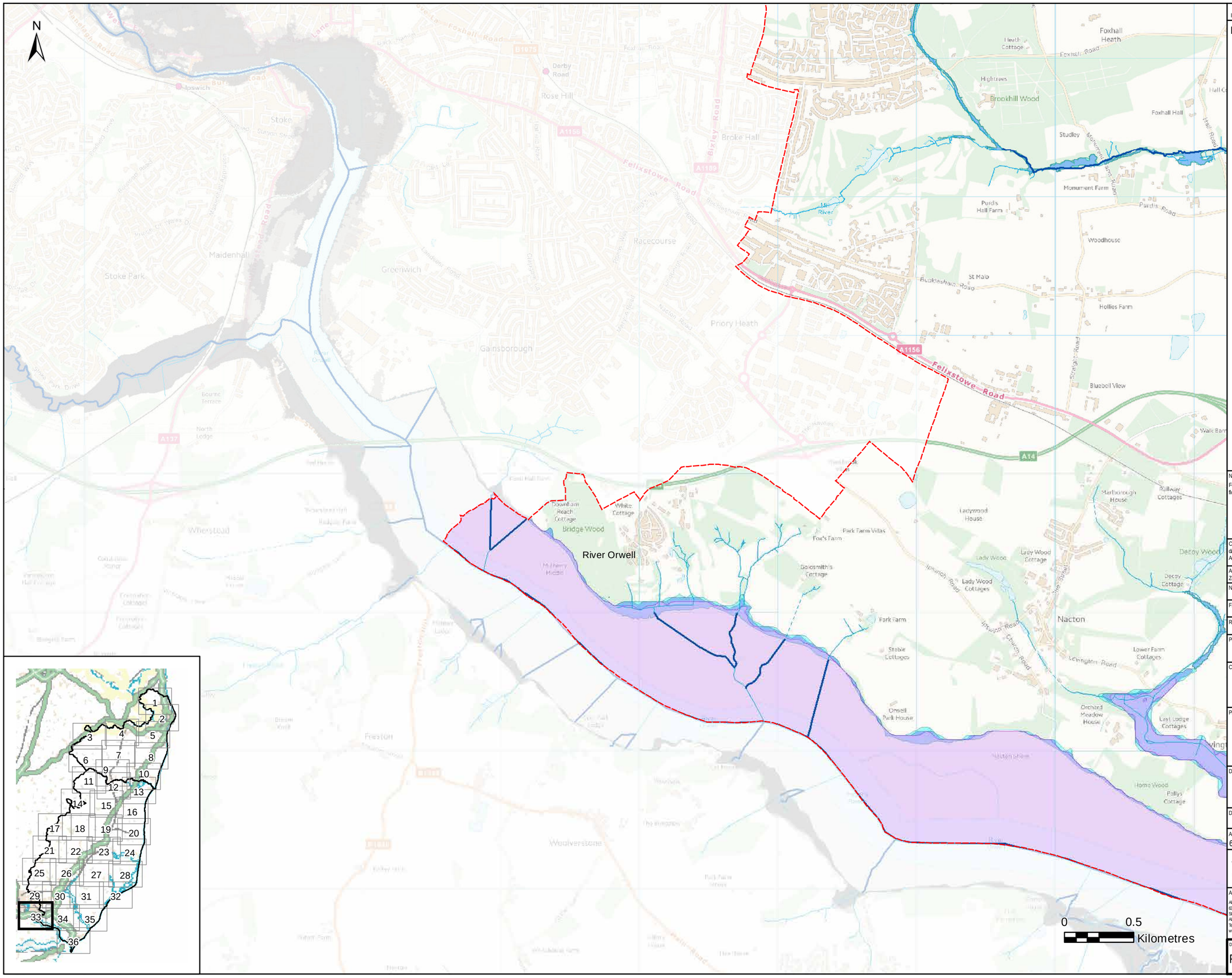
FIGURE 05.32	4



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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Revision Details	By / Check	Check Date	Suffix
ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 33 OF 36

Drawn	Checked	Approved	Date
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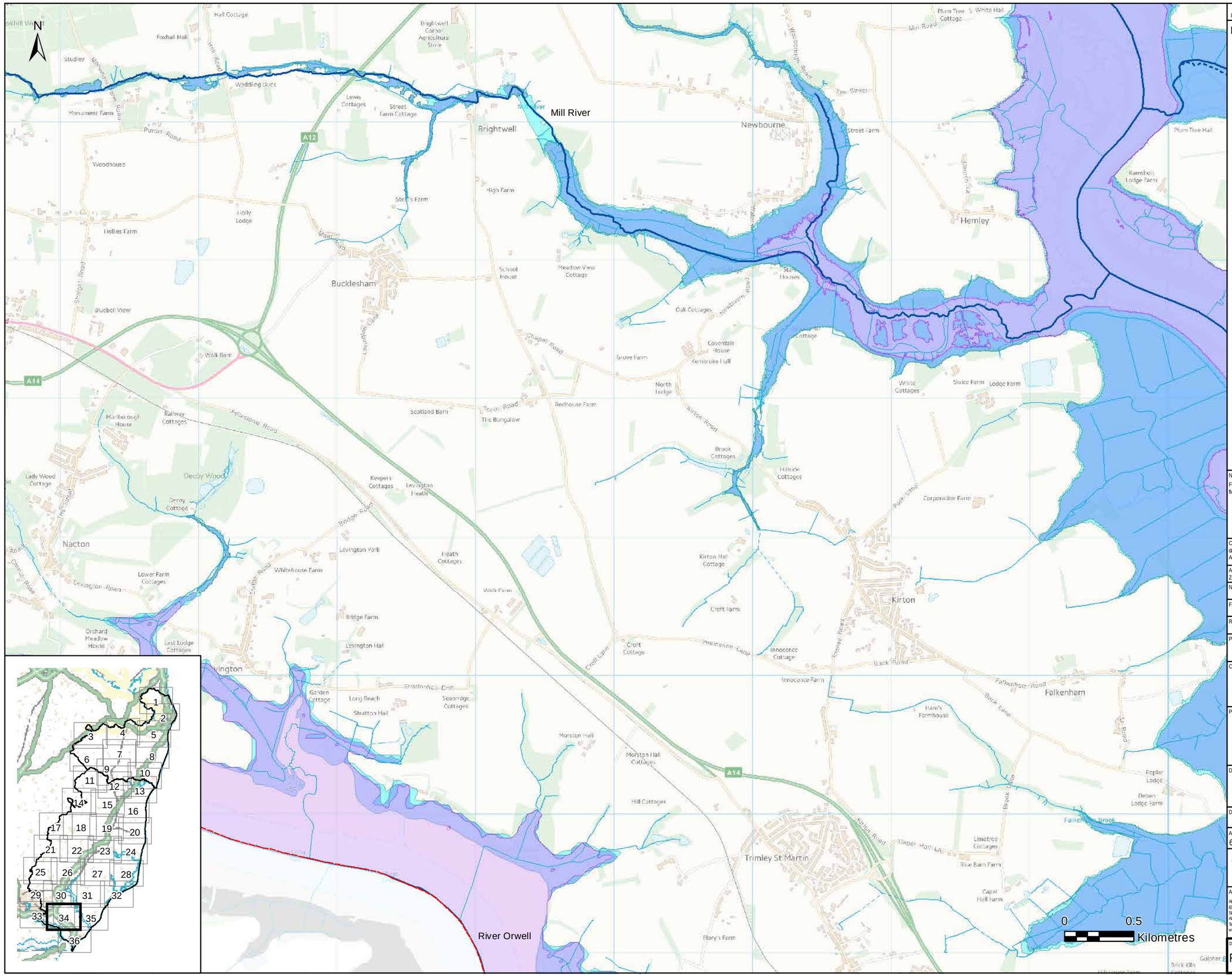

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

For Areas Benefitting from Defences refer to flood-map-for-planning.service.gov.uk.

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ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 34 OF 36

Drawn	Checked	Approved	Date
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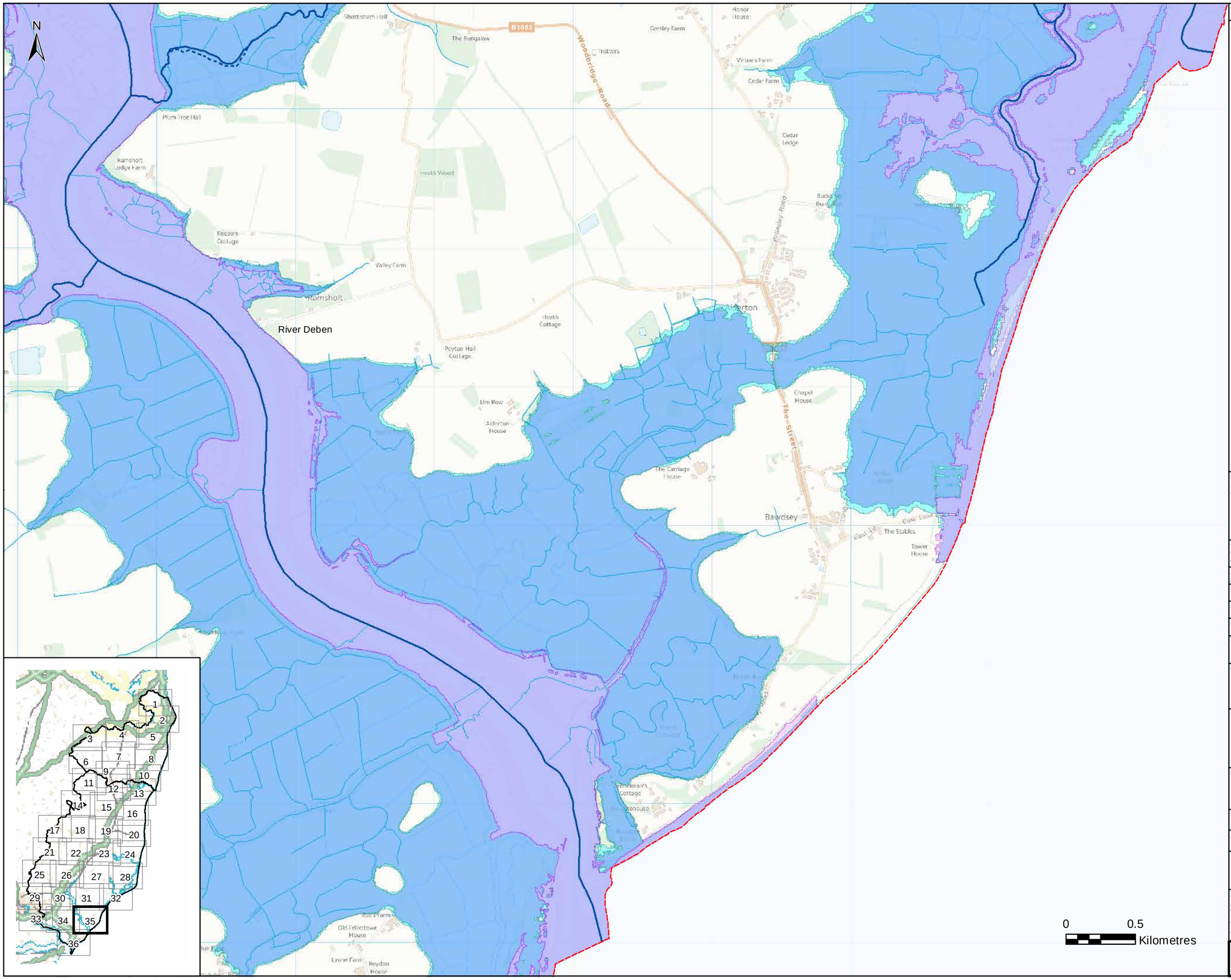

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

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Revision Details	By / Check	Check Date	Suffix
ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
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FZ out of boundaries shown. ABD amended.	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 35 OF 36

Drawn	Checked	Approved	Date
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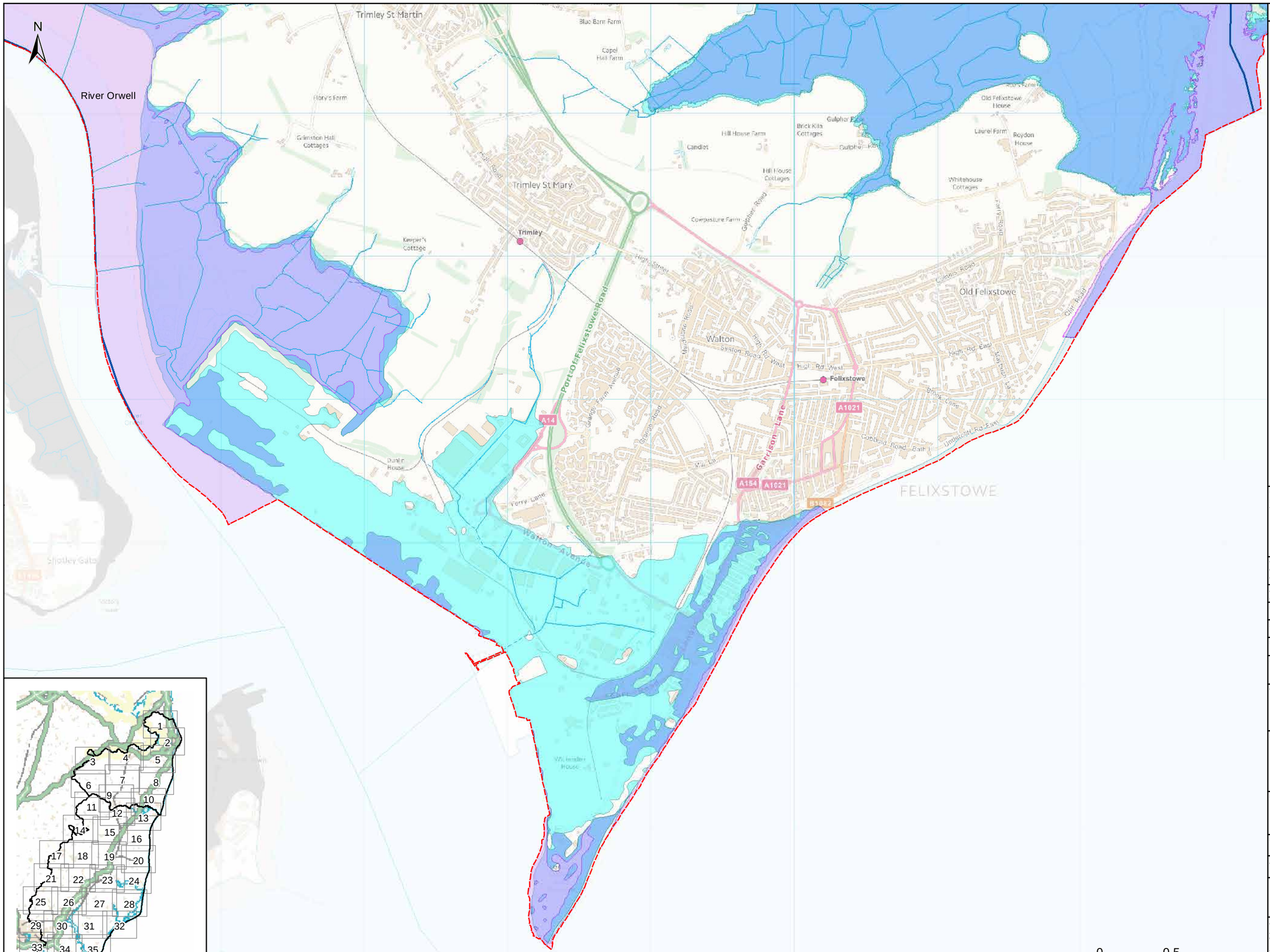
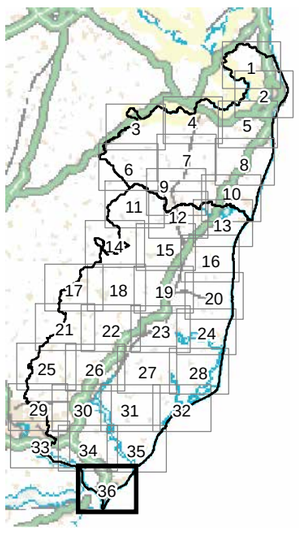
FIGURE 05.35	4





0 0.5 Kilometres

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

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Revision Details	By / Check	Check Date	Suffix
ABDs removed. Blyth and Deben and Flood Zones amended.	LM / MD	18.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
FZ out of boundaries shown. ABD amended.	LM / MD	27.1117	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND SEA SHEET 36 OF 36

Drawn	Checked	Approved	Date
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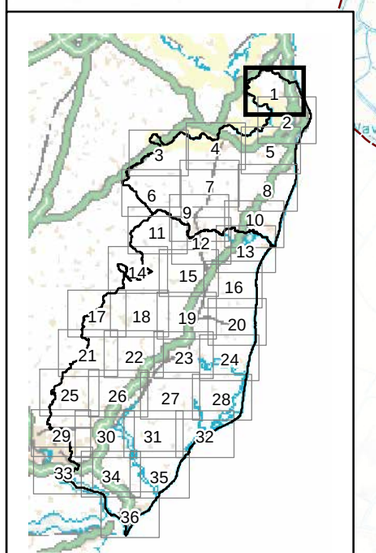
Drawing Number	Rev.
FIGURE 05.36	4

N



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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No changes - Issued as final	LM MD	27.11.17	2	
Revision Details	By Check	Check Date	Suffix	

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 1 OF 36

Drawn	Checked	Approved	Date
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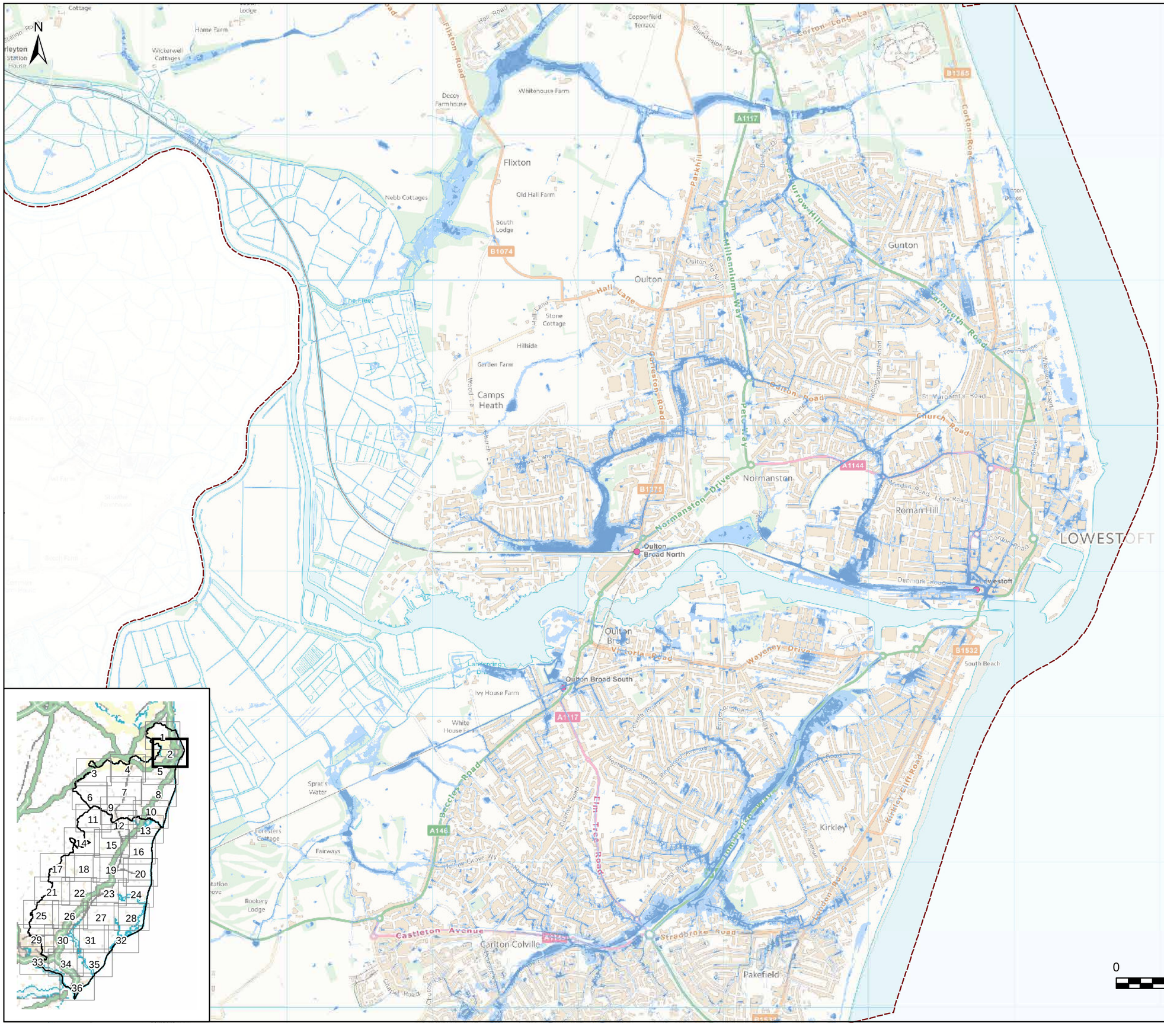
0 0.5 Kilometres

Drawing Number: FIGURE 06.1

Rev.: 2



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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No changes - Issued as final	LM / MD		27.11.17	2
Revision Details	By / Check		Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 2 OF 36

Drawn	Checked	Approved	Date
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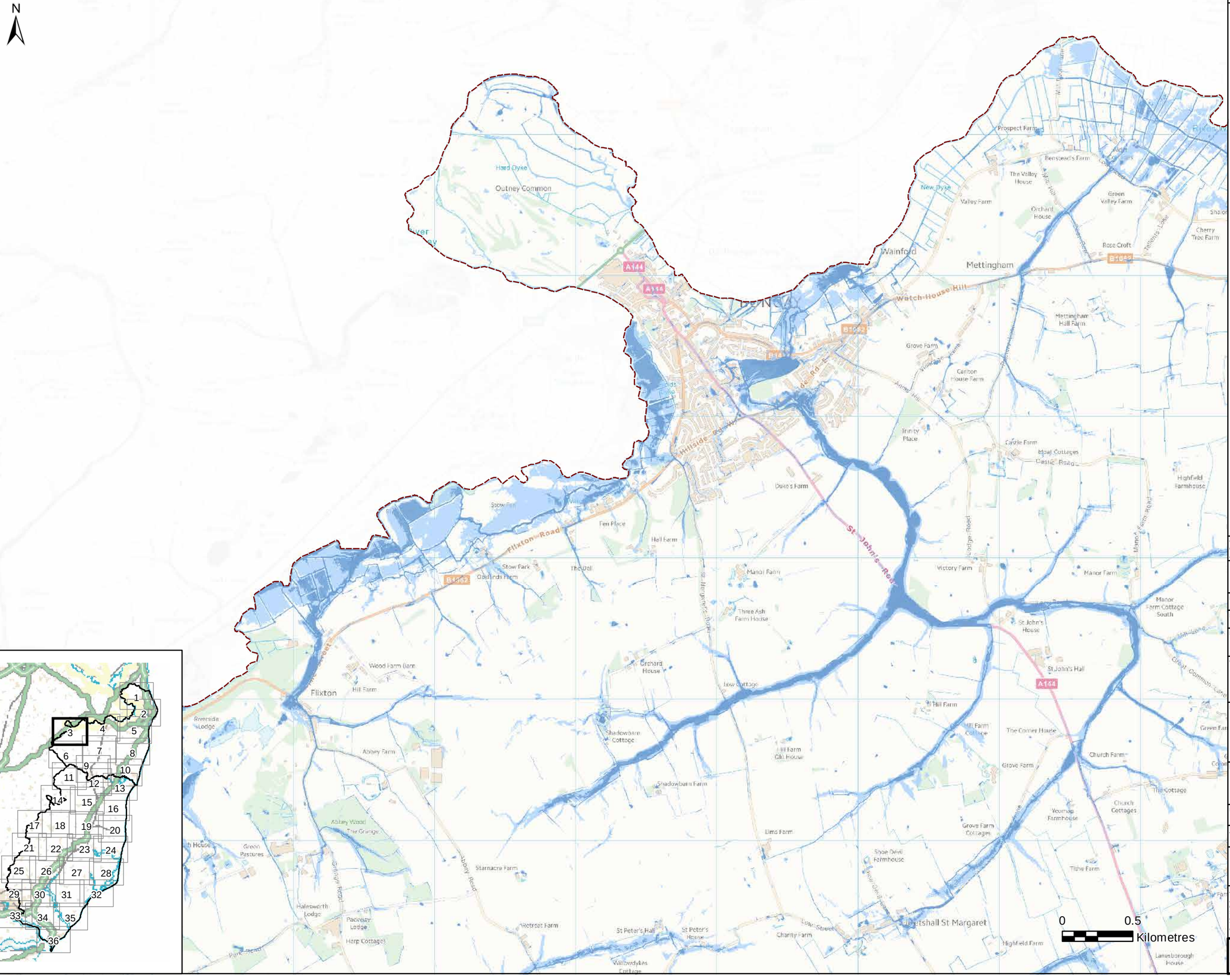
Drawing Number: FIGURE 06.2

Rev.: 2



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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No changes - Issued as final	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 3 OF 36

Drawn	Checked	Approved	Date
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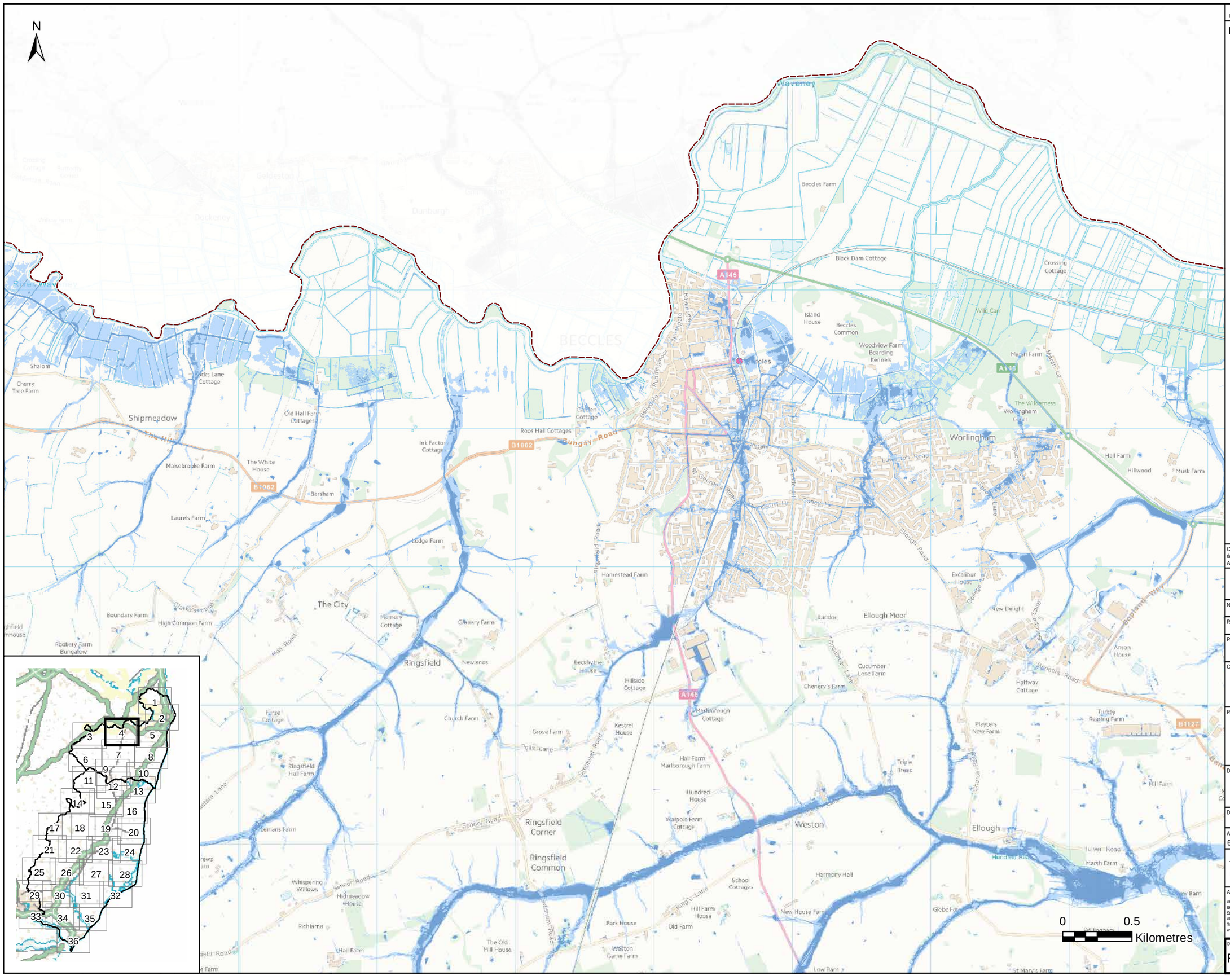
Rev.: 2



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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No changes - Issued as final	LM / MD	27.11.17	2	
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Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 4 OF 36

Drawn	Checked	Approved	Date
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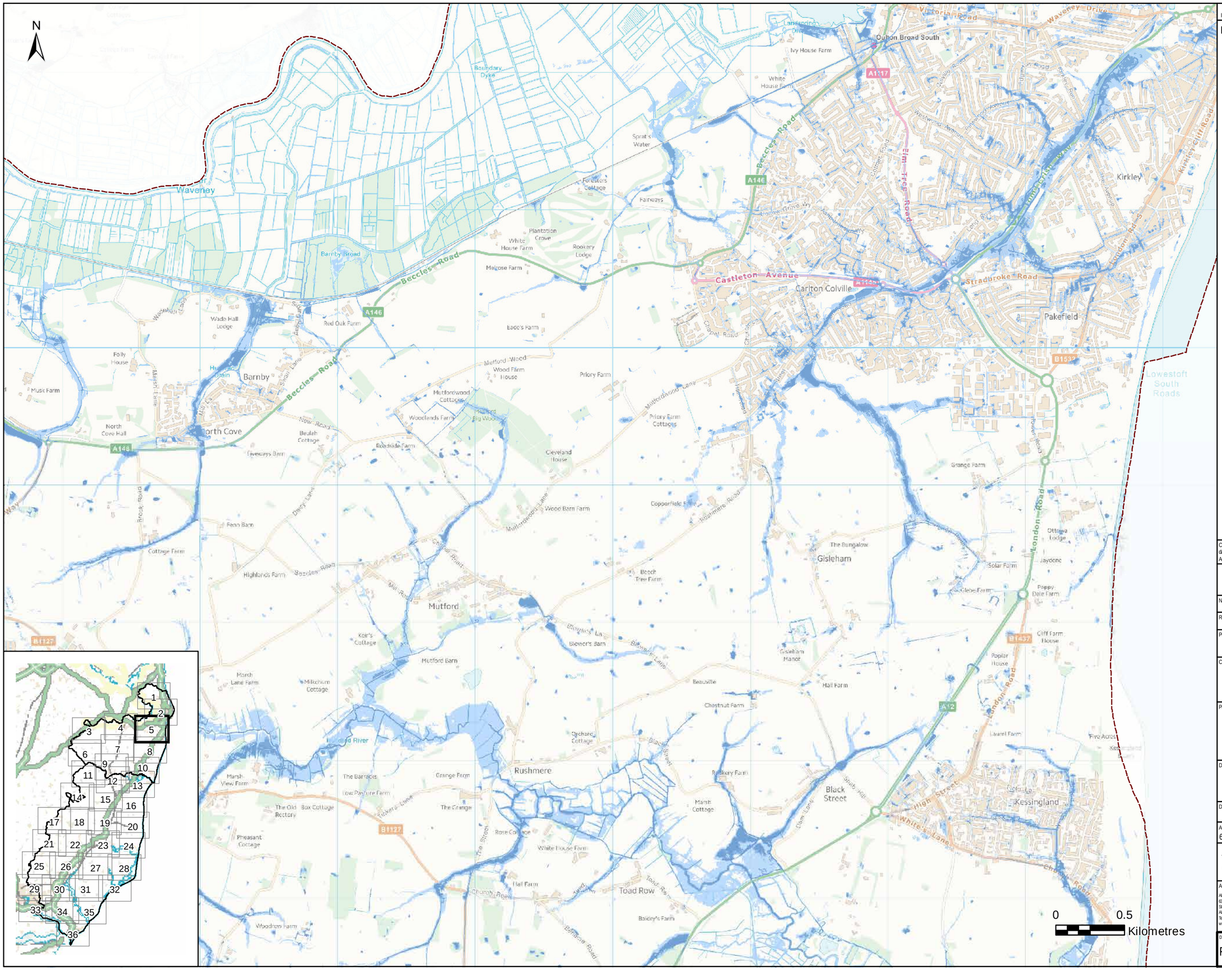
FIGURE 06.4	2



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 5 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	27/11/2017

AECOM Internal Project No.: 60520248

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Drawing Number: FIGURE 06.5

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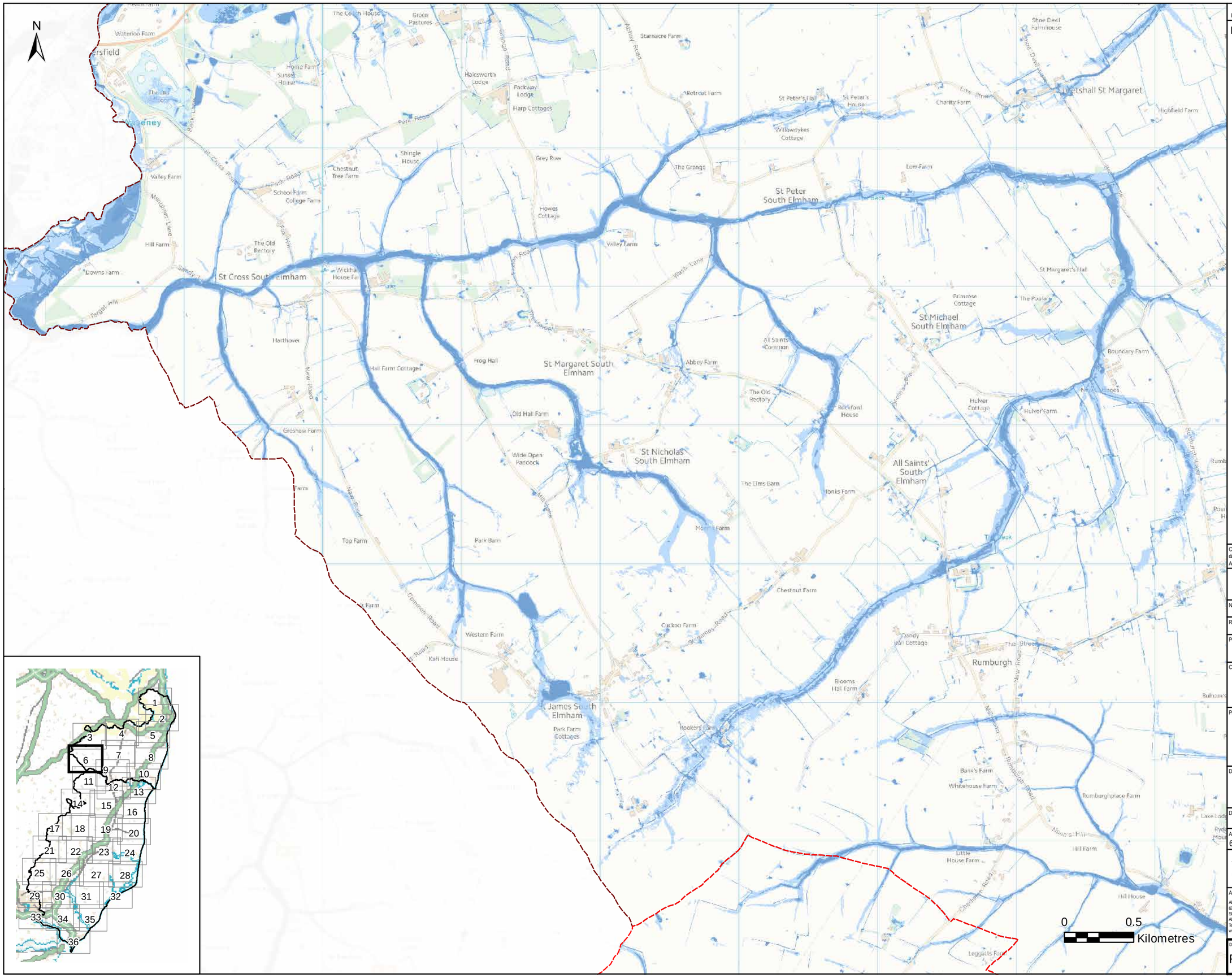

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 6 OF 36

Drawn	Checked	Approved	Date
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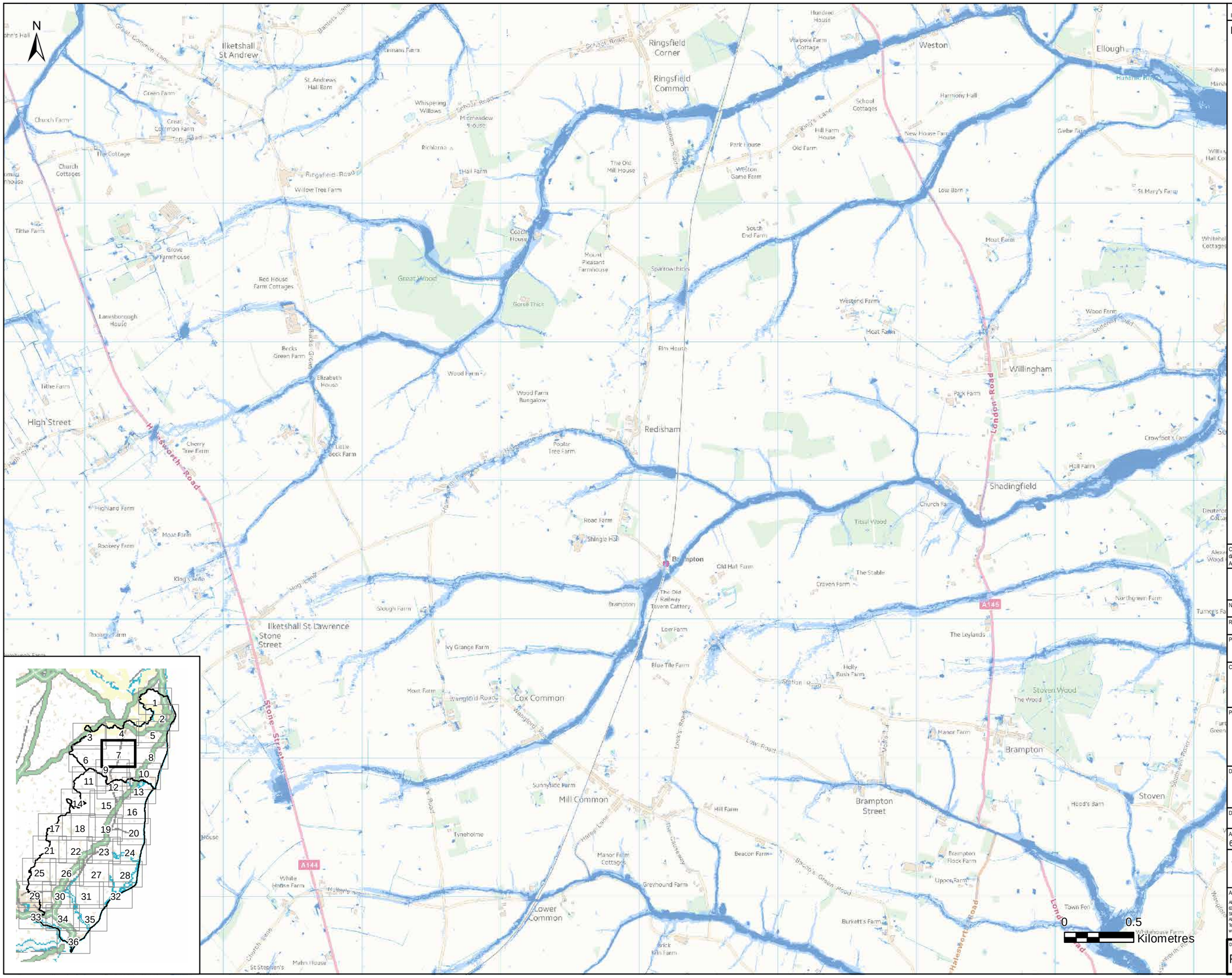

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 7 OF 36

Drawn	Checked	Approved	Date
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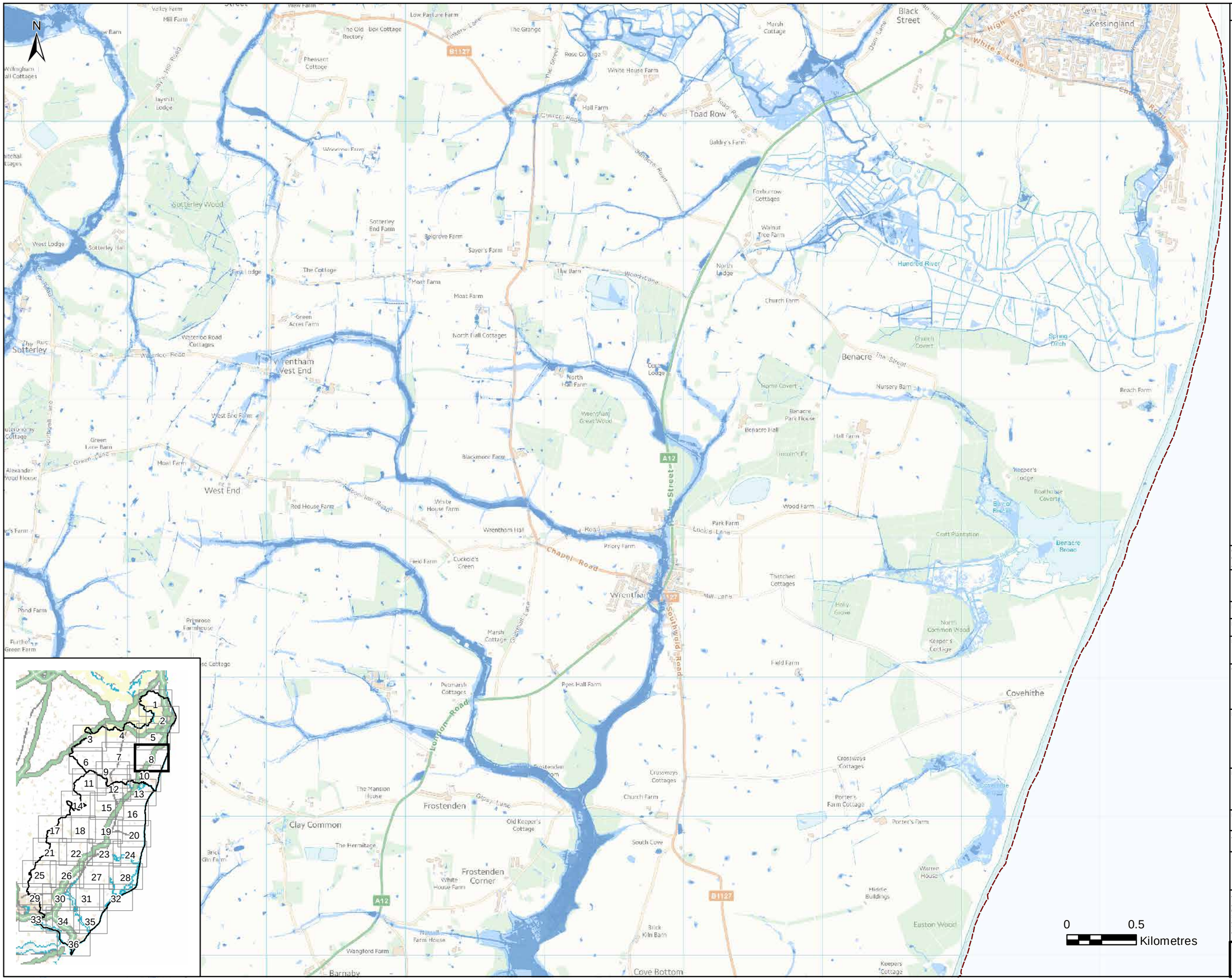

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 8 OF 36

Drawn	Checked	Approved	Date
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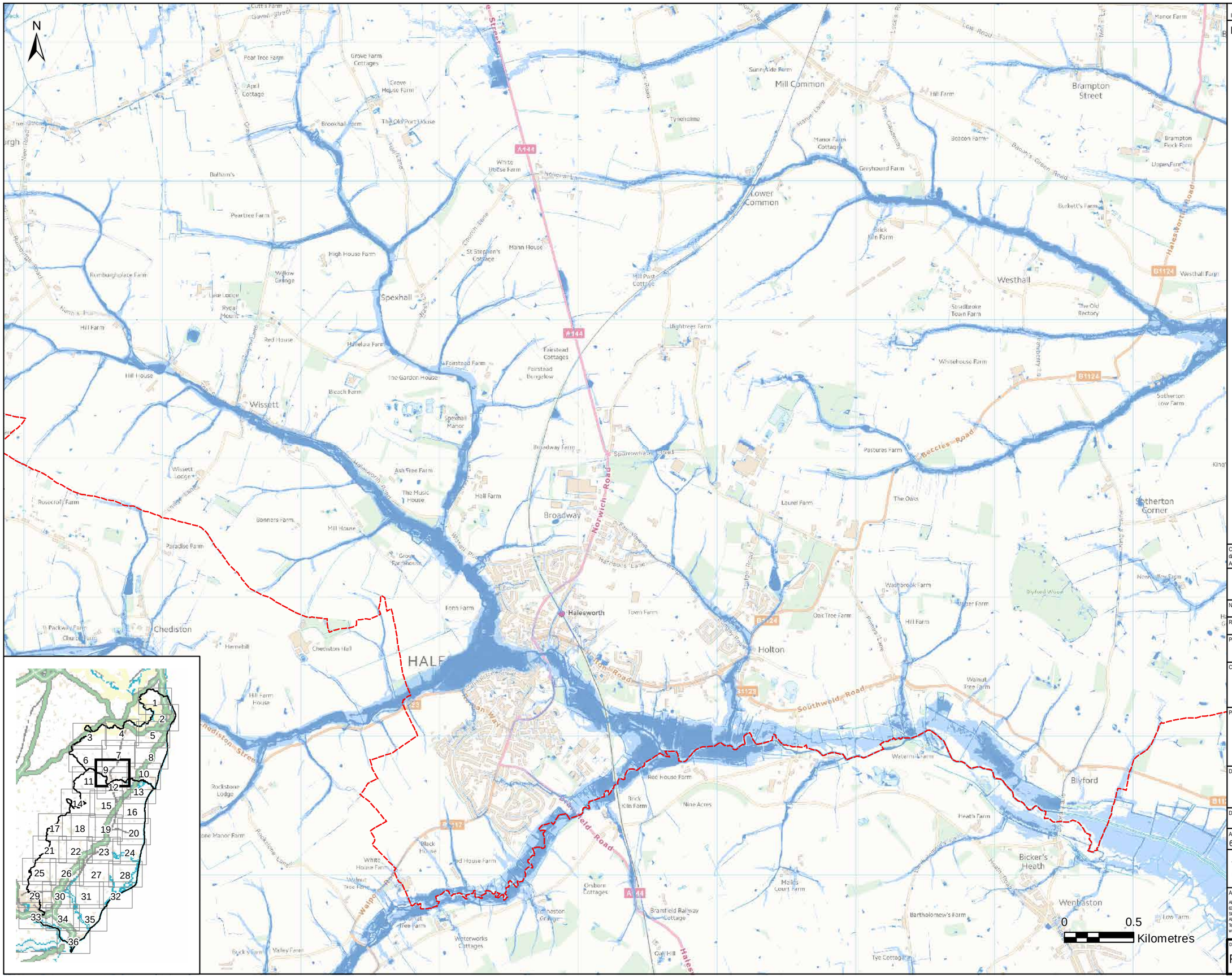
FIGURE 06.8	2



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Client: Waveney District Council, Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 9 OF 36

Drawn	Checked	Approved	Date
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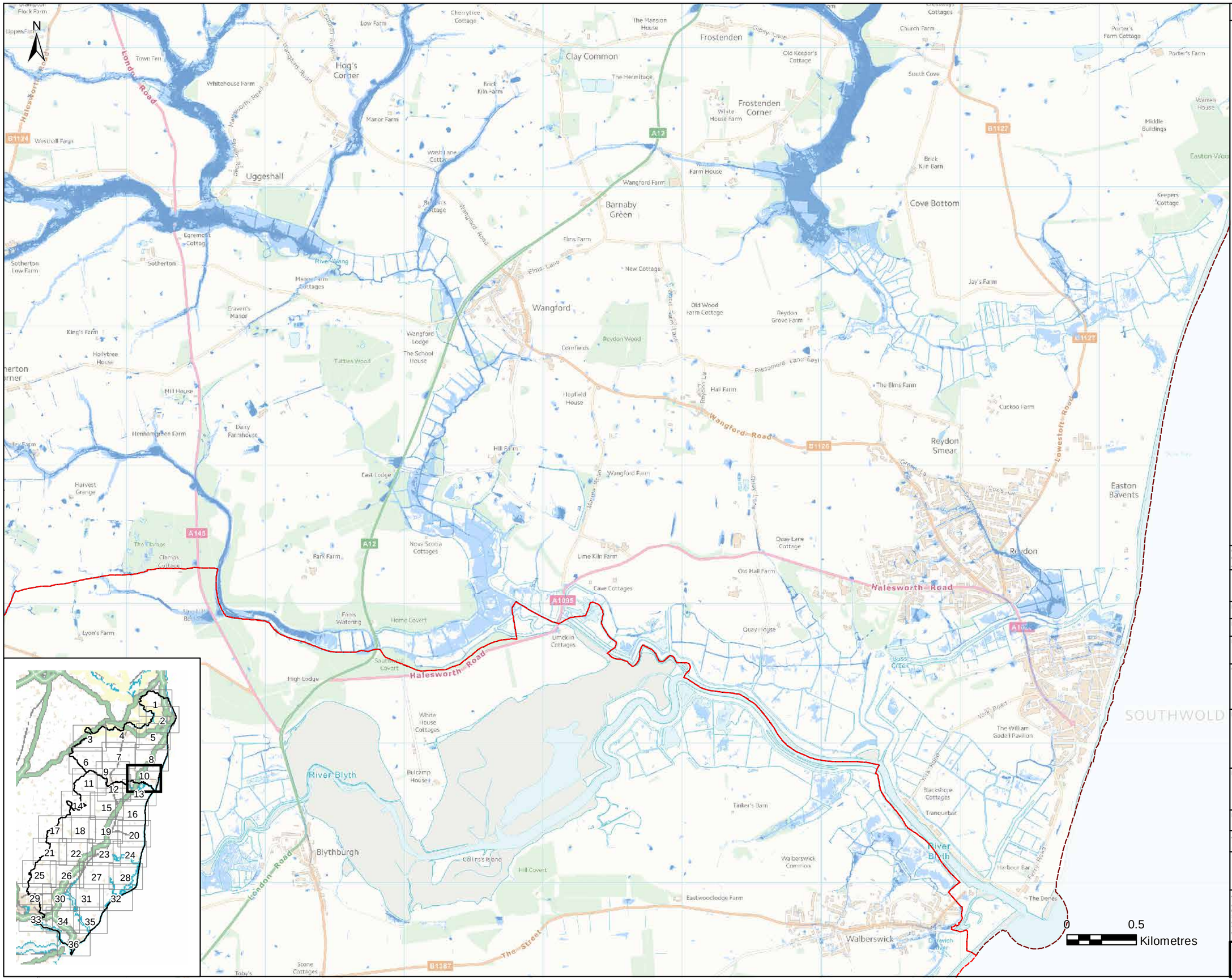

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 10 OF 36

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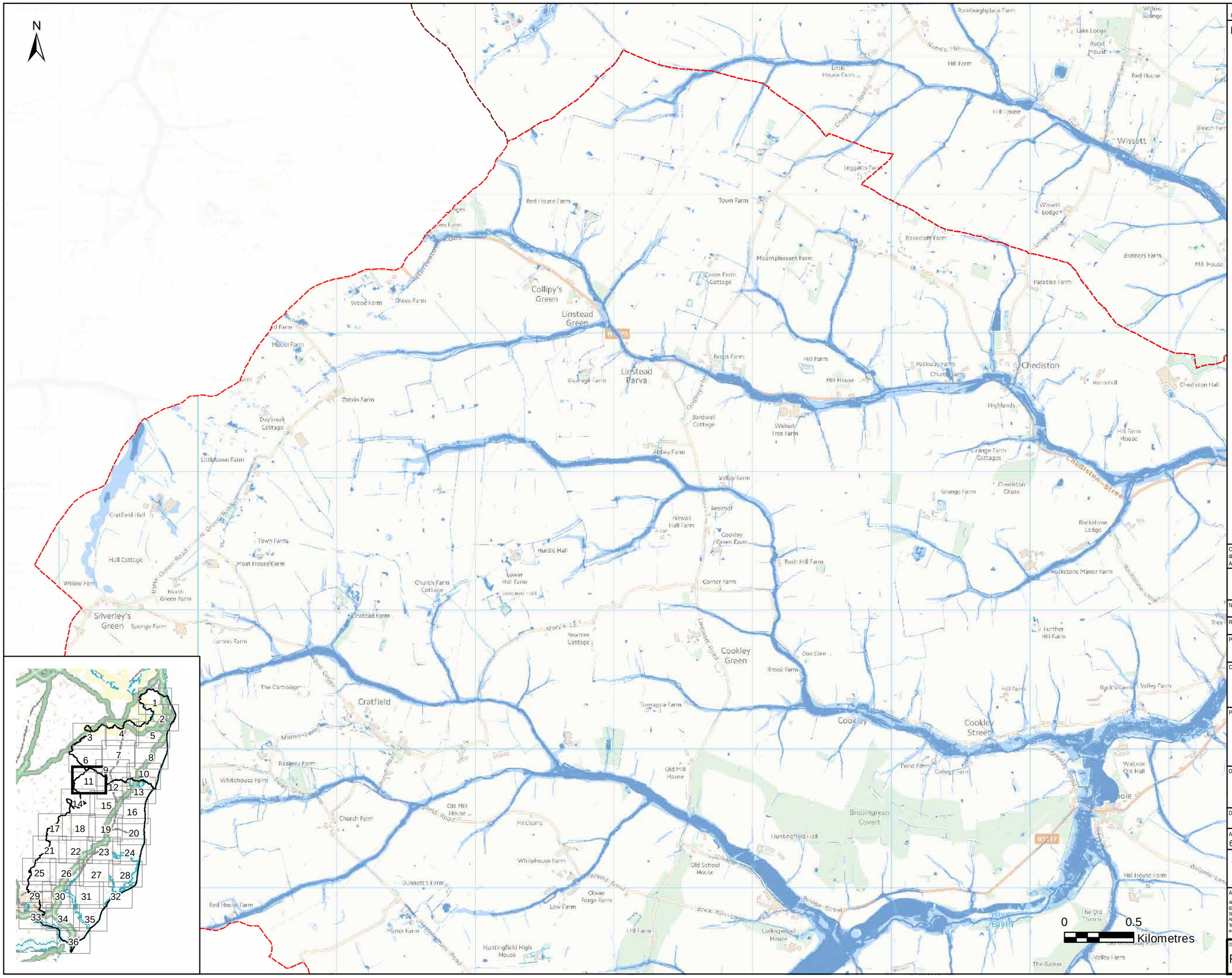
FIGURE 06.10	2



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 11 OF 36

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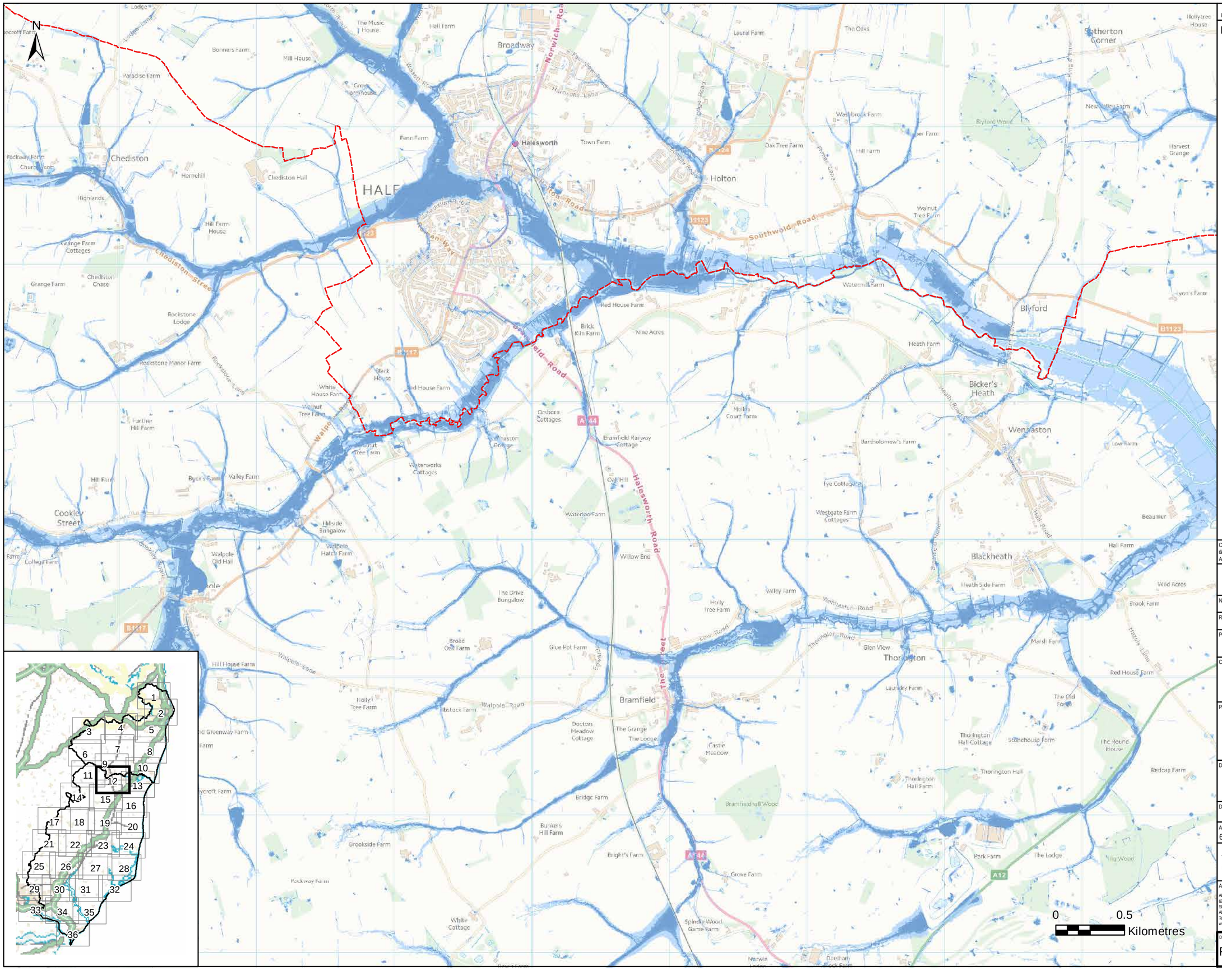
Drawing Number: FIGURE 06.11

Rev.: 2



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 12 OF 36

Drawn	Checked	Approved	Date
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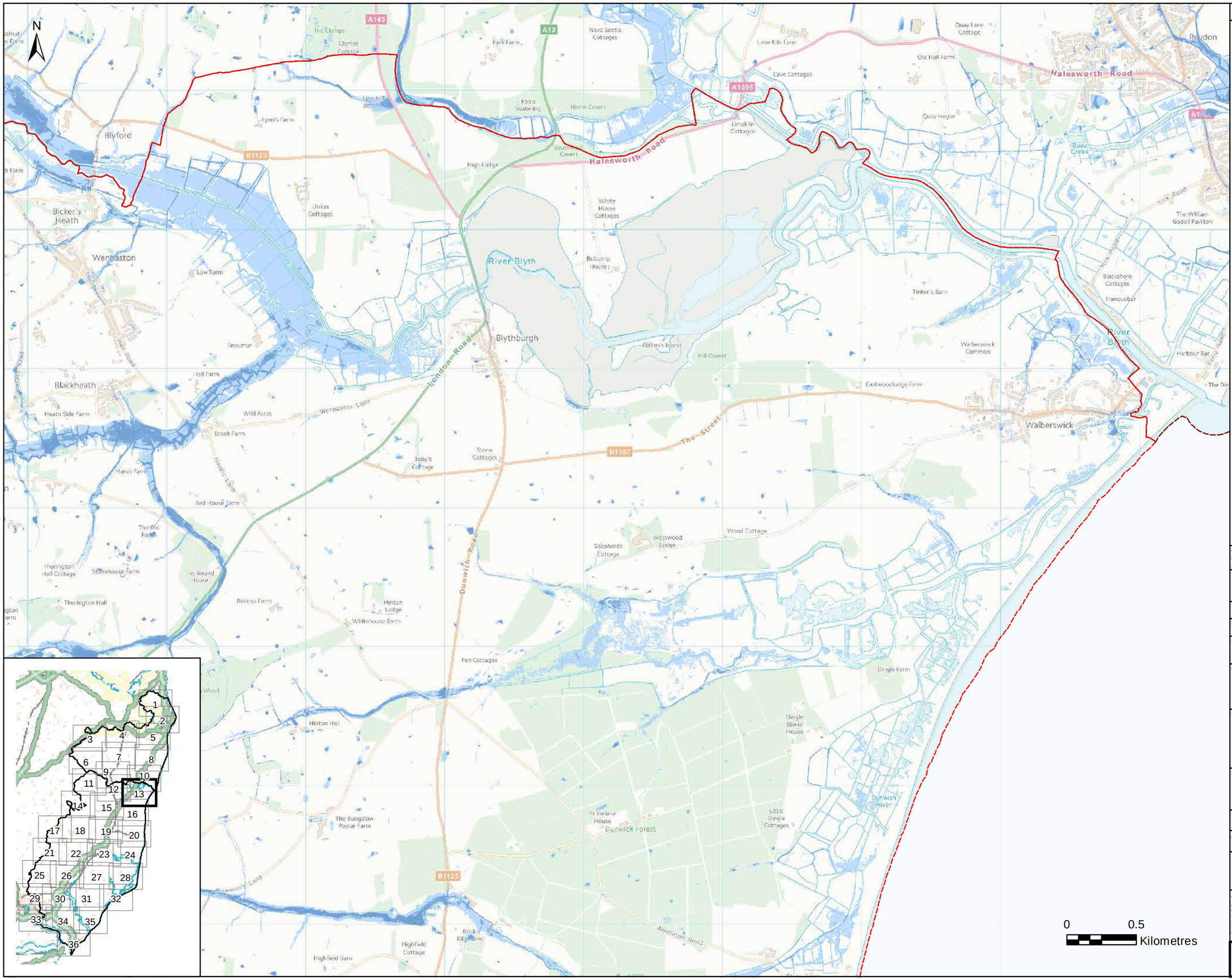
FIGURE 06.12	2



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 13 OF 36

Drawn	Checked	Approved	Date
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FIGURE 06.13	2

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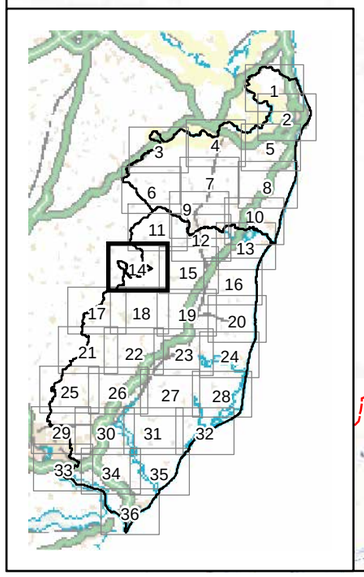

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

0 0.5 Kilometres

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Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 14 OF 36

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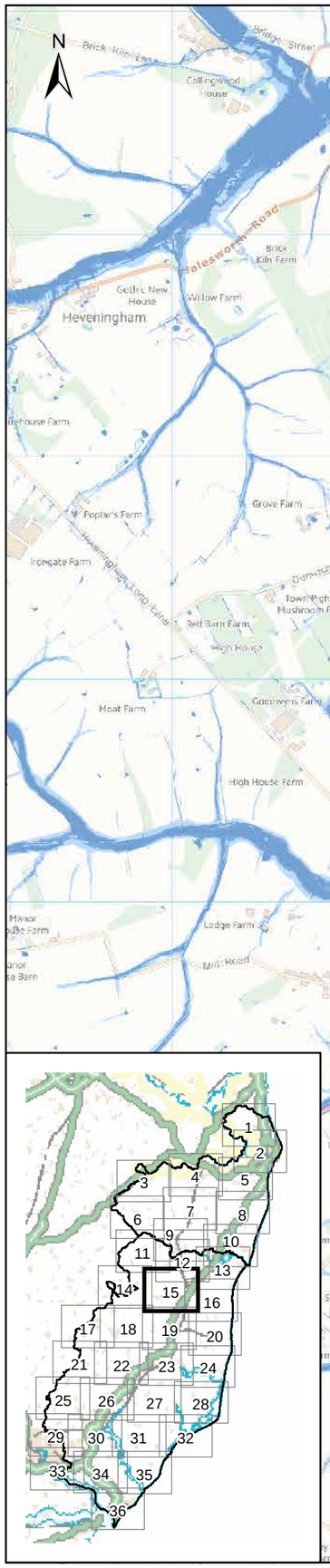

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 15 OF 36

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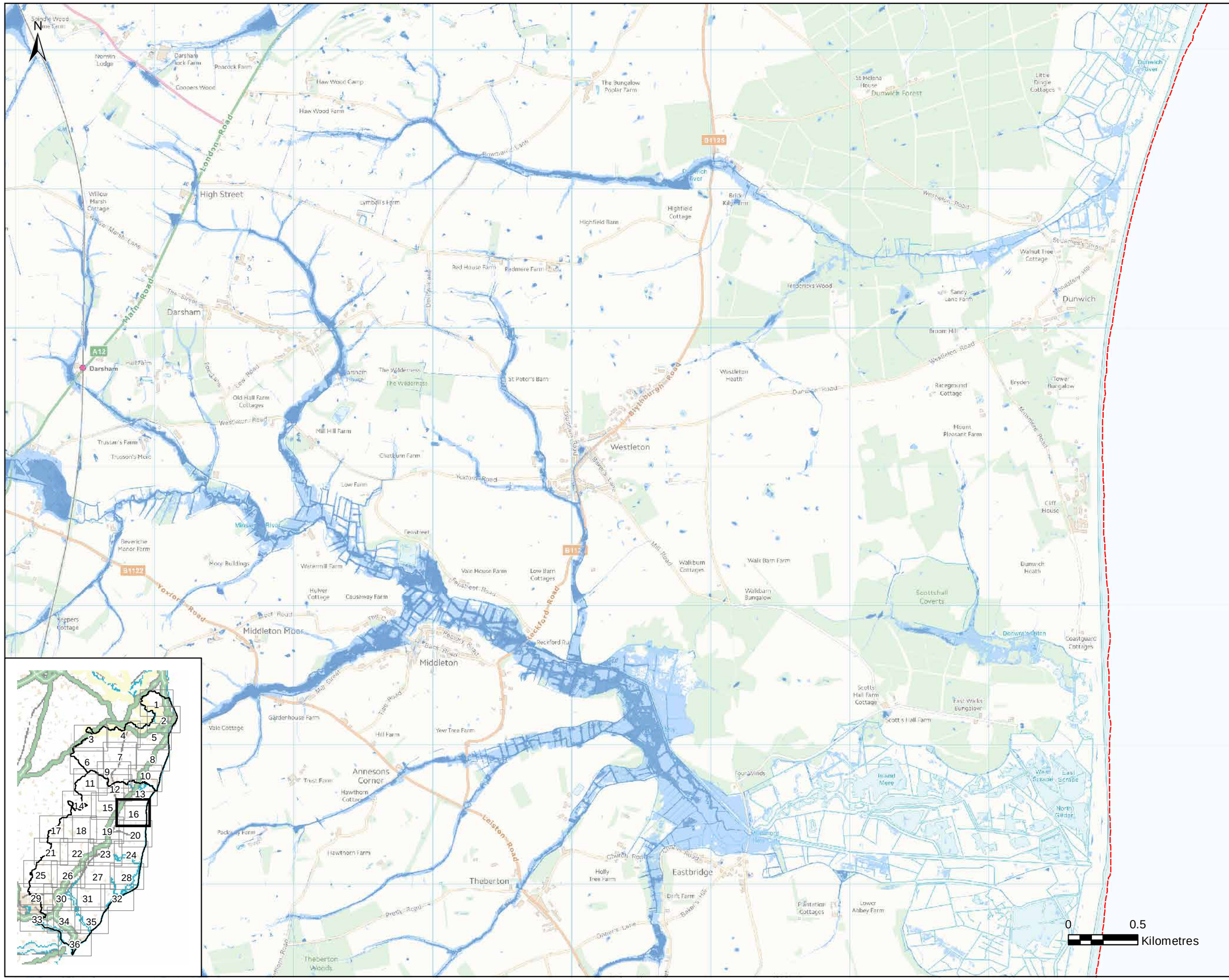
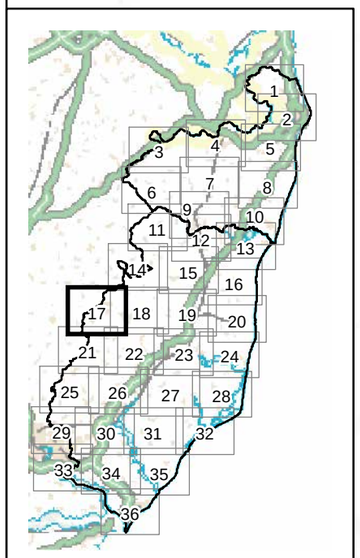

High Street
London Road
Main Road
Darsham
Westleton
Middleton
Middleton Moor
Theberton
Eastbridge
Dunwich
Dunwich Forest
Blythburgh Road
Yoxford Road
Leiston Road
Westleton Road
Dunwich River
Minsmere River
Annesons Corner
Scotts Hall Farm
Walnut Tree Cottage
Darsham Lock Farm
Haw Wood Camp
Haw Wood Farm
Lymbolls Farm
Highfield Barn
Highfield Cottage
Brick Kiln Farm
Red House Farm
Redmere Farm
Hendricks Wood
Sandy Lane Farm
Broom Hill
Westleton Heath
Rangeground Cottage
Bryden
Tower Bungalow
Mount Pleasant Farm
Old Hall Farm Cottages
Mill Hill Farm
Chediston Farm
Low Farm
Fenstreet
Vale House Farm
Low Barn Cottages
Walk Barn Farm
Walkburn Cottages
Walkburn Bungalow
Scottshall Coverts
Dunwich Heath
Coastguard Cottages
Cliff House
Scotts Hall Farm Cottage
East Walks Bungalow
Scott's Hall Farm
Four Winds
Island Mere
Minsmere Level
Holly Tree Farm
Drift Farm
Plantation Cottages
Lower Abbey Farm
Garden House Farm
Hill Farm
Yew Tree Farm
Hawthorn Cottage
Hawthorn Farm
Packway Farm
Trust Farm
Vale Cottage
Theberton Woods
Beverichie Manor Farm
Moor Buildings
Waterm ill Farm
Huver Cottage
Causeway Farm
Keppers Cottage
Truston's Farm
Truston's Moric
Chediston Farm
Low Farm
Willow Marsh Cottage
Willow Marsh Lane
Halfpenny Lane
Low Road
Westleton Road
Dunwich Road
Fenstreet Road
Mill Road
Church Road
Priory Road
Back Road
Tree Road
Mill Street
Pretty Road
Corner's Lane
Baker's Hill
Minsmere Road
Sandy Lane
Darsham Mill
The Wilderness
St Peter's Barn
Ferry Road
Ordnance Survey
Sandy Wood Nine Farm
Norwin Lodge
Peacock Farm
Coopers Wood
The Bungalow
Poplar Farm
St Helena House
Little Dingle Cottages
Dunwich River
Brownhall Land
Ordnance Survey
B1125
B1122
B1122
B1125
A12
Darsham
Darsham
Darsham
Westleton
Middleton
Theberton
Eastbridge
Dunwich
Dunwich Forest

N



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

0 0.5 Kilometres

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 17 OF 36

Drawn	Checked	Approved	Date
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Drawing Number: FIGURE 06.17

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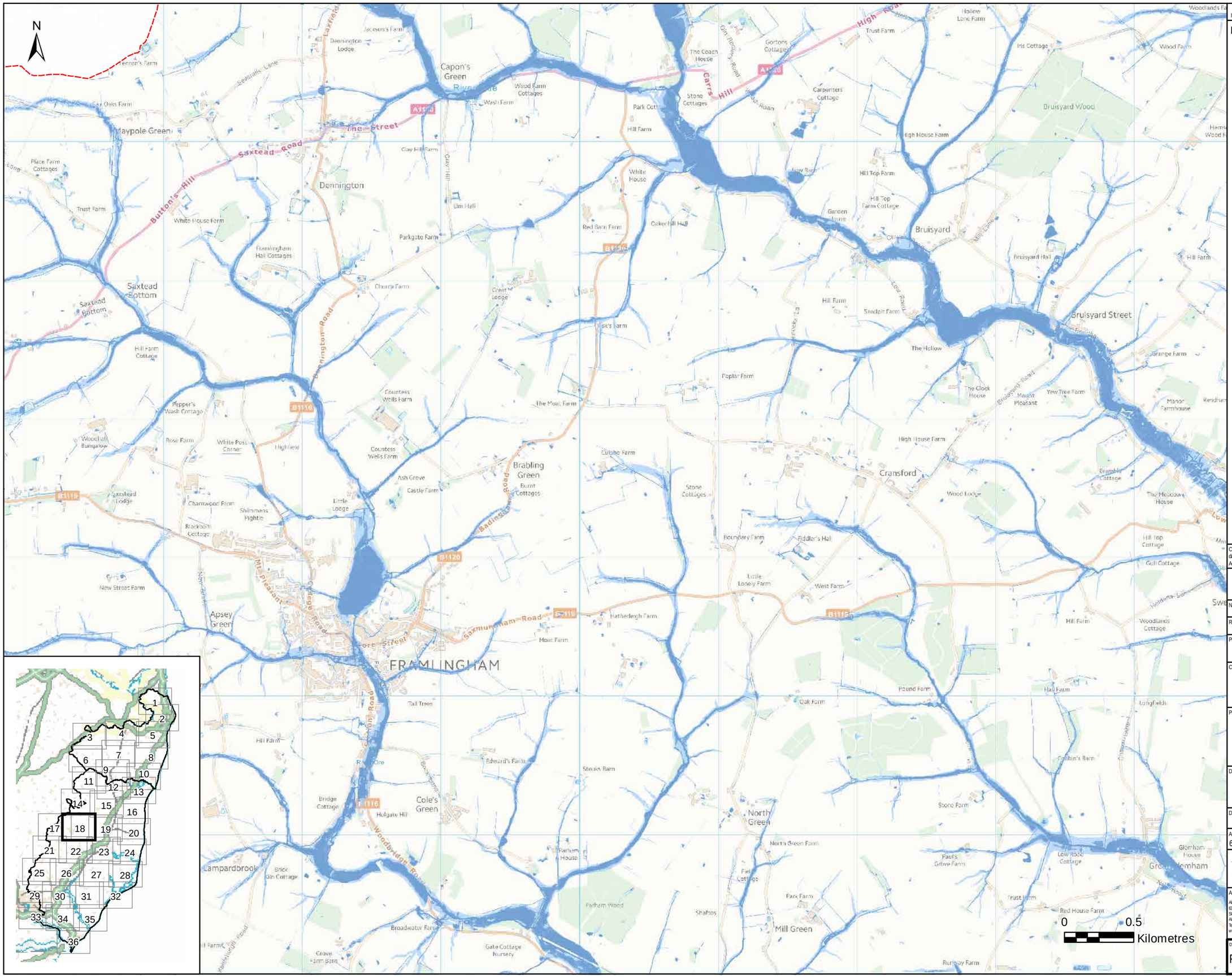

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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No changes - Issued as final	LM / MD	27.11.17	2	
Revision Details	By / Check	Check Date	Suffix	

Purpose of Issue: FINAL

Client: Suffolk Coastal District Council; Waveney District Council, Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 18 OF 36

Drawn	Checked	Approved	Date
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Drawing Number: FIGURE 06.18

Rev.: 2

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 19 OF 36

Drawn	Checked	Approved	Date
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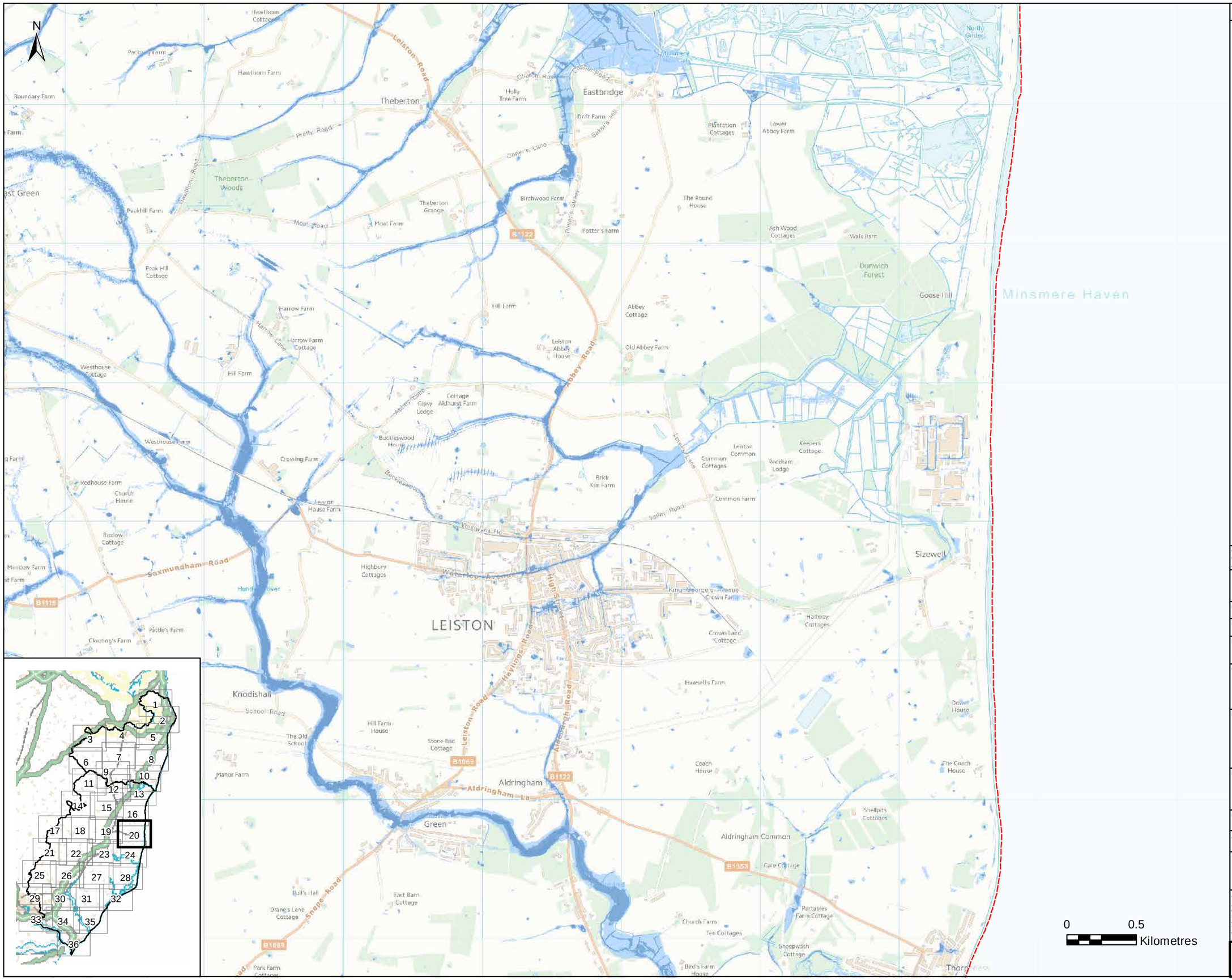

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 20 OF 36

Drawn	Checked	Approved	Date
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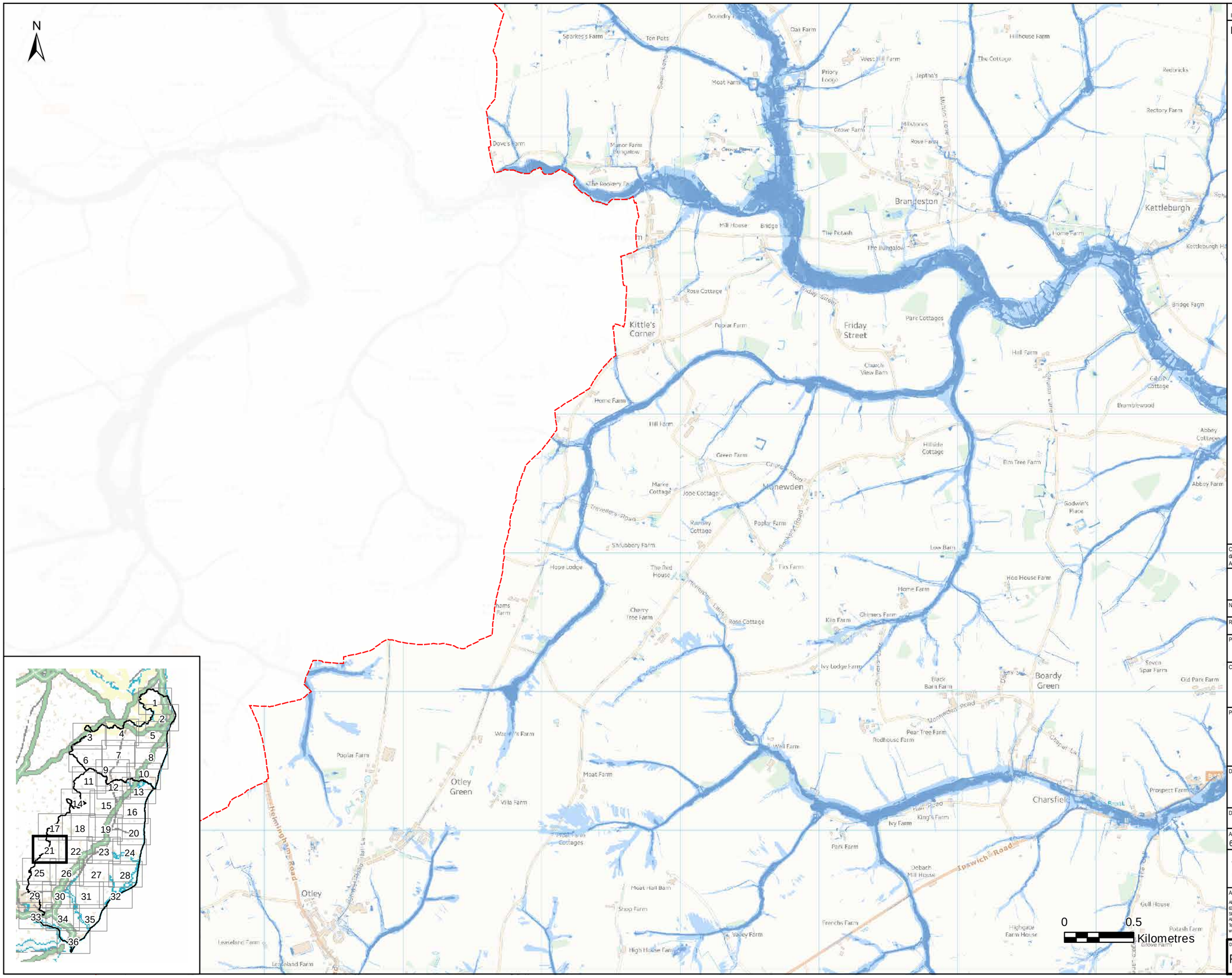
FIGURE 06.20	2



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 21 OF 36

Drawn	Checked	Approved	Date
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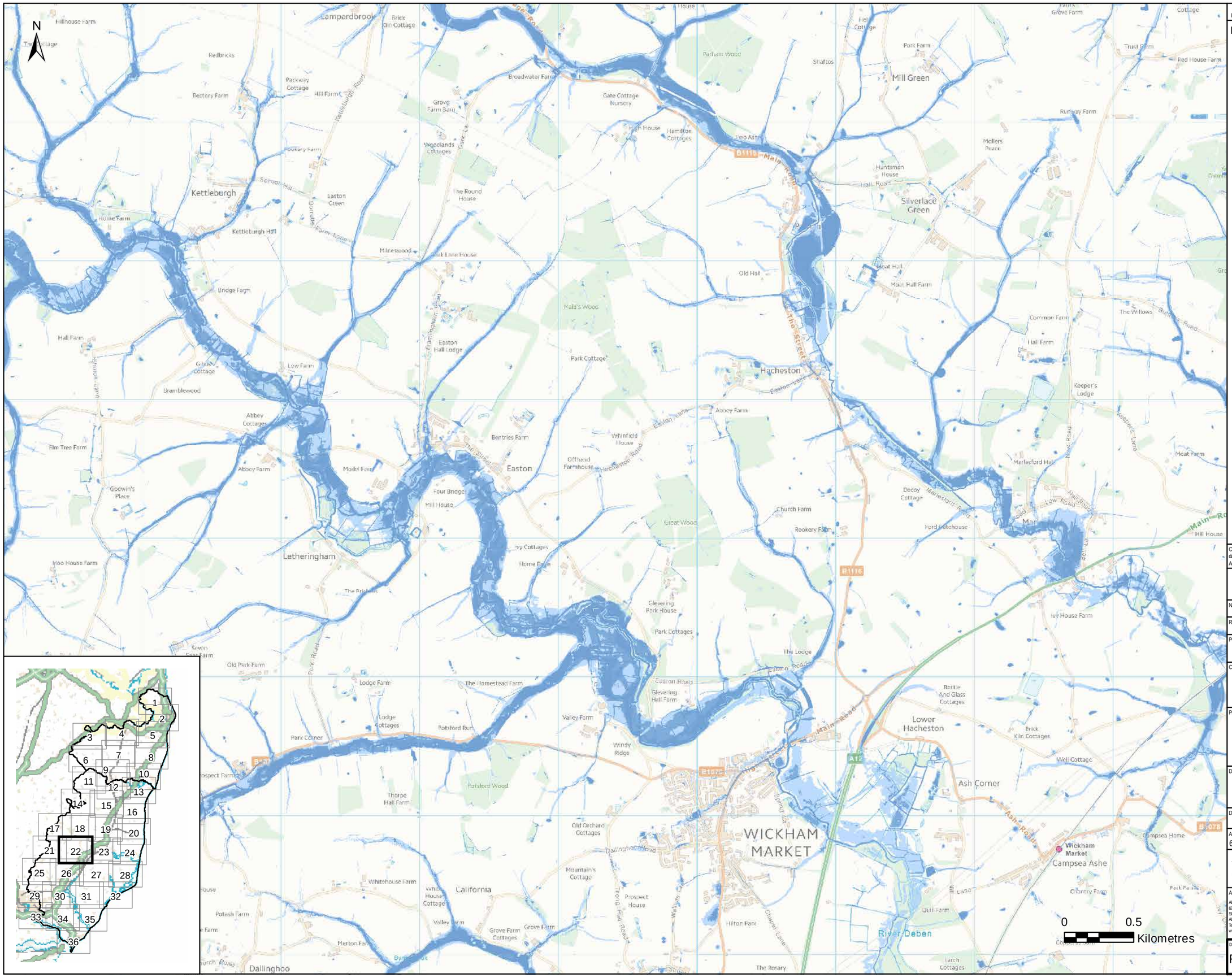
FIGURE 06.21	2



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 22 OF 36

Drawn	Checked	Approved	Date
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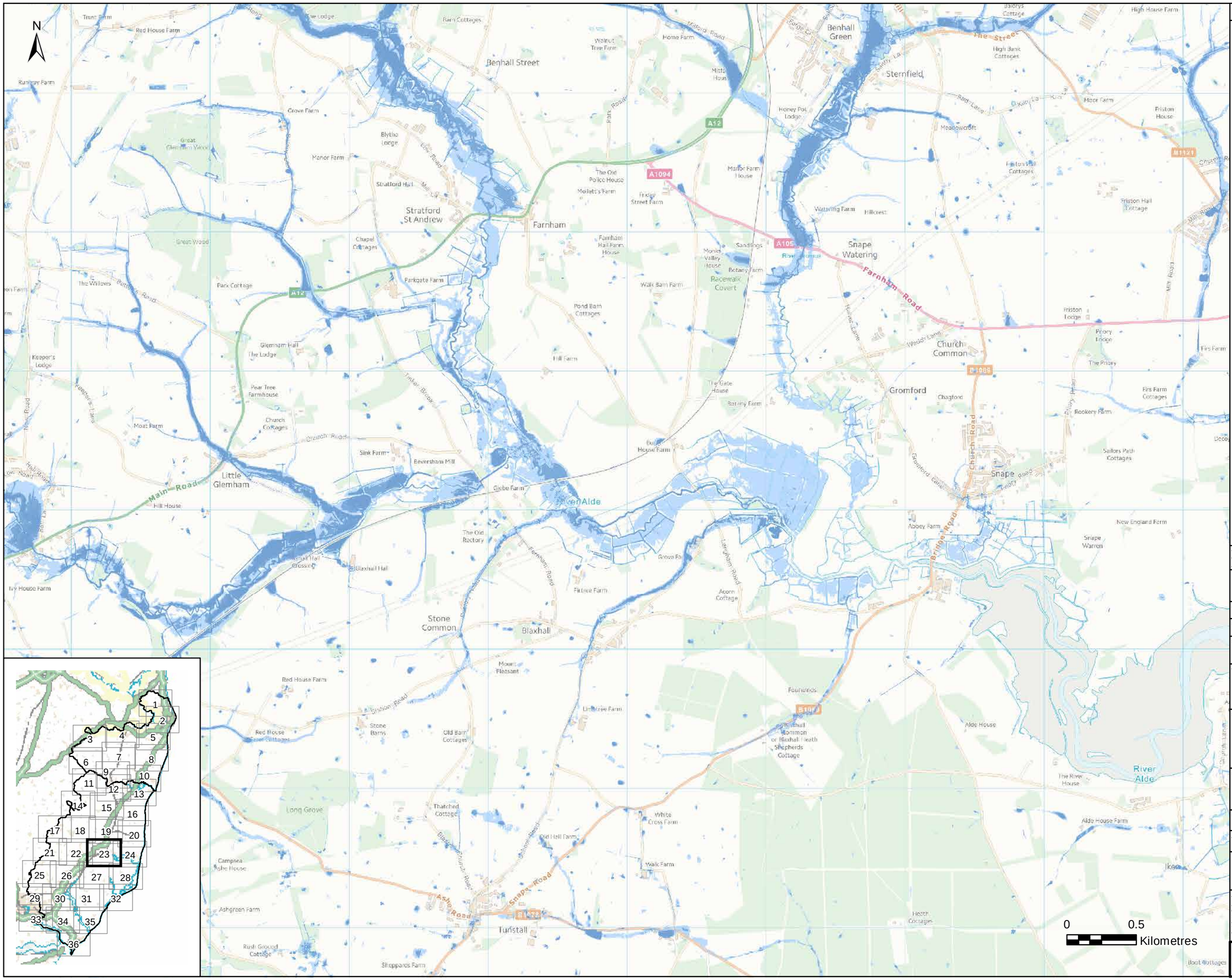

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 23 OF 36

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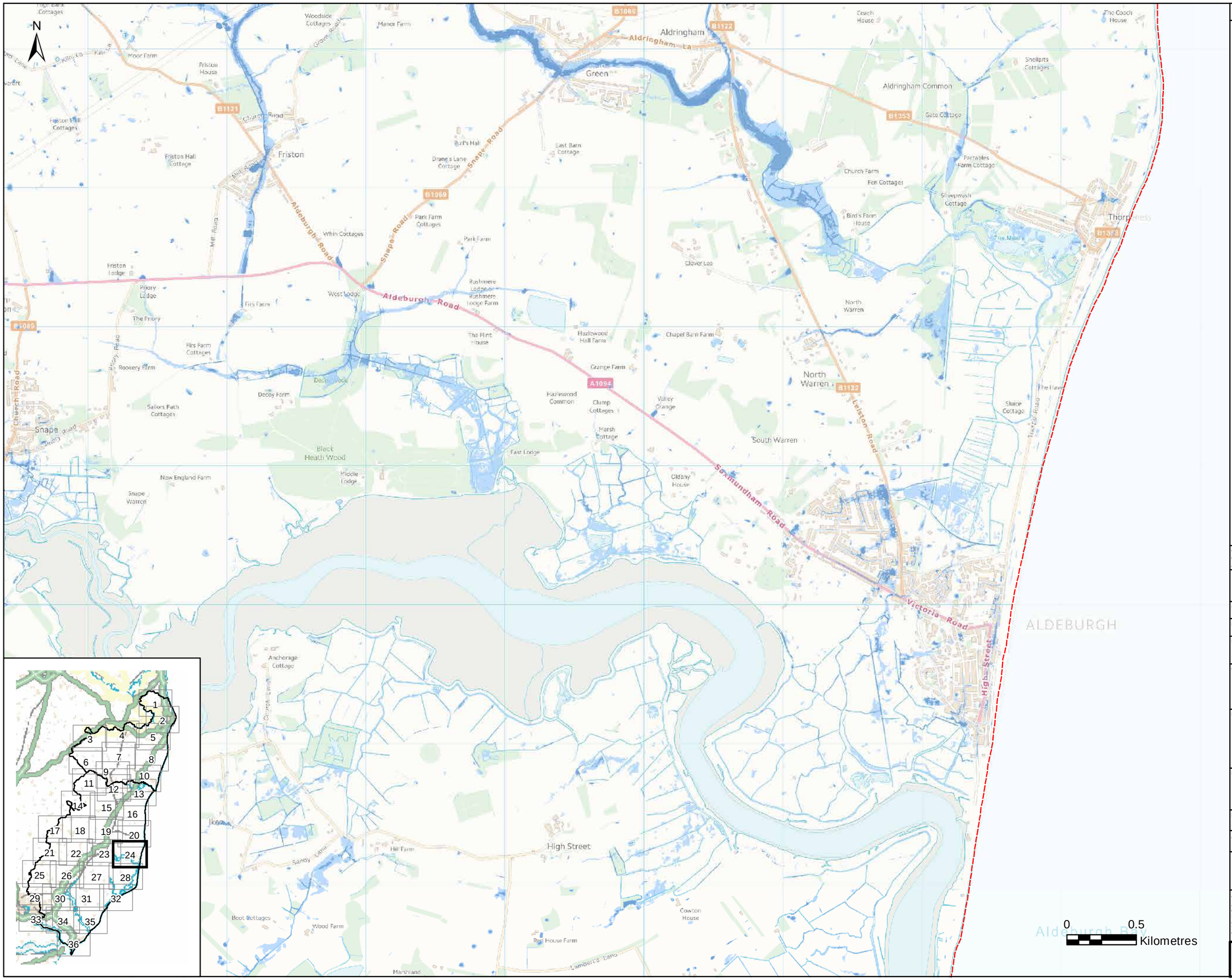

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: East Suffolk Council; Waveney District Council Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 24 OF 36

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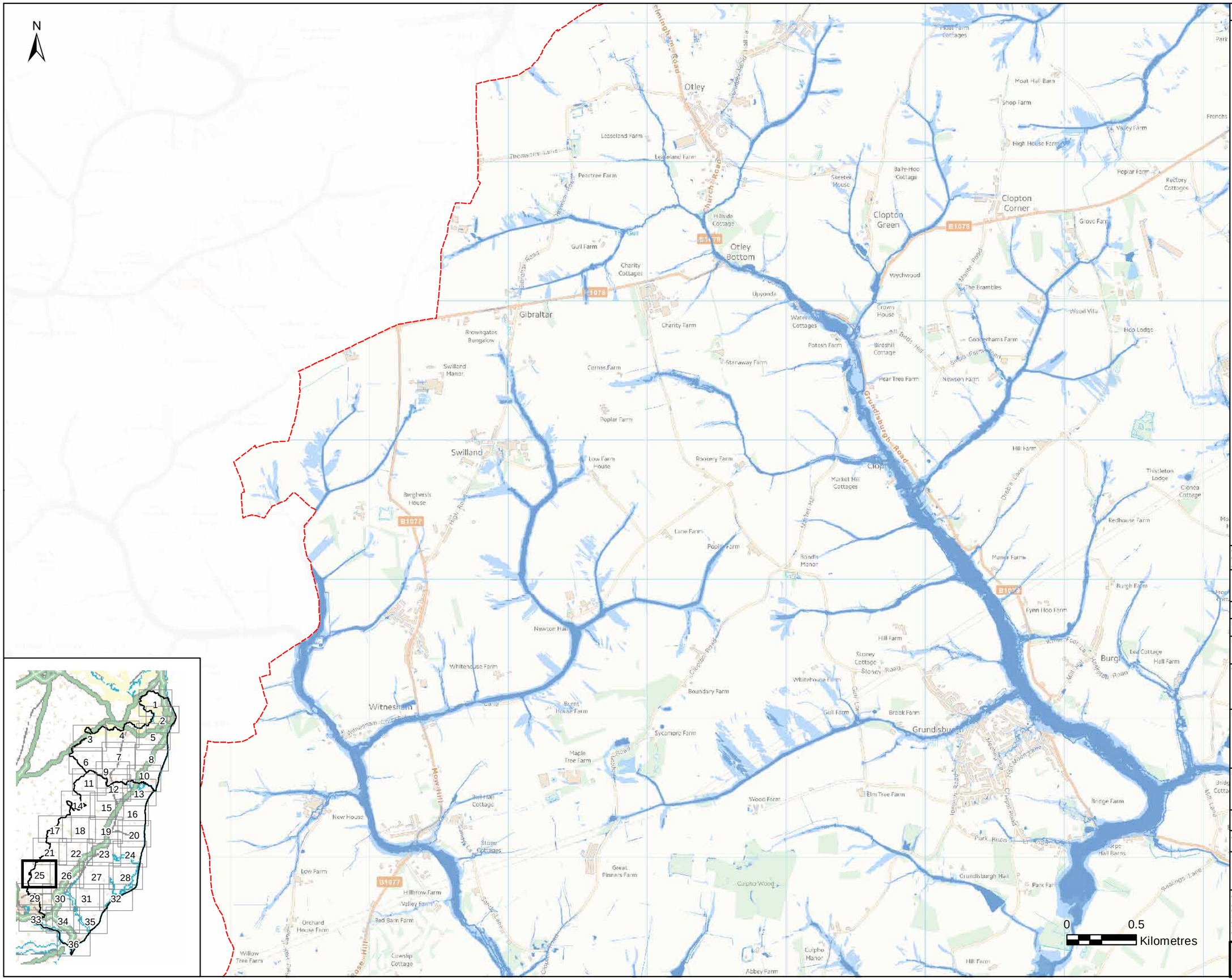

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 25 OF 36

Drawn	Checked	Approved	Date
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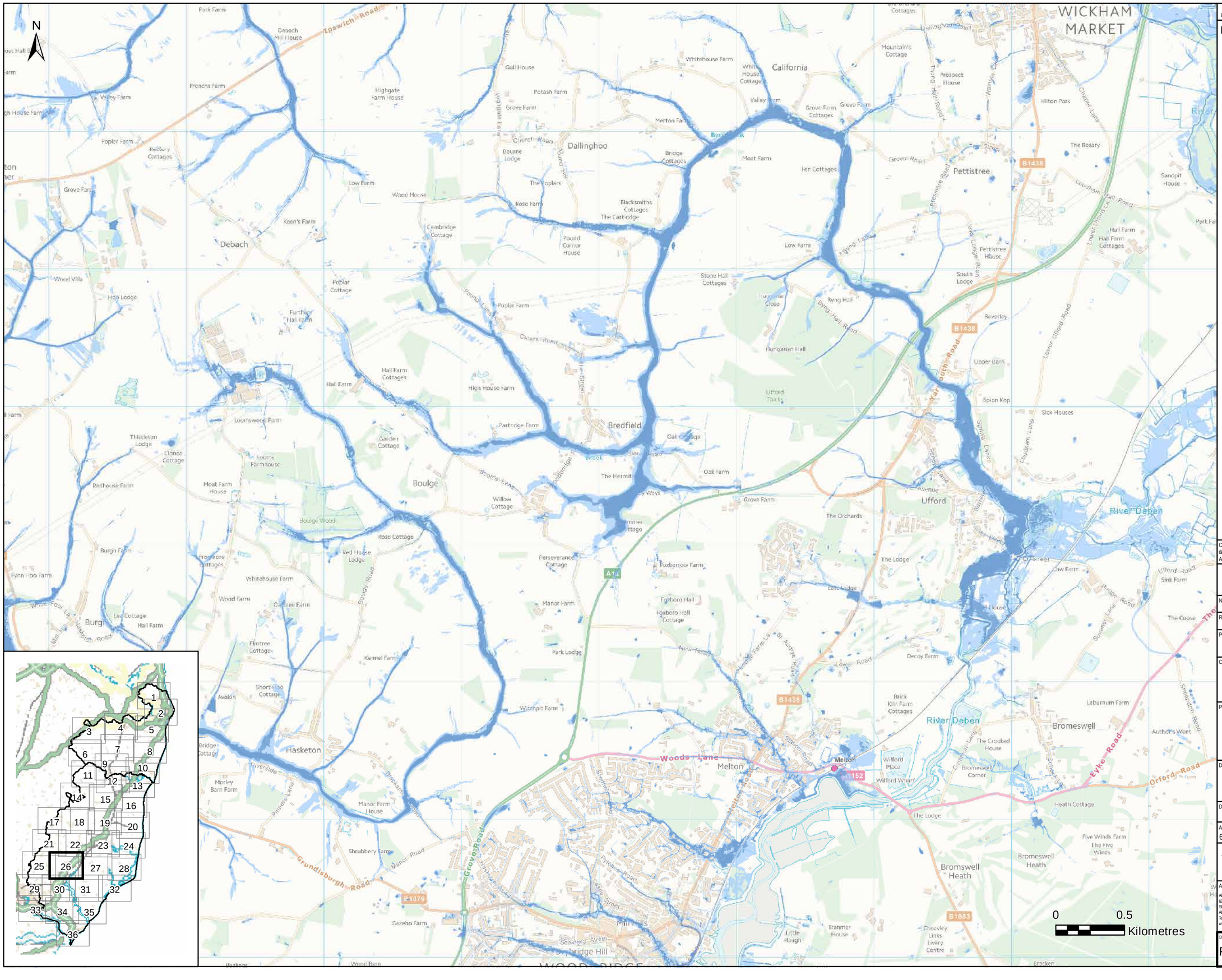

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 26 OF 36

Drawn	Checked	Approved	Date
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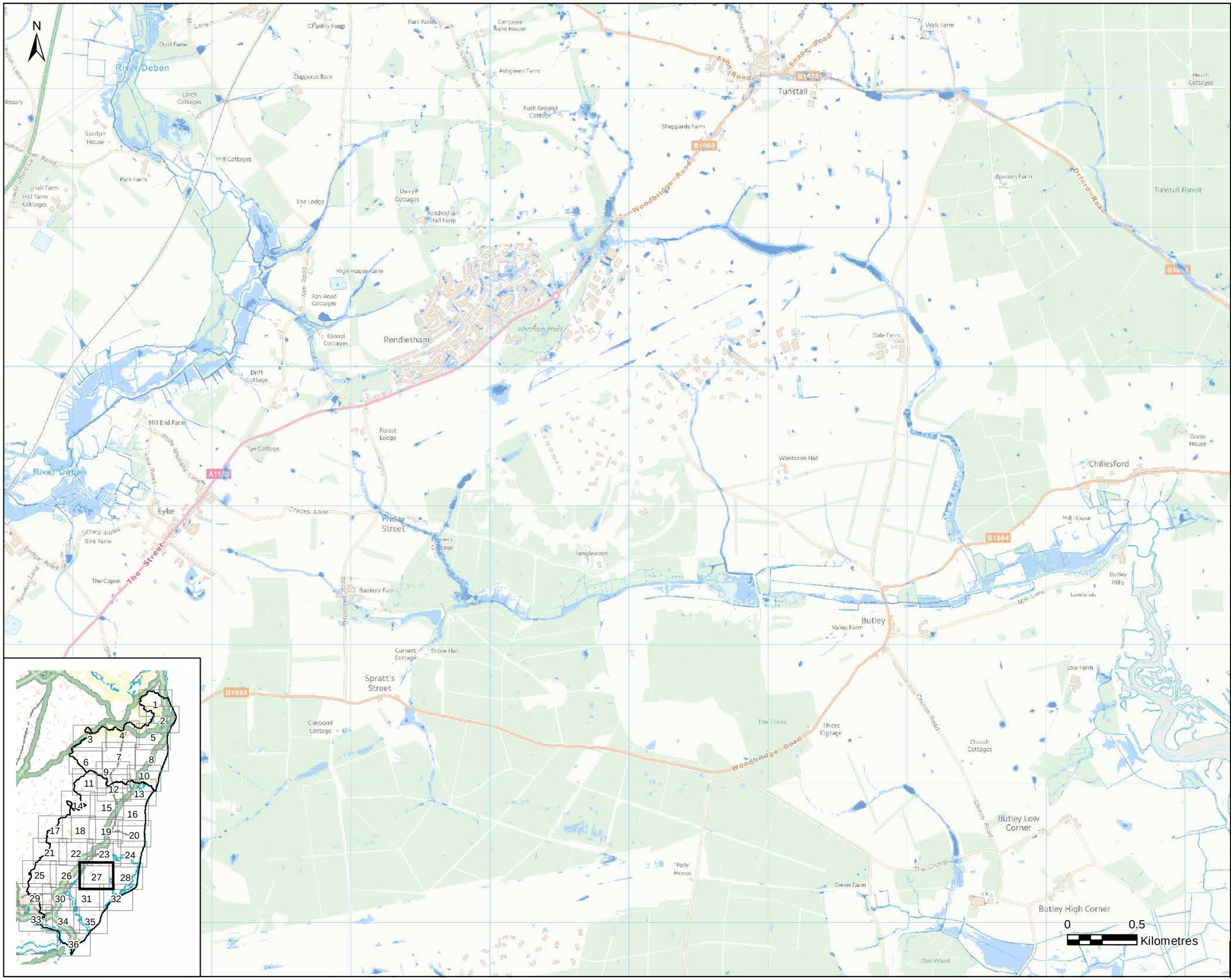
FIGURE 06.26	2



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: Suffolk Coastal District Council; Waveney District Council Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 27 OF 36

Drawn	Checked	Approved	Date
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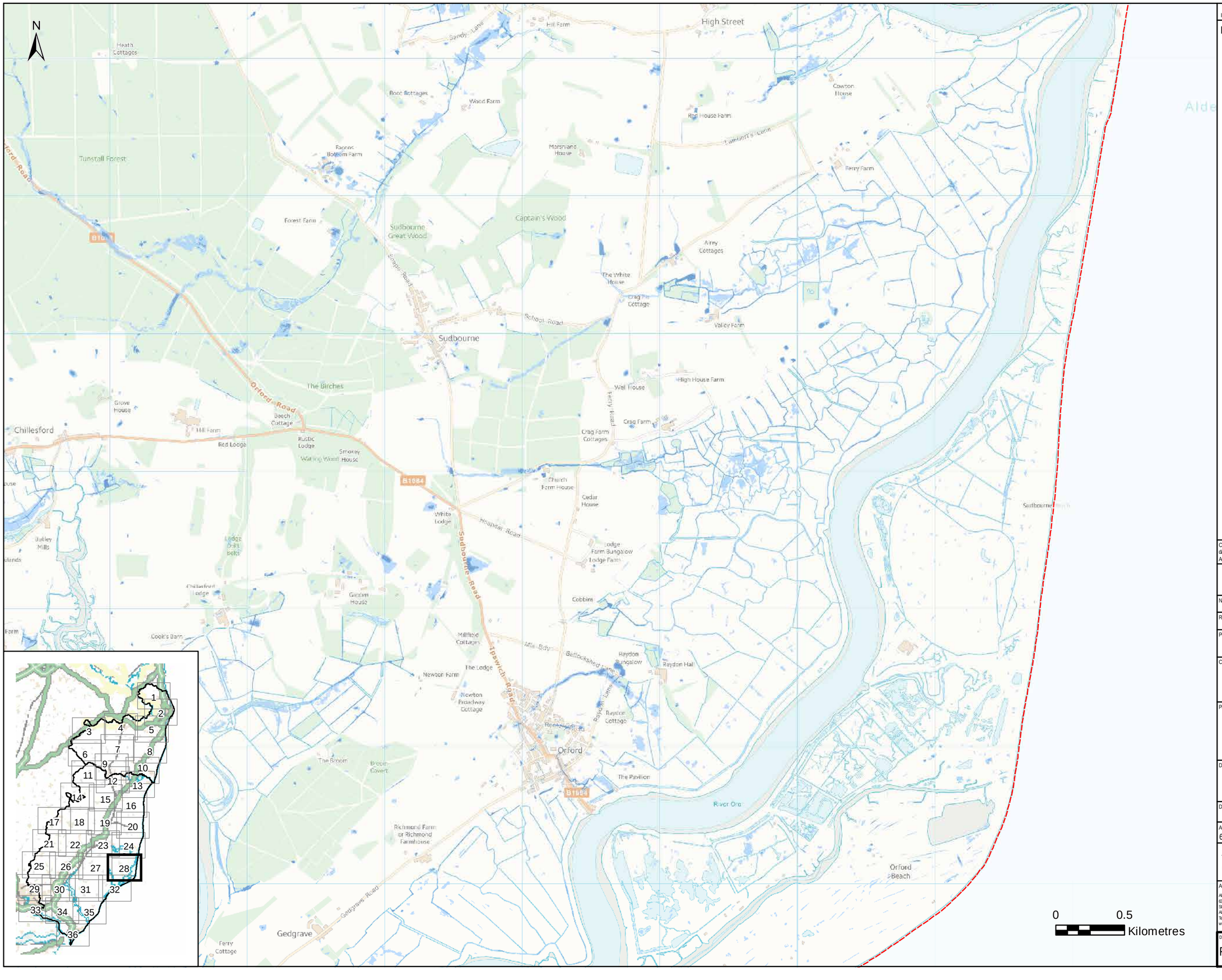
FIGURE 06.27	2



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 28 OF 36

Drawn	Checked	Approved	Date
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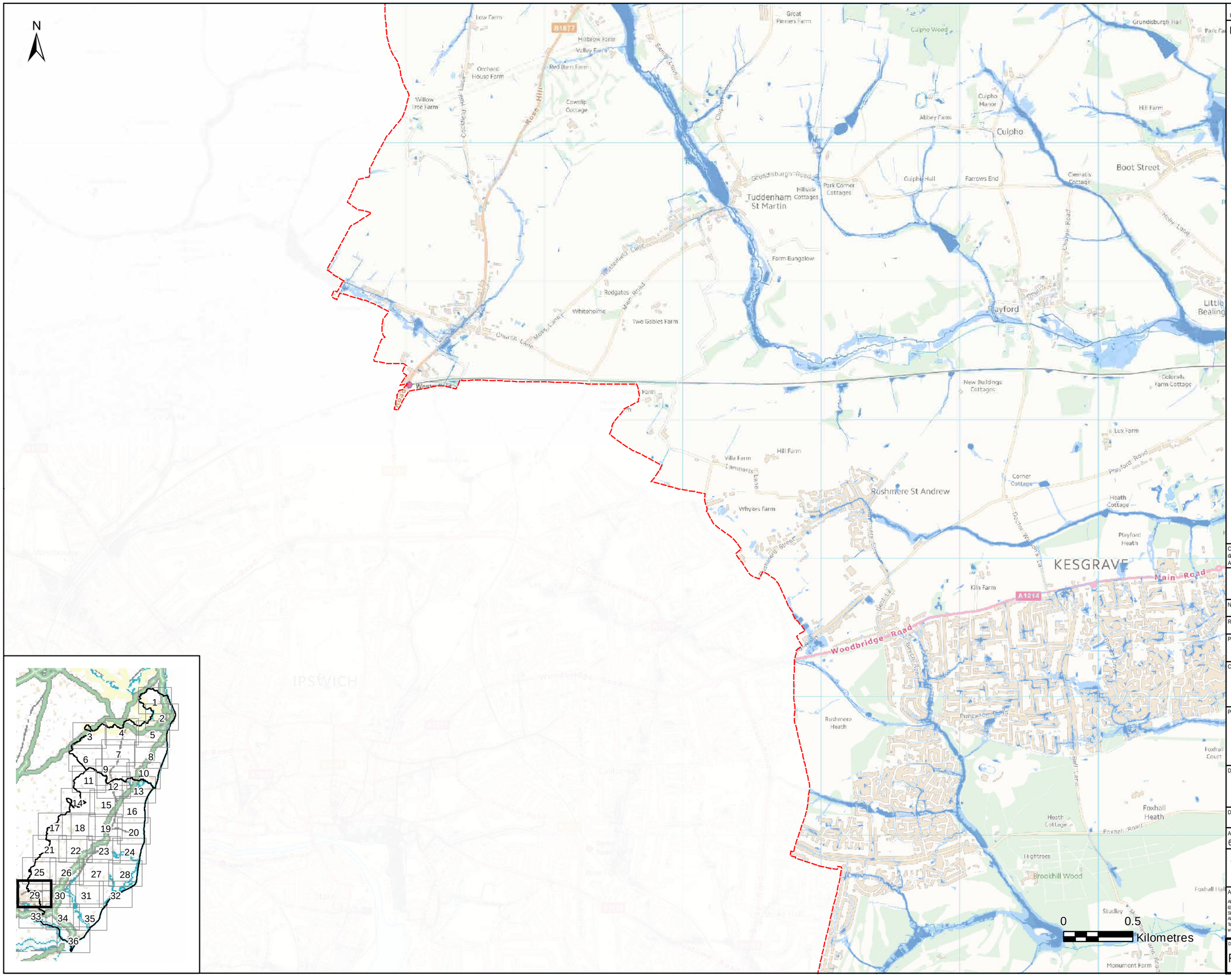

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: East Suffolk Council / Waveney District Council Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 29 OF 36

Drawn	Checked	Approved	Date
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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 30 OF 36

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 31 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	27/11/2017

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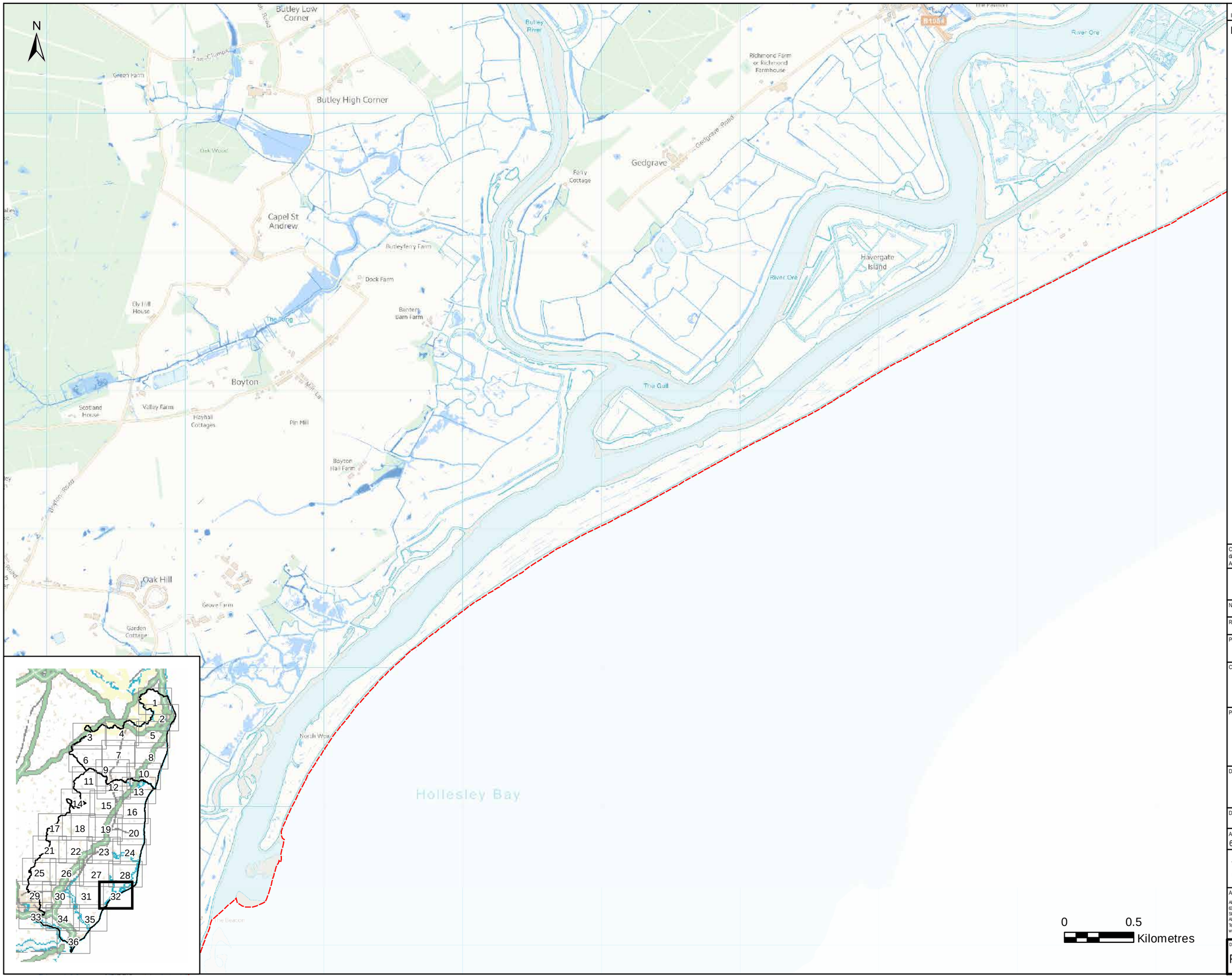
Drawing Number: FIGURE 06.31

Rev.: 2



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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No changes - Issued as final	LM / MD	27.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 32 OF 36

Drawn	Checked	Approved	Date
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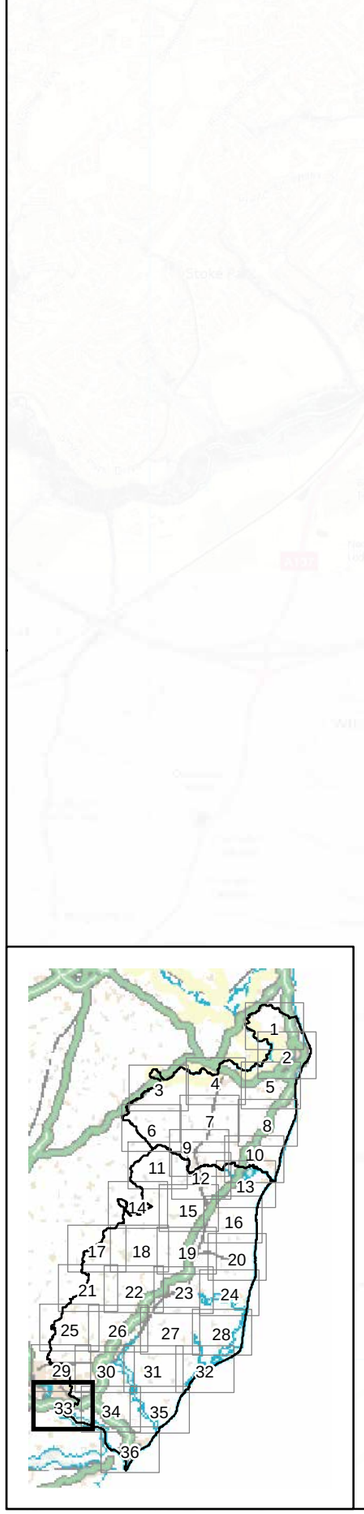
Drawing Number: FIGURE 06.32

Rev.: 2

N



0 0.5 Kilometres

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 33 OF 36

Drawn	Checked	Approved	Date
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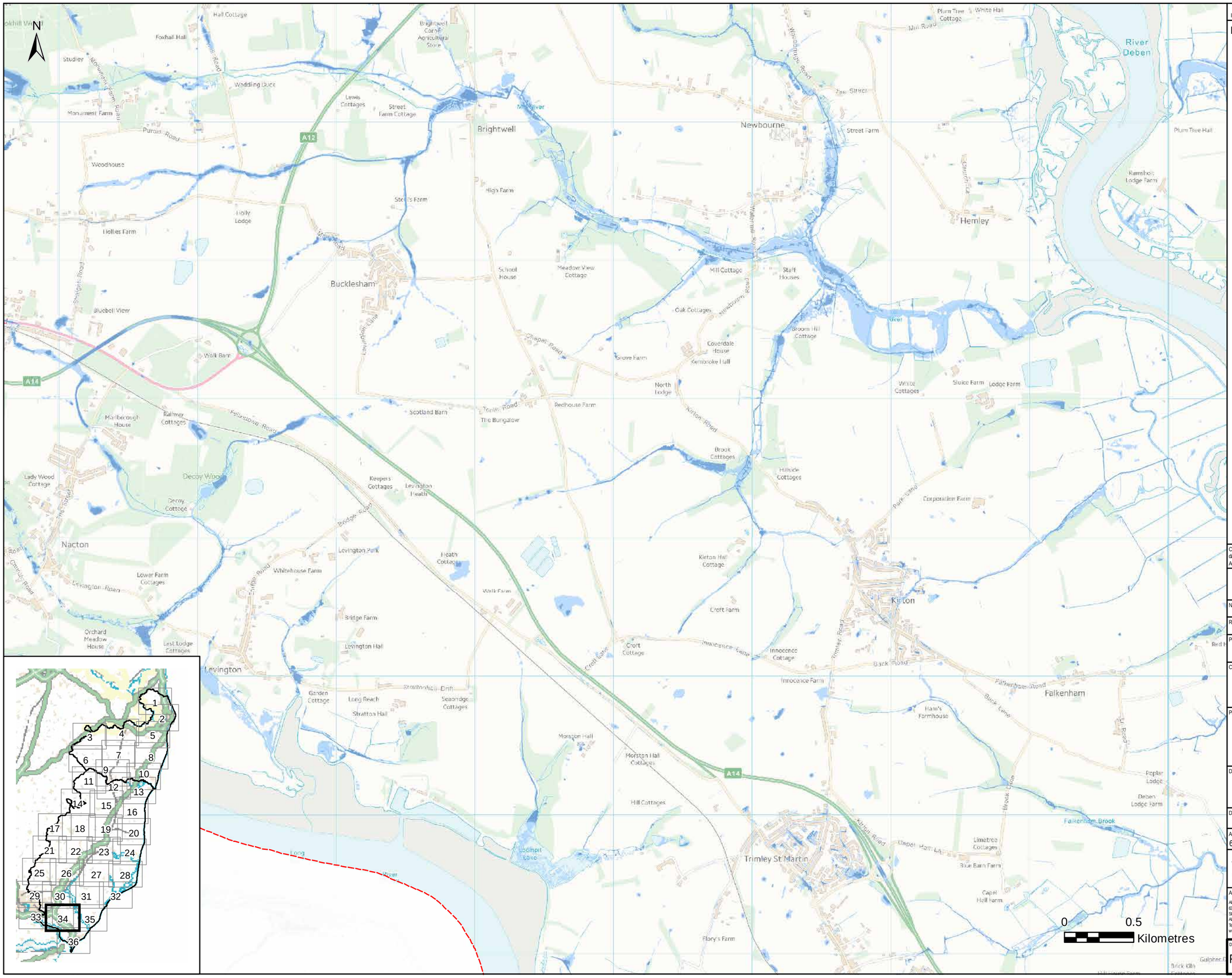

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 34 OF 36

Drawn	Checked	Approved	Date
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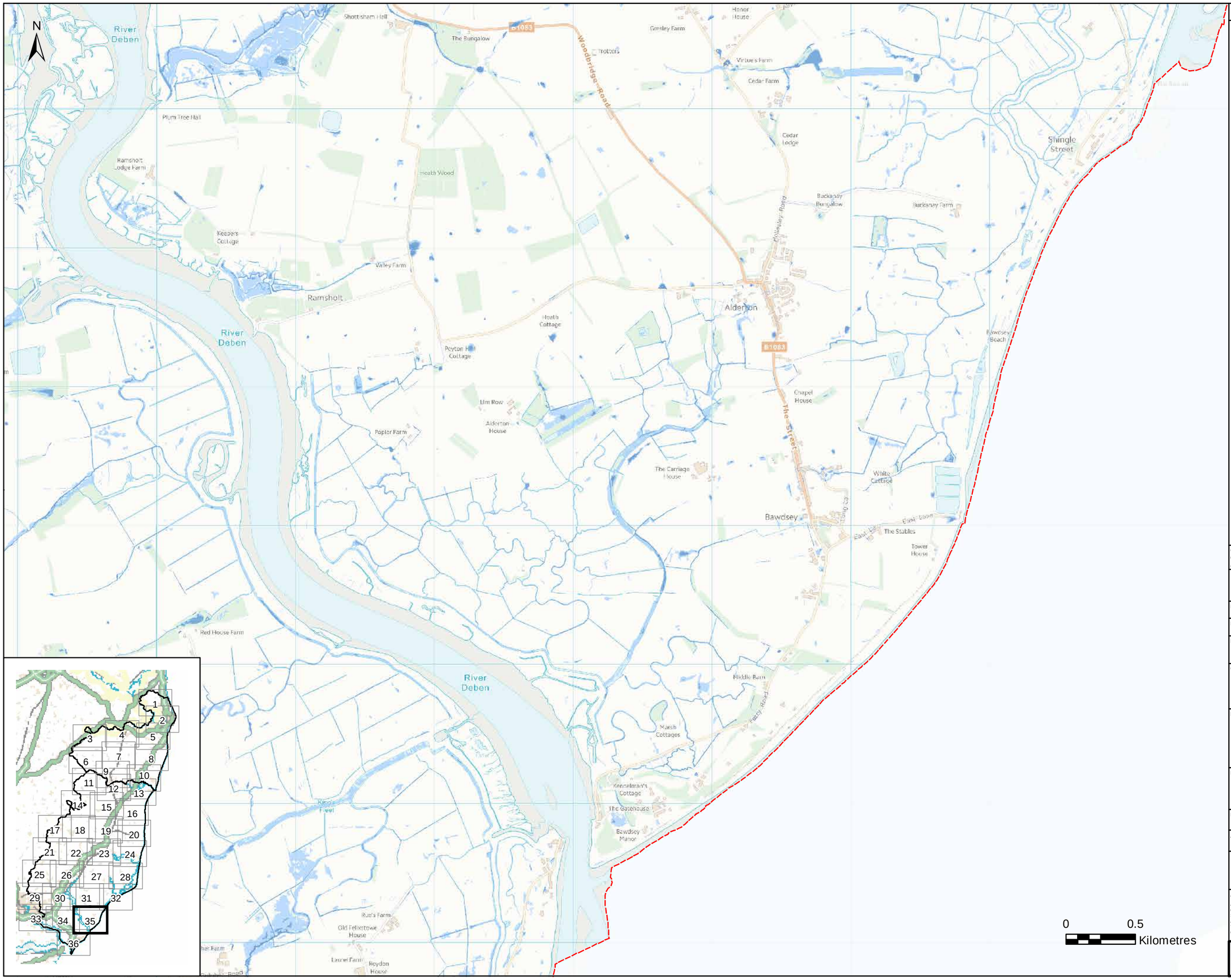
Drawing Number	Rev.
FIGURE 06.34	2



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 35 OF 36

Drawn	Checked	Approved	Date
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Drawing Number: FIGURE 06.35

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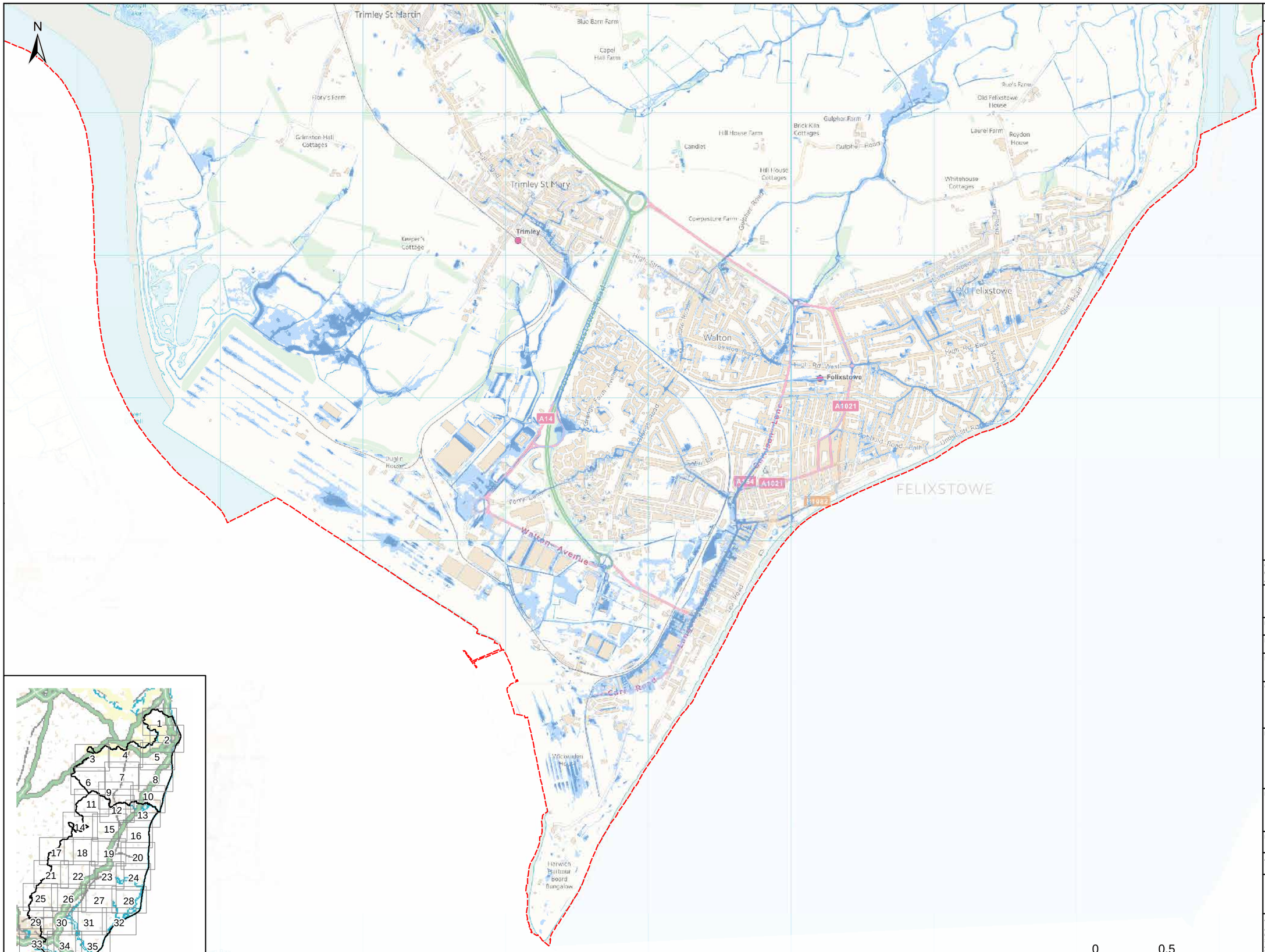

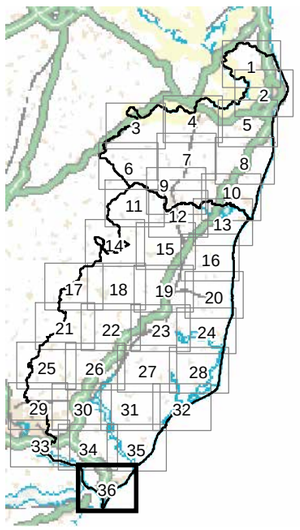

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Risk of flooding

- High risk (3.3% AEP)
- Medium Risk (1% AEP)
- Low Risk (0.1% AEP)

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM SURFACE WATER SHEET 36 OF 36

Drawn	Checked	Approved	Date
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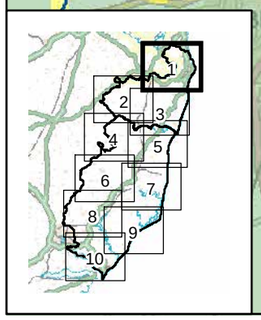
Drawing Number: FIGURE 06.36

Rev.: 2

N

Fritton
St Olaves
Lower Thurlton
Subcourse
Thurlton
Haddiscoe
Thorpe
Haddiscoe
Three Cocked Hat
Maypole Green
Toft Monks
Wheatacre
Burgh St Peter
Aldeby
Gillingham
Beccles
BECCLES
Worlingham
Bamby
North Cove
Mutford
Gisleham
Carlton Colville
Pakefield
Kirkley
Oulton
Oulton Broad North
Oulton Broad South
Lowestoft
Camps Heath
Lound
Herringfleet
Somerleyton
Somerleyton
Blundeston
Corton
Hopton on Sea
A12(T)
A1117
A146
A1145
A12
A14

River Waveney
Hundred Drain
The Fleet
Landspring Drain



0 1 Kilometres

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

BGS Susceptibility to Groundwater flooding

- Potential for groundwater flooding to occur at surface
- Potential for groundwater flooding of property situated below ground level
- Limited potential for groundwater flooding to occur
- Not considered to be prone to groundwater flooding

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	By	Check	Check Date	Suffix
River Labels amended	LM	MD	11.04.18	3
No changes - Issued as final	LM	MD	23.11.17	2
Revision Details				

Purpose of Issue: FINAL

Client: Waveney District Council Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: SUSCEPTIBILITY TO GROUNDWATER FLOODING SHEET 1 OF 10

Drawn	Checked	Approved	Date
LM	MD	GP	11/04/2018

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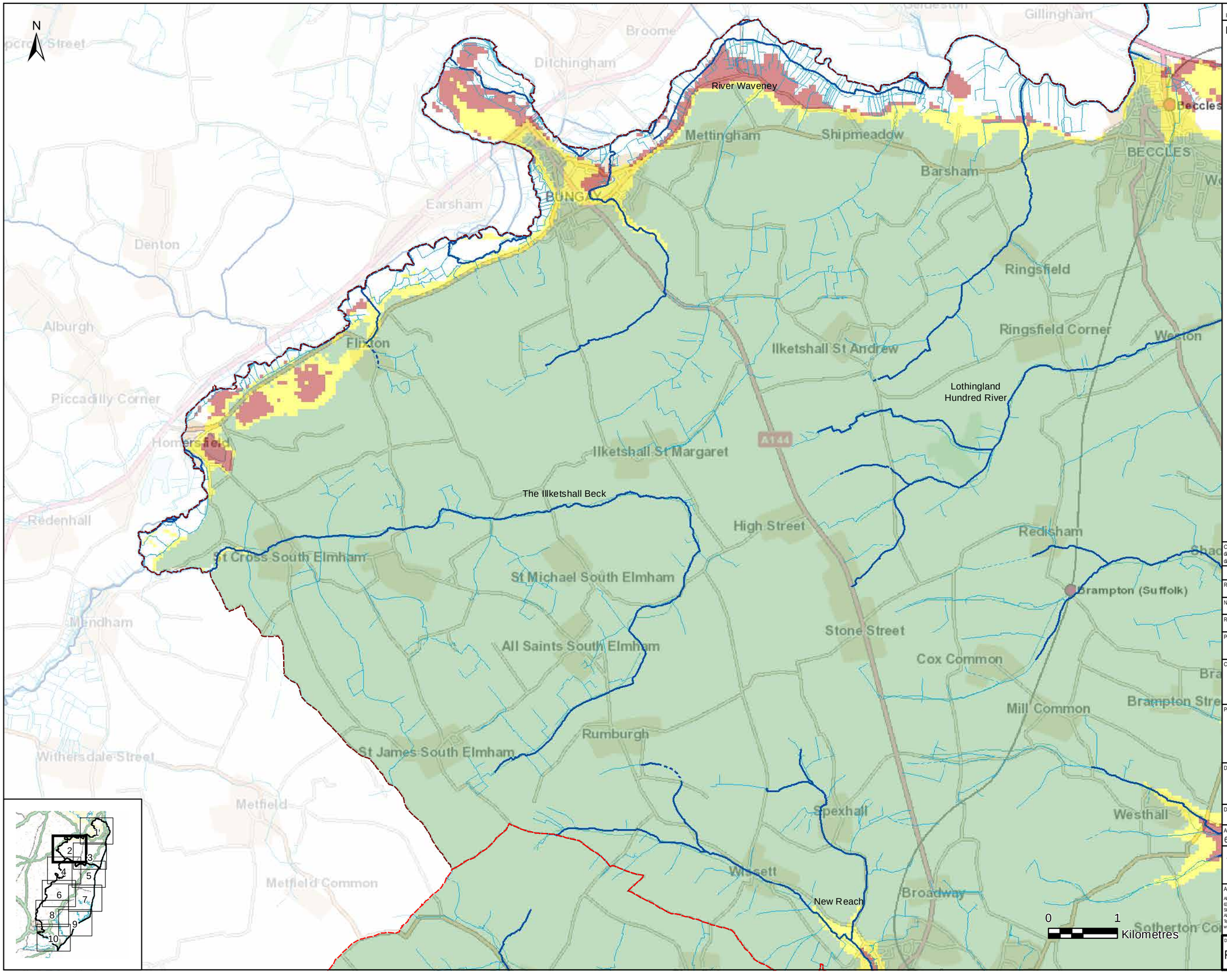
Drawing Number: FIGURE 07.1

Rev.: 3



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

BGS Susceptibility to Groundwater flooding

- Potential for groundwater flooding to occur at surface
- Potential for groundwater flooding of property situated below ground level
- Limited potential for groundwater flooding to occur
- Not considered to be prone to groundwater flooding

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River Labels amended	LM / MD	11.04.18	3
No changes - Issued as final	LM / MD	23.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: SUSCEPTIBILITY TO GROUNDWATER FLOODING SHEET 2 OF 10

Drawn	Checked	Approved	Date
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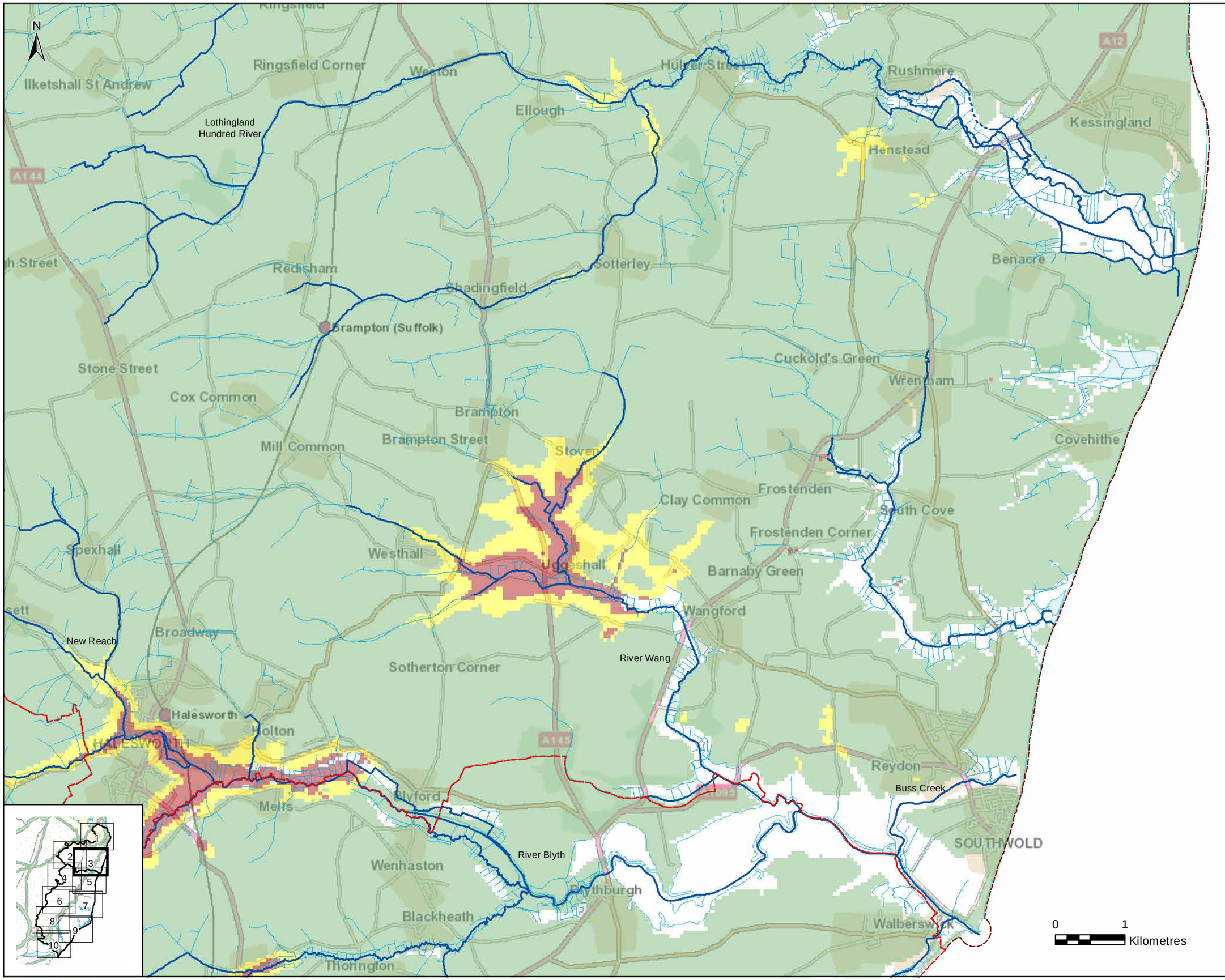
Drawing Number: FIGURE 07.2

Rev.: 3



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

BGS Susceptibility to Groundwater flooding

- Potential for groundwater flooding to occur at surface
- Potential for groundwater flooding of property situated below ground level
- Limited potential for groundwater flooding to occur
- Not considered to be prone to groundwater flooding

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River Labels amended	LM / MD	11.04.18	3
No changes - Issued as final	LM / MD	23.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council, Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: SUSCEPTIBILITY TO GROUNDWATER FLOODING SHEET 3 OF 10

Drawn	Checked	Approved	Date
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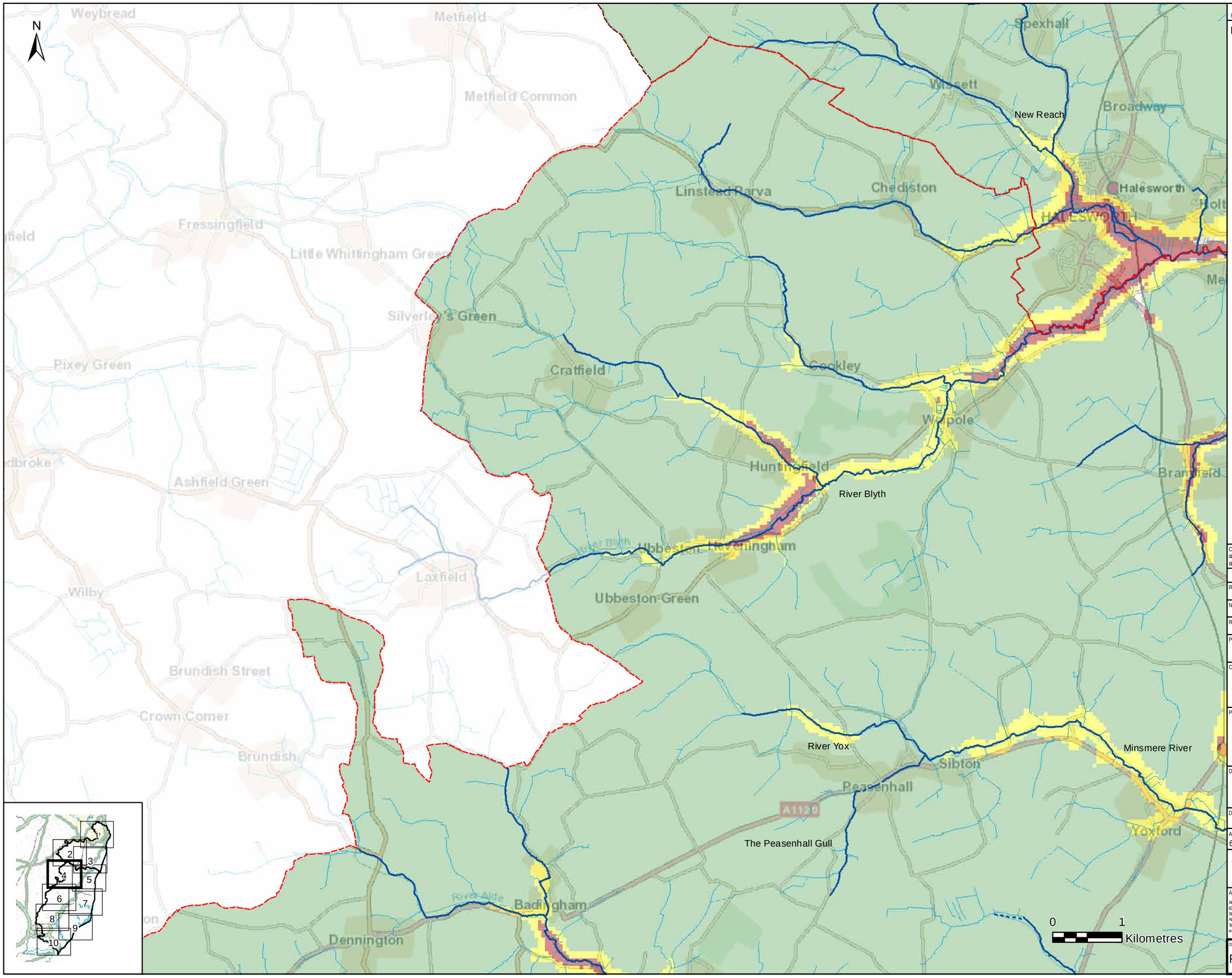
FIGURE 07.3	3



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

BGS Susceptibility to Groundwater flooding

- Potential for groundwater flooding to occur at surface
- Potential for groundwater flooding of property situated below ground level
- Limited potential for groundwater flooding to occur
- Not considered to be prone to groundwater flooding

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River Labels amended	LM / MD	11.04.18	3
No changes - Issued as final	LM / MD	23.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: SUSCEPTIBILITY TO GROUNDWATER FLOODING SHEET 4 OF 10

Drawn	Checked	Approved	Date
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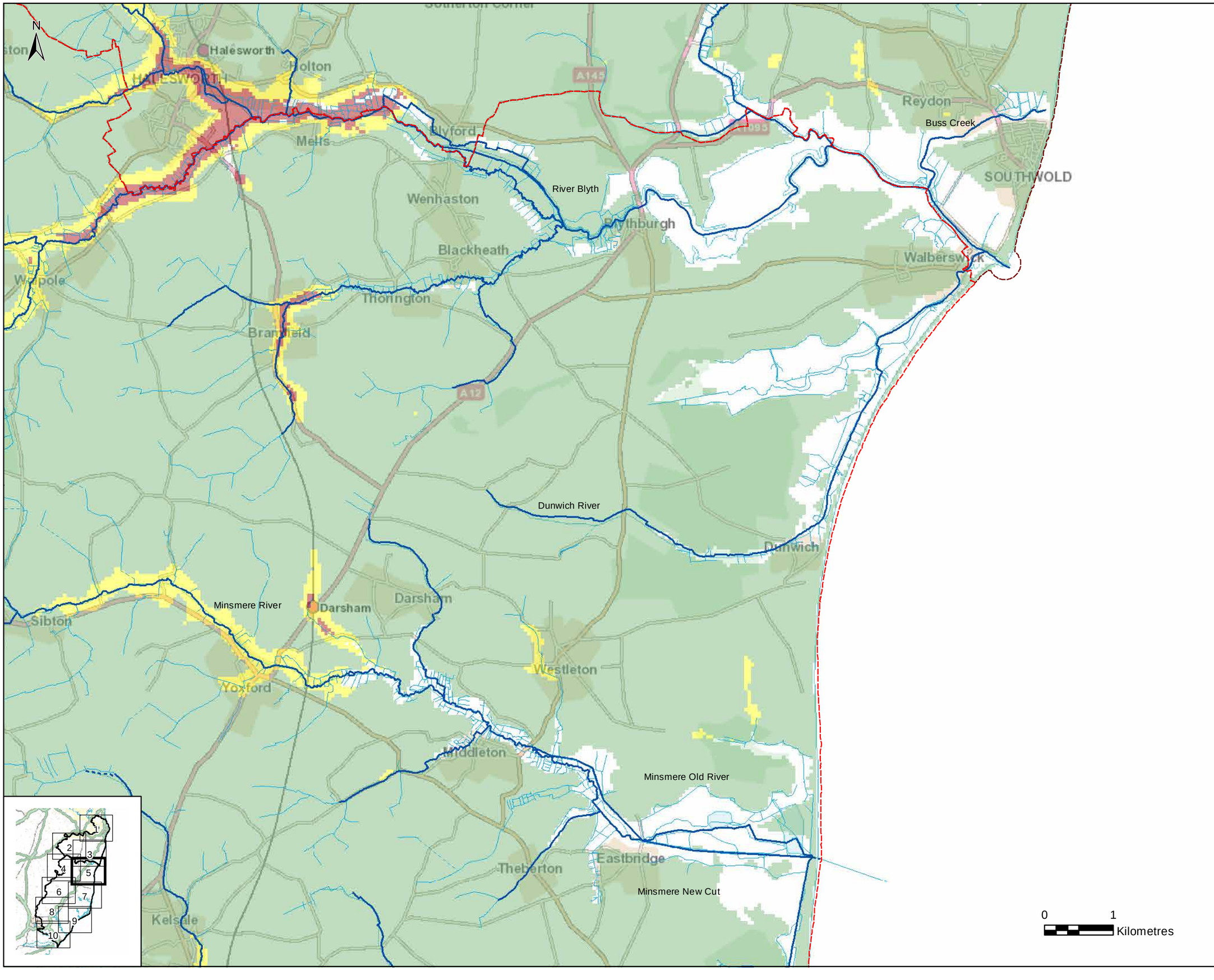
Drawing Number	Rev.
FIGURE 07.4	3



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

BGS Susceptibility to Groundwater flooding

- Potential for groundwater flooding to occur at surface
- Potential for groundwater flooding of property situated below ground level
- Limited potential for groundwater flooding to occur
- Not considered to be prone to groundwater flooding

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River Labels amended	LM / MD	11.04.18	3
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Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: SUSCEPTIBILITY TO GROUNDWATER FLOODING SHEET 5 OF 10

Drawn	Checked	Approved	Date
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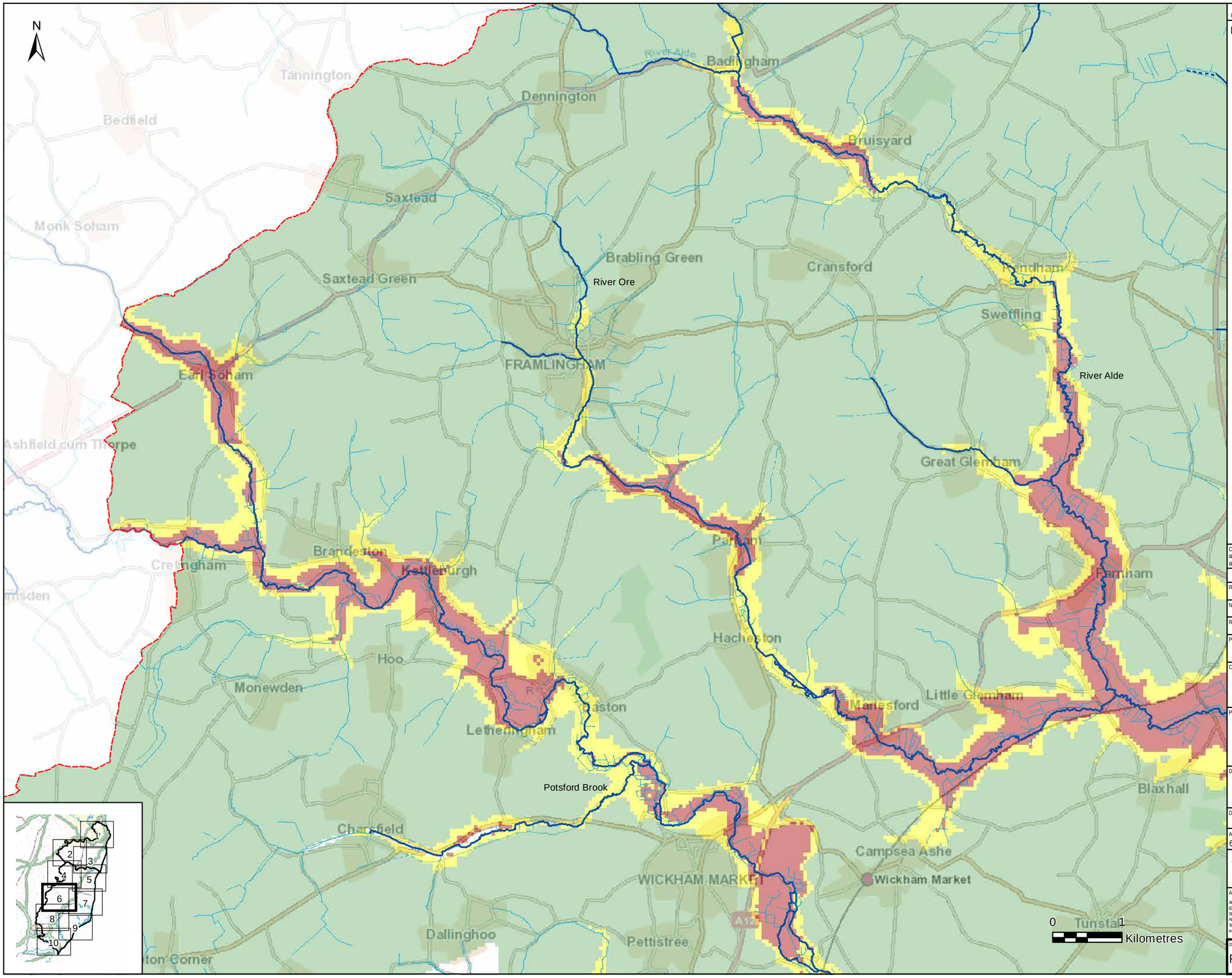
FIGURE 07.5	3



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

BGS Susceptibility to Groundwater flooding

- Potential for groundwater flooding to occur at surface
- Potential for groundwater flooding of property situated below ground level
- Limited potential for groundwater flooding to occur
- Not considered to be prone to groundwater flooding

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River Labels amended	LM / MD	11.04.18	3
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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: SUSCEPTIBILITY TO GROUNDWATER FLOODING SHEET 6 OF 10

Drawn	Checked	Approved	Date
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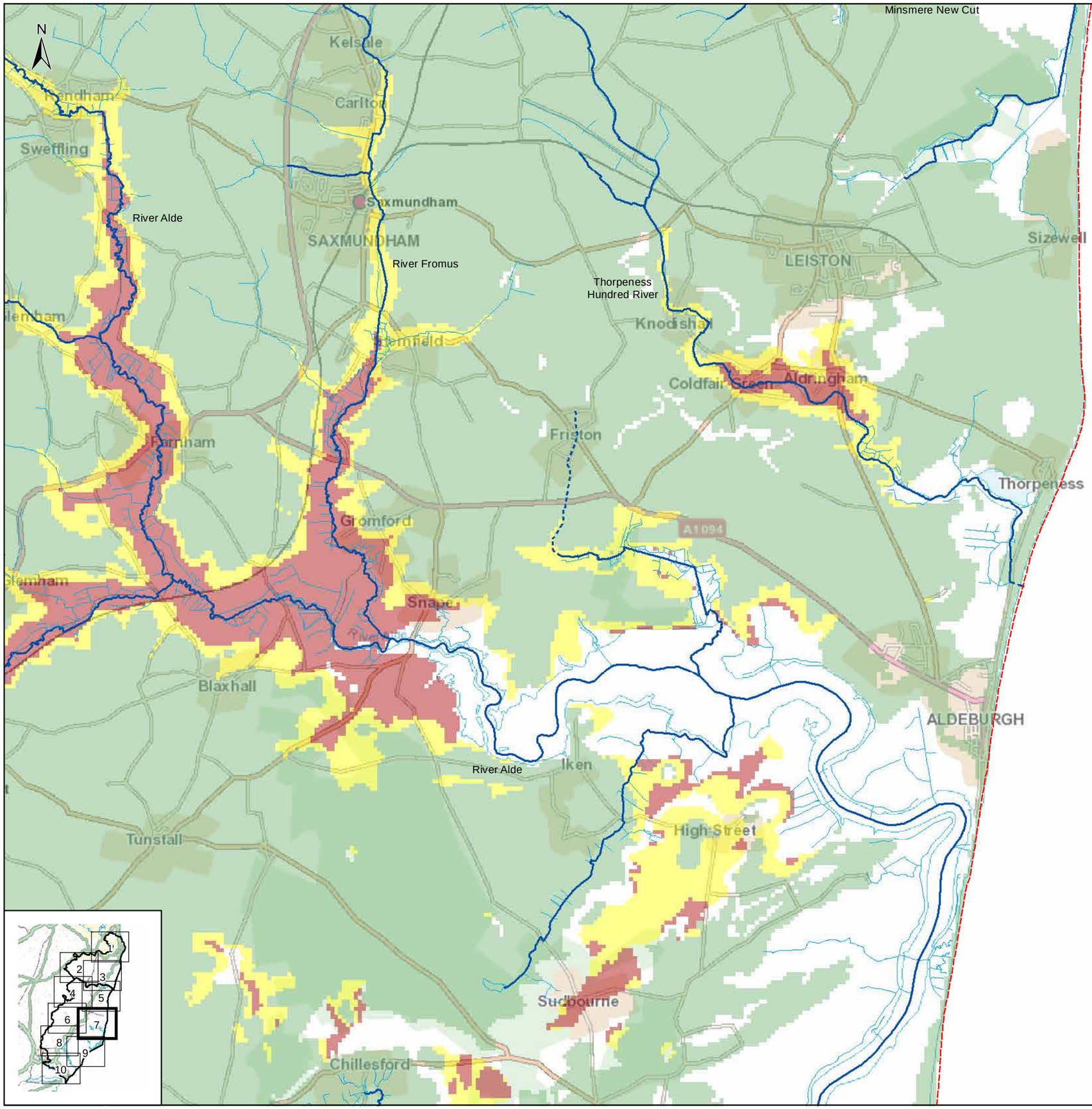

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

BGS Susceptibility to Groundwater flooding

- Potential for groundwater flooding to occur at surface
- Potential for groundwater flooding of property situated below ground level
- Limited potential for groundwater flooding to occur
- Not considered to be prone to groundwater flooding

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Revision Details	By / Check	Check Date	Suffix
River Labels amended	LM / MD	11.04.18	3
No changes - Issued as final	LM / MD	23.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: SUSCEPTIBILITY TO GROUNDWATER FLOODING SHEET 7 OF 10

Drawn	Checked	Approved	Date
LM	MD	GP	11/04/2018

AECOM Internal Project No.	Scale at A3
60520248	1:50,000

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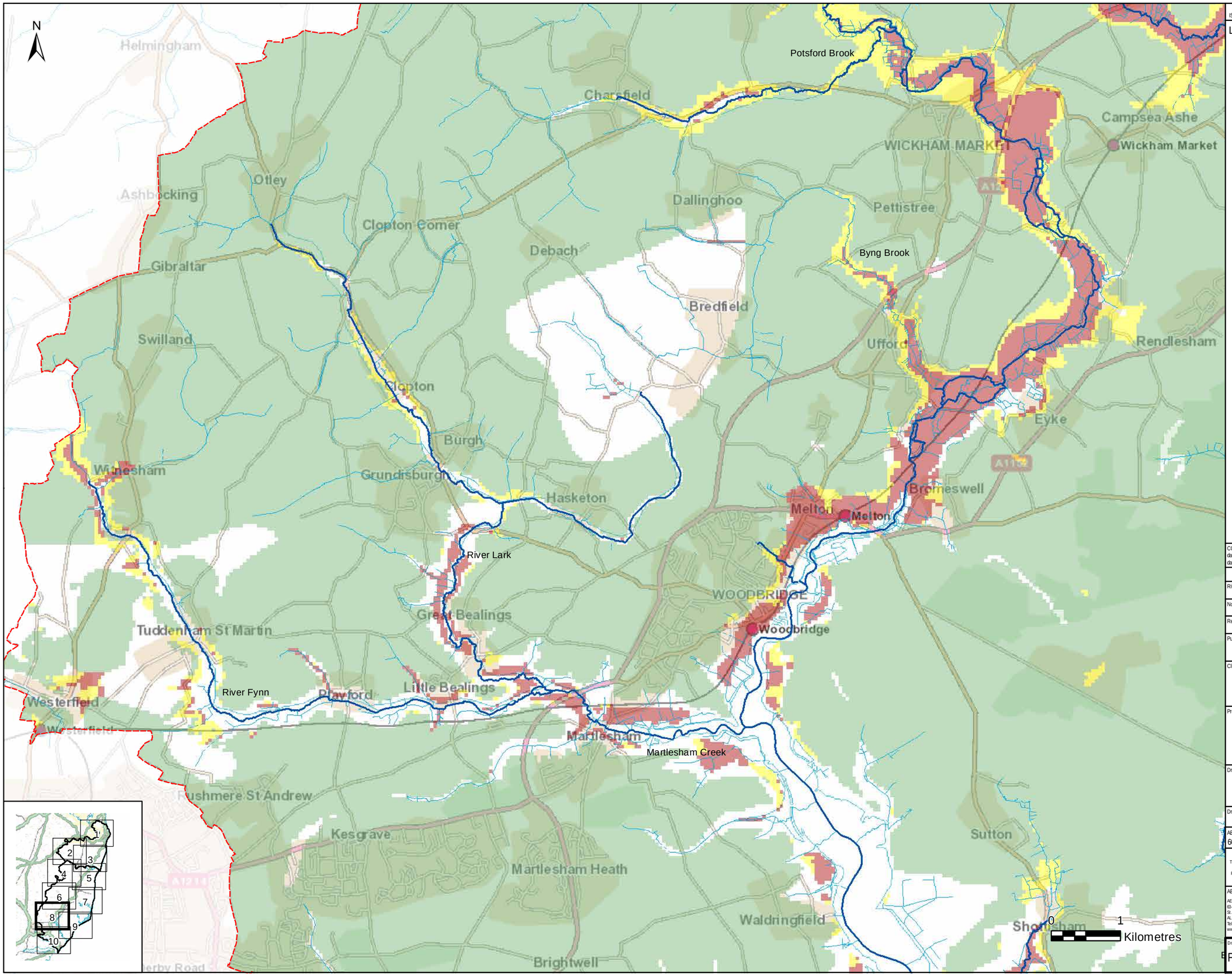
Drawing Number	Rev.
FIGURE 07.7	3



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

BGS Susceptibility to Groundwater flooding

- Potential for groundwater flooding to occur at surface
- Potential for groundwater flooding of property situated below ground level
- Limited potential for groundwater flooding to occur
- Not considered to be prone to groundwater flooding

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Revision Details	By / Check	Check Date	Suffix
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No changes - Issued as final	LM / MD	23.11.17	2

Purpose of Issue: FINAL

Client: Suffolk Coastal District Council; Waveney District Council, Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: SUSCEPTIBILITY TO GROUNDWATER FLOODING SHEET 8 OF 10

Drawn	Checked	Approved	Date
LM	MD	GP	11/04/2018

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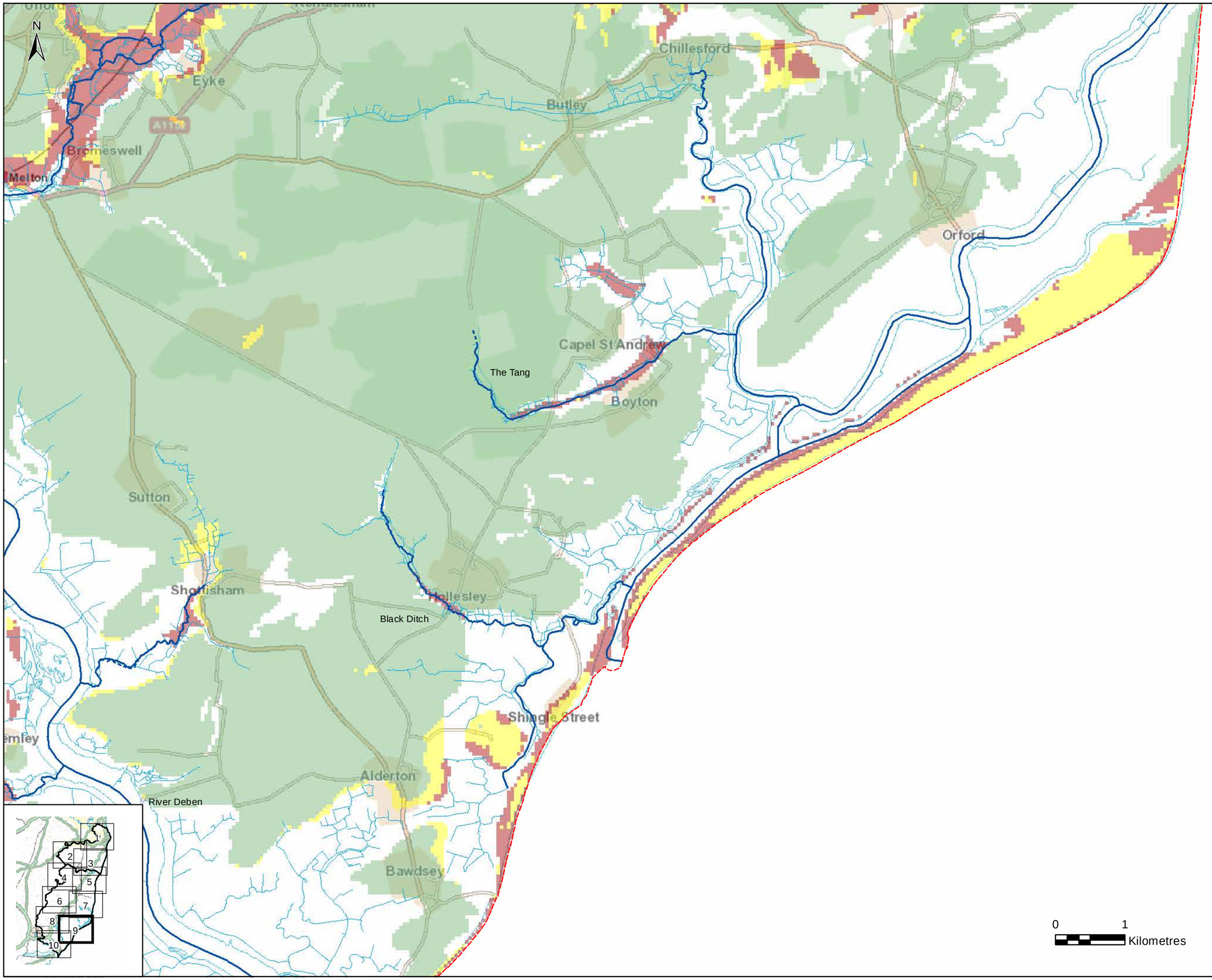
Drawing Number: FIGURE 07.8

Rev.: 3



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

BGS Susceptibility to Groundwater flooding

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- Not considered to be prone to groundwater flooding

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River Labels amended	LM / MD	11.04.18	3
No changes - Issued as final	LM / MD	23.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: SUSCEPTIBILITY TO GROUNDWATER FLOODING SHEET 9 OF 10

Drawn	Checked	Approved	Date
LM	MD	GP	11/04/2018

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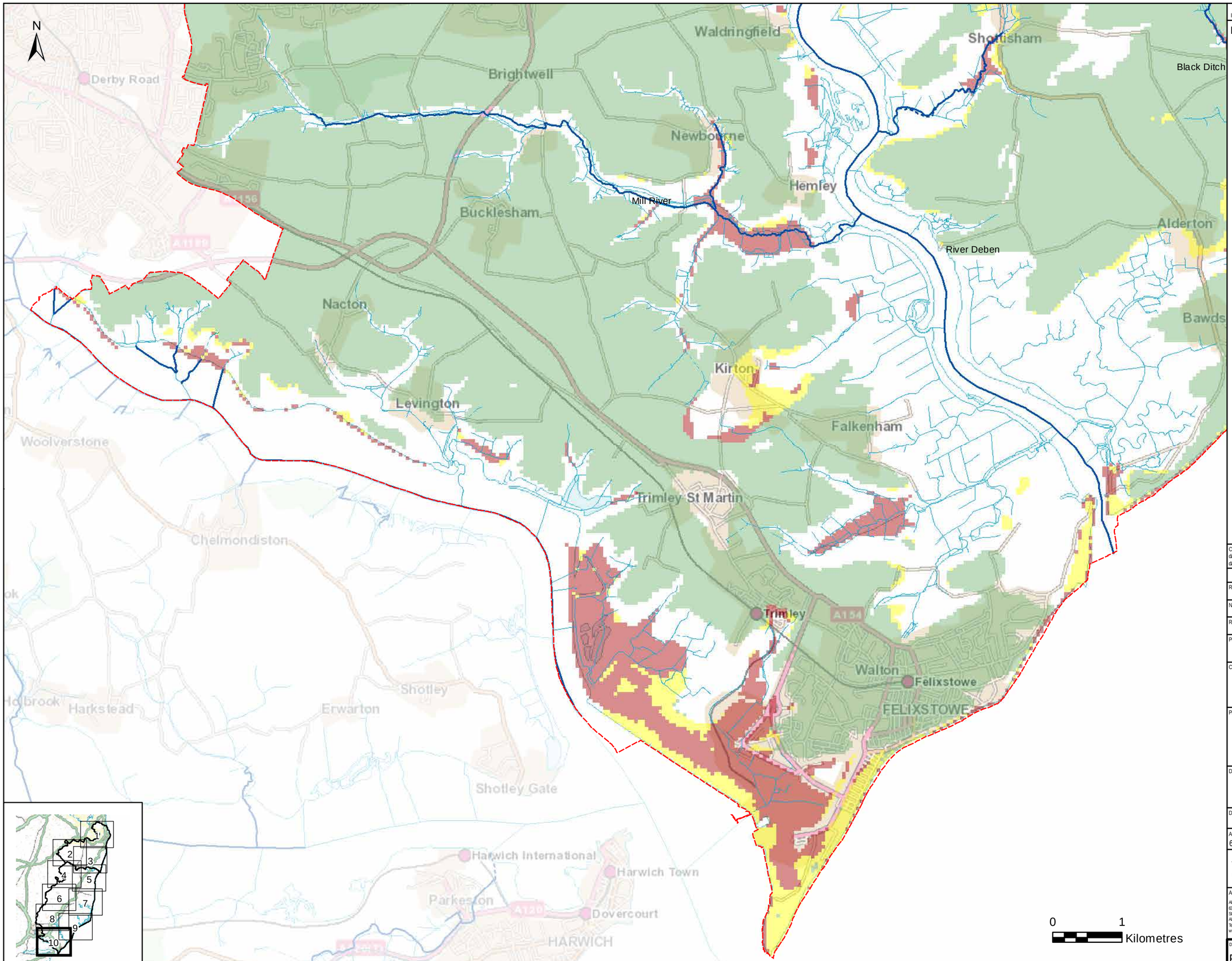
Rev.: 3



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

BGS Susceptibility to Groundwater flooding

- Potential for groundwater flooding to occur at surface
- Potential for groundwater flooding of property situated below ground level
- Limited potential for groundwater flooding to occur
- Not considered to be prone to groundwater flooding

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No changes - Issued as final	LM / MD	23.11.17	2
Revision Details			

Purpose of Issue: FINAL

Client: Waveney District Council Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: SUSCEPTIBILITY TO GROUNDWATER FLOODING SHEET 10 OF 10

Drawn	Checked	Approved	Date
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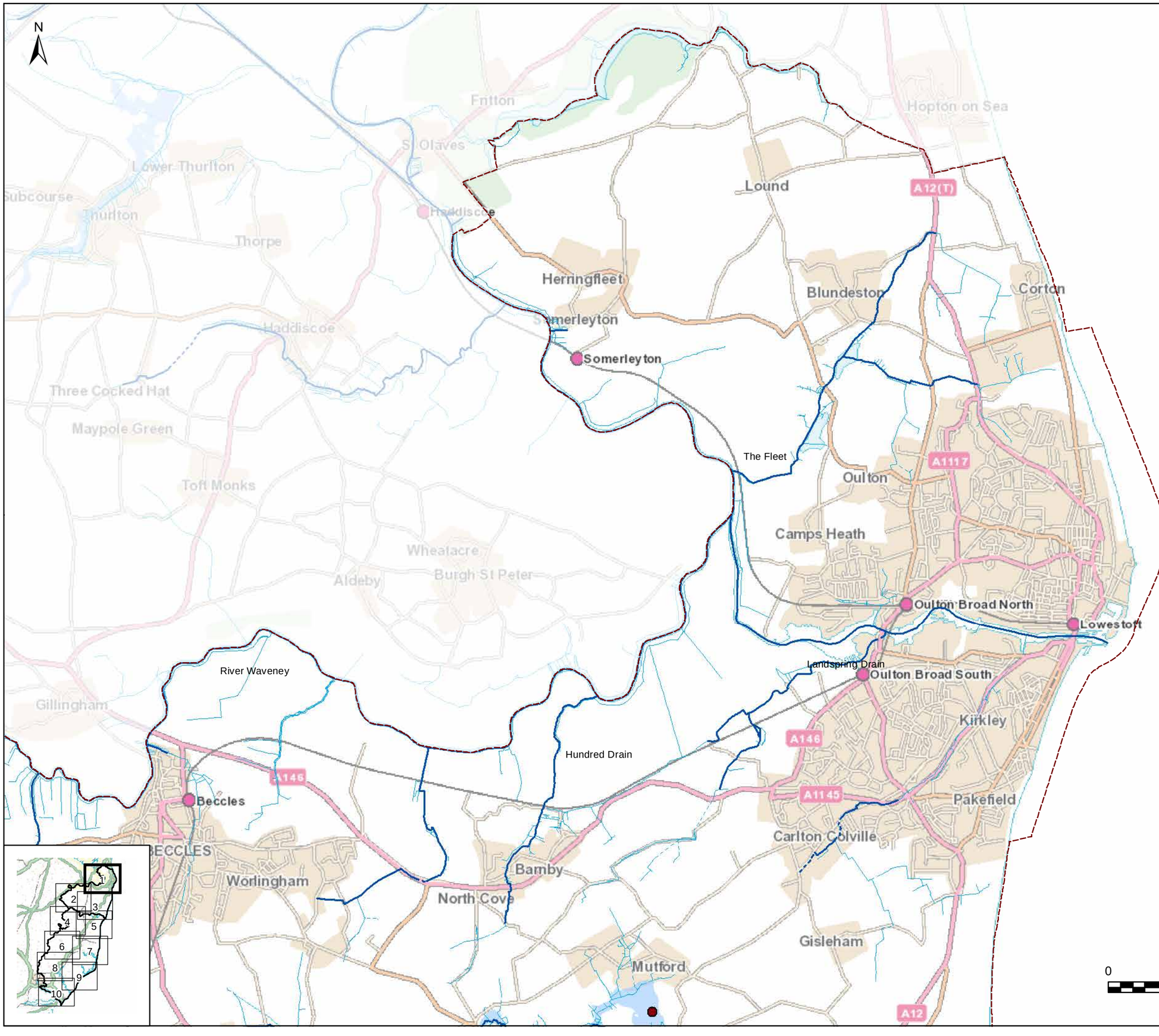
FIGURE 07.10	3



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Reservoir
- Risk of flooding from Reservoir

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River Labels amended	LM / MD	11.04.18	3
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Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RESERVOIRS SHEET 1 OF 10

Drawn	Checked	Approved	Date
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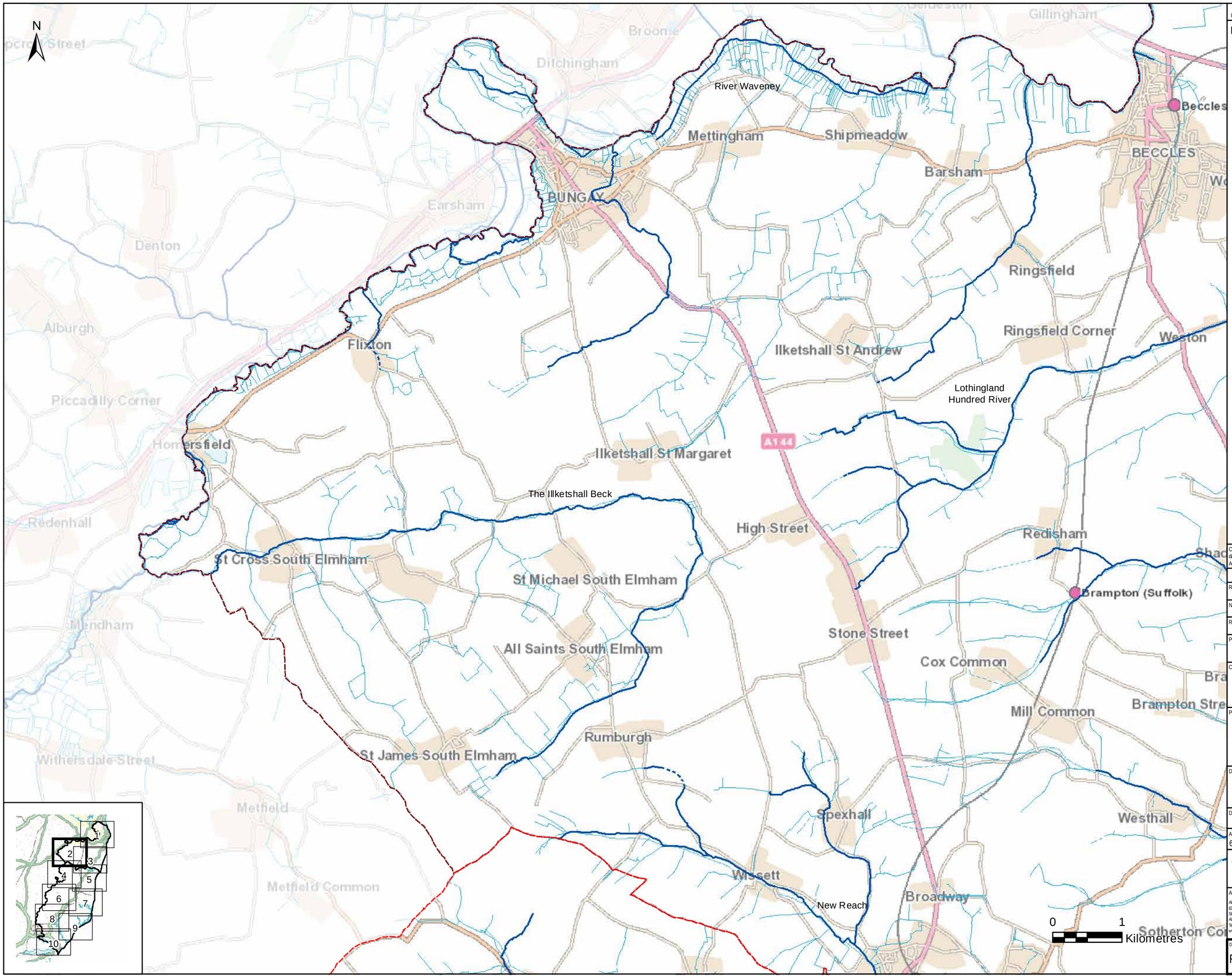

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Reservoir
- Risk of flooding from Reservoir

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Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RESERVOIRS SHEET 2 OF 10

Drawn	Checked	Approved	Date
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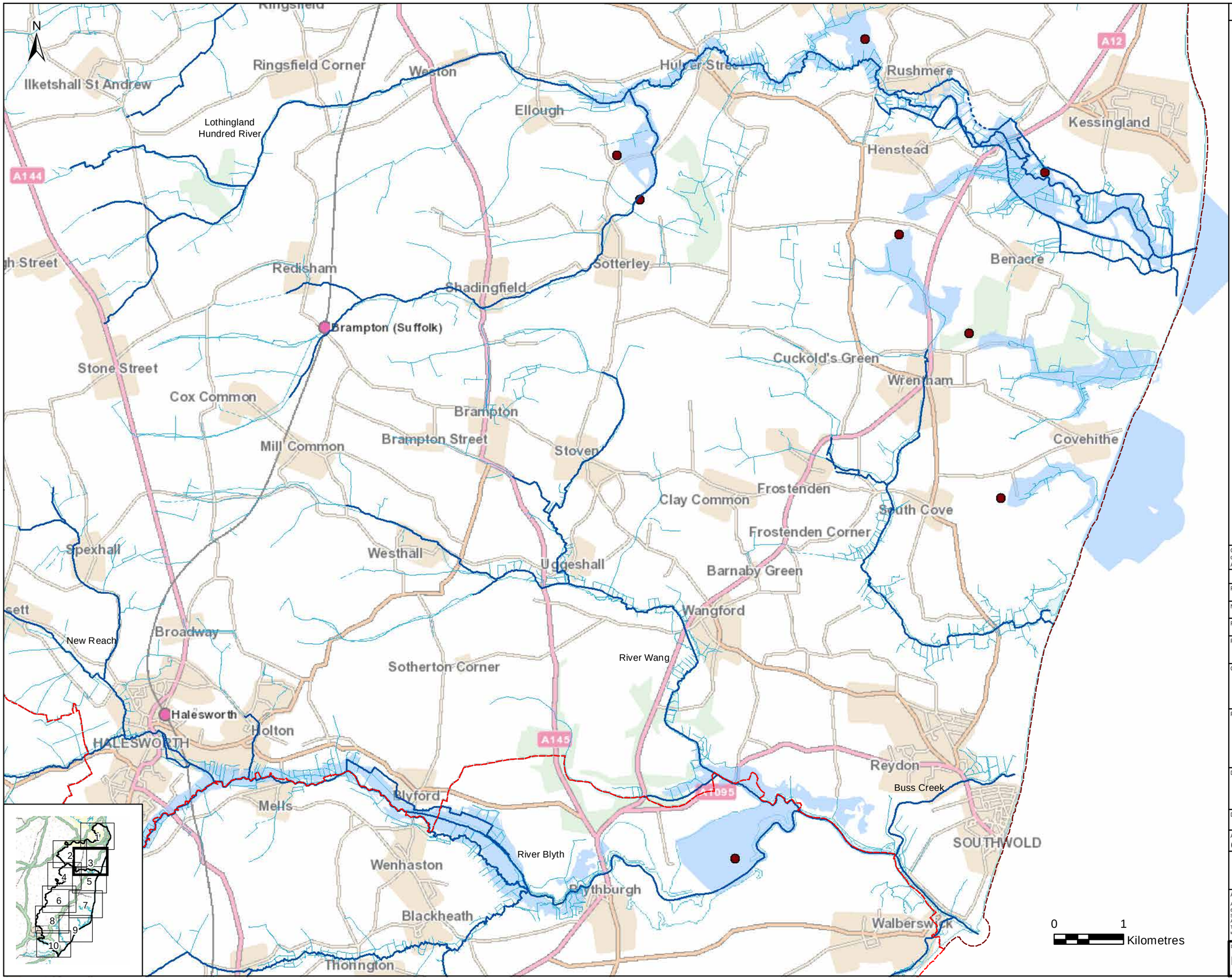

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Reservoir
- Risk of flooding from Reservoir

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River Labels amended	LM / MD	11.04.18	3
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Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RESERVOIRS SHEET 3 OF 10

Drawn	Checked	Approved	Date
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Drawing Number: FIGURE 08.3

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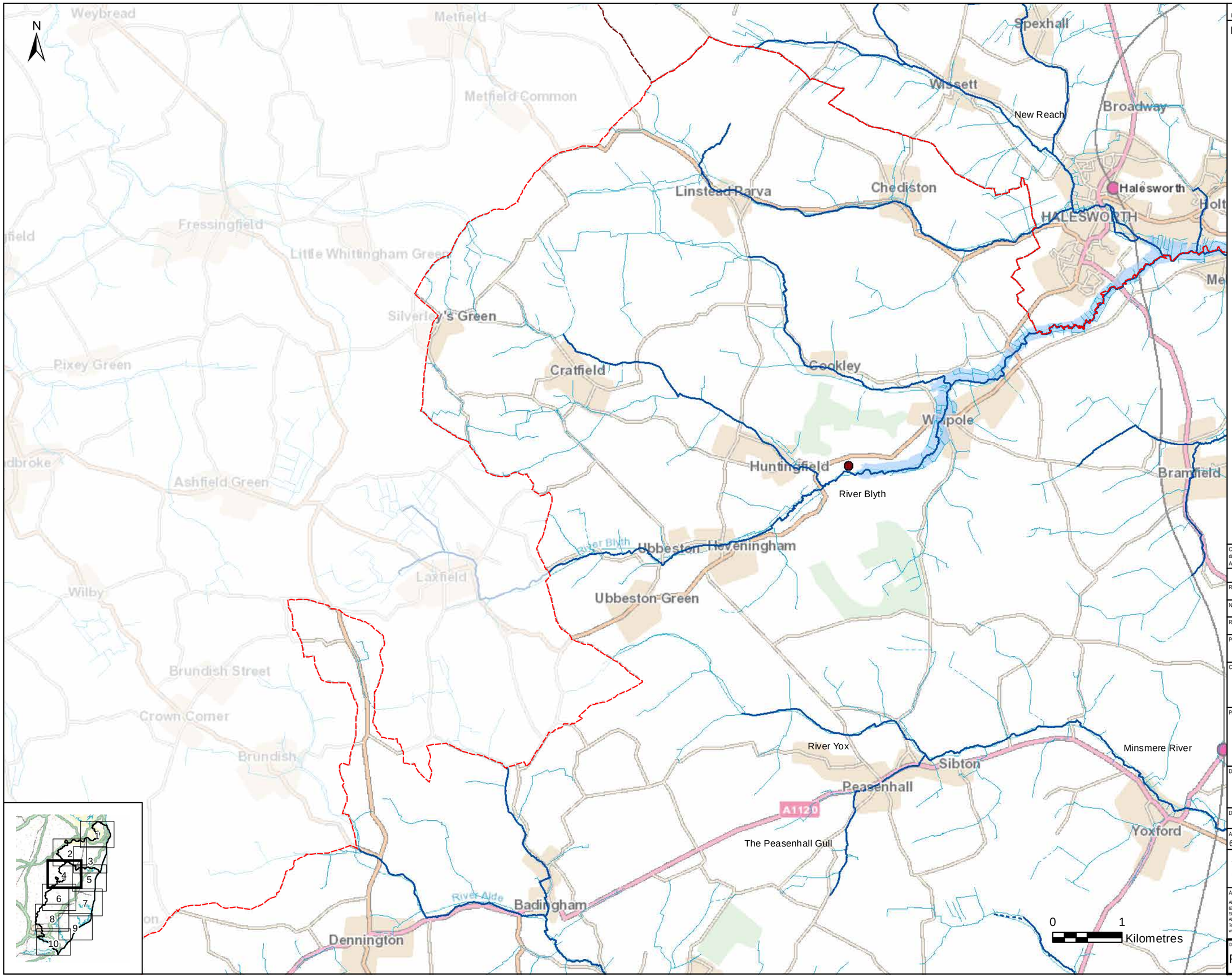

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Reservoir
- Risk of flooding from Reservoir

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River Labels amended	LM / MD	11.04.18	3
No changes - Issued as final	LM / MD	23.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RESERVOIRS SHEET 4 OF 10

Drawn	Checked	Approved	Date
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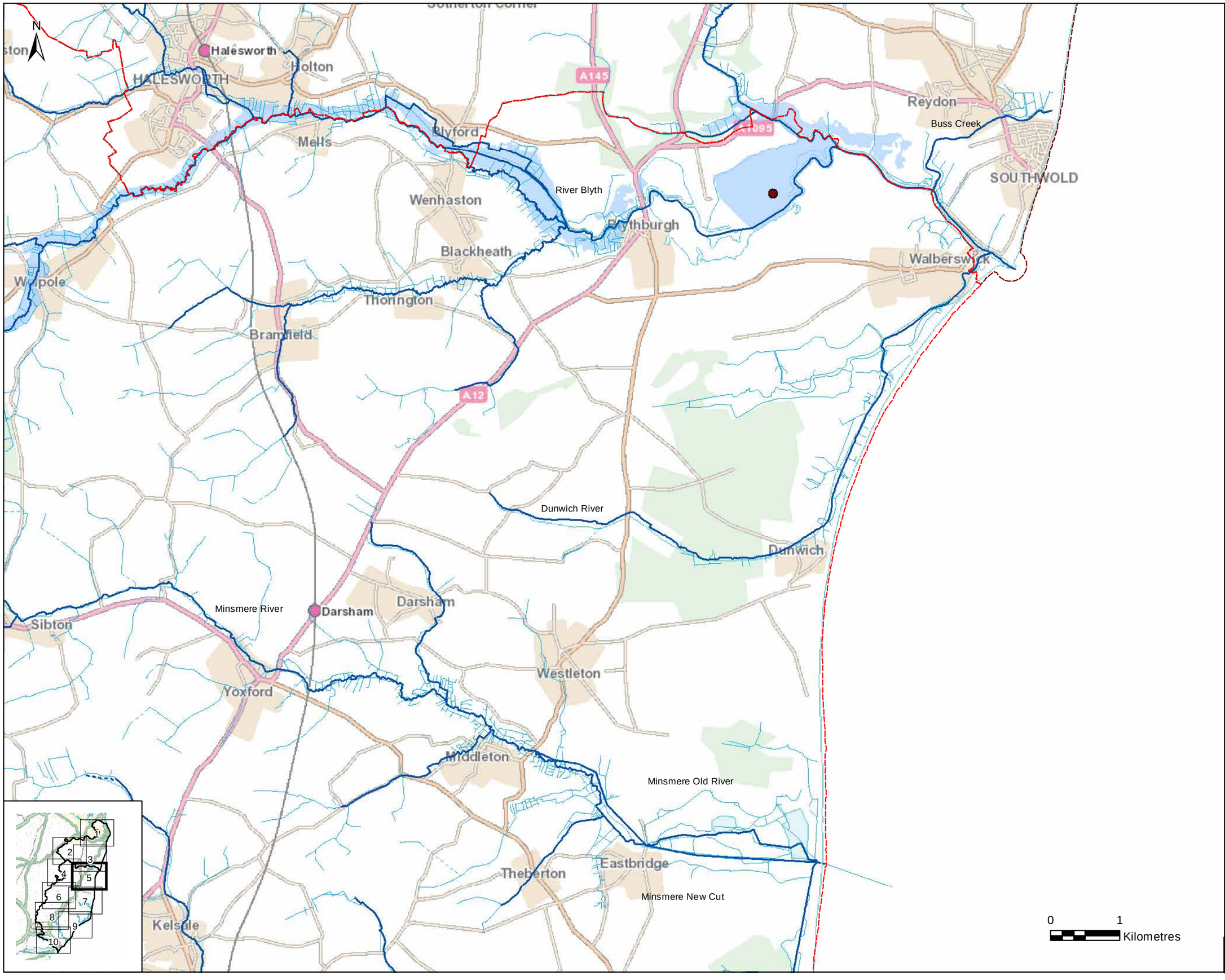
Rev.: 3



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Reservoir
- Risk of flooding from Reservoir

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Revision Details	By / Check	Check Date	Suffix
River Labels amended	LM / MD	11.04.18	3
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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RESERVOIRS SHEET 5 OF 10

Drawn	Checked	Approved	Date
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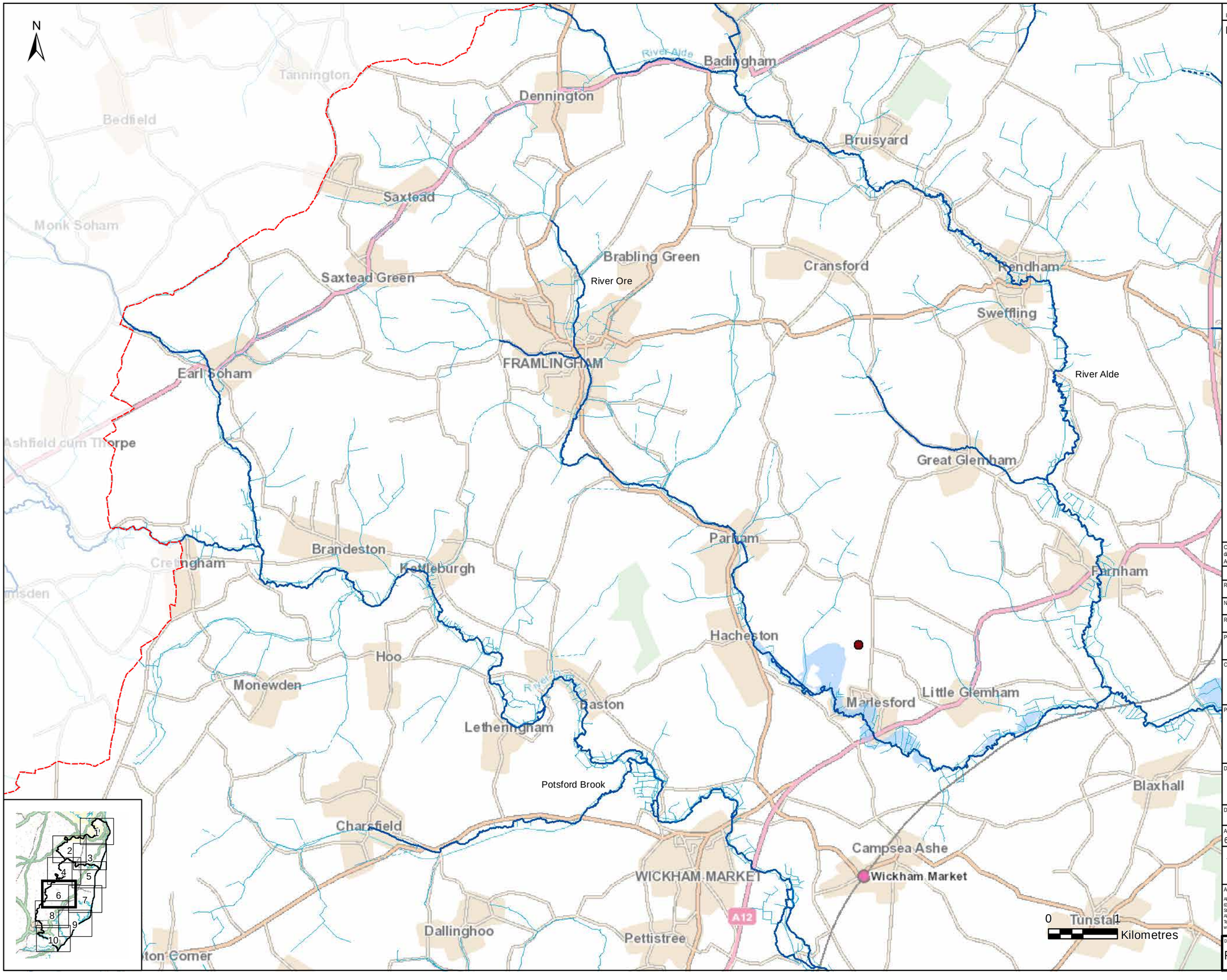
FIGURE 08.5	3



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Reservoir
- Risk of flooding from Reservoir

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RESERVOIRS SHEET 6 OF 10

Drawn	Checked	Approved	Date
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N

Minsmere New Cut

Kelsale

Carlton

Rendham

Sweffling

River Alde

Saxmundham

SAXMUNDHAM

River Fromus

LEISTON

Sizewell

Thorpeness
Hundred River

Knodishall

Stemfield

Coldfair Green

Aldringham

Friston

Farnham

Thorpeness

Gromford

A1094

Glemham

Snape

Blaxhall

ALDEBURGH

River Alde

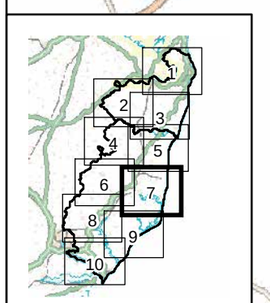
Iken

Tunstall

High Street

Sudbourne

Chillesford



0 1 Kilometres

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
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- Risk of flooding from Reservoir

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Purpose of Issue: FINAL

Client: East Suffolk Council / Waveney District Council Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RESERVOIRS SHEET 7 OF 10

Drawn	Checked	Approved	Date
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Drawing Number	Rev.
FIGURE 08.7	3

N

Helmingham
Potsford Brook
Charsfield
Campsea Ashe
WICKHAM MARKET
Wickham Market
Otley
Ashbocking
Dallinghoo
Pettistree
A12
Clopton Corner
Debach
Byng Brook
Gibraltar
Bredfield
Swilland
Ufford
Rendlesham
Clopton
Eyke
Burgh
A1152
Witnesham
Grundisburgh
Hasketon
Bromeswell
Melton
Melton
River Lark
WOODBRIDGE
Great Bealings
Tuddenham St Martin
Woodbridge
River Fynn
Playford
Little Bealings
Westerfield
Westerfield
Martlesham
Martlesham Creek
Kesgrave
Sutton
Martlesham Heath
A1214
Waldringfield
Shottisham
Brightwell

0 1 Kilometres

1 2 3 4 5 6 7 8 9 10

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RESERVOIRS SHEET 8 OF 10

Drawn	Checked	Approved	Date
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N

Orford

Eyke

A1152

Bromeswell

Melton

Butley

Chillesford

Orford

Capel St Andrew

The Tang

Boyton

Sutton

Shottisham

Hollesley

Black Ditch

Shingle Street

Alderton

River Deben

Bawdsey

0 1 Kilometres

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
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- Ordinary Watercourse
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Client: Waveney District Council Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RESERVOIRS SHEET 9 OF 10

Drawn	Checked	Approved	Date
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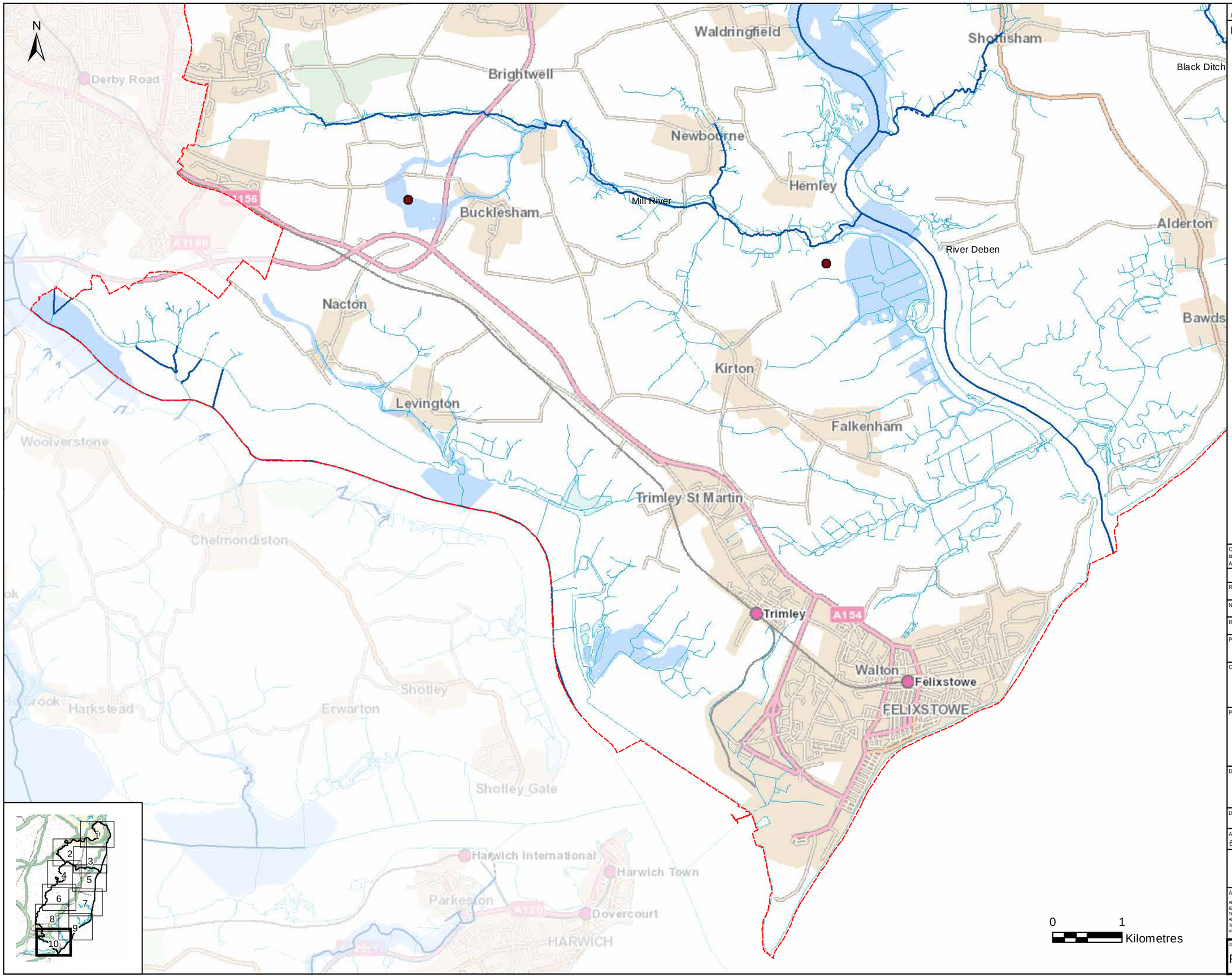
Drawing Number: FIGURE 08.9

Rev.: 3



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Reservoir
- Risk of flooding from Reservoir

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Revision Details	By / Check	Check Date	Suffix
River Labels amended	LM / MD	11.04.18	3
No changes - Issued as final	LM / MD	23.11.17	2

Purpose of Issue: FINAL

Client: Suffolk Coastal District Council; Waveney District Council, Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RESERVOIRS SHEET 10 OF 10

Drawn	Checked	Approved	Date
LM	MD	GP	11/04/2018

AECOM Internal Project No.	Scale at A3
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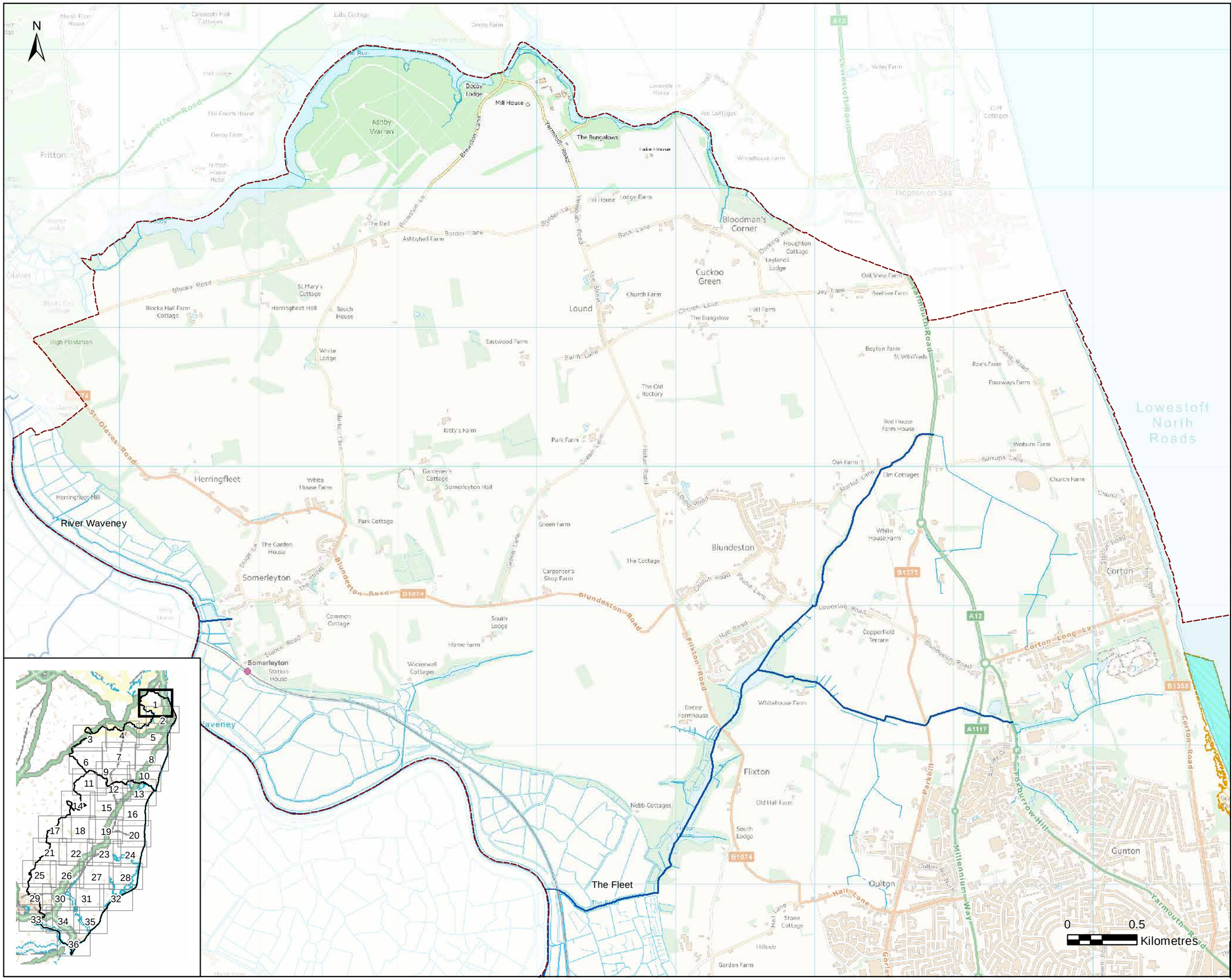
Drawing Number	Rev.
FIGURE 08.10	3



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
- Indicative extent of 1 in 100 year Fluvial Event with Climate Change*
- Modelled Fluvial 1 in 100 year event with 65% Climate Change allowance.**
- Modelled Tidal 1 in 200 year event with Climate Change

Notes

Only areas where detailed hydraulic modelling has been undertaken for the 1 in 100 year fluvial and 1 in 200 year tidal events have been shown. This is equivalent to Flood Zone 3 for these areas.

*Detailed fluvial modelling including the latest climate change allowances was not available for the majority of watercourses during the production of this SFRA. Therefore the 1 in 1000 year event has been mapped as a surrogate for the anticipated extent of the 1 in 100 year event plus climate change extent. It should be noted that this is indicative only and further assessment will be required for development sites in these areas.

**Modelled flood outlines incorporating 20%, 25% and 35% climate change allowances are additionally available from the Environment Agency.

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	By / Check	Check Date	Suffix
River Deben model amended. River labels amended	LM / MD	13.04.18	4
River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2
Revision Details			

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 1 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	13/04/2018

AECOM Internal Project No.	Scale at A3
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Drawing Number	Rev.
FIGURE 09.1	4

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
- Indicative extent of 1 in 100 year Fluvial Event with Climate Change*
- Modelled Fluvial 1 in 100 year event with 65% Climate Change allowance.**
- Modelled Tidal 1 in 200 year event with Climate Change

Notes

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River Deben model amended. River labels amended	LM / MD	13.04.18	4
River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 2 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	13/04/2018

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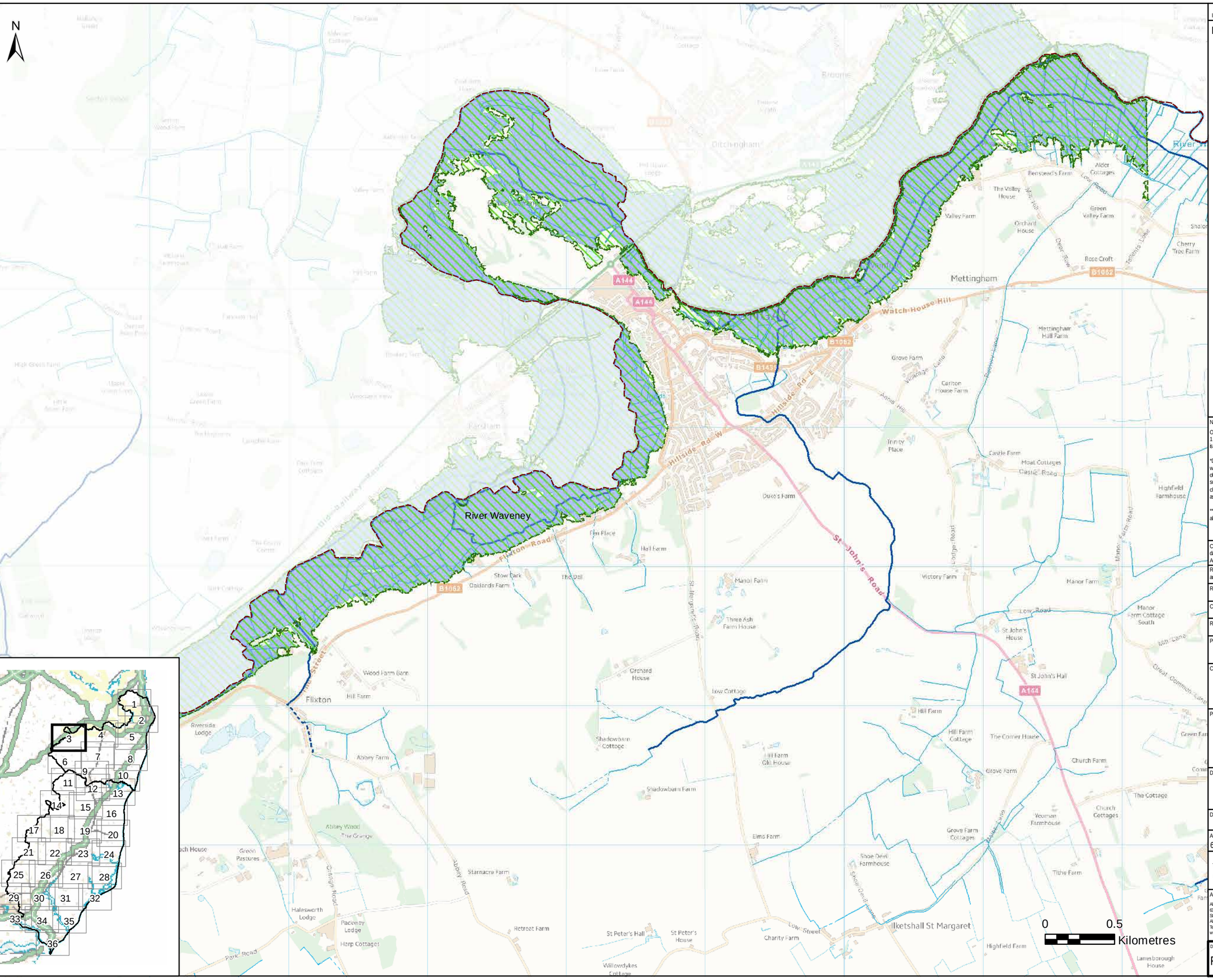
Drawing Number: FIGURE 09.2

Rev.: 4

0 0.5 Kilometres



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
- Indicative extent of 1 in 100 year Fluvial Event with Climate Change*
- Modelled Fluvial 1 in 100 year event with 65% Climate Change allowance.**
- Modelled Tidal 1 in 200 year event with Climate Change

Notes

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	By	Check	Date	Suffix
River Deben model amended. River labels amended	LM	MD	13.04.18	4
River Deben Model added	LM	MD	31.01.18	3
CC allowance amended	LM	MD	06.12.17	2
Revision Details				

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 3 OF 36

Drawn	Checked	Approved	Date
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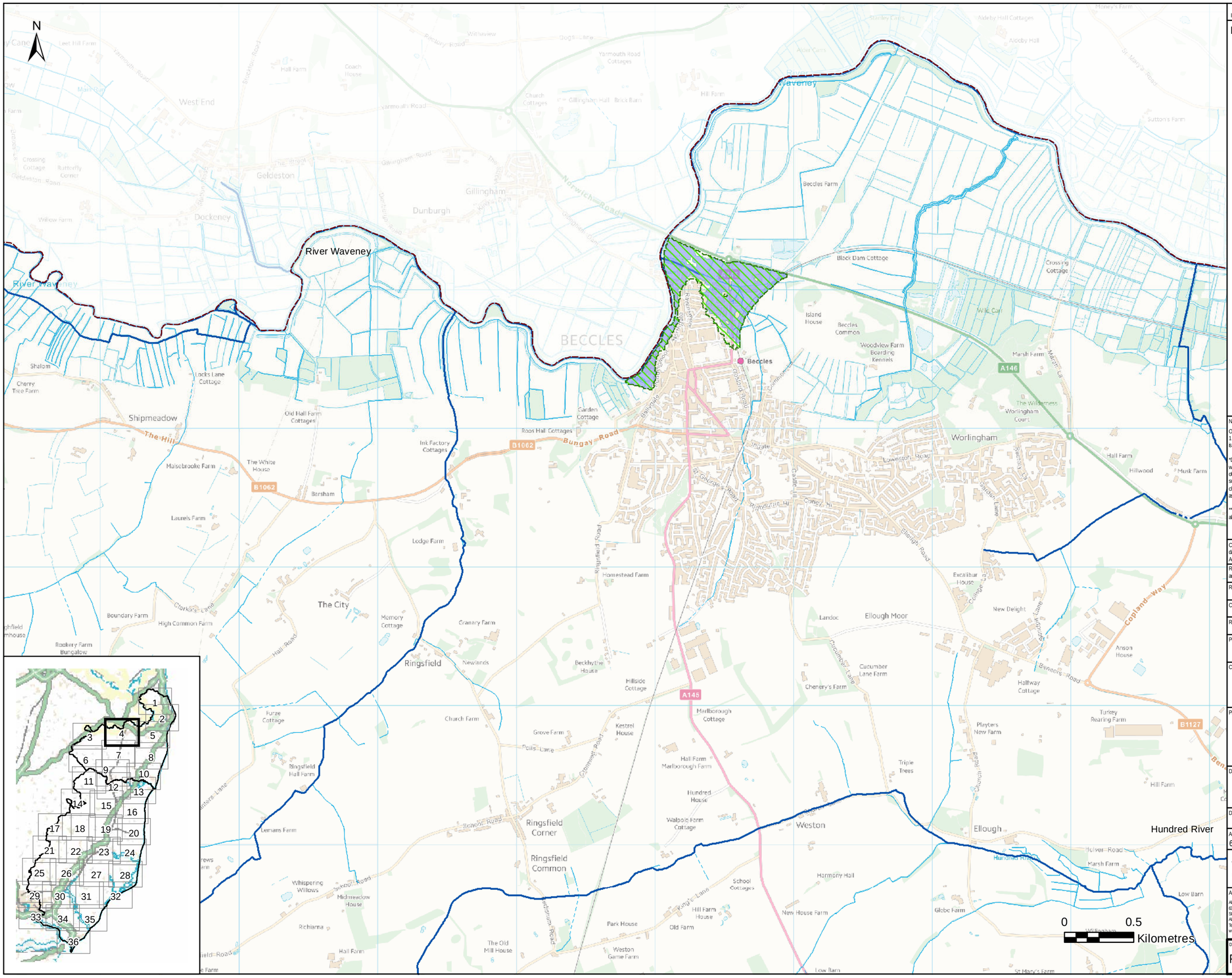
Drawing Number	Rev.
FIGURE 09.3	4



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
- Indicative extent of 1 in 100 year Fluvial Event with Climate Change*
- Modelled Fluvial 1 in 100 year event with 65% Climate Change allowance.**
- Modelled Tidal 1 in 200 year event with Climate Change

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River Deben model amended. River labels amended	LM / MD	13.04.18	4
River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 4 OF 36

Drawn	Checked	Approved	Date
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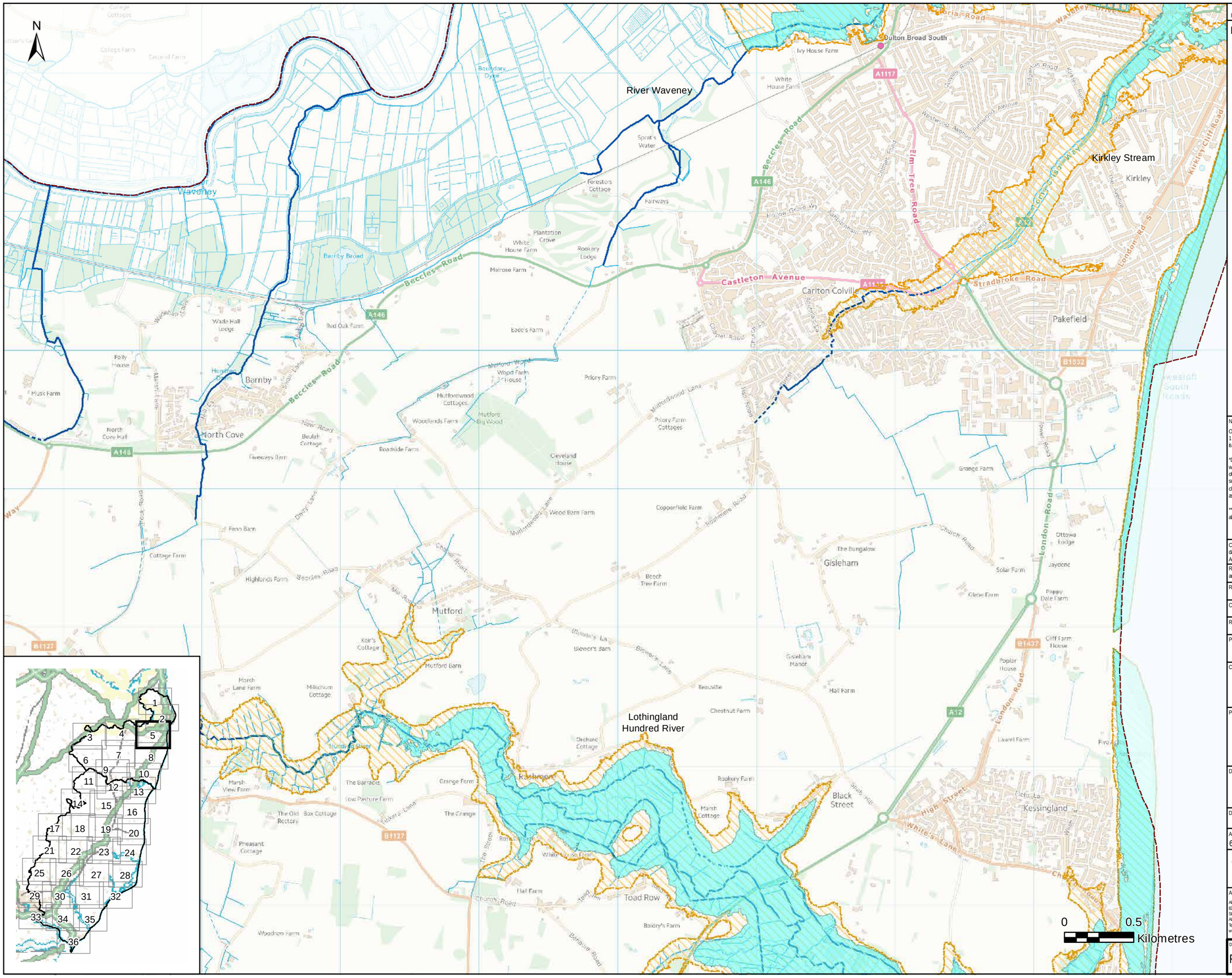
Drawing Number: FIGURE 09.4

Rev.: 4



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
- Indicative extent of 1 in 100 year Fluvial Event with Climate Change*
- Modelled Fluvial 1 in 100 year event with 65% Climate Change allowance.**
- Modelled Tidal 1 in 200 year event with Climate Change

Notes

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River Deben model amended. River labels amended	LM / MD	13.04.18	4
River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 5 OF 36

Drawn	Checked	Approved	Date
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Drawing Number: FIGURE 09.5

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
- Indicative extent of 1 in 100 year Fluvial Event with Climate Change*
- Modelled Fluvial 1 in 100 year event with 65% Climate Change allowance.**
- Modelled Tidal 1 in 200 year event with Climate Change

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River Deben model amended. River labels amended	LM / MD	13.04.18	4
River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: East Suffolk Council Services / Waveney District Council, Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 6 OF 36

Drawn	Checked	Approved	Date
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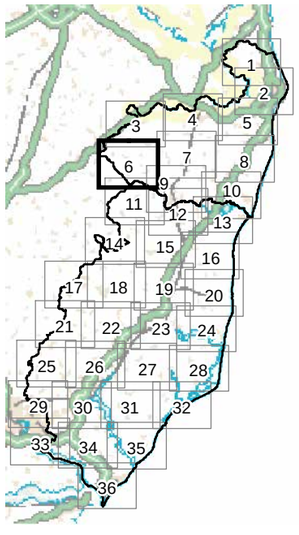
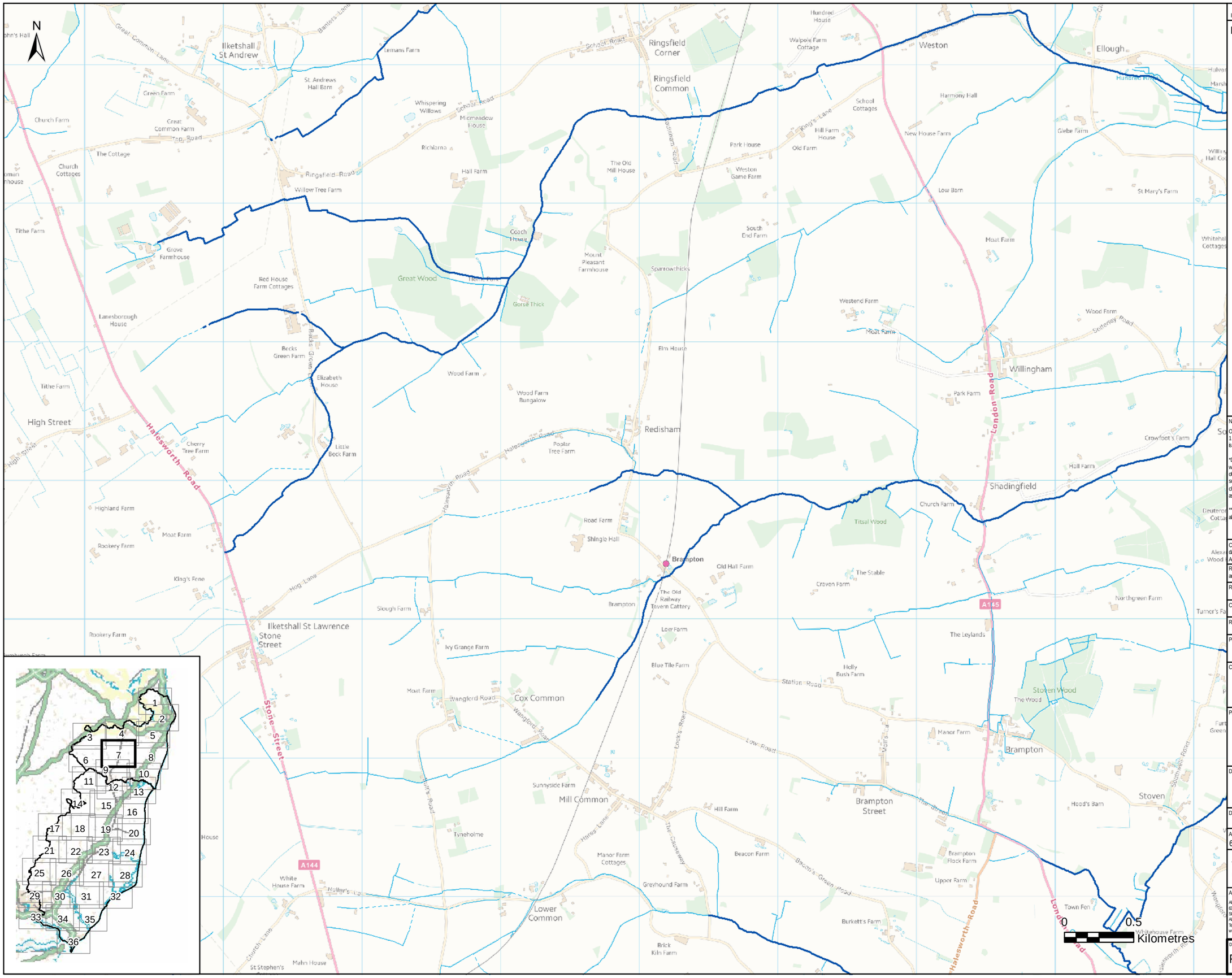
Drawing Number: FIGURE 09.6

Rev.: 4

0 0.5 Kilometres





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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
- Indicative extent of 1 in 100 year Fluvial Event with Climate Change*
- Modelled Fluvial 1 in 100 year event with 65% Climate Change allowance.**
- Modelled Tidal 1 in 200 year event with Climate Change

Notes

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	By	Check	Date	Suffix
River Deben model amended. River labels amended	LM	MD	13.04.18	4
River Deben Model added	LM	MD	31.01.18	3
CC allowance amended	LM	MD	06.12.17	2
Revision Details				

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 7 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	13/04/2018

AECOM Internal Project No.: 60520248

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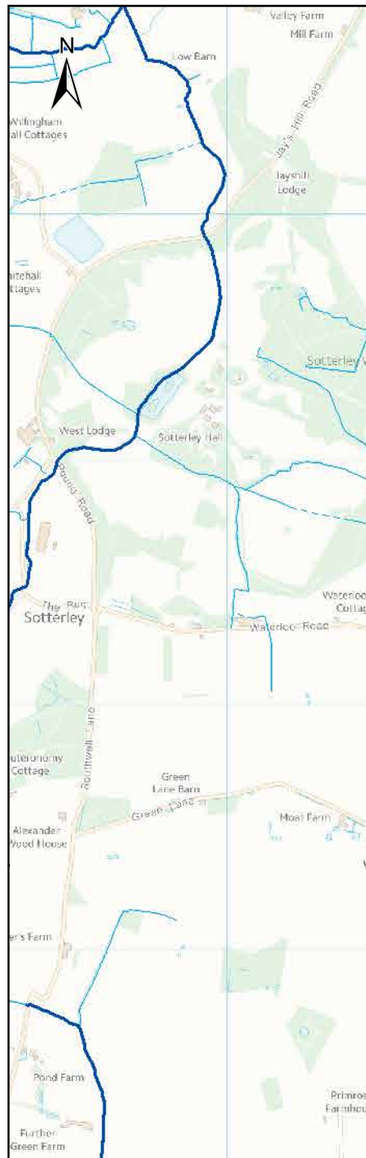
Drawing Number: FIGURE 09.7

Rev.: 4



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
- Indicative extent of 1 in 100 year Fluvial Event with Climate Change*
- Modelled Fluvial 1 in 100 year event with 65% Climate Change allowance.**
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Revision Details	By / Check	Check Date	Suffix
River Deben model amended. River labels amended	LM / MD	13.04.18	4
River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 8 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	13/04/2018

AECOM Internal Project No.: 60520248

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Drawing Number: FIGURE 09.8

Rev.: 4

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
- Indicative extent of 1 in 100 year Fluvial Event with Climate Change*
- Modelled Fluvial 1 in 100 year event with 65% Climate Change allowance.**
- Modelled Tidal 1 in 200 year event with Climate Change

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Revision Details	By / Check	Check Date	Suffix
River Deben model amended. River labels amended	LM / MD	13.04.18	4
River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 9 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	13/04/2018

AECOM Internal Project No.: 60520248

Scale at A3: 1:25,000

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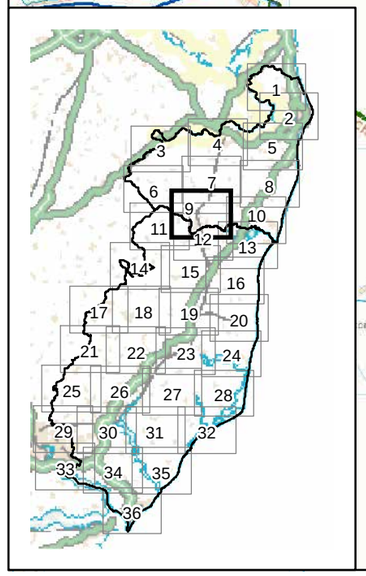
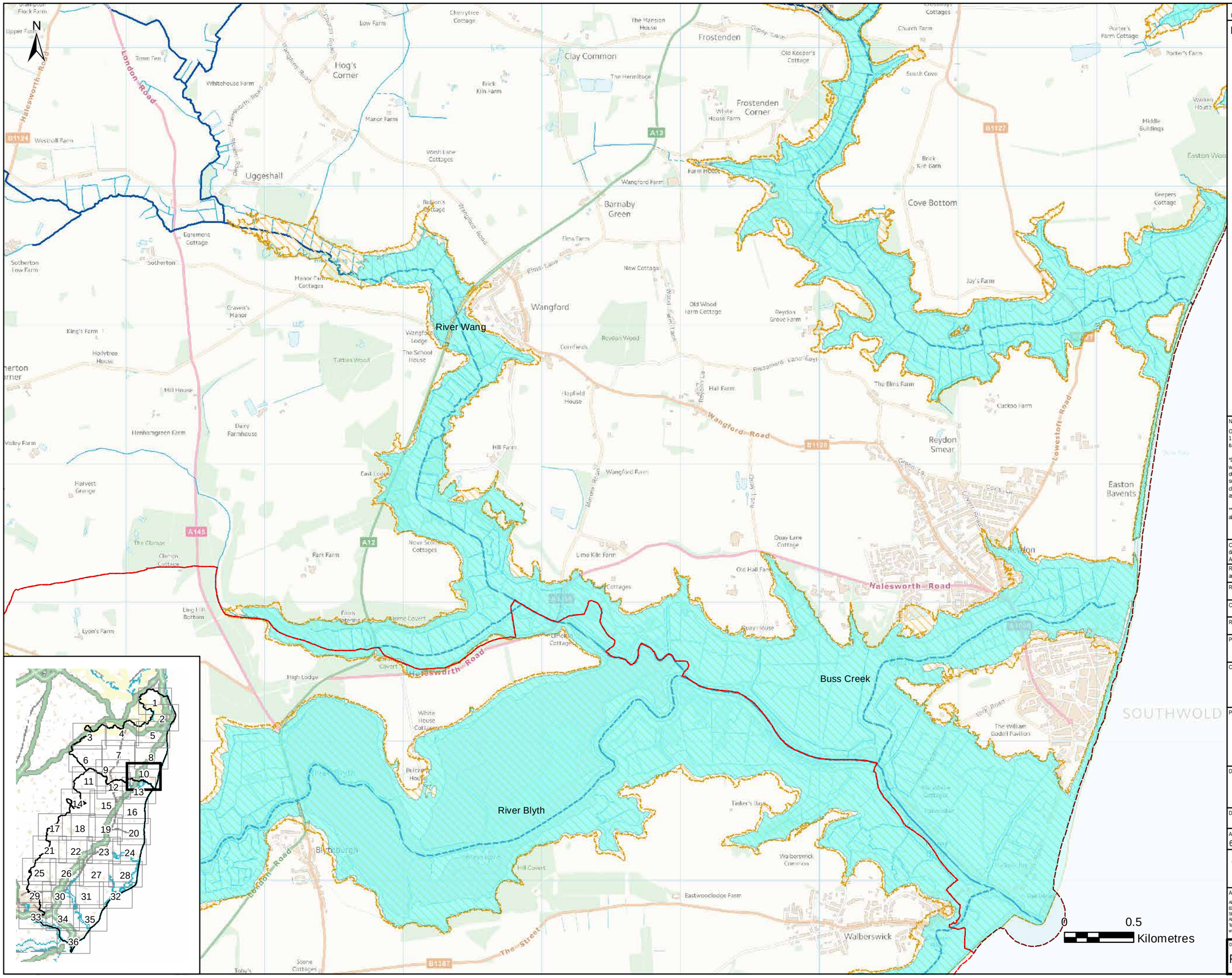
Drawing Number: FIGURE 09.9

Rev.: 4

0 0.5 Kilometres





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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
- Indicative extent of 1 in 100 year Fluvial Event with Climate Change*
- Modelled Fluvial 1 in 100 year event with 65% Climate Change allowance.**
- Modelled Tidal 1 in 200 year event with Climate Change

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	By	Check	Date	Suffix
River Deben model amended. River labels amended	LM	MD	13.04.18	4
River Deben Model added	LM	MD	31.01.18	3
CC allowance amended	LM	MD	06.12.17	2
Revision Details				

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 10 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	13/04/2018

AECOM Internal Project No.: 60520248

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
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River Deben Model added	LM	MD	31.01.18	3
CC allowance amended	LM	MD	06.12.17	2
Revision Details				

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 11 OF 36

Drawn	Checked	Approved	Date
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AECOM Internal Project No.: 60520248

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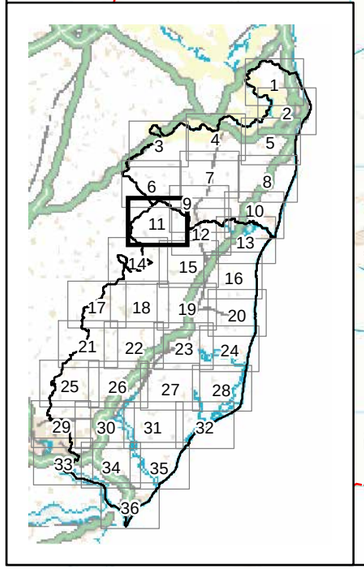
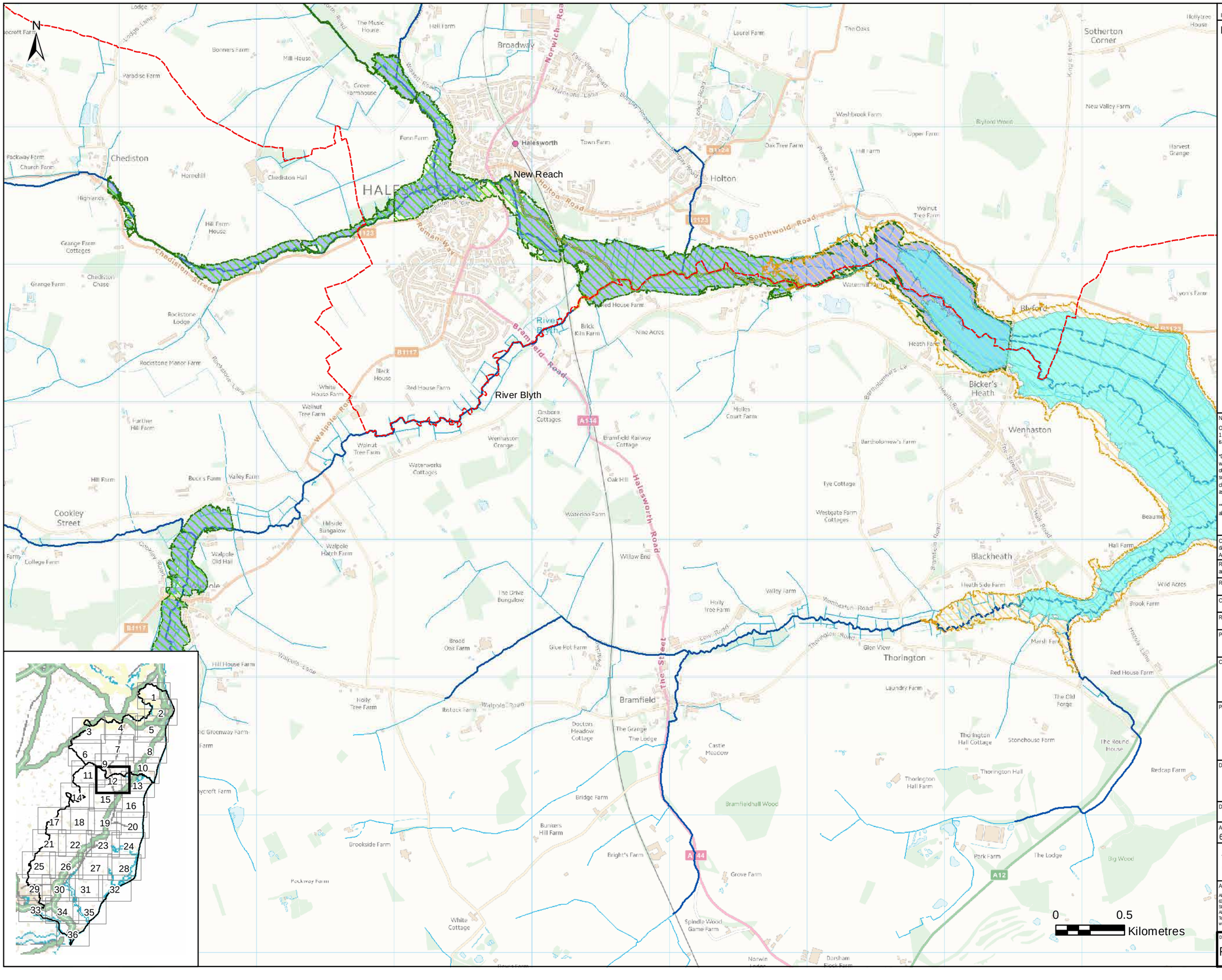
Drawing Number: FIGURE 09.11

Rev.: 4

0 0.5 Kilometres

River Blyth





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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
- Indicative extent of 1 in 100 year Fluvial Event with Climate Change*
- Modelled Fluvial 1 in 100 year event with 65% Climate Change allowance.**
- Modelled Tidal 1 in 200 year event with Climate Change

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Revision Details	By / Check	Check Date	Suffix
River Deben model amended. River labels amended	LM / MD	13.04.18	4
River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 12 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	13/04/2018

AECOM Internal Project No.	Scale at A3
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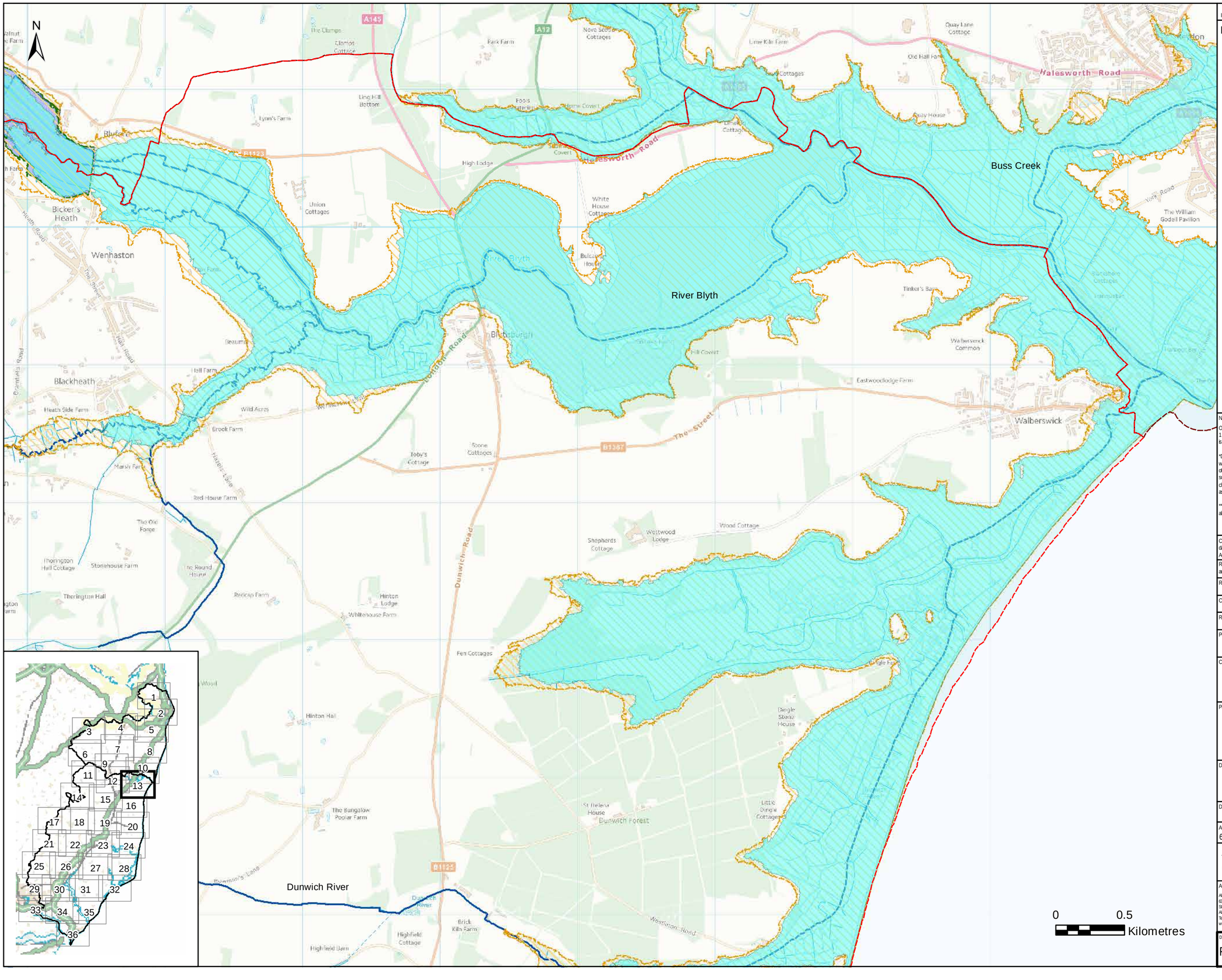

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
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	By / Check	Check Date	Suffix
River Deben model amended. River labels amended	LM / MD	13.04.18	4
River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2
Revision Details			

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 13 OF 36

Drawn	Checked	Approved	Date
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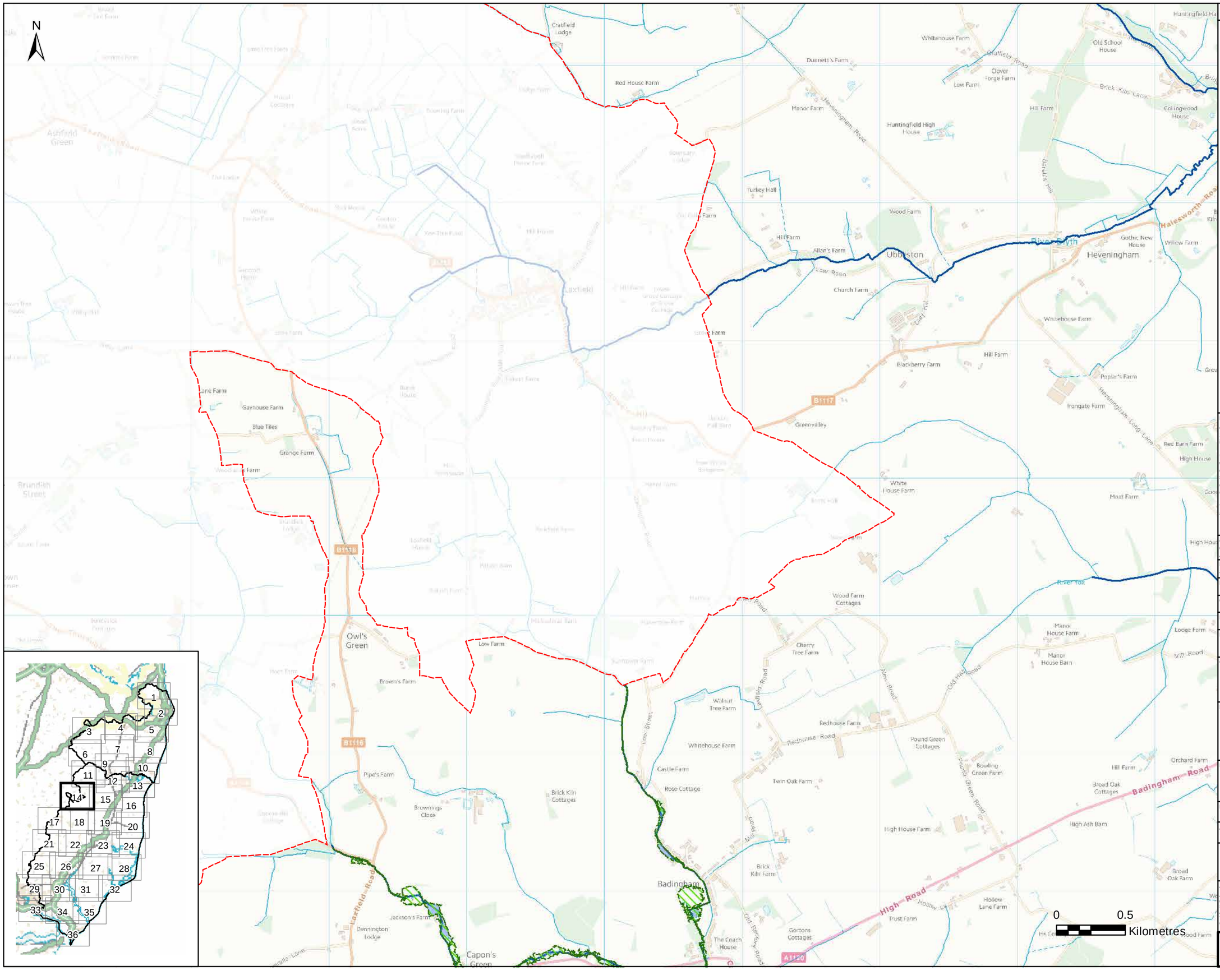

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
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River Deben model amended. River labels amended	LM / MD	13.04.18	4
River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Suffolk Coastal District Council; Waveney District Council, Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 14 OF 36

Drawn	Checked	Approved	Date
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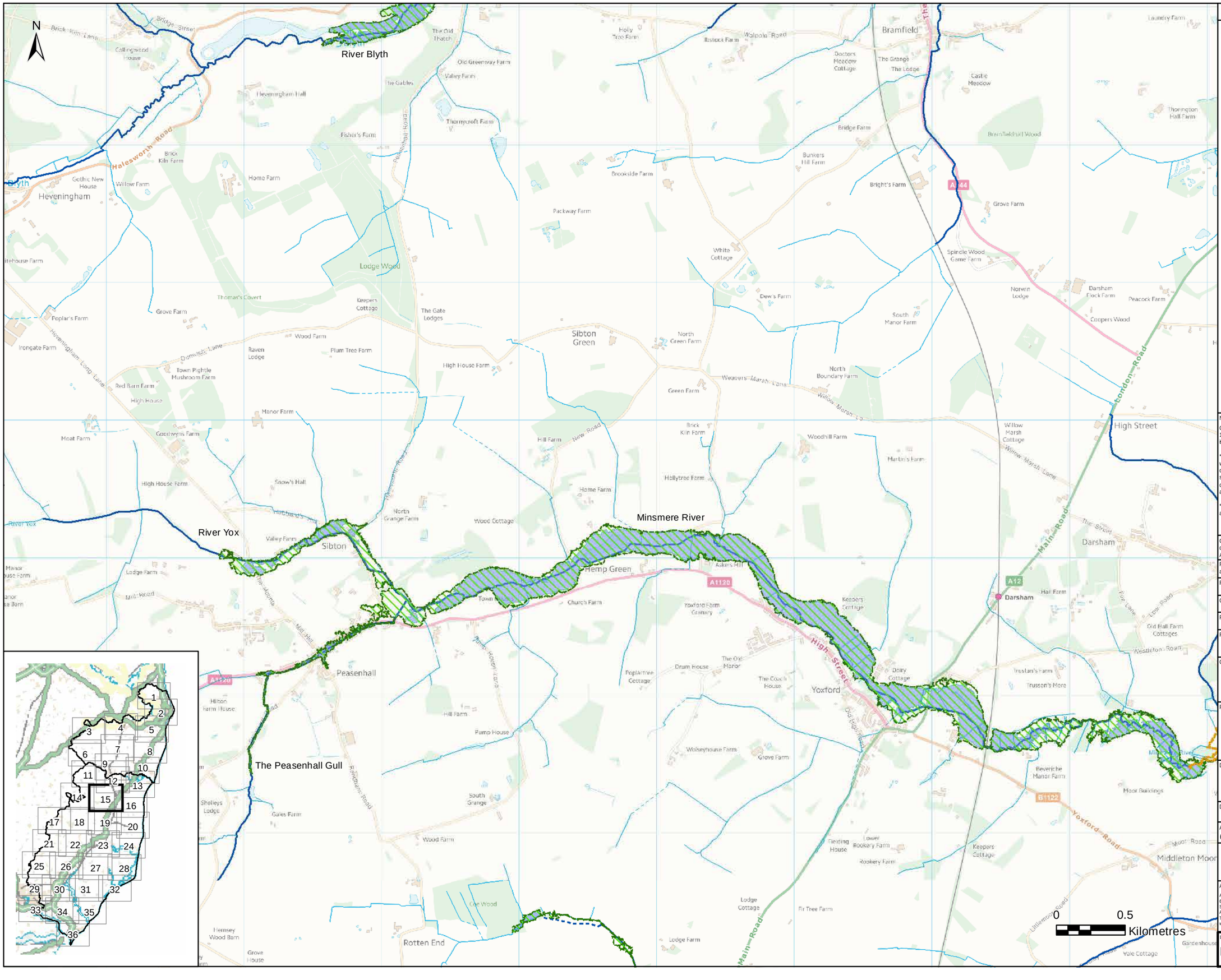

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
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River Deben model amended. River labels amended	LM / MD	13.04.18	4
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Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 15 OF 36

Drawn	Checked	Approved	Date
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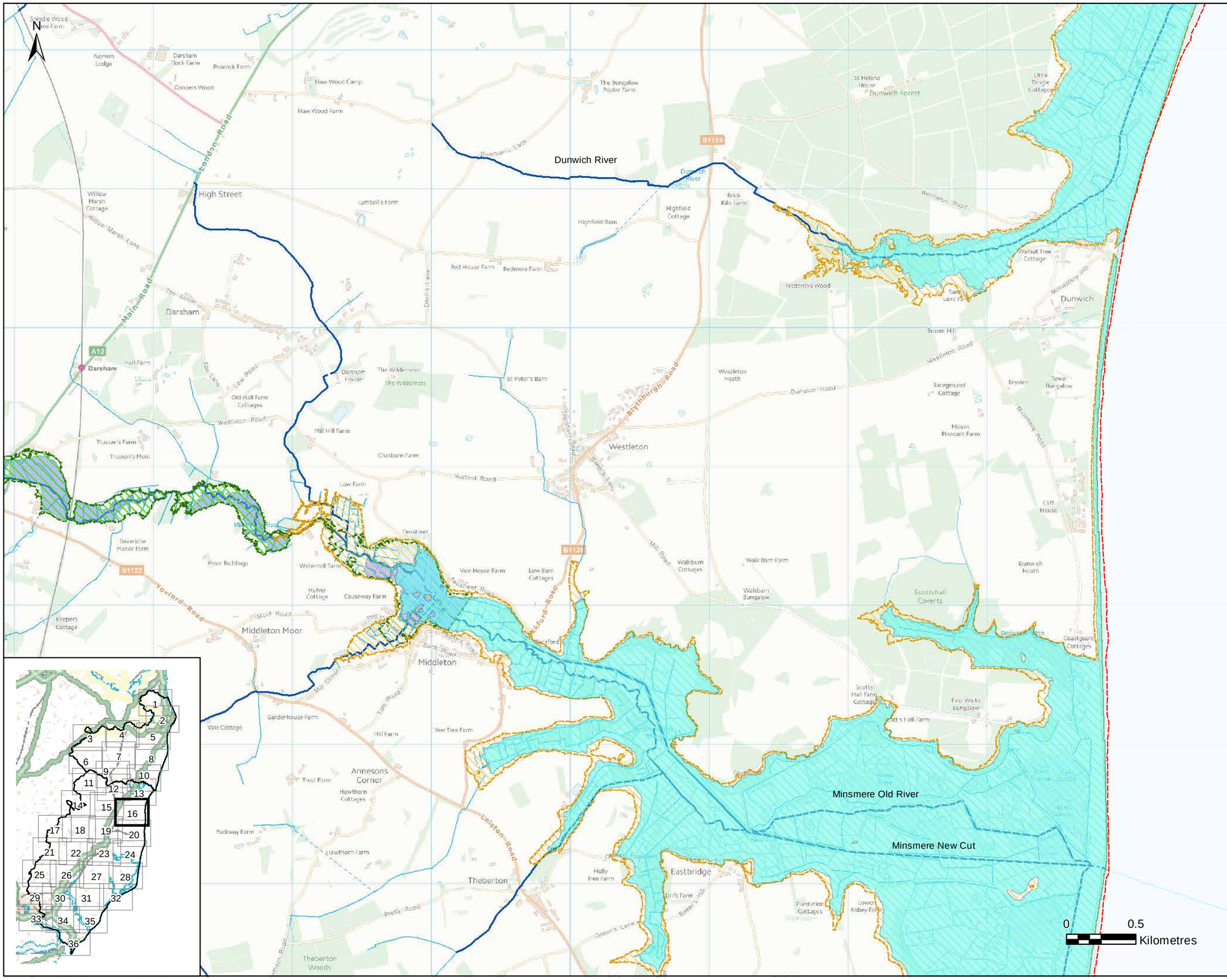

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
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Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 16 OF 36

Drawn	Checked	Approved	Date
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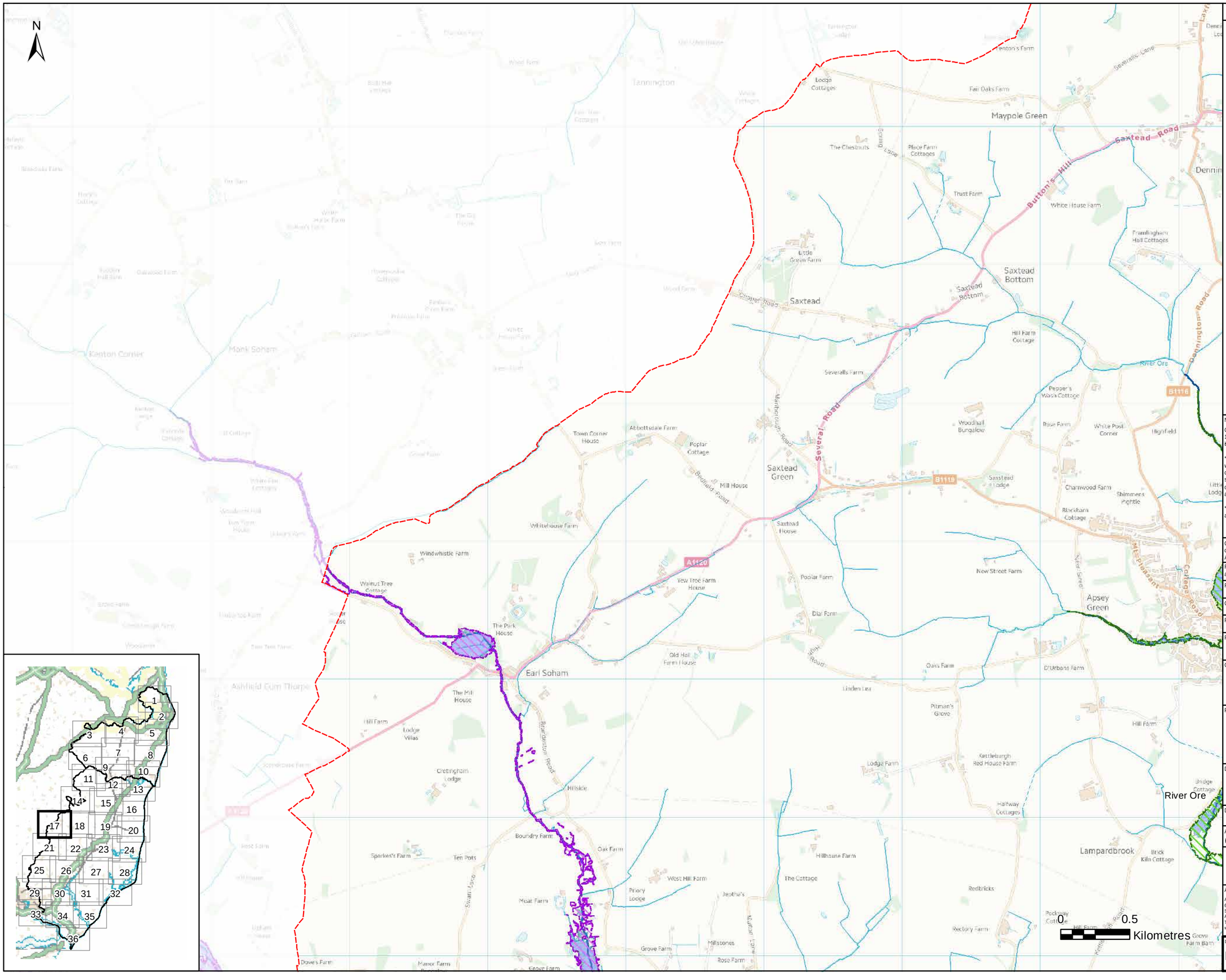

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 17 OF 36

Drawn	Checked	Approved	Date
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AECOM Internal Project No.: 60520248

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Drawing Number: FIGURE 09.17

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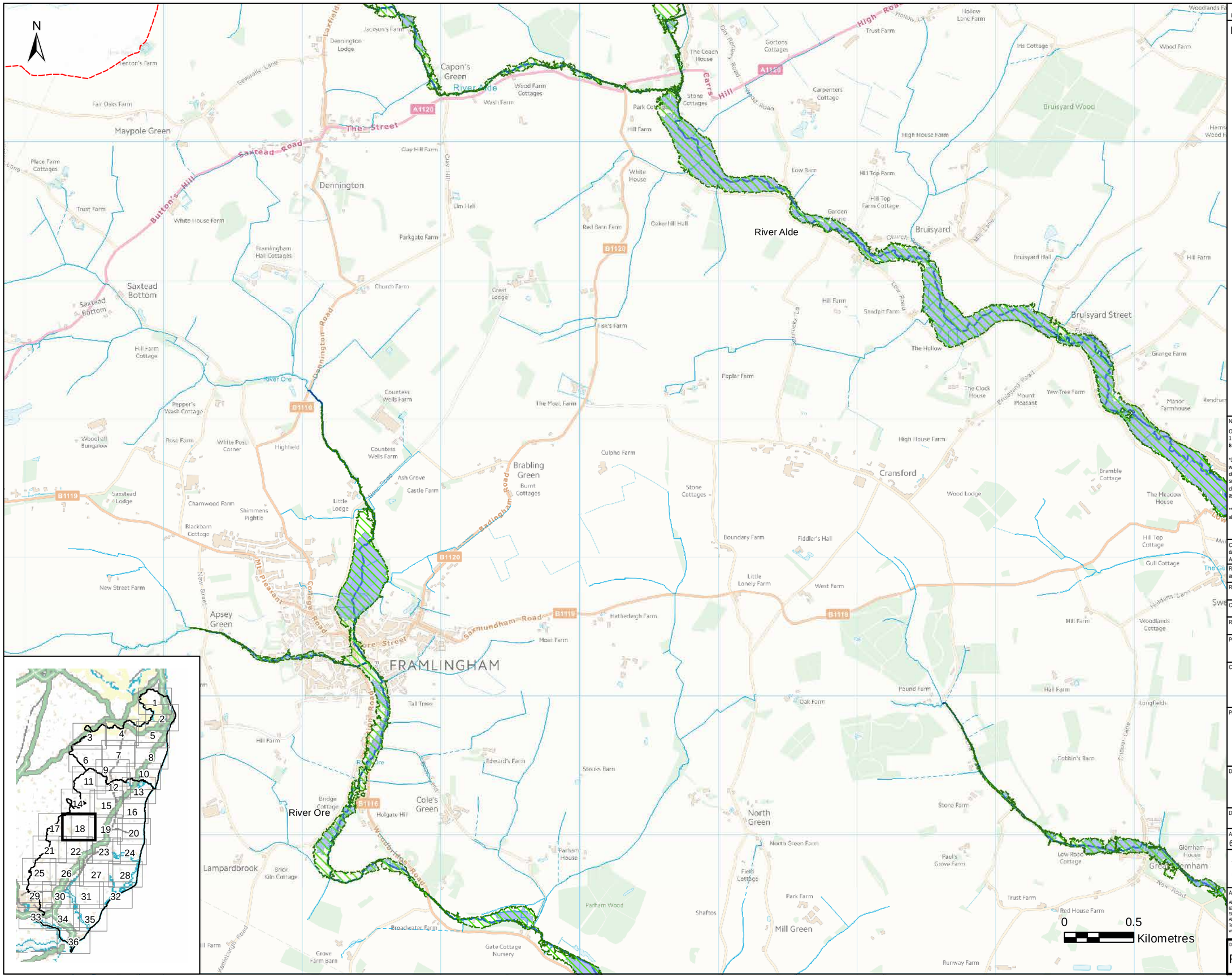
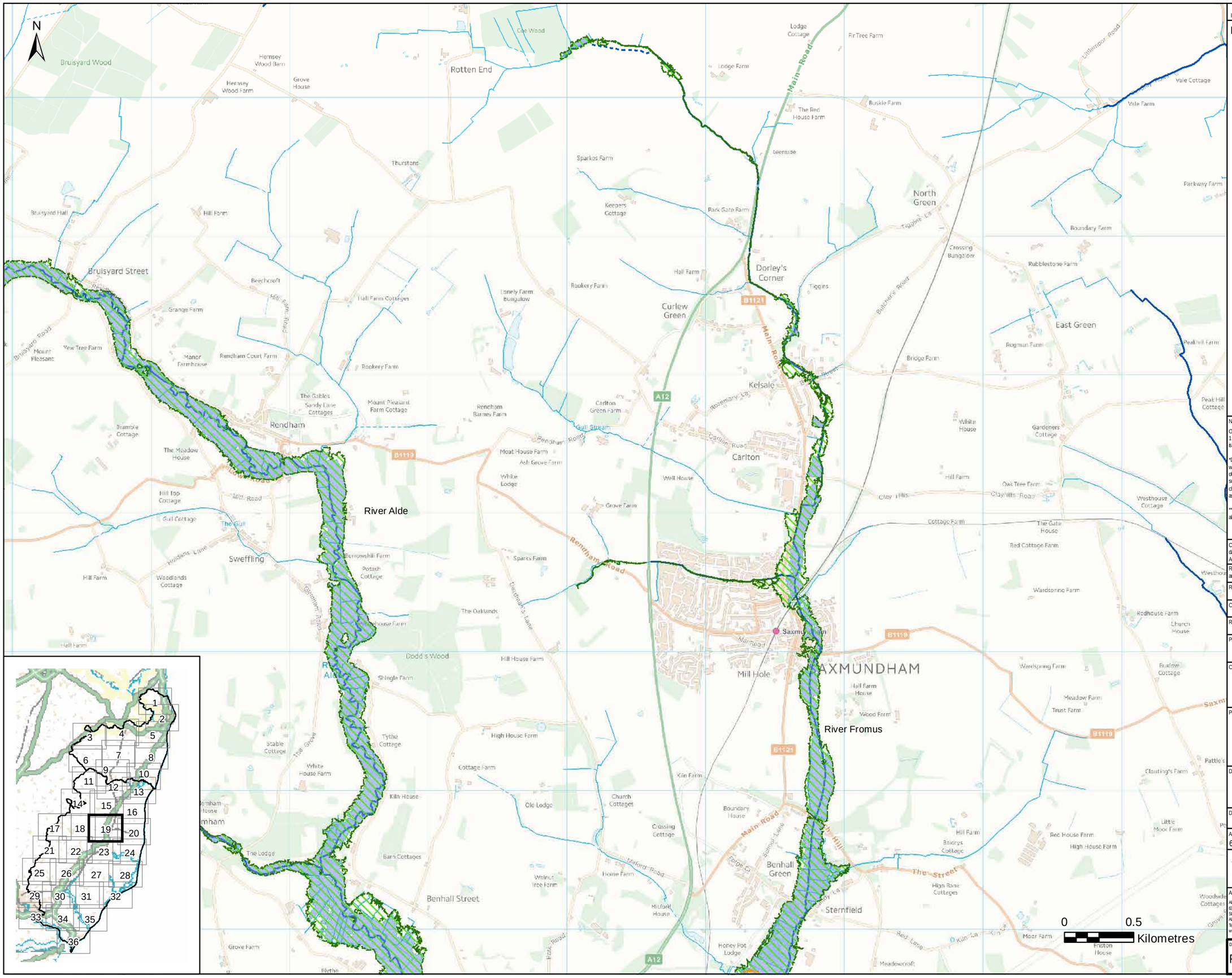

N
River Alde
River Ore
Capon's Green
Dennington
Saxtead Road
Saxtead Bottom
Maypole Green
Brabling Green
Cransford
Bruisyard
Bruisyard Street
Framlingham
Apsey Green
Cole's Green
North Green
Lampardbrook
Mill Green
Carrs Hill
The Street
Buttons Hill
Dennington Road
Badingham Road
Saxmundham Road
Framlingham Road
Wrentham Road
Broadwater Farm
Parham Wood
Bruisyard Wood
Dennington Lodge
Jackson's Farm
Fenton's Farm
Fair Oaks Farm
Place Farm Cottages
Trust Farm
White House Farm
Flemingham Hall Cottages
Parkgate Farm
Church Farm
Great Lodge
Hisk's Farm
Hill Farm Cottage
Pepper's Wash Cottage
Woodhall Bungalow
Rose Farm
White Post Corner
Highfield
Countess Wells Farm
Ash Grove
Castle Farm
Little Lodge
Saxstead Lodge
Charnwood Farm
Shimmens Pightle
Blackbarn Cottage
New Street Farm
Clay Hill Farm
Elm Hall
White House
Red Barn Farm
Oakerhill Hall
Hill Farm
Low Barn
Hill Top Farm
Hill Top Farm Cottage
Garden House
Sandpit Farm
Poplar Farm
The Moat Farm
Culpho Farm
Stone Cottages
Boundary Farm
Fiddler's Hall
Little Lonely Farm
West Farm
Hatheleigh Farm
Moat Farm
Tall Trees
Edward's Farm
Stonks Barn
Bridge Cottage
Holgate Hill
Parham House
Field Cottage
Park Farm
Shaftos
Oak Farm
Pound Farm
Stone Farm
Paul's Grove Farm
North Green Farm
Low Road Cottage
Red House Farm
Trust Farm
Runway Farm
Gate Cottage Nursery
Grove Farm Barn
Broadwater Farm
Brick Kiln Cottage
Gortons Cottages
The Coach House
Park Cottage
Stone Cottages
Carpenters Cottage
Wood Farm Cottages
Wash Farm
Iris Cottage
Wood Farm
Hollow Lane Farm
High House Farm
Bruisyard Hall
The Hollow
The Clock House
Mount Pleasant
Yew Tree Farm
Grange Farm
Manor Farmhouse
Bramble Cottage
The Meadow House
Wood Lodge
Hill Farm
Woodlands Cottage
Gull Cottage
Goldrams Farm
Longfields
Cobbin's Barn
Hall Farm
Glemham House
Great Glemham
Sandpit Lane
Oak Rectory Road
Wood Road
Mill Lane
Church Lane
Low Road
Bruisyard Road
New Road
College Road
Mt Pleasant
New Street
Sewells Lane
Oak Hill
Framlingham Road
Wrentham Road
Badingham Road
Saxmundham Road
Broadwater Farm
Holmsleigh Road
Hollow Lane
Trust Farm
Hill Farm
Hill Farm
Hill



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
- Indicative extent of 1 in 100 year Fluvial Event with Climate Change*
- Modelled Fluvial 1 in 100 year event with 65% Climate Change allowance.**
- Modelled Tidal 1 in 200 year event with Climate Change

Notes

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River Deben model amended. River labels amended	LM / MD	13.04.18	4
River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 19 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	13/04/2018

AECOM Internal Project No.: 60520248

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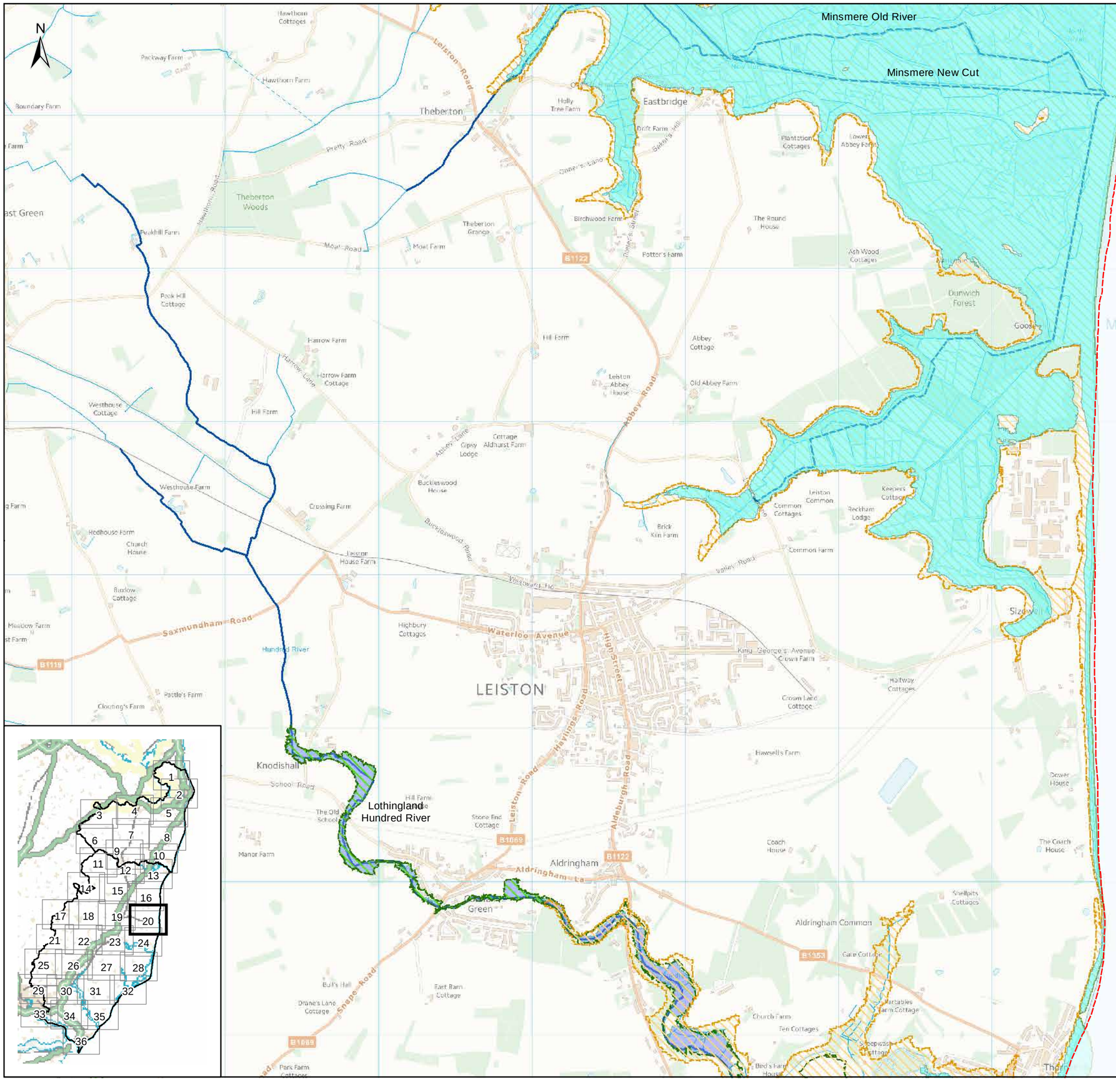

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
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River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 20 OF 36

Drawn	Checked	Approved	Date
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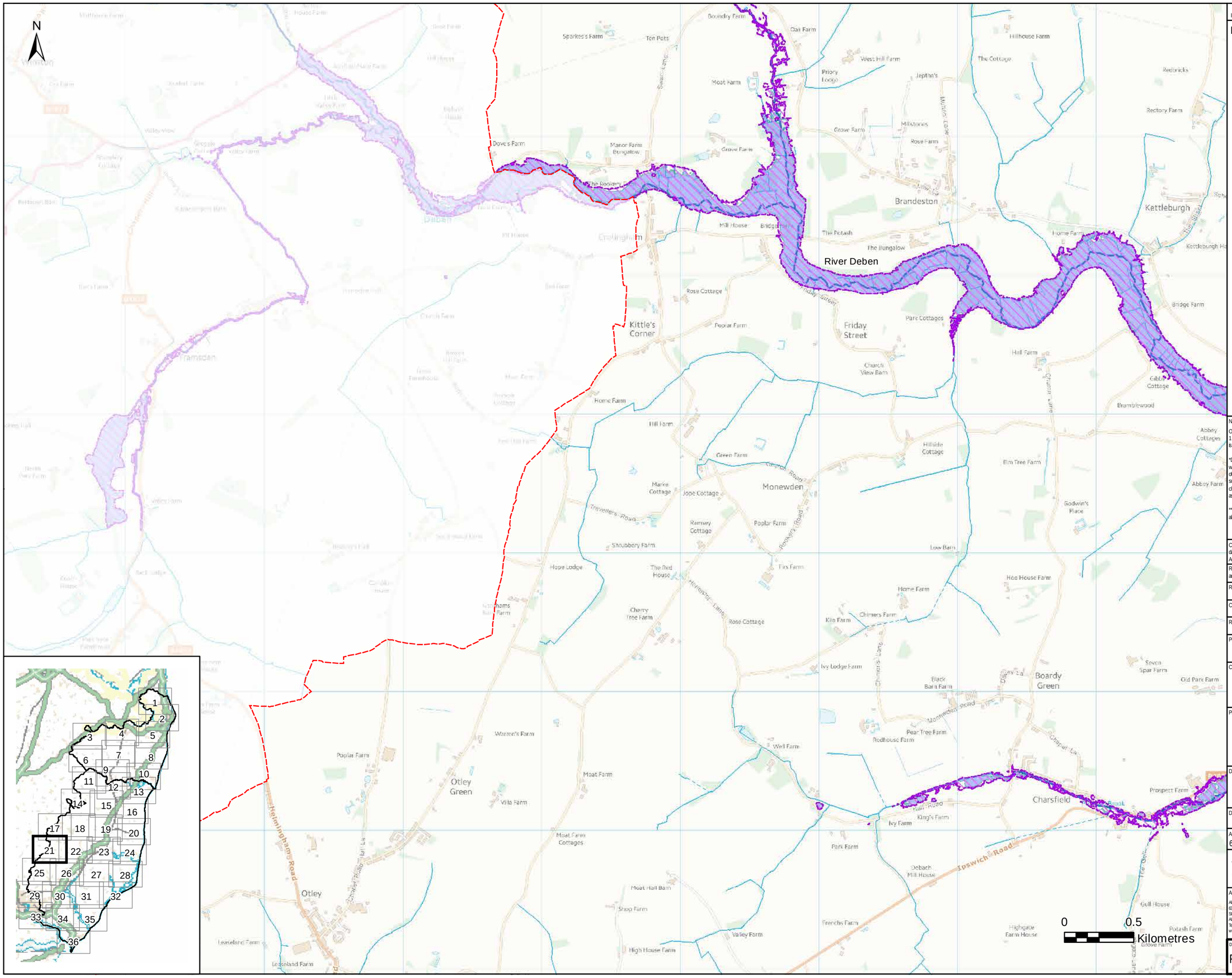

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
- Indicative extent of 1 in 100 year Fluvial Event with Climate Change*
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CC allowance amended	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 21 OF 36

Drawn	Checked	Approved	Date
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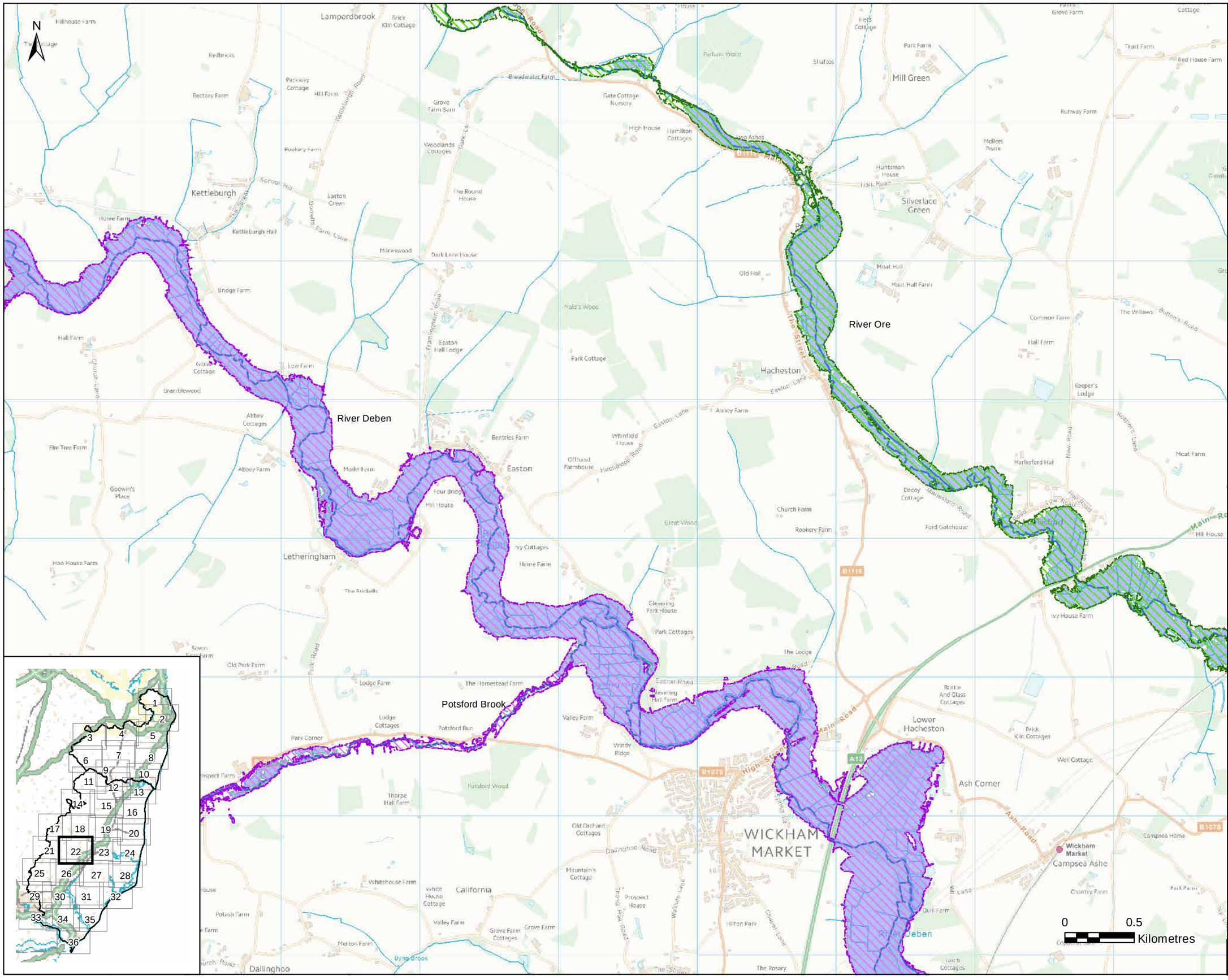

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
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River Deben model amended. River labels amended	LM / MD	13.04.18	4
River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2
Revision Details			

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 22 OF 36

Drawn	Checked	Approved	Date
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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
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River Deben model amended. River labels amended	LM / MD	13.04.18	4
River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 23 OF 36

Drawn	Checked	Approved	Date
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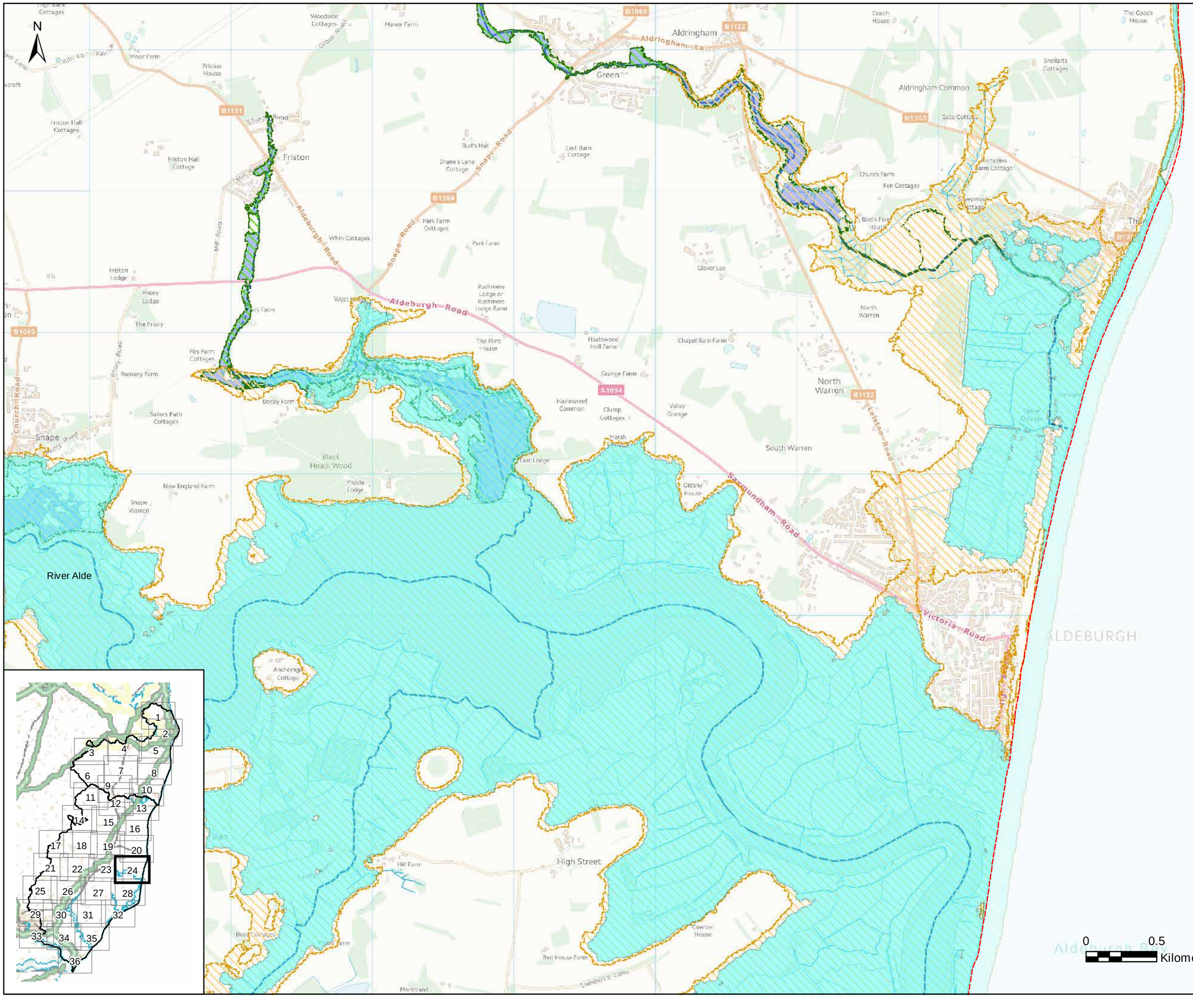

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
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Revision Details	By / Check	Check Date	Suffix
River Deben model amended. River labels amended	LM / MD	13.04.18	4
River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 24 OF 36

Drawn	Checked	Approved	Date
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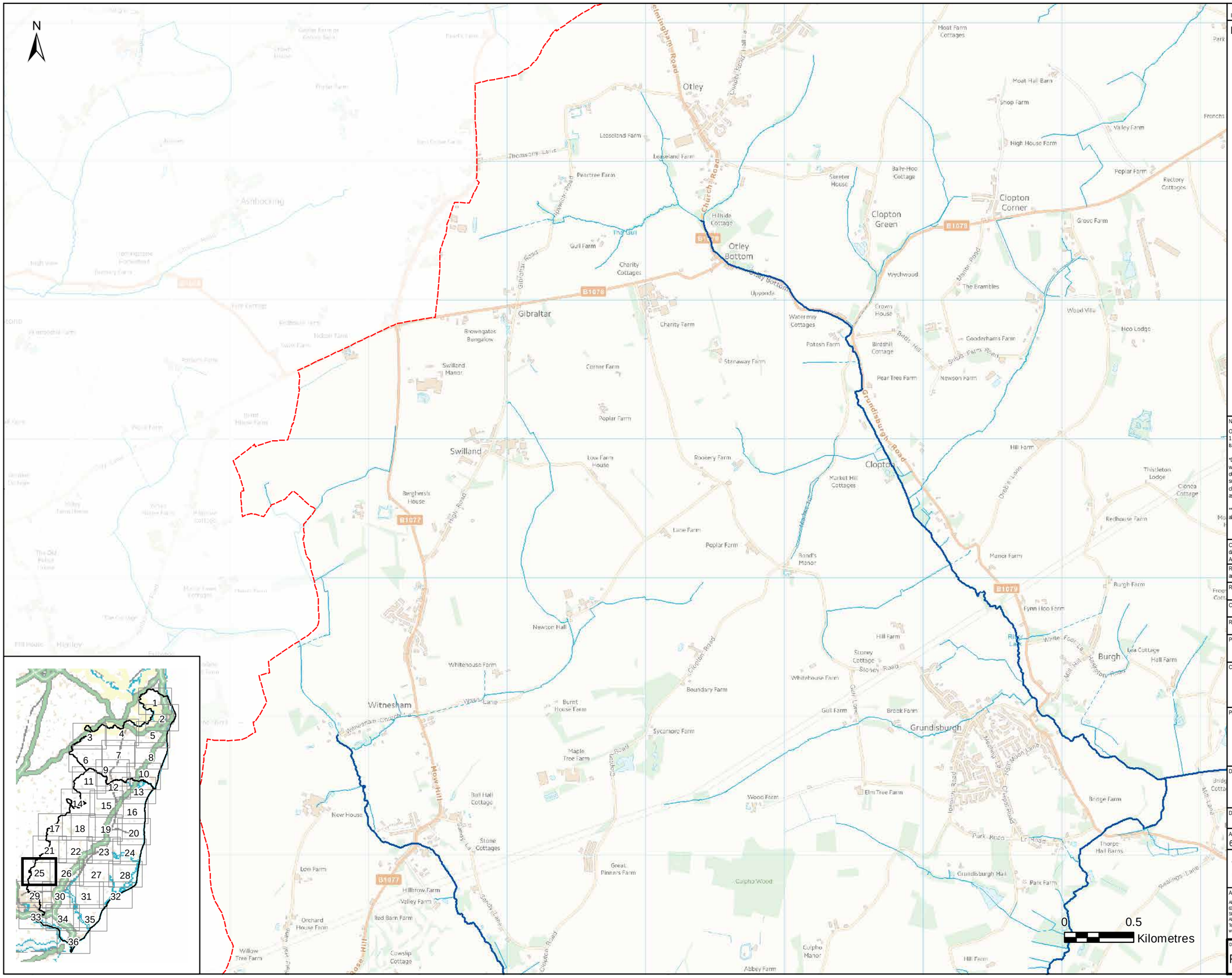

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
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	By / Check	Check Date	Suffix
River Deben model amended. River labels amended	LM / MD	13.04.18	4
River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2

Revision Details

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 25 OF 36

Drawn	Checked	Approved	Date
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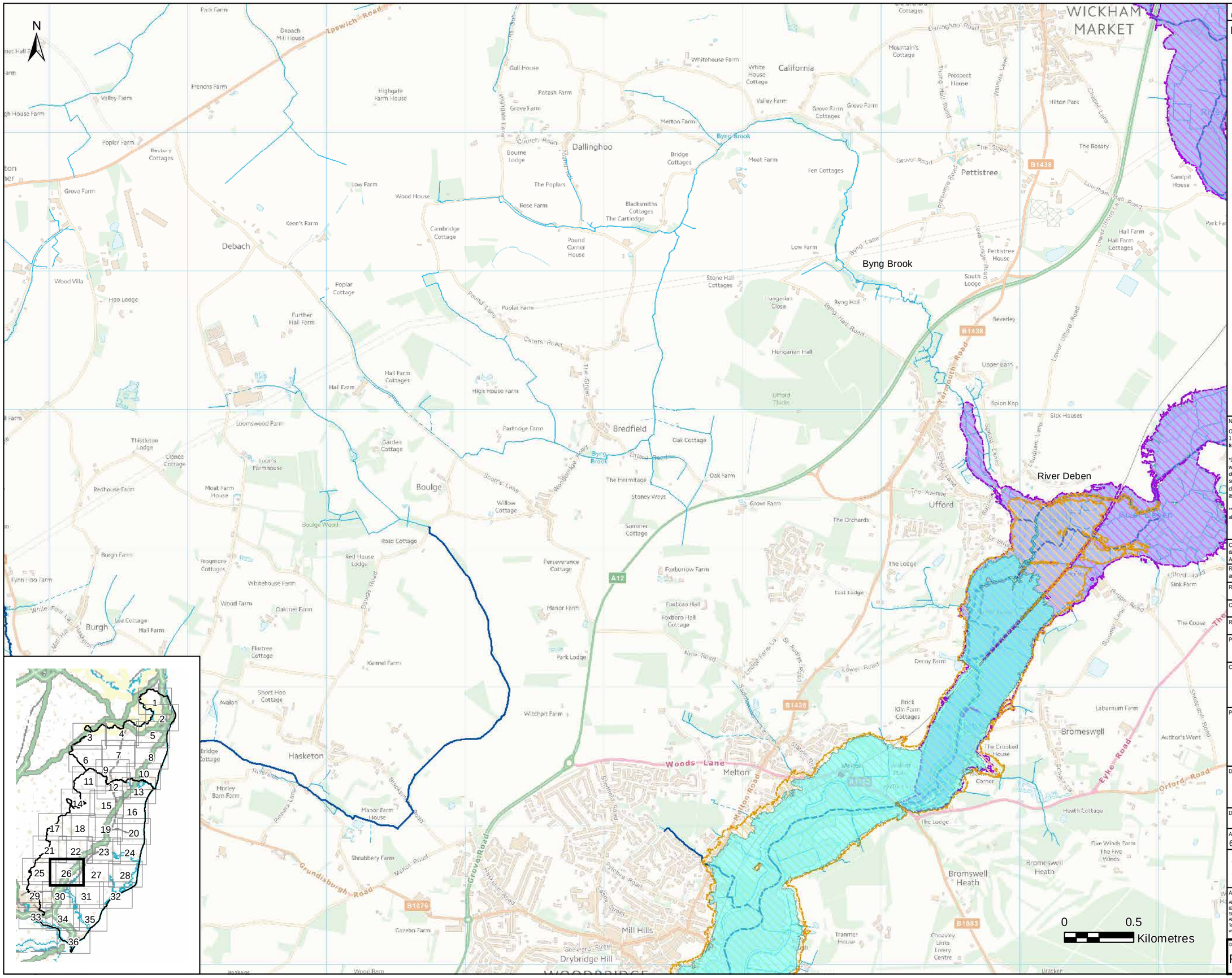

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
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Revision Details	By / Check	Check Date	Suffix
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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 26 OF 36

Drawn	Checked	Approved	Date
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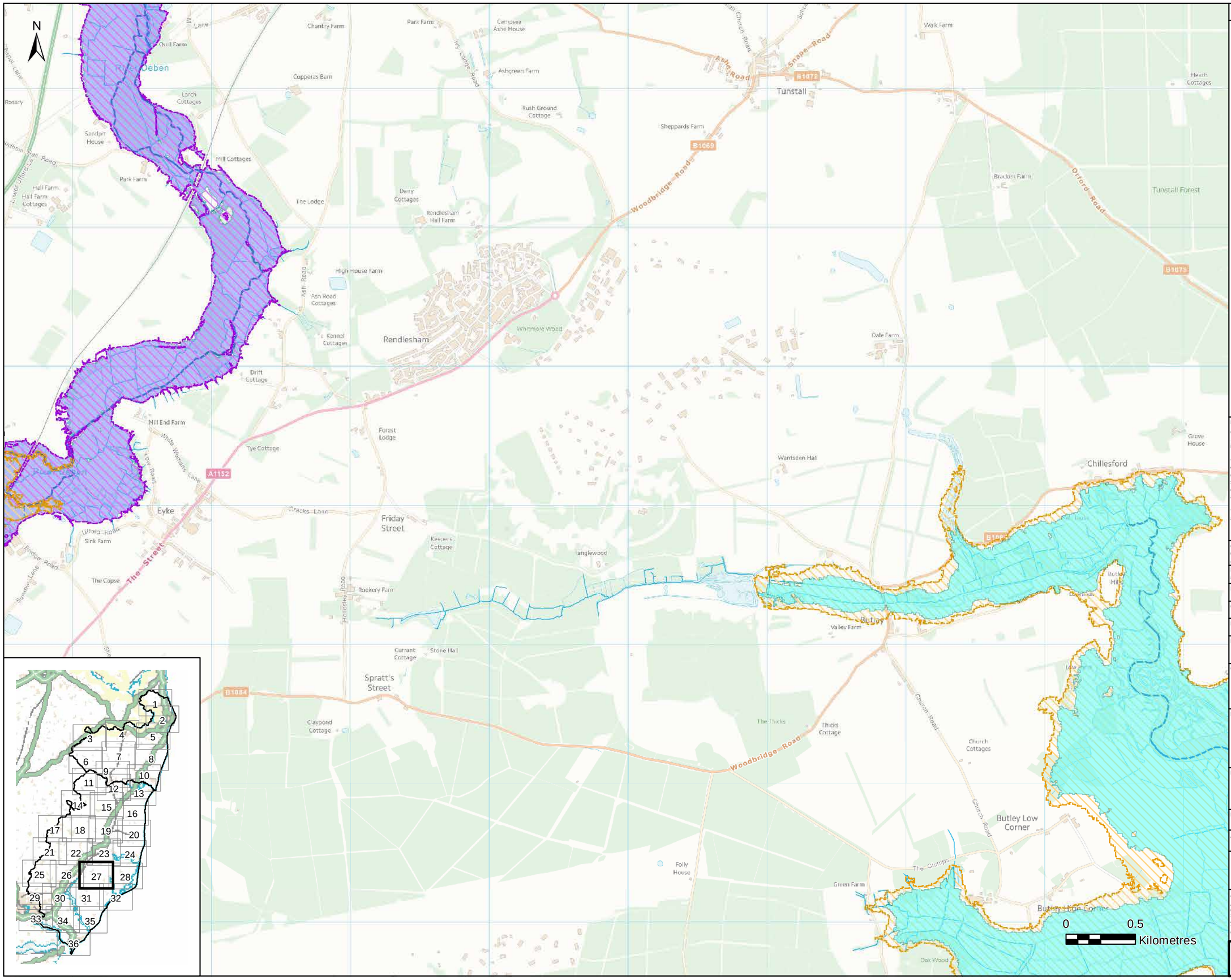

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LEGEND

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- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
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CC allowance amended	LM / MD	06.12.17	2
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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 27 OF 36

Drawn	Checked	Approved	Date
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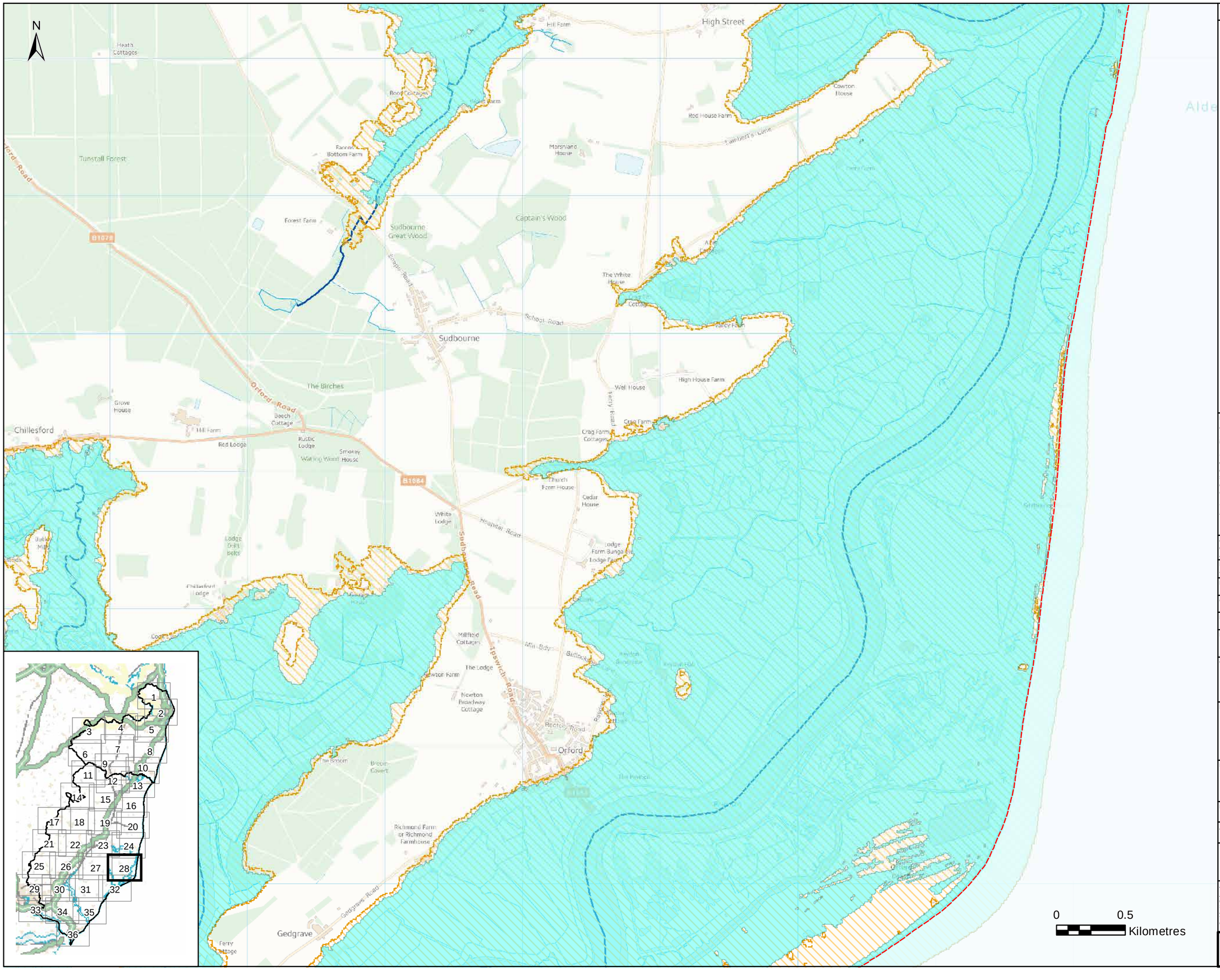

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
- Indicative extent of 1 in 100 year Fluvial Event with Climate Change*
- Modelled Fluvial 1 in 100 year event with 65% Climate Change allowance.**
- Modelled Tidal 1 in 200 year event with Climate Change

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	By	Check	Date	Suffix
River Deben model amended. River labels amended	LM	MD	13.04.18	4
River Deben Model added	LM	MD	31.01.18	3
CC allowance amended	LM	MD	06.12.17	2
Revision Details				

Purpose of Issue: FINAL

Client: Suffolk Coastal District Council; Waveney District Council, Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 28 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	13/04/2018

AECOM Internal Project No.: 60520248

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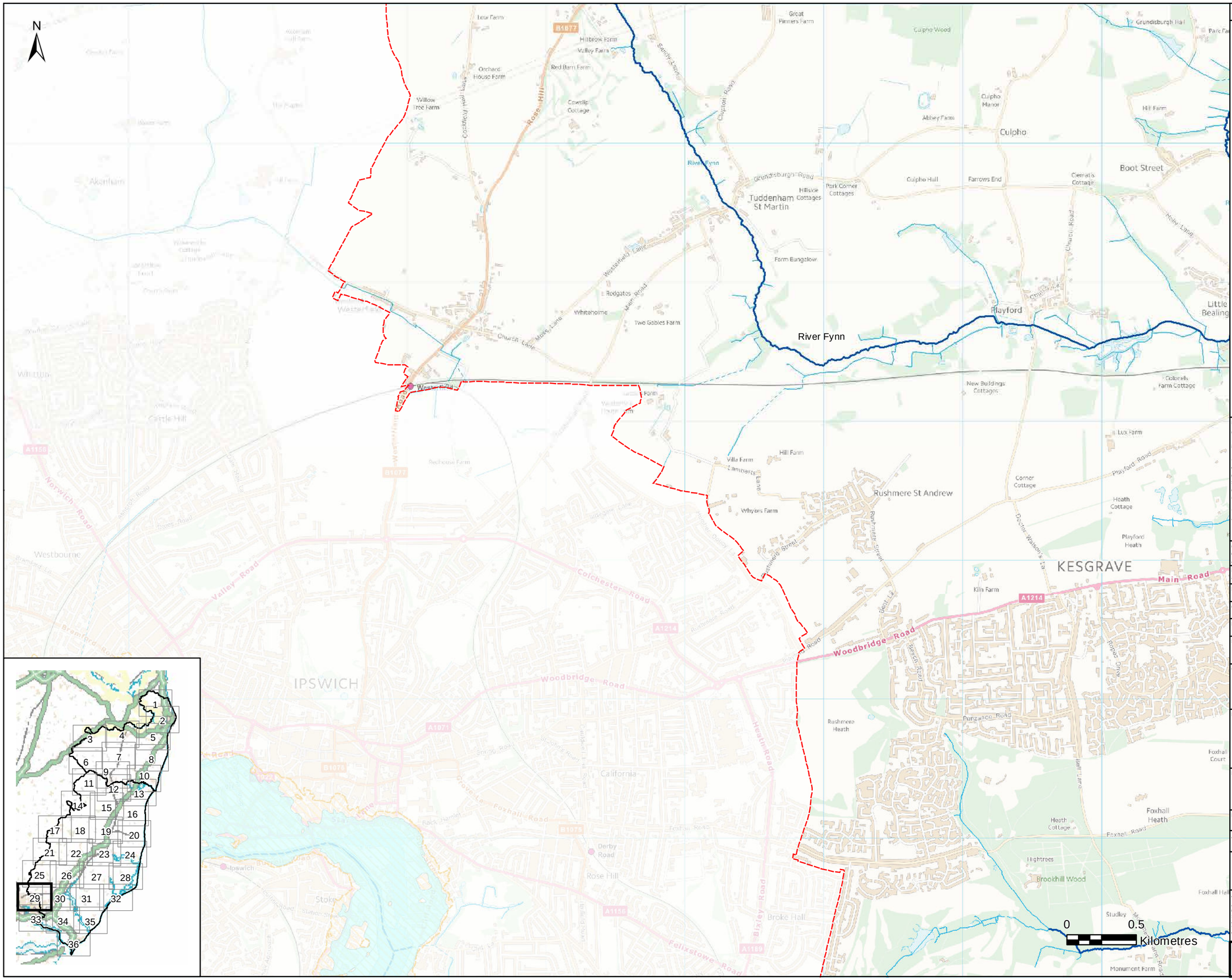
Rev.: 4



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
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River Deben model amended. River labels amended	LM / MD	13.04.18	4
River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue

FINAL

Client

Waveney District Council Serving the Community

Project Title

EAST SUFFOLK COUNCILS
STRATEGIC FLOOD
RISK ASSESSMENT

Drawing Title

RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 29 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	13/04/2018

AECOM Internal Project No.	Scale at A3
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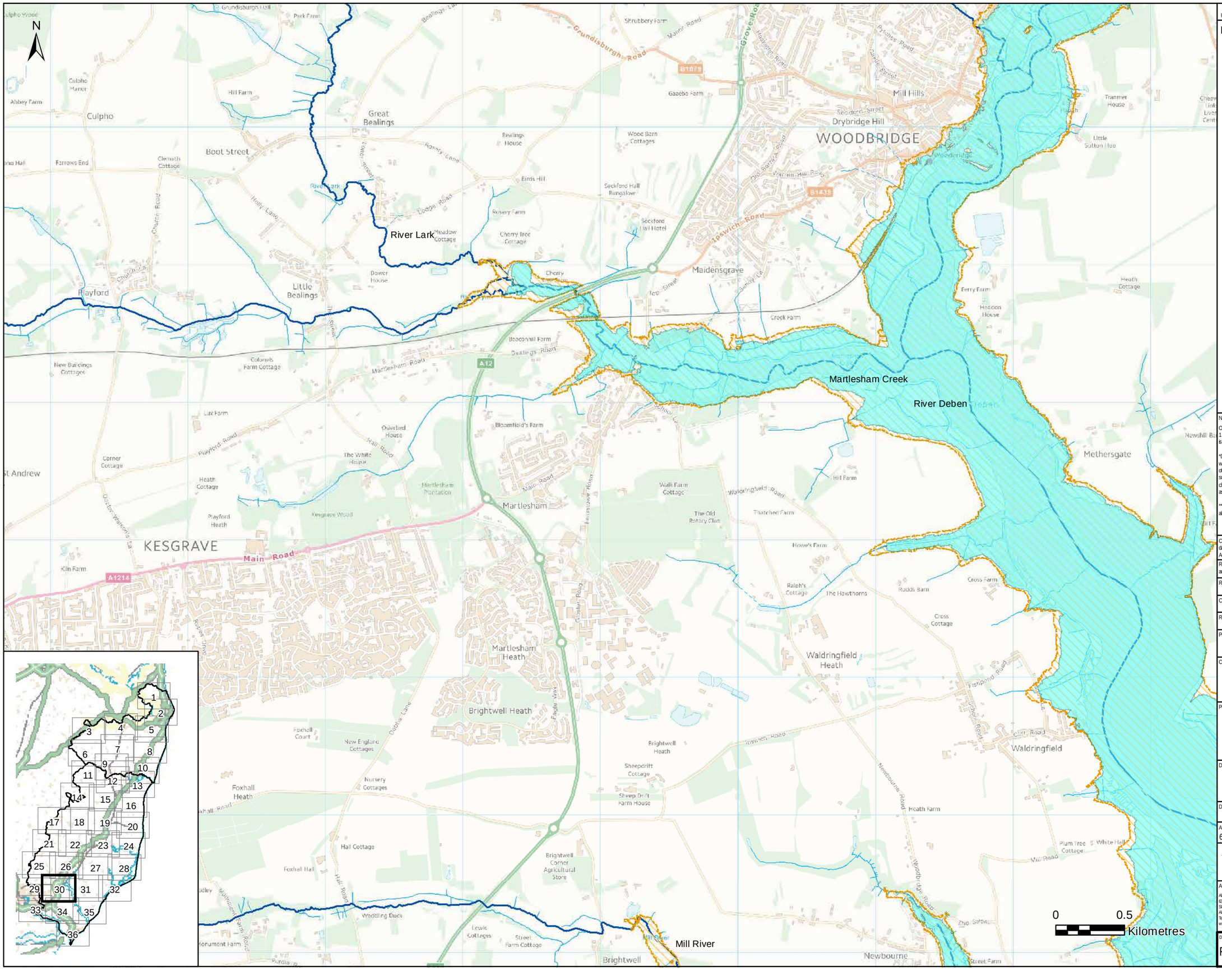

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
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River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2
Revision Details	By / Check	Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 30 OF 36

Drawn	Checked	Approved	Date
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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
- Indicative extent of 1 in 100 year Fluvial Event with Climate Change*
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Revision Details	By / Check	Check Date	Suffix
River Deben model amended. River labels amended	LM / MD	13.04.18	4
River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2

Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 31 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	13/04/2018

AECOM Internal Project No.	Scale at A3
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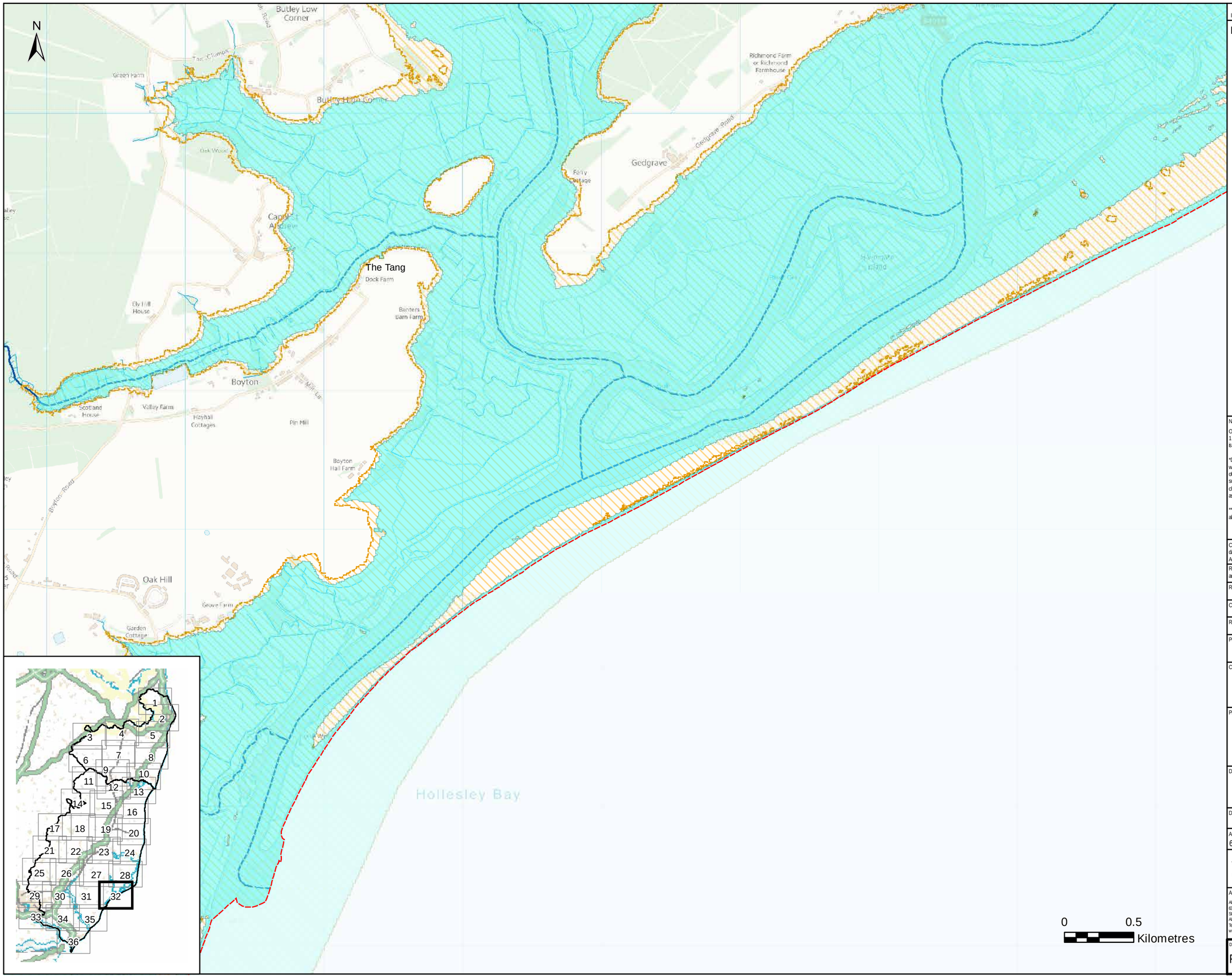
Drawing Number: FIGURE 09.31 — Rev. 4

0 0.5 Kilometres



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
- Modelled 1 in 100 year Fluvial Event
- Modelled 1 in 200 year Tidal Event
- Indicative extent of 1 in 100 year Fluvial Event with Climate Change*
- Modelled Fluvial 1 in 100 year event with 65% Climate Change allowance.**
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Revision Details	By / Check	Check Date	Suffix
River Deben model amended. River labels amended	LM / MD	13.04.18	4
River Deben Model added	LM / MD	31.01.18	3
CC allowance amended	LM / MD	06.12.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 32 OF 36

Drawn	Checked	Approved	Date
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AECOM Internal Project No.	Scale at A3
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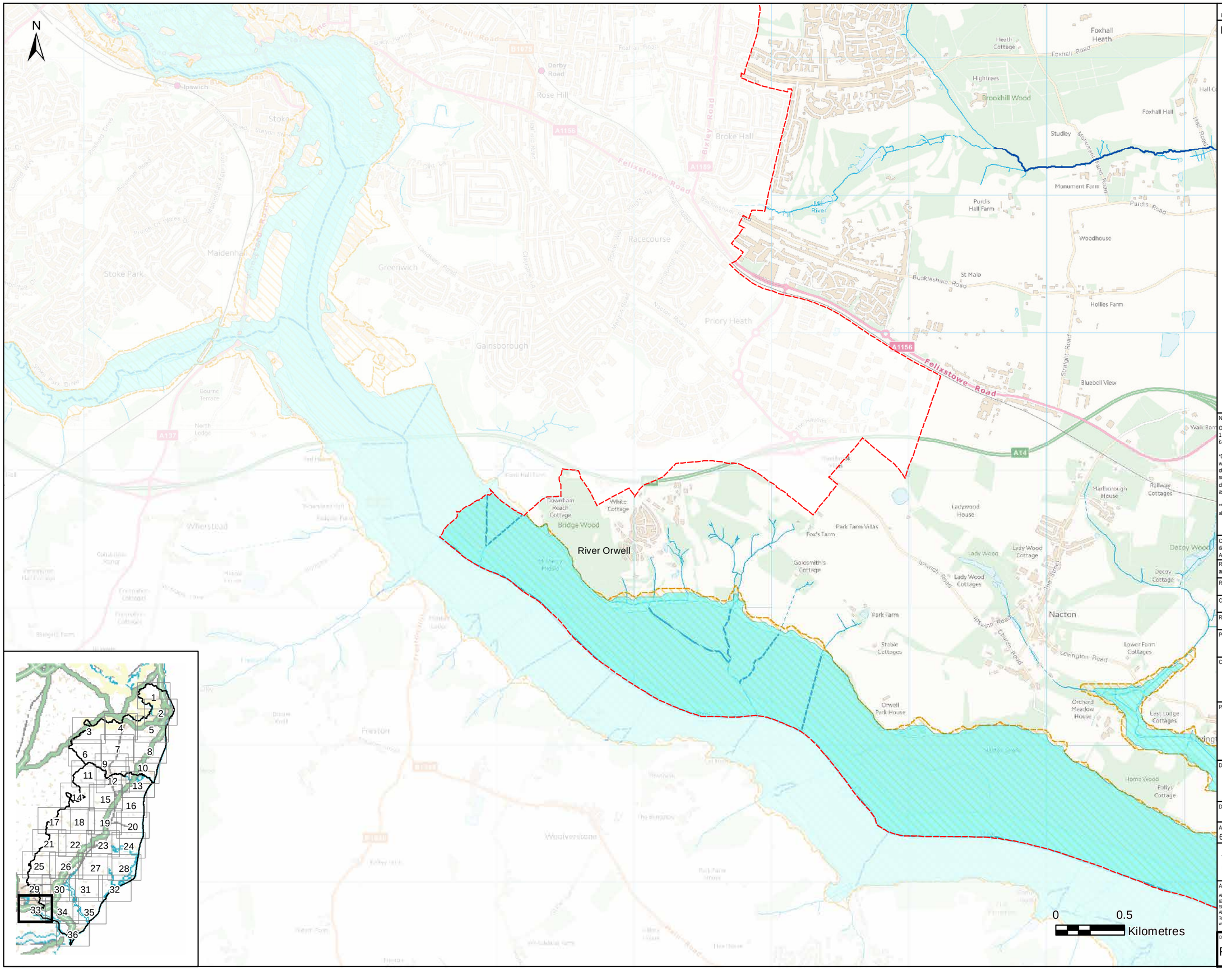
Drawing Number	Rev.
FIGURE 09.32	4



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LEGEND

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- Waveney District
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Revision Details	By / Check	Check Date	Suffix
River Deben model amended. River labels amended	LM / MD	13.04.18	4
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CC allowance amended	LM / MD	06.12.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 33 OF 36

Drawn	Checked	Approved	Date
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Drawing Number: FIGURE 09.33

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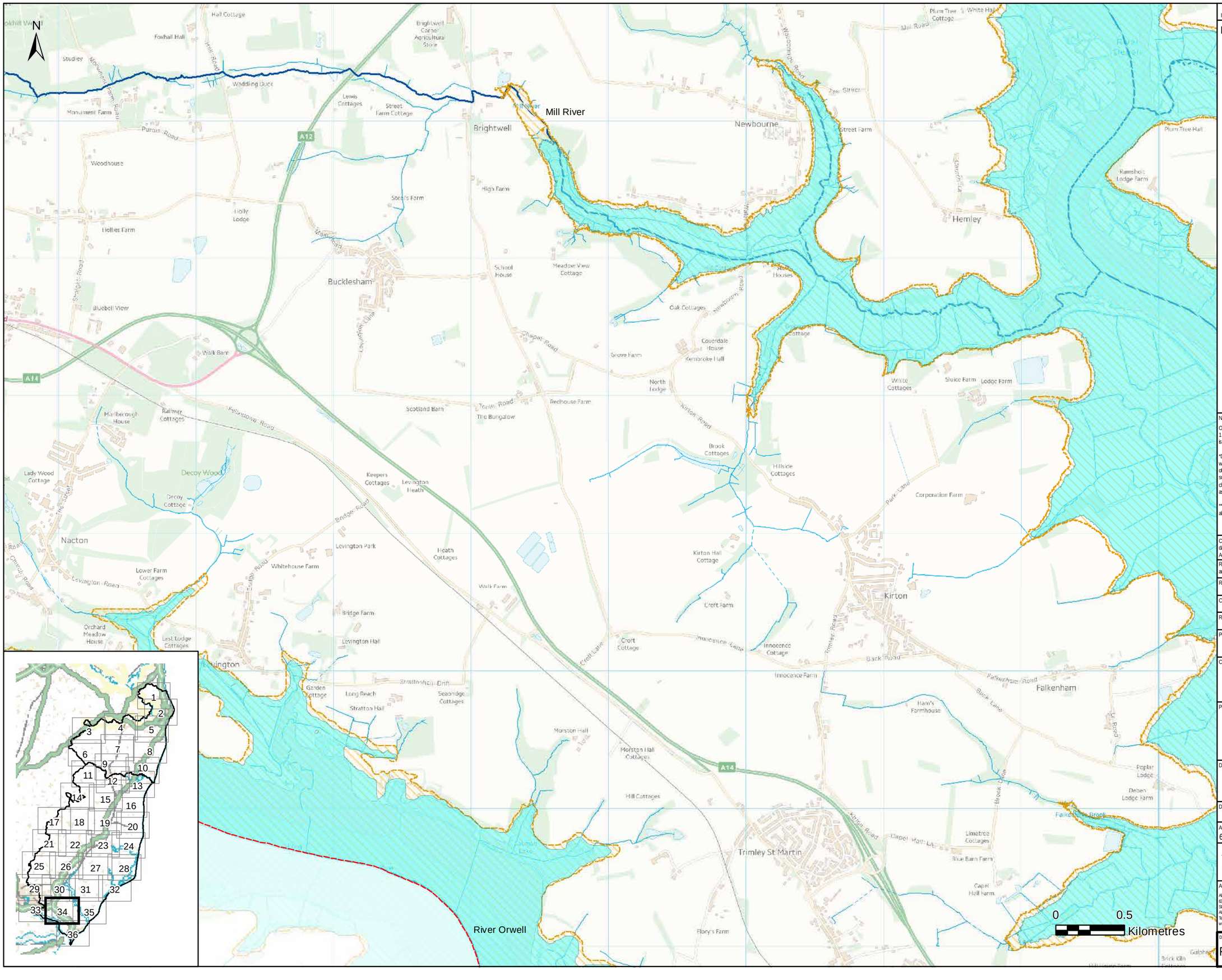

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Revision Details			

Purpose of Issue

FINAL

Client

Waveney District Council Serving the Community

Project Title

EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title

RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 34 OF 36

Drawn	Checked	Approved	Date
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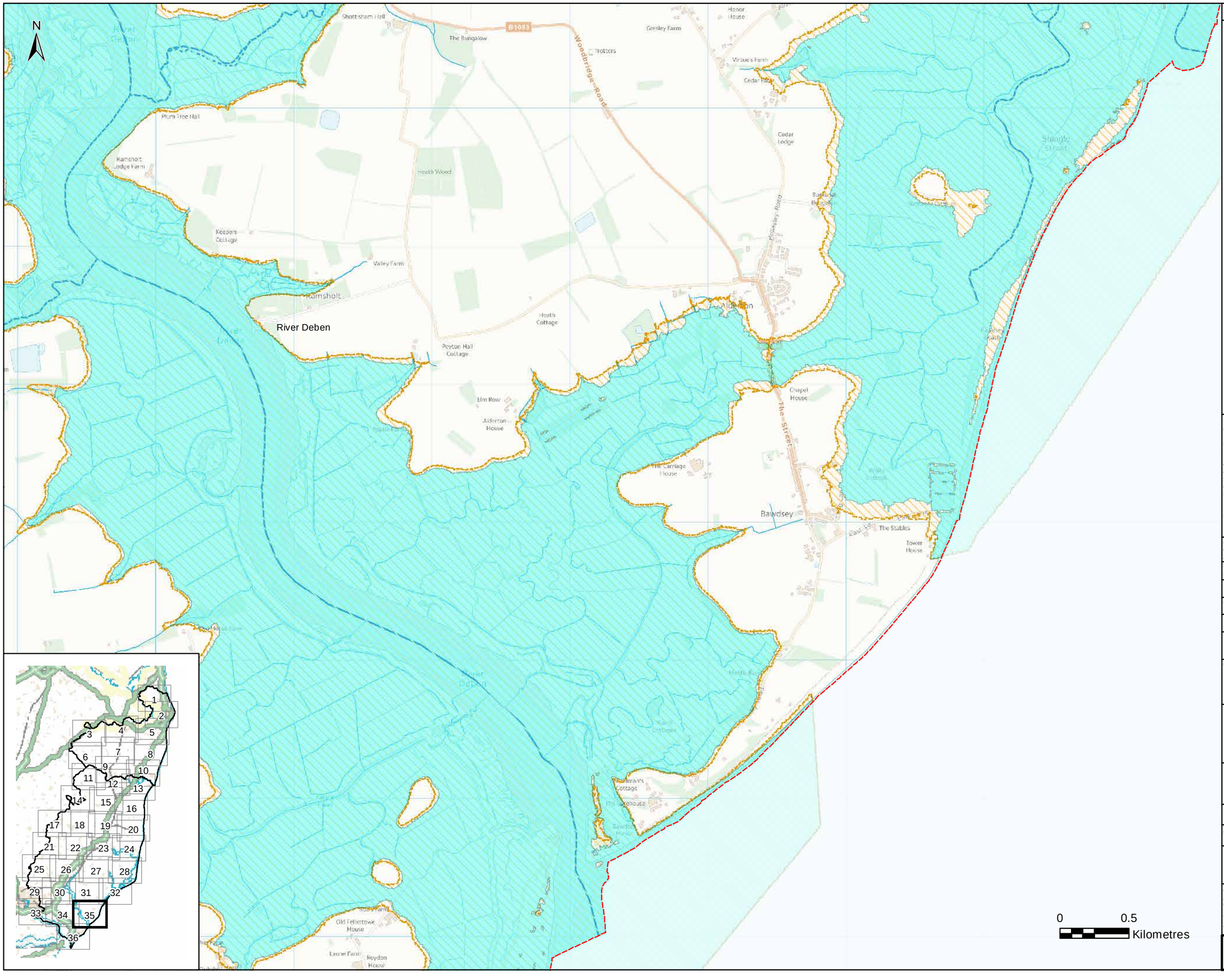
FIGURE 09.34	4



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LEGEND

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- Waveney District
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- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)
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Purpose of Issue: FINAL

Client: Suffolk Coastal District Council; Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 35 OF 36

Drawn	Checked	Approved	Date
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AECOM Internal Project No.	Scale at A3
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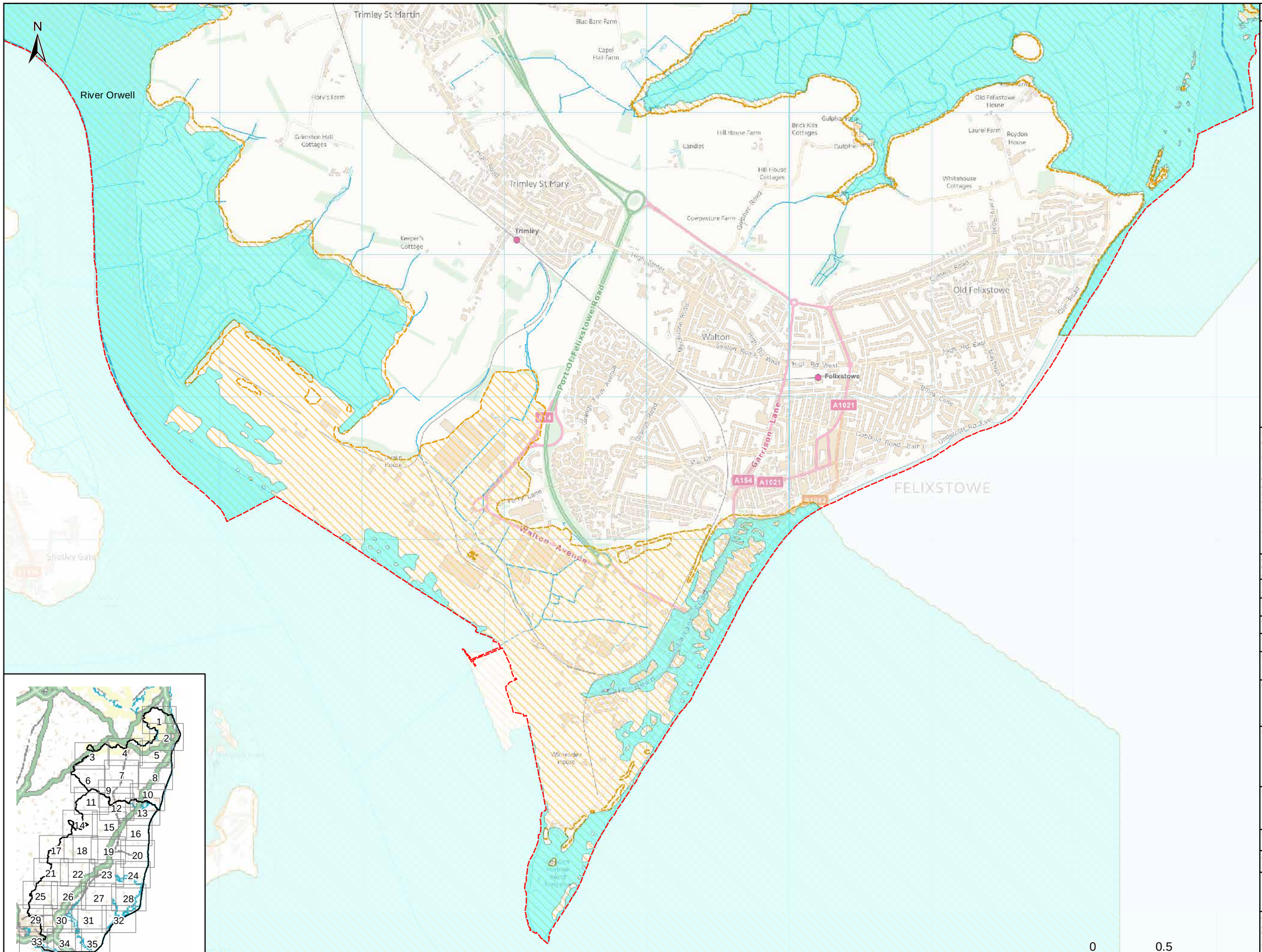
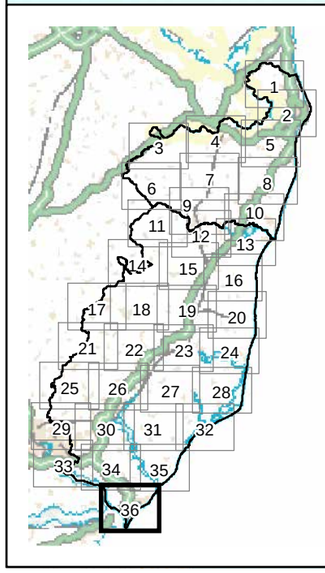
FIGURE 09.35	4





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LEGEND

- Suffolk Coastal District
- Waveney District
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CC allowance amended	LM / MD	06.12.17	2
Revision Details			

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: RISK OF FLOODING FROM RIVERS AND THE SEA WITH AN ALLOWANCE FOR CLIMATE CHANGE SHEET 36 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	13/04/2018

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N

Fritton
Hopton on Sea
Lower Thurlton
Subcourse
Thurlton
Thorpe
Haddiscoe
Three Cocked Hat
Maypole Green
Toft Monks
Wheatacre
Aldeby
Burgh St Peter
Gillingham
Beccles
SECCLES
Worlingham
Bungay
Lound
Herringfleet
Somerleyton
Blundeston
Corton
A12(T)
The Fleet
Oulton
A1117
Carlton Colville
Oulton Broad North
Oulton Broad South
Landspring Drain
River Waveney
Hundred Drain
A146
A1145
Pakefield
Bamby
North Cove
Gisleham
Mutford
A12
0
1
Kilometres

1 2 3 4 5 6 7 8 9 10

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Flood Response Measures

- Flood Warning Areas
- Flood Alert Areas
- Ambulance Stations
- Fire Stations
- NHS Hospitals
- Police Stations
- Rest Centres

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River Labels amended	LM / MD	11.04.18	3
No changes - Issued as final	LM / MD	27.11.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: FLOOD WARNING AND ALERT AREAS SHEET 1 OF 10

Drawn	Checked	Approved	Date
LM	MD	GP	11/04/2018

AECOM Internal Project No.	Scale at A3
60520248	1:50,000

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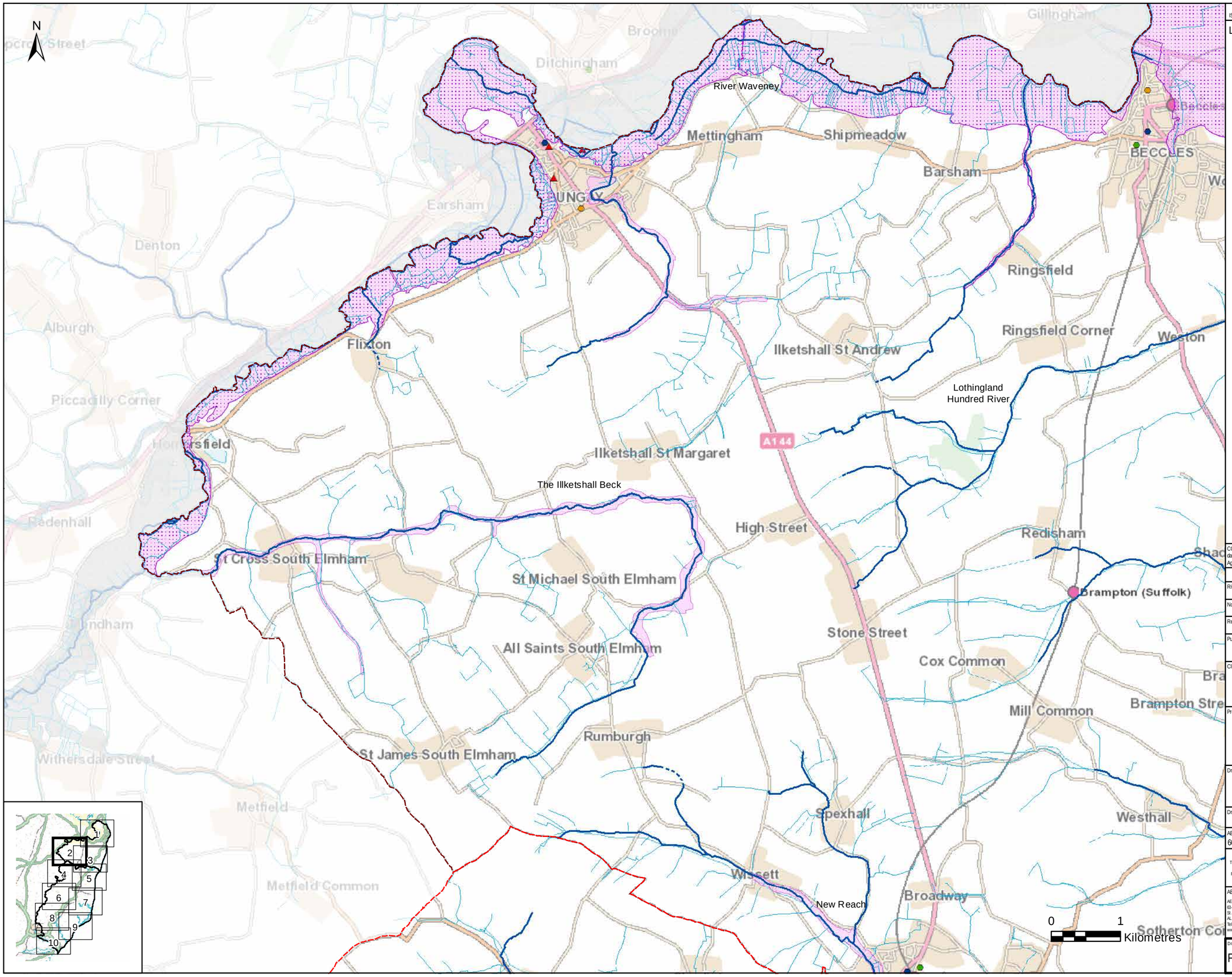
FIGURE 10.1	3



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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: FLOOD WARNING AND ALERT AREAS SHEET 2 OF 10

Drawn	Checked	Approved	Date
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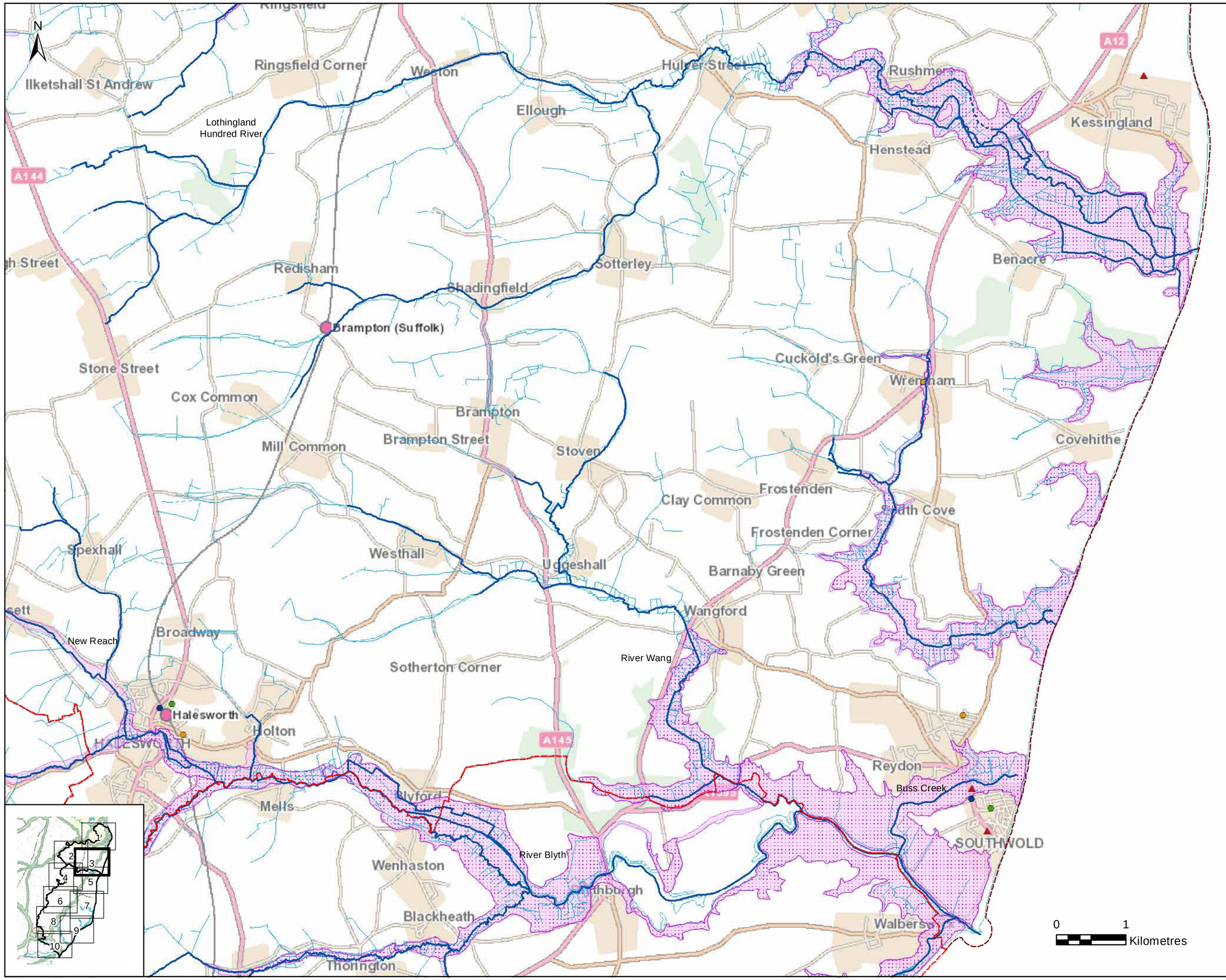

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Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: FLOOD WARNING AND ALERT AREAS SHEET 3 OF 10

Drawn	Checked	Approved	Date
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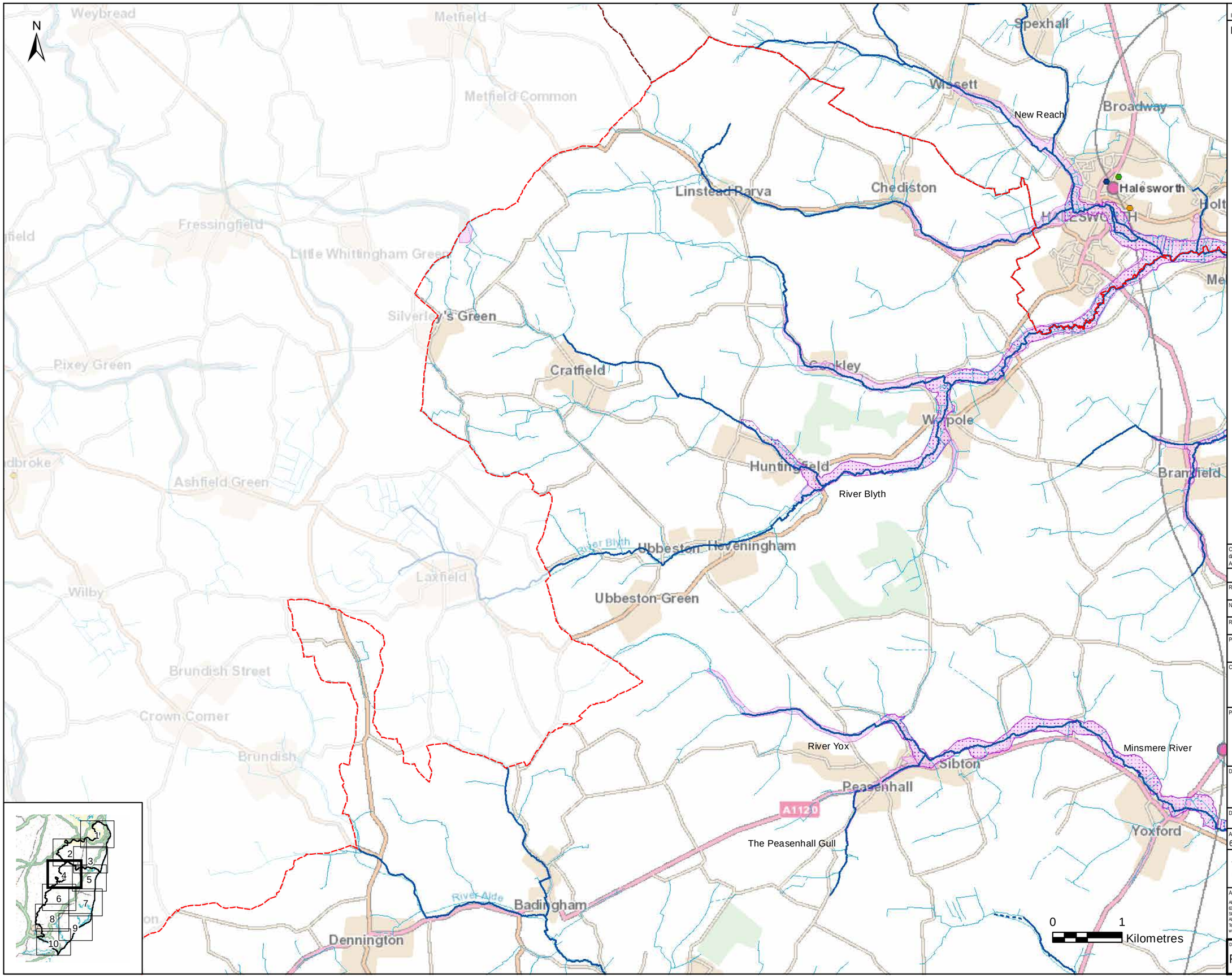

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: FLOOD WARNING AND ALERT AREAS SHEET 4 OF 10

Drawn	Checked	Approved	Date
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Drawing Number: FIGURE 10.4

Rev.: 3

N

Halesworth
Holton
Mells
Ilyford
Wenhaston
River Blyth
Blackheath
Walberswick
Reydon
Buss Creek
SOUTHWOLD
Thorington
Bramfield
A145
A12
Dunwich River
Minsmere River
Darsham
Sibton
Yoxford
Westleton
Middleton
Minsmere Old River
Theberton
Eastbridge
Minsmere New Cut
Kelsale

1 2 3 4 5 6 7 8 9 10

0 1 Kilometres

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: FLOOD WARNING AND ALERT AREAS SHEET 5 OF 10

Drawn	Checked	Approved	Date
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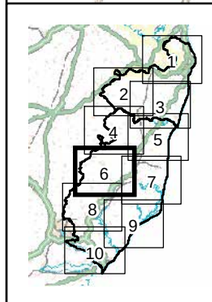
Drawing Number: FIGURE 10.5

Rev.: 3

N

Tannington
Bedfield
Monk Soham
Dennington
River Alde
Badingham
Bruisyard
Saxtead
Saxtead Green
Brabling Green
River Ore
Cransford
Rendham
Sweffling
FRAMLINGHAM
Earl Soham
River Alde
Ashfield cum Thorpe
Great Glemham
Brandeston
Parham
Hacheston
Hoo
Monewden
Little Glemham
Marlesford
Letheringham
Potsford Brook
Blaxhall
Charsfield
Campsea Ashe
Wickham Market
WICKHAM MARKET
A12
Dallinghoo
Pettistree
0 Tunstall 1 Kilometres



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Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: FLOOD WARNING AND ALERT AREAS SHEET 6 OF 10

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FIGURE 10.6	3

N

Minsmere New Cut

Kelsale

Carlton

Rendham

Sweffling

River Alde

Saxmundham

SAXMUNDHAM

River Fromus

LEISTON

Thorpeness Hundred River

Knodishall

Stemfield

Coldfair Green

Aldringham

Friston

Farnham

Gromford

A1094

Thorpeness

Glemham

Stratford St Andrew

Blaxhall

ALDEBURGH

River Alde

Iken

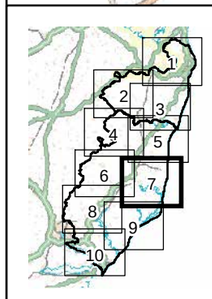
High Street

Tunstall

Sudbourne

Chillesford

0 1 Kilometres



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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: FLOOD WARNING AND ALERT AREAS SHEET 7 OF 10

Drawn	Checked	Approved	Date
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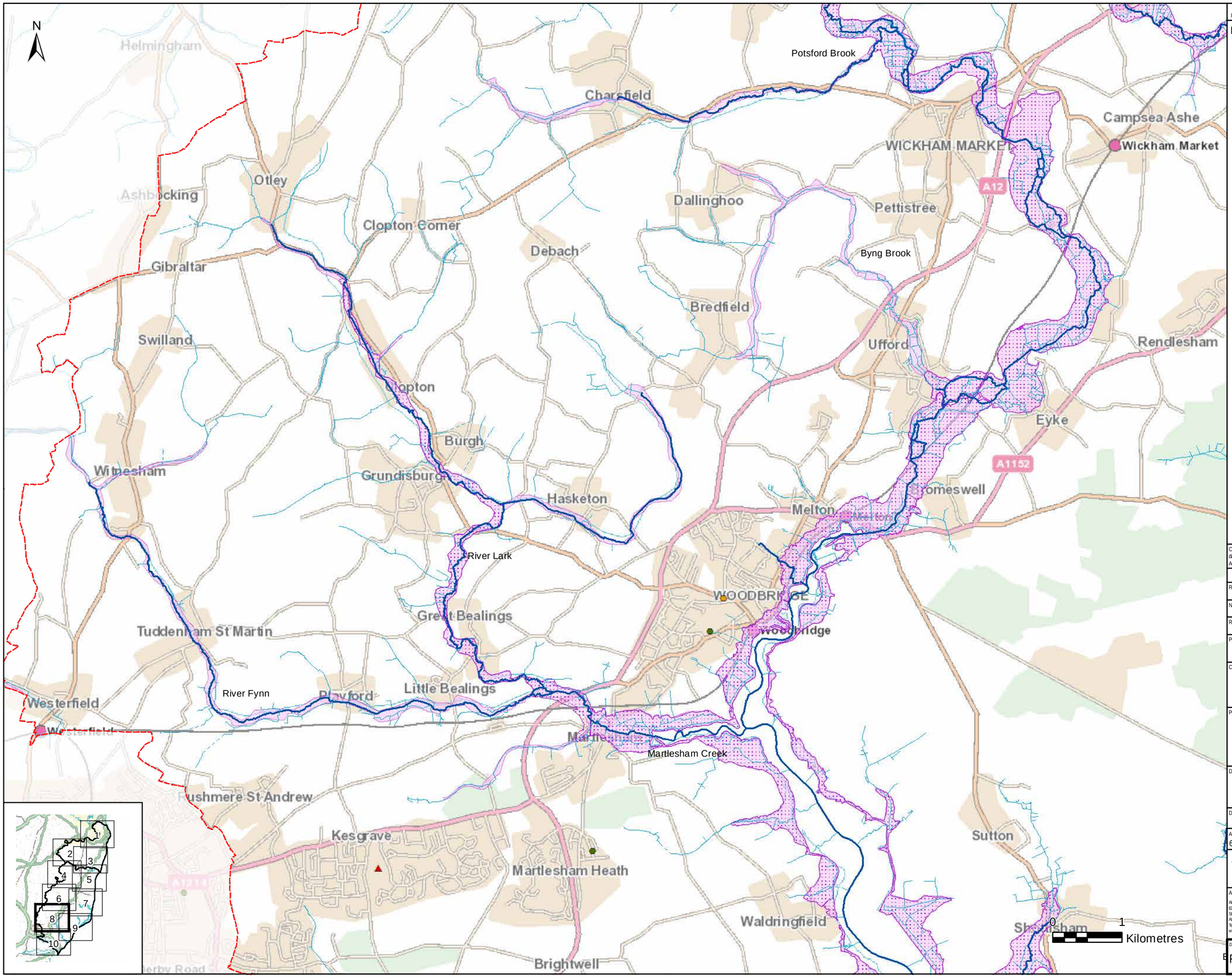
FIGURE 10.7	3



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Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: FLOOD WARNING AND ALERT AREAS SHEET 8 OF 10

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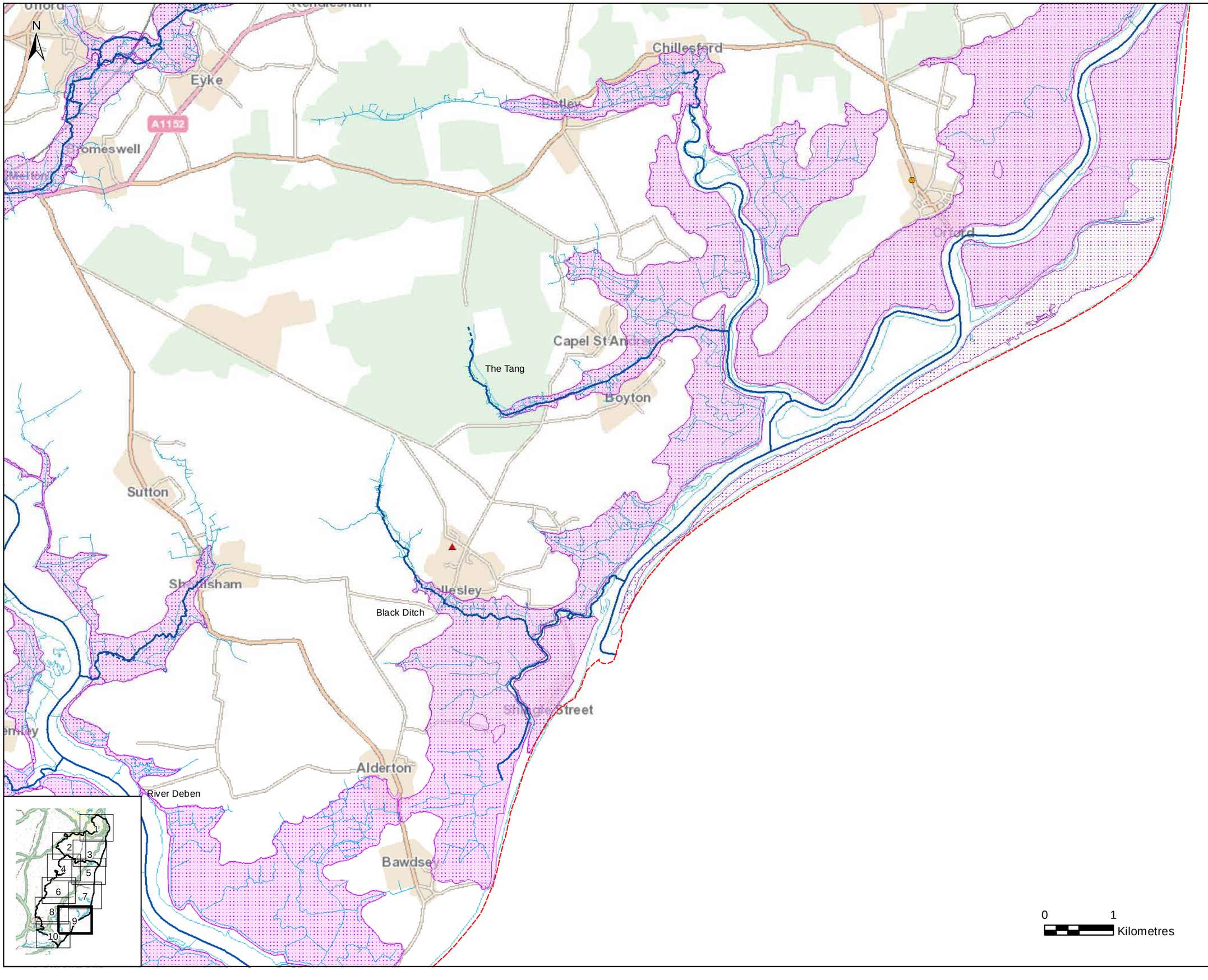
FIGURE 10.8	3



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Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: FLOOD WARNING AND ALERT AREAS SHEET 9 OF 10

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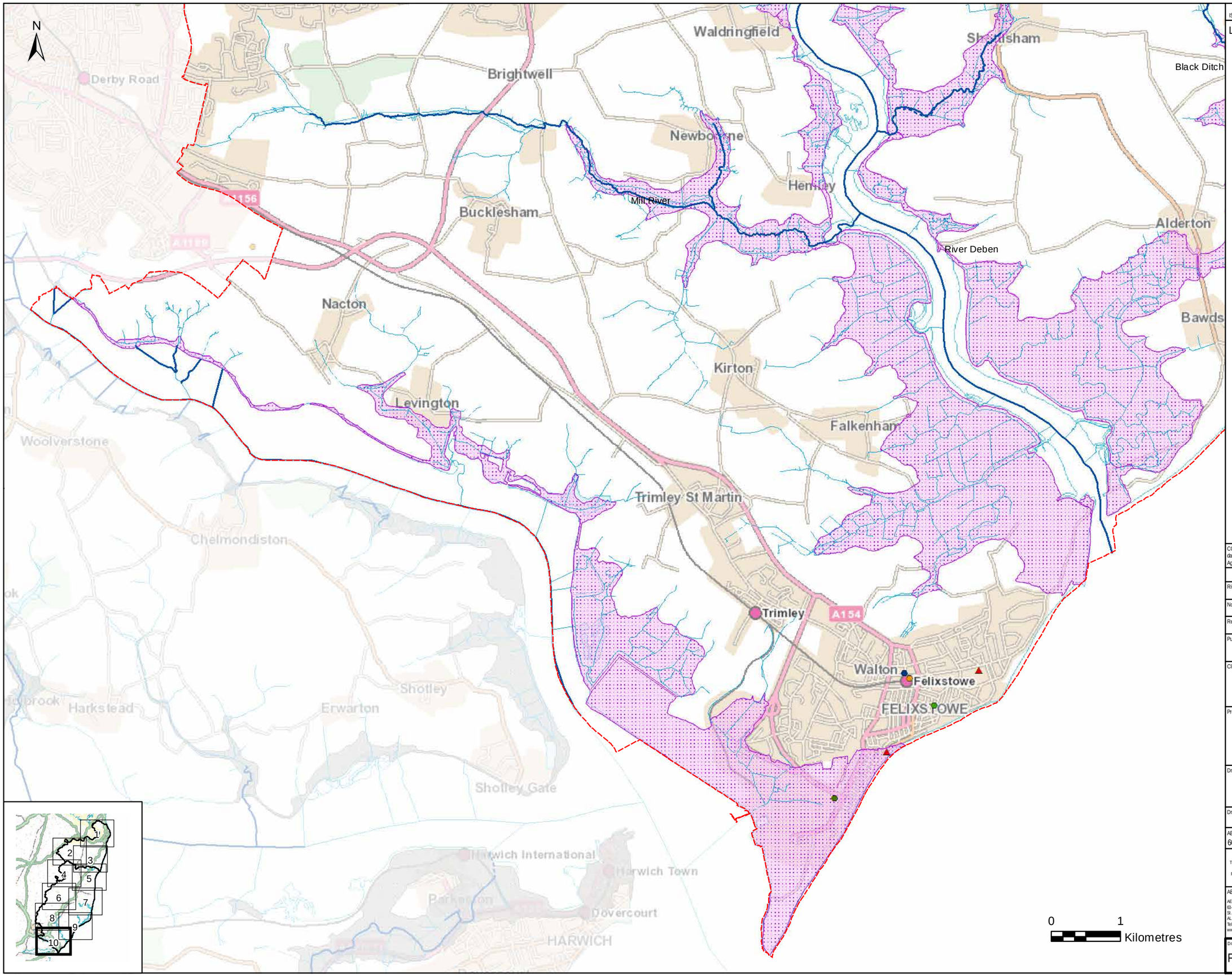
FIGURE 10.9	3



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Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: FLOOD WARNING AND ALERT AREAS SHEET 10 OF 10

Drawn	Checked	Approved	Date
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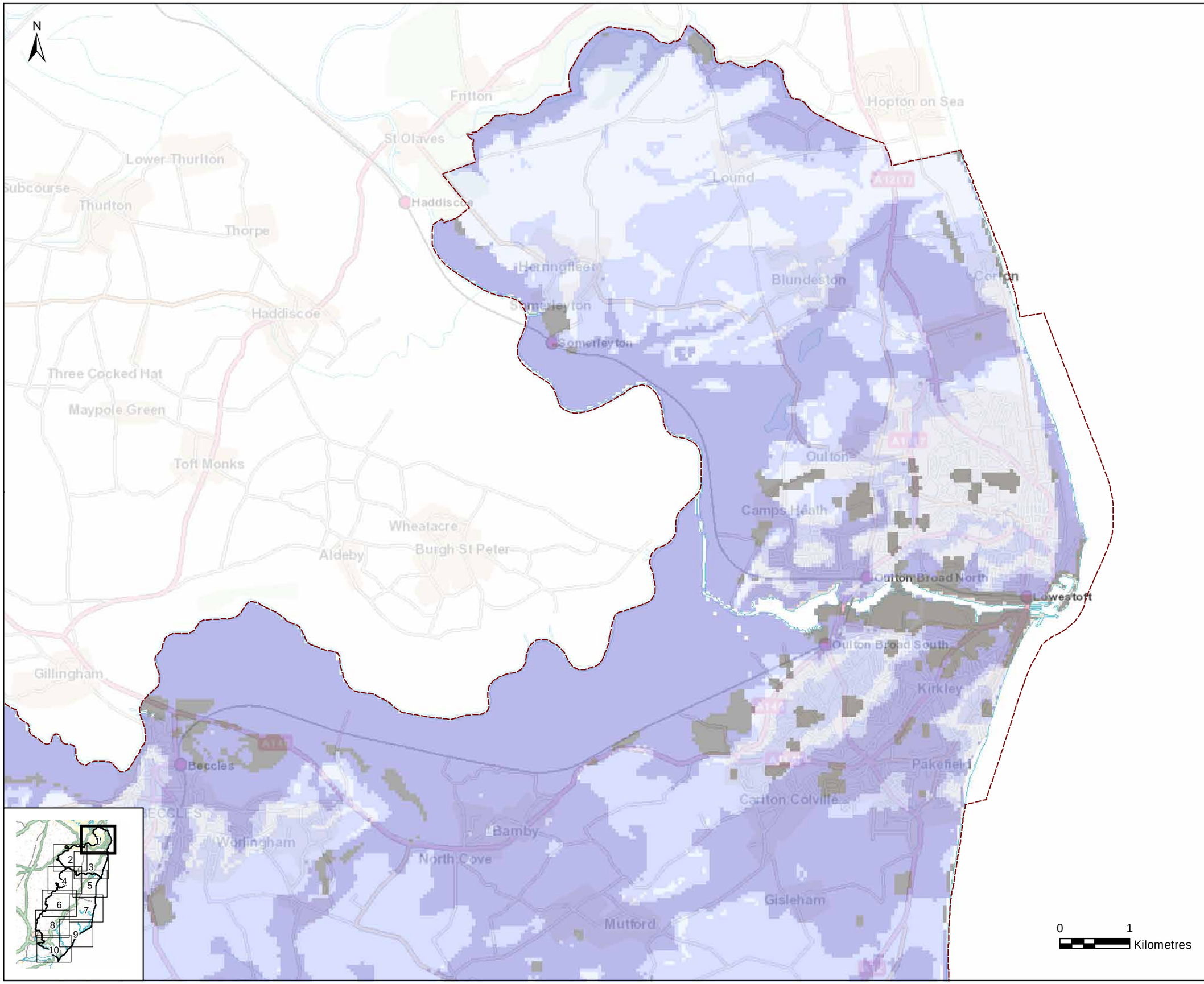

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BGS Infiltration SuDS Suitability Map (Summary)

- Highly compatible for infiltration SuDS
- Probably compatible for infiltration SuDS
- Opportunities for bespoke infiltration SuDS
- Very significant constraints are indicated

Notes

The 1:50,000 scale digital map data is generalised and the geological interpretation should be used only as a guide to the geology at a local level. Site-specific investigation is required to confirm infiltration suitability.

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Note added	LM / MD	23.11.17	2	
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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: INFILTRATION SUDS SUITABILITY SHEET 1 OF 10

Drawn	Checked	Approved	Date
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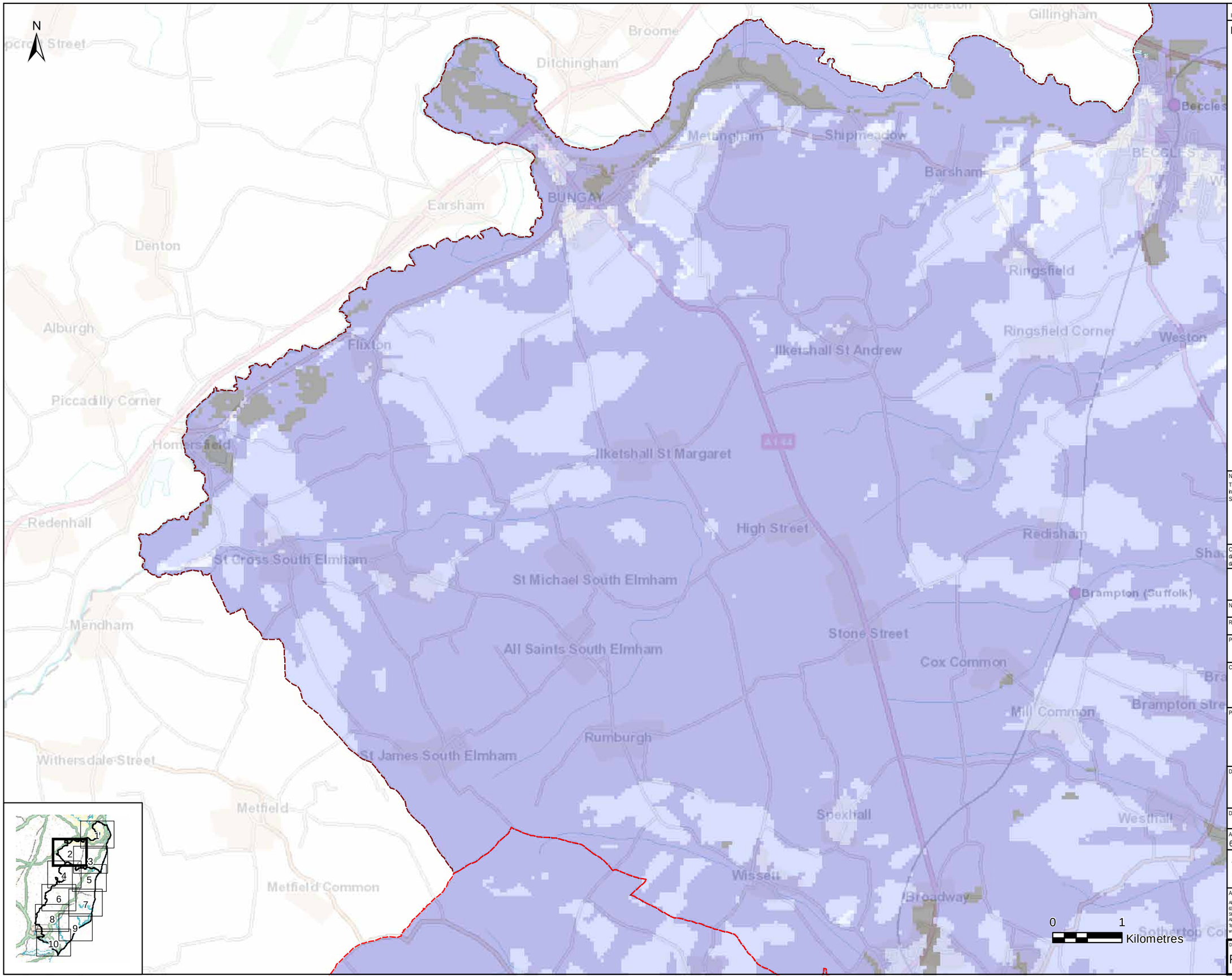
FIGURE 11.1	2



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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: INFILTRATION SUDS SUITABILITY SHEET 2 OF 10

Drawn	Checked	Approved	Date
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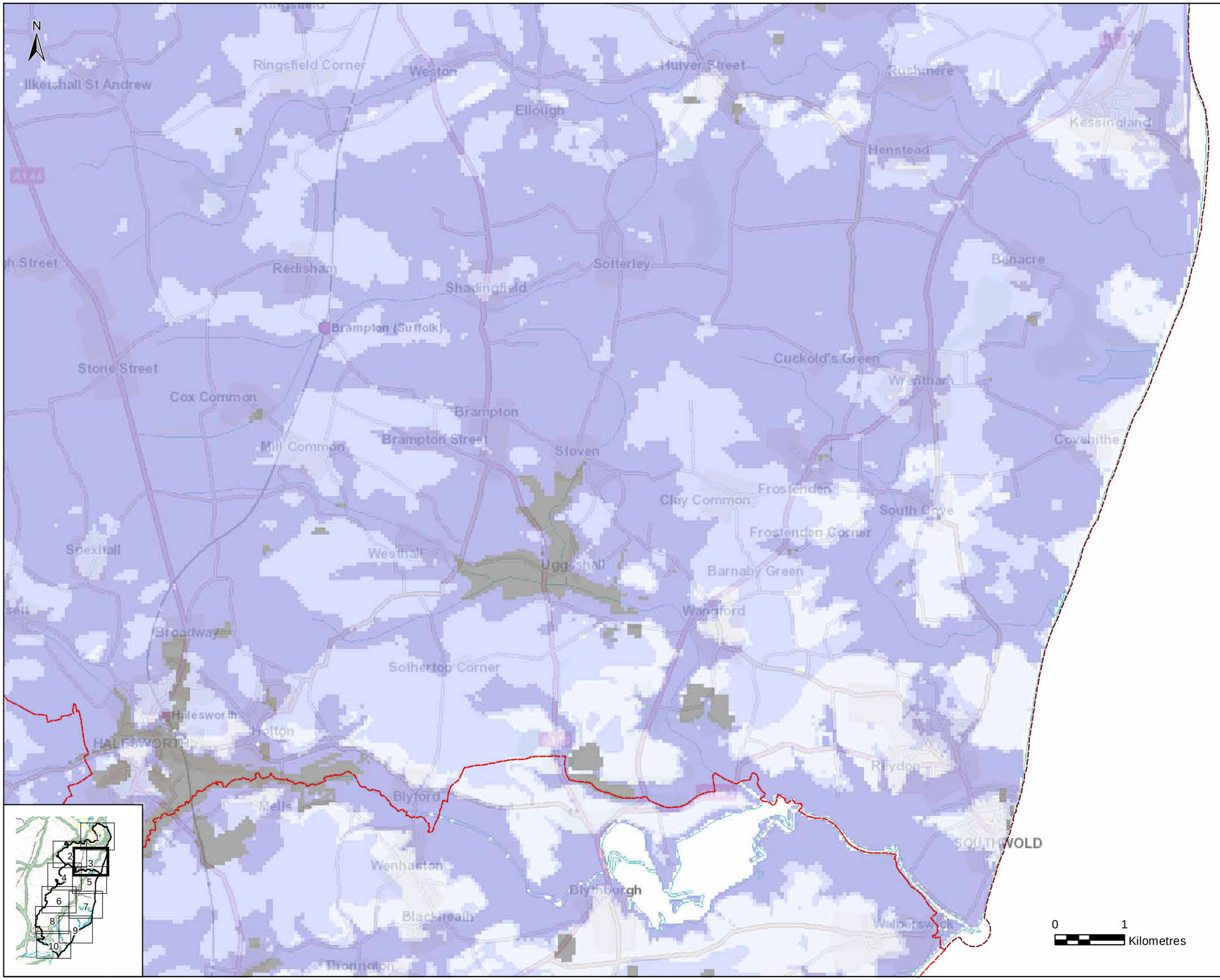
Rev.: 2



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

BGS Infiltration SuDS Suitability Map (Summary)

- Highly compatible for infiltration SuDS
- Probably compatible for infiltration SuDS
- Opportunities for bespoke infiltration SuDS
- Very significant constraints are indicated

Notes

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Note added	LM / MD	23.11.17	2	
Revision Details	By / Check	Check Date	Suffix	

Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: INFILTRATION SUDS SUITABILITY SHEET 3 OF 10

Drawn	Checked	Approved	Date
LM	MD	GP	23/11/2017

AECOM Internal Project No.: 60520248

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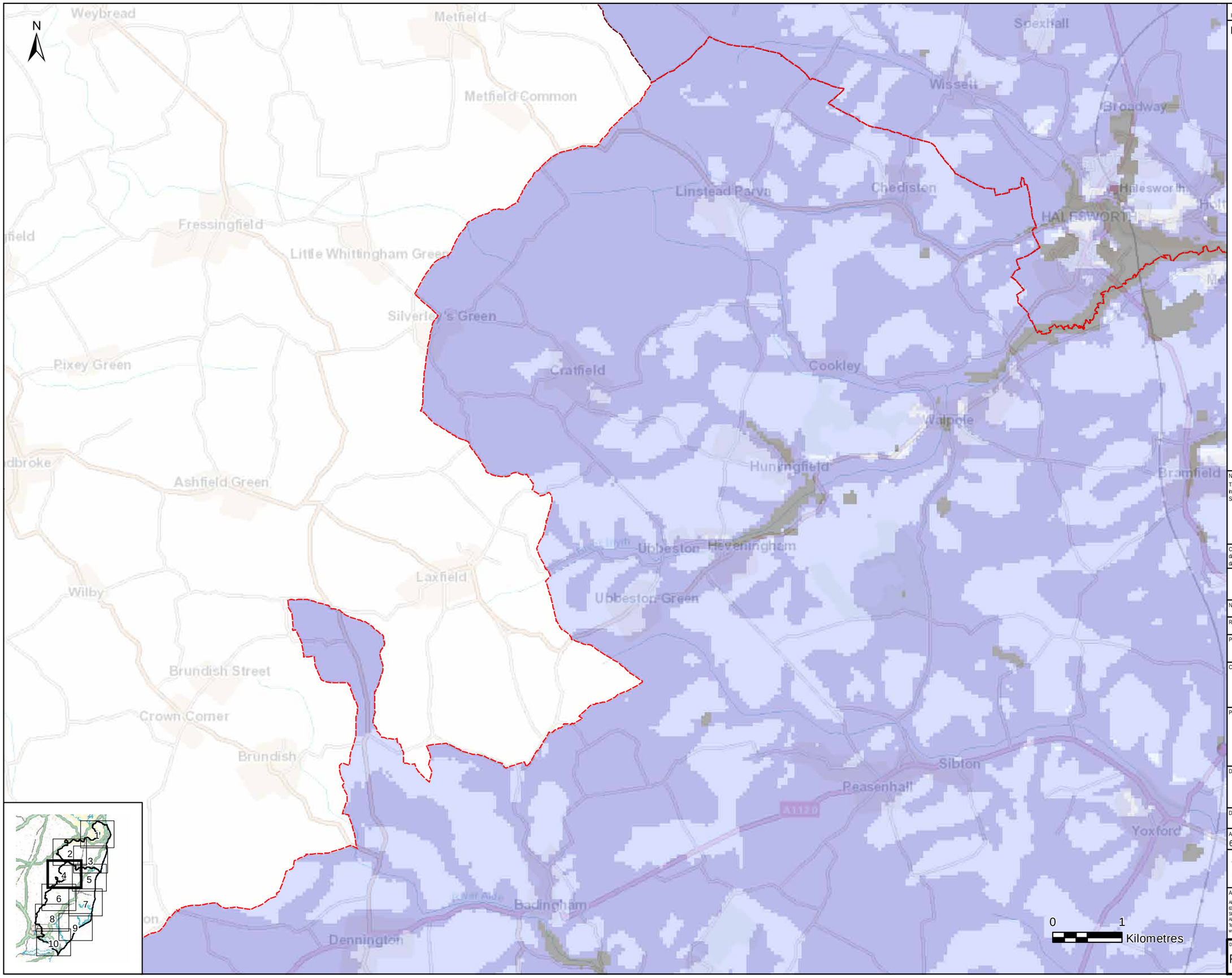

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
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Note added	LM / MD	23.11.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: INFILTRATION SUDS SUITABILITY SHEET 4 OF 10

Drawn	Checked	Approved	Date
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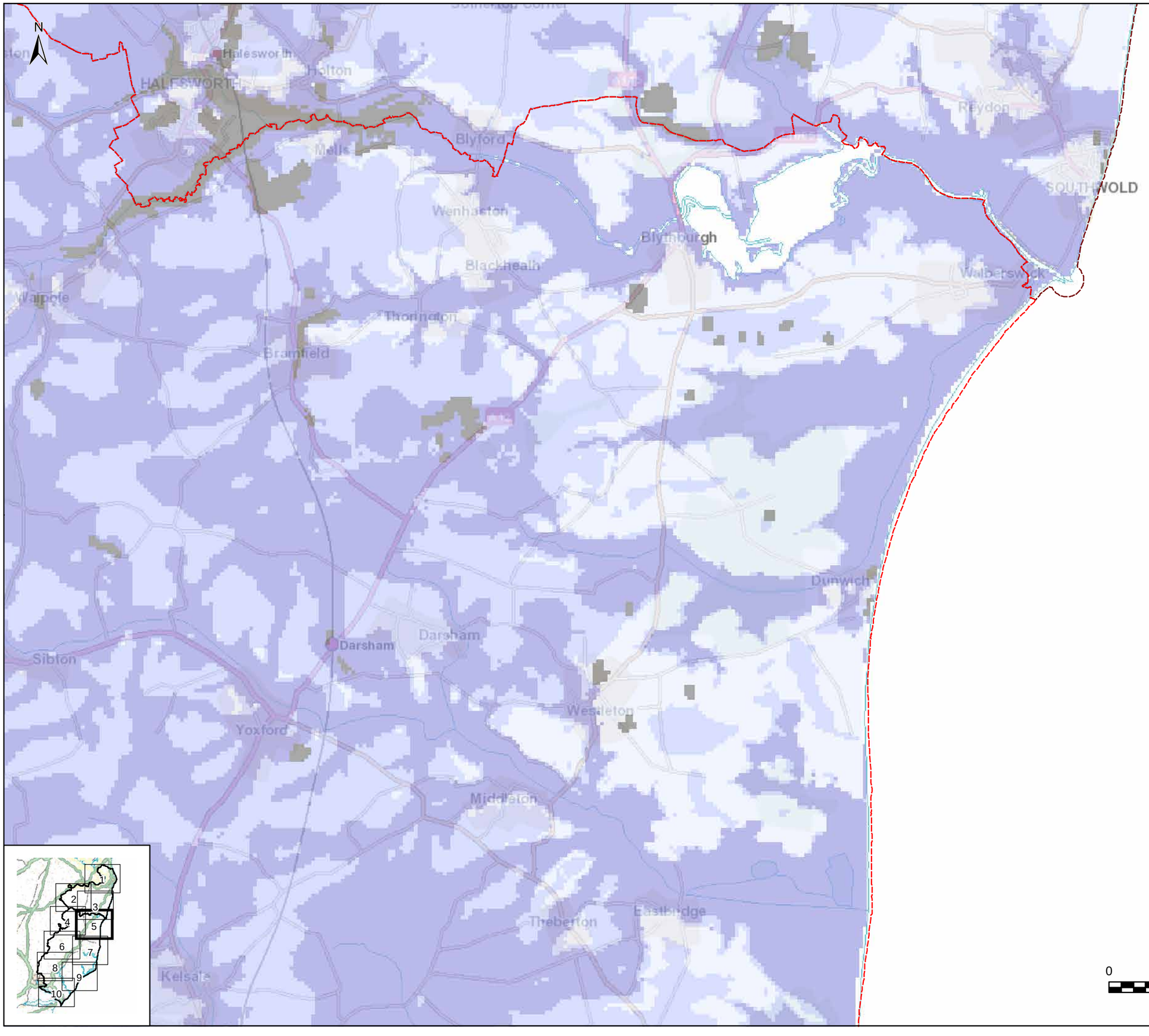
FIGURE 11.4	2



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

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Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: INFILTRATION SUDS SUITABILITY SHEET 5 OF 10

Drawn	Checked	Approved	Date
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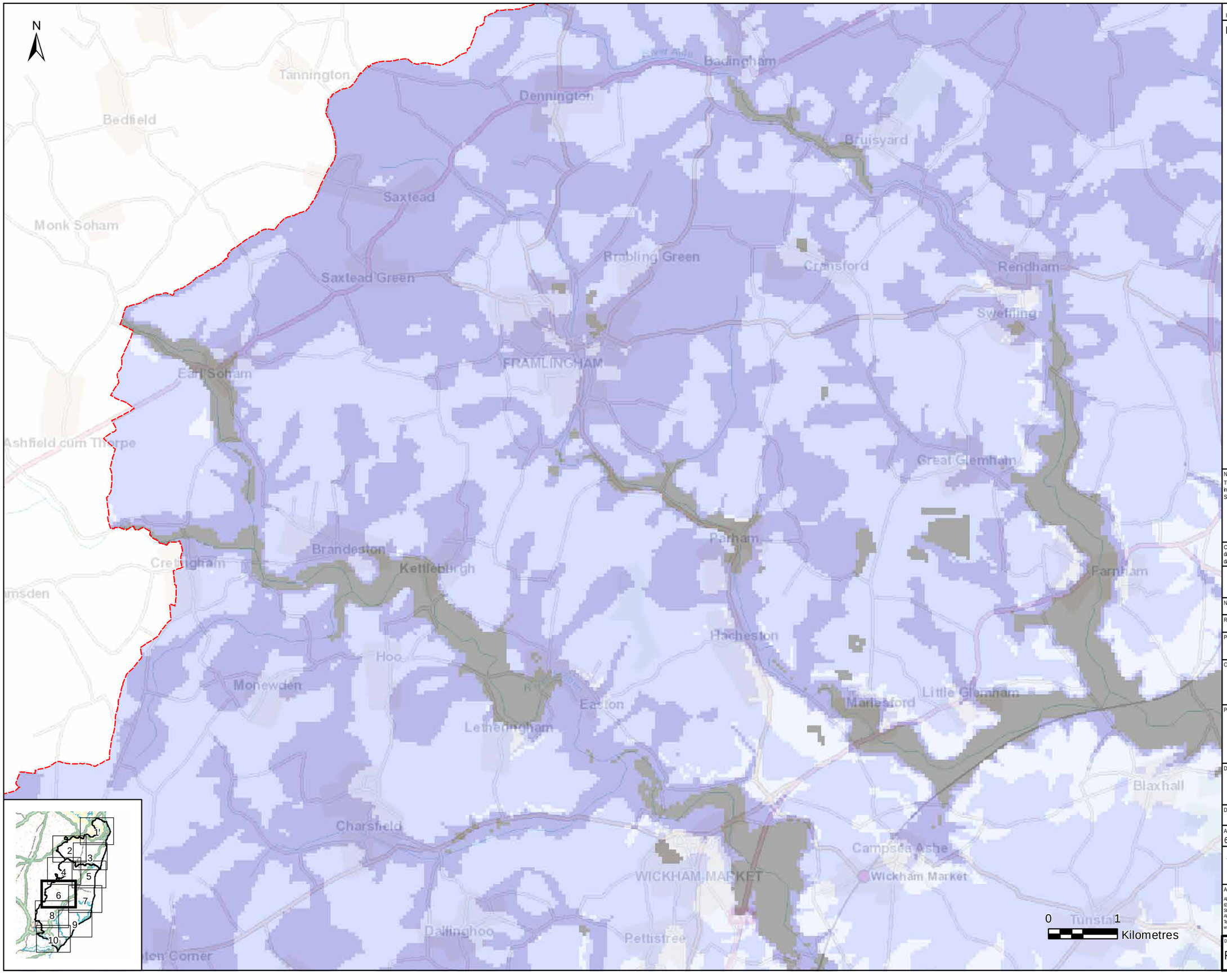

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LEGEND

- Suffolk Coastal District
- Waveney District
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- Ordinary Watercourse (Culverted)

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Note added	LM / MD	23.11.17	2

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Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: INFILTRATION SUDS SUITABILITY SHEET 6 OF 10

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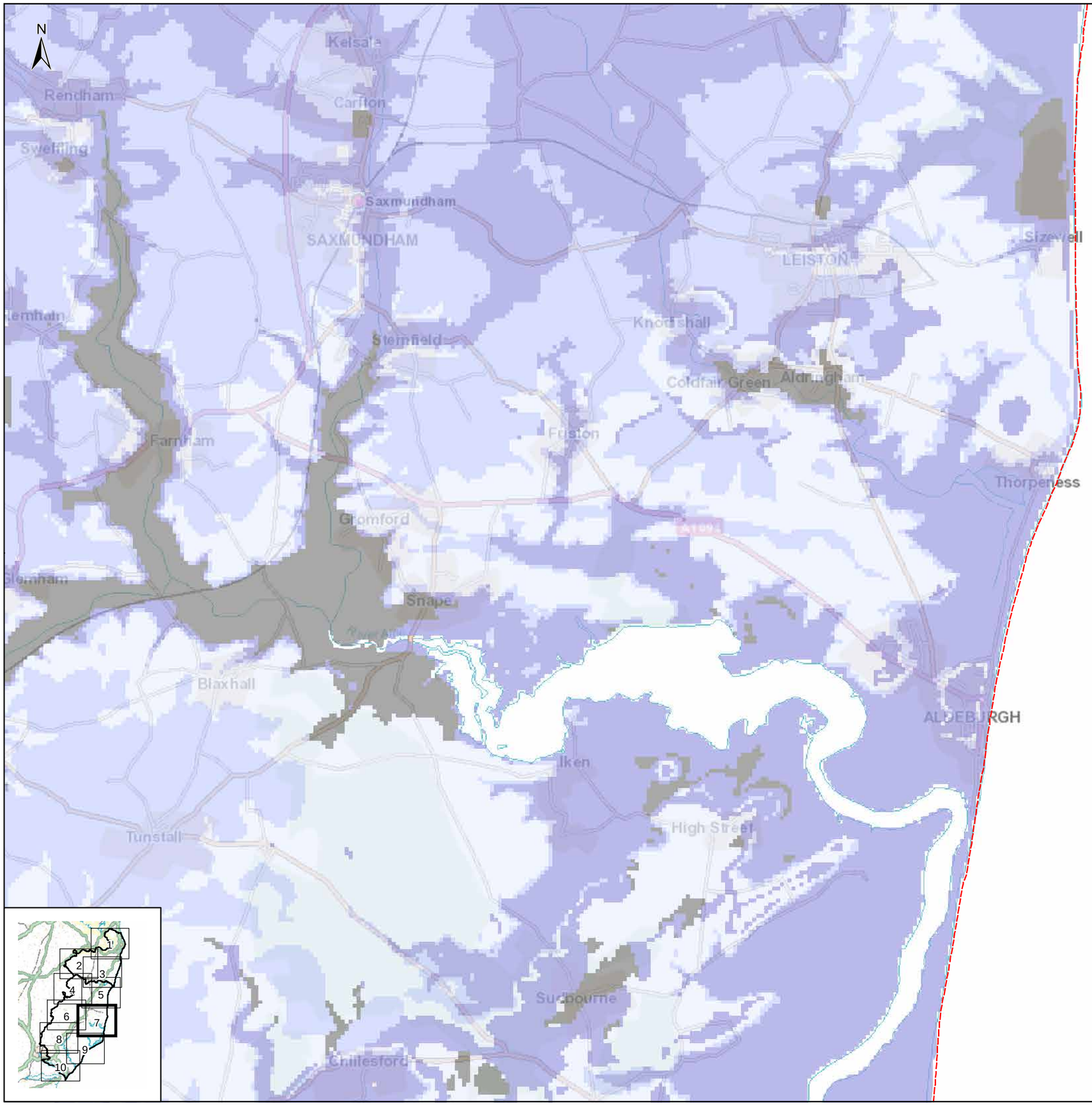
FIGURE 11.6	2



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LEGEND

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- Main River
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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: INFILTRATION SUDS SUITABILITY SHEET 7 OF 10

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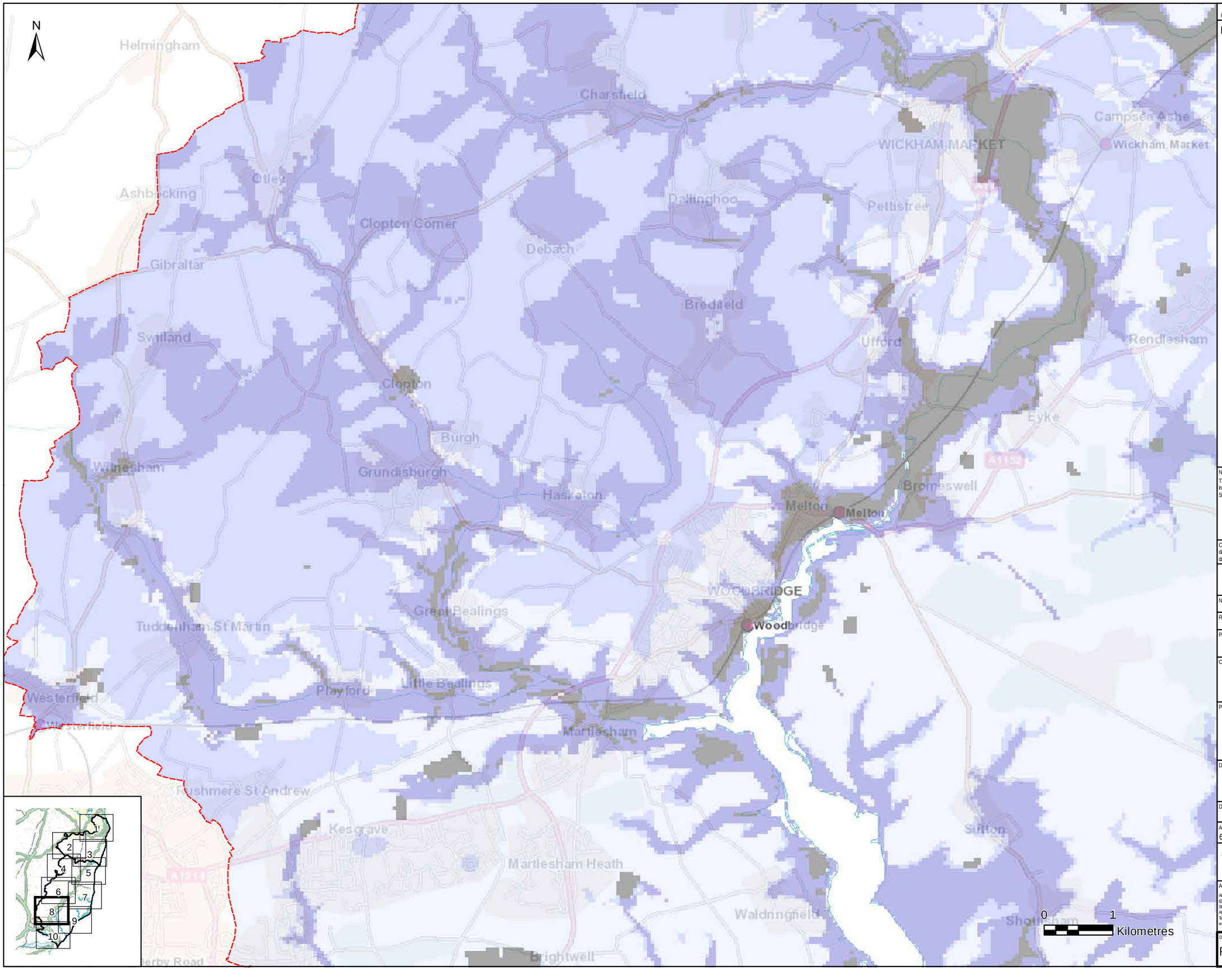
FIGURE 11.7	2



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LEGEND

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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: INFILTRATION SUDS SUITABILITY SHEET 8 OF 10

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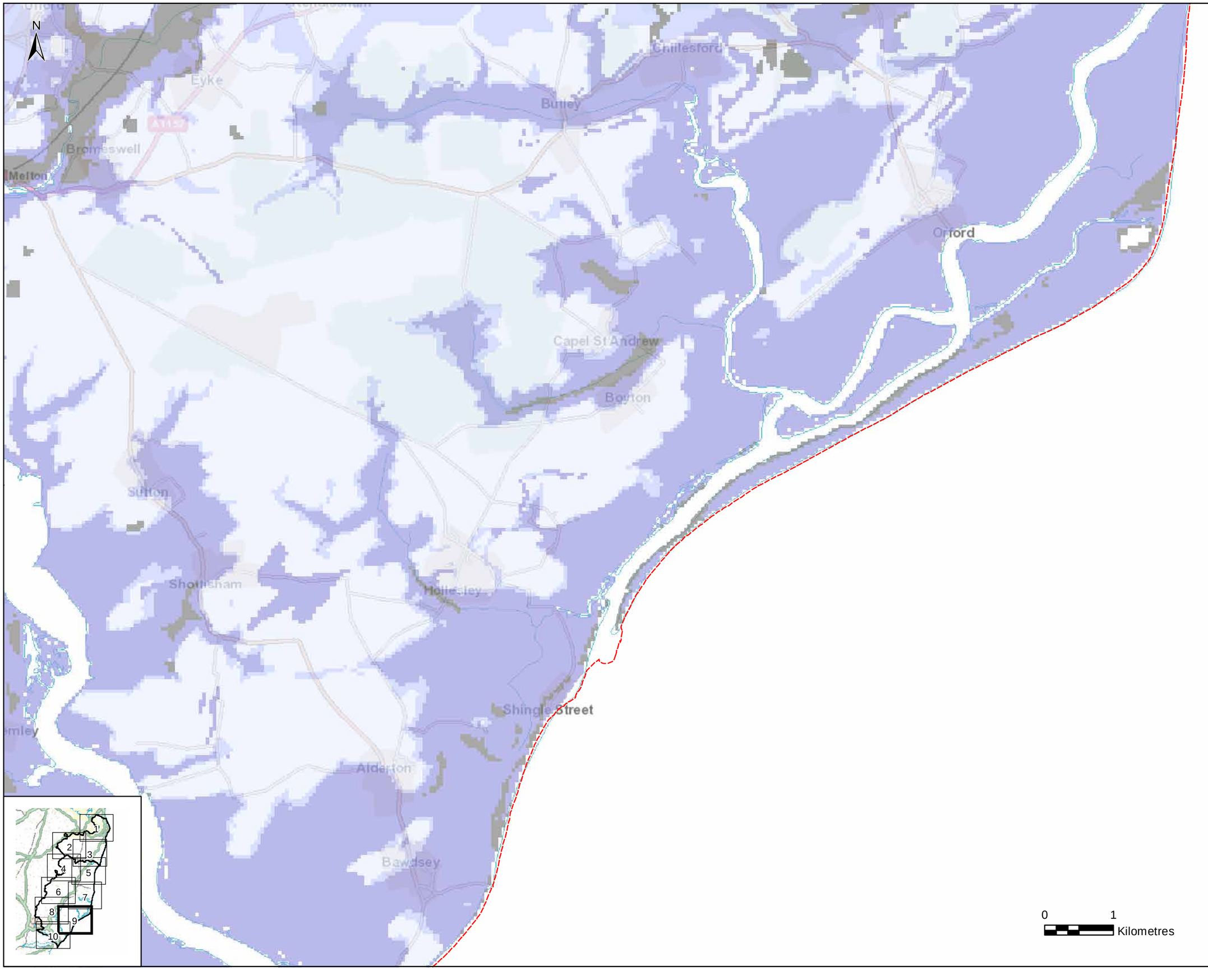
FIGURE 11.8	2



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LEGEND

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- Waveney District
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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: INFILTRATION SUDS SUITABILITY SHEET 9 OF 10

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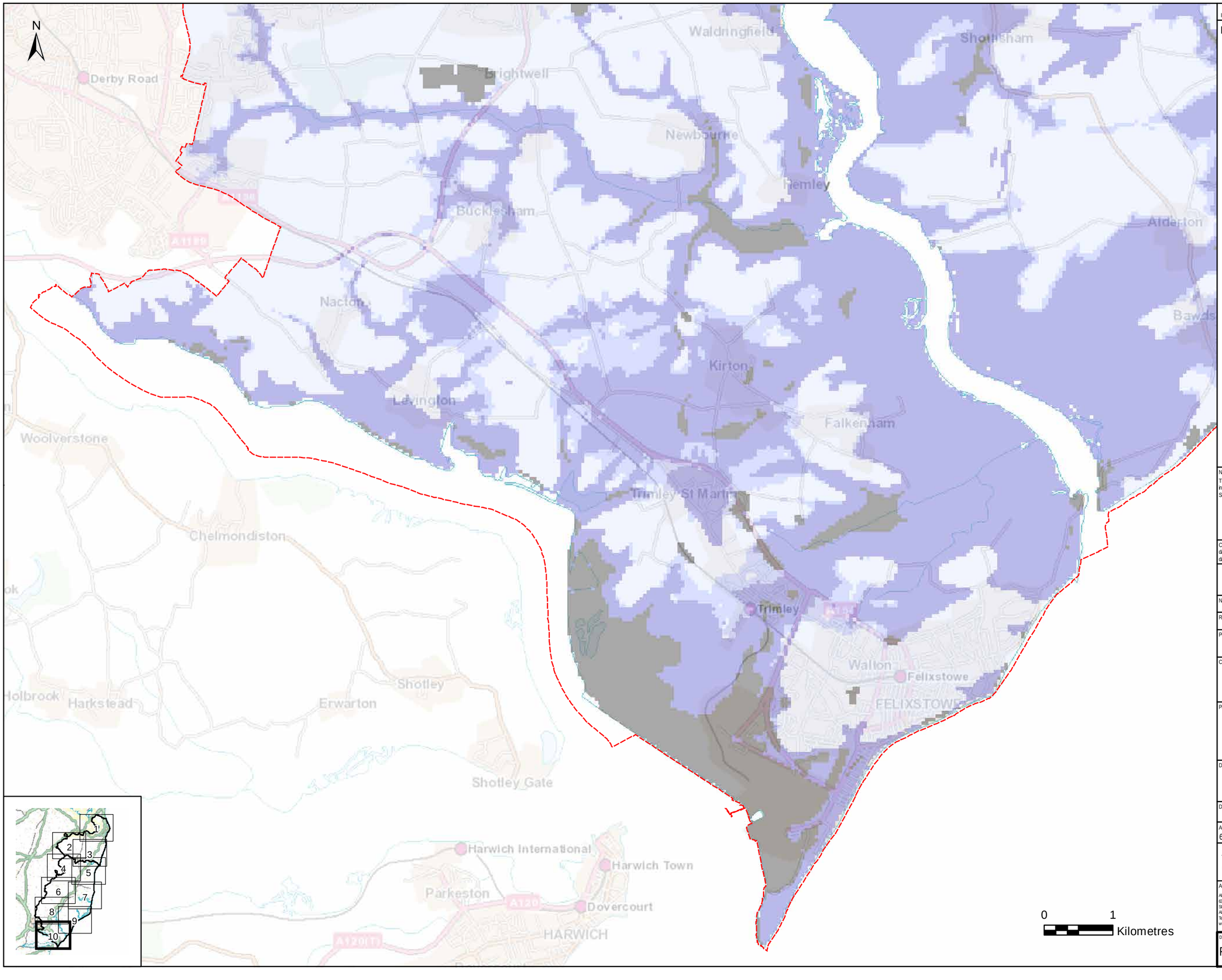
FIGURE 11.9	2



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
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BGS Infiltration SuDS Suitability Map (Summary)

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Note added	LM / MD	23.11.17	2
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Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: INFILTRATION SUDS SUITABILITY SHEET 10 OF 10

Drawn	Checked	Approved	Date
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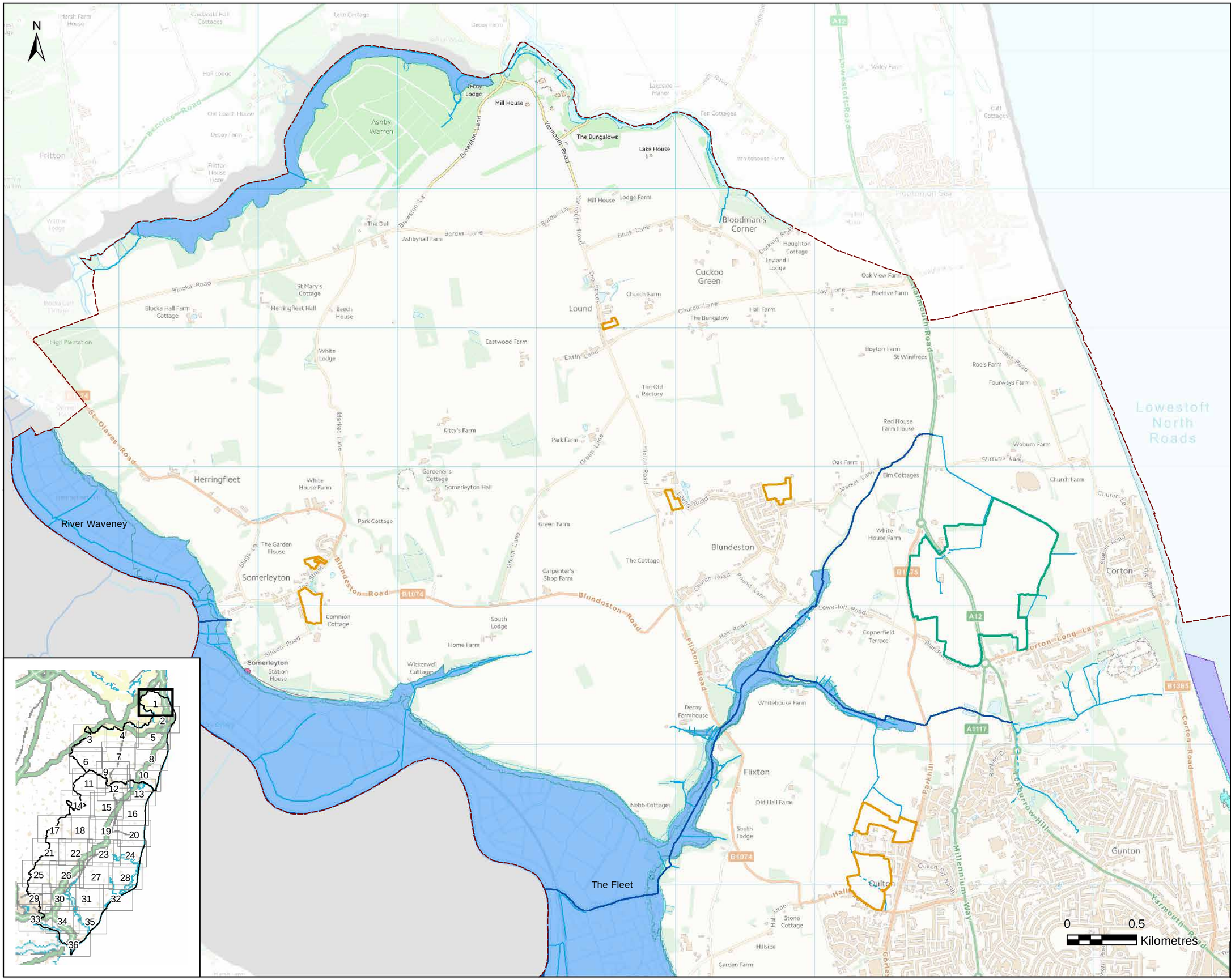

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Employment
- Mixed Use
- Proposed Destination Park
- Proposed Sports and Leisure
- Broads Local Plan Sites
- Retail and Leisure
- Power Park
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes
Only Local Plan allocations are shown on this Figure.

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Revision Details	By / Check	Check Date	Suffix
ABDs removed.	LM / MD	10.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
Note and sites added	LM / MD	06.12.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 1 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	10/04/2018

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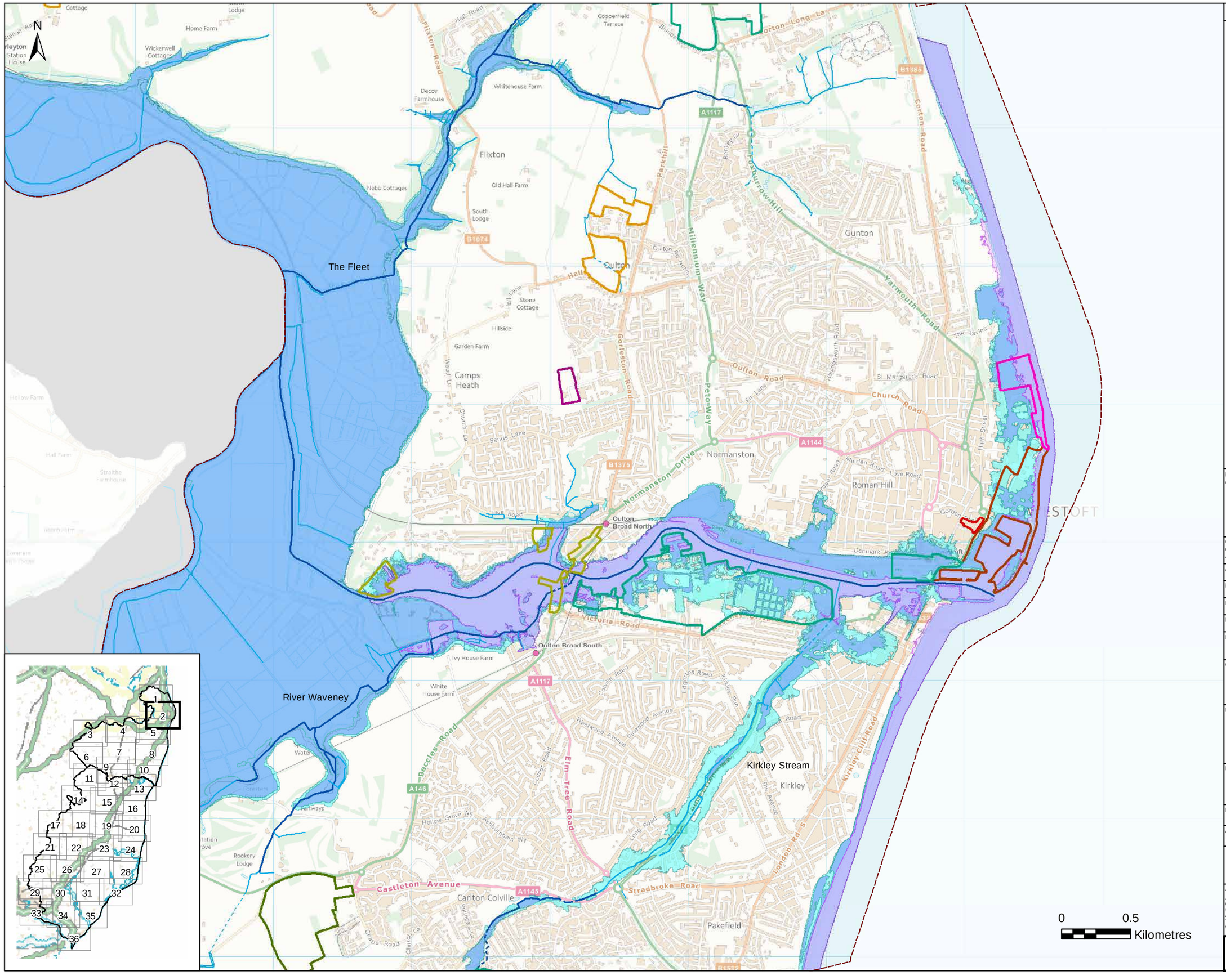

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LEGEND

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ABDs removed.	LM	MD	10.04.18	4
New River Deben model added.	LM	MD	12.01.18	3
Note and sites added	LM	MD	06.12.17	2
Revision Details	By	Check	Date	Suffix

Purpose of Issue
FINAL

Client
Waveney District Council
Serving the Community

Project Title
EAST SUFFOLK COUNCILS
STRATEGIC FLOOD
RISK ASSESSMENT

Drawing Title
PROPOSED DEVELOPMENT
SITE LOCATIONS
SHEET 2 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	10/04/2018

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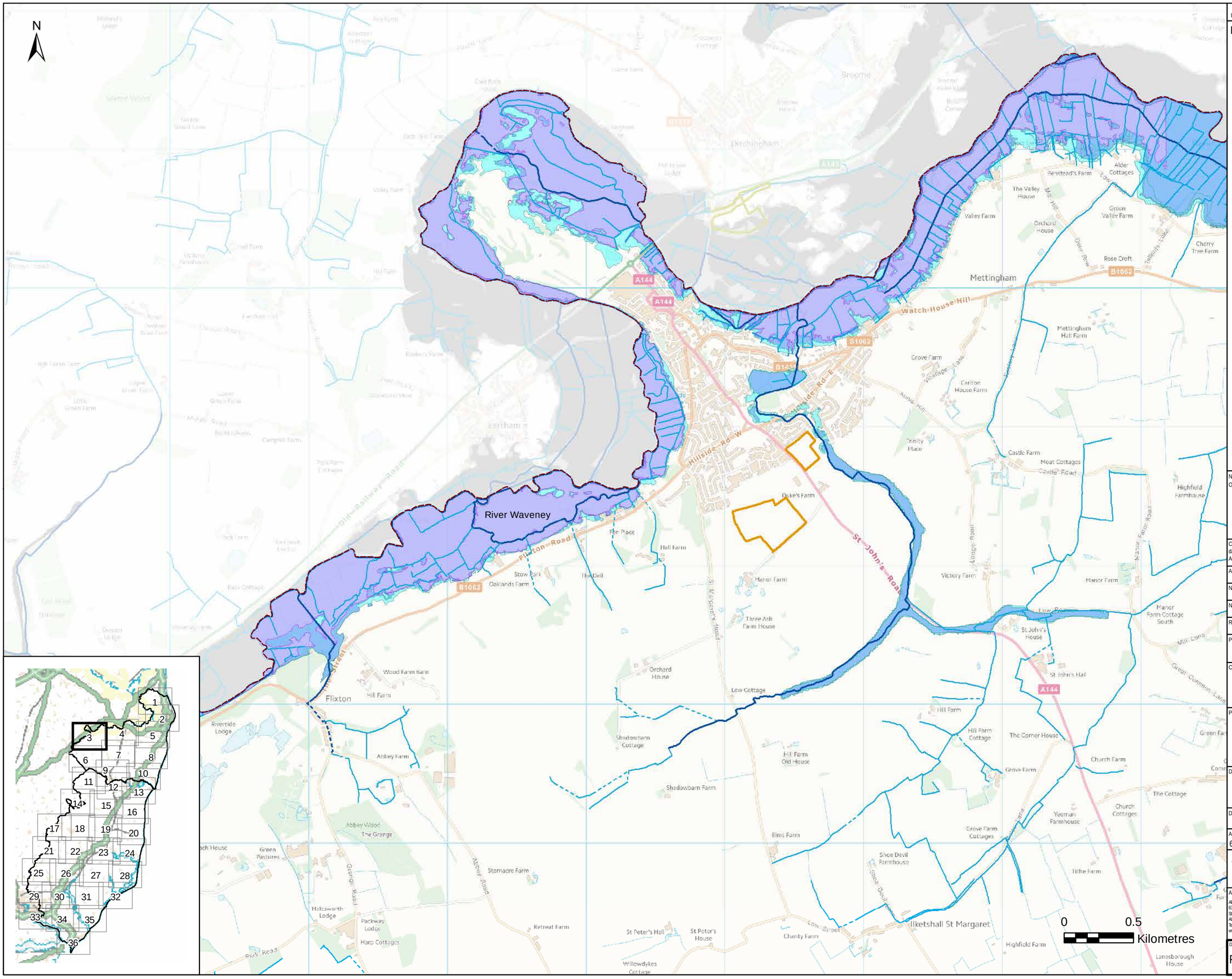
FIGURE 12.2	4



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Note and sites added	LM	MD	06.12.17	2
Revision Details	By	Check	Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 3 OF 36

Drawn	Checked	Approved	Date
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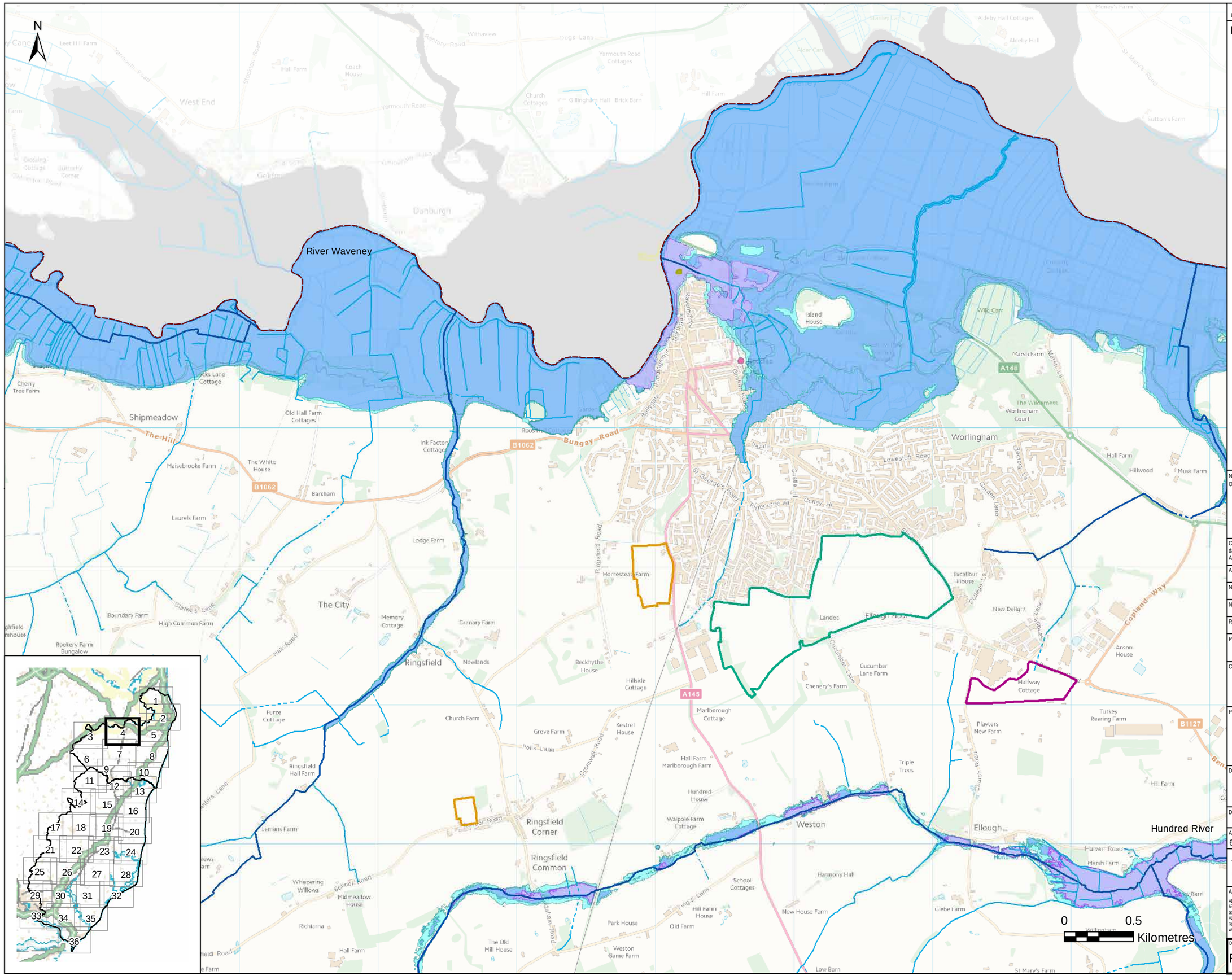
Rev.: 4



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Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 4 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	10/04/2018

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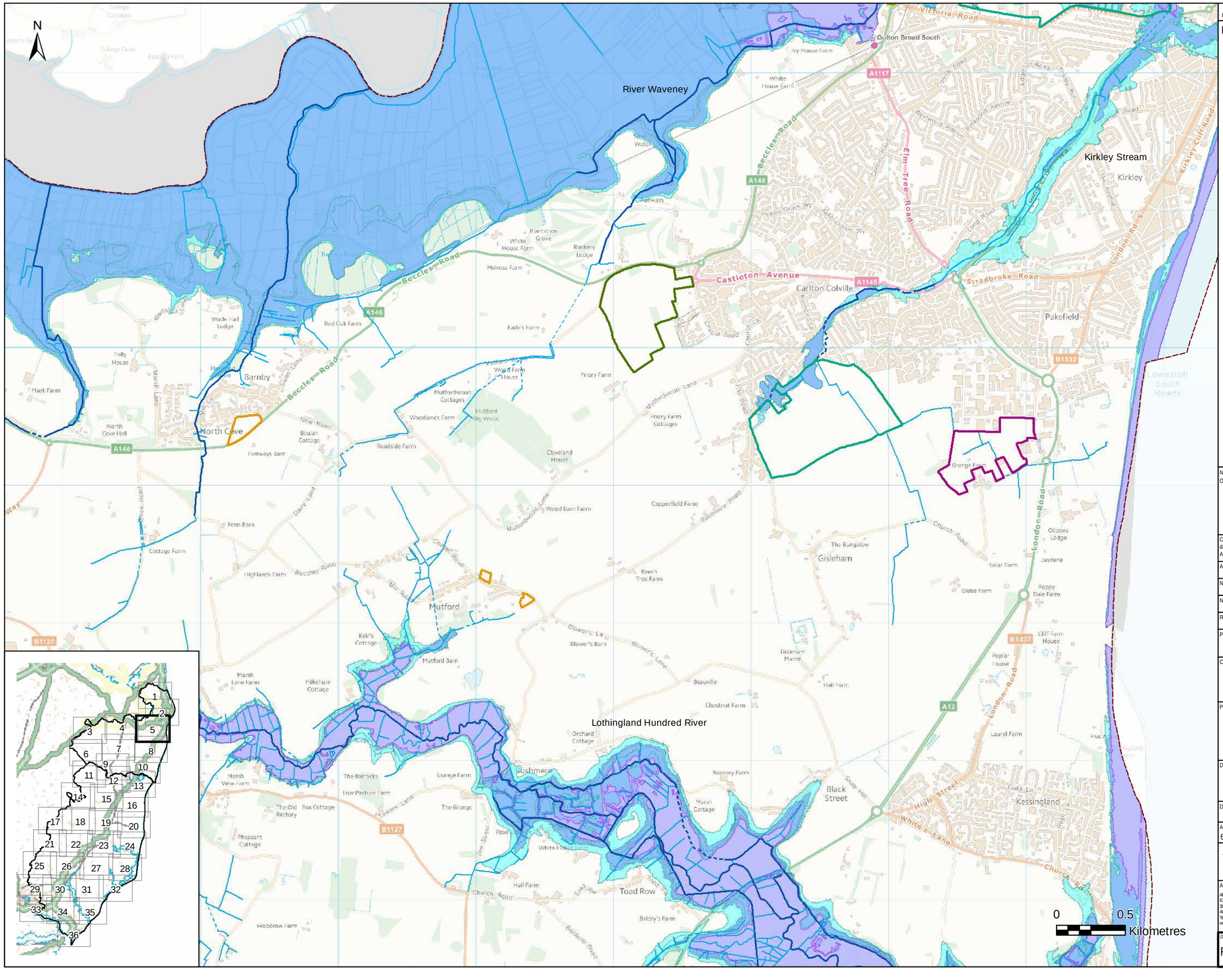

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Employment
- Mixed Use
- Proposed Destination Park
- Proposed Sports and Leisure
- Broads Local Plan Sites
- Retail and Leisure
- Power Park
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes
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ABDs removed.	LM / MD	10.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
Note and sites added	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 5 OF 36

Drawn	Checked	Approved	Date
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LEGEND

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- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Employment
- Mixed Use
- Proposed Destination Park
- Proposed Sports and Leisure
- Broads Local Plan Sites
- Retail and Leisure
- Power Park
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

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New River Deben model added.	LM / MD	12.01.18	3
Note and sites added	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue
FINAL

Client
Waveney District Council Serving the Community

Project Title
EAST SUFFOLK COUNCILS
STRATEGIC FLOOD
RISK ASSESSMENT

Drawing Title
PROPOSED DEVELOPMENT
SITE LOCATIONS
SHEET 6 OF 36

Drawn	Checked	Approved	Date
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FIGURE 12.6

Rev.
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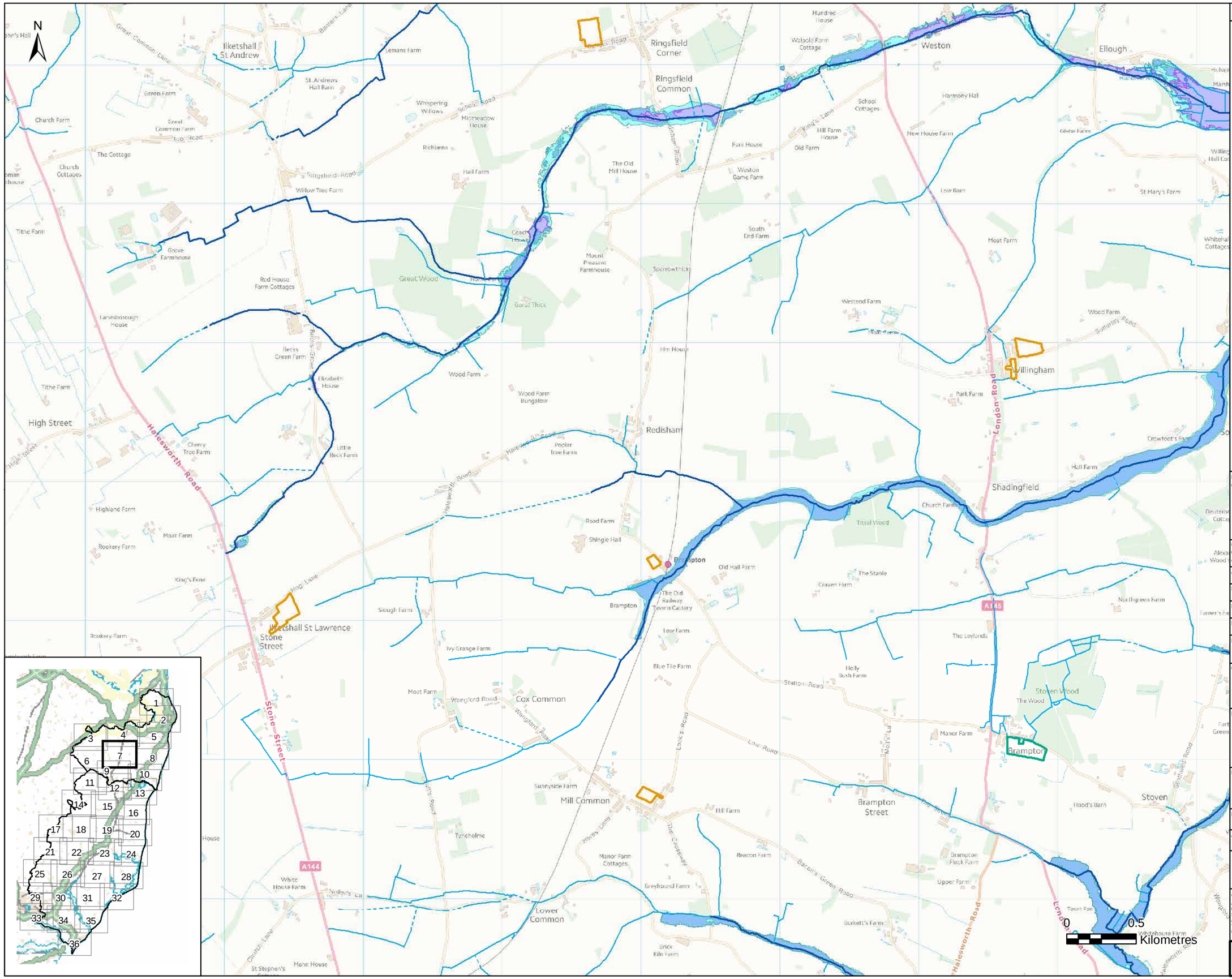

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Employment
- Mixed Use
- Proposed Destination Park
- Proposed Sports and Leisure
- Broads Local Plan Sites
- Retail and Leisure
- Power Park
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes
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Note and sites added	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 7 OF 36

Drawn	Checked	Approved	Date
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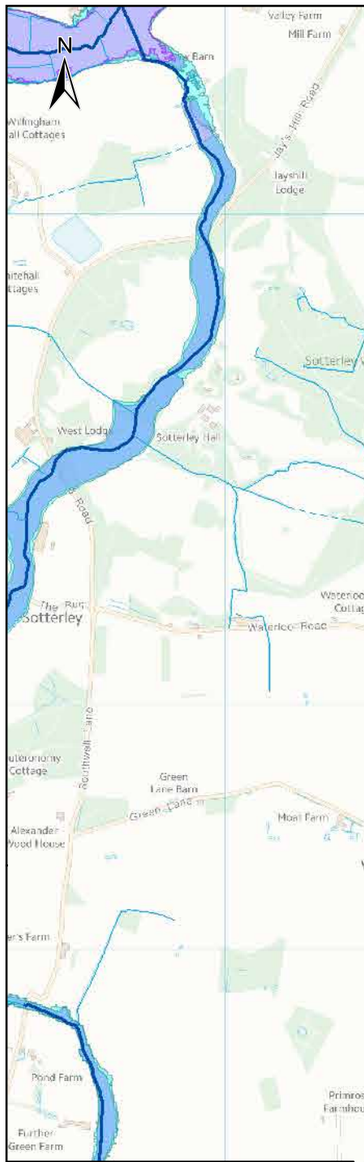

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Employment
- Mixed Use
- Proposed Destination Park
- Proposed Sports and Leisure
- Broads Local Plan Sites
- Retail and Leisure
- Power Park
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

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ABDs removed.	LM / MD	10.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
Note and sites added	LM / MD	06.12.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 8 OF 36

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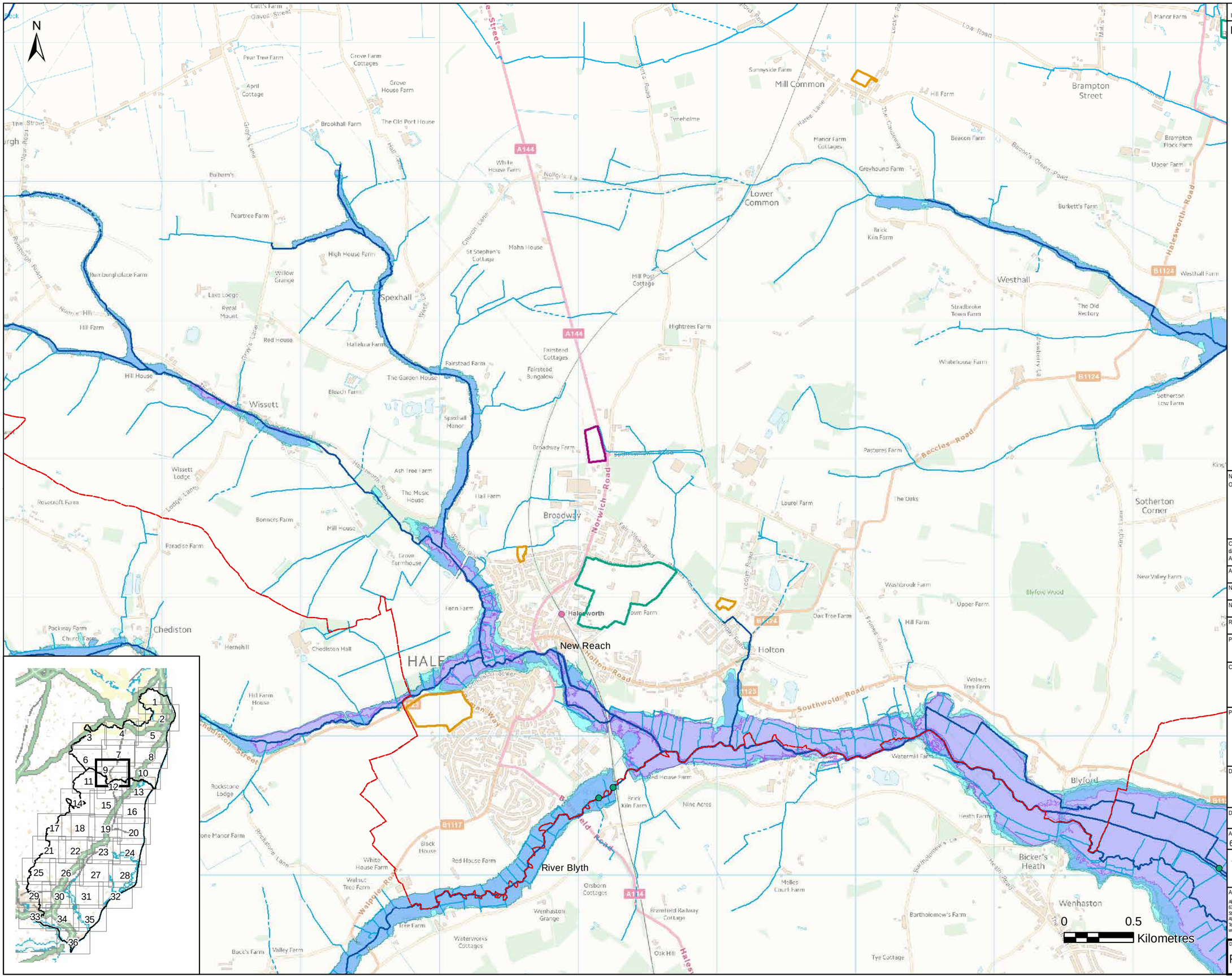

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Employment
- Mixed Use
- Proposed Destination Park
- Proposed Sports and Leisure
- Broads Local Plan Sites
- Retail and Leisure
- Power Park
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

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New River Deben model added.	LM	MD	12.01.18	3
Note and sites added	LM	MD	06.12.17	2
Revision Details	By	Check	Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 9 OF 36

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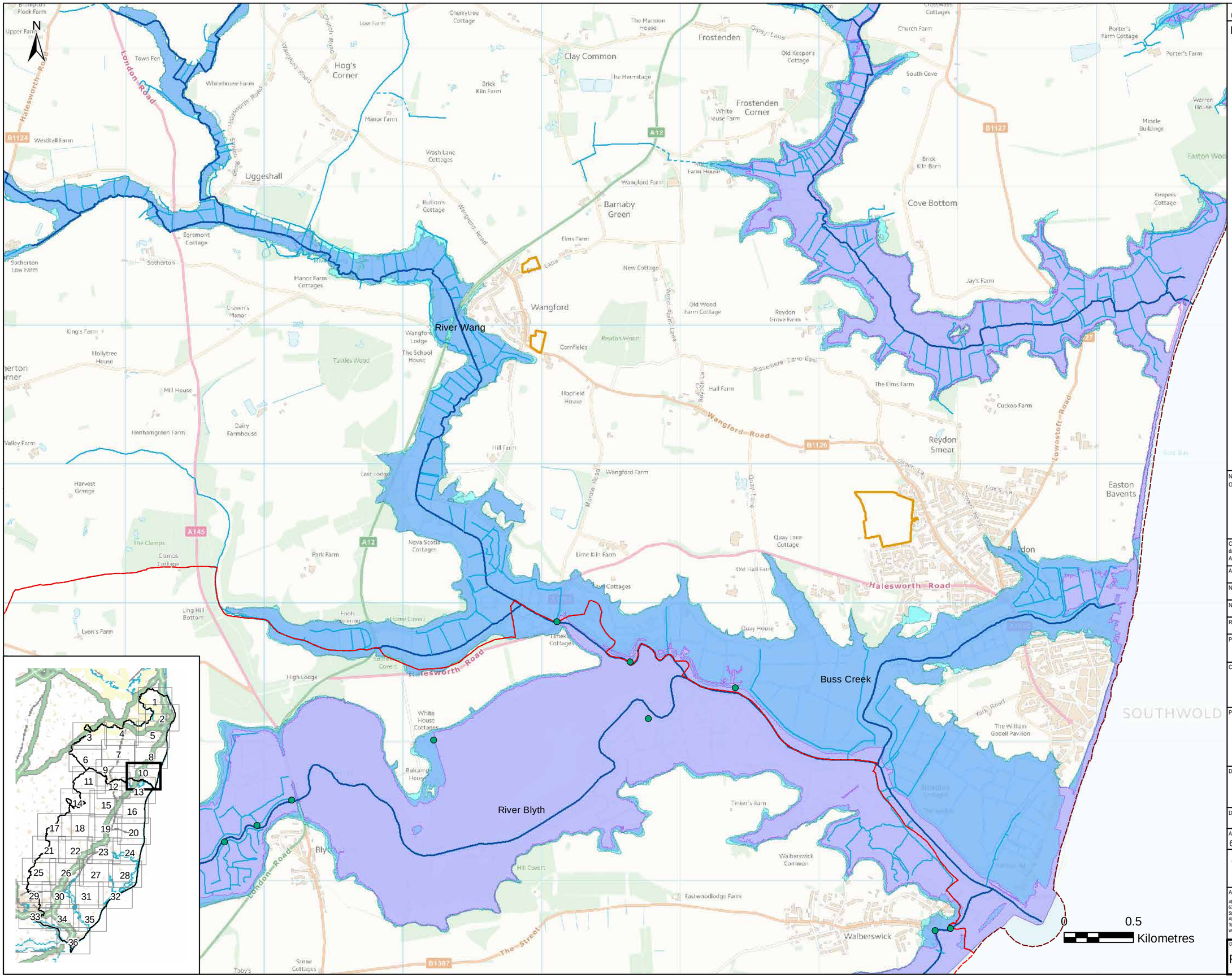

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Employment
- Mixed Use
- Proposed Destination Park
- Proposed Sports and Leisure
- Broads Local Plan Sites
- Retail and Leisure
- Power Park
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes
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ABDs removed.	LM	MD	10.04.18	4
New River Deben model added.	LM	MD	12.01.18	3
Note and sites added	LM	MD	06.12.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 10 OF 36

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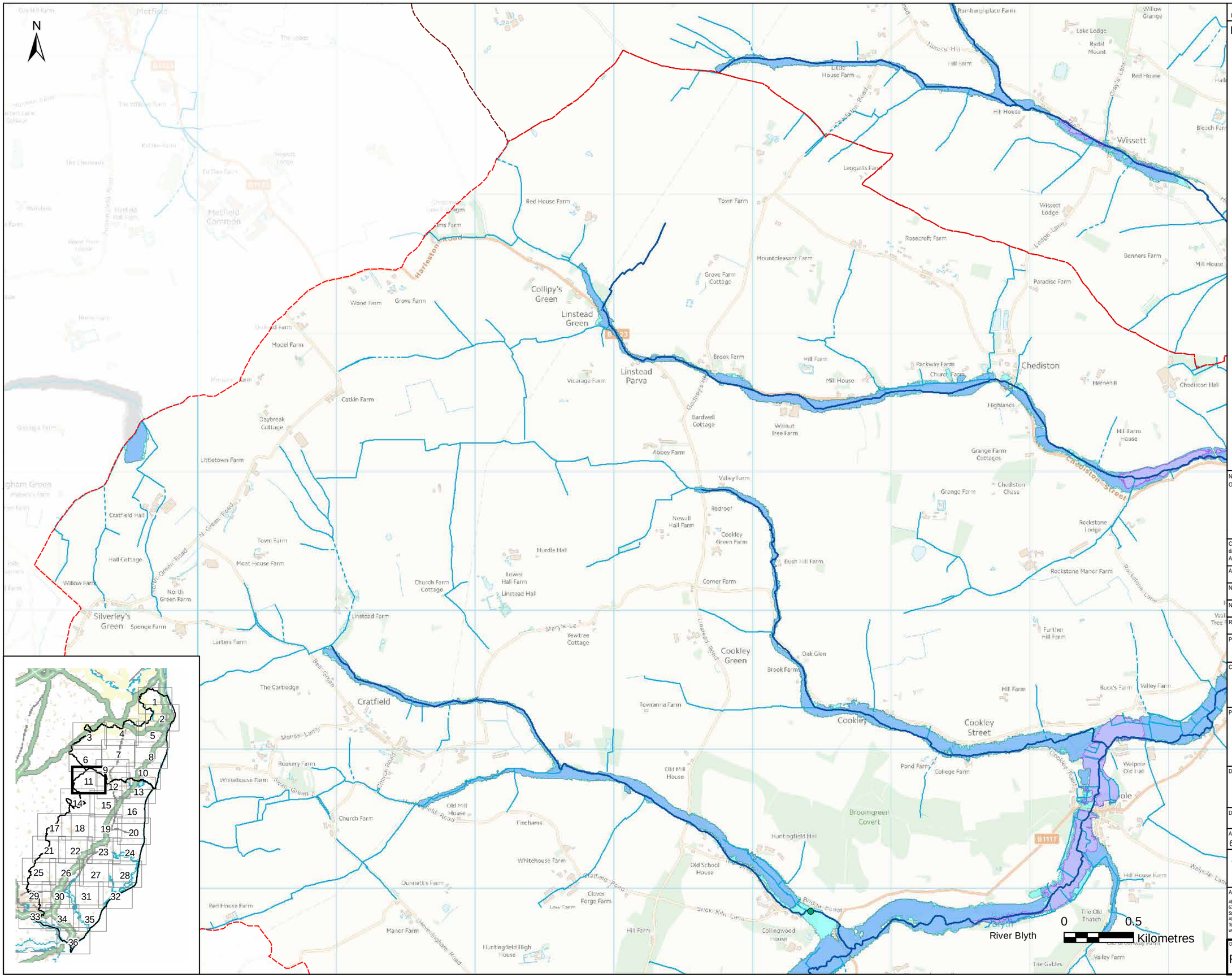

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

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New River Deben model added.	LM	MD	12.01.18	3
Note and sites added	LM	MD	06.12.17	2
Revision Details				

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 11 OF 36

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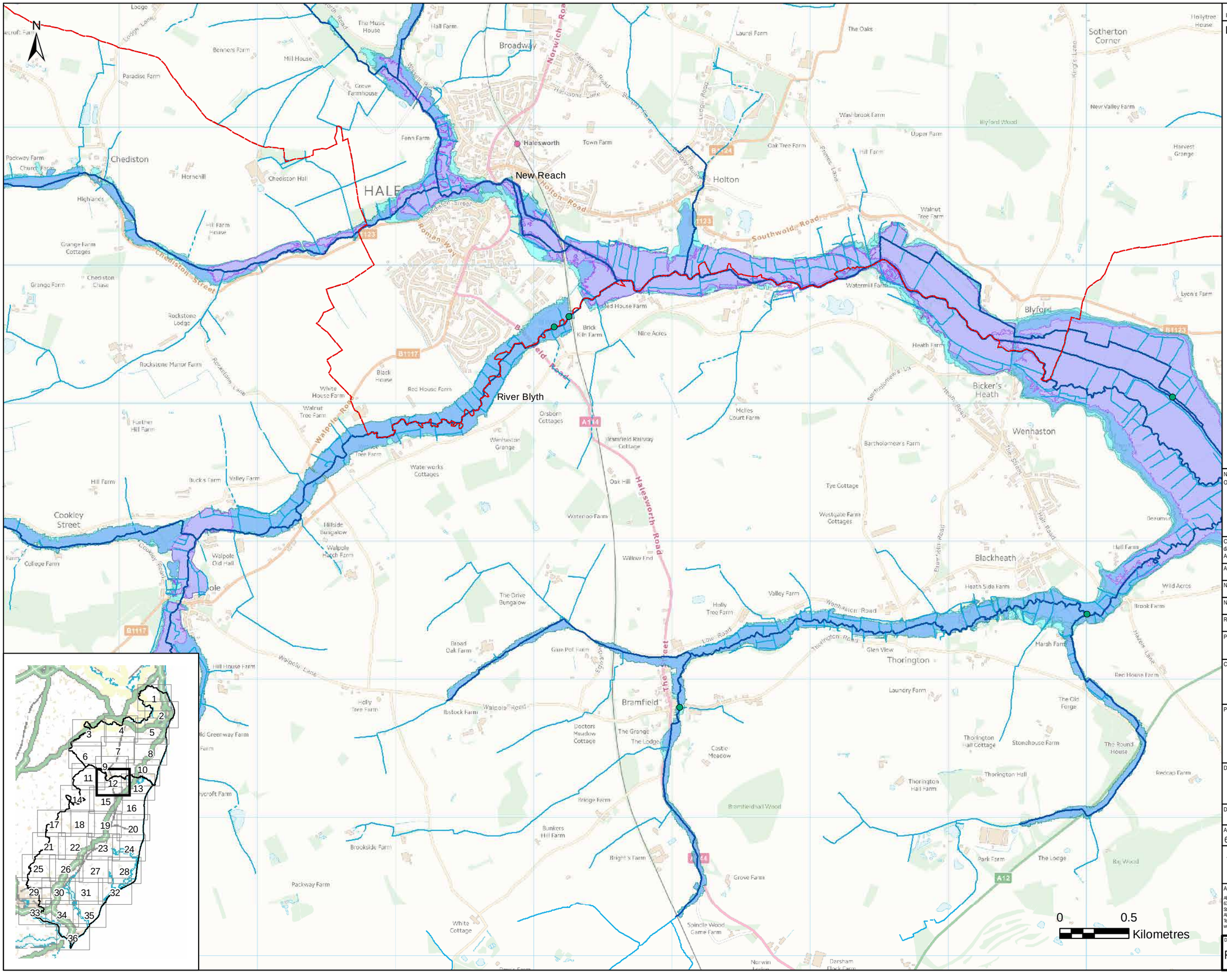

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes
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ABDs removed.	LM	MD	10.04.18	4
New River Deben model added.	LM	MD	12.01.18	3
Note and sites added	LM	MD	06.12.17	2
Revision Details	By	Check	Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council, Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 12 OF 36

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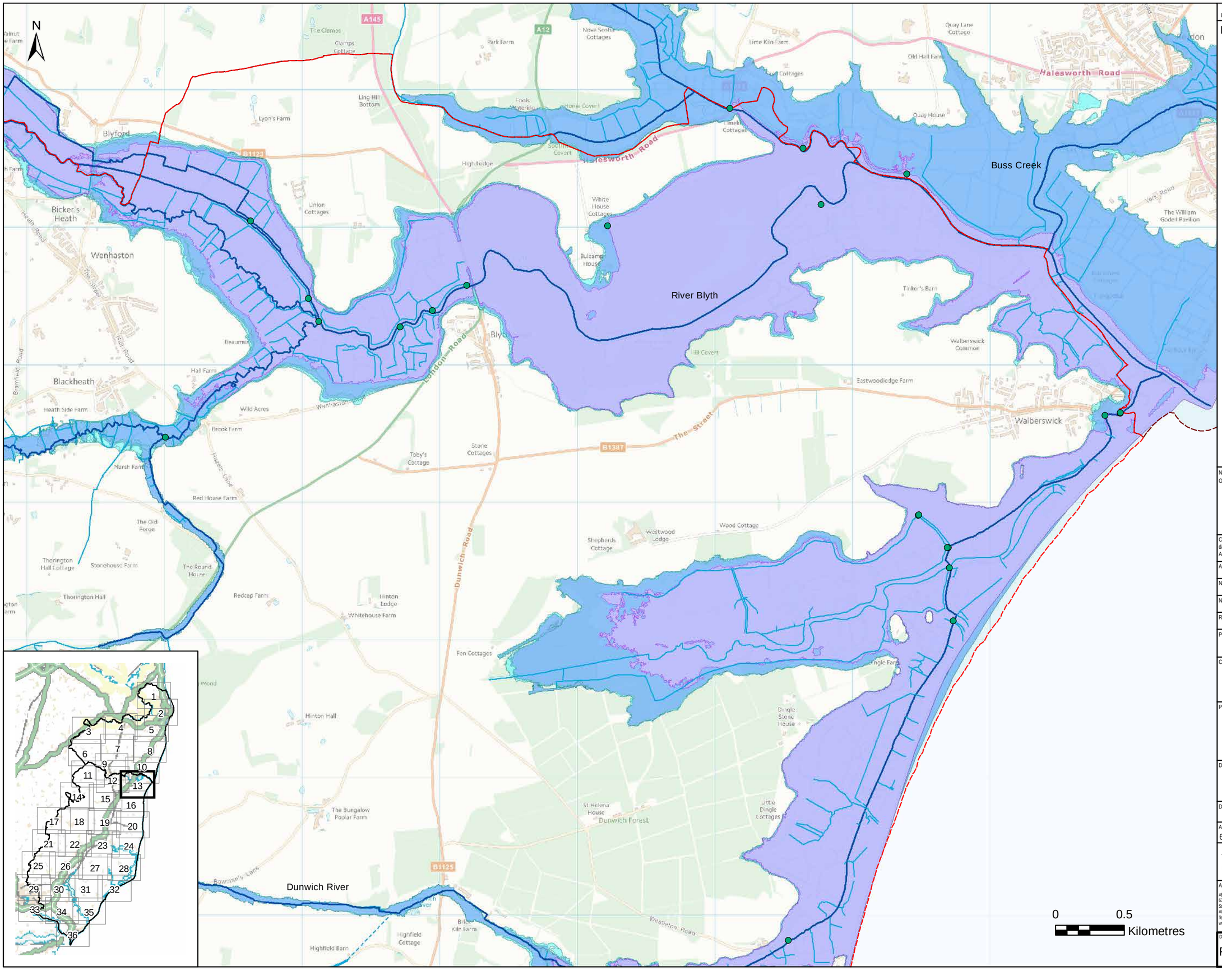

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes
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ABDs removed.	LM / MD	10.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
Note and sites added	LM / MD	06.12.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 13 OF 36

Drawn	Checked	Approved	Date
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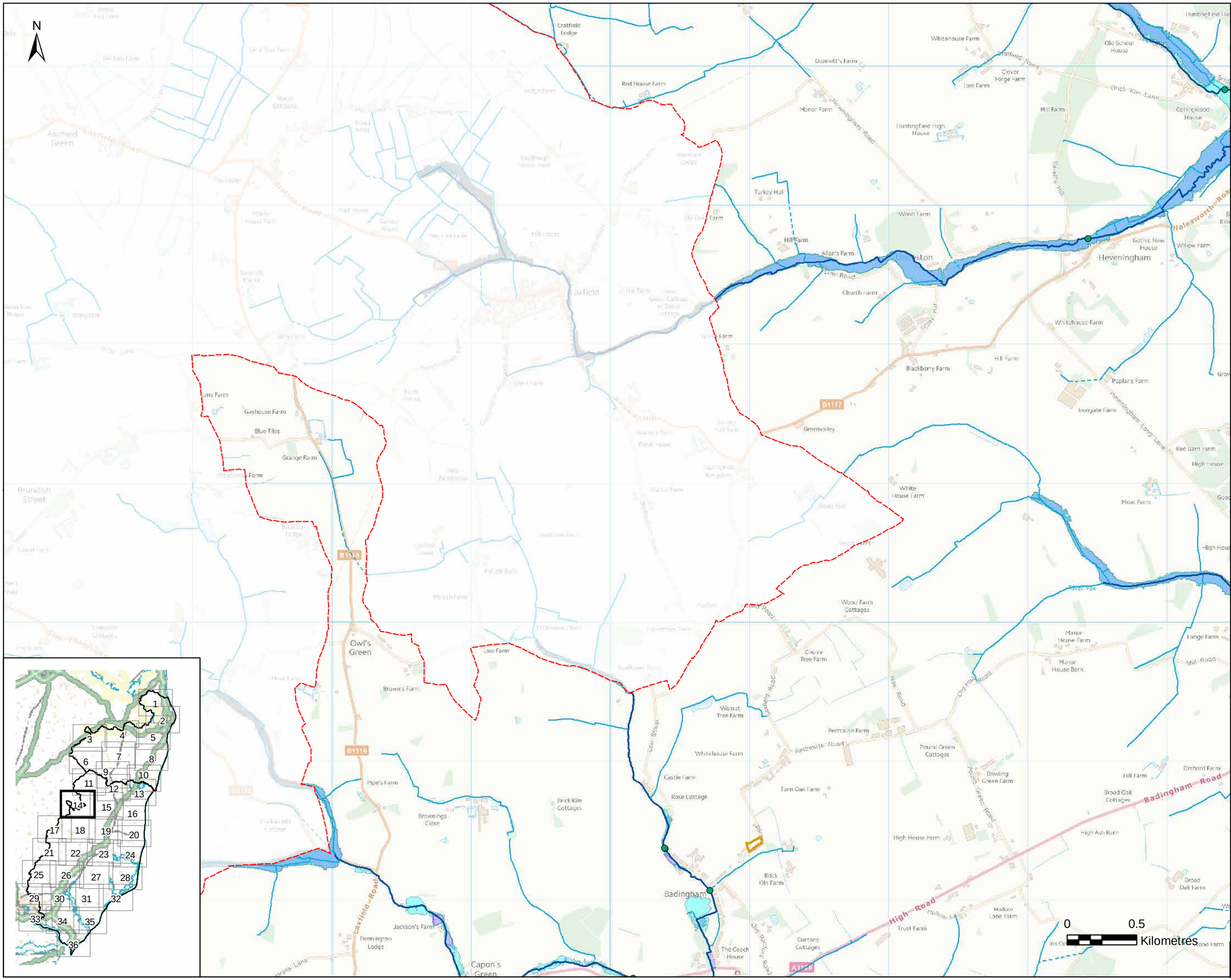
Rev.: 4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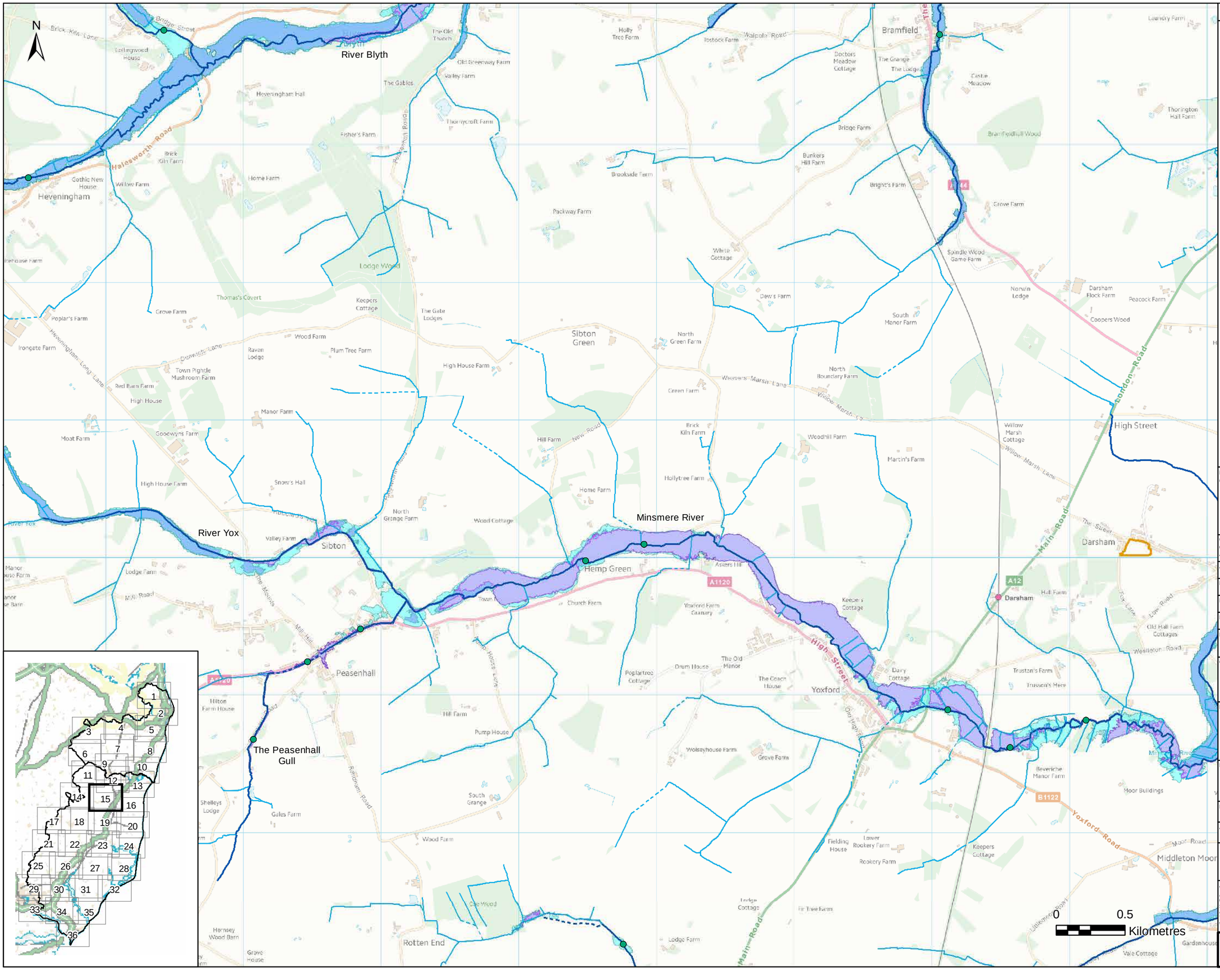
Cratfield Lodge
Red House Farm
Dunnett's Farm
Whitehouse Farm
Clover Forge Farm
Low Farm
Old School House
Cratfield Road
Brick Kiln Lane
Collingwood House
Hill Farm
Manor Farm
Heveningham Road
Huntingfield High House
Aldringham Road
Turkey Hall
Wood Farm
Allan's Farm
Linstead Road
Church Farm
Gothic New House
Willow Farm
Heveningham
Halesworth Road
Whitehouse Farm
Blackberry Farm
Poplars Farm
Irongate Farm
Heveningham Long Lane
B1117
Greenvalley
Red Barn Farm
High House
White House Farm
Moat Farm
Wood Farm Cottages
Cherry Tree Farm
Manor House Farm
Manor House Barn
Lodge Farm
Mill Road
Walnut Tree Farm
Redhouse Farm
Redhouse Road
Pound Green Cottages
Bowling Green Farm
Orchard Farm
Hill Farm
Broad Oak Cottages
Badingham Road
Whitehouse Farm
Castle Farm
Rose Cottage
Twin Oak Farm
High House Farm
High Ash Barn
Brick Kiln Farm
Badingham
High Road
Hollow Lane Farm
Broad Oak Farm
Trust Farm
Cortons Cottages
The Coach House
Old Rectory Road
Capon's Green
Jackson's Farm
Dennington Lodge
Brownings Close
Brick Kiln Cottages
Pipe's Farm
Owl's Green
Brown's Farm
Low Farm
Lodge Farm
Potsells Farm
Woodhouse Farm
Gayhouse Farm
Blue Tiles
Grange Farm
Aldringham Lodge
Brundish Street
Aldringham Lodge
Aldringham Lodge
Aldringham Lodge



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes
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Note and sites added	LM	MD	06.12.17	2
Revision Details				

Purpose of Issue
FINAL

Client
Waveney District Council Serving the Community

Project Title
EAST SUFFOLK COUNCILS
STRATEGIC FLOOD
RISK ASSESSMENT

Drawing Title
PROPOSED DEVELOPMENT
SITE LOCATIONS
SHEET 15 OF 36

Drawn	Checked	Approved	Date
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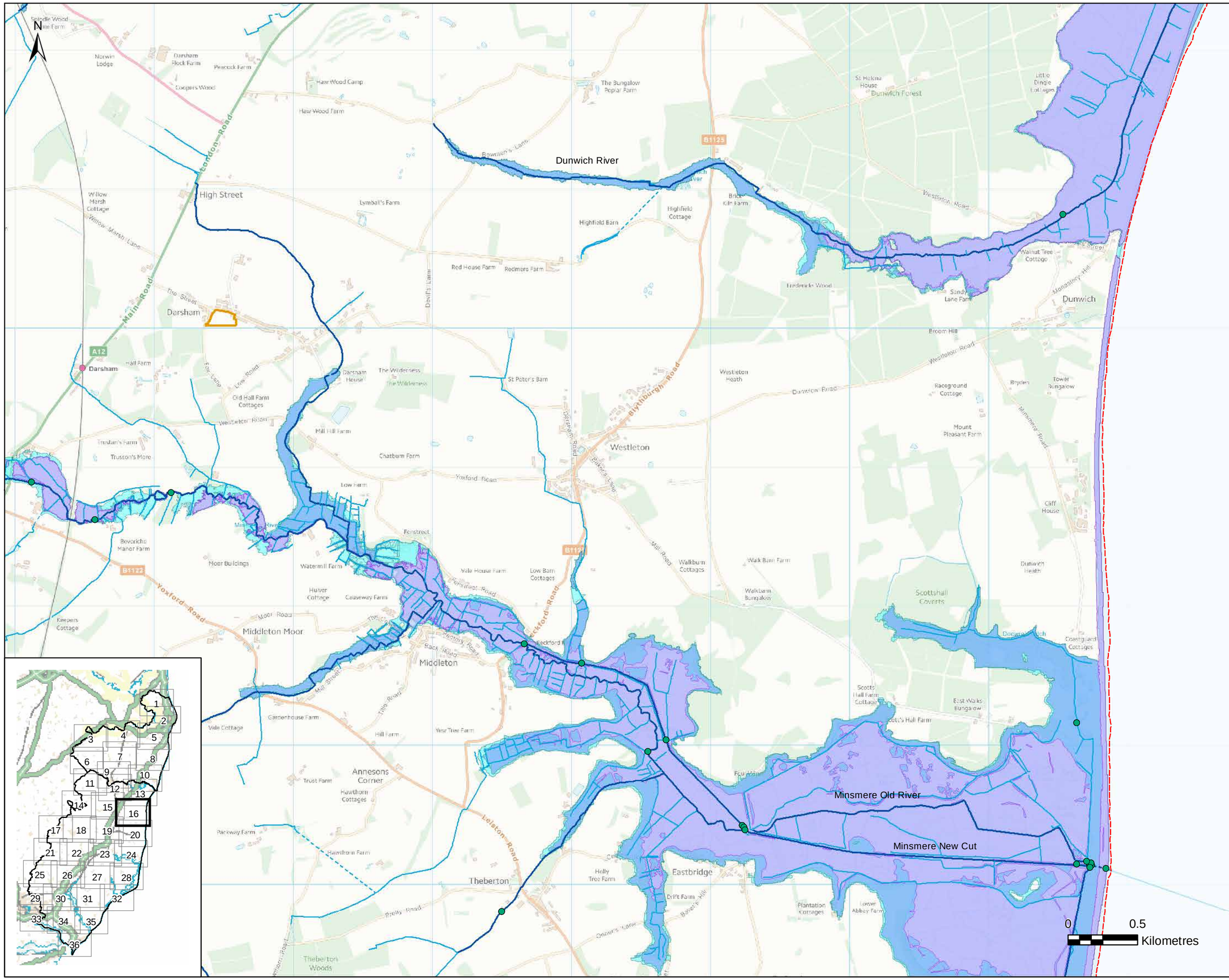
Drawing Number	Rev.
FIGURE 12.15	4



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes
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ABDs removed.	LM / MD	10.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
Note and sites added	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Suffolk Coastal District Council; Waveney District Council, Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 16 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	10/04/2018

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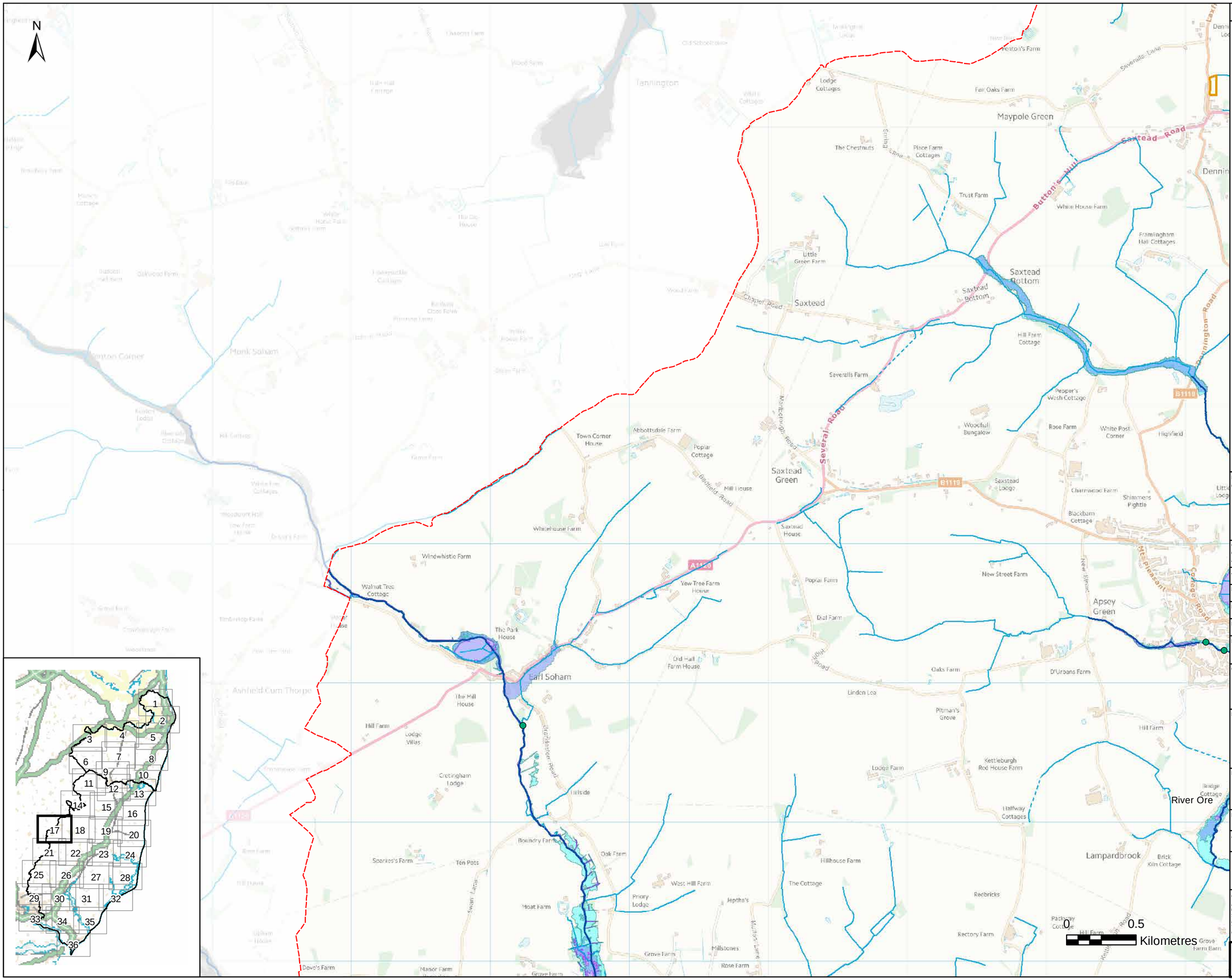
FIGURE 12.16	4



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes
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Note and sites added	LM	MD	06.12.17	2
Revision Details	By	Check	Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 17 OF 36

Drawn	Checked	Approved	Date
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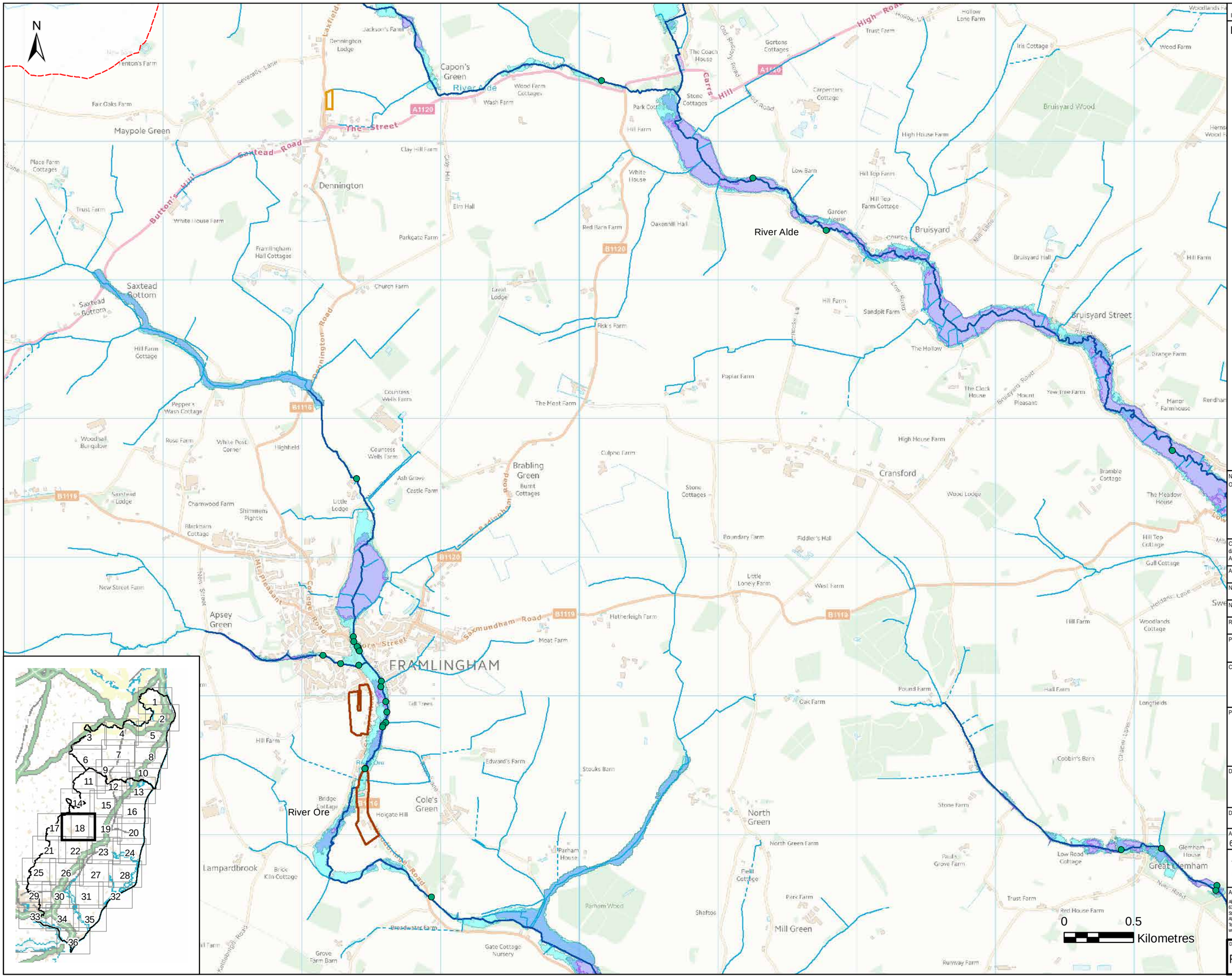

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes
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Note and sites added	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 18 OF 36

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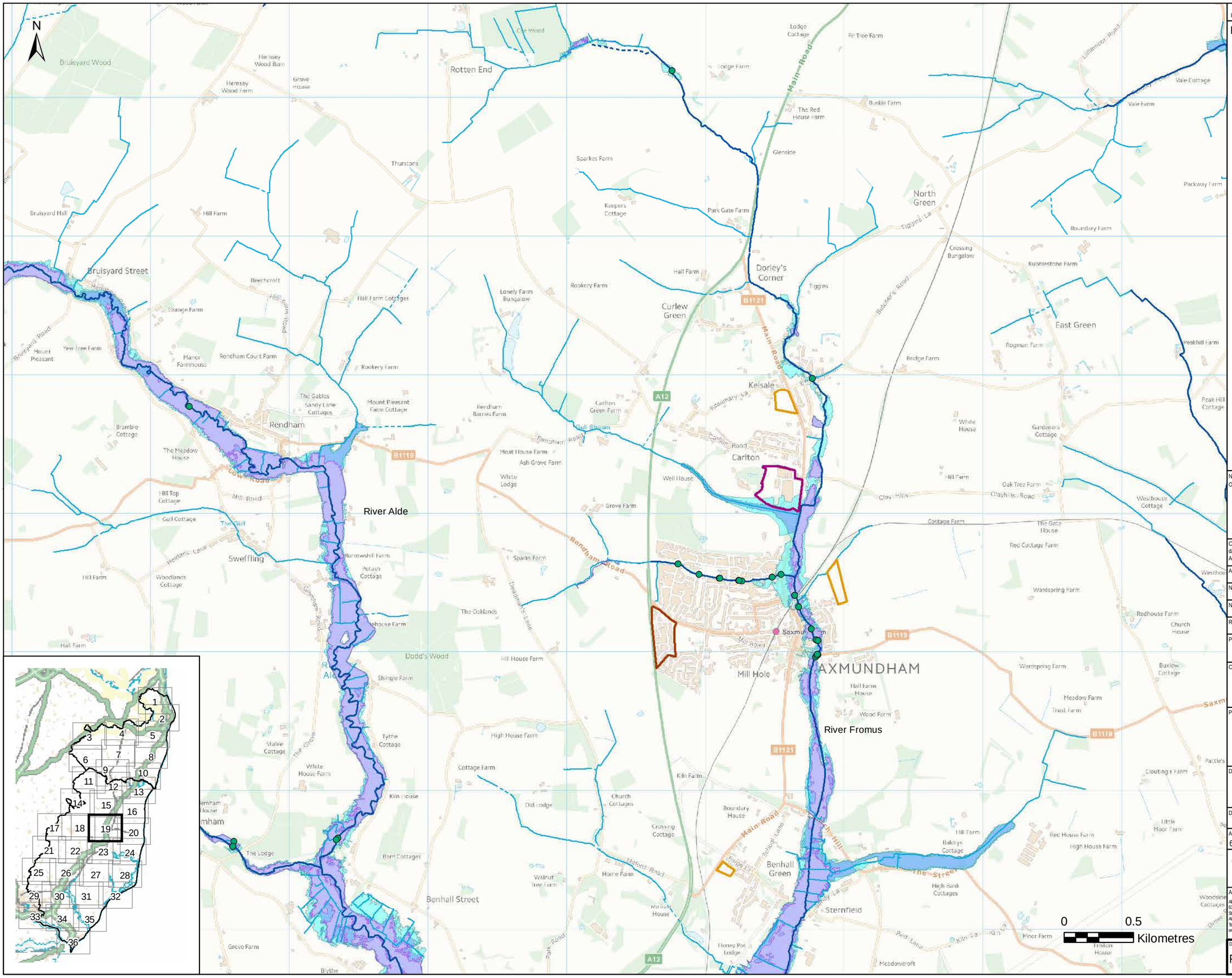

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

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Note and sites added	LM	MD	06.12.17	2
Revision Details				

Purpose of Issue
FINAL

Client
Waveney District Council
Serving the Community

Project Title
EAST SUFFOLK COUNCILS
STRATEGIC FLOOD
RISK ASSESSMENT

Drawing Title
PROPOSED DEVELOPMENT
SITE LOCATIONS
SHEET 19 OF 36

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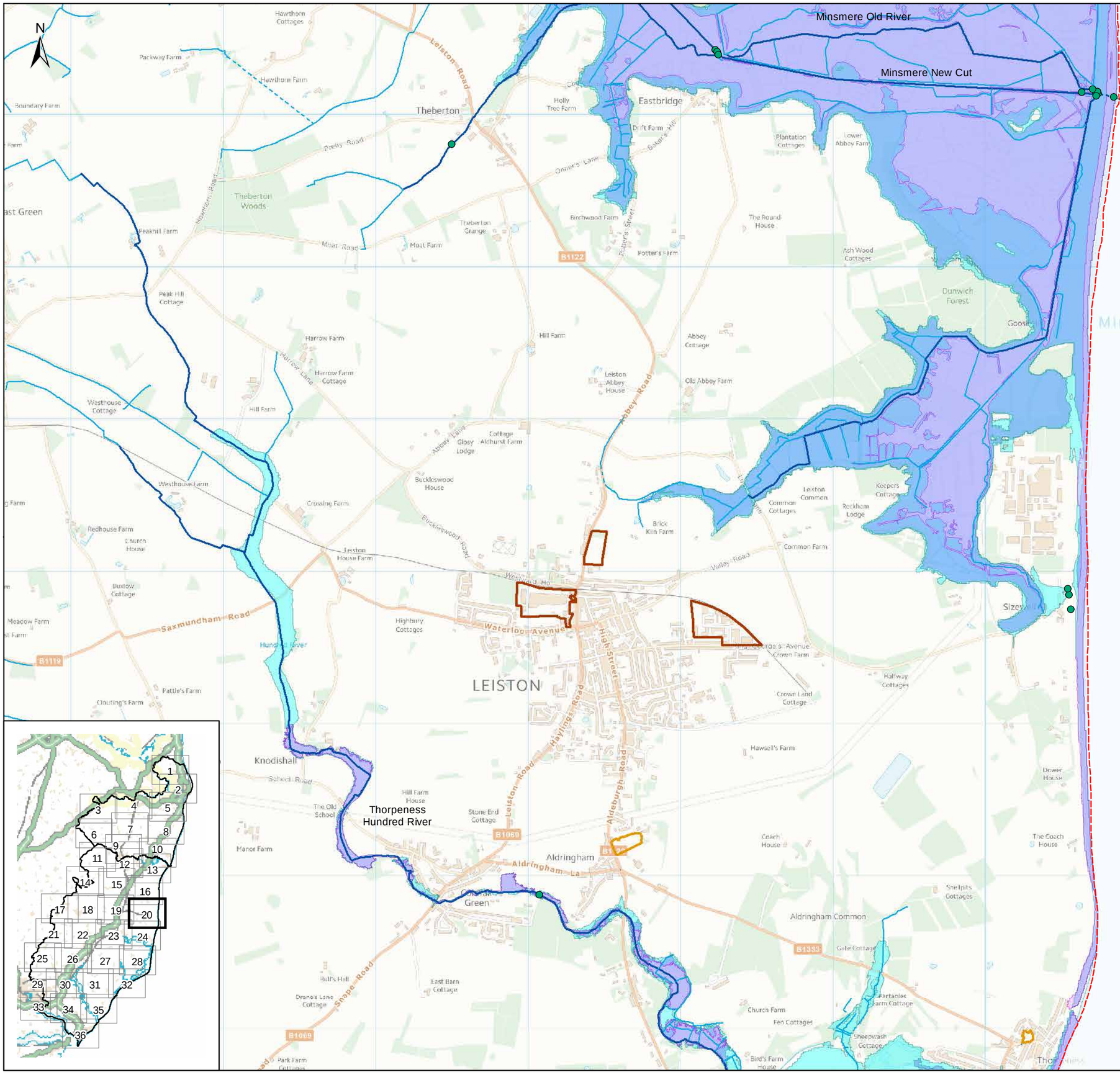

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes
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Note and sites added	LM	MD	06.12.17	2
Revision Details	By	Check	Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 20 OF 36

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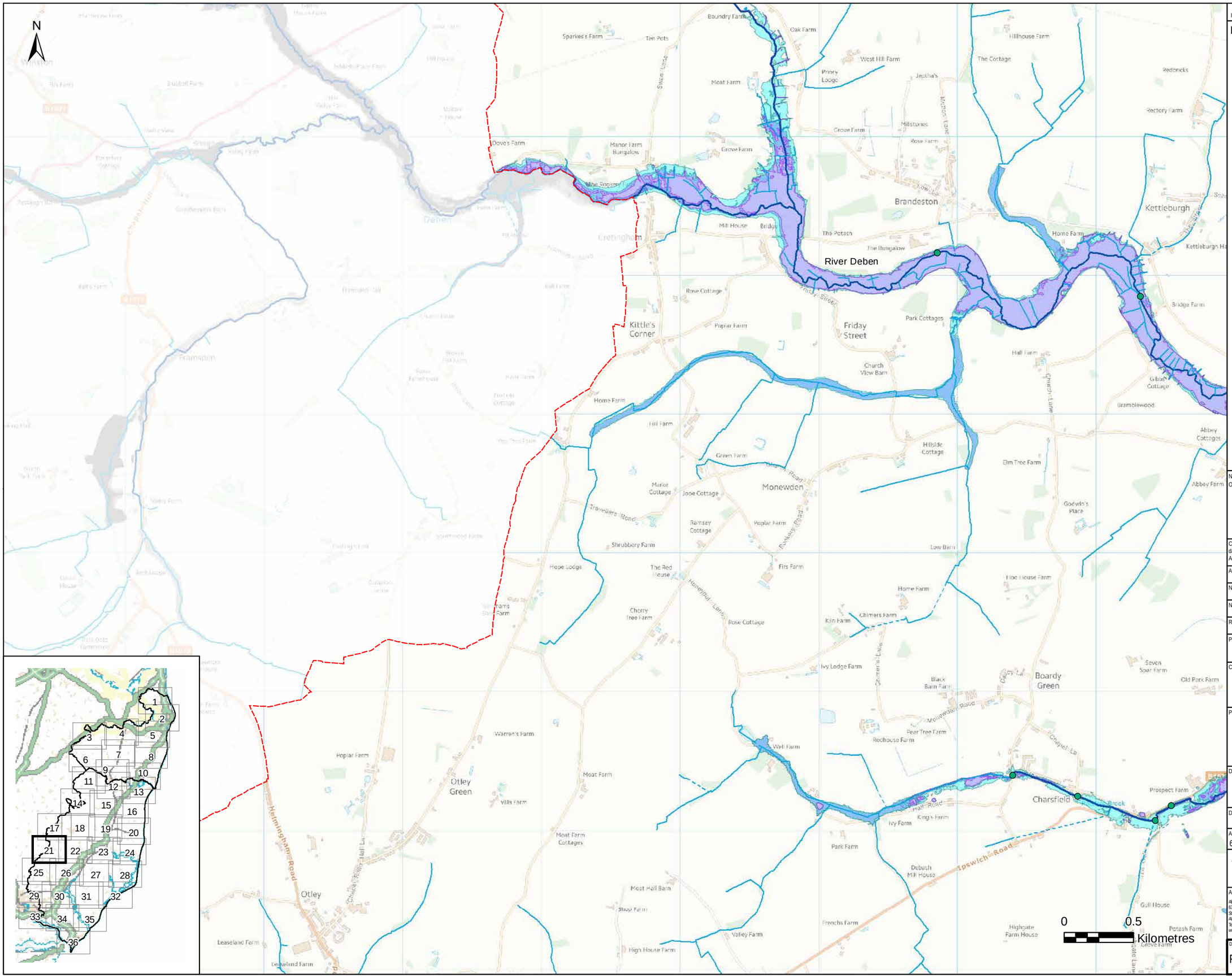

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

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ABDs removed.	LM	MD	10.04.18	4
New River Deben model added.	LM	MD	12.01.18	3
Note and sites added	LM	MD	06.12.17	2

Purpose of Issue
FINAL

Client
Waveney District Council
Serving the Community

Project Title
EAST SUFFOLK COUNCILS
STRATEGIC FLOOD
RISK ASSESSMENT

Drawing Title
PROPOSED DEVELOPMENT
SITE LOCATIONS
SHEET 21 OF 36

Drawn	Checked	Approved	Date
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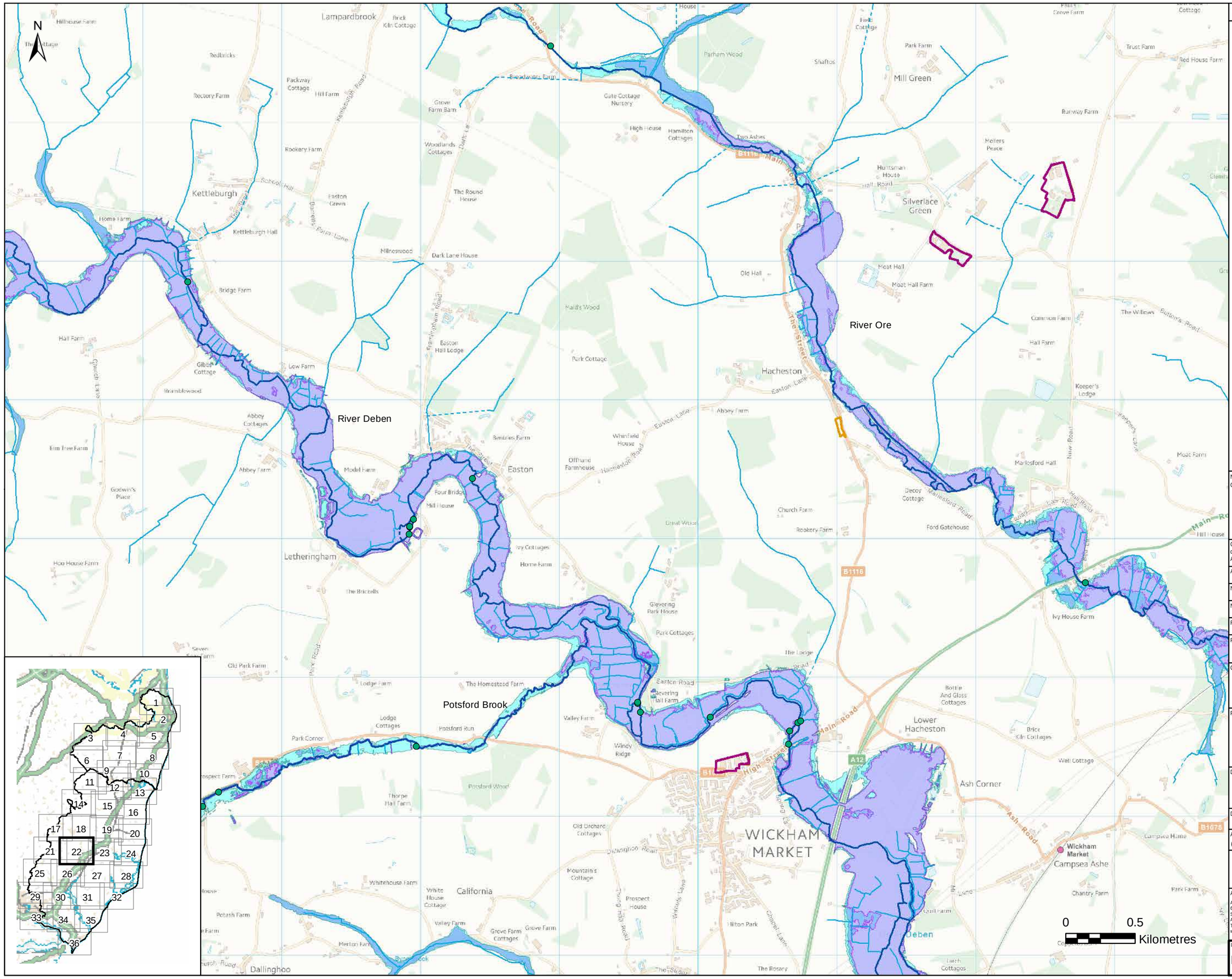

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes

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Note and sites added	LM / MD	06.12.17	2
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Purpose of Issue: FINAL

Client: Waveney District Council — Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 22 OF 36

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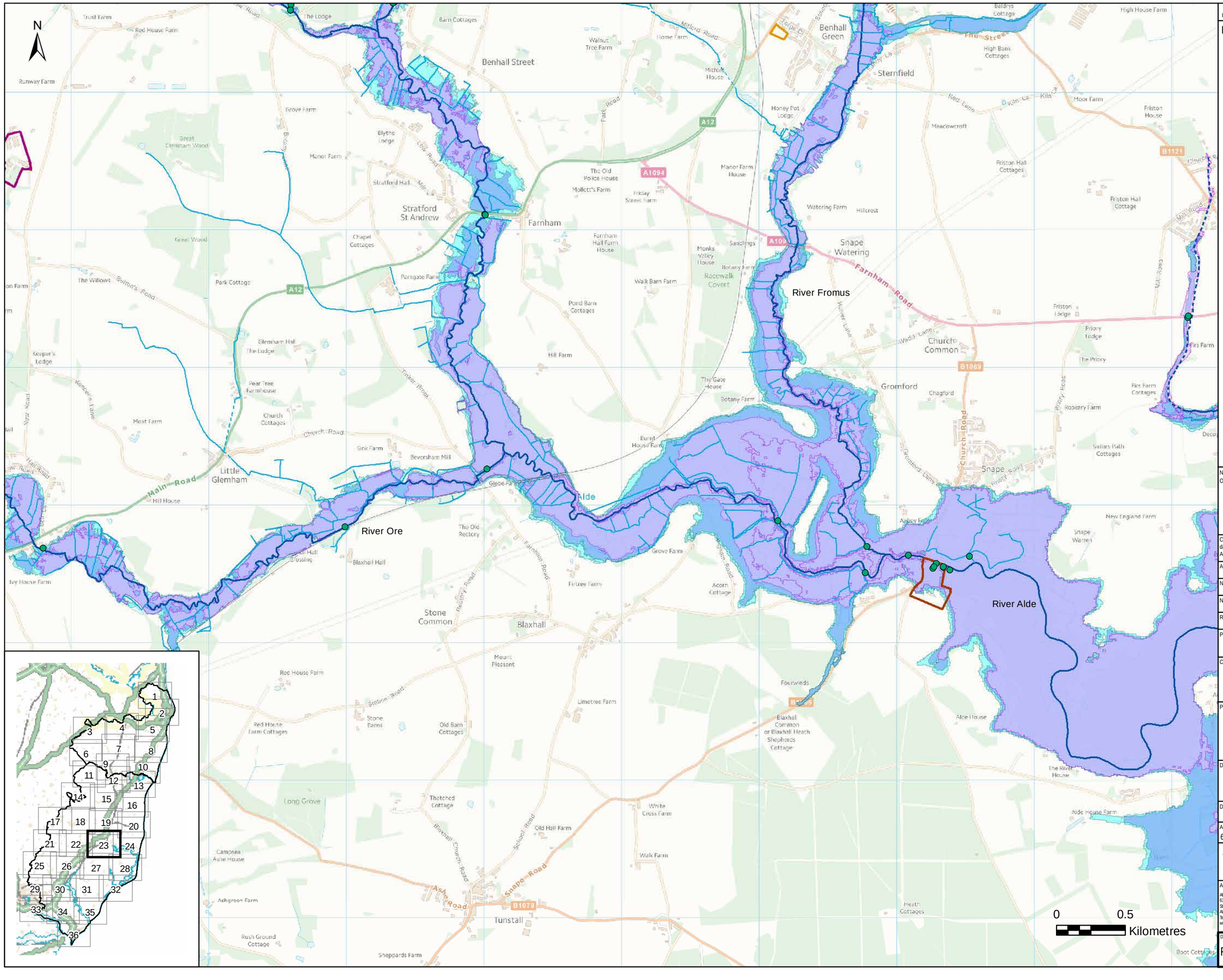

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes
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ABDs removed.	LM / MD	10.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
Note and sites added	LM / MD	06.12.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 23 OF 36

Drawn	Checked	Approved	Date
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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

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New River Deben model added.	LM / MD	12.01.18	3
Note and sites added	LM / MD	06.12.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 24 OF 36

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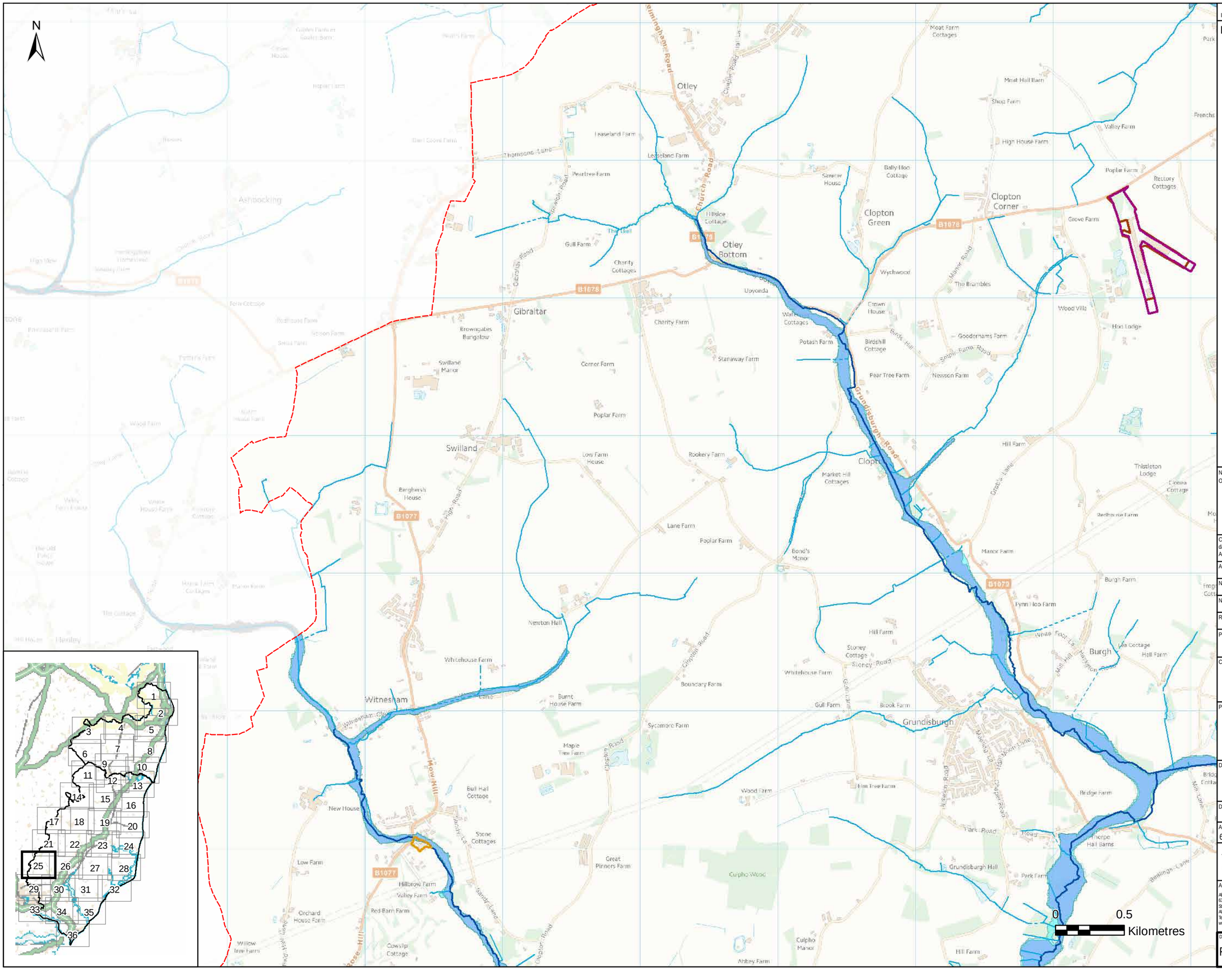
0 0.5 Kilometres



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

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ABDs removed.	LM / MD	10.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
Note and sites added	LM / MD	06.12.17	2

Purpose of Issue: FINAL

Client: East Suffolk Council; Waveney District Council, Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 25 OF 36

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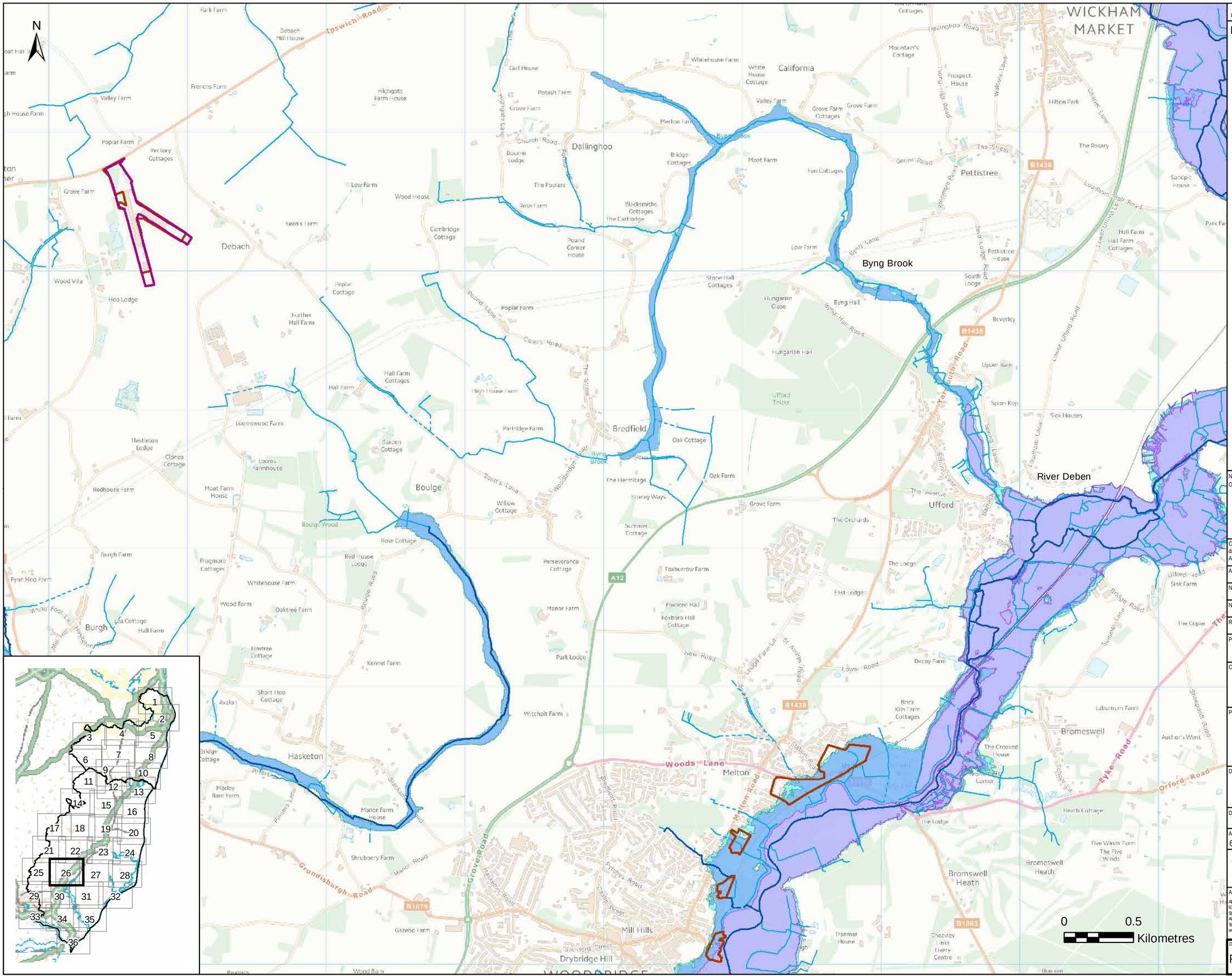

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

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New River Deben model added.	LM / MD	12.01.18	3
Note and sites added	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 26 OF 36

Drawn	Checked	Approved	Date
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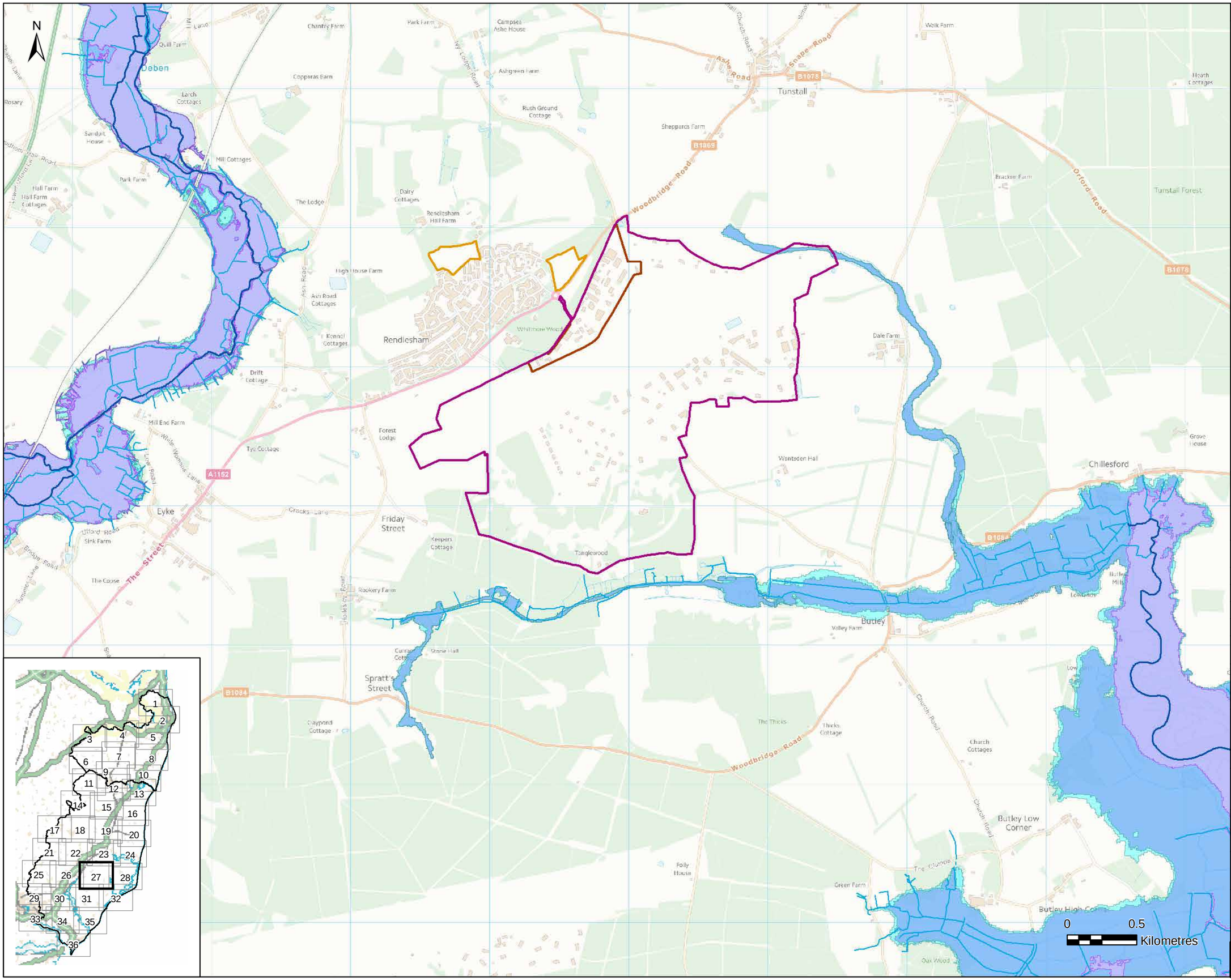

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

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New River Deben model added.	LM	MD	12.01.18	3
Note and sites added	LM	MD	06.12.17	2
Revision Details	By	Check	Date	Suffix

Purpose of Issue: FINAL

Client: Suffolk Coastal District Council; Waveney District Council, Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 27 OF 36

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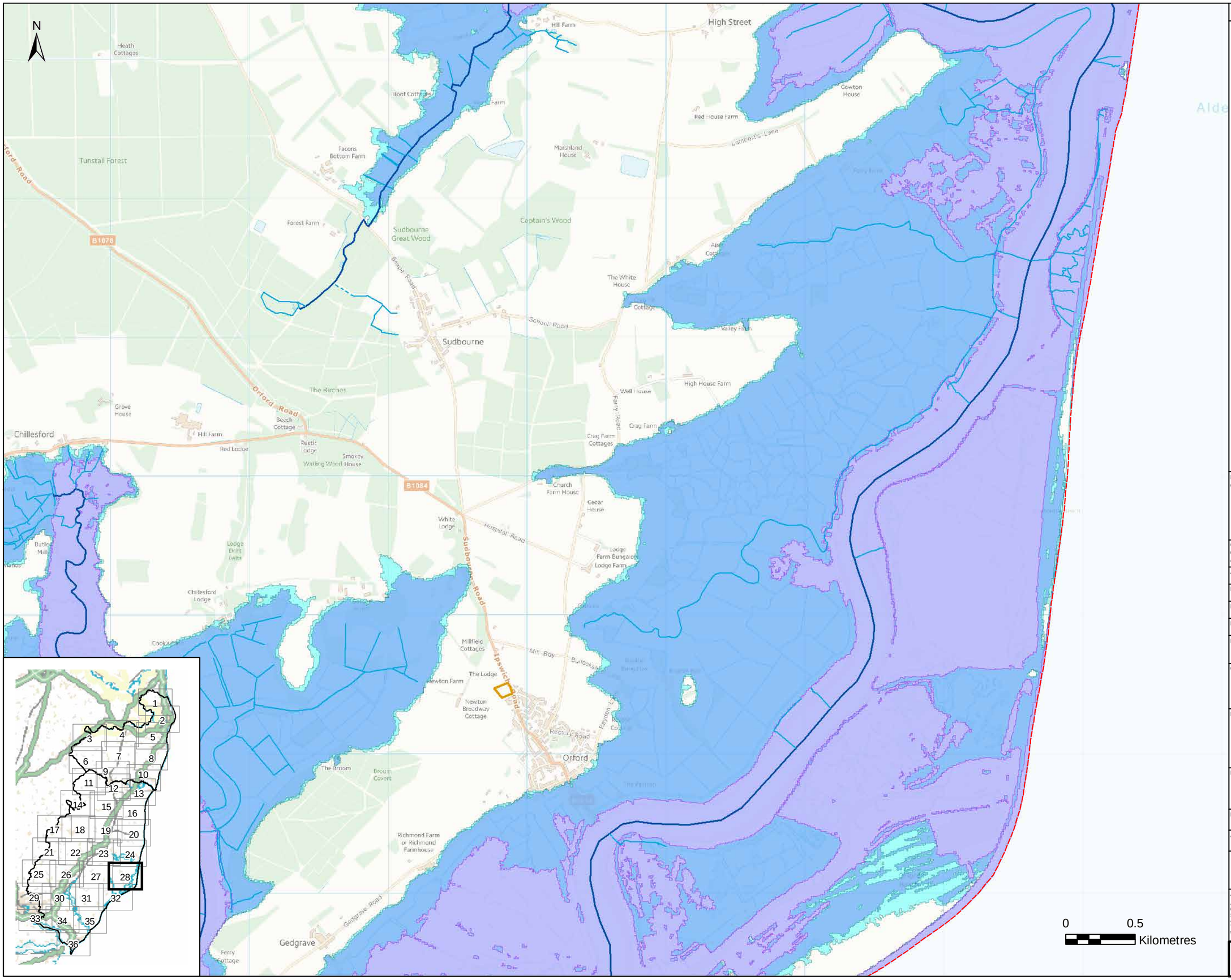
Drawing Number	Rev.
FIGURE 12.27	4



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes
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Revision Details	By / Check	Check Date	Suffix
ABDs removed.	LM / MD	10.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
Note and sites added	LM / MD	06.12.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 28 OF 36

Drawn	Checked	Approved	Date
LM	MD	GP	10/04/2018

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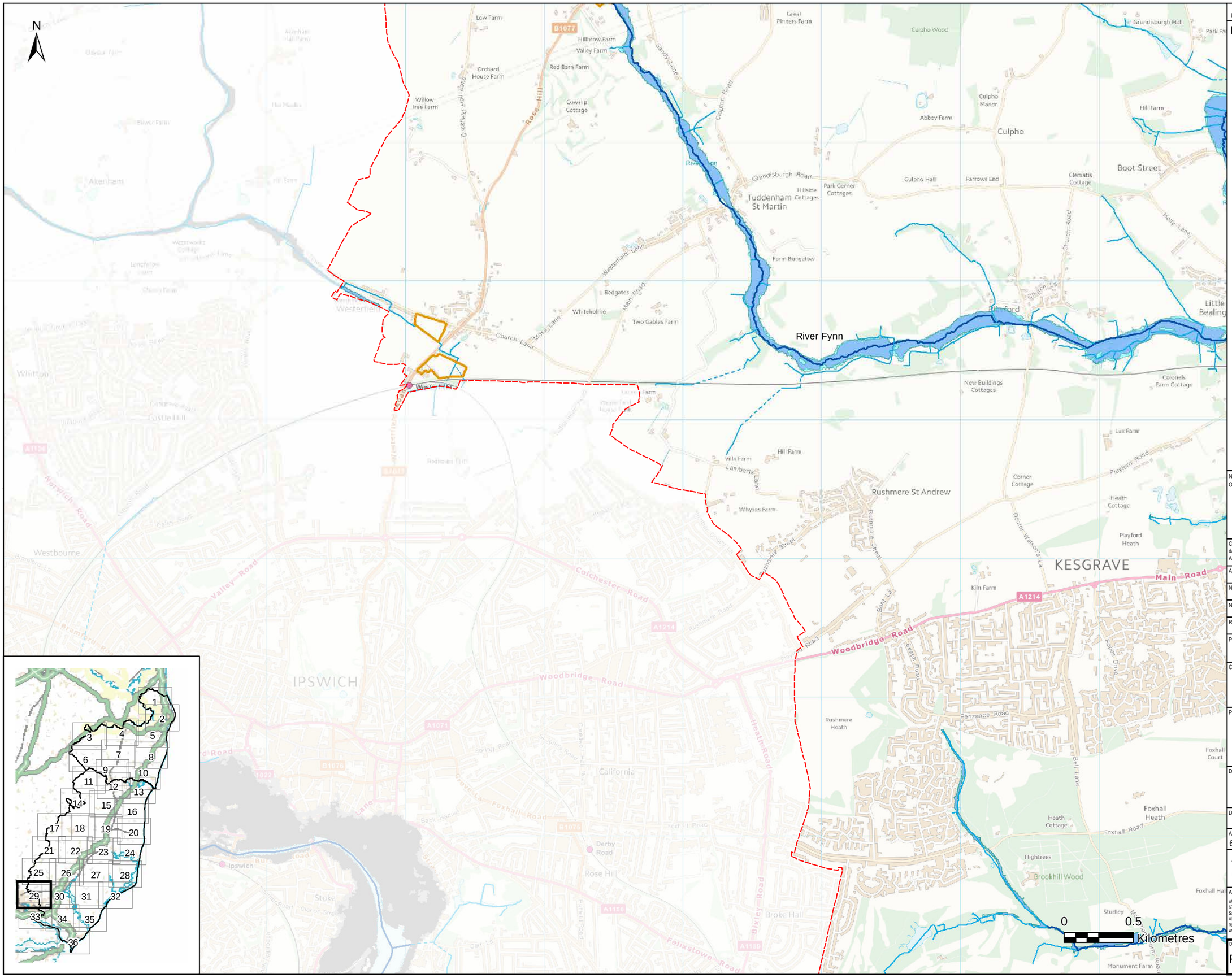
FIGURE 12.28	4



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes
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ABDs removed.	LM / MD	10.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
Note and sites added	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 29 OF 36

Drawn	Checked	Approved	Date
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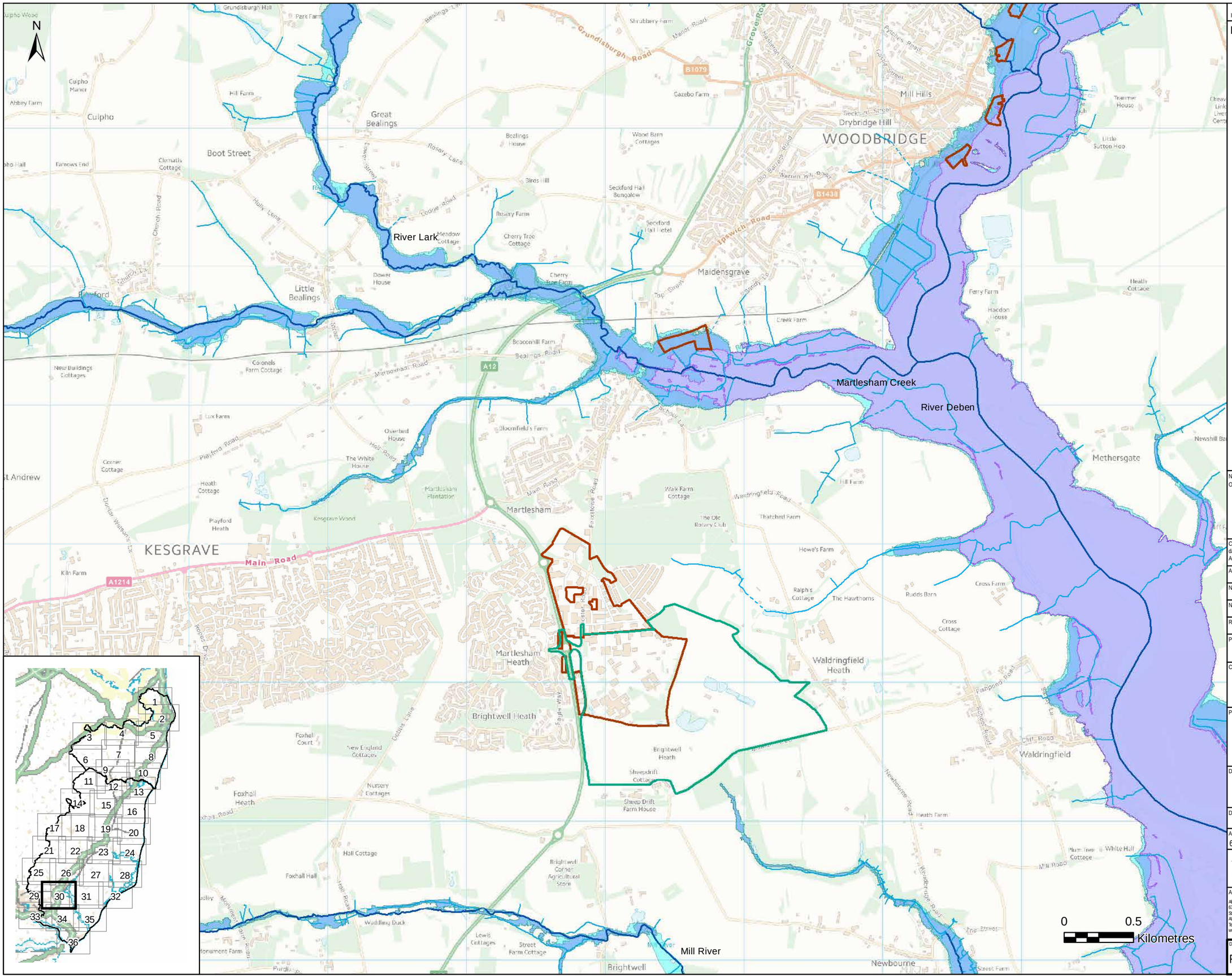
Drawing Number: FIGURE 12.29

Rev.: 4



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

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New River Deben model added.	LM / MD	12.01.18	3
Note and sites added	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Suffolk Coastal District Council; Waveney District Council, Serving the Community

Project Title
EAST SUFFOLK COUNCILS
STRATEGIC FLOOD
RISK ASSESSMENT

Drawing Title
PROPOSED DEVELOPMENT
SITE LOCATIONS
SHEET 30 OF 36

Drawn	Checked	Approved	Date
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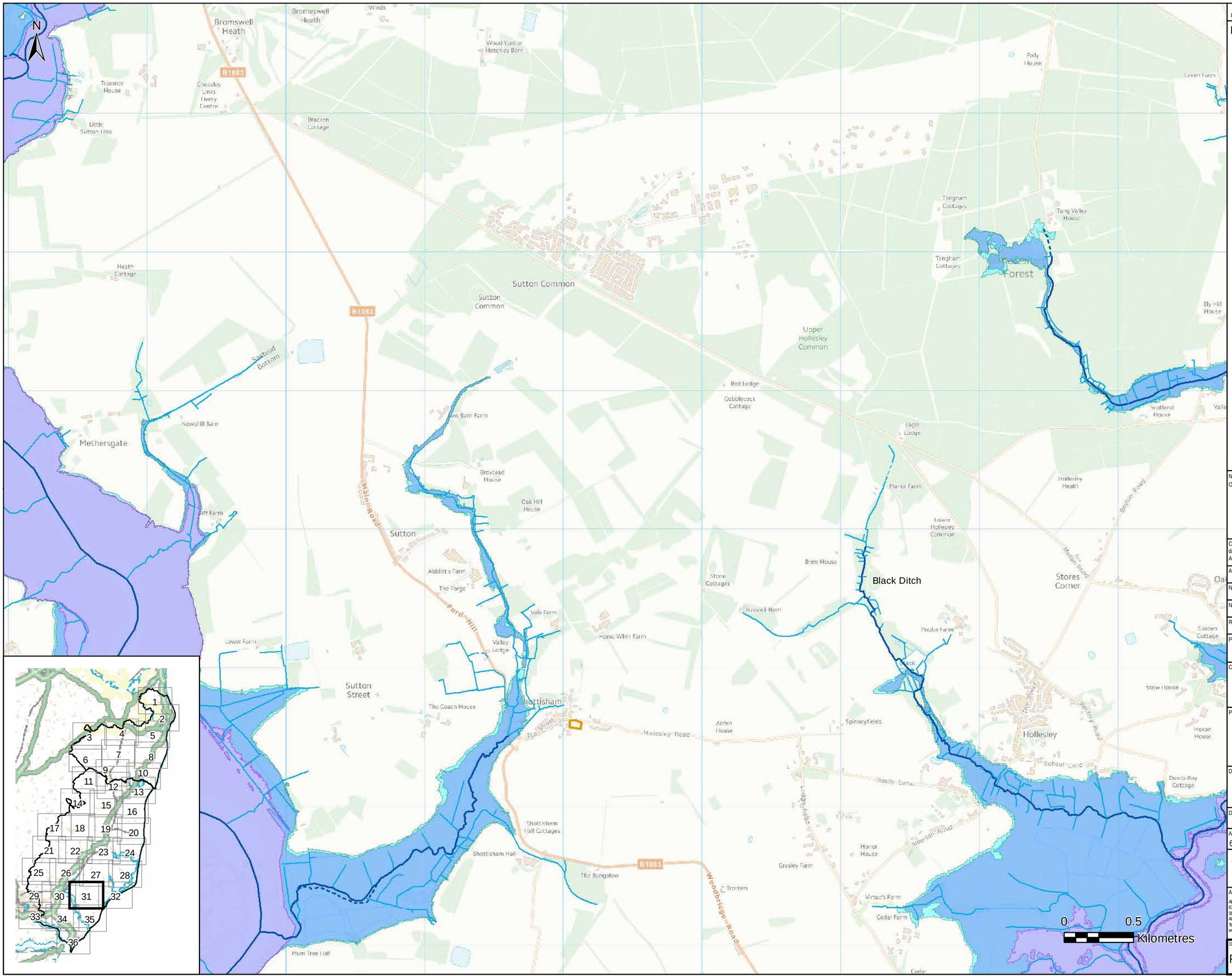

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

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New River Deben model added.	LM / MD	12.01.18	3
Note and sites added	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 31 OF 36

Drawn	Checked	Approved	Date
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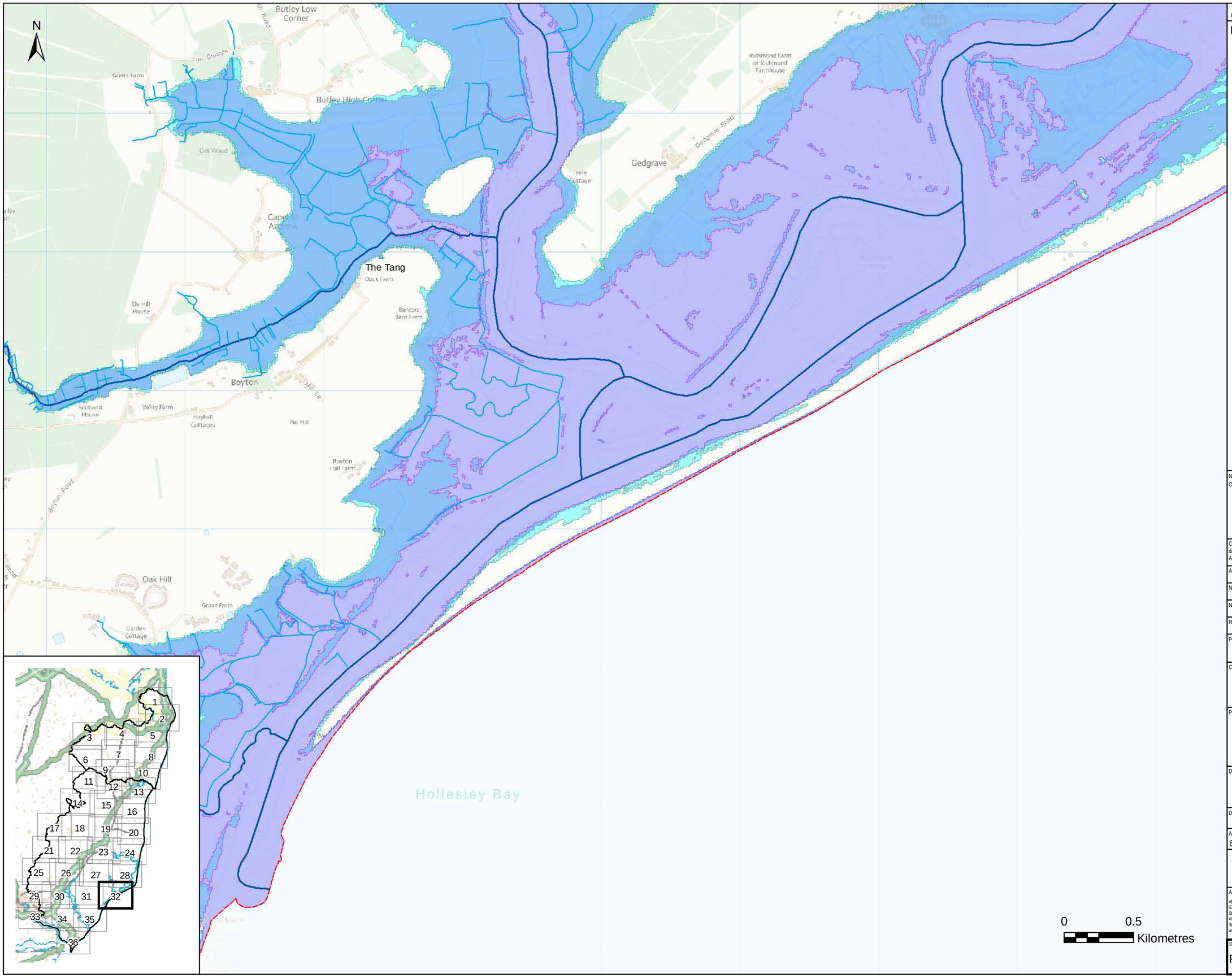

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes
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ABDs removed.	LM / MD	10.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
Note and sites added	LM / MD	06.12.17	2
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: East Suffolk Council; Waveney District Council, Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 32 OF 36

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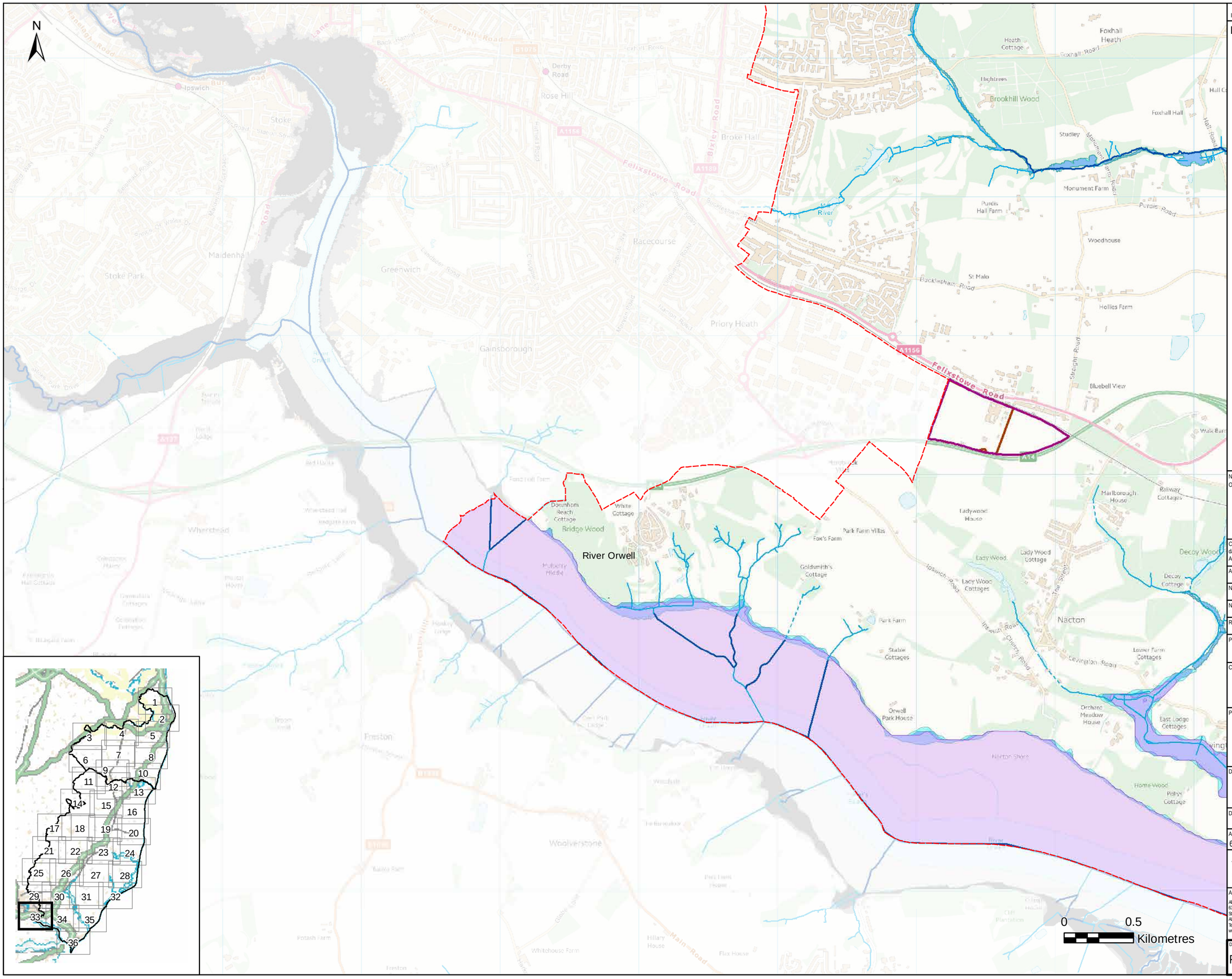
FIGURE 12.32	4



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

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	By	Check	Date	Suffix
ABDs removed.	LM	MD	10.04.18	4
New River Deben model added.	LM	MD	12.01.18	3
Note and sites added	LM	MD	06.12.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 33 OF 36

Drawn	Checked	Approved	Date
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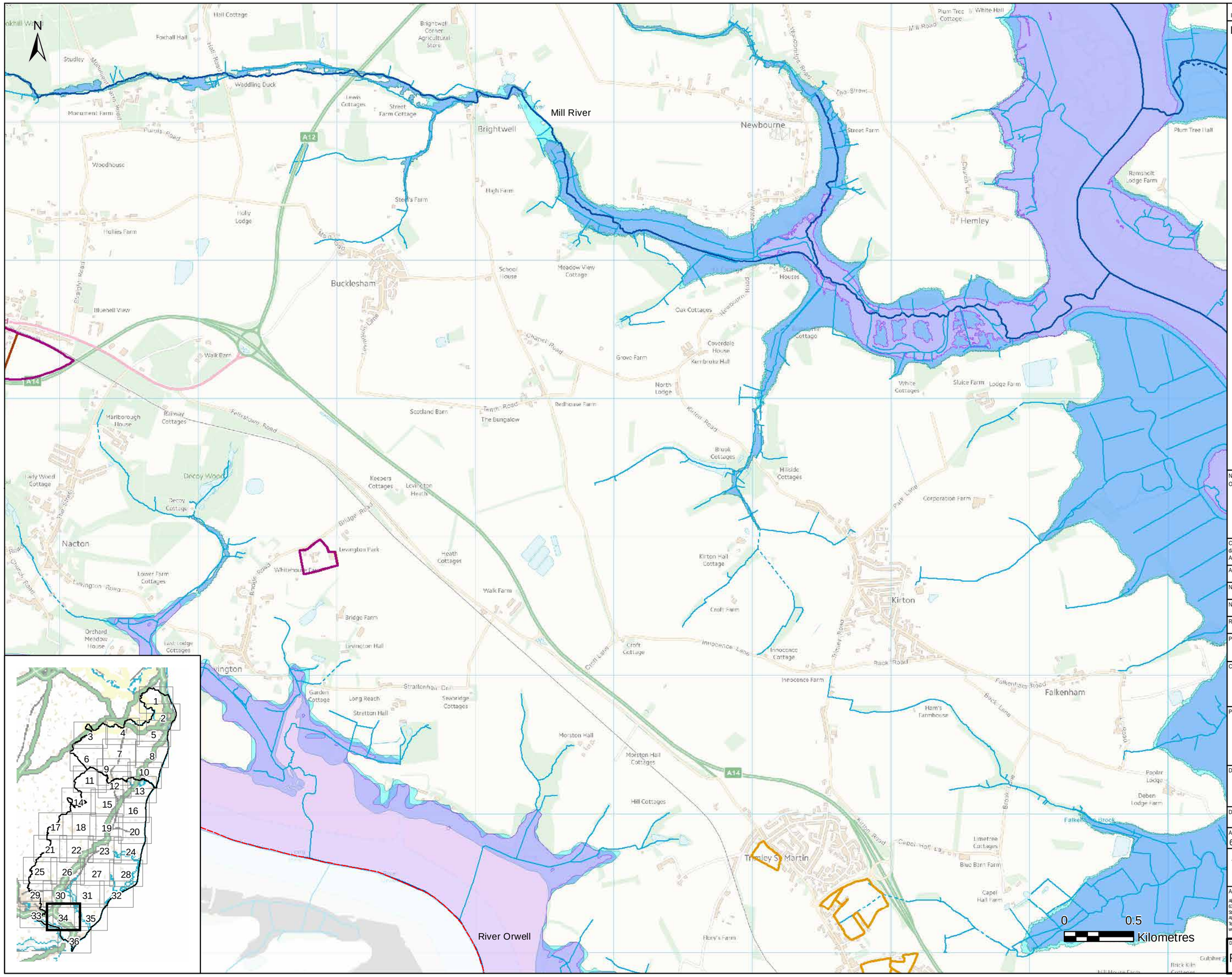
FIGURE 12.33	4



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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes
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	By	Check	Date	Suffix
ABDs removed.	LM	MD	10.04.18	4
New River Deben model added.	LM	MD	12.01.18	3
Note and sites added	LM	MD	06.12.17	2
Revision Details				

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 34 OF 36

Drawn	Checked	Approved	Date
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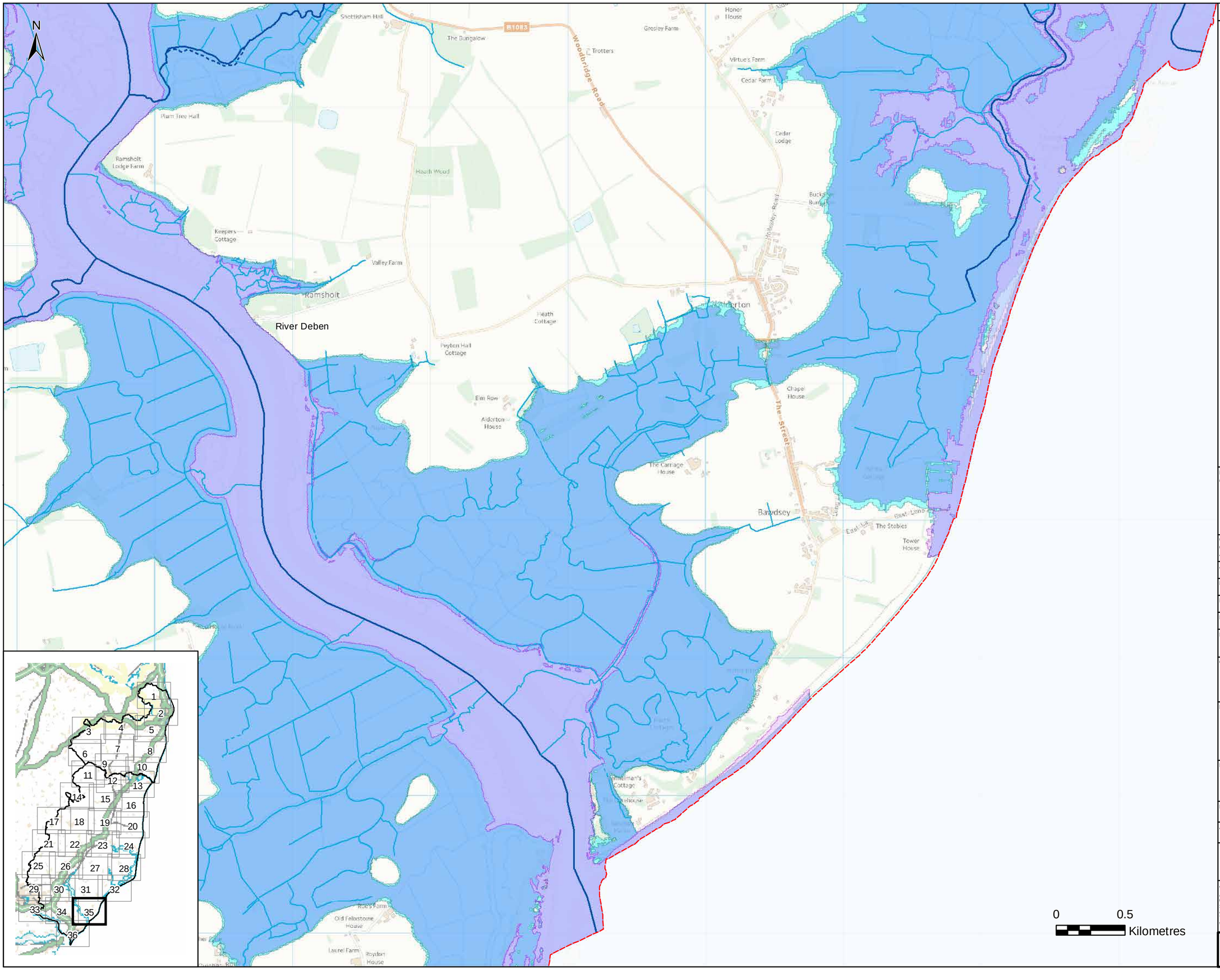

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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes
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Revision Details	By / Check	Check Date	Suffix
ABDs removed.	LM / MD	10.04.18	4
New River Deben model added.	LM / MD	12.01.18	3
Note and sites added	LM / MD	06.12.17	2

Purpose of Issue: FINAL

Client: Waveney District Council – Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 35 OF 36

Drawn	Checked	Approved	Date
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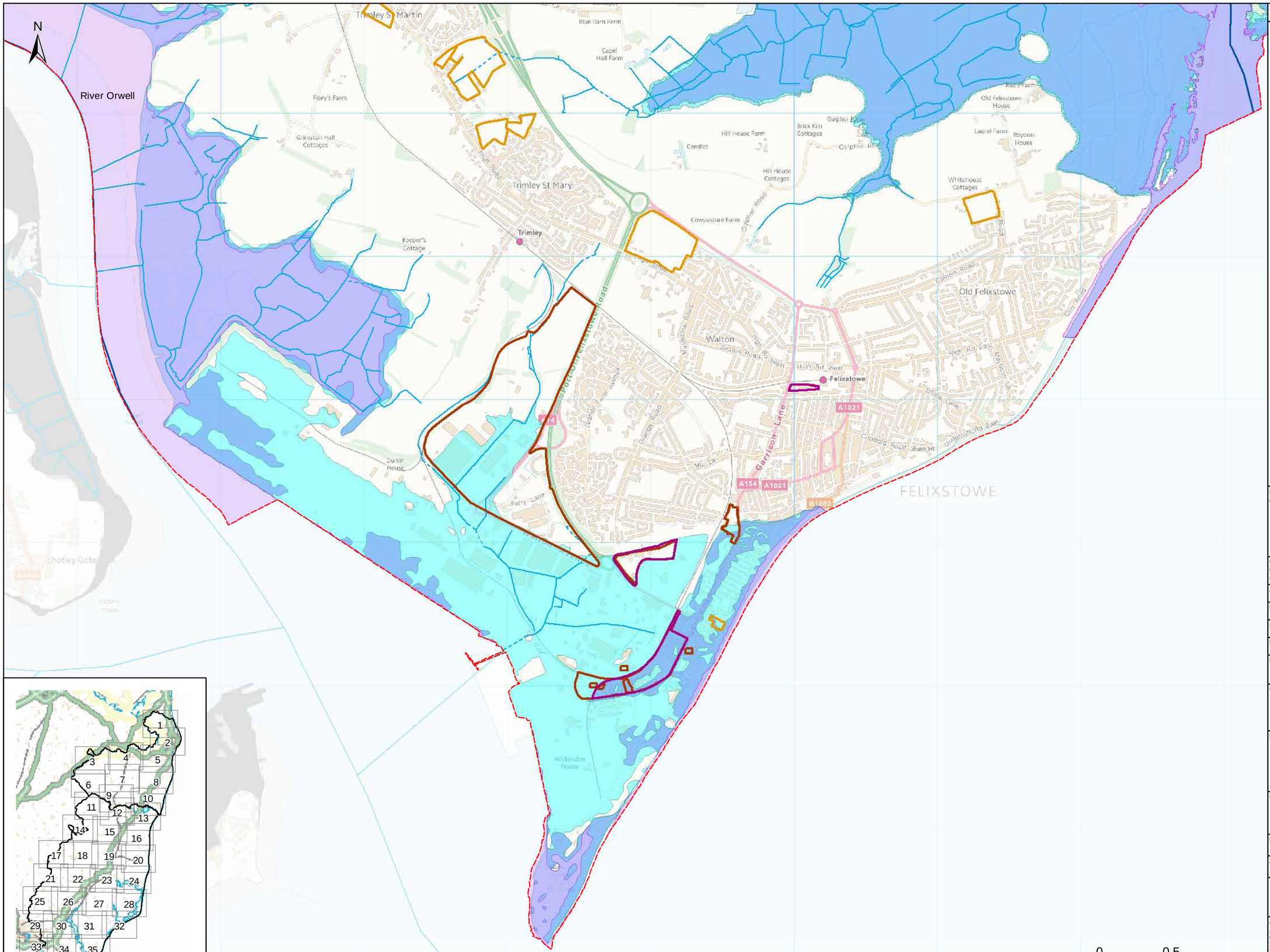
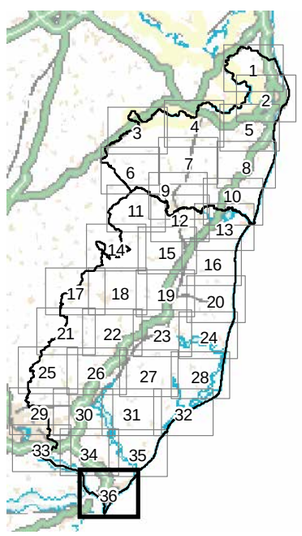
Rev.: 4





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LEGEND

- Suffolk Coastal District
- Waveney District
- Main River
- Main River (Culverted)
- Ordinary Watercourse
- Ordinary Watercourse (Culverted)

Development Sites

- Housing
- Mixed Use
- Employment
- Industrial Land Available
- Flood Management Structures (EA Database)

Risk of Flooding from Rivers and the Sea

- Flood Zone 2
- Flood Zone 3
- Flood Zone 3b

Notes
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	By	Check	Date	Suffix
ABDs removed.	LM	MD	10.04.18	4
New River Deben model added.	LM	MD	12.01.18	3
Note and sites added	LM	MD	06.12.17	2
Revision Details				

Purpose of Issue: FINAL

Client: Waveney District Council Serving the Community

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: PROPOSED DEVELOPMENT SITE LOCATIONS SHEET 36 OF 36

Drawn	Checked	Approved	Date
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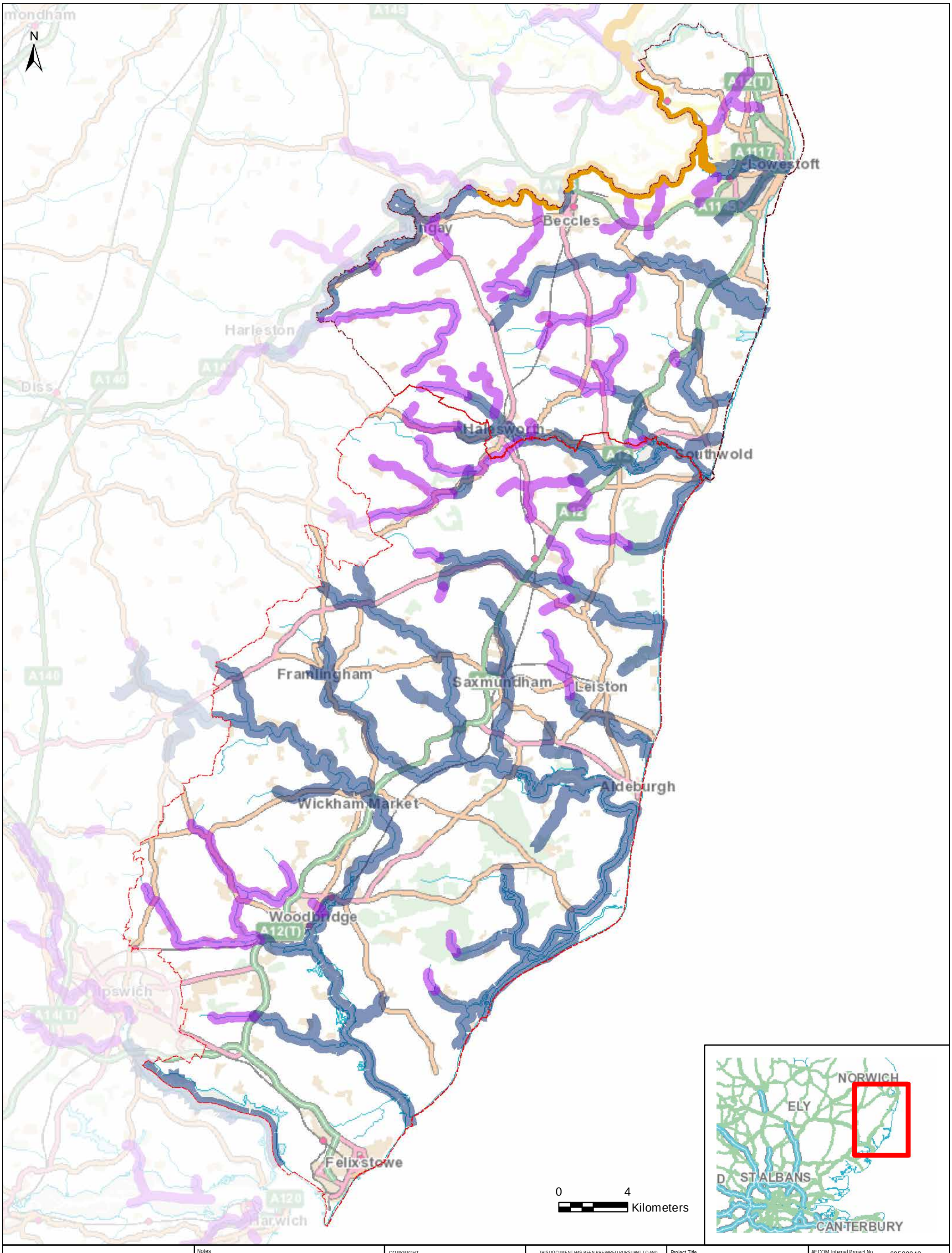
Drawing Number: FIGURE 12.36

Rev.: 4



LEGEND

- Suffolk Coastal District
- Waveney District
- Main Rivers not covered by detailed hydraulic models
- Main Rivers covered by detailed hydraulic models
- River Waveney covered by 2008 Broads Model (not available to inform this SFRA)

Notes

No known detailed hydraulic models covering Ordinary Watercourses are present in the study area

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Broads model added	LM / MD	11.04.18	3
Main River colour changed	LM / MD	06.12.17	2
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Purpose of Issue: FINAL

Project Title: EAST SUFFOLK COUNCILS STRATEGIC FLOOD RISK ASSESSMENT

Drawing Title: MAIN RIVERS COVERED BY DETAILED HYDRAULIC MODELLING

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Rev.: 3