

Great Ouse

Environmental and agricultural baseline

2025



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1. Introduction

1.1 Aim and purpose of this document

This document presents a catchment-scale environmental and agricultural baseline for the Great Ouse catchment. It is intended to support future choices, investments and actions for the Fens2100+ programme (hereafter referred to as the “Fens 2100+”). The environmental and agricultural baseline covers the following disciplines:

- Landscape
- Agriculture
- Ground conditions (soils and resources)
- Water Environment
- Biodiversity
- Cultural Heritage
- Population and Health
- Air Quality

1.2 Usage statement

This document should be read alongside the Great Ouse baseline evidence report and is intended to provide a strategic environmental and agricultural baseline which will inform the development of a future Sustainability Appraisal for the Fens 2100+. This document provides a proportionate level of detail required for a strategic catchment-scale baseline. A detailed baseline analysis may be required at project level to align with the Environment Agency’s Minimum Technical Requirements or Environmental Impact Assessment.

1.3 Catchment context

The Great Ouse catchment (hereafter referred to as “the catchment”¹) covers 2,196km² (219,600 hectares (ha)), occupying a large proportion of the Fens 2100+ study area.

The catchment extends along the River Great Ouse from the Earith Sluice to the outlet of the Tidal River Ouse into The Wash at King’s Lynn. To the south-east the catchment is bordered by the low clay hills of the Huntingdonshire Uplands. In the north-west the natural catchment boundary sits along the edge of the Whittlesey Washes and the River Nene.

Other watercourses in the study area include the Hundred Foot River (also known as New Bedford River), the Old Bedford River, Ely Ouse, Wissey, Lark and Cam. Water enters the river network from field ditches which are connected to larger drains managed by Internal Drainage



Figure 1: View of the Ouse Washes from Welches Dam © Josie Osborne, Arup

¹ The Great Ouse catchment is not strictly a hydrological catchment as there are movements of water both into and out of the area defined, that are not being considered in this report. However, the term ‘catchment’ has been used throughout the dialogue with the Environment Agency during establishment of the study areas and these areas are being defined for water management purposes. Therefore, the term catchment is used to describe the study area.

Boards (IDBs). The catchment is protected from flooding by a network of drains, embankments, pumping stations and sluice gates. Two key assets include:

- The Ouse Washes, which can store 90 million m³ of flood attenuation and is Britain's largest wash land; and
- St Germans pumping station, the largest in the UK. It drains a substantial portion of the catchment, from which there is no ability for water to escape naturally via gravity.

The Environment Agency have permissive powers to carry out flood and coastal risk management activities on Main Rivers as well as certain non-Main Rivers known as critical ordinary watercourses. In addition, the Environment Agency are responsible for producing a national strategy for Flood and Coastal Erosion Risk Management (FCERM). The latest strategy published in 2020 contains 'Measure 1.5.4'. This requires development of a long-term plan for managing future flood risk in the Fens. Ordinary watercourses are regulated by Internal Drainage Boards (IDBs) and the Lead Local Flood Authority (LLFA), which includes Lincolnshire County Council, Cambridgeshire County Council, Norfolk County Council and Suffolk County Council for the catchment.

IDBs play a vital role in managing water levels and drainage across the catchment for agricultural and environmental purposes. The IDB's are responsible for managing the complex network of drains that feed into Main Rivers by pumps.

The catchment's topography is flat and low-lying, with almost a third lying below mean sea level. A branched network of drainage channels with numerous water level management structures allow the low-lying catchment to be drained.

The land use within the catchment is primarily agricultural, with farms covering all sectors of agriculture and horticulture, including arable, livestock, poultry and dairy farming. It is a highly productive agricultural area with approximately 42% of the land classified as Grade 1 agricultural land. Although largely rural, the catchment includes several key urban areas, such as Kings Lynn, Ely and March. Other key land uses are summarised below.

1.3.1 Settlements

March, Chatteris, Soham, Downham Market, Ely and King's Lynn are the main centres of population in the catchment. Wisbech lies just outside the catchment boundary to the west, and Cambridge and Huntingdon are large settlements located close to the catchment to the south. Due to the low-lying wetlands which dominated much of the catchment in the past, these urban areas and villages generally developed on isolated 'islands' which are higher than the surrounding floodplain.



Figure 2: The historic Purfleet Quay, King's Lynn © Dave Hitchborne and licensed for reuse under the Creative Commons Licence

1.3.2 Access and connectivity

The main arterial roads include the A17, A47, A10, A141.

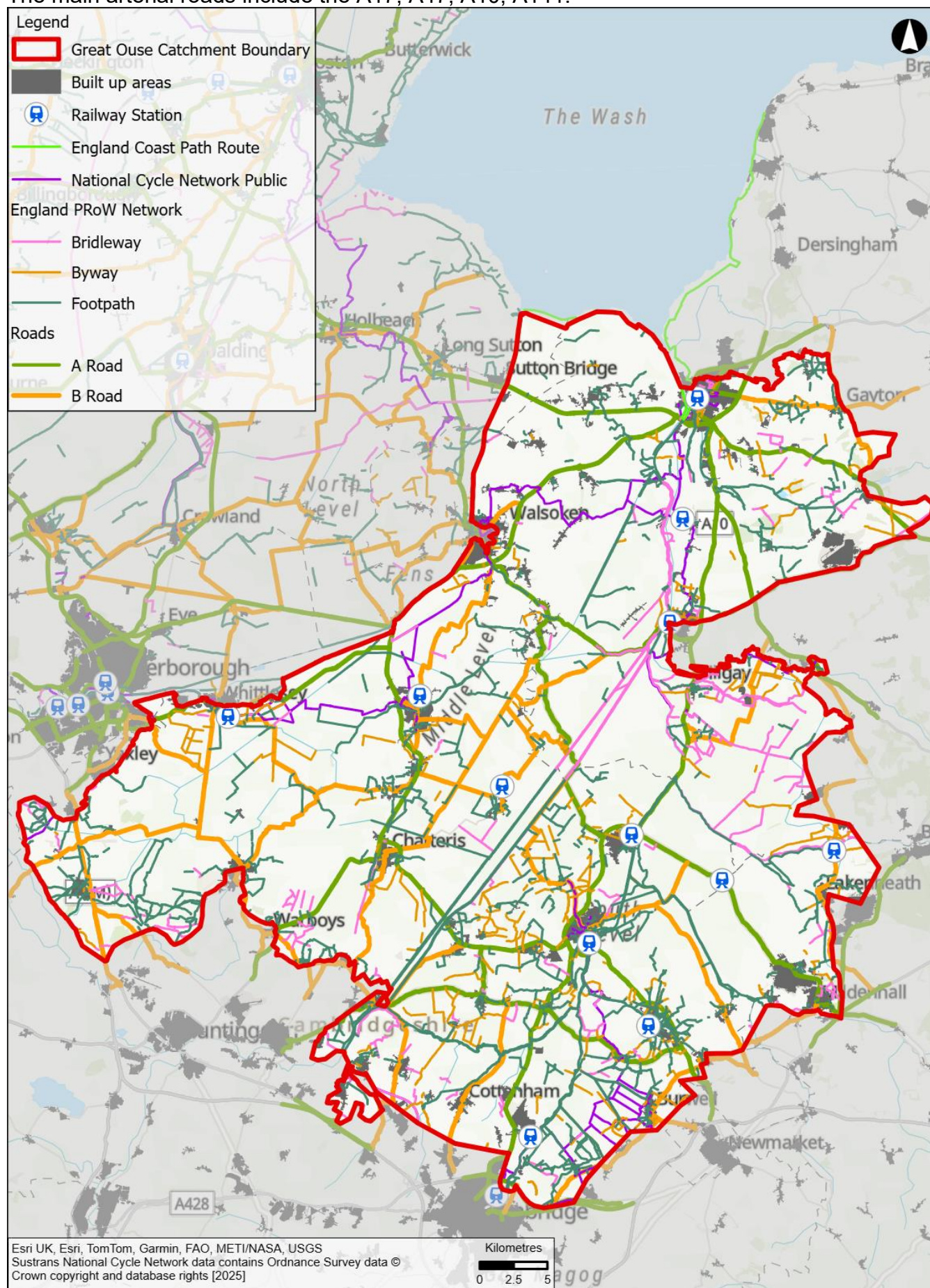


Figure 3 illustrates the spatial distribution of transport and access routes in the catchment.

- The A17 runs west to east across the northern part of the catchment, linking King's Lynn with the East Midlands;
- The A47 runs north-east to south-west across the northern portion of the catchment, connecting Norfolk to Peterborough and the midlands;
- The A10 runs north to south across the eastern portion of the catchment, connecting King's Lynn and Ely with London;
- The A141 runs north-east to south-west and connects March and Chatteris with Huntingdon and the A1(M); and
- The A1(M) runs north to south across a short length of the far east portion of the catchment and links the Midlands, and North of England to London.

Much of the watercourse network within the catchment is also navigable from Bedford to The Wash at King's Lynn.

Nationally important passenger and rail freight networks cross the catchment including the (Fenline) King's Lynn to London King's Cross line; the East Coast Mainline; the Cambridge/Norwich (Breckland) line; and the Ely to Peterborough (Cambridge-Birmingham) line. The Fenline also connects to the King's Lynn quarry freight line; and the Felixstowe freight line connecting the UK's largest container port [1] to the Midlands crosses the catchment at the Ely North rail junction.

Part of the King Charles III England Coast Path is located in the northern part of the catchment following the coastline. Additionally, six National Cycle Network (NCN) routes are located within the catchment:

- NCN Route 1: This long-distance route, running from Dover to Scotland, passes through the northern part of the catchment, including King's Lynn and Wisbech town centre;
- NCN Route 11: Connecting Harlow in Essex to Wigginhall St Germans in Norfolk via Cambridge and Ely, this route runs through the central part of the catchment, including Ely and Downham town centre;
- NCN Route 12: This route, stretching from Spalding to London, follows the western boundary of the catchment and is situated on the outskirts of Peterborough;
- NCN Route 21: Located in Peterborough, this route follows Peterborough's Green Wheel and runs along a section of the western boundary of the catchment;
- NCN Route 51: Passing through Oxfordshire, Buckinghamshire, Bedfordshire, Cambridgeshire, Suffolk and Essex, this route is situated along the southern boundary of the catchment; and
- NCN Route 63: Running from Burton on Trent to Wisbech, this route runs within the north-western part of the catchment, passing through March and Wisbech town centre.

1.3.3 Renewable energy infrastructure

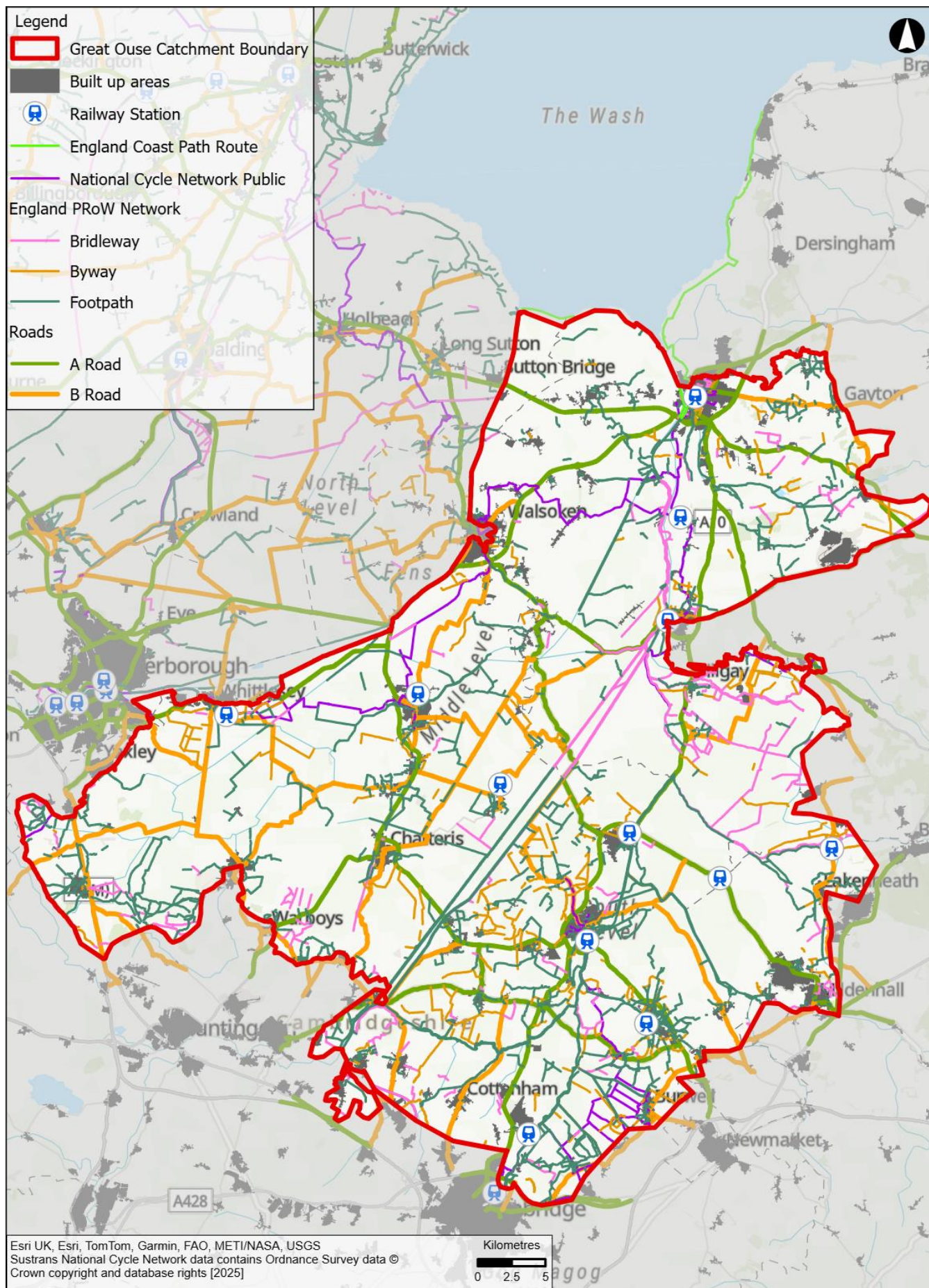
In common with other areas across the Fens, there is evidence of farm diversification to support renewable energy from solar, wind, and anaerobic digestion [2].

Larger-scale wind farms in the catchment include:

- Red Tile wind farm, Chatteris, 24MW;
- Glass Moor wind farm phase 1 and 2, 28MW;
- Whittlesey wind farm, 9MW;
- Ransom Moor wind farm phase 1 and 2, 10MW;
- Boardinghouse wind farm, 10.3MW;
- Whitemill wind farm, 14MW; and

- Coldham Hall wind farm, 16MW;

There are also a number of new solar farm projects either in proposal or construction phase across the catchment.



2. Overview of legislation and policy context

This section presents an overview of the legislative and planning policy that may be applicable to any future Flood and Coastal Erosion Risk Management (FCERM) intervention or project within the catchment. This includes national, regional and local policy which has been considered across the disciplines included within this document. A detailed baseline analysis may be required at project level to align with the Environment Agency's Minimum Technical Requirements or Environmental Impact Assessment.

2.1 Environment Act (2021)

The Environment Bill became an Act [3] (law) in November 2021, amending the Environment Act 1995 [4]. The Act provides targets and policy for improving the natural environment in relation to air quality, restoring natural habitats, increasing biodiversity, reducing waste and making better use of resources. Key aspects of the Environment Act 2021 which are relevant to the Fens 2100+ include but are not limited to:

- Provisions that require that at least a 10% net gain for biodiversity be demonstrated through a Biodiversity Net Gain assessment (using Defra's Statutory Biodiversity Metric);
- A new mandatory system of spatial strategies for nature through Local Nature Recovery Strategies (LNRS); designed as tools to encourage more coordinated practical and focused action and investment in nature;
- Measures to support new and existing internal drainage boards (amending the Land Drainage Act 1991);
- Effective collaboration between water companies through statutory water management plans; and
- Requirement for local authorities to report to Defra on local air quality and local air quality management within their local authority area. This also requires an assessment of compliance against the relevant air quality standards.

2.2 Agriculture Act (2020)

The Agriculture Act for England [5], represents a significant shift in agricultural policy post-Brexit. This legislation aims to reward farmers and land managers for delivering "public goods" such as improved air and water quality, thriving wildlife, and measures to tackle climate change. The Bill includes measures to the phase out of the of Basic Payment Scheme (BPS) by 2028, which is proceeding as planned.

Key features of the bill include:

- Environmental Land Management Scheme: Farmers will be incentivised to provide environmental goods and services alongside food production. There will be three schemes:
 - the Sustainable Farming Incentive (SFI) will pay farmers to adopt and maintain sustainable farming practices that can protect and enhance the natural environment alongside food production, and support farm productivity;
 - Countryside Stewardship (CS) will pay for more targeted actions relating to specific locations, features and habitats. There will be an extra incentive through CS Plus for land managers to join up across local areas to deliver bigger and better results; and

- Landscape Recovery will pay for bespoke, longer-term, larger scale projects to enhance the natural environment.
- Transition Period: A seven-year transition period to move away from the EU's Basic Payment Scheme, which primarily rewarded the amount of land farmed, towards a system that rewards environmental benefits. This includes the phase out of the of Basic Payment Scheme (BPS) by 2028, which is proceeding as planned. In 2024, the payments are for the first time, delinked from land, meaning that farmers who were farming before 2024 will continue to receive the remainder of BPS through to 2027, even if they stop farming or dispose of land. These changes mean there will be a push towards farming being profitable at global market prices by 2028.
- Support for Innovation: Investments in new technology and research to boost productivity and sustainability in farming.

2.3 Flood and Water Management Act (2010)

The Flood and Water Management Act 2010 [6] is a significant piece of legislation in the UK aimed at improving the management of flood risk and water resources. Key aspects of this legislation include:

- Risk Management Authorities: The Act designates various authorities, including the Environment Agency, Lead Local Flood Authorities (LLFAs), and Internal Drainage Boards (IDBs), with specific responsibilities for managing flood risks.
- Partnership and Cooperation: It emphasises the need for these authorities to work in partnership and share information to effectively manage flood risks.
- Sustainable Drainage Systems (SuDS): The Act promotes the use of sustainable drainage systems to manage surface water and reduce flood risk.
- Flood Risk Management Strategies: Authorities are required to develop and implement strategies for managing flood risks, including mapping and assessing flood risks.
- Reservoir Safety: The Act includes provisions to improve the safety of reservoirs, ensuring they are regularly inspected and maintained.
- Powers and Duties: It grants new powers to authorities to carry out works to manage flood risks and imposes duties on them to maintain a register of structures or features that affect flood risk.

2.4 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) [7] sets out the Government's planning policies for England and how these should be applied. It was last updated in December 2024. It aims to achieve sustainable development through a balanced approach that considers economic, social, and environmental objectives. Key aspects of Sustainable Development in the NPPF include:

- Growth and innovation: Ensuring sufficient land is available to support economic growth, innovation, and productivity.
- Infrastructure: Coordinating the provision of infrastructure to support development
- Housing: Providing a sufficient number and range of homes to meet the needs of present and future generations.
- Community well-being: Fostering well-designed, safe, and accessible places that support health, social, and cultural well-being
- Natural and built environment: Protecting and enhancing natural, built, and historic environments.

- Resource efficiency: Using natural resources prudently, minimizing waste and pollution, and mitigating climate change impacts
- Meeting the challenge of climate change, flooding and coastal change: Supporting measures that ensure the future health and resilience of communities and infrastructure to climate change impacts, including flooding.

2.5 Environmental Improvement Plan (EIP) (2023)

The Environmental Improvement Plan for England (EIP) [8] details how the Government will work with communities and businesses to improve the environment compared to its current state. It is the first revision of the 25 Year Environment Plan (25YEP), providing interim targets to measure progress for improving the environment. Key aspects of the plan which are relevant to the Fens 2100+ include but are not limited to:

- Supporting the management of 70% of the countryside to adopt nature friendly land management practices by incentivising farmers;
- Updating a Green Finance Strategy setting out steps to leverage private finance to deliver the goals of the 25YEP;
- Published the Land Use Framework in 2023, setting out how to balance multiple demands on land including climate mitigation and adaptation;
- Deliver investment plan to improve coastal and flood defences, including £100 million on the most frequently flooded areas; and
- Reward farmers for actions to reduce risks and impacts from floods, droughts, and wildfires through the new future farming schemes.

2.6 Summary of key legislation and policy

A wide range of legislation is relevant to the different aspects of the environment and agriculture for Fens 2100+. Table 1 present a summary of the relevant key legislation, policy and guidance. This summary is not intended to be exhaustive and should be reviewed as part of any future interventions or projects.

Table 1: Summary of key environmental legislation and policy

Topic	Relevant Legislation, Policy and Guidance	Summary
Landscape	Guidelines for Landscape and Visual Impact Assessment [9]	Protection of landscape character and quality and the creation of Green Infrastructure.
	The European Landscape Convention (2006) [10]	
Agriculture	Autumn Budget 2024 [11]	The changes to Agricultural Property Relief (APR) and Business Property Relief (BPR) were announced in the Autumn Budget 2024. APR will be extended to include land managed under environmental agreements with the UK government, devolved governments, public bodies, local authorities, or approved responsible bodies. The 100% relief rate for APR and BPR will apply only up to a combined allowance of £1 million. These changes will be legislated in the Finance Bill 2024-25.
	Safeguarding our Soils - A strategy for	

Topic	Relevant Legislation, Policy and Guidance	Summary
Ground Conditions	England (2009) [12]	Protect best quality soils and agricultural land as well as the protection and restoration of peatland habitat.
	England Peat Action Plan [13]	
	Greater Cambridge Geodiversity Strategy [14]	
	Norfolk Geodiversity Action Plan [15]	
	Greater Lincolnshire Nature Partnership – Geodiversity Strategy (GLNP) [16]	
Water Environment	The Environment (Amendment etc.) (EU Exit) Regulations 2020 [17]	The key objectives of these acts/policies are to reduce and manage flood risk, improve water quality (so all water bodies achieve 'Good status' as set out in the Water Environment Regulations), prevent or limit groundwater pollution and promote the efficient use of water.
	Environmental Protection Act 1990 [18]	
	Water Resources Act 1991 [19]	
	The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (WFD) [20]	
	Land Drainage Act 1991 [21]	
	Water Act 2014 [22]	
	Water Resources (Abstraction and Impounding) Regulations 2006 [23]	
	Flood Risk Regulations 2009 [24]	
	Nitrate Pollution Prevention Regulations 2015 (as amended) [25]	
Biodiversity	The Conservation of Species and Habitat Regulations 2017 [26]	These pieces of legislation state the offences relating to protected species and the requirements for licenses to allow any damaging works to proceed. Specific actions which are prohibited by legislation can be made lawful on the approval and granting of a derogation license from Natural England (NE) and, or assent can be applied for when works are proposed within Special Site of Scientific Interest (SSSI) that could damage the interest features, or specific conditions are stated. In addition, the Habitats Regulations set out the requirement for the consideration of the potential effects of a plan or project upon European Sites through the Habitats Regulations Assessment (HRA) process.
	Wildlife and Countryside Act 1981 (as amended) (WCA) [27]	
	Natural Environment and Rural Communities (NERC) Act 2006 [28]	
	The Countryside and Rights of Way Act 2000 [29]	
	The Hedgerows Regulations 1997 [30]	
	Protection of Badgers Act 1992 [31]	
	The Salmon and Freshwater Fisheries Act 1975 [32]	
	The Eels (England and Wales) Regulations 2009 [33]	
	The Invasive Alien Species (Enforcement and Permitting) Order 2019 [34]	

Topic	Relevant Legislation, Policy and Guidance	Summary
Cultural Heritage	Ancient Monuments and Archaeological Areas Act (1979) [35]	Protect nationally important archaeological remains, historic buildings, historic landscape features and remains of military aircraft and vessels that have crashed, sunk or been stranded and of associated human remains
	Planning (Listed Buildings and Conservation Areas) Act (1990) [36]	
	Protection of Military Remains Act (1986) [37]	
	Hedgerows Regulations (1997) [30]	
	Treasure Act (1996) [38]	
Population and Health	Countryside and Rights of Way Act (2000) [29]	Promote sustainable and healthy communities and social inclusion and community participation. The policies and guidance encourage a 'whole system' approach to engaging planning and environmental agencies in support of health, well-being and social care provision.
	Health and Social Care Act (2012) [39]	
	Draft Cambridgeshire and Peterborough Joint Health Strategy [40]	
	Norfolk and Waveney Integrated Care Strategy and Norfolk Joint Health and Wellbeing Strategy [41]	
	Suffolk Joint Local Health and Wellbeing Strategy 2022-2027 [42]	
	Lincolnshire Joint Strategic Needs Assessment [43]	
	Lincolnshire Joint Health and Wellbeing Strategy [44]	
Air Quality	Air Quality Standards Regulations 2010 (amended in 2016) [45]	Defines the policy framework for twelve air pollutants known to have harmful effects on human health or the natural environment. The Secretary of State for the Environment has the duty of ensuring compliance with the air quality limit values. The regulation sets out the national air quality standards for NO ₂ , PM ₁₀ and PM _{2.5} . It also provides guidance on how air quality should be considered to comply with the NPPF.
	Planning Practice Guidance (PPG) 2014 [46]	
	Defra Clean Air Strategy 2019 [47]	

2.7 Local plans

The catchment spans the boundaries of eight Local Planning Authorities^{*2}, which are shown in Figure 4. Each local authority has a Local Plan setting out their vision and strategic policies:

- East Cambridgeshire District Council - East Cambridgeshire Local Plan [48];
- Fenland District Council - Fenland Local Plan [49];
- Huntingdonshire District Council - Huntingdonshire's Local Plan [50];
- South Cambridgeshire District Council - South Cambridgeshire Local Plan [51];

^{*2} Peterborough City Council, Cambridge City Council, and North Northamptonshire District Council also intersect with the catchment boundary but have been excluded from the analysis due to their minimal representation in the catchment area, accounting for only 0.1%, 0.001% and 0.01% respectively.

- South Holland District Council - South East Lincolnshire Local Plan [52];
- Breckland Council - Breckland Local Plan [53];
- Borough Council of King's Lynn and West Norfolk - The Local Plan for the borough is currently made up of the King's Lynn and West Norfolk Borough Council Local Development Framework - Core Strategy (adopted in 2011) and the Site Allocations and Development Management Policies Plan (adopted 2016) [54]; and
- West Suffolk Council – the local plan currently consists of the former Forest Heath and St Edmundsbury areas, but there is an emerging Local Plan for West Suffolk which was submitted for examination in May 2024 [55].

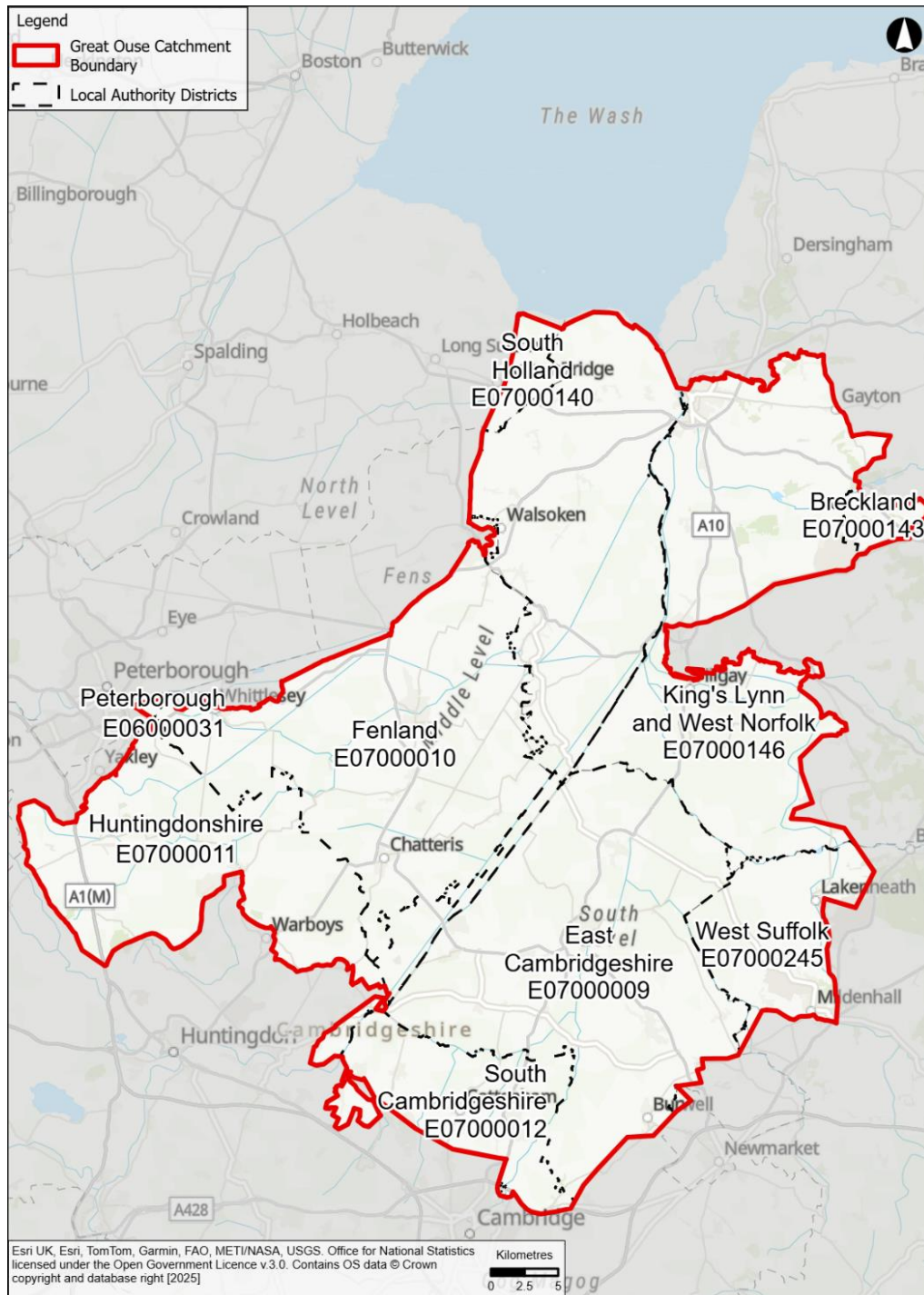


Figure 4: Local authority districts within the catchment

2.7.1 East Cambridgeshire Local Plan

The East Cambridgeshire Local Plan [48] sets out several policies relevant to environment and agriculture in the south-east of the catchment:

- Policy ENV 1 – Landscape and settlement character: any development should protect, conserve, and where possible enhance the pattern of distinctive landscape features, such as watercourses, field patterns and characteristic vegetation, as well as public amenity and access, and the unspoilt tranquillity of the area.
- Policy ENV 7 – Biodiversity and geology: All development proposals will be required to protect the biodiversity and geological value of land and buildings and minimise harm to or loss of environmental features, such as trees, hedgerows, woodland, wetland and ponds. Opportunities for creation, restoration, enhancement and connection of natural habitats should be maximised.
- Policy ENV 9 – Pollution: proposals will be refused where there are unacceptable impacts arising from the development on air quality, health and safety of the public, surface and groundwater quality, and the natural environment, general amenity and the tranquillity of the wider rural area, including noise and light pollution.
- Policy ENV 11 – Conservation areas: Development proposals, within, or affecting a Conservation Area should preserve or enhance the character or appearance of the area, and seek to retain attractive traditional materials and original architectural features.
- Policy COM 4 – New community facilities: New or improved community facilities should be located within settlement boundaries wherever possible, be accessible by foot and cycle, and be designed to facilitate future adaptation for alternative or shared usage.
- Policy COM 5 – Strategic green infrastructure: Proposals which would harm any of these strategic sites will be resisted: Ely Country Park; Ely Ouse corridor; Soham Town Commons; Littleport Urban Greenway; Ouse Washes improvement and habitat creation; Wicken Fen Vision; Green Fen Way (Fens Adventurers Partnership); Fens Waterways Link; Block Fen Nature Reserve. All development should be consistent with the objectives of the Cambridgeshire Green Infrastructure Strategy [56].

2.7.2 Fenland Local Plan

The policies of relevance to environment and agriculture in the Fenland District [49] include:

- LP2 – Facilitating Health and Wellbeing of Fenland Residents: Development proposals should contribute to the highest attainable standard of health amongst Fenland's residents, irrespective of their characteristics. Good access should be provided to health, leisure and recreation facilities.
- LP6 – Employment, Tourism, Community Facilities and Retail: Opportunities for jobs growth in the district will be maximised with the aim of achieving 7,200 net additional jobs over the period 2011-2031. To achieve this jobs growth target, the Council will facilitate the delivery of 85ha of new employment land to provide for business, industrial and distribution uses, concentrated in March, Wisbech, Chatteris and Whittlesey.
- LP16 – Delivering and Protecting High Quality Environments Across the District: Development proposals will only be permitted if they meet rigorous requirements relating to the protection of biodiversity, heritage, amenity value, public safety, and light and noise pollution.
- LP18 – The Historic Environment: The Council will protect, conserve and seek opportunities to enhance the historic environment throughout Fenland, for example by taking steps to reduce the number of heritage assets in Fenland on English Heritage's Heritage at Risk Register.

- LP19 – The Natural Environment: The Council will promote the preservation, restoration and re-creation of priority habitats, and the preservation and increase of priority species identified for Fenland in the Cambridgeshire and Peterborough Biodiversity Action Plans.

2.7.3 Huntingdonshire's Local Plan

In the Local Plan for Huntingdonshire [50], the policies of relevance to environment and agriculture include:

- LP3 – Green Infrastructure: The Great Fen, west of Ramsey, and the Great Ouse Valley Landscape Character Area have been identified as Green Infrastructure Priority Areas within the district. They have potential to consolidate and link important habitats and facilitate access improvements.
- LP15 – Surface Water: A proposal will only be supported where surface water has been considered from the outset as an integral part of the design process. SuDS should be integrated into developments where possible and provision made for their maintenance. There should be no adverse effect on the quality or quantity of water resources.
- LP16 – Sustainable Travel: New development will be expected to contribute to an enhanced transport network that supports an increasing proportion of journeys being undertaken by sustainable travel modes.
- LP30 – Biodiversity and Geodiversity: Proposals will only be supported where there will be no adverse impact on water bodies, and other ecosystems, and where adverse impacts are unavoidable they must be minimised as far as possible and then mitigated.
- LP34 – Heritage Assets and their Settings: Great weight and importance is given to the conservation of heritage assets and their settings.
- LP35- Renewable and Low Carbon Energy: A proposal for a renewable or low carbon energy generating scheme will be supported where all potential adverse impacts have been mitigated. It sets even more rigorous planning guidelines for wind energy developments.
- LP36 – Air Quality: An Air Quality Assessment must accompany large-scale development proposals, and further low emissions strategy may be required where adverse impacts are predicted.

2.7.4 South Cambridgeshire Local Plan

South Cambridgeshire covers the far south of the catchment. The Local Plan for the district [51] includes the following relevant policies:

- CC/4: Water Efficiency: The Cambridge Water Company is in an area of water stress as designated by the Environment Agency. All new residential developments must achieve as a minimum water efficiency equivalent to 110 litres per person per day (compared to the UK average of 150 litres of water per day).
- CC/7: Water Quality: All development proposals must demonstrate that appropriate SuDS measures have been considered, and that the quality of ground, surface or water bodies will not be harmed, and ideally improved through re-naturalisation of river morphology, and ecology.
- NH/2: Protecting and Enhancing Landscape Character: Development will only be permitted where it respects and retains or enhances the local character and distinctiveness of the local landscape.
- NH/3: Protecting Agricultural Land: Planning permission will not be granted for development which would lead to the irreversible loss of Grades 1, 2 or 3a agricultural land, unless such land is allocated for development in the Local Plan.

- NH/4: Biodiversity: New development must aim to maintain, enhance, restore or add to biodiversity. Opportunities should be taken to achieve positive gain through the form and design of development.
- NH/5: Sites of Biodiversity or Geological Importance: Proposed development likely to have an adverse effect on land within or adjoining a Site of Biodiversity or Geological Importance will not be permitted, except in exceptional circumstances where benefits outweigh any adverse impact.
- NH/6: Green Infrastructure: The Council will encourage proposals which: reinforce, link, buffer and create new green infrastructure, and enhance public enjoyment of it.

2.7.5 South East Lincolnshire Local Plan (2011-2036)

A small portion of the north-western catchment is under the jurisdiction of South Holland District Council. The South East Lincolnshire Local Plan [52] was prepared jointly by Boston Borough Council and South Holland District Council and adopted in March 2019. The following policies are considered key to environment and agriculture:

- Strategic Policy 3 – Design of New Development: outlines the requirement for new developments to respect and enhance the character of the landscape and the quality of an area. The policy also recognises the importance of using high quality and inclusive design and layout to make innovative use of local traditional styles and materials.
- Strategic Policy 4 – Approach to Flood Risk: outlines the requirement for development proposals to take account of flood risk issues and ensures that new development will be resilient to the potential consequences of flooding.
- Strategic Policy 28 – The Natural Environment: recognises the importance of protecting both national and locally-designated habitats and species; and the value of addressing gaps in the ecological network in the Local Plan area.
- Strategic Policy 29 – The Historic Environment: outlines the policy approach with respect to Listed Building and Conservation Areas within the Local Plan area. The policy also recognises the role of enabling development in securing improvements to heritage assets.
- Strategic Policy 30 – Pollution: outlines how new developments must account for environment impacts on surface and groundwater quality, in particular, adverse effects arising from pollution.

2.7.6 Breckland Local Plan

The following policies relevant to the Breckland district [53] in the north-eastern corner of the catchment are considered key to environment and agriculture:

- Policy TR 01 – Sustainable Transport Network: The council will improve safety, security and healthy lifestyles by encouraging walking and cycling, creating and improving links to existing routes and, for new developments, ensuring the provision of facilities such as secure, accessible bicycle parking with changing facilities on site.
- Policy ENV 04 – Open Space, Sport and Recreation: All new residential development of 11 or more dwellings will be expected to provide a contribution towards outdoor playing space equivalent to 2.56 hectares per 1,000 population.
- Policy ENV 07 – Designated Heritage Assets: The significance of designated heritage assets (including their settings), such as listed buildings, scheduled monuments, registered parks and gardens and conservation areas, will be conserved, or wherever possible enhanced. Great weight shall be given to their conservation.

- Policy EC 06 – Farm Diversification: In order to ensure that agricultural businesses are sustainable and competitive, well-conceived proposals relating to the diversification of farm businesses will be supported where they can help ensure the long-term viability of existing farm businesses and provide rural employment opportunities.

2.7.7 King's Lynn and West Norfolk Borough Council Local Development Framework - Core Strategy

The majority of the northern catchment falls under the jurisdiction of King's Lynn and West Norfolk Borough Council. The following policies in the Local Plan [54] are considered key to environment and agriculture:

- Policy CS06 – Rural Areas: The Council will work to maintain local character and a high quality environment and focus most new development in key rural service centres to ensure employment, housing (including affordable housing), services and other facilities are provided in close proximity.
- Policy CS07 – Coastal Areas: It is recognised that some land may in time be lost to the sea, therefore any development on the coast must be sustainable and able to withstand the effects of climate change; mitigation strategies will be developed for threatened sites that may be designated of special importance, historic interest, or particular landscape character. Coastal communities have been consulted and feel that improved public transport, footpaths, cycleways, year-round services, and employment are key areas of need. The council will support and develop services which attract visitors throughout the year and provide for the local community to increase economic sustainability for businesses and services.
- Policy CS12 – Environmental Assets: The Borough Council will work with partners to ensure an integrated network of green infrastructure throughout the urban and rural areas. Development should seek to avoid, mitigate or compensate for any adverse impacts on biodiversity, geodiversity and heritage as well as seeking to enhance sites through the creation of features of new biodiversity, geodiversity and heritage interest.

2.7.8 West Suffolk Local Plan

The current West Suffolk Local Plan [55] (consisting of the former Forest Heath area and former St Edmundsbury area) has the following policies that are relevant to the environment and agriculture:

Former Forest Heath area:

- SP CS2 – Natural Environment: Areas of landscape, biodiversity and geodiversity interest and local distinctiveness within the district will be protected from harm and their restoration, enhancement and expansion will be encouraged, particularly on brownfield sites or areas which are currently lacking biodiversity.
- SP CS3 – Landscape Character and the Historic Environment: Outlines the requirement for development proposals to protect the local character and distinctiveness of the landscape and historic environment.
- SP CS4 – CS5 Design Quality and Local Distinctiveness: Outlines the policy approach for development to enhance the character, appearance and environmental quality of an area.
- CS 12 – Strategic Transport Improvement and Sustainable Transport: proposals for improved rights of way, and the extension of the national cycle network in the district will be supported.

Former St Edmundsbury area:

- SP CS2 – Sustainable Development: Developments should make the most resource efficient use of land and infrastructure, and should protect and enhance biodiversity, wildlife and geodiversity.
- SP CS3 – Design and Local Distinctiveness: Proposals for new development must create and contribute to a high quality, safe and sustainable environment, including consideration of landscape context and historic views.
- SP CS7 – Sustainable Transport: All proposals for development will be required to prioritise walking, cycling, and public transport above commercial vehicles and private cars.

3. Methodology

This section presents an overview of the methodology used to develop the catchment-scale environmental and agricultural baseline. It has been produced using a desk-based review of publicly available information from a variety of sources.

3.1 Catchment study area

Figure 5 presents an overview of the study area used for the catchment environmental and agricultural baseline.

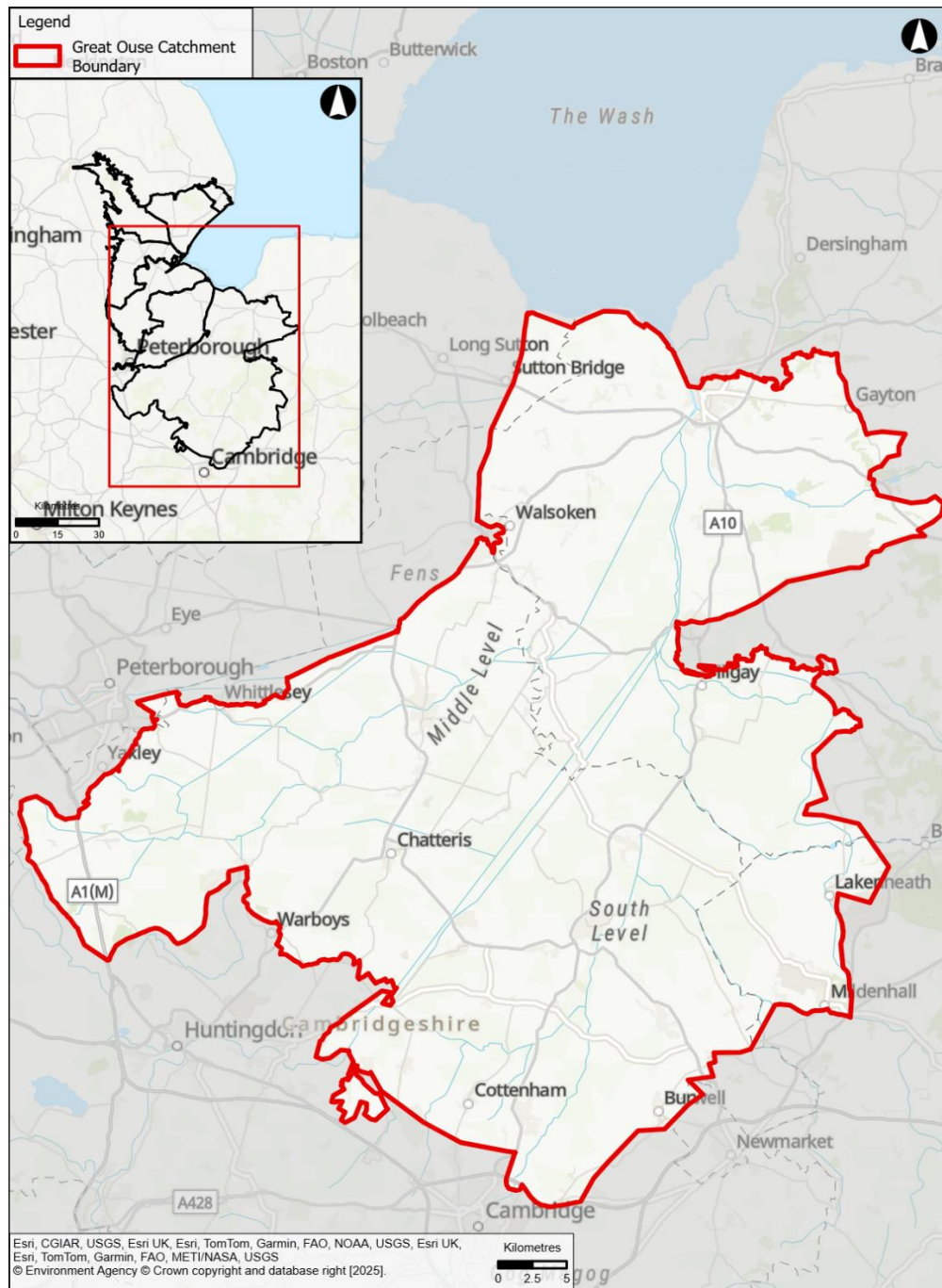


Figure 5: Great Ouse catchment

3.2 Limitations and Assumptions

The following limitations and assumptions have been made in the production of this catchment-scale baseline report:

- The baseline collated comprises a proportionate level of detail from publicly available data sources and it is reported at the geographical basis relevant to the data availability. Therefore, this report reviews and provides commentary of existing reports written by others. Arup accept no responsibility for any error or omission in this report which is due to an error or omission in the original documentation we refer to. Arup have not independently verified the information and have assumed it to be accurate, complete, reliable, and current as of the date of such information.
- This baseline assessment has not been informed or verified by any field surveys or site visits conducted by Arup.
- Due to the strategic nature of this baseline report, engagement and consultation with external stakeholders or statutory consultees has not been undertaken to inform this report.
- This baseline assessment is currently limited to the catchment boundary that has been defined for the Fens 2100+ project by the Environment Agency. It should be noted that the zone of influence for any future interventions or projects as part of Fens 2100+ may extend beyond the study area identified in Figure 5.
- Arup has used publicly available data to undertake a review of baseline conditions throughout the study area.

The following limitations and assumptions apply to the individual environmental and agricultural baseline chapters presented in this document:

- Landscape:
 - The landscape baseline excludes discussion on the significance of landscape and visual considerations.
- Agriculture:
 - The agricultural baseline is based on the official data available which is produced at district level. There is no official data boundary that matches the catchment study area. Data reported within this baseline has been sense-checked against other sources such as published satellite data and been informed by local sector knowledge, to ensure that the estimates are as robust as possible.
 - As publicly available satellite derived data on land cover (and crops) improves over the next 5 years, the ability to analyse agricultural data at small spatial levels will improve. However, agricultural cropping is also subject to larger year to year variations, often due to extreme weather events, or longer-term changes in the market. Therefore, even if detailed data was available, e.g. for the 2023-'24 crop year, this would need to be treated with caution and averaged with other years.
 - The greenhouse and controlled environment agriculture data resolution is poor at national as well as regional levels, as Defra withdrew from collecting this data in the early 2010s. This baseline therefore uses the limited Defra data to sense-check local knowledge of the larger greenhouse units. The output per hectare in this sector is also extremely variable from crop to crop and farm to farm. The approach taken was to use conservative averages derived from Defra national data and to check this against feedback from individual growers. This exercise was undertaken by Collison and Associates.
 - The main additional assumption is that farms in the catchments do not, on average, deviate much from regional and national averages of output for the enterprises they

run. This is the only practicable way to produce the data, as individual farm level data is not available or published by any source. Our working assumption is that, given the higher productivity in general of the Fens that this produces a conservative estimate of the true value of farm output in the Fens.

- Ground conditions:
 - This baseline does not provide a review of available ground investigation data (borehole data etc.) beyond those specifically outlined or comprise the development of a catchment level ground model. Further, this baseline excludes discussion on the significance of mineral safeguarding designations, their specific extents or resource volume capability.
- Water environment:
 - The water environment baseline excludes in-depth discussion on Water Framework Directive / Water Environment Regulations. Reporting of all Water Environment Regulations baseline data or delivery of any preliminary compliance assessments has been excluded.
- Biodiversity:
 - The biodiversity baseline excludes discussion on non-statutory designated sites (e.g. Local Wildlife Sites and Roadside Nature Reserves). Records of protected and notable species from Local Environmental Records Centres or flora or fauna records have not been obtained at this stage.
- Cultural heritage:
 - The cultural heritage baseline excludes discussion on the significance of heritage assets, the assessment of impact(s), and a detailed baseline analysis which would identify non-designated heritage assets and specific areas of archaeological potential.
- Population and health
 - The population and health baseline is based on the official data available which is published at different spatial boundaries. There is no official data boundary that matches the catchment study area. The baseline collated comprises a proportionate level of detail from publicly available data sources and it is reported at the geographical basis relevant to the data availability. Different classes of administrative unit each have their own datasets in terms of the geographical scale at which they operate and these have been used to inform the baseline:
 - Lower Layer Super Output Area (LSOAs)
 - Middle Layer Super Output Areas (MSOAs)
 - Lower Tier Local Authority Areas
 - Upper Tier Local Authority Areas
- Air Quality:
 - The air quality baseline will exclude discussion on consideration of pollutants other than NO₂, NO_x, PM₁₀ and PM_{2.5}. No dispersion modelling has been carried out at this time.

4. Catchment-scale baselines

The following sections provide an overview of the environmental and agricultural baseline.

4.1 Landscape

This section outlines the baseline landscape characteristics for the catchment. Table 2 outlines the key terminology used in this section.

Table 2: Glossary of landscape and land use terminology

Terminology	Summary Definition
National Character Area	A National Character Area (NCA) is a natural subdivision of England based on landscape, biodiversity, geodiversity, and economic activity. Their boundaries follow natural lines in the landscape, not county or district boundaries. This makes them a good framework for decision-making and planning for future change [57].
Landscape Character Assessment	The process of identifying and describing the unique variations in the character of the landscape. It aims to explain the distinct combination of elements and features that make one landscape different from another [58].
Green and Blue Infrastructure	Refers to a strategic network of natural and semi-natural areas designed to deliver a wide range of environmental, social, and economic benefits.

4.1.1 Landscape character

National Character Area

The majority of the catchment is located within the National Character Area (NCA) 46 The Fens [59] (see Figure 6). The Fens NCA is a distinctive, historic and human influenced wetland landscape lying to the west of The Wash estuary. The NCA is notable for its large-scale, flat, open topography with extensive vistas to level horizons. The level, open topography shapes the impression of huge skies which convey a strong sense of place, tranquillity and inspiration.

Vegetation cover largely comprises meadows, coastal and flood plain grazing marsh, purple moor-grass and rush pastures and sparse woodland. Given the flat and open landscape, new planting can introduce inappropriate and visually intrusive elements.

The NCA has a distinctive hierarchy of rivers, drains and ditches which strongly influences the dominant rectilinear/geometric landscape pattern which is a consistent feature of the area. The drainage infrastructure (including the network of drainage ditches, embankments and pumping stations) provides an evident reminder of the area's reclaimed past. Efforts to drain the area have resulted in much of the Fens area being predominantly utilised for arable agriculture (wheat, root crops, bulbs, vegetables and market gardening).

Statements of Environmental Opportunity (SEO) for the NCA have been identified by Natural England³ based on the unique characteristics and properties of the Fens. These priorities comprise the following which should be considered during future project stages:

³ Statements of Environmental Opportunity are developed by Natural England and reflect their opinion on how best to secure environmental gains within each NCA.

- Manage the agricultural landscape and soils which allow the Fens to be a major provider of food and horticultural produce, while seeking to enhance opportunities for biodiversity.
- Manage the core wetland complexes and increase their connectivity by enhancing the main rivers, waterways and their associated riparian habitats and improve recreational access opportunities to the Fens.
- Plan for the creation of new coastal landscapes in The Wash area that are adapted and resilient to the impact of climate change, for the benefit of people and wildlife.
- Conserve, manage and enhance the Fens landscape and increase educational opportunities to access its geodiversity, archaeology and cultural heritage to enhance enjoyment and understanding for those who live, work in and visit the Fens.
- Seek partners to aid in the development and future provision of new, distinctive, Fenland economies.

The far south-west of the catchment is located within NCA 88 Bedfordshire and Cambridgeshire Claylands [60]. The Bedfordshire and Cambridgeshire Claylands NCA is a gently undulating, lowland plateau divided by shallow river valleys that gradually widen as they approach The Fens NCA in the east. The landscape is predominantly an open, arable landscape of planned and regular fields.

The far south-east of the catchment is located within NCA 87 East Anglian Chalk [61]. The East Anglian Chalk NCA is characterised by the narrow continuation of the chalk ridge that runs south-west north-east across southern England. The landscape is rolling chalkland hills with large regular fields, with sparse vegetation, straight roads and expansive views to the north.

The far east of the catchment is located within NCA 85 The Brecks [62]. The Brecks NCA has an ages-old identity, a particular land use and a richly distinctive wildlife. The underlying geology has produced a low, gently undulating plateau, largely covered with sandy soils of glacial origin.

The far north-east of the catchment is located within NCA 76 North West Norfolk [63]. The North West Norfolk NCA extends from Downham Market on the edge of the Fens east towards Castle Acre, and skirts Fakenham before sweeping eastwards into a narrowing triangular area abutting the western edge of the Cromer Ridge. The landscape features an open, rolling topography which contrasts with the surrounding coastal, fenland and other lowland areas.

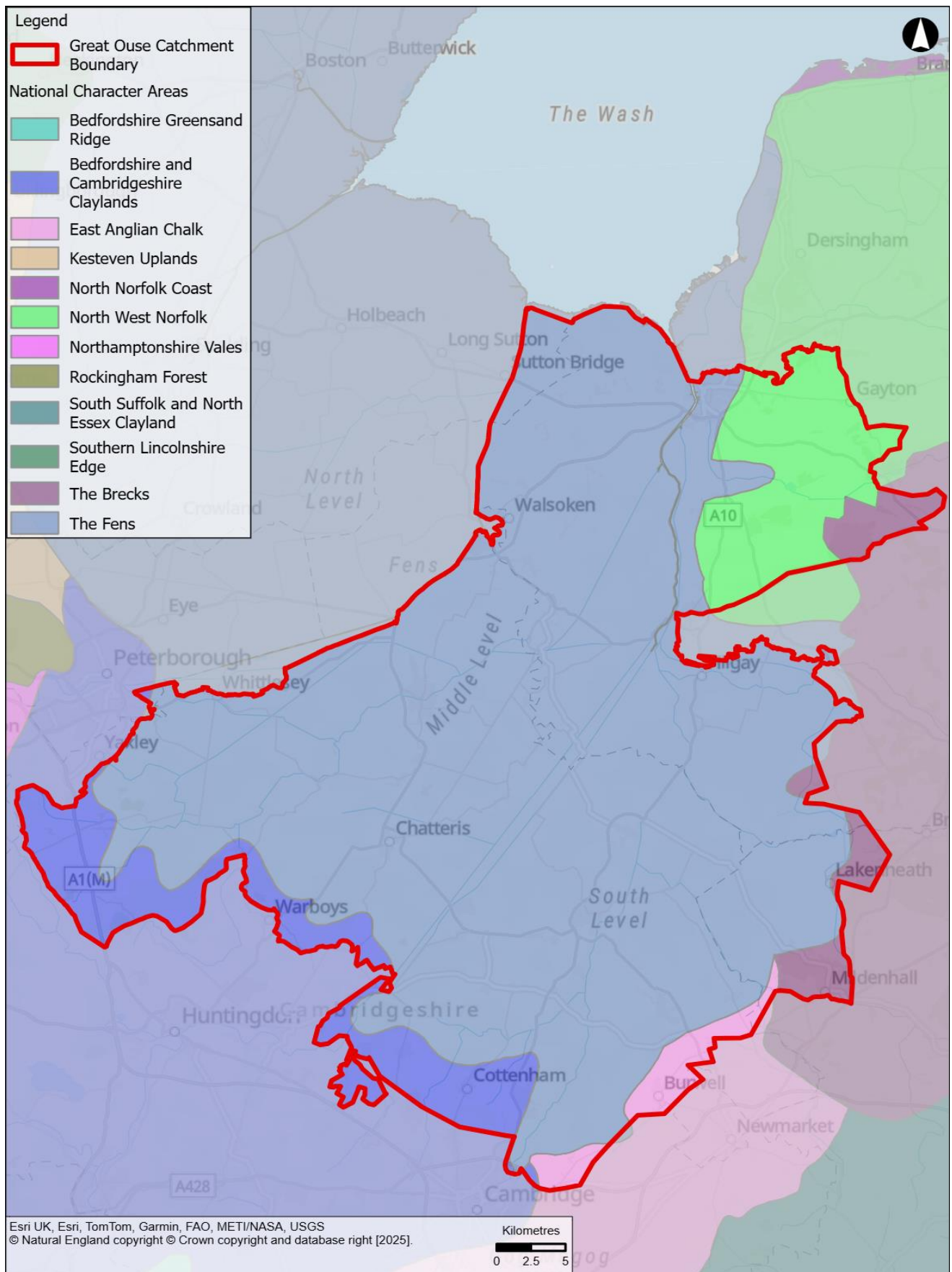


Figure 6: National Character Areas for the catchment

Landscape Character Assessment

The catchment falls within multiple administrative boundaries, as such, the most up to date Landscape Character Assessments are detailed below in Table 3. These are used as a material construction when determining planning applications.

Table 3: Summary of Landscape Character Assessments for local authorities within the catchment

Local Authority	Date Published	Landscape Character Assessment
East Cambridgeshire District Council	N/A	There is currently no published Landscape Character Assessment covering East Cambridgeshire. This will be kept under review during later stages of the project and baseline studies to understand the local landscape character will be undertaken as required.
Fenland District Council [64]	2009	The catchment is spread across five LCAs defined by the study. These comprise: The Fens, Wisbech Settled Fen, Chatteris Clay Island, March Clay Island and Whittlesey Island. • The Fens feature a large-scale, flat, and open landscape with extensive views and large skies. It is largely unsettled, with an arable landscape of isolated villages and scattered properties, rectilinear fields divided by artificial drainage ditches, few hedgerows, and long straight roads elevated above the surrounding fields. • The Wisbech Settled Fen features a large-scale, flat, and open landscape with extensive views and large skies. It is largely unsettled, with an arable landscape of isolated villages and scattered properties, rectilinear fields divided by artificial drainage ditches, few hedgerows, and long straight roads elevated above the surrounding fields. • The Chatteris Clay Island features a slightly elevated clay island within the surrounding peaty Fens, rising to a maximum height of 11mAOD. It has a highly visible settlement edge with a historic core of buildings. Poplar and other tree belts create strong linear features around fields and isolated properties. • The March Clay Island features a slightly elevated clay island within the surrounding peaty Fens, rising to a maximum height of 6mAOD. It has a built edge of settlements with industrial structures and limited woodland. The area includes paddocks and smaller fields related to settlements, hedgerows and poplar belts along old and windy roads. • The Whittlesey Island features a slightly elevated clay island within the surrounding Fens, rising to a maximum height of 8mAOD. The island appears relatively wooded in distant views, especially to the east, and has a highly visible settlement edge. The landscape is degraded in

Local Authority	Date Published	Landscape Character Assessment
		association with Hanson brickworks west of Whittlesey. Large industrial buildings and associated infrastructure are found to the east of Whittlesey.
Huntingdonshire District Council [65]	2022	The catchment is spread across five LCAs defined by the study. These comprise: The Fens, Fen Margin, Central Claylands (including the Central Claylands sub-area of extensive woodland), Great Ouse Valley and Northern Wolds. • The Fens features an expansive, flat landscape below sea level with open views. Predominantly used for arable agriculture on dark peaty soil, the area relies heavily on water management with prominent ditches, dykes and rivers, and has a geometric layout with limited settlement, sparse woodland cover and significant vertical features. • The Fen Margin features a low-lying area that slopes gently eastwards towards the Fens, with well-vegetated landscapes including deciduous woodland, hedgerow trees, and orchards. It has a matrix of land uses such as arable farmland, pasture, airfield, orchards, deciduous woodland and settlements. • The Central Claylands feature gently undulating arable farmland with a large-scale field pattern and few hedgerows, creating a predominantly open landscape. It features relatively large-scale developments, major transport corridors, extensive ancient woodland in the north-west and regularly spaced traditional villages. • The Great Ouse Valley features a mosaic of land uses united by their topography and relationship to the River Great Ouse, which meanders through the landscape. It includes significant towns and villages with attractive buildings, wetlands, flood meadows, grassland, willow and poplar trees, existing and former gravel workings, traditional structures of bridges and mills, and various recreational activities, including boating, fishing and camping. • The Northern Wolds feature a strong topography of ridges bisected by pronounced villages, with well-vegetated valleys. It is a historic landscape with medieval features, with little modern development.
South Cambridgeshire District Council [66]	2021	The catchment is spread across eight LCAs defined by the study. These comprise: 1A Ouse Floodplain Fens, 1B Cow Fen, 1C Bare Fen to Fildwell Fen, 1D North Fen to Milton Fen, 2A Longstanton Fen Edge Claylands, 2B Cottenham Fen Edge Claylands, 6A Fen Ditton Fen Edge Chalklands and 6C Fulbourn Fen Edge Chalklands.

Local Authority	Date Published	Landscape Character Assessment
		• The Ouse Floodplain Fens features a broad, flat floodplain landscape south of the River Great Ouse, transformed by extensive gravel pit lakes and wetlands. The area is highly accessible with a network of Public Rights of Way and cycle routes and has a strong sense of place due to its archaeologically rich landscape and historic droveways. • The Cow Fen features a regimented pattern of arable fields defined by drains and low mature hedgerow boundaries. It is generally unsettled, comprising isolated small farms, and has a sense of isolation and separation from the Fen Edge village. The Bare Fen to Fildwell Fen features an open, low-lying, flat floodplain landscape with expansive views to distant horizons. It has a regular rectilinear enclosure pattern defined by drains, dykes and lodes, sparse woodland cover with fragmented hedgerows and isolated trees, and limited settlement consisting of isolated farms and occasional small, linear settlements along the roads. • The North Fen to Milton Fen features a broad, flat floodplain landscape with wide views interrupted by shelterbelts. It has a distinctive rectilinear field pattern defined by ditches, drains and hedgerow boundaries. There is limited settlement comprising small, scattered farms along roads. • The Longstanton Fen Edge Claylands features a settled rural landscape with villages having historic linear cores on elevated fen 'islands' and small, isolated farms. It features fragmented pockets of ecological value, deciduous woodlands and traditional orchards. The Cottenham Fen Edge Claylands features a well-settled rural landscape with large villages having historic linear cores on elevated 'islands'. It includes pockets of remnant parkland, orchards, hedgerows and shelterbelts, creating a distinctive vegetation pattern near the villages, while urban influences from Cambridge and major roads in the south contrast with the rural character. • The Fen Ditton Fen Edge Chalklands features an irregular pattern of large rectilinear fields contrasting with smaller, more regular field patterns around settlement edges. It has a settled rural landscape with small villages having historic linear cores and isolated farms, and urban influences from the proximity to Cambridge, including large-scale transport infrastructure and hospitals. The Fulbourn Fen Edge Chalklands features a scattered woodland cover, including remnant historic parkland near historic villages. It has small-scale field patterns around settlement edges, a settled rural landscape with historic linear settlements and isolated farms, and pockets of ecological value such as

Local Authority	Date Published	Landscape Character Assessment
		floodplain grazing marsh and lowland meadow.
South Holland District Council [67]	2003	The catchment is spread across one Landscape Character Type (LCT). The Settled Fen, defined the study is a predominantly flat terrain with main roads, rivers and drainage channels on raised banks. It features nucleated settlements with mature trees, prominent church spires and medium to large fields with intensive market gardening, strong hedgerows and views restricted by shelterbelts and woodlands.
Breckland District Council [68]	2022	The catchment is spread across one LCA (D1: Swaffham Heath), The Swaffham Heath is a gently undulating landscape with free-draining sandy soils supporting arable cultivation, pig farming and plantation woodland. It is sparsely populated, characterised by scattered Halls, farm buildings, historic parklands and a few nucleated villages and hamlets.
The Borough Council of King's Lynn and West Norfolk [69]	2007	The catchment is spread across six LCTs and 21 LCAs defined by the study. The LCTs comprise: B Drained Coastal Marshes, D The Fens – Settled Inland Marshes, E The Fens – Open Inland Marshes, F – Wooded Slopes with Estate Land, G Farmland with Woodland and Wetland and H Settled Farmland with Plantations. - The LCAs comprise: B1 Terrington, D1 Clenchwarton Marsh, D2 Walpole, Terrington and Clench Warton, D3 Terrington St John, D4 Emneth, West Walton and Walsoken, D5 Outwell, E1 Tilney All Saints, E2 Saddlebow and Wormegay, E3 Wiggenshall St Mary, E4 Marshal St James, E5 Downham West, E6 Hilgay Fen, E7 Welney River, E8 Denver Sluice, E9 Methwold, E10 Feltwell, H1 Stow Bardolph, H2 Fincham, H5 Northwold and H6 Hilgay and Southery. - The Drained Coastal Marshes features a large-scale, open and exposed landscape reclaimed from The Wash, bordered by sea defence walls. Dominated by large geometric arable fields bordered by drainage ditches and dykes, the area has a flat landform, embanked rivers, sparse settlement with occasional isolated farmsteads and stationary caravans. - The Fens – Settled Inland Marshes features a large-scale, low-lying landscape with open views, intensively farmed arable fields divided by straight drainage channels and dykes. It is a well-settled landscape with villages and individual farms, with constant movement from main roads and farm machinery. - The Fens – Open Inland Marshes features a large-scale, flat landscape with extensive vistas and wide-open skies. It

Local Authority	Date Published	Landscape Character Assessment
		has strong geometric and linear patterns from large-scale intensive arable farming, largely unsettled with villages and dispersed farmsteads and is dominated by human influences including artificial drainage channels, ditches and dykes. • The Wooded Slopes with Estate Land features a medium-scale landscape dominated by coniferous and mixed plantation woodlands, with arable farming areas and varying degrees of enclosure. It includes gently undulating, sloping landform cut by tributaries, settlements and urban influence from the edge of King's Lynn. • The Farmland with Woodland and Wetland features mixed agricultural fields, woodland, and open water, creating a medium-scale landscape with varied enclosure. The terrain is flat to gently undulating, with irregular fields bound by hedgerows and settlements on higher ground. • The Settled Farmland with Plantations features medium to large fields interspersed with woodland and belts, creating a medium-scale landscape with some enclosure. The topography is mostly flat and the landscape is dominated by arable crop production, scattered farm dwellings, low-density settlements, suburban development near Downham Market and a distinctive military character at RAF Marham airfield. • The LCTs presented in the King's Lynn and West Norfolk Borough Landscape Character Assessment provide sufficient detail at a proportionate scale to the project and summaries are therefore provided below. At later stages of the project the LCAs identified above may be useful to inform proposals, responding to context at a finer grain of detail.
West Suffolk District Council [70]	2022	The catchment is spread across four LCAs which are divided further into eight sub-areas. These four LCAs comprise: The Fen and Fen Edge LCA, The Brecks Sandlands LCA, The Chalk Landscapes LCA and The River Valleys LCA. • The Fen and Fen Edge features a diverse mix of farmland on peaty soils and settlements on low chalk and gravel outcrops, with isolated farmsteads and barns sheltered by trees. The area has a vast open landscape with geometric fields, limited settlement and extensive managed wetlands. • The Brecks Sandlands features gently rolling plateau farmland with large-scale geometric arable fields and mixed woodland on free-draining soils. Settlement is highly dispersed, with isolated farmsteads and small groups of cottages and larger settlements on the fringes. The Chalk

Local Authority	Date Published	Landscape Character Assessment
		Landscapes features gently rolling or flat terrain surrounding Newmarket, with free-draining chalky soils supporting large-scale crop production in rectilinear fields. Settlement includes areas of studscape and fen edge settlements, while modern infrastructure fragments the landscape. • The River Valleys features a flat river valley threading through forested Brecks to the open fen edge, with peaty fen floodplain enclosed by woodland. The diverse landscapes includes historic villages, meadows, farmland, woodland, heathland, and parkland, with medium-scale arable farmland and floodplain pastures. • The LCAs presented in the West Suffolk District Landscape Character Assessment provide sufficient detail at a proportionate scale to the project and summaries are therefore provided below. At later stages of the project the LCA sub-areas identified above may be useful to inform proposals, responding to context at a finer grain of detail.

4.1.2 Statutory designated landscapes

There are no statutory landscape designations (i.e. National Parks or National Landscapes⁴) within the catchment. The Norfolk Coast National Landscape is located approximately 230m from the northern boundary. There are no local landscape designations within the catchment.

The close proximity of the catchment to a nationally designated landscape would require further analysis at the later stages of the project to fully understand potential impacts.

Heritage and nature conservation designations can contribute to landscape character and landscape value outside of statutory and locally designated landscapes. Please see Section 4.5 and Section 4.6 for further information.

4.1.3 Green and blue infrastructure

The far north of the catchment (South Holland District Council) is covered by The Wash and Fens Green Infrastructure Plan [71] identifying plans to enhance access to green infrastructure, promote biodiversity and proposals for the creation of new habitat networks. The Plan includes habitat network maps that identify potential opportunities to create and enhance habitat networks across the catchment and wider Fens landscape. Potential areas for habitat enhancement or creation within the catchment comprises:

- Coastal habitat enhancement or creation – an area located in The Wash and an area located along the River Nene; and
- Grassland habitat enhancement or creation – an area at the confluence of River Nene and North Level Main Drain.

⁴ Following the government's Landscapes review of 2019, Areas of Outstanding Natural Beauty (AONB) became National Landscapes as of November 2023. A number of documents including legislation still refer to these as AONB. The statutory status of National Landscapes remains.

The south of the catchment is covered by the Cambridgeshire Green Infrastructure Strategy [56] which identifies plans to shape and co-ordinate the delivery of green infrastructure in the county. The plans include the Strategic Network which is a county-wide framework on which to provide new or enhance existing green infrastructure in Cambridgeshire up to and beyond 2031. Strategic areas within the catchment comprise:

- Strategic Area 1: River Nene;
- Strategic Area 2: Huntingdonshire Fens and Wood;
- Strategic Area 3: Great Ouse;
- Strategic Area 4: Eastern Fens and Towns; and
- Strategic Area 6: Cambridge & Surrounding Areas.

The north-east of the catchment is covered by the Borough Council of King's Lynn and West Norfolk Green Infrastructure Study: Stage Two [72] which promotes and supports the delivery of green infrastructure in the Borough of King's Lynn and West Norfolk. High priority projects within the catchment comprise:

- Fens Waterway Link – Ouse to Nene (King's Lynn);
- Fens Waterways – Sea Lock at Great Ouse Relief Channel (King's Lynn);
- King's Lynn/Wash/Norfolk Coastal Path (King's Lynn);
- Brecks Regional Park (Borough Level);
- Countryside and Recreation Zone (King's Lynn);
- Gaywood Valley (Borough Level);
- Hardwick Industrial Estate (King's Lynn);
- Nar Riverside Park (King's Lynn);
- Waterfront Regeneration Area (King's Lynn);
- Wissey Living Landscapes (Downham Market);
- Allotments (Borough Level); and
- The development of SuDS (Borough Level).

The south-east of the catchment is covered by the West Suffolk Green Infrastructure Study [73] which identifies plans to enhance access to green infrastructure for the district. The Plan includes priority areas that identify potential opportunities to create and enhance habitat networks across the catchment and wider landscape. Priority areas within the catchment comprise:

- Priority Area 1: River Lark Corridor; and
- Priority Area 2: Little Ouse Corridor.

Green Infrastructure mapping undertaken by Natural England [74] indicates that the catchment comprises sparse tree cover, however there are small areas of accessible woodlands within the catchment. Small areas of accessible woodland within the catchment are located within King's Lynn, Roydon, March, Whittlesey, Chatteris, Somersham, Ely, Bawsey, Lakenheath, Mildenhall, Wicken, Milton, Soham, Earith, Holme, Sawtry and Ramsey.

The catchment falls within the boundaries of the Greater Lincolnshire Local Nature Recovery Strategy [75] (LNRS), the Cambridgeshire and Peterborough LNRS [76] and the Norfolk County Council Local Nature Recovery Strategy which are currently being developed to identify priorities and opportunities for nature recovery [77]. These strategies will help map areas of existing high-quality habitats or areas of biodiversity, outline opportunities to recover or enhance biodiversity and identify local priorities to provide broader environmental benefits. The Greater Lincolnshire LNRS, the Cambridgeshire and Peterborough LNRS and the Norfolk County Council LNRS are part of Round 1 of the national rollout.

4.2 Agriculture

This section outlines the baseline agricultural land uses and productivity of the catchment. Table 4 outlines the key terminology used in this section.

Table 4: Glossary of agriculture terminology

Terminology	Summary Definition
Agricultural Land Classification	A system used in England and Wales to assess and compare the quality of agricultural land. It categorises land into five grades based on its versatility and suitability for growing crops.
Countryside Stewardship (CS)	Countryside Stewardship is part of ELMS and recently has undergone changes in what in funds. It provides financial incentives to farmers, foresters, and land managers to improve and protect the environment. CS Higher Tier will open in summer 2025.
Entry Level Stewardship (ELS)	An agri-environment scheme in England under the previous Common Agricultural Policy (CAP) that provided funding to farmers and land managers for delivering environmental management on their land. This is now closed to new agreements.
Environmental Land Management Scheme (ELMS)	ELMS are part of the broader agricultural policy reforms in England, transitioning from the EU's Common Agricultural Policy (CAP). It provides financial incentives and support to landowners for making changes to their land that produce environmental benefits. These schemes aim to promote sustainable farming practices, enhance biodiversity, improve water and air quality, and contribute to climate change mitigation. There are currently three ELMS Schemes.
Gross Value Added	An economic productivity metric that measures the contribution of a corporate subsidiary, company, or municipality to an economy, producer, sector, or region.
Soilscape	A soilscape is a classification used to describe the broad regional differences in soil types and their distribution across a landscape. Soilscapes are helpful for understanding the general characteristics of soils in a region, including their carbon stock, which can inform land management, agricultural practices, and environmental conservation efforts.

4.2.1 Overview of soilscape within the catchment

Throughout most of the catchment towards The Wash the land is soilscape 21 [78], *'Loamy⁵ and clayey soils of coastal flats with naturally high groundwater'*, a soil with *'Lime-rich to moderate'* status. This soilscape depending on how light it is, can support different cropping, *'Lighter soils support a wide range of crops and are highly productive as they contain much available water and are stoneless and flat. Heavier soils are less easily worked and favour grass'*.

Throughout much of the centre and south of the catchment, as well as in smaller pockets elsewhere except for the west of Ouse area adjacent to The Wash, Natural England's 2008 peaty soils locations layer [79] maps more than 119,000 hectares of land as peaty soils. This area is equivalent to more than a quarter of the lowland peat area [80]. These soils are identified by Cranfield as primarily soilscape 23 *'Loamy and sandy soils with naturally high groundwater and a peaty surface'* and smaller areas of soilscape 27 *'Fen peat soils'*; as well as a single area mapped as soilscape 26 *'Raised bog peat soils'* south of Yaxley.

This peat mapping is however out of date, as peat drainage, causes oxidisation and degradation, reducing their extent, and releasing significant greenhouse gases over time [80]. Consequently,

⁵ Loamy soils are composed of a balanced mixture of sand, silt and clay, offering excellent nutrient retention and water-holding capacity. Its structure and fertility make it highly suitable for most plant species and agricultural applications.

most of this area has degraded to wasted peat soils, or to peat remnant mineral soils where the peat layer has oxidised away completely. Natural England and DEFRA released an updated England Peat Map in 2025 which provides a national dataset of peat and peaty soils. The dataset was produced using remote sensing techniques and may contain local inaccuracies in data. In 2011, Holman and Kechavarzi, estimated that less than 32,000 hectares of peatland (thick peat, peat at depth, or thin peat), was still extant in the Fens as a whole [81], with continued loss having continued since; compared to the c.120,000 hectares mapped by the 2008 peaty soils location layer. The estimated carbon stock of peatland within the catchment is discussed further in the Natural Capital Technical Appendix.

In addition to these peat soil areas, and areas of coastal flats, there are further areas throughout the catchment, apart from the northern area west of Ouse by The Wash, of soilscape 18 *‘Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils’*; soilscape 3 *‘Shallow lime-rich soils over chalk or limestone’*; soilscape 8 *‘Slightly acid loamy and clayey soils with impeded drainage’*; soilscape 10 *‘Freely draining slightly acid sandy soils’*; soilscape 15 *‘Naturally wet very acid sandy and loamy soils’*; soilscape 20 *‘Loamy and clayey floodplain soils with naturally high groundwater’*; soilscape 9 *‘Lime-rich loamy and clayey soils with impeded drainage’*; soilscape 5 *‘Freely draining lime-rich loamy soils’*; and soilscape 6 *‘Freely draining slightly acid loamy soils’*.

4.2.2 Overview of Agricultural Land Classification within the catchment

Across the catchment, around 1,580km² (72%) of land is classified as ALC Grade 1 and 2 land, with the majority of the Grade 1 land located in the central section of the catchment (see Figure 7). Table 5 presents an overview of ALC classification.

Table 5: Overview of ALC classification within the catchment

	Grade 1	Grade 2	Grade 3	Grade 4	Non-agricultural
Area (km ²)	919.1	660.7	403.2	110.8	62.3
Percentage of catchment (%)	41.8%	30.1%	18.4%	5%	2.8%

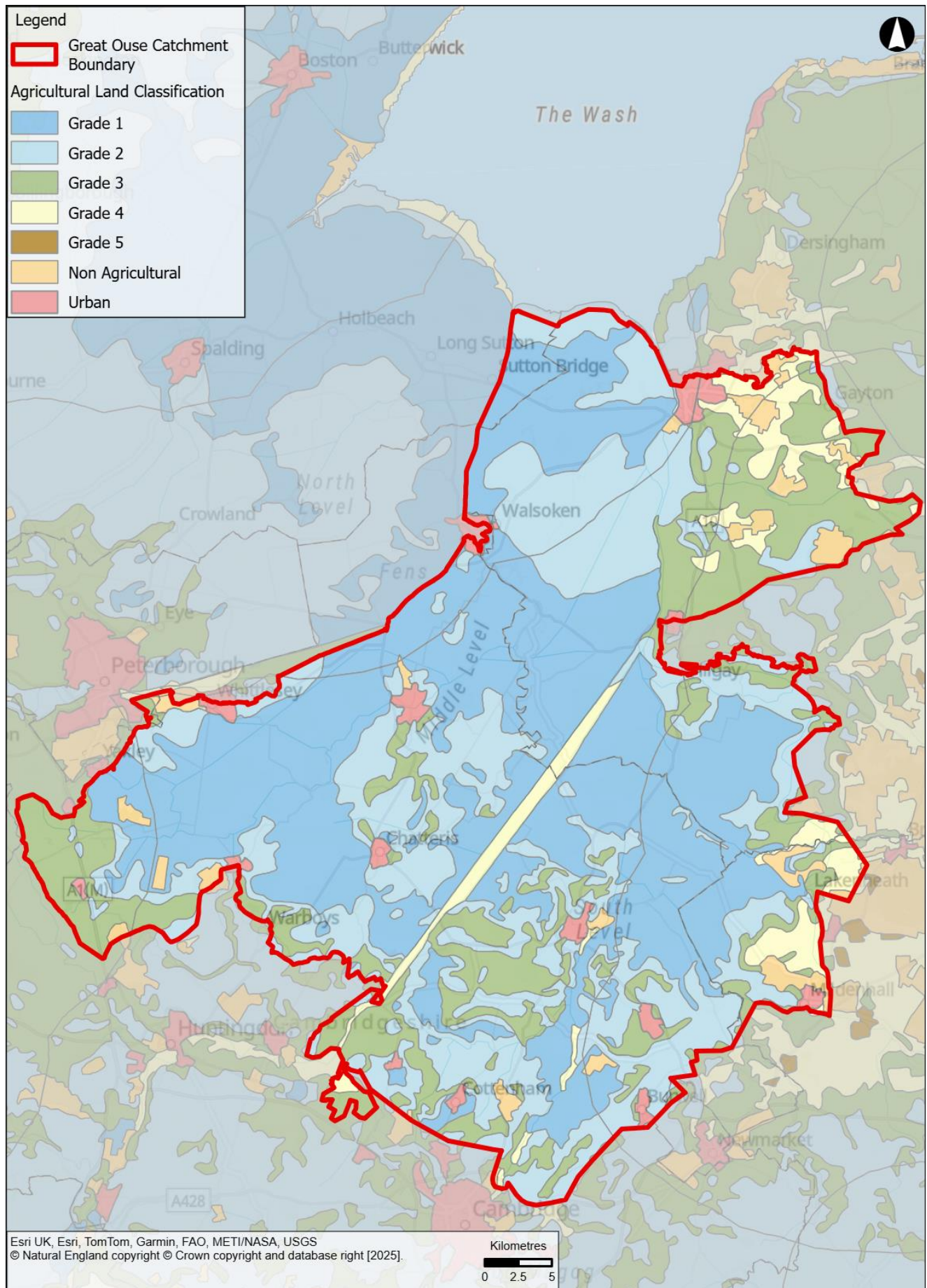


Figure 7: Agricultural land classification for the catchment

4.2.3 Agriculture and water management

The catchment is included within several abstraction licensing strategy catchments. These include the Cam and Ely Ouse abstraction licensing strategy (ALS) [82], the Old Bedford including Middle Level ALS [83], the North-West Norfolk abstraction licensing strategy [84] and the Nene catchment ALS [85]:

- Cam and Ely Ouse ALS covers the south of the catchment. Notably this ALS area indicates abstraction in the region of 341 million m³, of which 14.6% was for agriculture. Currently in the area of the Great Ouse, the majority of the catchment has water available at Q30 flows⁶ and above, and restricted water available at Q50, whereas at flows lower than these levels the whole catchment has no water available.
- The Old Bedford including Middle Level ALS, covers the centre of the Great Ouse Fens. This strategy shows that water is only available for licensing over winter, and that it includes 3 areas, at the Great Fen, adjacent to Denver, and East of Warboys which are environmentally sensitive to abstraction.
- The North-West Norfolk ALC covers the north-eastern part of the Great Ouse Fens, though only provides assessment on the availability of water for the areas east of the River Great Ouse. Water is available in the Great Ouse catchment for: less than 30% of the time near the Polver drain; 30-50% of the time at the upper River Nar; and at least 50% of the time adjacent to the A47 east of King's Lynn.

Given the variability of water abstraction throughout the catchment, and the salinity constraints in the north of the catchment, a number of farmers have invested in recent decades in on-farm water storage reservoirs.

As well as farm reservoirs, there is a proposal for a new Fens Reservoir to the north of Chatteris, and filling from the Middle Level System, and the Dog in a Doublet Sluice, the Anglian Water Fens Reservoir [86]. This reservoir is expected to have a significant impact on the volumes of water which are discharged at the St German's pumping station because it will draw water primarily from the Middle Level system.

The catchment has a long history of flooding which impacts both properties and farming. Recent events include

- 2023: Heavy rain in Storm Babet and early 2024 caused significant strain to the drainage infrastructure throughout the catchment leading to widespread localised flooding and waterlogging of lower lying roads and fields.

Flooding has major impacts on crops and to a lesser extent areas of land utilised for livestock grazing. Flood events can restrict the ability to establish new crops, reduce crop yields and quality, or can destroy crops once ready for harvest leading to direct agricultural damages and wider economic consequences for landowners.

4.2.4 Value of agriculture in the catchment

The catchment is home to several UK leading agricultural and horticultural businesses, many of which are also engaged in food processing.

⁶ The Environment Agency's Water Resources Geographical Information System provides a snapshot in time on water availability at four flow snapshots. From high to low, these are: Q30 (i.e. the flow of a river which is exceeded on average for 30% of the time, therefore you would expect the river flow to be lower than Q30 on 256 days in an average year, i.e. a higher flow), Q50, Q70 and Q95. These are calculated for each integrated Water Framework Directive waterbody and looks at the balance between the flow in the river, the quantity needed to support the ecology and the water that can be licensed for abstraction.

Approximately 1717km² (78%) of land across the catchment is currently farmed. Land use is not published at catchment level, so the catchment's crop area has been proxied as its relative proportion [87] of the East Cambridgeshire, Fenland, Huntingdonshire, South Cambridgeshire, South Holland, Breckland, King's Lynn and West Norfolk and West Suffolk districts crop areas, and checked using satellite imagery of crop cover, to estimate the land use allocation as set out in Table 6.

Table 6: Estimated land use, crop areas and livestock populations on commercial agricultural holdings, 2022 data [88] (Rounded to nearest decimal place)

	Total farmed area	Cereals	Arable crops excl. cereals	Grassland	Fruit and vegetables
Great Ouse catchment (km ²)	1717.1	840.7	417.1	224	65.3
Percentage of farmed land in the catchment (%)	n/a	49%	24.3%	13%	3.8%

Crops produce direct economic output, whereas grassland does not directly create economic value but instead supports the grazing of sheep and cattle, or the production of livestock feed or (AD) energy inputs. It is estimated that the agricultural value of across crop areas (based on 2023 data) [89] is as follows:

- Cereal production – c.£120.8 million
- Poultry – c.£61.4 million
- Other arable – c. £97.3 million
- Fruit and vegetables – c.£124.8 million

Grassland does not directly create economic value but instead supports the grazing of sheep and cattle, or the production of livestock feed. The estimated overall economic output of crop and livestock is in the region of £520.8 million, highlighting the importance of the agricultural sector.

Within the catchment, there are a range of renewable energy enterprises in operation however, without the availability of accurate data on the revenues from the farm diversification enterprises in the catchment, the national average has been used to provide a conservative output figure. The gross annual agricultural output (including farm related diversification) in the catchment is therefore believed to be c.£580 million (in 2023 values).

4.2.5 Agriculture and the food chain

Farming is critical to the local economy within the catchment. The whole agri-food chain employs people at different stages of food production, from agriculture to food processing and packing and retail.

In the local authority areas that the catchment is located in, a total of 20,030 people were directly employed in crop and animal production, hunting and related service activities sector in 2022.

It is estimated that agriculture supports around 6,117 jobs across the catchment. These 6,117 jobs have a Gross Value Added (GVA) of £37,312 per job, whereas across the UK as a whole, with a total workforce of 462,000 people in 2023 [89] and agricultural GVA of £13.681 billion, agricultural GVA was only £29,613 per job, or 23% lower than the catchment.

Employment from direct agriculture also supports wider jobs across in the agri-food supply chain. In 2023, farmers purchased £21.086 billion of intermediate consumption (e.g. seeds); and invested £5.140 billion in fixed capital across the UK. Input and capital spending therefore was equivalent to £26.226 billion to generate £34.767 billion of gross output, or 75.4% of gross output. Spending by farmers in the catchment on inputs and capital can therefore be estimated as being £0.438 billion (2023). Given that approximately £300,000 of input spending is believed to support one FTE job in the agricultural input supply chain, this spending is equivalent to a further 1,458 jobs supported by farms.

In 2022 Great Britain had employment in the wider food chain [90] of:

- Agriculture (and fishing): 469,000;
- Food and drink manufacturing: 445,000; and
- Food and drink and agricultural raw materials wholesaling: 250,000; and
- Freight logistics sector: 703,300 staff (road, rail and water freight), of which c.30% can be attributed to the food and drink supply chain.

As such 210,990 jobs were associated with logistics in the end-to-end food chain, of which 40% is believed to be focused on the manufacturing and farm to factory gate end of the food chain or c.84,400.

The UK produces around 60% of its food consumption [91] with imports c.40% of its food. Given, that a proportion of domestic food and drink manufacturing, wholesale and logistics is reliant on imported ingredients, it can be estimated that 75% of food chain employment depends on domestic production. Therefore, it is estimated that agriculture and fishing supported a total of $(75\% * (445,000 + 250,000 + 84,400))$ 584,550 jobs in the food and drink chain. As such every job on farm, supported a further 1.25 jobs in the further supply chain.

This national figure however ignores differences between food types, with vegetables and fruit supporting higher supply chain multiples. Similarly, some 'other arable crops' such as potatoes or sugar beet, also disproportionately support more supply chain jobs.

Therefore, in the catchment, as across the Fens as a whole, given the over-representation of vegetable production, and that of higher value crops such as sugar beet or potatoes, this supply chain job multiplier is believed to be higher, at 2 jobs per job supported on farm. Therefore, agriculture in the catchment can be estimated as supporting 12,235 food processing, distribution, storage and wholesale jobs locally and nationally.

The reliance on local employment in food processing, and related industries is demonstrated across the catchment with a number of large food supply chain businesses present.

4.2.6 Agriculture and the environment

Within the catchment there is a large amount of land entered into various countryside stewardship including mid-tier Countryside Stewardship agreements and higher tier agreements (see Figure 8). As well as Countryside Stewardship agreements in the new ELMS framework, a small number of farms still have historic Entry (ELS) or Higher-Level Stewardship (HLS) agreements which are yet to close. It is believed many farms will replace these historic schemes with new ELMS agreements in the future. These stewardship areas are not however evenly spread in the catchment, with these agreements covering most of the middle and south level areas of the catchment, as well as east of the Ouse. The area west of Ouse towards The Wash has notably fewer land parcels covered by agreements, mainly due to the presence of more higher value cropping.

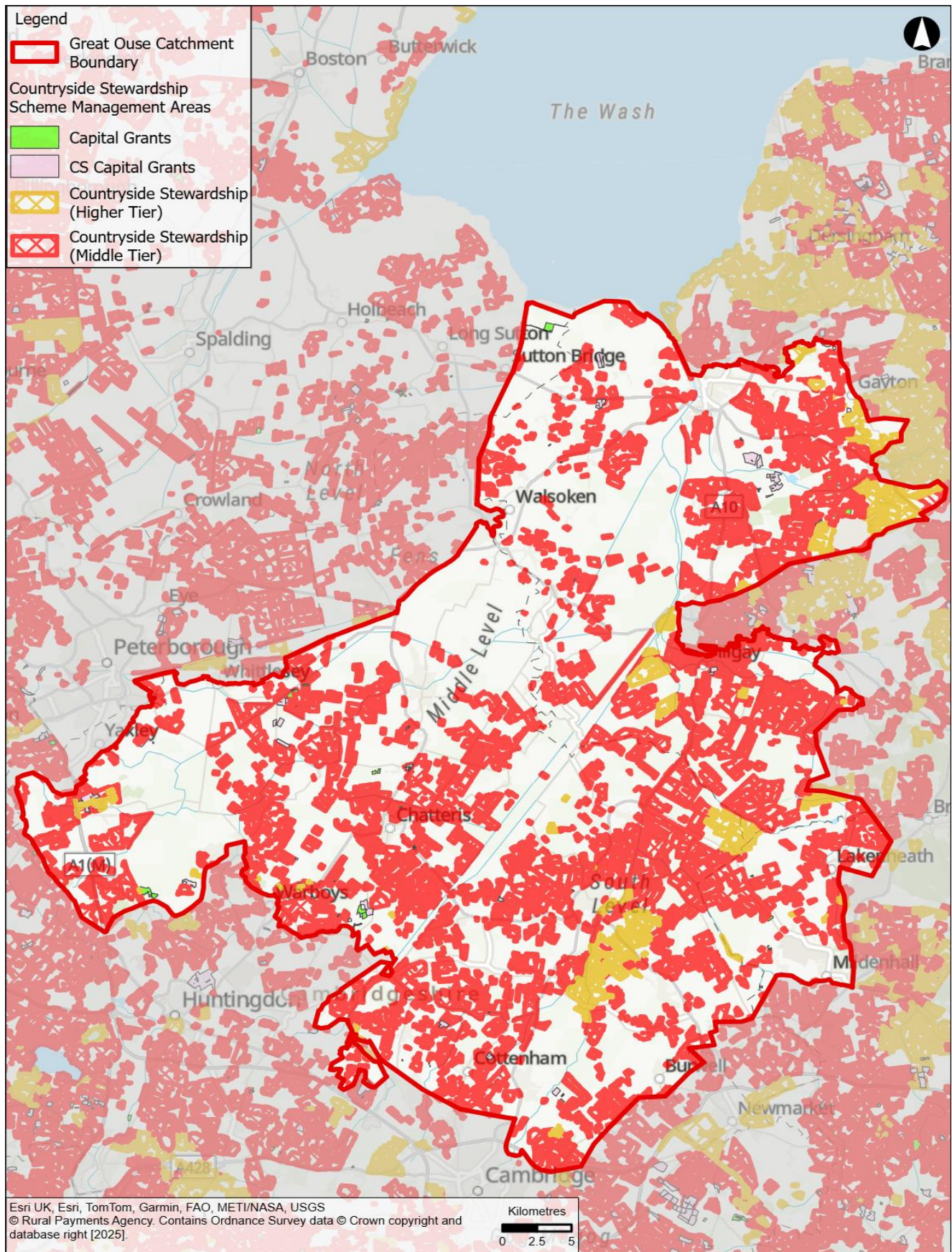


Figure 8: Overview of current environmental stewardship agreements within the catchment

4.3 Ground conditions

This section outlines the baseline ground conditions in the catchment. Table 7 outlines the key terminology used in this section. It should be noted that superficial deposits of a coastal or marine origin can be highly variable and complex in their composition, deposition and extent. Those presented here are intended to provide an insight into a variety of deposits that may be encountered within the catchment and may not represent the full variety and complexity of such deposits.

Table 7: Glossary of ground conditions terminology

Terminology	Summary Definition
Source Protection Zones (SPZs)	SPZs are defined areas around large and public potable groundwater abstraction sites to protect and safeguard drinking water quality. They constrain the proximity of any activities that may impact upon drinking water abstraction. [92]
Nitrate Vulnerable Zone (NVZs)	NVZs are areas designated as being at risk from agricultural nitrate pollution and include just over half of all land in England [93]. Nitrate pollution poses a risk to water quality through eutrophication which is harmful to aquatic life, disrupts biodiversity and damages sensitive habitats and has the potential to affect drinking water.
Engineered materials	Earthworks where the ground has been artificially realigned or adapted. These materials can be poorly sorted, containing an undefined mix of silts, sands, gravels and peats and other organic materials.
Palaeochannels / Roddons	A remnant reach of river bed representing areas of incised channel and tidal creek systems, cut contemporaneously into the underlying clay deposits and filled with “fossilised” silt and sand.
Buried valleys	An ancient, abandoned river or drainage network which has become partially or completely buried by more recent sediment.
Faulting	The process of rock masses breaking and moving along fractures in the Earth’s crust causing displacement.

4.3.1 Catchment-scale designations

Source Protection Zones (SPZ)

Only a few select areas on the eastern boundary of the catchment are designated as being in a SPZ. These areas are around Mildenhall, Narborough and Gayton. These designations include Zone I – Inner Protection Zone, Zone II - Outer Protection Zone and Zone III – Total Catchment. The definition of the zones is provided in Table 8.

Table 8: Source Protection Zone definitions as per Groundwater source protection zones (SPZs) - GOV.UK [92]

Designation	Definition
Inner Zone – SPZ1	A groundwater SPZ1 is the area immediately around an abstraction point for domestic supply or for food production purposes. Groundwater in a SPZ1 is most vulnerable to pollution given the close proximity of the abstraction point and the water's intended use for human consumption. It is defined within the Environmental Permitting (England and Wales) Regulations 2016 as one of the following. 1. The area within 50m of a point where the groundwater is abstracted for domestic supply or food production purposes. 2. The area where it takes groundwater that is intended to be used to supply water for domestic or food production purposes up to 50 days to travel to the groundwater abstraction point. For any given abstraction point, whichever area is largest applies.
Outer Zone – SPZ2	A groundwater SPZ2 is the area around an abstraction point for domestic supply or for food production purposes that meets one of the following definitions. • The area within 250m of the abstraction point if the maximum allowable annual volume, divided by 365, is less than 2,000m³ per day. This is when this is authorised by either: ○ an abstraction licence under section 24 of the Water Resources Act 1991. ○ the right to abstract small quantities under section 27 of the Water Resources Act 1991. • The area within 500m of the abstraction point if the maximum allowable annual volume, divided by 365, is equal to or greater than 2,000m³ per day. This is when this is authorised by an abstraction licence under section 24 of the Water Resources Act 1991. • The area where it takes groundwater that is used to supply water for domestic or food production purposes up to 400 days to travel to the groundwater abstraction point. For any given abstraction point, whichever area is largest applies.
Total catchment – SPZ3	This is the area around a supply source within which all the groundwater ends up at the abstraction point. This is the point from where the water is taken. This could extend some distance from the source point.

Nitrate Vulnerable Zone (NVZ)

The majority of the catchment is regarded as a NVZ, with the exception of the northwest corner of the catchment near Wisbech and Sutton Bridge.

Radon

The risk from radon is significantly influenced by the underlying bedrock geology. Most of the catchment is designated as no apparent risk from Radon. The entire catchment falls within the less than 1% of homes at or above Action Level [94], however some areas such as that between Chatteris and Ely and between Gayton and Old Hunstanton are regarded having a maximum radon potential is 5 to 10 %.

4.3.2 Geology

The geology of the catchment is covered by the following geological maps:

- 1:50,000 King's Lynn and The Wash 145 Solid and Drift Geology [95];
- 1:50,000 Fakenham 146 Solid and Drift Geology [96];

- 1:50,000 Peterborough Sheet 158 Solid and Drift Geology [97];
- 1:50,000 Wisbech Sheet 159 Solid and Drift Geology [98];
- 1:50,000 Ramsey Sheet 172 Solid and Drift Geology [99];
- 1:50,000 Ely Sheet 173 Solid and Drift Geology [100]; and
- 1:50,000 Cambridge Sheet 188 Solid and Drift Geology [101].

The strata identified within the catchment including those designated as engineered materials, superficial deposits and bedrock geology are described below:

Engineered materials

The catchment is predominately an artificially drained and heavily engineered landscape with a significant reliance on the use of the Ouse Washes for controlled flooding and the operation of many sluices. Much of the catchment has been altered by artificial realignment or adaption of pre-existing watercourses or the formation of new cuts and drains.

It is commonly observed that many raised flood embankments in the area originate from the 1600s e.g. the first sluice at Denver being constructed in 1651 and are dredging bunds. For some, they have also been adapted and now support roads and access tracks but have not necessarily been strengthened to accommodate for modern traffic loads. As a result, pavement deformation is common across the road network.

Similarly, the composition of these earthworks is often of poor quality and identified as comprising of locally sourced materials, commonly from channel “digout” or from deepening and widening exercises. Material from subsequent dredging activities is also locally incorporated to raise the embankments or spread out on the land as natural fertiliser. These materials are frequently poorly sorted, containing an inconsistent mix of silts, sands, gravels, peats, and other organic matter. At Hockwold Diversion Sluice, it was noted that earthwork composition could be locally variable with some sections being notably sandy and others appearing to be more clayey and cohesive. It is also noted that peat shrinkage is a notable contributing factor.

Superficial deposits

The catchment exhibits a range of superficial deposits which can be roughly divided into three main types of superficial deposits. In the northern half of the catchment, Tidal Flat Deposits are predominant apart from in the northeast corner, east of places such as West Winch and Watlington where a mix of fluvial gravels (River Terrace Deposits), glacial materials, peat and head deposits take precedence. The southern half of the catchment is predominantly covered by broad areas of peat with localised areas of glacial material, alluvium (such as along the Great Ouse) and some areas of fluvial gravels (River Terrace Deposits).

An overview of the superficial materials that may be encountered within the catchment is presented in Figure 9.

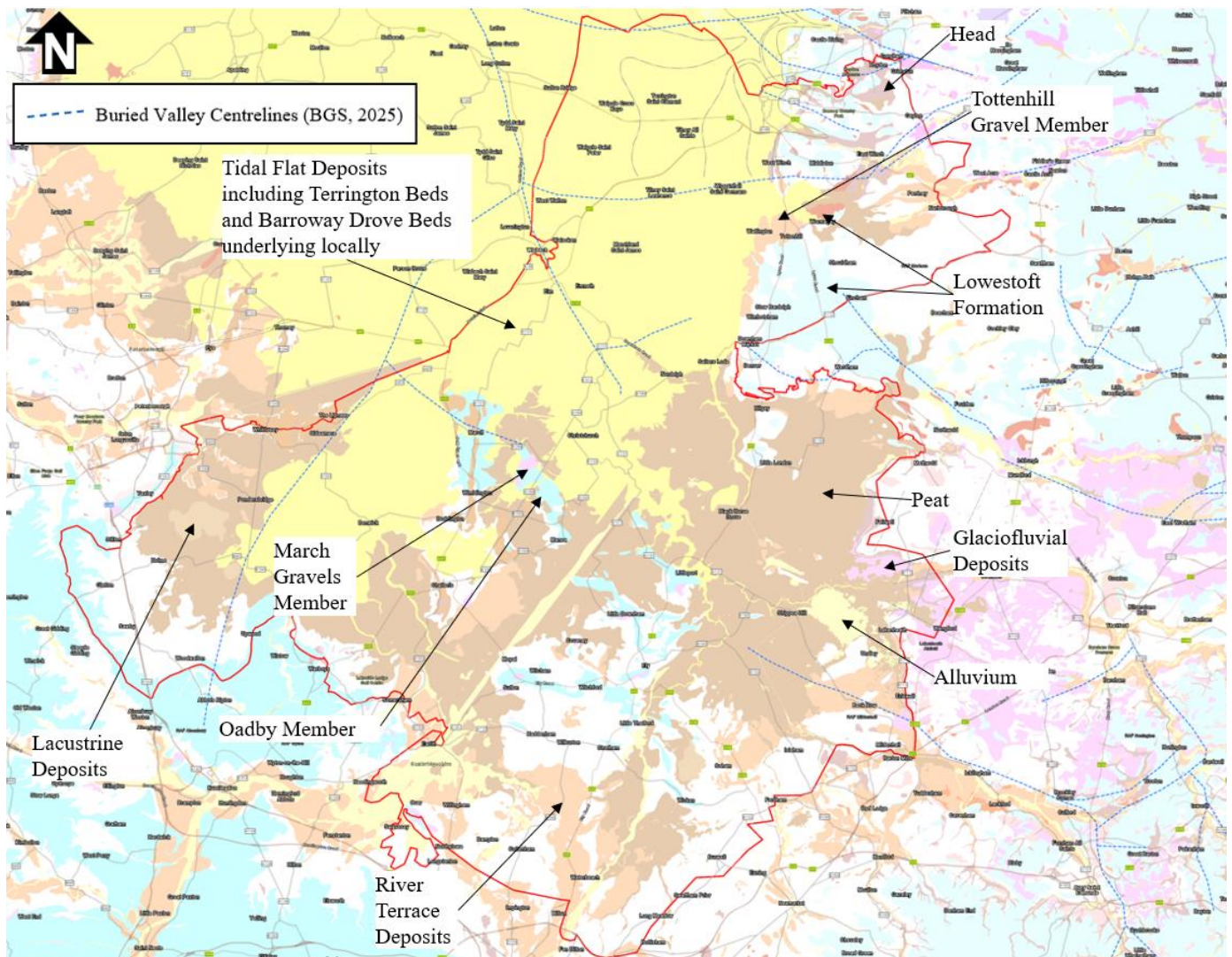


Figure 9: Simplified overview of superficial deposits in the catchment from BGS 1:50K geological mapping

Head

Head deposits are identified in the northeastern portion of the catchment near Roydon and East Winch. Head deposits are regarded as a function of topography and are representative of erosion of hillside materials. They are often composed of cohesive materials, often mottled brownish orange and contain a mix of other materials. They are also prone to shallow angle slope failures. Historical borehole TF72SW4 (between Roydon and Grimston) describes a Head deposit as “brown clay and gravel” to a depth of 1.22mbgl.

Alluvium

Alluvium or Alluvial materials, derived from fluvial sources are commonplace across the catchment and will be subject to frequent periods of deposition and reworking. Alluvium is often grey or brown in colour but can be locally variable and is predominantly composed of cohesive materials including significant proportions of clay and silt. Alluvium may also locally contain sands and gravels and varying quantities of organic materials and shell fragments. All materials may be laterally restricted and may only be present as isolated lenses and horizons. The depth and thickness of Alluvium is also likely to be highly variable. Boreholes in the region such as TL37SE16 (near Willingham) and TF37SE19 (at Queen’s Grounds, Bluntisham) describe Alluvium to an approximate thickness of 0.40m to 1.50m, which was described as a “clay, silty, yellow-orange mottled grey” and “clay, silty, grey orange with rare flint pebbles and thin silty bands”

respectively. TL56NW20 near Upware, describes a similar material but also includes a mention of peat to a depth of 2mbgl.

River Terrace Deposits and Tottenhill Sand and Gravel Member

River Terrace Deposits are identified locally within the catchment such as near Narborough and Chatteris, with the Tottenhill Sand and Gravel Member identified near Watlington. The River Terrace Deposits are typically encountered as sands and gravels, such as that in TF60SW55 near Narborough and reported to a depth of 1.2mbgl. The Tottenhill Sand and Gravels are described as “complex sequences of sands and gravels, dominated by flint” and noted to contain peats and some clays.

Tidal Flat Deposits

The Tidal Flat Deposits can include the following: Terrington Beds, Barroway Drove Beds and Nordelph Peat.

- **Terrington Beds**

The Terrington Beds cover a broad extent of land along the coastal edge of The Wash and are noted to extend in land as far as Benwick and Littleport, with occurrences also noted along former river channels (such as a realigned section of the River Lark). They typically comprise of pale brown silts, fine grained sands, and interlaminated reddish-brown clays. They are often extensive, near to horizontal and can facilitate the creation of marshy land and areas of unconsolidated sediment, mainly of mud and/or sand [102]. In borehole TF40NE17 (east of Wisbech) they are described as thin brown silts and grey silt with occasional mention of peat.

- **Barroway Drove Beds**

Barroway Drove Beds may also underlie the Tidal Flat Deposits locally in the northern half of the catchment but are apparently less common than the Terrington Beds. The Barroway Drove Beds are identified in some broader areas such as that around the Middle Level Main Drain in Marshland Fen but can also be more subtle and are locally identified in boreholes in the southern half such as in TL56NW20 and TL56NW22 near Upware.

The Barroway Drove Beds frequently comprise primarily of clay and silt but can locally contain peats and organic materials such as roots and rootlets as shown in historical boreholes. Whilst the Barroway Drove Beds may contain Peat, they can also be sandwiched by Peat above (the Upper Peat) and Peat below (the Lower Peat) which can also display repeating smaller layers or lenses of Peat [103].

- **Peat and Nordelph Peat**

Peat is identified in broader areas, particularly in the southern half of the Catchment and towards Peterborough but is also identified at a more local scale. It is also likely to be present in other areas and likely concealed below or within other superficial deposits such as in Marshland Fen. In TL38NE14, northwest of Chatteris, the Nordelph Peat is identified as a 1.40m thick deposit, described as “dark brownish black, friable, silty”. The same borehole also identifies the Barroway Drove Beds and showcases this separating the Upper or Nordelph Peat from the Lower Peat, the latter described as a “dark brown, fibrous and woody” 0.20m thick peat deposit. In other areas, the peat is reported as 2m thick, such as in TL56NW20 near Upware but can up to 3m thick locally [104]. Some localised Lacustrine Beds are also identified within the peat areas, such as that southeast of Peterborough on Whittlesey Mere. Whittlesey Mere was previously an area of open water before it was drained in the 1800’s. It is regarded as the last “great mere” to be drained, with the old course of the Nene providing a source of water. The lacustrine beds identified reflect this former setting and within these beds, laminated silts and clays are noted and may also contain a mix of fine material and coarser grains as well as peat and calcareous muds. The historical borehole TL29SW2 (located in Whittlesey Mere)

describes a variable mixture of soils comprising of peats and other organic matter, clays, gravels, and fine sand.

Crowland Bed

The Crowland Beds are locally identified and described as “a thin heterogeneous deposit of silty, sandy clays and clayey sand containing scattered pebbles.” The bed is noted to overly the Fenland Gravels (Abbey Sand and Gravel Member and the March Gravels Member) and is sometimes referred to as “older alluvium” [105].

The Crowland Bed is locally reported, such as in TL38NE14 (west of Chatteris). The bed is identified at depth beneath the upper and lower peat and the Barroway Drove Beds. It is identified at 2.7mbgl as 0.90m thick layer of “medium light grey, light olive, thixotropic⁷, clayey silt”.

March Gravels Member

The March Gravels Member are locally identified such as at March, Whittlesey and Chatteris, with records indicating that the deposit can vary from sandy flint gravel to clayey, silty, pebbly sand [106].

In borehole TF49NW8 (in March), the March Gravels are described as a “shelly gravel” to a thickness of 0.30m beneath the Made Ground.

Glacial Deposits

Glacial Till/Diamicton (namely the Oadby Member and Lowestoft Formation) and Glaciofluvial Deposits are locally present across the Catchment. Near March and to the southeast, the Oadby Member is identified and in the northeast of the catchment, the Lowestoft Formation is identified. Both are described as chalky tills with subordinate sands and gravels.

In borehole TL49SW6 (near Chatteris railway station), the Oadby Member is described as a “very stiff blue chalky boulder clay” with a thickness of 1.80m and in the northeast of the catchment, near Downham Market, the Lowestoft Formation is described in borehole TF60SW55 as a “firm to stiff olive green and brown silty clay” and a “stiff light grey silty clay with some chalk gravel” with an apparent thickness of 2.30m.

4.3.3 Bedrock Geology

Beneath the superficial soils and locally at crop in some area, the catchment is underlain by a variety of differing bedrock geologies from the Oxford Clay in the west of the catchment, to the chalks in the east of the catchment. The bedrock geology is highly variable and in place, quite challenging such as the Gault Formation. The anticipated bedrock geology of the catchment is presented in Table 9. A simplified geological map is presented in Figure 10.

⁷ *Thixotropic or Thixotropy is a property of some materials that causes them to become less viscous when agitated or stressed. The materials then return to a more viscous state when the stress is removed.*

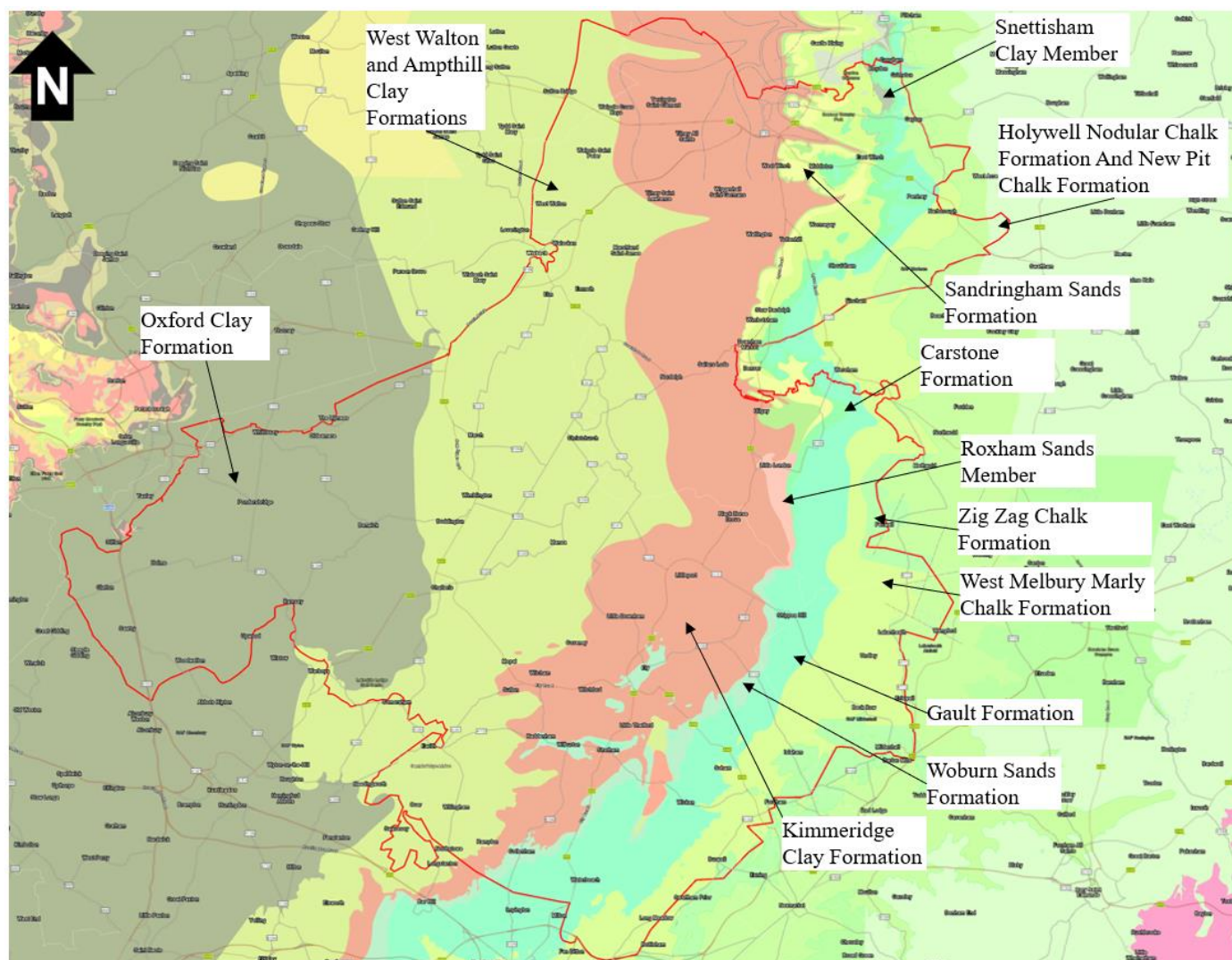


Figure 10: Simplified overview of the bedrock geology underlying the catchment from BGS 1:50K geological mapping

Table 9: Summary of bedrock geology within the catchment

\\ Denotes unconformity

Formation	Members (if applicable)	Description [107]
Holywell Nodular Chalk Formation and New Pit Chalk Formation (Undifferentiated)		Chalk with flints. With discrete marl seams, nodular chalk, sponge-rich and flint seams throughout.
Zig Zag Chalk Formation		Firm, pale grey to off-white blocky chalk with a lower part characterised by rhythmic alternations of marls and marly chalks with firm white chalk
West Melbury Marly Chalk Formation		Buff, grey and off-white, soft, marly chalk and hard grey limestone arranged in couplets.
Gault Formation		Pale to dark grey or blue-grey clay or mudstone, glauconitic in part, with a sandy base. Discrete bands of phosphatic nodules (commonly

		preserving fossils), some pyrite and calcareous nodules. Gault clay causes a number of serious geotechnical problems. Ancient and recent landslides have been recognised when at outcrop including shallow translational slips. It also contains a lot of smectite so is highly expansive and susceptible to shrink/swell. The material is also very aggressive in regards to concrete attack, containing aqueous solutions of sulphate and sulphuric acid [108].
Carstone Formation		Greenish-brown (rusty when weathered) thick-bedded, cross-bedded, oolitic ferruginous sandstone. The formation is medium- to coarse-grained and pebbly in part, especially at the base where it becomes a conglomerate. Pebbles comprising quartz, quartzite, pyritised sandstone, ironstone, grey siltstone and rolled ammonites.
Dersingham Formation	Snettisham Clay Member	Greyish brown clay with a seam of fossiliferous clay ironstones in the upper part and ironstone concretions scattered throughout. Sand partings are present.

Sandringham Sand Formation	Leziate Member	Unconsolidated, moderately clean, pale grey (occasionally green, yellow or orange), fine- to medium-grained, cross-bedded quartz sands with subordinate bands of silt or clay. Pyrite nodules are present and glauconite is locally abundant.
	Mintlyn Member	Glauconitic, clayey, grey and green sands with bands and "doggers" of brown-weathering clay-ironstone and seams of phosphatic nodules.
	Roxham Member and Runction Member	Grey and yellow-green, pyritic, silty sands with an indurated basal pebbly sandstone with black chert phosphatic nodules and derived Kimmeridgian debris.

Woburn Sands Formation		Fine- to coarse-grained rounded marine quartz sand, glauconitic in part. Unconformity with overlying Jurassic or older strata and unconformity with overlapping Gault Formation
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Kimmeridge Clay Formation		Mudstone, siltstone and cementstones, may be calcareous or kerogen-rich and locally fossiliferous [109].
Ampthill Clay Formation and West Walton Formation		Mudstone, often argillaceous limestones and marls [110]. Fossiliferous material can also be expected. Overconsolidated, high plasticity, frequently

		fissured and susceptible to shallow slope angle failure. Fossiliferous material can also be expected. Fissured clays are also expected with selenite (gypsum) crystals reported.
Oxford Clay Formation	Weymouth Member	High to very high plasticity brown, grey, green and blue-grey shelly over-consolidated clay and organic-rich (bituminous) weak mudstones, prone to seasonal shrink-swell movement. Laterally persistent limestone bands and cementstone concretions may be present resulting in locally stronger horizons [111].
	Stewartby Member	
	Peterborough Member	

4.3.4 Regional structure

Palaeochannels / “Roddons”

An influential feature of significance in the Fens, is the presence of palaeochannels which are locally referred to as “roddons” or “silt-filled creeks” such as those well documented in the Peterborough district. These are however not well recorded on neighbouring district sheets. The influence of anthropogenic changes and involvement such as agriculture and engineered drainage, has caused these former channels to become positive topographical features [103]. As the land surrounding, which is notably cohesive and susceptible to shrink, the more granular material infilling the former channel remains proud. These features, whilst subtle, can form ridges up to 1m high.

It is also noted that the roddons would not be able to facilitate or be re-used as channels in the event of future transgression events, and due to compaction, settlement and peat wastage that has occurred between them, they may be capable of funnelling or concentrating water flow between them [103]. Roddon structures are well observed with the use of LiDAR. An example for the catchment, situated north of March is provided as shown in Figure 11.



Figure 11: LiDAR extract displaying roddons of varying size and scale, located south-east of Guyhirn adjacent to the western catchment boundary.

A summary of the encountered roddon structures scale across the Fens is provided in Table 10.

Table 10: Summary of the identified roddon hierarchy

Roddon Hierarchy	Dimensions	Description
Major “Trunk” Roddon	2m to >1km	Predominantly fine sand, consistent of grain size from mouth to upper extents, likely representative of being deposited under uniform depositional conditions.
Tributaries	1m to >10m	Predominantly silt.
Minor Tributaries		Predominantly clay.

Buried Valleys

There is potential for buried valleys to be present within the catchment, with several identified, crossing the catchment, primarily from east to west [112]. These are shown on Figure 9.

Buried valleys present the risk of encountering much deeper than anticipated superficial materials which in themselves, may be influential on settlement or act as preferential pathways for

groundwater migration and likely to be infilled with a mix of materials potentially including a mix of sands and gravels and even glacial materials. Thick till sequences (up to 80m) are confined to deep valleys in the rock-head surface in the King's Lynn area and beneath Fenland and The Wash [112]. A historical borehole, TF51SW11 which was undertaken as part of the A47 Walpole-Tilney Bypass works potentially proves such thickness of glacial material, reporting a mix of grey, glacial material including glacial till and glaciolacustrine clays and laminated clays to a depth of 36.50mbgl. The full depth of the buried valley was not proven.

Faulting

Faulting is typically absent across the wider catchment but a few faults are identified on the eastern catchment boundary near Wangford. The presence of faulting is likely to be subtle across the region and with a relatively subdued and flat topography, the identification of faulting at the surface is low. Faulting could also be present at depth or masked by superficial deposits.

4.3.5 Hydrogeology

A summary of aquifer designations for geologies at outcrop and underlying the site have been summarised using information from the GeoIndex [107], Magic Maps [113] and hydrogeological Mapping [114].

Superficial Geology Aquifers

A summary of the superficial aquifers is presented in Table 11.

Table 11: Summary of encountered superficial deposit aquifer designations within the catchment

Formation	Superficial Aquifer Designation
Alluvium	Secondary A. Very small yields and often poor water quality.
River Terrace Deposits	
Tottenham Gravel Member	
Marine Gravels including March Gravels and Abbey Sand and Gravels	
Silt-infilled creeks	Secondary (Undifferentiated). Very small yields and often poor water quality
Glacial Till (Oadby Member and Lowestoft Formation)	
Head	
Tidal Flats Deposits including Terrington Beds and Barroway Drove Beds	Unproductive. Low permeability that can however confine underlying aquifers
Glaciolacustrine	
Peat	

Bedrock Geology Aquifers

A summary of the bedrock aquifers is presented in Table 12.

Table 12: Summary of encountered bedrock geology aquifer designations within the catchment

Formation	Bedrock Aquifer Designation
Holywell Nodular Chalk Formation and New Pit Chalk Formation (Undifferentiated)	Principal
Zig Zag Chalk Formation	
West Melbury Marly Chalk Formation	
Carstone Formation	
Sandringham Sands Formation	
Woburn Sands Formation	
Desringham Formation	Secondary A
Gault Formation	Unproductive. Low permeability that can however confine underlying aquifers
Kimmeridge Clay Formation	
Ampthill Clay Formation	
West Walton Formation	
Oxford Clay Formation	

4.3.6 Geotechnical appraisal – engineered structures

Earthworks

Earthworks constructed within the catchment to facilitate the transportation and containment of surface waters may be locally subject to failures and degradation. Many earthworks are not built to modern engineering standards, commonly composed of dredgings and localised digout and in many cases they perform as required despite this. The composition and distribution of the materials can be highly variable and as a result can present the risk of localised failures. These failures can be divided into five main risks. These include:

- Slope failure under extreme groundwater conditions where slopes are formed out of low shear strength materials are steep gradients on poor foundations;
- Settlement due to consolidation of the foundation soil and internal deformation due to self-weight consolidation and external loading;
- Excessive seepage;
- Overtopping; and
- Animal activity.

Earthwork slope instability

Slope instability of the embankments side slopes could take the form of shallow surface slips where the embankment is not particularly high and the slopes are steep, or deeper, rotational failures where the embankments are taller with slopes that are less steep and poor foundation soils (i.e. peat). The cause of slope instability is due to high groundwater conditions within the embankment and the foundation soil during flood conditions coupled with the embankments being built out of low strength soils with overly steep side slope angles over poor foundation soils also with low strength.

Poor vegetation cover can also present a risk to shallow slope instability. If vegetation was well-maintained vegetation, it can help to stabilise the shallow soils through root cohesion and control of moisture content. For example, a ranker sward comprising of shallow or predominantly tap-rooted vegetation offers poor resistance compared to a species-rich grass sward.

Slope instability is often a very localised feature and where it does occur it might only impact of a few metres to a few 10s of metres of linear embankment. It can result in potential loss of containment by increasing the risk of seepage due to the reduced seepage pathways through the embankment. Also, further scour or erosion of the embankment can occur where bare soil is exposed either on the riverward face or the landward face.

Settlement and deformation

Settlement can occur from a range of causes. The embankment can settle due to consolidation of the foundation soil due to ongoing drainage activities and long-term creep settlement of organic rich soils. Settlement can over time lower the crest and where the foundation soil comprises contrasting soils which consolidate by different amounts, differential settlement can occur across the embankment.

Settlement may occur due to internal consolidation of the embankment where this was inadequately compacted. At a shallow depth with embankments where clay soils are present, these can be susceptible to changes in moisture and can readily change in volume leading to shrinkage and swelling. Overtime this can lead to differential settlement at the surface and becomes particularly obvious where embankments support roads in the form of cracking and undulation of the pavement.

Seepage

Seepage can occur in earthworks or structures that are composed of granular soils or have more permeable layers such as sands and gravels. It can also occur where there are palaeochannels beneath the embankment or where there are burrowing animals. The composition of earthworks in the region can be variable, so the risk of seepage can be highly variable.

Seepage essentially undermines the effectiveness of any structure designed to retain water and can result in the removal of material, particularly fines and ultimately leading to reduction in mass soil strength with the potential to induce slope failure or ultimately, breaching.

Overtopping

Overtopping of embankments is identified as a risk, particularly if low spots are present due to settlement. Where embankments are poorly vegetated (either a lack of soil binding vegetation or surface cover), there is additional risk from scour during an overtopping event which could lead to a breach and effective loss of containment.

Animal Activity

Animal activity presents several risks to earthworks including the establishment of burrows through and within earthworks but also from the frequent trafficking and trampling of surface soils and vegetation. Burrowing can encourage instability and promote seepage whilst animal movement on the surface, can lead to the removal of protective vegetation.

Burrowing, particularly from badgers was mentioned by the operations team to be particularly challenging to manage and had many additional costs and repairs associated with it. The operations team made specific mention of badgers being noted as problematic to the existing earthwork assets.

Additionally, the following risks may be present:

Aggressive groundwater conditions

Acid groundwaters could be encountered in areas that are rich in pyritic minerals such as the fossiliferous strata, such as the Oxford Clay, West Walton and Ampthill Clay and Kimmeridge Clay Formations and very notably, the Gault Formation. Those that promote mobility of groundwaters or where groundwater levels can fluctuate as to promote oxidation, would be anticipated to have a greater potential to create aggressive (acidic) groundwater conditions and would potentially have a detrimental impact on concrete foundations and sub-structures. Peat also has the potential to increase acidity in groundwaters.

Channel realignment

Channel and watercourse realignment has been a common engineering practice in the Fens for managing the relative direction and flow of water. These realignments can leave behind variable ground conditions from their original position and can create locally differing ground conditions. An example here is an apparent realignment of the River Lark, southeast of Littleport. The possible realignment is noted on the LiDAR imaging as shown in Figure 11, but is mapped as a differing geology to the surrounding. In this instance, the former channel is noted to comprise of material from the Terrington Beds, incised into the surrounding peatland.

4.4 Water environment

This section outlines the baseline water environment in the catchment, focusing primarily on surface water bodies considered within the Water Environment Framework/Water Framework Directive (WER/WFD). Analysis of the groundwater bodies present within the catchment has focused on their overarching status, at this stage. Further information regarding the hydrogeology baseline condition of the catchment, including details of the various aquifers and source protection zones and drinking water safeguard zones present, is provided in the Ground Conditions section of this report, above. An overview of flood risk and key flood risk management infrastructure within the catchment is provided in the Great Ouse catchment baseline report, and the flood risk technical appendix. Table 13 outlines the key terminology used in this section.

Table 13: Glossary of water environment terminology

Terminology	Summary Definition
Main River	Designated 'Main Rivers' are usually larger rivers and streams with the highest flood risk. The Environment Agency, using its permissive powers, can carry out maintenance, improvement, or construction work on main rivers to manage flood risk and protect the environment. As these powers are permissive only, the Environment Agency is not obliged to carry out either maintenance or new works on Main Rivers.
Flood Zone	Areas classified by the probability of river or sea flooding, excluding the presence of flood defences.
AIMS	Asset Information and Maintenance programme dataset detailing flood risk management assets. The dataset is owned by the Environment Agency but includes assets also owned or operated by third parties.
River Basin District	The area of land (and sea) comprising one or more neighbouring river basins together with their associated groundwaters and coastal waters. There are 10 river basin districts in England.
Management Catchment	A sub-category of a river basin district, a management catchment comprises a number of water body catchments in one management unit at which actions are applied.
Operational Catchment	A sub-category of a management catchment, an operational catchment groups water body catchments together for economic appraisal.
Water Framework Directive (WFD) or Water Environment Regulations (WER)	Legislation designed to halt the deterioration in status of water bodies in Europe (WFD) and England (WER) and achieve good status for rivers, lakes and groundwaters.
River Basin Management Plan (RBMP)	RBMPs are produced for each river basin district and set the legally binding, locally specific environmental objectives for water regulation and planning activities.

4.4.1 Catchment overview

There is approximately 425km of Main River within the Great Ouse catchment⁸.

- The River Great Ouse enters the study area to the east of Huntingdon and initially flows in an easterly direction through the southern portion of the study area. Here it is joined by a number of other Main Rivers, including Swavesey Drain, Wadsby's Folly, Willingham Lode

⁸ Based on measurements of Main River within the catchment study area boundary undertaken in ArcGIS.

and New Cut (also known in the lower reaches as the Cottenham Lode). In these upper reaches of the catchment, the Hundred Foot Drain (also known as the New Bedford River) forms a linear by-pass channel off the River Great Ouse, flowing north-eastward and dissecting the centre of the study area catchment from Earith to Salters Lode. The Old Bedford River and River Delph Main Rivers also run parallel to the Hundred Foot Drain in the centre of the catchment.

- The River Cam enters the far south of the study area catchment and flows northward to form a confluence with the River Great Ouse immediately to the east of Stretham. The River Cam is fed by several other Main Rivers between Cambridge and its confluence with the River Great Ouse, including Bottisham Lode, Swaffham Bulbeck Lode and Reach Lode.
- Downstream of the confluence with the River Cam, the River Great Ouse flows northward past Ely, Littleport and Southery. Along this section the river is joined by several Main River tributaries which drain the south-east portion of the study area catchment, including Soham Lode, River Lark and Little Ouse River.
- To the north of Southery, the River Great Ouse is joined by the River Wissey which flows from the east, before bifurcating into the River Great Ouse Relief channel and the River Great Ouse via the Denver Complex (sluices) near Salters Lode. Immediately downstream of Denver Sluice, the tidal River Great Ouse is joined by the Hundred Foot Drain and Old Bedford River Main Rivers from the south-west, before flowing northward in gently meandering planform. The River Great Ouse Relief Channel is joined by the Cut-off Channel from the east at the Denver Complex and forms a linear channel flowing northward adjacent to the River Great Ouse from Downham Market to Kings Lynn.
- The Cut-off Channel flows around the eastern boundary of the catchment in a northerly and then westerly direction, before joining the River Great Ouse Relief Channel. The Cut-off Channel is another artificial relief channel carrying the headwaters of the River Wissey, River Lark and River Little Ouse during high flows.
- The lower reaches of the River Great Ouse are joined by the River Nar, Puny Drain and Gaywood River, which drain the north-eastern portion of the study area catchment. These Main Rivers outfall into the River Great Ouse in King's Lynn.

The extent of these Main Rivers and ordinary watercourses are shown in

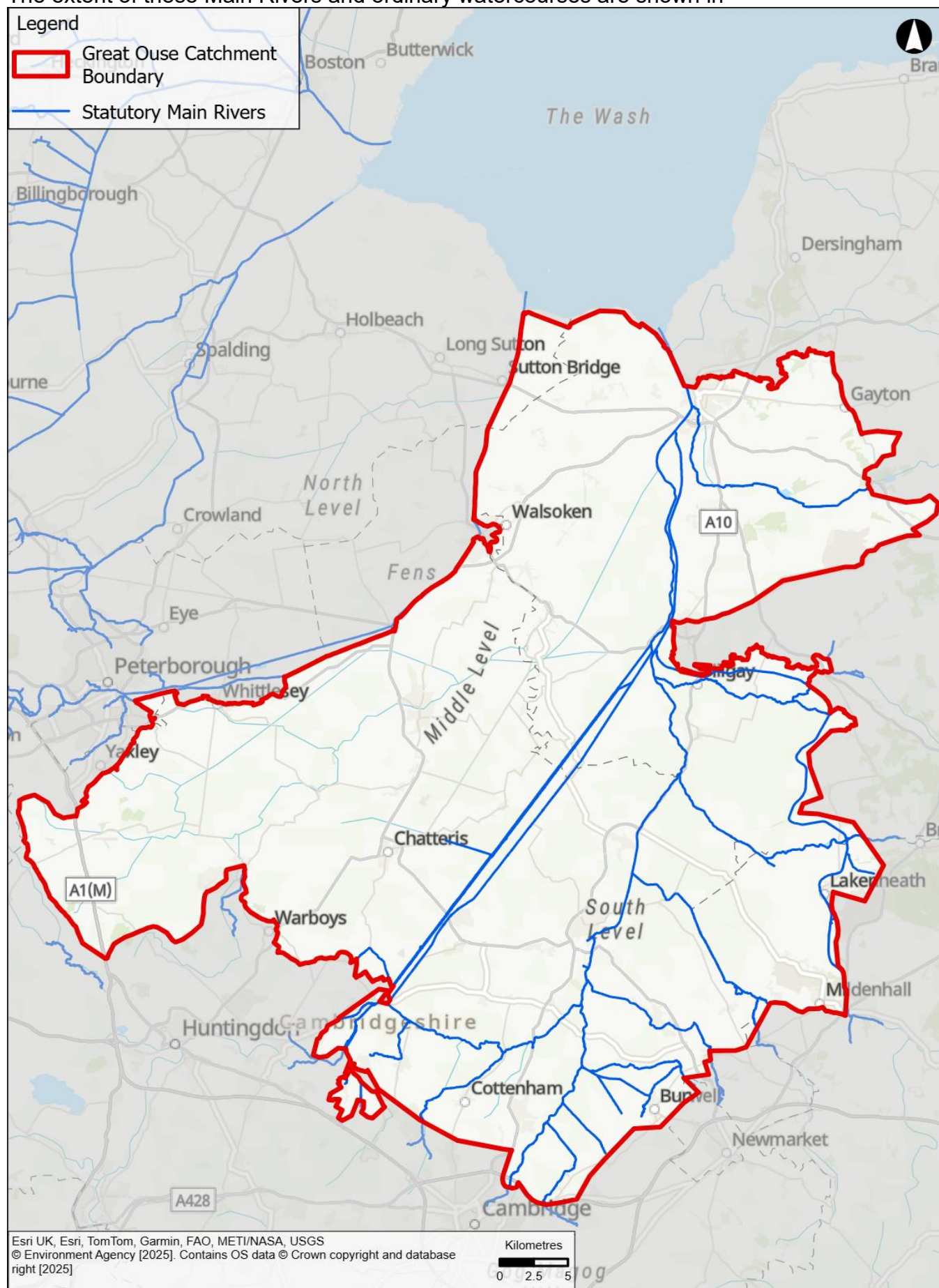
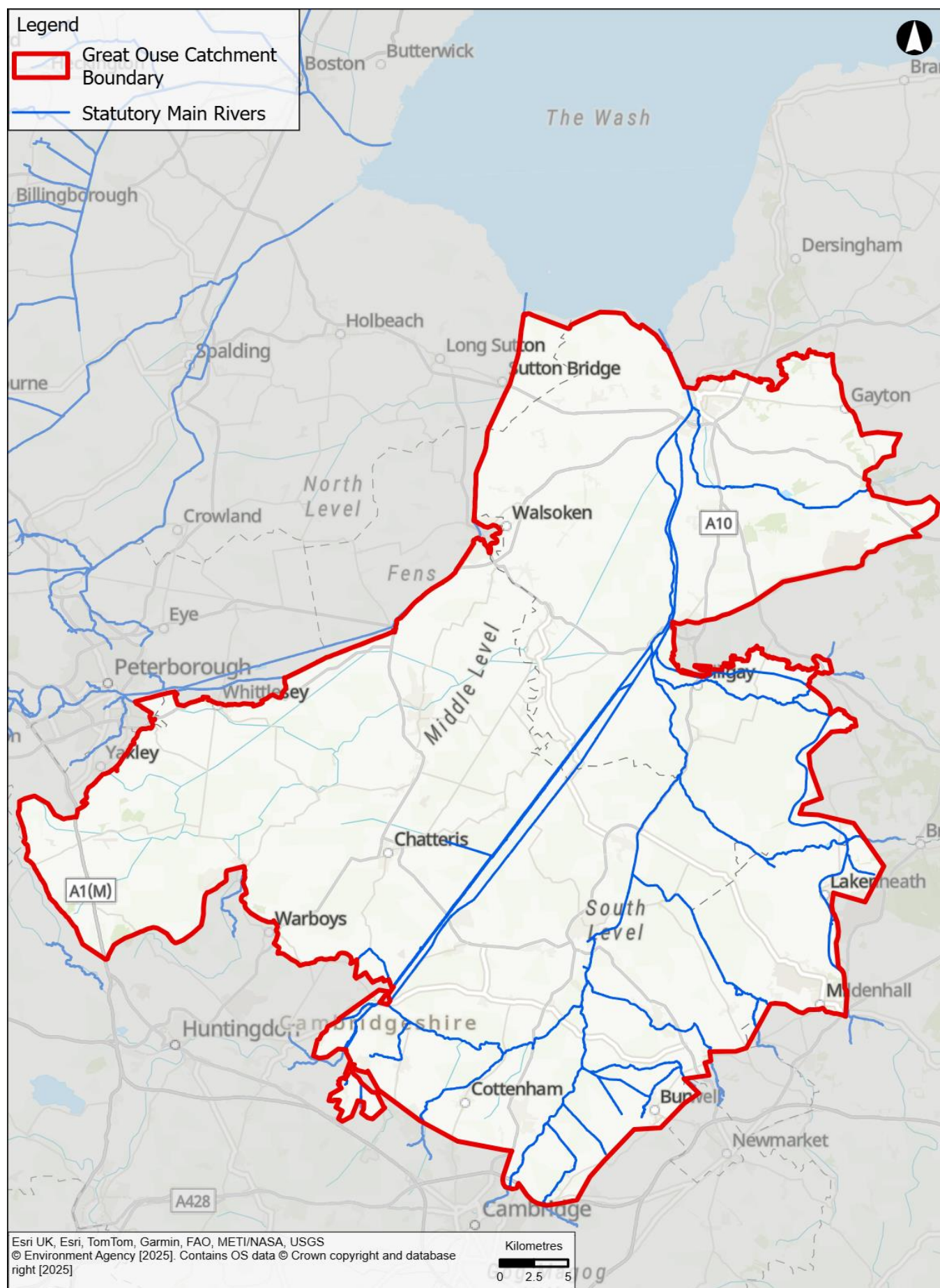


Figure 12. The western portion of the study area catchment is drained by ordinary watercourses comprising the New Dyke, Great Raveley Drain, Bevill's Leam and Whittlesey Dike and their tributaries which drain the area of the catchment south of Peterborough. These ordinary watercourses flow into the River Nene (Old Course) and Well Creek which flows in a north-easterly direction and outfalls to the River Great Ouse at Salters Lode. The Well Creek passes over the artificial Middle Level Main Drain via Mullicourt Aqueduct in the central northern portion of the catchment. The Middle Level Main Drain commences at Three Holes, continuing the Sixteen Foot Drain, and flows in a linear north-easterly direction to discharge into the River Great Ouse via St German Pumping Station at Wiggenshall St Germans. The Ouse Washes are located within the centre of the catchment provide a flood storage area taking high flows from the River Great Ouse via the Hundred Foot Drain and Old Bedford River and is largely inundated through the winter months.



4.4.2 Water Environment Regulations (WER) / Water Framework Directive (WFD)

Surface water bodies

The Great Ouse catchment study area is located within the Anglian River Basin District (RBD), which extends from Lincolnshire in the north to Essex in the south, and Northamptonshire in the west to the East Anglian coast. The district is predominantly rural, with agricultural land uses dominating over half the area. The RBD is subdivided into 14 Management Catchments. The Great Ouse catchment is partially located within the following management and operational catchments:

- North West Norfolk: North West Norfolk Rivers;
- Cam and Ely Ouse: Wissey, South Level and Cut-Off Channel, Lark, Little Ouse and Thet and Lower Cam;
- Old Bedford and Middle Level: Old Bedford and Middle;
- Ouse Upper and Bedford: Great Ouse Lower;
- Nene: Nene Middle and Nene Lower; and
- Anglian Transitional and Coastal (TraC): Great Ouse and The Wash TraC.

The majority of the study area catchment is located within the 'Middle Level', 'Ely Ouse (South Level)', and 'Old West River' river water body catchments. These river water body catchments surround the smaller 'Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain)', 'Old Bedford River/River Delph (incl. The Hundred Foot Drain)', 'Counter Drain (Manea and Welney IDB)' and 'Counter Drain (Upwell and Outwell IDB)' river water bodies that occupy the central portion of the study area catchment.

The river water body catchments of the 'Polver Drain' and 'Nar downstream of Abbey Farm' are also wholly located within the study area catchment in the north-eastern portion of the catchment. The north and eastern portions of the study area catchment also intersect parts of the 'Gaywood River', 'Middleton Stop Drain', 'Country Drain' Nar upstream of Abbey Farm, 'Stringside Stream', 'Relief Channel' and 'Cut-off Channel' river water body catchments.

The southern portion of the study area catchment also intersects the 'Kennett – Lee Brook', 'Soham Lode', 'New River', 'Burwell Lode', 'Swaffham Bulbeck Lode', 'Bottisham Lode – Quay Water', 'Cam', 'Swavesey Drain' and 'Ouse (Roxton to Earith)' river water bodies.

The Great Ouse transitional (TRaC) river water body encompasses the lower tidal reaches of the River Great Ouse from The Wash upstream to the Denver Complex, as well as the length of the Hundred Foot Drain to the Footbridge River Lock on the River Great Ouse south of Earith.

The eastern and southern boundary of the study area catchment partially ingresses into small areas of the 'Wissey – Lower', 'Little Ouse River', 'Lark – Downstream of Mill Street Bridge', 'Fen Drayton Drain' and 'Bury Brook' river water body catchments. Similarly, the northwestern boundary of the study area extends slightly into the 'Morton's Leam' river water body, which is located within the neighbouring Lower Nene catchment study area. These river water bodies have therefore been excluded from the baseline assessment.

Parts of the central and northern extents of the study area comprise lowland areas that are not defined as WER/WFD surface water bodies. In the northern part of the study area, these drain to coastal saltmarsh and mudflat habitats, which form the margins of the 'Wash Inner' transitional (TRaC) water body extent.

The location and extent of these surface water body catchments relative to the study area boundary is shown in Figure 13. The majority of the surface water bodies in the catchment are considered to be artificial or heavily modified. An overview of these surface water bodies and their current statuses is then provided in Table 14.

Table 14: Summary of WER/WFD surface water bodies and their latest Cycle 3 (2022) status classifications

Waterbody Name	Waterbody ID	Waterbody Type	Hydromorphological Designation	Catchment area (km ²)	Overall Status	Ecological Status	Biological quality elements	Physico-chemical quality elements	Hydromorphological Supporting Elements	Supporting Elements	Specific Pollutants	Chemical Status
Nar upstream of Abbey Farm	GB105033047791	River	Not designated artificial or heavily modified	154.3	Moderate	Moderate	Moderate	Good	Supports Good	-	High	Fail*
Nar downstream of Abbey Farm	GB105033047792	River	Heavily modified	13.5	Moderate	Moderate	High	Moderate	Supports Good	Moderate	-	Fail*
Polver Drain	GB105033047662	River	Heavily modified	15.7	Moderate	Moderate	High	Moderate	Supports Good	Moderate	High	Fail*
Middleton Stop Drain	GB105033047670	River	Heavily modified	35.3	Moderate	Moderate	High	Good	Supports Good	Moderate	High	Fail*
Gaywood River	GB105033047680	River	Not designated artificial or heavily modified	57.7	Good	Good	Good	Good	Supports Good	-	-	Fail*
Stringsides Stream	GB105033047810	River	Heavily modified	50.2	Poor	Poor	Poor	High	Supports Good	Moderate	-	Fail*
Country Drain	GB105033047770	River	Not designated artificial or heavily modified	73.0	Poor	Poor	Poor	Moderate	Supports Good	-	-	Fail*
Cut-off Channel	GB205033000040	River	Artificial	151.7	Moderate	Moderate	Moderate	Good	-	Moderate	High	Fail*

Waterbody Name	Waterbody ID	Waterbody Type	Hydromorphological Designation	Catchment area (km ²)	Overall Status	Ecological Status	Biological quality elements	Physico-chemical quality elements	Hydromorphological Supporting Elements	Supporting Elements	Specific Pollutants	Chemical Status
Ely Ouse (South Level)	GB205033000070	River	Artificial	87.7	Moderate	Moderate	High	Moderate	-	Moderate	High	Fail*
Relief Channel	GB205033047665	River	Artificial	40.7	Poor	Poor	Poor	Moderate	Supports Good	Moderate	High	Fail*
Ouse (Roxton to Earith)	GB105033047921	River	Heavily modified	162.9	Moderate	Moderate	Good	Moderate	Supports Good	Moderate	High	Fail*
Kennett - Lee Brook	GB105033043020	River	Heavily modified	7.6	Poor	Poor	Poor	High	Supports Good	Good	-	Fail*
Soham Lode	GB105033042860	River	Heavily modified	66.5	Moderate	Moderate	Moderate	Moderate	Supports Good	Moderate	High	Fail*
Bottisham Lode - Quay Water	GB105033042700	River	Heavily modified	99.6	Moderate	Moderate	Good	Moderate	-	Good	High	Fail*
Swaffham - Bulbeck Lode	GB105033042710	River	Heavily modified	43.7	Moderate	Moderate	High	Moderate	-	Moderate	-	Fail*
Burwell Lode	GB105033042720	River	Heavily modified	40.5	Moderate	Moderate	High	High	Supports Good	Moderate	High	Fail*
Cam	GB105033042750	River	Heavily modified	36.8	Moderate	Moderate	Good	Moderate	Supports Good	Moderate	High	Fail*
Swavesey Drain	GB105033042770	River	Heavily modified	42.4	Moderate	Moderate	Moderate	Moderate	Supports Good	Moderate	High	Fail*
New River	GB105033042780	River	Heavily modified	58.5	Moderate	Moderate	Good	High	Supports Good	Moderate	-	Fail*
Old West River	GB205033043375	River	Heavily modified	194.2	Moderate	Moderate	Good	Moderate	Supports Good	Moderate	High	Fail*

Waterbody Name	Waterbody ID	Waterbody Type	Hydromorphological Designation	Catchment area (km ²)	Overall Status	Ecological Status	Biological quality elements	Physico-chemical quality elements	Hydromorphological Supporting Elements	Supporting Elements	Specific Pollutants	Chemical Status
Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain)	GB205033000010	River	Artificial	72.4	Moderate	Moderate	Good	Moderate	Supports Good	Moderate	High	Fail*
Middle Level	GB205033000050	River	Artificial	615.2	Moderate	Moderate	Moderate	Moderate	Supports Good	Moderate	High	Fail*
Old Bedford River / River Delph (inc The Hundred Foot Washes)	GB205033000060	River	Artificial	21.1	Moderate	Moderate	High	Moderate	Supports Good	Moderate	High	Fail*
Counter Drain (Manea and Welney IDB)	GB205033000020	River	Artificial	31.9	Moderate	Moderate	Good	Moderate	Supports Good	Moderate	High	Fail*
Counter Drain (Upwell and Outwell IDB)	GB205033000030	River	Artificial	19.9	Moderate	Moderate	High	Moderate	Supports Good	Moderate	High	Fail*
Great Ouse	GB530503300300	Transitional	Heavily modified	8.78	Poor	Poor	Poor	Moderate	Supports Good	Good	High	Fail*

Note: Chemical Status is assessed once per RBMP Cycle (every 6 years) and so was last assessed in 2019 (and is recorded as 'does not require assessment' within the latest interim Cycle 3 2022 status classification)

*

Existing pressures on status

The Environment Agency's 'reasons for not achieving Good' (RNAG) dataset identifies the key pressures and activities that are currently considered to be limiting the status of each of the different status elements that are not currently achieving their 'Good' status objective. Each RNAG is linked to a 'Surface Water Management Issue' (SWMI), which have been identified via the catchment management planning process. These comprise the main issues that are deemed to limit the uses and potential benefits of managing the water environment in the river basin district in a sustainable way.

The latest RNAG identified for the river water bodies present within the Great Ouse catchment study area are summarised in Table 15. The current RNAGs identified for the river water bodies in the catchment primarily related to physical modification associated with agriculture and rural land management, local and central government and recreation.

Table 15: Summary of RNAG within the catchment

Number of RNAGs per Surface Water Management Issue (SWMI)							
Water body	Physical modifications	Pollution from wastewater	Pollution from towns, cities and transport	Changes to the natural flow and level of water	Invasive non-native species	Pollution from rural areas	Pollution from abandoned mine
Nar upstream of Abbey Farm	0	0	0	0	0	0	0
Nar downstream of Abbey Farm	3	0	0	0	0	0	0
Polver Drain	1	0	0	0	0	0	0
Middleton Stop Drain	2	0	0	0	0	0	0
Gaywood River	0	0	0	0	0	0	0
Stringsie Stream	3	0	0	1	0	0	0
Country Drain	0	0	0	0	0	0	0
Cut-off Channel	3	0	0	0	0	0	0
Ely Ouse (South Level)	3	1	0	0	0	2	0
Relief Channel	3	2	0	0	0	2	0
Ouse (Roxton to Earith)	2	1	0	0	0	2	0
Kennett - Lee Brook	3	0	0	8	1	0	0

Number of RNAGs per Surface Water Management Issue (SWMI)							
Soham Lode	3	1	0	0	0	0	0
Bottisham Lode - Quy Water	0	1	0	0	0	0	0
Swaffham - Bulbeck Lode	0	1	0	0	0	0	0
Burwell Lode	3	1	0	0	0	1	0
Cam	4	1	0	0	0	0	0
Swavesey Drain	3	2	0	1	0	0	0
New River	3	0	0	0	0	0	0
Old West River	3	3	0	1	0	3	0
Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain)	3	1	0	0	0	1	0
Middle Level	3	0	0	0	0	0	0
Old Bedford River / River Delph (inc The Hundred Foot Washes)	2	0	0	0	0	0	0
Counter Drain (Manea and Welney IDB)	2	0	0	0	0	0	0
Counter Drain (Upwell and Outwell IDB)	3	0	0	0	0	0	0
GREAT OUSE	3	0	0	0	0	0	0
TOTAL	58	15	0	11	1	11	0

Mitigation measures

The artificial or heavily modified water body Mitigation Measures assessments for the relevant surface water bodies within the catchment study area have identified various measures derived to mitigate the impacts of flood protection and land drainage 'uses'. These measures are required to be in place in order for the water bodies to achieve their Good Ecological Potential objectives under the WER/WFD. A variety of measures are already in place or not applicable to some of the water bodies. The measures which are not in place are outlined in Table 16. It should be noted

that a Mitigation Measures Assessment has not been provided by the EA for the Country Drain, Nar downstream of Abbey Farm, Stringside Stream or Swavesey Drain river water bodies.

Table 16: Mitigation Measures which are currently not in place in the relevant Surface Water Bodies

Mitigation measure not in place	Relevant Surface Water Body
Removal of hard engineering structures that modify the natural flow and sediment regime, including weirs, locks, floodgates, sluices, and erosion control structures.	Swaffham - Bulbeck Lode; Burwell Lode; Middle Level; Polver Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River
Removal/softening of hard engineering structures that modify natural bank profile	Swaffham - Bulbeck Lode; Burwell Lode; Cam; Middle Level; Polver Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River
Preserve and/or restore existing in stream and riparian/shoreline habitats	Swaffham - Bulbeck Lode; Burwell Lode; Ouse (Roxton to Earith); Middle Level; Polver Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River
Restore or increase in-channel morphological diversity e.g. riffle and pool creation and bar creation etc.	Swaffham - Bulbeck Lode; Burwell Lode; Cam; New River; Ouse (Roxton to Earith); Middle Level; Polver Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River
Rehabilitation of degraded bankside habitats to improve their physical structure and the condition of the riparian zone. Includes bank reprofiling, the creation of aquatic ledges and removal of hard bank protection etc.	Swaffham - Bulbeck Lode; Burwell Lode; Middle Level; Polver Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River
Re-opening of covered culverts	Swaffham - Bulbeck Lode; Burwell Lode; Middle Level; Polver Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River
Bed of culvert altered to allow decreased flow conditions and to allow longitudinal connectivity of both biota and sediments	Swaffham - Bulbeck Lode; Burwell Lode; Middle Level; Polver Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River
Restoration of lateral connectivity with the water bodies surrounding floodplain e.g. flood plain spillways	Cam; New River; Soham Lode; Ouse (Roxton to Earith)

Mitigation measure not in place	Relevant Surface Water Body
Managed realignment of flood defence assets	Swaffham - Bulbeck Lode; Burwell Lode; Cam; New River; Soham Lode; Ouse (Roxton to Earith); Kennett - Lee Brook; Middle Level; Polver Drain; Middleton Stop Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River
Installation of structures designed to facilitate and improve the passage of migratory (e.g. salmon and sea trout) and non-migratory fish where structures cannot be removed	Swaffham - Bulbeck Lode; Burwell Lode; Cam; New River; Soham Lode; Ouse (Roxton to Earith); Kennett - Lee Brook; Middle Level; Polver Drain; Middleton Stop Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River
Modification of structure to prevent/reduce fish entrainment e.g. screens	Swaffham - Bulbeck Lode; Burwell Lode; Cam; New River; Soham Lode; Ouse (Roxton to Earith); Kennett - Lee Brook; Middle Level; Polver Drain; Middleton Stop Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River
Retro-fitting existing structures to accommodate niche habitats, as opposed to more substantial structural modifications that would be likely to deliver greater hydromorphological change but may not be possible given the use	Swaffham - Bulbeck Lode; Burwell Lode; Cam; New River; Soham Lode; Ouse (Roxton to Earith); Kennett - Lee Brook; Middle Level; Polver Drain; Middleton Stop Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River
Structural changes to locks, sluices, weirs, beach control	Swaffham - Bulbeck Lode; Burwell Lode; Cam; New River; Soham Lode; Ouse (Roxton to Earith); Kennett - Lee Brook; Middle Level; Polver Drain; Middleton Stop Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River
Good practice management of in channel and riparian vegetation works or maintenance practices (e.g. macrophyte cutting), carried out in a manner that considers the impacts of the activity upon ecology and hydromorphology	Swaffham - Bulbeck Lode; Burwell Lode; Cam; New River; Soham Lode; Ouse (Roxton to Earith); Kennett - Lee Brook; Middle Level; Polver Drain; Middleton Stop Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River
Action(s) to reduce the extent and spread of invasive non-native species, including actions on our own assets	Swaffham - Bulbeck Lode; Burwell Lode; Cam; New River; Soham Lode; Ouse (Roxton to Earith); Kennett - Lee Brook; Middle Level; Polver Drain; Middleton Stop Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River

Mitigation measure not in place	Relevant Surface Water Body
Leaving habitat or parts of natural habitat while undertaking operations or maintenance in a water body	Swaffham - Bulbeck Lode; Burwell Lode; Cam; New River; Soham Lode; Ouse (Roxton to Earith); Kennett - Lee Brook; Middle Level; Polver Drain; Middleton Stop Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River
Implement an active sediment management strategy (develop and revise) e.g. substrate reinstatement; sediment traps; allow natural recovery; riffle construction; reduce management in flood risk areas	Swaffham - Bulbeck Lode; Burwell Lode; Cam; New River; Soham Lode; Ouse (Roxton to Earith); Kennett - Lee Brook; Middle Level; Polver Drain; Middleton Stop Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River
Ensure best practice techniques are applied when undertaking maintenance activities to minimise impacts to the habitat	Swaffham - Bulbeck Lode; Burwell Lode; Cam; New River; Soham Lode; Ouse (Roxton to Earith); Kennett - Lee Brook; Middle Level; Polver Drain; Middleton Stop Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River
Ensure best practice is applied when undertaking maintenance works e.g. coffer dam placement, working during appropriate flow conditions	Swaffham - Bulbeck Lode; Burwell Lode; Cam; New River; Soham Lode; Ouse (Roxton to Earith); Kennett - Lee Brook; Middle Level; Polver Drain; Middleton Stop Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River.
Appropriate channel maintenance strategies and techniques, e.g. remove woody debris only upstream of, or within, areas of urban flood risk	Swaffham - Bulbeck Lode; Burwell Lode; Cam; New River; Soham Lode; Ouse (Roxton to Earith); Kennett - Lee Brook; Middle Level; Polver Drain; Middleton Stop Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River
Implement a downstream flow regime that does not impact the ecology (applies to rivers and reservoirs)	Swaffham - Bulbeck Lode; Burwell Lode; Cam; New River; Soham Lode; Ouse (Roxton to Earith); Kennett - Lee Brook; Middle Level; Polver Drain; Middleton Stop Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River
Activity to create new habitat where it did not exist before	Swaffham - Bulbeck Lode; Burwell Lode; Cam; New River; Soham Lode; Ouse (Roxton to Earith); Kennett - Lee Brook; Middle Level; Polver Drain; Middleton Stop Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River

Mitigation measure not in place	Relevant Surface Water Body
Raise public awareness of the impacts and responsibilities of landowners	Swaffham - Bulbeck Lode; Burwell Lode; Cam; New River; Soham Lode; Ouse (Roxton to Earith); Kennett - Lee Brook; Middle Level; Polver Drain; Middleton Stop Drain; Relief Channel; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Cut-off Channel; Ely Ouse (South Level); Old West River

WER/WFD protected areas

Under the WER/WFD 'Protected Areas' were defined as areas requiring additional protection because of their sensitivity to pollution or due to their particular economic, social or environmental importance. These include designated water bodies (or parts of water bodies) or catchment areas that are abstracted from for human consumption, support economically significant aquatic species, are recreational waters, are sensitive to nutrient enrichment or support habitats or species of international conservation importance.

The specific environmental designations, measures and actions for these Protected Areas have been established under previous European Directives and their associated domestic legislation/regulations, which set out the requirements to ensure the protection of the area's water environment or protection of wildlife that is directly dependent on that water environment. Where a WER/WFD water body falls within or forms all or part of one of these designated Protected Areas, the water body is subject to additional environmental objectives (and associated monitoring regimes, risk assessments, and regulations) in accordance with the relevant legislation.

The WER/WFD Protected Areas present within the Great Ouse catchment study area are summarised in Table 17.

Table 17: WER/WFD Protected Areas present within the catchment

Protected Area Type	Protected Area Name (code)	Relevant waterbody
Nitrates Directive	Sandringham Sands South (G150)	Nar downstream of Abbey Farm; Nar upstream of Abbey Farm; Polver Drain; Middleton Stop Drain; Gaywood River; Country Drain; Cut-off Channel; Ely Ouse (South Level)
	Nar upstream of Abbey Farm NVZ (S389)	Nar downstream of Abbey Farm; Nar upstream of Abbey Farm
	Anglian Chalk (G71)	Nar upstream of Abbey Farm; Cut-off Channel; Soham Lode; Bottisham Lode - Quay Water; Swaffham - Bulbeck Lode; Burwell Lode; New River
	Ely Ouse and Cut-off channel NVZ (S390)	Relief Channel; Stringsides Stream; Cut-off Channel; Ely Ouse (South Level); Kennett - Lee Brook; Soham Lode; Cam; Bottisham Lode - Quay Water; Swaffham - Bulbeck Lode; Burwell Lode; New River; Old West River
	Relief Channel/Polver drain NVZ	Relief Channel; Polver Drain; Middle Level; Counter Drain (Upwell and Outwell IDB); Ely Ouse (South Level)

Protected Area Type	Protected Area Name (code)	Relevant waterbody
	Middle Level NVZ (S386)	Middle Level
	Counter Drain and 100 ft. Drain NVZ (S831)	Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes)
	Great Ouse NVZ (S391)	Old Bedford River / River Delph (inc The Hundred Foot Washes); Swavesey Drain; Ouse (Roxton to Earith)
	Mintlyn Stream NVZ (S384)	Middleton Stop Drain
	Anglian Chalk (G71)	Stringside Stream; Ely Ouse (South Level); Kennett - Lee Brook;
	Gaywood River NVZ (S835)	Gaywood River
	Country Drain NVZ (S388)	Country Drain
	Huntingdon River Gravels (G144))	Cam; Swavesey Drain; Ouse (Roxton to Earith); Old West River
Shellfish Water Directive	South East Wash (UKSW2)	Great Ouse
Special Area of Conservation	The Wash & North Norfolk Coast (UK0017075)	Great Ouse
	Fenland (UK0014782)	Middle Level; Soham Lode; Burwell Lode; New River
	Nene Washes (UK0030222)	Middle Level
	Ouse Washes (UK0013011)	Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Ely Ouse (South Level); Ouse (Roxton to Earith); Old Bedford River / River Delph (inc The Hundred Foot Washes)
	Roydon Common & Dersingham Bog (UK0012801)	Gaywood River
	Norfolk Valley Fen (UK0012892)	Country Drain
	Breckland (UK0019865)	Cut-off Channel
	Portholme (UK0030054)	Ouse (Roxton to Earith)
Special Protection Area	The Wash (UK9008021)	Great Ouse

Protected Area Type	Protected Area Name (code)	Relevant waterbody
	Ouse Washes (UK9008041)	Great Ouse; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Ely Ouse (South Level); Ouse (Roxton to Earith); Old West River
	Nene Washes (UK9008031)	Middle Level
Ramsar Site	The Wash (UK11072)	Great Ouse
	Ouse Washes (UK11051)	Great Ouse; Counter Drain (Sutton and Mepal IDB incl. Cranbrook Drain); Counter Drain (Manea and Welney IDB); Counter Drain (Upwell and Outwell IDB); Old Bedford River / River Delph (inc The Hundred Foot Washes); Ely Ouse (South Level); Ouse (Roxton to Earith); Old West River
	Nene Washes (UK11046)	Middle Level
	Woodwalton Fen (UK11078)	Middle Level
	Wicken Fen (UK11077)	Burwell Lode; New River
	Roydon Common (UK11061)	Gaywood River
	Chippenham Fen (UK11014)	Soham Lode
Urban Waste Water Treatment Directive	River Great Ouse (UKENRI61)	Great Ouse; Ouse (Roxton to Earith)
	Headwaters of the Great Ouse (UKENRI61_&_UKENRI83b)	Great Ouse; Ouse (Roxton to Earith)
	Cut Off and Relief Channel (UKENRI25)	Great Ouse; Relief Channel; Cut-off Channel
	Middle Level (UKENRI70)	Middle Level
	Old West & Ely Ouse (UKENRI90)	Ely Ouse (South Level); Old West River
	Little Ouse (UKENRI71)	Ely Ouse (South Level)
	River Lark (UKENRI69)	Ely Ouse (South Level)
	Soham Lode (UKENRI64)	Ely Ouse (South Level); Soham Lode
	River Cam (Cambridgeshire) (UKENRI91_	Cam
Safeguard Zone	River Nar (SWSGZ1015)	Nar upstream of Abbey Farm

Protected Area Type	Protected Area Name (code)	Relevant waterbody
	Great Ouse (SWSGZ1012)	Ouse (Roxton to Earith)
Drinking Water Protected Area	Nar upstream of Abbey Farm (UKGB105033047791)	Nar upstream of Abbey Farm
	Cut-off Channel (ukgb205033000040)	Cut-off Channel
	Ouse (Roxton to Earith) (UKGB105033047921)	Ouse (Roxton to Earith)

Groundwater bodies

Groundwater bodies are the principal units of groundwater as defined in the WER/WFD, and are hydraulically connected, distinct entities of groundwater.

The majority of the catchment is not located within a WER/WFD groundwater body. However, the eastern boundary of the catchment is partially located over four groundwater bodies within the Anglian Groundwater management catchment. The status of the groundwater bodies is summarised in Table 18.

Table 18: WER/WFD groundwater body within the catchment and their latest Cycle 3 (2019) status classifications

Waterbody Name	Waterbody ID	Surface Area (km ²)	Overall Status	Quantitative Status	Chemical (GW) Status
North West Norfolk Chalk	GB40501G400200	366.3	Poor	Poor	Poor
North West Norfolk Sandringham Sands	GB40501G400400	195.0	Good	Good	Good
Cam and Ely Ouse Chalk	GB40501G400500	2,995.8	Poor	Poor	Poor
Cam and Ely Ouse Woburn Sands	GB40501G445700	95.3	Good	Good	Good

4.5 Biodiversity

This section outlines the baseline biodiversity in the catchment. Table 19 outlines the key terminology used in this section.

Table 19: Glossary of biodiversity terminology

Terminology	Summary Definition
Priority Habitat and Species	Priority habitats and Species are those identified as being of principal importance for the conservation of biodiversity. These habitats are listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.
Critically Endangered	Critically Endangered species are defined by the IUCN as species that face an extremely high risk of extinction in wild habitats.
Endangered	Endangered species are species which have been defined by IUCN as very likely to become extinct in their known native ranges in the near future.
Biodiversity Net Gain (BNG)	Biodiversity net gain (BNG) is a world-leading government strategy to create and improve natural habitats by making sure development has a measurably positive impact.
International Union for Conservation of Nature (IUCN)	International Union for Conservation of Nature is a membership union comprised of government and civil society organisations and is regarded as the global authority on the status of the natural world and the measures needed to safeguard it.
Local Nature Reserves (LNR)	Local Nature Reserve are statutory designated areas under Section 21 of the National Parks and Access to the Countryside act 1949.
National Nature Reserves (NNR)	National Nature Reserves are areas of land declared under the National Parks and Access to the Countryside Act 1949 or Wildlife and Countryside Act (1981).
Special Areas of Conservation (SAC)	Special Areas of Conservation are protected areas in the UK designated under the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales (including the adjacent territorial sea).
Special Protection Areas (SPAs)	Special Protection Areas are protected areas for birds in the UK classified under the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales (including the adjacent territorial sea).
Sites of Special Scientific Interest (SSSI)	Sites of Special Scientific Interest are protected areas within England. They are designated (legally protected) to maintain and protect a specific aspect of biological or earth heritage interest.

4.5.1 Designated nature conservation sites

There are 81 statutory internationally/nationally designated nature conservation sites within or partially within the catchment, some of which overlap in entirety or partially with other designations. These comprise:

- The Wash & North Norfolk Coast - Special Area of Conservation (SAC);
- Breckland - Special Protection Area (SPA) and SAC;
- Breckland Forest - Site of Special Scientific Interest (SSSI);
- Breckland Farmland - SSSI;

- Ouse Washes - SSSI, SPA, SAC, and Ramsar Site (Ramsar);
- The Wash - SSSI, SPA, Ramsar, and National Nature Reserve (NNR);
- Holme Fen - SSSI and NNR;
- Nene Washes - SSSI, SPA, SAC, and Ramsar;
- Fenland - SAC;
- Norfolk Valley Fens - SAC;
- Roydon Common & Dersingham Bog - SAC;
- River Nar - SSSI;
- Woodwalton Fen - SSSI, Ramsar, and NNR;
- Roydon Common - SSSI, Ramsar, and NNR;
- Cam Washes - SSSI;
- Monks Wood and The Odd Quarter - SSSI;
- Monks Wood - NNR;
- RAF Lakenheath - SSSI;
- Ely Pits and Meadows - SSSI;
- Wicken Fen - SSSI, Ramsar, and NNR;
- Wangford Warren and Carr - SSSI;
- Maids Cross Hill - SSSI and Local Nature Reserve (LNR);
- Warboy's and Wistow Wood - SSSI;
- Stow-cum-Quy Fen - SSSI;
- East Winch Common - SSSI;
- Aspall Close - LNR;
- Aversley Wood - SSSI;
- Berry Fen - SSSI;
- Devil's Dyke - SSSI;
- East Walton and Adcock's Common - SSSI;
- Soham Wet Horse Fen - SSSI;
- Mare Fen - LNR;
- Pashford Poor's Fen, Lakenheath - SSSI;
- Lattersey Field - LNR;
- Wilde Street Meadow - SSSI;
- Leziate, Sugar and Derby Fens - SSSI;
- Barton Mills - LNR;
- Ring's End - LNR;
- Somersham - LNR;
- Narborough Railway Embankment - SSSI;
- Little Downham - LNR;
- Isleham - LNR;
- Stallode Wash, Lakenheath - SSSI;
- Wilde Street Meadow - SSSI;
- Upwood Meadows - SSSI and NNR;
- Worts Meadow - LNR;
- Lakenheath Pools Fen - SSSI;
- Hilgay Heronry - SSSI;
- Islington Heronry - SSSI;
- Upware North Pit - SSSI;
- Woodwalton Marsh - SSSI;
- Chettisham Meadow - SSSI;
- Delph Bridge Drain - SSSI;

- Warboys Claypit - SSSI;
- Setchey - SSSI;
- Shippea Hill - SSSI;
- Blackborough End Pit - SSSI;
- Wighenhall St. Germans - SSSI;
- Bawsey - SSSI;
- Upware Bridge Pit North - SSSI;
- Wretton - SSSI; and
- Upware South Pit – SSSI.

The location of each designated site is shown in Figure 14 and a summary provided in Table 20.

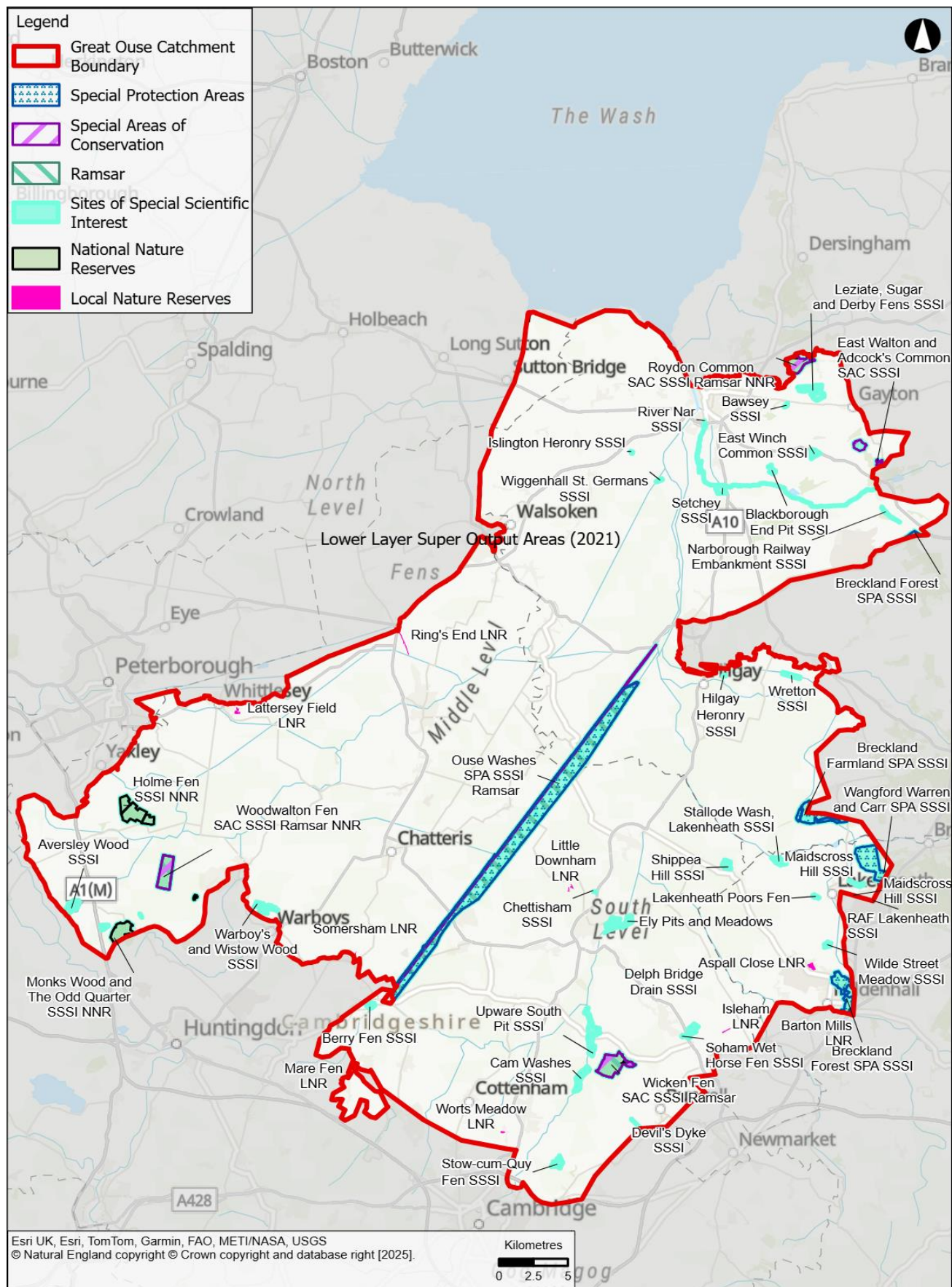


Table 20: Designated sites within the catchment

Site Name	Designation	Citation / Overview and key features
The Wash & North Norfolk Coast	SAC	The Wash & North Norfolk Coast overlaps with the Great Ouse catchment for less than 0.1% of the protected areas total as the site is associated coastal subtidal sandbanks mudflats and shallow bays. SAC – The Wash and North Norfolk Special Area of Conservation (SAC), covering 107719 ha, is one of the largest marine areas in the UK, featuring extensive subtidal sandbanks, mudflats, and sandflats. The site supports diverse benthic communities, including brittlestars (<i>Ophiothrix fragilis</i>), sand-mason worms (<i>Lanice conchilega</i>), and tellins (<i>Angulus tenuis</i>), and provides important nursery grounds for commercial fish species like plaice (<i>Pleuronectes platessa</i>), cod (<i>Gadus morhua</i>), and sole (<i>Solea solea</i>). The area is also home to the largest colony of harbour seals (<i>Phoca vitulina</i>) in the UK, with extensive intertidal flats providing ideal breeding and hauling-out conditions.
Breckland	SPA SAC	Breckland SPA and SAC overlaps with Great Ouse catchment for less than 1-2% of the protected areas total as the site is associated coastal intertidal mudflats and saltmarshes. SPA – Breckland Special Protection Area (SPA) is a 39433.66 hectares (ha) conservation area in Norfolk and Suffolk, characterised by sandy soils of glacial origin. The site supports dry heath and grassland communities, with remnants of these habitats providing breeding grounds for heathland birds. Key species include stone curlew (<i>Burhinus oedicephalus</i>), nightjar (<i>Caprimulgus europaeus</i>), and woodlark (<i>Lullula arborea</i>), which breed in clear-fell and open heath areas. SAC – Breckland SAC is a 7543.5 ha conservation area with diverse habitats, including inland water bodies, bogs, marshes, fens, heath, scrub, dry grassland, arable land, various types of woodland, and inland rocks. Key habitats include inland dunes with open <i>Corynephorus</i> and <i>Agrostis</i> grasslands, natural eutrophic lakes, European dry heaths, and semi-natural dry grasslands on calcareous substrates. The site supports rare species such as grey hair-grass (<i>Corynephorus canescens</i>), perennial knawel (<i>Scleranthus perennis</i> ssp. <i>prostratus</i>), and great crested newt (<i>Triturus cristatus</i>).
Breckland Forest	SSSI	Breckland Forest overlaps with Great Ouse catchment for less than 2% of the protected areas total as the site is associated forest habitat. SSSI – Breckland Forest Site of Special Scientific Interest (SSSI), covering 18078.70 ha, provides suitable breeding habitat for woodlark (<i>Lullula arborea</i>) and nightjar (<i>Caprimulgus europaeus</i>), which occur in internationally important numbers. The forest supports five vascular plants listed on Schedule 8 of the Wildlife and Countryside Act, including perennial knawel (<i>Scleranthus perennis</i> subsp. <i>prostratus</i>) and red-tipped cudweed (<i>Filago lutescens</i>). The site also hosts an exceptionally rich invertebrate fauna, with numerous Red Data Book and nationally scarce species, and is home to the red squirrel (<i>Sciurus vulgaris</i>), the only extant population in East Anglia.

Site Name	Designation	Citation / Overview and key features
Breckland Farmland	SSSI	Breckland Farmland overlaps with Great Ouse catchment for less than 5% of the protected areas total as the site is associated complex, sandy soils. SSSI – Breckland Farmland SSSI, spanning 13335 ha between Bury St Edmunds in Suffolk and Swaffham in Norfolk, is characterised by its semi-continental climate and complex, sandy soils. The predominant land use is arable farming, which supports a variety of crops and outdoor pig units and provides crucial nesting and foraging habitats for the stone curlew (<i>Burhinus oedicnemus</i>). The site is also adjoined by heathland SSSIs, enhancing its ecological value and biodiversity.
Ouse Washes	SSSI SPA SAC Ramsar	Ouse Washes overlaps with Great Ouse catchment for less than 97% of the protected areas total as the site is associated washland habitat. SSSI - Ouse Washes SSSI is a 2403 ha site that plays a crucial role in land drainage and flood water storage. This extensive washland habitat supports large numbers of wildfowl and waders, especially during winter, including teal (<i>Anas crecca</i>), pintail (<i>Anas acuta</i>), wigeon (<i>Anas penelope</i>), shoveler (<i>Anas clypeata</i>), pochard (<i>Aythya ferina</i>), and Bewick's swan (<i>Cygnus bewickii</i>). The grassland communities feature reed and floating sweet-grass (<i>Glyceria maxima</i> and <i>G. fluitans</i>), reed canary-grass (<i>Phalaris arundinacea</i>), and marsh foxtail (<i>Alopecurus geniculatus</i>), along with various sedges, rushes, and herbs. SPA – Ouse Washes SPA is a wetland of major international importance, comprising seasonally flooded washlands managed traditionally. It provides crucial breeding and winter habitats for wetland bird species, particularly wildfowl and waders. The site supports significant populations of ruff (<i>Philomachus pugnax</i>), Bewick's swan (<i>Cygnus columbianus bewickii</i>), whooper swan (<i>Cygnus cygnus</i>), and hen harrier (<i>Circus cyaneus</i>), among others. SAC – The Ouse Washes SAC support populations of spined loach (<i>Cobitis taenia</i>) within the River Ouse catchment. The Counter Drain, with its clear water and abundant macrophytes, is particularly important for maintaining a healthy population of this species. This site is one of only four known outstanding localities for spined loach in the United Kingdom. Ramsar – Ouse Washes Ramsar is a significant wetland characterised by seasonally flooding washlands, holding high conservation value for many plants and animals. It supports nationally rare plants like small water pepper (<i>Polygonum minus</i>), whorled water-milfoil (<i>Myriophyllum verticillatum</i>), and greater water parsnip (<i>Sium latifolium</i>), as well as rare invertebrates such as the large darter dragonfly (<i>Libellula fulva</i>) and the rifle beetle (<i>Oulimnius major</i>). The site is crucial for internationally important populations of wintering waterfowl, including Bewick's swan (<i>Cygnus columbianus bewickii</i>), gadwall (<i>Anas strepera</i>), and pintail (<i>Anas acuta</i>).
The Wash	SSSI SPA Ramsar	The Wash overlaps with the Great Ouse catchment for less than 1% of the protected areas total as the site is associated coastal intertidal mudflats and saltmarshes. SSSI – Covers the same area as the SPA and Ramsar and is of international biological interest. The intertidal mudflats and saltmarshes are crucial winter-feeding areas for waders and wildfowl, supporting large numbers of migrant birds. The saltmarsh and shingle

Site Name	Designation	Citation / Overview and key features
	NNR	communities are botanically significant, and the mature saltmarsh is a valuable bird breeding zone. The Wash is also an important breeding ground for common seals (<i>Phoca vitulina</i>). SPA – The Wash SPA covers 622 km² and forms part of the larger Wash and North Norfolk Coast Special Area of Conservation which encompasses the largest embayment in the UK, as well as extensive intertidal sand and mudflats, subtidal sandbanks, biogenic and geogenic reef, saltmarsh and a barrier beach system unique in the UK. The Wash SPA supports non-breeding including a large number of species such as: bar-tailed godwit; bewick's swan (<i>Cygnus columbianus bewickii</i>) and black-tailed godwit (<i>Limosa limosa islandica</i>). Ramsar – The Wash is Britain's largest estuarine system, fed by four rivers. It has extensive saltmarshes, intertidal banks, and deep channels. It is crucial for migrant wildfowl and wading birds, supports a shellfish fishery, and hosts large populations of common and grey seals. The sublittoral area includes diverse marine communities. NNR – The Wash National Nature Reserve (NNR), covering over 8,880 ha, is one of England's last great wildernesses and its largest reserve. This crucial wetland, with extensive mudflats and saltmarshes, supports thousands of birds year-round. In winter, it attracts wildfowl like pink-footed geese (<i>Anser brachyrhynchus</i>) and shelduck (<i>Tadorna tadorna</i>), while summer sees waders and seabirds breeding. The Wash is also a prime breeding area for common seals (<i>Phoca vitulina</i>), hosting one of England's largest populations. Seal Sands, a major basking site, offers summer boat trips from Hunstanton to view these seals up close.
Holme Fen	SSSI NNR	Holme Fen completely overlaps with the Great Ouse Catchment. SSSI – Holme Fen SSSI is a National Nature Reserve partly located on the site of the former Whittlesey Mere, which was drained in the 19th century. Since then, extensive birch woods have developed, considered the finest examples of this type of woodland in lowland Britain. The woodland consists almost entirely of birch (<i>Betula spp.</i>) with a small number of pedunculate oak (<i>Quercus robur</i>) trees. The ground flora is generally species-poor, dominated by bracken (<i>Pteridium aquilinum</i>), but includes relict plants from the former raised mire habitat. The wildlife value of the Reserve is being enhanced by the excavation of several lakes, showing an interesting pattern of re-colonisation. NNR – Holme Fen NNR is a 269.4 ha biological Site of Special Scientific Interest near Holme in Cambridgeshire, part of the Great Fen project. It is renowned for its birch woodland, remnant ancient bog, heathland, and acid grassland, providing habitats for a variety of birds such as the Eurasian siskin (<i>Spinus spinus</i>), nightingale (<i>Luscinia megarhynchos</i>), and lesser redpoll (<i>Acanthis cabaret</i>). The reserve also supports relict wetland plants like saw sedge (<i>Cladium mariscus</i>) and fen wood-rush (<i>Luzula pallescens</i>) and is home to around 450 species of fungi.
Nene Washes	SSSI SPA	Nene Washes SPA, SSSI, Ramsar overlaps with Great Ouse catchment for less than 1% of the protected areas total as the site is associated washland habitat. The Nene Washes SAC overlaps with the Great Ouse catchment for 6% of the protected area.

Site Name	Designation	Citation / Overview and key features
	SAC Ramsar	SSSI – The Nene Washes SSSI represents one of the country's few remaining areas of washland habitat which is essential to the survival nationally and internationally of populations of wildfowl and waders. Covering an area of 1522 ha, this site is notable for its diverse plant and animal life within its network of dykes and supports large numbers of wintering wildfowl, including species such as wigeon (<i>Anas penelope</i>), teal (<i>Anas crecca</i>), pintail (<i>Anas acuta</i>), and Bewick's swan (<i>Cygnus bewickii</i>). Additionally, it provides important breeding grounds for wetland birds like snipe (<i>Gallinago gallinago</i>) and redshank (<i>Tringa totanus</i>). SPA – The Nene Washes SPA, located in the lower reaches of the River Nene in Cambridgeshire, is an area of seasonally flooding grassland and grazing marsh. It supports an internationally important wintering population of Bewick's swan (<i>Cygnus columbarius bewickii</i>). The site also supports nationally important breeding populations of migratory species such as gadwall (<i>Anas strepera</i>), garganey (<i>Anas querquedula</i>), shoveler (<i>Anas clypeata</i>), and black-tailed godwit (<i>Limosa limosa</i>). Additionally, it supports nationally important wintering populations of wigeon (<i>Anas penelope</i>), teal (<i>Anas crecca</i>), gadwall (<i>Anas strepera</i>), pintail (<i>Anas acuta</i>), and shoveler (<i>Anas clypeata</i>). The site is important for a diverse assemblage of breeding birds of wet grasslands, including redshank (<i>Tringa totanus</i>), snipe (<i>Gallinago gallinago</i>), lapwing (<i>Vanellus vanellus</i>), mute swan (<i>Cygnus olor</i>), sedge warbler (<i>Acrocephalus schoenobaenus</i>), and yellow wagtail (<i>Motacilla flava</i>). It also hosts a notable assemblage of wintering waterfowl and a wide range of raptors throughout the year. SAC – Nene Washes SAC, covering 82.57 ha, is designated for the Annex II species spined loach (<i>Cobitis taenia</i>), which is a primary reason for the site's selection. Moreton's Leam, a large drainage channel along the eastern flank of the Nene Washes, contains the highest recorded density of spined loach in the UK. There may also be thriving populations in the smaller ditches of The Washes. This site is one of only four known outstanding localities for spined loach in the United Kingdom. Ramsar – Nene Washes Ramsar Site, covering 1,517 ha, is an extensive area of seasonally flooded wet grassland along the canalised lower River Nene, known as "washland." The site also contains a substantial network of drainage ditches that remain wet throughout the year. Nationally scarce plants include fringed water-lily (<i>Nymphoides peltata</i>), hairlike pondweed (<i>Potamogeton trichoides</i>), and marsh dock (<i>Rumex palustris</i>). The site supports a relict invertebrate fauna representative of the region's formerly extensive fenland, including the aquatic snail (<i>Valvata macrostoma</i>), the water beetle (<i>Agabus undulatus</i>), the dragonfly (<i>Libellula fulva</i>), and the hoverfly (<i>Anasimyia interpuncta</i>). It also holds a notable assemblage of breeding water birds, such as gadwall (<i>Anas strepera</i>), garganey (<i>Anas querquedula</i>), shoveler (<i>Anas clypeata</i>), snipe (<i>Gallinago gallinago</i>), redshank (<i>Tringa totanus</i>), and black-tailed godwit (<i>Limosa limosa</i>). The site supports internationally important numbers of wintering water birds, including Bewick's swan (<i>Cygnus columbianus bewickii</i>).
Fenland	SAC	Fenland overlaps with Great Ouse catchment for less than 75% of the protected areas total as the site is associated inland water bodies, bogs, and woodland habitat. SAC – Fenland SAC is a 619 ha with diverse habitats, including inland water bodies, bogs, marshes, fens, arable land, and broad-leaved deciduous woodland. Key habitats are Molinia meadows and calcareous fens, which are crucial for conserving rare and distinctive fen-meadow types in East Anglia. The site supports species like black bog-rush (<i>Schoenus nigricans</i>), tormentil (<i>Potentilla erecta</i>), meadow

Site Name	Designation	Citation / Overview and key features
		thistle (<i>Cirsium dissectum</i>), purple moor-grass (<i>Molinia caerulea</i>), spined loach (<i>Cobitis taenia</i>), and great crested newt (<i>Triturus cristatus</i>).
Norfolk Valley Fens	SAC	Fenland overlaps with Great Ouse catchment for about 10% of the protected areas total as the site is associated spring-fed fens habitat. SAC – Norfolk Valley Fens, covering 616 ha, is one of two sites in East Anglia where lowland alkaline fens are concentrated. The site comprises valley-head spring-fed fens, which are rare in the lowlands, and supports a rich flora including grass-of-Parnassus (<i>Parnassia palustris</i>), common butterwort (<i>Pinguicula vulgaris</i>), and marsh helleborine (<i>Epipactis palustris</i>). It is also home to strong populations of narrow-mouthed whorl snail (<i>Vertigo angustior</i>) and Desmoulin's whorl snail (<i>Vertigo moulinsiana</i>), particularly around ancient wetlands known as pingos.
Roydon Common & Dersingham Bog	SAC	Roydon Common & Dersingham Bog overlaps with Great Ouse catchment for over 40% of the protected areas total as the site is associated wet heath habitat. SAC – Roydon Common and Dersingham Bog SAC, covering 353 ha, represent the largest and best examples of M16 Erica tetralix – Sphagnum compactum wet heath in East Anglia. This diverse mire supports many rare plants, birds, and insects, including the dragonfly Sympetrum scoticum, European nightjar (<i>Caprimulgus europaeus</i>), hen harrier (<i>Circus cyaneus</i>), and merlin (<i>Falco columbarius</i>). Dersingham Bog also features depressions on peat substrates of the Rhynchosporion, with important habitats for bog orchid (<i>Hammarbya paludosa</i>).
River Nar	SSSI	River Nar overlaps with Great Ouse catchment for over 10% of the protected areas total as the site is associated River Nar. SSSI – The River Nar SSSI, covering 233.43 ha, is an ecologically significant river system combining characteristics of a southern chalk stream and an East Anglian fen river. It supports a rich and diverse flora, including starwort (<i>Callitriche spp.</i>), reed sweet-grass (<i>Glyceria maxima</i>), and narrow-leaved water-parsnip (<i>Berula erecta</i>), as well as a variety of fish species like brown trout (<i>Salmo trutta</i>) and pike (<i>Esox lucius</i>). The adjacent habitats, such as unimproved pasture and wet woodland, enhance biodiversity, providing breeding and foraging grounds for birds like snipe (<i>Gallinago gallinago</i>) and marsh harrier (<i>Circus aeruginosus</i>).
Woodwalton Fen	SSSI Ramsar NNR	Woodwalton Fen completely overlaps with the Great Ouse Catchment. SSSI – Woodwalton Fen SSSI, covering 229.7 ha, holds a range of wetland plant communities once characteristic of large areas of the East Anglian fens. The site features open fen and swamp communities, with key species including purple moor-grass (<i>Molinia caerulea</i>), ling (<i>Calluna vulgaris</i>), and bog myrtle (<i>Myrica gale</i>). The network of ditches supports many uncommon water plants, such as

Site Name	Designation	Citation / Overview and key features
		bladderwort (<i>Utricularia vulgaris</i>) and water violet (<i>Hottonia palustris</i>), while the fen carr includes willow (<i>Salix spp.</i>), blackthorn (<i>Prunus spinosa</i>), and guelder rose (<i>Viburnum opulus</i>). Ramsar – Woodwalton Fens is a wetland site in East Anglia, featuring a range of open fen and swamp communities, a relict area of acid peat, and an important network of ditches. The site supports endangered plants like fen violet (<i>Viola persicifolia</i>), fen wood (<i>Luzula pallidula</i>), and fen ragwort (<i>Senecio paludosus</i>), as well as a large number of wetland invertebrates, including 20 British Red Data Book species. Significant habitats include mixed fen, marshy grassland, birch and alder woodland, and fen carr, with species such as purple moor-grass (<i>Molinia caerulea</i>), heather (<i>Calluna vulgaris</i>), bog myrtle (<i>Myrica gale</i>), and great fen-sedge (<i>Cladium mariscus</i>). NNR –Woodwalton Fen NNR is one of the last fragments of the ancient wild fens, providing a refuge for thousands of species of fen animals and plants. This 209ha reserve is internationally important, hosting rare fen plants like fen wood-rush (<i>Luzula pallescens</i>) and fen violet (<i>Viola persicifolia</i>), and supporting a diverse array of invertebrates, including over 1,000 beetle species and 900 species of moths and butterflies. The fen is also home to breeding kingfishers (<i>Alcedo atthis</i>) and marsh harriers (<i>Circus aeruginosus</i>), making it a paradise for nature lovers and photographers.
Roydon Common	SSSI Ramsar NNR	Roydon Common overlaps with Great Ouse catchment for over 75% of the protected areas total as the site is associated lowland mixed valley mire habitat. SSSI – Roydon Common SSSI, spanning 194.09 ha, is one of Britain's finest examples of a lowland mixed valley mire. This site features a complex series of plant communities transitioning from wet acid heath through valley mire to calcareous fen, supporting many rare and locally uncommon plants. The area also includes nationally important dry <i>Calluna</i> heath on acidic sands and is of significant ornithological and entomological interest. Ramsar –Roydon Common Ramsar is an area of lowland mixed valley mire surrounded by heathland, located on the Cretaceous greensand of west Norfolk. The site supports nationally important flora such as bog orchid (<i>Hammarbya paludosa</i>), mossy stonecrop (<i>Crassula tillaea</i>), and narrow-leaved marsh orchid (<i>Dactylorhiza traunsteineri</i>), as well as lower plants like marsh fern (<i>Thelypteris palustris</i>), <i>Lophozia capitata</i>, and <i>Kurzia sylvatica</i>. It also hosts a range of nationally rare and scarce invertebrates, including the buckleria moth (<i>Buckleria paludum</i>), fungus gnat (<i>Macrocera fascipennis</i>), and the hoverfly (<i>Orthonevra geniculata</i>). NNR –Roydon Common NNR is a glorious relic of the vast heaths, bogs, and commons that once spanned Norfolk. The reserve features diverse habitats, including heathland, acid bog, wet carr woodland, and grassland, making it one of the best sites in East Anglia for natural history enthusiasts. It is home to many rare species, such as the black darter (<i>Sympetrum danae</i>), round-leaved sundew (<i>Drosera rotundifolia</i>), and bog asphodel (<i>Narthecium ossifragum</i>), and supports breeding populations of woodlark (<i>Lullula arborea</i>) and nightjar (<i>Caprimulgus europaeus</i>).
Cam Washes	SSSI	Cam Washes completely overlaps with Great Ouse Catchment.

Site Name	Designation	Citation / Overview and key features
		SSSI – Cam Washes SSSI is a 169.3 ha site consisting of low-lying pastures subject to seasonal flooding, providing important habitats for wintering and breeding wildfowl and waders. The site features a range of grassland structures, pools, ditches, and river margins, with associated scrub and scattered trees enhancing its value for birds, particularly warblers. The agriculturally unimproved pasture holds diverse plant communities, while wetter areas support various sedges and wetland herbs.
Monks Wood and The Odd Quarter	SSSI	Monks Wood and The Odd Quarter almost completely overlaps with Great Ouse Catchment. SSSI – Monk's Wood and The Odd Quarter SSSI is one of Britain's most important lowland woods, covering 169.8 ha. Monks. The woodland is primarily a high forest of the wet ash-maple type, with acidic pockets holding stands of pedunculate oak hazel and pedunculate oak hazel-ash woodland types. The ground flora is characteristic of ancient woodlands, and additional habitats include ponds, streams, herb-rich neutral grassland, and woodland rides. The site is also highly important for its invertebrate fauna and bird populations.
Monks Wood	NNR	Monks Wood almost completely overlaps with Great Ouse Catchment. NNR –Monks Wood NNR is a 157 ha, renowned for its wet ash-maple woodlands and diverse habitats. The site features a creamy shrub layer with species such as hazel (<i>Corylus avellana</i>), Midland hawthorn (<i>Crataegus oxyacanthoides</i>), and blackthorn (<i>Prunus spinosa</i>), and supports ground flora typical of ancient woodlands, including dog's mercury (<i>Mercurialis perennis</i>) and bluebell (<i>Hyacinthoides non-scriptus</i>). The woodlands are also home to various dragonflies like the broad-bodied chaser (<i>Libellula depressa</i>) and butterflies such as the black hairstreak (<i>Satyrrium pruni</i>) and white admiral (<i>Limenitis camilla</i>).
RAF Lakenheath	SSSI	RAF Lakenheath overlaps with the Great Ouse Catchment for less than 1% as it is associated with Breckland grassland habitat. SSSI – RAF Lakenheath SSSI covers an area of 111.79 ha. It is notable for its extensive species-rich Breckland grassland on well-drained sandy soils over chalk. This site boasts the highest number of rare and scarce plant species in Suffolk, including the nationally rare perennial knawel and eight other nationally rare plants. The grassland supports a diverse range of invertebrates, with eleven nationally rare species and forty-seven nationally scarce species recorded.
Wicken Fen	SSSI Ramsar NNR	Wicken Fen completely overlaps with Great Ouse Catchment. SSSI – Wicken Fen SSSI, covering 254.49 ha, is a small remnant of the East Anglian peat fens and one of the best surviving examples, unique in Cambridgeshire. The site supports a range of characteristic fenland communities and is notable for its diverse fauna and flora, particularly the invertebrate fauna and relic fen flora. The northern part of the site features original peat fen with carr and sedge communities, while the southern part includes rough pasture land, reedbeds, and pools that attract breeding wetland birds and wintering wildfowl.

Site Name	Designation	Citation / Overview and key features
		Ramsar – Wicken Fen Ramsar is a remnant of the original peat fenland of the East Anglian basin, preserved as a flood catchment area with controlled water levels. The site features a mosaic of habitats due to extensive peat-cutting and different crop exploitation systems, supporting a diverse range of species including sedges, rushes, spike rushes, and marsh orchids. Notable species include fen violet (<i>Viola persicifolia</i>), fen ragwort (<i>Senecio paludosus</i>), and milk parsley (<i>Peucedanum palustre</i>), along with wildfowl such as mallard (<i>Anas platyrhynchos</i>), teal (<i>Anas crecca</i>), and wigeon (<i>Anas penelope</i>). NNR – Wicken Fen NNR, the first nature reserve managed by the National Trust, is one of Europe's most important wetlands, home to over 9,000 species. The site supports a diverse array of wildlife, including booming bitterns (<i>Botaurus stellaris</i>), cuckoos (<i>Cuculus canorus</i>), rare orchids, and dragonflies in summer, as well as hen harriers (<i>Circus cyaneus</i>) and short-eared owls (<i>Asio flammeus</i>) in winter. The fen's habitats, such as reedbeds and wet grasslands, provide crucial breeding grounds for species like the great crested newt (<i>Triturus cristatus</i>) and various warblers, including the chiffchaff (<i>Phylloscopus collybita</i>) and Cetti's warbler (<i>Cettia cetti</i>).
Wangford Warren and Carr	SSSI	Wangford Warren and Carr overlaps with 85% of the Great Ouse Catchment as it is associated with active sand dune habitat. SSSI – Wangford Warren and Carr SSSI is a 54 ha site featuring the best-preserved system of active sand dunes in Breckland. It supports a variety of plant communities, including rare species like maritime grass (<i>Corynephorus canescens</i>) and diverse lichen species. The site also spans the transition between Breckland and fen soil types, with areas of relict fen, damp grassland, and carr.
Maidscross Hill	SSSI LNR	Maidcross Hills completely overlaps with Great Ouse Catchment. SSSI – Maidscross Hill SSSI is a sizeable area of very dry Breck grassland, covering 45.16 ha, on a range of soil types, including grassland over a nearby reservoir. Past gravel workings have left areas of bare ground at various stages of recolonisation. The site features well-developed areas of calcareous and acidic grassland, as well as intermediate areas. Lack of grazing has allowed bracken and gorse scrub to invade some areas. Four nationally and one locally rare plant species occur here, with the scrub providing additional nesting habitat for birds. LNR – Maidscross Hill Local Nature Reserve (LNR) is a 49.82 ha site located on the outskirts of Lakenheath Village. This expansive sandy warren is part of the Breckland SSSI and is a valuable remnant of Brecks heathland. The area features old chalk and gravel workings, providing a unique habitat for a variety of Breckland species, some of which are rare. The patches of chalky and sandy topsoil support diverse plant life, making it an important site for wildlife. Visitors can enjoy views over RAF Lakenheath airfield and the western Brecks landscape.
Warboy's and Wistow Wood	SSSI	Warboy's and Wistow Wood completely overlaps with the Great Ouse Catchment. SSSI – Warboys and Wistow Woods is a 44.5 ha biological Site of Special Scientific Interest in Cambridgeshire. These ancient ash (<i>Fraxinus excelsior</i>) and maple (<i>Acer campestre</i>) woodlands have high conservation value due to their rarity and diverse flora and fauna,

Site Name	Designation	Citation / Overview and key features
		including hazel (<i>Corylus avellana</i>), Midland hawthorn (<i>Crataegus oxyacanthoides</i>), and blackthorn (<i>Prunus spinosa</i>). The ground flora features dog's mercury (<i>Mercurialis perennis</i>), bluebell (<i>Hyacinthoides non-scriptus</i>), wood melick (<i>Melica uniflora</i>), and wood anemone (<i>Anemone nemorosa</i>), while the rides support meadowsweet (<i>Filipendula ulmaria</i>) and ragged robin (<i>Lychnis flos-cuculi</i>).
Stow-cum-Quy Fen	SSSI	Stow-cum-Quy Fen completely overlaps with Great Ouse Catchment. SSSI – Stow-cum-Quy Fen SSSI is a 29.6 ha site with floristically rich calcareous loam pasture and pools formed on Chalk Marl, supporting a range of uncommon aquatic plants. The grassland features herbs such as purging flax (<i>Linum catharticum</i>), cowslip (<i>Primula veris</i>), and quaking grass (<i>Briza media</i>), while the pools attract dragonflies and damselflies, including the emperor (<i>Ajax imperator</i>). The site's importance is heightened by its location within an intensively cultivated area where semi-natural habitats are rare.
East Winch Common	SSSI	East Winch Common completely overlaps with Great Ouse Catchment. SSSI – East Winch Common SSSI is an area of predominantly wet acid heathland on shallow peat, covering 25.6 ha. This type of habitat has become rare in west Norfolk. The site features many wet hollows with diverse fen and mire communities, and it is surrounded by young woodland. The wet heathland is dominated by heather (<i>Calluna vulgaris</i>) and cross-leaved heath (<i>Erica tetralix</i>), with abundant purple moor-grass (<i>Molinia caerulea</i>) and bog mosses (<i>Sphagnum spp.</i>). Several interesting species are present in the wet hollows, including the rare marsh gentian (<i>Gentiana pneumonanthe</i>). The fen-type community in less acidic hollows is dominated by yellow iris (<i>Iris pseudacorus</i>) and blunt-flowered rush (<i>Juncus subnodulosus</i>), with abundant southern marsh orchid (<i>Dactylorhiza praetermissa</i>). The surrounding woodland consists mainly of silver birch (<i>Betula pendula</i>) and oak (<i>Quercus robur</i>), with abundant willow scrub in wetter areas. Notable breeding birds include nightingale and grasshopper warbler.
Aspall Close	LNR	Aspall Close completely overlaps with Great Ouse Catchment. LNR –Aspal Close LNR is a 20.49 ha site featuring diverse habitats such as woodland, grassland, and scrub. This medieval wood pasture within the Breckland landscape supports a wide variety of insects, birds, and flowers, with almost 300 different plant species recorded. The site is also home to at least six species of bats, roosting or feeding in the area. Ancient oak pollards, some potentially 1,000 years old, sit on hummocks of chalk and sand, surrounded by open grassland and scrub. The undulating landscape, shaped by glacial action, provides a rich environment for important wildlife.
Aversley Wood	SSSI	Aversley Wood completely overlaps with Great Ouse Catchment. SSSI – Aversley Wood, covering 60 ha, is an ancient ash-maple woodland on heavy clay soils, with a history dating back to before the Middle Ages. The woodland is dominated by oak (<i>Quercus robur</i>), ash (<i>Fraxinus excelsior</i>), and field maple (<i>Acer campestre</i>), and features uncommon wild service trees (<i>Sorbus torminalis</i>). The ground flora includes bluebell (<i>Hyacinthoides non-scripta</i>), dog's mercury

Site Name	Designation	Citation / Overview and key features
		(<i>Mercurialis perennis</i>), and ancient woodland plants such as yellow archangel (<i>Galeobdolon luteum</i>) and early-purple orchid (<i>Orchis mascula</i>).
Berry Fen	SSSI	Berry Fen completely overlaps with Great Ouse Catchment. SSSI – Berry Fen SSSI represents a washland habitat of ornithological value, holding neutral grassland communities that are now scarce in Britain. Located close to the internationally important Ouse Washes, Berry Fen is used by wintering wildfowl, especially when The Washes are too deeply flooded, with Bewick's swan numbers reaching nationally significant levels. The wash grassland is characterised by marsh foxtail (<i>Alopecurus geniculatus</i>) and reed canary-grass (<i>Phalaris arundinacea</i>), grading into stands of reed sweet-grass (<i>Glyceria maxima</i>) and clumps of slender-tufted sedge (<i>Carex acuta</i>). Other herbs include purple loosestrife (<i>Lythrum salicaria</i>) and meadowsweet (<i>Filipendula ulmaria</i>). The ditches add further diversity, retaining open water into the summer months, and support wetland herbs such as sneezewort (<i>Achillea ptarmica</i>), marsh ragwort (<i>Senecio aquaticus</i>), and the uncommon narrow-leaved water-dropwort (<i>Oenanthe silaifolia</i>).
Devil's Dyke	SSSI	Devil's Dyke overlaps with over 85% of the Great Ouse Catchment as it is associated with chalk grassland habitat. SSSI – Devil's Dyke SSSI, covering 89 ha, is renowned for its species-rich chalk grassland and extensive chalk scrub grading into woodland. This habitat supports a diverse range of chalk herbs, such as upright brome (<i>Bromus erectus</i>), salad burnet (<i>Sanguisorba minor</i>), and rock-rose (<i>Helianthemum nummularium</i>), along with uncommon plants like purple milk-vetch (<i>Astragalus danicus</i>) and pasque flower (<i>Pulsatilla vulgaris</i>). The combination of grassland, scrub, and woodland provides valuable habitats for a variety of insects and birds, making it an important site for biodiversity in the region.
East Walton and Adcock's Common	SSSI	East Walton and Adcock's Common completely overlaps with Great Ouse Catchment. SSSI – East Walton and Adcock's Common SSSI, covering 62.4 ha, features a unique topography with basin-shaped depressions and chalky ridges formed under periglacial conditions. This varied landscape supports a mosaic of habitats, from fen and open water in the depressions to chalk grassland and scrub on the ridges. Key species include red fescue (<i>Festuca rubra</i>), sheep's fescue (<i>Festuca ovina</i>), and common bent (<i>Agrostis capillaris</i>), with rare plants such as the field gentian (<i>Gentianella campestris</i>) and the fragrant orchid (<i>Gymnadenia conopsea</i> ssp. <i>densiflora</i>).
Soham Wet Horse Fen	SSSI	Soham Wet Horse Fen completely overlaps with Great Ouse Catchment. SSSI – Soham Wet Horse Fen SSSI, covering 32.9 ha, holds neutral grassland communities of the calcareous loam pasture type, along with elements of alluvial meadow and calcareous clay types. The calcareous loam grassland is characterised by species such as creeping bent (<i>Agrostis stolonifera</i>), sweet vernal grass (<i>Anthoxanthum odoratum</i>), and red fescue (<i>Festuca rubra</i>). The wetter areas are

Site Name	Designation	Citation / Overview and key features
		dominated by hard rush (<i>Juncus inflexus</i>), blunt-flowered rush (<i>Juncus subnodulosus</i>), and common spike-rush (<i>Eleocharis palustris</i>), with herbs like green-winged orchid (<i>Orchis morio</i>) and adder's tongue fern (<i>Ophioglossum vulgatum</i>).
Mare Fen	LNR	Mare Fen overlaps with over 85% of the Great Ouse Catchment as it is associated with permanent pasture habitat. LNR – Mare Fen LNR is a 16.26 ha site located in the floodplain of the River Great Ouse. This permanent pasture features a mosaic of grassland types, reed-fringed ditches, and ponds, making it an excellent habitat for a variety of wildlife. The reserve is a great place to see wildfowl such as mute swans (<i>Cygnus olor</i>), wigeons (<i>Mareca penelope</i>), teals (<i>Anas crecca</i>), shovelers (<i>Spatula clypeata</i>), tufted ducks (<i>Aythya fuligula</i>), and snipes (<i>Gallinago gallinago</i>). During spring and summer, aquatic plants flourish, attracting dragonflies, frogs, toads, newts, and grass snakes (<i>Natrix natrix</i>). Badgers (<i>Meles meles</i>) forage for worms in the soft ground, and muntjac deer (<i>Muntiacus reevesi</i>) can be seen grazing. The reserve's water levels are managed using sluices, providing shallow water for overwintering waterfowl and wading birds in winter.
Pashford Poor's Fen, Lakenheath	SSSI	Pashford Poor's Fen, Lakenheath completely overlaps with Great Ouse Catchment. SSSI – Pashford Pools Fen, Lakenheath SSSI is a 12.2 ha site managed by the Suffolk Wildlife Trust. This mosaic of habitats includes species-rich mesotrophic meadows, spring-fed fen, marshy grassland, birch woodland, willow scrub, and reedbeds. Notable plant species include sweet vernal-grass (<i>Anthoxanthum odoratum</i>), small scabious (<i>Scabiosa columbaria</i>), meadow saxifrage (<i>Saxifraga granulata</i>), lady's bedstraw (<i>Galium verum</i>), and red fescue (<i>Festuca rubra</i>).
Lattersey Field	LNR	Lattersey Field completely overlaps with Great Ouse Catchment. LNR – Lattersey Field LNR is an 11.86 ha site that was originally a clay pit for the brick industry. This reserve forms a wildlife island amidst intensively farmed land and housing, featuring a mix of reedbed, marsh, open water pools and lakes, grassland, trees, and scrub. The fen vegetation supports a variety of wildlife, including water shrews (<i>Neomys fodiens</i>), water voles (<i>Arvicola amphibius</i>), and many insects such as red-eyed damselflies (<i>Erythromma najas</i>). Frogs and toads inhabit all the pools, along with sticklebacks, water scorpions, and water stick insects. The older grassland areas host twayblade (<i>Neottia ovata</i>), bee orchids (<i>Ophrys apifera</i>), and spotted orchids (<i>Dactylorhiza spp.</i>). Dense scrub provides food and shelter for birds like sparrowhawks (<i>Accipiter nisus</i>) and woodcocks (<i>Scolopax rusticola</i>). The site also features a boardwalk to explore the wetland, which is important for various wildlife, including rare beetles and moths.
Wilde Street Meadow	SSSI	Wilde Street Meadow completely overlaps with Great Ouse Catchment. SSSI – Wilde Street Meadow SSSI is a prime example of species-rich calcareous grassland and calcareous loam grassland, transitioning into damp pasture, spanning 10.9 has. This site is particularly notable for its sizeable population of green-winged orchid

Site Name	Designation	Citation / Overview and key features
		(<i>Orchis morio</i>). The meadow's unique topography and long history of traditional, non-intensive summer grazing have preserved its ecological value. Additional features include open scrub that attracts various bird species and dykes supporting wetland plants.
Leziate, Sugar and Derby Fens	SSSI	Leziate, Sugar and Derby Fens completely overlap with Great Ouse Catchment. SSSI – Leziate, Sugar and Derby Fens SSSI is an 87.91 ha site that includes remnants of a once extensive valley fen system along the Gaywood River, featuring a wide range of habitats from dry calcareous grassland to wet boggy heath. The diverse plant communities reflect variations in the underlying soils, with extensive areas of damp acidic grassland and heath on the greensand belt, and species-rich calcareous grassland on chalky soils. The site supports a variety of notable species and habitats, including seasonally wet rough grassland, damp birch woodland, and dry grassy heath.
Barton Mills	LNR	Barton Mills almost completely overlaps with Great Ouse Catchment. LNR – Barton Mills Valley LNR is a 10.74 ha site located in Mildenhall, Suffolk. Managed by West Suffolk Council, this reserve is part of the Breckland Forest biological SSSI. The Riverside Reserve features a mosaic of six different habitats, including reedbeds, sedge areas, alder carr (<i>Alnus glutinosa</i>), willow carr (<i>Salix spp.</i>), and river valley habitat.
Ring's End	LNR	Ring's End completely overlaps with Great Ouse Catchment. LNR – Ring's End LNR is an 8.54 ha site featuring extensive reedbeds, three large ponds, and small areas of scrub. The main path runs along the old railway embankment, offering excellent views across the fen. This post-industrial habitat, reclaimed from industrial land, supports uncommon flowering plants like coltsfoot (<i>Tussilago farfara</i>) due to its nutrient-poor soil. The reserve is home to mature ash (<i>Fraxinus excelsior</i>) and white willow (<i>Salix alba</i>) trees, as well as stands of perennial rose bay willow herb (<i>Chamerion angustifolium</i>) and mugwort (<i>Artemisia vulgaris</i>). The diverse habitats attract many butterflies, invertebrates, and reptiles, making it a valuable retreat for wetland birds.
Somersham	LNR	Somersham overlaps with over 50% of the Great Ouse Catchment as it is associated with woodland and lake habitat. LNR – Somersham LNR is a vibrant 8.91 ha site showcasing diverse habitats including woodland, grassland, wetland, and a lake. The lake, formed by gravel extraction for the railway, supports a variety of bird species such as common terns (<i>Sterna hirundo</i>), great crested grebes (<i>Podiceps cristatus</i>), herons (<i>Ardea cinerea</i>), and kingfishers (<i>Alcedo atthis</i>). The meadow is a haven for butterflies, while the disused railway line is ideal for spotting grass snakes (<i>Natrix natrix</i>) and common lizards (<i>Zootoca vivipara</i>). Notable plant species include red bartsia (<i>Odontites vernus</i>), St John's wort (<i>Hypericum perforatum</i>), toadflax (<i>Linaria vulgaris</i>), and purple loosestrife (<i>Lythrum salicaria</i>). This reserve is a testament to nature's resilience and biodiversity.

Site Name	Designation	Citation / Overview and key features
Narborough Railway Embankment	SSSI	Narborough Railway Embankment completely overlaps with Great Ouse Catchment. SSSI – Narborough Railway Embankment SSSI is a 7.9 ha site featuring an embanked section of a disused railway line, constructed from locally extracted chalk rubble, which has developed an herb-rich chalk flora. It is likely the most diverse chalk grassland site in Norfolk, supporting a wide range of butterflies, including several locally scarce species. The site also includes calcareous scrub, mosses, molluscs, and young secondary woodland.
Little Downham	LNR	Little Downham completely overlaps with Great Ouse Catchment. LNR – Little Downham LNR is a 6.59 ha site comprising three areas: Pingle Wood, Myles Meadow, and The Holts (Holts Spinney & Holts Meadows). Pingle Wood, established in 1995, features native tree species and shrubs with mown walkways leading to Myles Meadow and the Community Orchard. Myles Meadow, seasonally grazed by cattle, has two ponds and aims to enhance floral diversity through 'green hay' experiments. Holts Spinney is secondary woodland, while Holts Meadows are stock-fenced with safe access to the pond and seating. The reserve supports a variety of wildlife, including bullfinches (<i>Pyrrhula pyrrhula</i>) and tawny owls (<i>Strix aluco</i>). Holts Meadow pond is home to dragonflies and damselflies such as the emperor (<i>Anax imperator</i>) and scarce chaser (<i>Libellula fulva</i>), as well as great crested newts (<i>Triturus cristatus</i>). Tubular water dropwort (<i>Oenanthe fistulosa</i>) and lady's smock (<i>Cardamine pratensis</i>) are also present.
Isleham	LNR	Isleham completely overlaps with Great Ouse Catchment. LNR – Isleham LNR is a 1.12 ha site featuring species-rich chalk grassland and hedgerows along a disused railway line. The grassland supports a variety of butterflies and is home to flowering plants such as field scabious (<i>Knautia arvensis</i>), greater knapweed (<i>Centaurea scabiosa</i>), broomrape (<i>Orobancha spp.</i>), St John's wort (<i>Hypericum perforatum</i>), wild marjoram (<i>Origanum vulgare</i>), salad burnet (<i>Sanguisorba minor</i>), tufted vetch (<i>Vicia cracca</i>), and bladder campion (<i>Silene vulgaris</i>). In winter, birds like skylarks (<i>Alauda arvensis</i>), yellowhammers (<i>Emberiza citrinella</i>), and bullfinches (<i>Pyrrhula pyrrhula</i>) can be seen using the reserve. Managed by Cambridgeshire County Council and the Friends of Isleham Nature Reserves, this site offers a rich diversity of flora and fauna.
Stallode Wash, Lakenheath	SSSI	Stallode Wash, Lakenheath completely overlaps with Great Ouse Catchment. SSSI – Stallode Wash, Lakenheath SSSI is a 33.95 ha washland with a permanently high water table, regularly flooded by the Little Ouse River. The site features a range of vegetation from seasonally flooded grassland to tall fen and reedswamp, with smaller areas of open water and old dykes. It contains populations of two nationally rare plants and is noted for its bird life.
Wilde Street Meadow	SSSI	Wilde Street Meadow completely overlaps with Great Ouse Catchment.

Site Name	Designation	Citation / Overview and key features
		SSSI – Wilde Street Meadow SSSI is a prime example of species-rich calcareous grassland and calcareous loam grassland, transitioning into damp pasture, spanning 10.9 ha. This site is particularly notable for its sizeable population of Green-winged Orchid (<i>Orchis morio</i>). The meadow's unique topography and long history of traditional, non-intensive summer grazing have preserved its ecological value. Additional features include open scrub that attracts various bird species and dykes supporting wetland plants.
Upwood Meadows	SSSI NNR	Upwood Meadows completely overlaps with Great Ouse Catchment. SSSI – Upwood Meadows SSSI is a 6.2 ha site consisting of three meadows, ponds, scrub, and mature hedgerow. One of the meadows is agriculturally unimproved and is a fine example of old grassland on clay, a vegetation type now scarce throughout the British Isles. The unimproved meadow exhibits ridges and furrows and is rich in different grass and herb species, with a notable large population of green-winged orchid (<i>Orchis morio</i>). Many other characteristic plants of old meadows also occur, such as pepper saxifrage (<i>Silva silaus</i>), Devil's-bit scabious (<i>Succisa pratensis</i>), and dropwort (<i>Filipendula vulgaris</i>). The remaining improved grassland is managed to encourage recolonisation by old meadow herbs and grasses. Additional habitats, including small ponds and old mature hedgerows, are of local importance due to their scarcity in the area. NNR –Upwood Meadows NNR is designated for its floristic diversity and is awash with life. Bentley Meadow, with its medieval ridge-and-furrow and numerous ant hills, provides microhabitats for plants and invertebrates, including cowslip (<i>Primula veris</i>), green-winged orchid (<i>Anacamptis morio</i>), saw-wort (<i>Serratula tinctoria</i>), dropwort (<i>Filipendula vulgaris</i>), sulphur clover (<i>Trifolium ochroleucon</i>), and dyer's greenweed (<i>Genista tinctoria</i>). The surrounding mature hedgerows and veteran trees offer nesting habitats for birds such as turtle dove (<i>Streptopelia turtur</i>), blackcap (<i>Sylvia atricapilla</i>), and whitethroat (<i>Sylvia communis</i>), while dew ponds serve as breeding grounds for great crested newts (<i>Triturus cristatus</i>), dragonflies, and damselflies.
Worts Meadow	LNR	Worts Meadow completely overlaps with Great Ouse Catchment. LNR –Wort Meadow LNR is a 5.65 ha site located in the village of Landbeach. This former medieval settlement features a homestead moat, fish pond, and earthworks indicating the locations of roads and houses. The site includes improved lowland grassland pasture, hedgerows, plantation woodland, and ponds. The grassland, though species-poor, is grazed by cattle from April to October, while the species-rich hedgerows provide habitat for birds such as yellowhammers (<i>Emberiza citrinella</i>) and whitethroats (<i>Sylvia communis</i>). In summer, you might hear the gentle "purring" of a turtle dove (<i>Streptopelia turtur</i>). The ponds are vital for wildlife, hosting great-crested newts (<i>Triturus cristatus</i>), frogs, and toads. Bourne Wood, planted in 1992, is home to willow warblers (<i>Phylloscopus trochilus</i>) and blackcaps (<i>Sylvia atricapilla</i>).
Lakenheath Poors Fen	SSSI	Lakenheath Poors Fens completely overlaps with Great Ouse Catchment. SSSI – Lakenheath Poors Fen SSSI, covering 4.95 ha, is a species-rich fen meadow with areas of damp calcareous and neutral grassland. The grassland is dominated by common quaking-grass (<i>Briza media</i>), crested hair-grass (<i>Koeleria cristata</i>), and false oat-

Site Name	Designation	Citation / Overview and key features
		grass (<i>Arrhenatherum elatius</i>), and supports flowering plants such as marsh orchid (<i>Dactylorhiza incarnata</i>) and sneezewort (<i>Achillea ptarmica</i>). The main dyke contains broad-leaved pondweed (<i>Potamogeton natans</i>) and water violet (<i>Hottonia palustris</i>), while the ditches support lesser water plantain (<i>Baldellia ranunculoides</i>) and water mint (<i>Mentha aquatica</i>).
Hilgay Heronry	SSSI	Hilgay Heronry completely overlaps with the Great Ouse Catchment. SSSI – Hilgay Heronry SSSI, covering 1.8 ha, is a small copse on the edge of the Fens that supports a nationally important breeding colony of grey herons (<i>Ardea cinerea</i>). Approximately 40 nests are occupied each year in the mature trees of European larch (<i>Larix decidua</i>) and ash (<i>Fraxinus excelsior</i>). The nearby fenland, with its extensive system of drainage dykes, provides ideal feeding conditions for the herons.
Islington Heronry	SSSI	Islington Heronry completely overlaps with Great Ouse Catchment. SSSI – Islington Heronry SSSI is a small, isolated stand of mature oaks surrounded by fenland, supporting the largest colony of grey herons (<i>Ardea cinerea</i>) in Norfolk, with about 80 occupied nests each year. The adjacent dykes provide ideal feeding conditions for the herons, and several species of woodland birds, such as the great spotted woodpecker, are also present, representing isolated populations separated from nearby woods by farmland.
Upware North Pit	SSSI	Upware North Pit completely overlaps with Great Ouse Catchment. SSSI – Upware North Pit SSSI is a 1.1 ha site that holds one of the only two native British localities for the water germander (<i>Teucrium scordium</i>) and is valuable for its wetland communities and uncommon plants. The site consists of small, flooded pits with emergent vegetation, including common reed (<i>Phragmites communis</i>) and greater pond sedge (<i>Carex riparia</i>).
Woodwalton Marsh	SSSI	Woodwalton Marsh completely overlaps with Great Ouse Catchment. SSSI – Woodwalton Marsh SSSI is a 0.8 ha area supporting species-rich neutral grassland on calcareous clay, a rare community type in this part of Cambridgeshire. The grassland is characterised by species such as red fescue (<i>Festuca rubra</i>), quaking grass (<i>Briza media</i>), knapweed (<i>Centaurea nigra</i>), and cowslip (<i>Primula veris</i>). Other notable herbs include dropwort (<i>Filipendula vulgaris</i>), pepper saxifrage (<i>Silene silaus</i>), green-winged orchid (<i>Orchis morio</i>), and the rare sulphur clover (<i>Trifolium ochroleucon</i>).
Chettisham Meadow	SSSI	Chettisham Meadow completely overlaps with Great Ouse Catchment. SSSI – Chettisham Meadow SSSI is an example of ridge-and-furrow neutral grassland on calcareous clays, covering 0.6 ha. This type of grassland is restricted to southern Britain, and Chettisham Meadow is one of the few remaining examples in Cambridgeshire, being one of the best of its kind nationally. The grassland is characterised by red fescue (<i>Festuca rubra</i>), meadow foxtail (<i>Alopecurus pratensis</i>),

Site Name	Designation	Citation / Overview and key features
		rough meadow-grass (<i>Poa trivialis</i>), and sweet vernal-grass (<i>Anthoxanthum odoratum</i>). The species-rich sward supports a good range of typical meadow plants, including pepper saxifrage (<i>Silaum silaus</i>), adder's-tongue (<i>Ophioglossum vulgatum</i>), cowslip (<i>Primula veris</i>), and the green-winged orchid (<i>Orchis morio</i>), which is now quite rare in the county and decreasing nationally. The surrounding hedges play an important role in buffering the meadow communities from external influences in this largely arable area.
Delph Bridge Drain	SSSI	Delph Bridge Drain completely overlaps with Great Ouse Catchment. SSSI – Delph Bridge Drain SSSI is a 0.1 ha site that supports the only known British population of fen ragwort (<i>Senecio paludosus</i>), which was thought to be extinct in Britain until its rediscovery in 1971. The site consists of a ditch dug into surface peat deposits, with typical fen and reed swamp vegetation, including greater reedmace (<i>Typha latifolia</i>), branched bur-reed (<i>Sparganium erectum</i>), and amphibious bistort (<i>Polygonum amphibium</i>).
Setchey	SSSI	Setchey completely overlaps with Great Ouse Catchment. SSSI – Setchey SSSI is important for studies of Flandrian sea-level change, with stratigraphy conforming to the typical Fenland sequence, making it a key part of the overall network of Fenland sites for correlation across the area.
Shippea Hill	SSSI	Shippea Hill completely overlaps with Great Ouse Catchment. SSSI – Shippea Hill SSSI is crucial for studying Flandrian sea-level change and environmental history in the Fenland, integrating palynological, sedimentological, and archaeological investigations.
Wiggenhall St. Germans	SSSI	Wiggenhall St. Germans completely overlaps with Great Ouse Catchment. SSSI – Wiggenhall St Germans SSSI was one of the first sites in Britain to be investigated for sea-level studies using pollen and foraminifera analyses, with deposits dominated by fine-grained clastic sediments intercalated by peat layers, providing valuable palaeoenvironmental and chronological information.
Upware Bridge Pit North	SSSI	Upware Bridge Pit North completely overlaps with Great Ouse Catchment. SSSI – Upware Bridge Pit North SSSI is a key locality for Oxfordian (Jurassic) aged rocks, featuring a condensed Elsworth rock section with a rich ammonite fauna and an overlying Upware Limestone known for its diverse invertebrate faunas, including many Tethyan species.
Wretton	SSSI	Wretton completely overlaps with Great Ouse Catchment.

Site Name	Designation	Citation / Overview and key features
		SSSI – Wretton SSSI is a key stratigraphic locality where a complex series of late Pleistocene terrace deposits of the River Wissey have been exposed, containing the most complete sequence of Early Devensian deposits with abundant fossil mammal remains, including wolf, arctic fox, bear, reindeer, bison, and woolly rhinoceros.

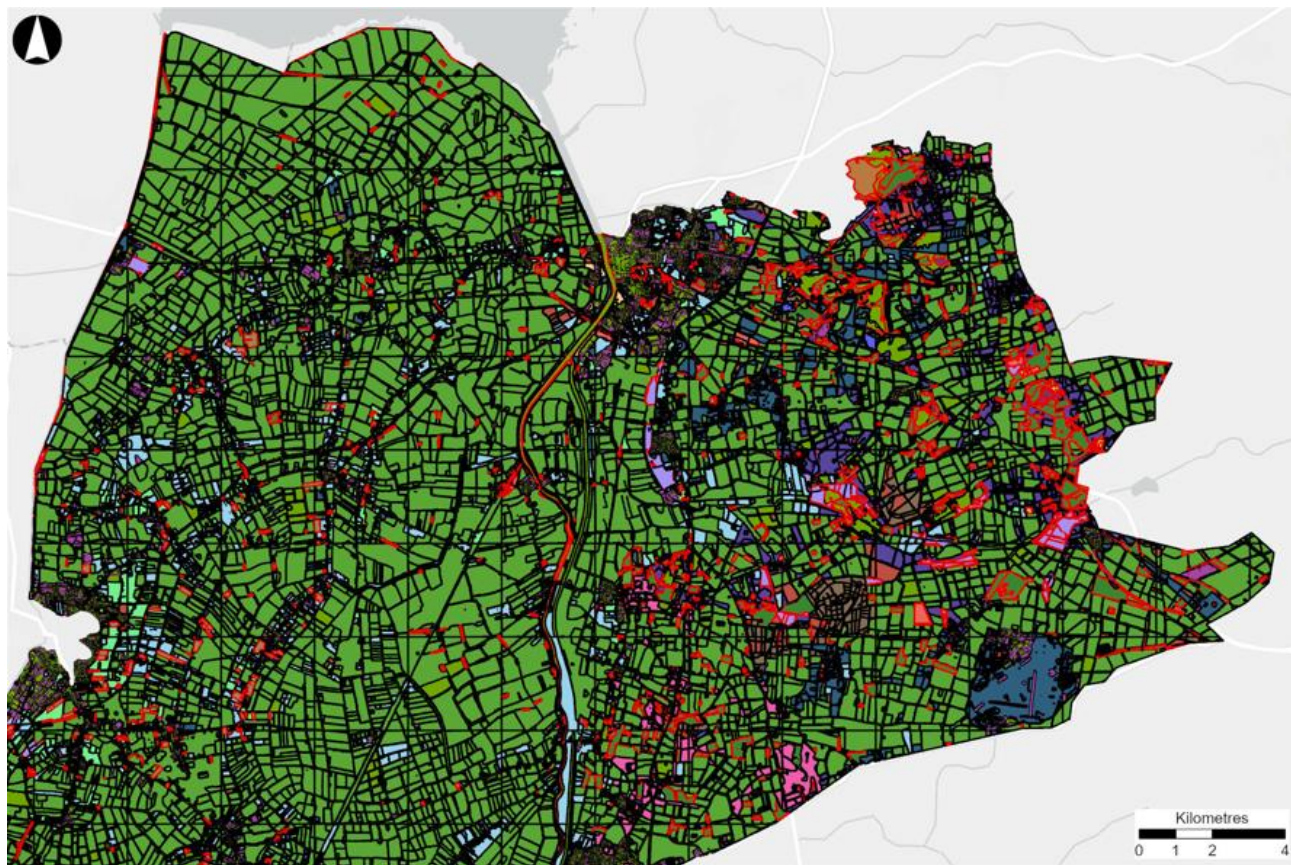
4.5.2 Priority habitats and other habitats

A habitat map for the catchment was created using Arup's suite of earth observation tools. Initially, habitats within the catchment that are listed on the Priority Habitat Inventory (PHI) were mapped. The PHI describes the spatial extent of 25 priority habitats in England. They were extracted from the existing Great Ouse map tiles to highlight areas specifically designated by Natural England.

In cases, where a single area has multiple priority habitat designations (indicative of coexisting habitats in the PHI) both habitats were kept as a separate category. For example, "Coastal floodplain and grazing marsh" and "Coastal floodplain and grazing marsh; Coastal saltmarsh" were kept as two discrete classes in accordance with the PHI.

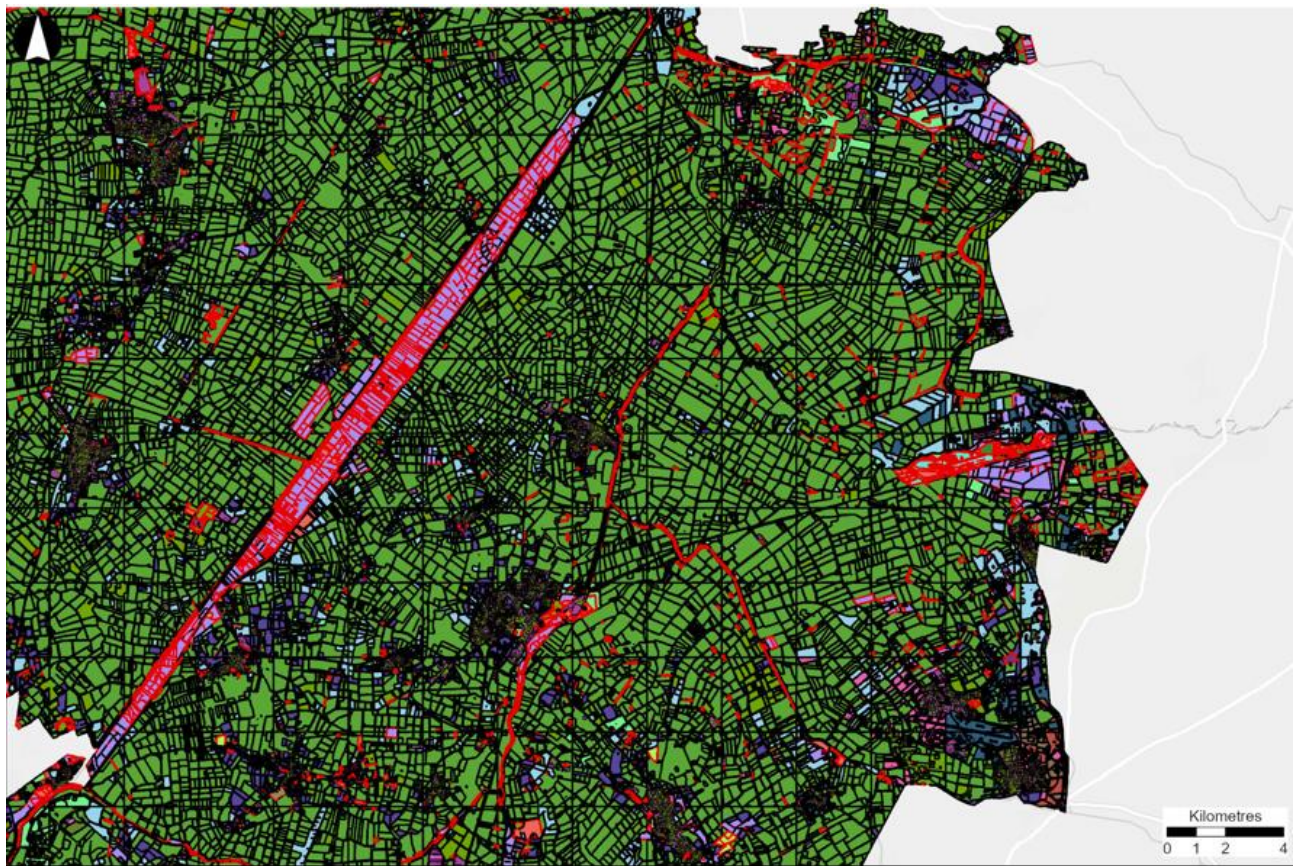
Following mapping of the PHI areas, OS open map data was used to identify features such as roads, buildings, trees and intertidal zones. Remaining habitats were then identified using a combination of earth observation imagery and publicly available datasets. The imagery was segmented into polygons and each polygon was assigned to a habitat type based on classification rules using Living England, Corine Land Cover, European Space Agency (ESA) World Cover datasets.

The habitats (including priority habitats) that have been identified within the boundary of the catchment are mapped in Figure 15, Figure 16, Figure 17 and Figure 18 and presented in Table 21.



Habitat					
	Traditional orchard (PHI)		Coastal and floodplain grazing marsh,Lowland meadows (PHI)		Developed land sealed surface
	Saline lagoons (PHI)		Coastal and floodplain grazing marsh,Coastal saltmarsh (PHI)		Fens (upland and lowland)
	Reedbeds (PHI)		Coastal and floodplain grazing marsh (PHI)		Littoral Sediment
	Ponds (PHI)		Purple moor grass and rush pastures (PHI)		Lowland calcareous grassland
	Mudflats (PHI)		Reedbeds,Coastal saltmarsh (PHI)		Lowland heathland
	Lowland meadows (PHI)		Arable and Horticultural		Modified grassland
	Lowland fens (PHI)		Artificial unvegetated, unsealed		Neutral grassland
	Lowland calcareous grassland (PHI)		Broadleaved and mixed woodland		Other coniferous woodland
	Deciduous woodland (PHI)		Built linear features		Other lowland acid grassland
	Coastal sand dunes (PHI)		Coastal saltmarsh		Vegetated garden
	Coastal saltmarsh (PHI)		Dense scrub		Ponds
					Standing open water and canals
					Watercourse Footprint

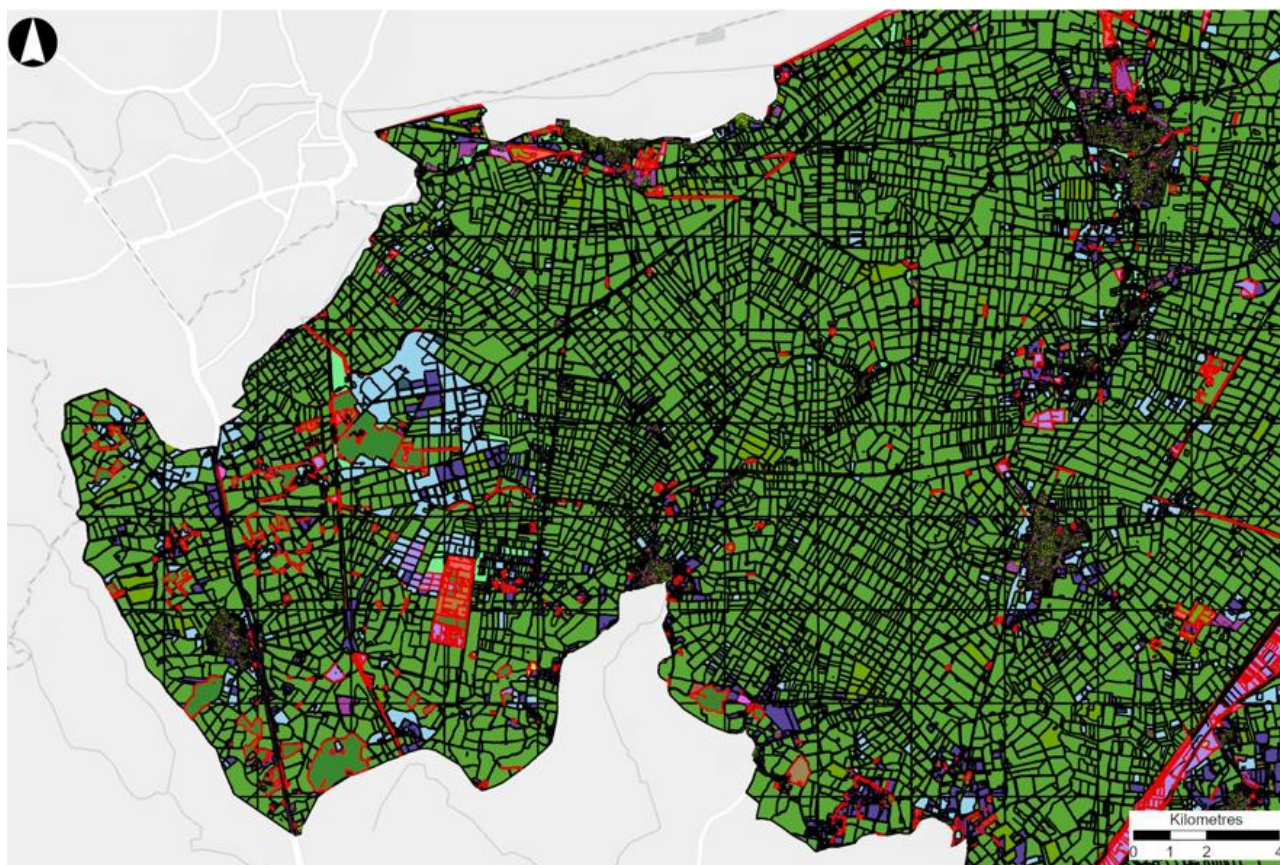
Figure 15: Habitat map for the catchment (North) developed using earth observation



Habitat

Traditional orchard (PHI)	Coastal and floodplain grazing marsh, Lowland meadows (PHI)	Developed land sealed surface
Saline lagoons (PHI)	Coastal and floodplain grazing marsh, Coastal saltmarsh (PHI)	Fens (upland and lowland)
Reedbeds (PHI)	Coastal and floodplain grazing marsh (PHI)	Littoral Sediment
Ponds (PHI)	Purple moor grass and rush pastures (PHI)	Lowland calcareous grassland
Mudflats (PHI)	Reedbeds, Coastal saltmarsh (PHI)	Lowland heathland
Lowland meadows (PHI)	Arable and Horticultural	Modified grassland
Lowland fens (PHI)	Artificial unvegetated, unsealed	Neutral grassland
Lowland calcareous grassland (PHI)	Broadleaved and mixed woodland	Other coniferous woodland
Deciduous woodland (PHI)	Built linear features	Other lowland acid grassland
Coastal sand dunes (PHI)	Coastal saltmarsh	Vegetated garden
Coastal saltmarsh (PHI)	Dense scrub	Ponds
		Standing open water and canals
		Watercourse Footprint

Figure 16: Habitat map for the catchment (Central and East) developed using earth observation



Habitat			
 Traditional orchard (PHI)	 Coastal and floodplain grazing marsh,Lowland meadows (PHI)	 Developed land sealed surface	
 Saline lagoons (PHI)	 Coastal and floodplain grazing marsh,Coastal saltmarsh (PHI)	 Fens (upland and lowland)	
 Reedbeds (PHI)	 Coastal and floodplain grazing marsh (PHI)	 Littoral Sediment	
 Ponds (PHI)	 Purple moor grass and rush pastures (PHI)	 Lowland calcareous grassland	
 Mudflats (PHI)	 Reedbeds,Coastal saltmarsh (PHI)	 Lowland heathland	
 Lowland meadows (PHI)	 Arable and Horticultural	 Modified grassland	
 Lowland fens (PHI)	 Artificial unvegetated, unsealed	 Neutral grassland	
 Lowland calcareous grassland (PHI)	 Broadleaved and mixed woodland	 Other coniferous woodland	
 Deciduous woodland (PHI)	 Built linear features	 Other lowland acid grassland	
 Coastal sand dunes (PHI)	 Coastal saltmarsh	 Vegetated garden	
 Coastal saltmarsh (PHI)	 Dense scrub	 Ponds	
		 Standing open water and canals	
		 Watercourse Footprint	

Figure 17: Habitat map for the catchment (West) developed using earth observation



Habitat			
Traditional orchard (PHI)	Coastal and floodplain grazing marsh,Lowland meadows (PHI)	Developed land sealed surface	
Saline lagoons (PHI)	Coastal and floodplain grazing marsh,Coastal saltmarsh (PHI)	Fens (upland and lowland)	
Reedbeds (PHI)	Coastal and floodplain grazing marsh (PHI)	Littoral Sediment	
Ponds (PHI)	Purple moor grass and rush pastures (PHI)	Lowland calcareous grassland	
Mudflats (PHI)	Reedbeds,Coastal saltmarsh (PHI)	Lowland heathland	
Lowland meadows (PHI)	Arable and Horticultural	Modified grassland	
Lowland fens (PHI)	Artificial unvegetated, unsealed	Neutral grassland	
Lowland calcareous grassland (PHI)	Broadleaved and mixed woodland	Other coniferous woodland	
Deciduous woodland (PHI)	Built linear features	Other lowland acid grassland	
Coastal sand dunes (PHI)	Coastal saltmarsh	Vegetated garden	
Coastal saltmarsh (PHI)	Dense scrub	Ponds	
		Standing open water and canals	
		Watercourse Footprint	

Figure 18: Habitat map for the catchment (South) developed using earth observation

Table 21: Habitat types identified within the catchment

	Habitat Type	Great Ouse Study Area Hectares (ha)	Habitat Description [115]	Context within the Great Ouse catchment Study Area
Coastal	Coastal and floodplain grazing marsh (PHI)	5162.63 ha	This habitat is a combination of coastal and floodplain grazing marsh and coastal saltmarsh (descriptions of these habitats is described in detail in the habitat descriptions for the individual habitats.	This habitat found throughout the catchment. This habitat is associated a couple of the designated nature conservation sites including Ouse Washes SSSI, SPA, SAC, and Ramsar Site.
	Mudflats (PHI)	53.36 ha	Mudflats are intertidal habitats formed by sediment deposition in low-energy coastal environments like estuaries. Their sediment is mainly silts and clays with high organic content, and sand content increases near estuary mouths. Mudflats are linked to other coastal habitats such as soft cliffs and saltmarshes, often appearing between subtidal channels and vegetated saltmarshes. They can be several kilometres wide in large estuaries but have been reduced by land reclamation. Mudflats dissipate wave energy, reducing erosion and flooding risks, and play a crucial role in nutrient chemistry and contaminant sequestration. They are highly productive but have low species diversity.	This habitat is limited to northern portion of the catchment along the coast as well as along the River Great Ouse. This habitat is associated a couple of the designated nature conservation sites including The Wash National Nature Reserve.
	Littoral Sediment	49.46 ha	Littoral sediment includes habitats of shingle (mobile cobbles and pebbles), gravel, sand and mud or any combination of these which occur in the intertidal zone. This is an area of littoral sediment identified from publicly available sources.	This habitat found primarily within the southern portion of the catchment, south of Ouse Washes SSSI, SPA, SAC, and Ramsar Site.
	Coastal saltmarsh (PHI)	5.57 ha	Coastal saltmarshes in the UK, are the vegetated upper portions of intertidal mudflats. They lie between mean high water neap tides and mean high water spring tides, with the lower limit defined by pioneer saltmarsh vegetation and the upper limit one metre above the highest astronomical tides. Saltmarshes are found in sheltered locations such as estuaries, saline lagoons, behind barrier islands, at sea loch heads, and on beach plains. Their vegetation consists of halophytic species adapted to regular tidal immersion, showing clear zonation based on inundation frequency. Pioneer species like	This habitat is limited to northern portion of the catchment along the coast.

	Habitat Type	Great Ouse Study Area Hectares (ha)	Habitat Description [115]	Context within the Great Ouse catchment Study Area
			glassworts can withstand up to 600 tides per year, while upper marsh species endure occasional inundation.	
	Coastal saltmarsh	0.98 ha	This is an area of coastal saltmarsh identified from publicly available sources but not identified on the PHI.	This habitat is limited to northern portion of the catchment along the coast.
Aquatic / semi-aquatic	Fens (upland and lowland)	5765.07 ha	This is an area of lowland fens habitat identified from publicly available sources.	This habitat is located in multiple locations across the catchment.
	Lowland fens (PHI)	852.02 ha	Lowland fens are peatlands that receive water and nutrients from the soil, rock, and groundwater, as well as from rainfall, making them minerotrophic. These fens can be categorised into topogenous fens, where water movement is vertical, and soligenous fens, where water movement is lateral. Rich in biodiversity, lowland fens support a variety of plant and animal communities, including up to 550 species of higher plants and numerous insect species, making them crucial habitats despite their decline in the past century.	This habitat found throughout the catchment. This habitat is associated a couple of the designated nature conservation sites including Wicken Fen.
	Reedbeds (PHI)	135.90 ha	Reedbeds are wetlands dominated by common reed (<i>Phragmites australis</i>), with the water table at or above ground level for most of the year. They often include areas of open water, ditches, wet grassland, and carr woodland. Reedbeds are crucial habitats for birds in the UK, supporting rare species like the bittern and marsh harrier, and providing roosting sites for migratory birds and raptors. Additionally, they are home to several rare invertebrates, including the red leopard moth and a rove beetle.	This habitat found primarily within the southern portion of the catchment north of Lakenheath and south of Wicken. This habitat is associated a couple of the designated nature conservation sites including Wicken Fen SSSI and Stallode Wash, Lakenheath SSSI.

	Habitat Type	Great Ouse Study Area Hectares (ha)	Habitat Description [115]	Context within the Great Ouse catchment Study Area
	Lowland fens, Reedbeds (PHI)	38.39 ha	Lowland fens and reedbeds are vital wetland habitats characterised by the dominance of common reed (<i>Phragmites australis</i>) and a water table at or above ground level for most of the year. These areas often feature open water, ditches, wet grassland, and carr woodland, providing essential habitats for rare bird species like the bittern and marsh harrier, as well as roosting sites for migratory birds and raptors. Additionally, they support rare invertebrates such as the red leopard moth and a rove beetle. Ponds, which can be permanent or seasonal and up to 2 hectares in size, are crucial for biodiversity, hosting species of high conservation importance and exceptional biotic assemblages. Identified using standard survey techniques, these ponds play a significant role in the landscape, with around 20% of the UK's 400,000 ponds potentially meeting priority habitat criteria.	This habitat found primarily within the southern portion of the catchment north of Lakenheath and south of Wicken. This habitat is associated a couple of the designated nature conservation sites including Wicken Fen SSSI and Stallode Wash, Lakenheath SSSI.
	Ponds (PHI)	6.75 ha	Ponds are permanent or seasonal standing water bodies up to 2 hectares in size, supporting species of high conservation importance and exceptional biotic assemblages. These ponds are crucial for biodiversity, hosting rare species and high ecological quality, and are identified using standard survey techniques. They play a significant role in the landscape, with around 20% of the UK's 400,000 ponds potentially meeting priority habitat criteria.	This habitat is found in isolated patches across the catchment.
Grassland	Modified grassland	11028.23 ha	This is an area of modified grassland identified from publicly available sources.	This habitat is found in patches across the catchment. There is significant patch of habitat located along the River Great Ouse
	Neutral grassland	8962.34 ha	This is an area of neutral grassland identified from publicly available sources.	This habitat is found in patches across the catchment with the highest concentration of habitat in the southern portion of the catchment.

	Habitat Type	Great Ouse Study Area Hectares (ha)	Habitat Description [115]	Context within the Great Ouse catchment Study Area
	Lowland calcareous grassland	3719.26 ha	This is an area of lowland calcareous grassland identified from publicly available sources.	This habitat is found in patches across the catchment with the highest concentration of habitat in the eastern portion of the catchment. The most significant patch of habitat is located across the RAF Marham site.
	Other lowland acid grassland	1362.10 ha	This is an area of other lowland acid grassland identified from publicly available sources.	
	Purple moor grass and rush pastures (PHI)	144.11 ha	Purple moor-grass and rush pastures are marshy grasslands often found on lowland farmland and around hill margins. These habitats are rich in wildlife, supporting up to 50 different plant species in a small area, including grasses, rushes, sedges, and broad-leaved herbs. They are particularly valuable for their biodiversity, providing habitat for rare species like the marsh fritillary butterfly and various orchids.	This habitat is found in patches across the catchment. This habitat is associated a couple of the designated nature conservation sites including Woodwalton Fen, and Roydon Common SSSI, Ramsar, and NNR
	Lowland calcareous grassland (PHI)	110.79 ha	This is an area of lowland calcareous grassland identified from publicly available sources.	This habitat is found in patches across the catchment. This habitat is associated a couple of the designated nature conservation sites including Leziate, Sugar, and Derby Fens SSSI.
	Lowland meadows (PHI)	86.02 ha	Lowland grasslands, treated as lowland meadows, includes most forms of unimproved neutral grassland in the UK. It covers various plant communities and considers both hay-cut and livestock-grazed pastures. These grasslands, though less common in non-agricultural settings, can be found in recreational sites, churchyards, and roadside verges. Excluded are maritime grasslands, upland hay meadows, and Molinia-Juncus	This habitat is found in patches across the catchment. This habitat is associated a couple of the designated nature conservation

	Habitat Type	Great Ouse Study Area Hectares (ha)	Habitat Description [115]	Context within the Great Ouse catchment Study Area
			pastures. Unimproved neutral grassland has declined significantly due to changing agricultural practices, with a 97% reduction in lowland England and Wales by 1984. Losses continued in the 1980s and 1990s, at rates of 2-10% per annum in some areas.	sites including Soham Wet Horse Fen SSSI and River Nar SSSI.
	Lowland dry acid grassland (PHI)	65.41 ha	Lowland dry acid grassland is found on nutrient-poor, free-draining soils with a pH of 4 to 5.5, typically below 300m in elevation. This habitat supports a variety of plant species, including heath bedstraw (<i>Galium saxatile</i>), sheep's-fescue (<i>Festuca ovina</i>), common bent (<i>Agrostis capillaris</i>), and tormentil (<i>Potentilla erecta</i>), with dwarf shrubs like heather (<i>Calluna vulgaris</i>) and bilberry (<i>Vaccinium myrtillus</i>) occurring at low abundance. It is also home to a diverse bird fauna, such as woodlark (<i>Lullula arborea</i>), stone-curlew (<i>Burhinus oedichnemus</i>), and skylark (<i>Alauda arvensis</i>), and specialist invertebrates like solitary bees and field-cricket (<i>Gryllus campestris</i>). The habitat has declined significantly due to agricultural intensification and afforestation, with important concentrations remaining in areas like Breckland.	This habitat is found in patches across the catchment. This habitat is associated a couple of the designated nature conservation sites including RAF Lakenheath SSSI.
Scrub and heathland	Lowland heathland (PHI)	152.78 ha	Lowland dry acid grassland typically occurs on nutrient-poor, free-draining soils with a pH of 4 to 5.5, often found in lowland heath landscapes, parklands, and coastal areas. This habitat supports a variety of plant species, including heath bedstraw, sheep's-fescue, and tormentil, and can be rich in bryophytes and lichens. It is important for conservation, providing habitat for rare birds like the woodlark and stone-curlew, as well as specialist invertebrates such as solitary bees and field-crickets.	This habitat is found in patches across the eastern portion of the catchment. This habitat is associated a couple of the designated nature conservation sites including Leziate, Sugar, and Derby Fens SSSI, East Winch Common SSSI, and Maidcross Hill SSSI.
	Lowland heathland	93.27 ha	This is an area of lowland heathland identified from publicly available sources.	This habitat is found in isolated across the catchment.
	Dense scrub	82.05 ha	This is an area of dense scrub identified from publicly available sources.	This habitat is primarily found in the northern portion of the catchment.

	Habitat Type	Great Ouse Study Area Hectares (ha)	Habitat Description [115]	Context within the Great Ouse catchment Study Area
Woodland	Broadleaved and mixed woodland	4304.44 ha	This is an area of broadleaved and mixed woodland identified from publicly available sources.	This habitat is primarily found in the northeastern portion of the catchment.
	Deciduous woodland (PHI)	3799.79 ha	Lowland mixed deciduous woodland grows on a range of soil conditions, from very acidic to base-rich, and includes most semi-natural woodland in southern and eastern England, and parts of lowland Wales and Scotland. These woodlands, often ancient and small (less than 20ha), complement upland oak and ash types. They show great variety in canopy and ground flora species, with <i>Quercus robur</i> being the common oak. The National Vegetation Classification places most of this type in W8 and W10, with lesser amounts in W16. Locally, they may form mosaics with other types, including beech woodland and wet areas. Canopy variations include field maple, lime, elm, hornbeam, wych elm, ash, and oak, with occasional birch and alder stands.	This habitat is found in patches across the catchment. This habitat is associated a couple of the designated nature conservation sites including Stallode Wash, Lakenheath SSSI, Breckland Forest, and Hilgay Herony SSSI.
	Other coniferous woodland	753.56 ha	This is an area of other coniferous woodland identified from publicly available sources.	This habitat is primarily found in the northeastern portion of the catchment.
Agricultural	Arable and Horticultural	165,480.86 ha	This is an area of arable land / horticultural land identified from publicly available sources. Further analysis of agricultural land use is available in the East and West Fens Catchment Agricultural Baseline. It is noted that there are likely to be some variation between landcover datasets used. The agricultural baseline has identified that the agricultural land use in the study area is dominated by arable crops.	This habitat is widely dispersed across the entirety of the catchment and comprises the dominant habitat type.
	Vegetated garden	2967.04 ha	This is an area of vegetated garden identified from publicly available sources.	This habitat is scattered throughout the catchment and within residential areas.
	Traditional orchard (PHI)	488.65 ha	Habitat structure, rather than vegetation type, topography, or soils, defines traditional orchards. These orchards are similar to wood-pasture and parkland but differ in tree species (mainly Rosaceae), denser tree arrangement, smaller habitat patches, and wider dispersion. They include nut plantings like hazel and walnuts. Management focuses on fruit and nut production through grafting and pruning, unlike wood-pastures	This habitat is primarily located in the area surrounding Wisbech, Somerham, and north of Cambridge.

	Habitat Type	Great Ouse Study Area Hectares (ha)	Habitat Description [115]	Context within the Great Ouse catchment Study Area
			where timber is the main product. Grazing or cutting herbaceous vegetation is integral, and scrub, often in hedgerows, plays a similar ecological role. Ponds and wetlands are common for livestock watering.	
Developed Land	Built linear features	4074.54 ha	This is an area of built linear features identified from publicly available sources.	This habitat is primarily associated with agricultural areas adjacent to watercourses.
	Artificial unvegetated, unsealed	110.12 ha	This is an area of artificial unvegetated, unsealed land identified from publicly available sources.	This habitat is limited to small, isolated patches.

4.5.3 Key species

The key species identified as qualifying species for the protected areas and designated sites within the catchment are presented in Table 22. Only species that are relevant to protected areas are included in the following table. Therefore, this table is intended to highlight some of the key species and not as an exhaustive list.

Table 22: Key species noted as citations for protected areas within the catchment

Species Common Name	Scientific Name	Relevant Protected Area or Key Habitats
Redshank	<i>Tringa totanus</i>	The Wash Ramsar, The Wash SPA, Roydon Common NNR, Ouse Washes Ramsar, Nene Washes Ramsar
Curlew	<i>Numenius arquata</i>	The Wash Ramsar, The Wash SPA, Roydon Common NNR, Ouse Washes SPA
Snipe	<i>Gallinago gallinago</i>	Mare Fen LNR, Ouse Washes Ramsar, Nene Washes SPA, Cam Washes SSSI
Wigeon	<i>Mareca penelope</i>	Mare Fen LNR, The Wash SPA, Ouse Washes Ramsar, Nene Washes SPA
Teal	<i>Anas crecca</i>	Mare Fen LNR, Ouse Washes Ramsar, Nene Washes SPA, Cam Washes SSSI
Shoveler	<i>Spatula clypeata</i>	Mare Fen LNR, Ouse Washes Ramsar, Nene Washes SPA, Cam Washes SSSI
Black-tailed godwit	<i>Limosa limosa</i>	The Wash Ramsar, The Wash SPA, Ouse Washes SPA, Nene Washes SPA
Marsh harrier	<i>Circus aeruginosus</i>	Woodwalton Fen NNR, Wicken Fen NNR, Ely Pits and Meadows SSSI, Nene Washes SPA
Hen harrier	<i>Circus cyaneus</i>	Roydon Common NNR, Ouse Washes SPA, Nene Washes SPA, Roydon Common and Dersingham Bog SAC
Bewick's swan	<i>Cygnus columbianus bewickii</i>	The Wash SPA, Ouse Washes SPA, Nene Washes SPA, Ouse Washes Ramsar
Gadwall	<i>Anas strepera</i>	The Wash SPA, Ouse Washes SPA, Nene Washes SPA, Cam Washes SSSI
Pintail	<i>Anas acuta</i>	The Wash SPA, Ouse Washes SPA, Nene Washes SPA, Ouse Washes Ramsar
Shelduck	<i>Tadorna tadorna</i>	The Wash Ramsar, The Wash SPA, Ouse Washes SPA, Nene Washes SPA
Lapwing	<i>Vanellus vanellus</i>	The Wash Ramsar, The Wash SPA, Ouse Washes SPA, Nene Washes SPA
Spined loach	<i>Cobitis taenia</i>	Nene Washes SAC, Ouse Washes SAC, Fenland SAC, The Wash and North Norfolk Coast SAC

6.4.1. Critical habitat screening

A critical habitat screening exercise has been conducted based on the criteria outlined in International Finance Corporation Performance Standard 6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources (2012) [116].

Critical habitats are defined as areas with high biodiversity value based on criterion 1 to 5 as outlined in the IFC guidance note. This screening has specifically focused only on Criterion 1 in Performance Standard 6 as defined below (see Figure 19). It should be noted that a full critical habitat screening would require screening against all five criteria.

International Finance Corporation Performance Standard 6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources.

Criterion 1: Critically Endangered and Endangered Species.

Species threatened with global extinction and listed as CR and EN on the IUCN Red List of Threatened Species shall be considered as part of Criterion 1. Critically Endangered species face an extremely high risk of extinction in the wild. Endangered species face a very high risk of extinction in the wild.

As described in footnote 11 of Performance Standard 6, the inclusion in Criterion 1 of species that are listed nationally/regionally as CR or EN in countries that adhere to IUCN guidance shall be determined on a project-by-project basis in consultation with competent professionals.

Thresholds for Criterion 1 are the following:

- a) Areas that support globally important concentrations of an IUCN Red-listed EN or CR species ($\geq 0.5\%$ of the global population AND ≥ 5 reproductive units GN16 of a CR or EN species).
- b) Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in GN72(a).
- c) As appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species.

Figure 19: Critical habitat Criterion 1 [117]

The results of the critical habitat screening are presented in Table 23.

Table 23: Overview of IUCN Global Red List species identified within the catchment

Common Name and Status (IUCN Global Red List)	Scientific Name	Habitat and ecology	Population Trend	Relevance to the catchment
Starry Breck Lichen (Extinct)	<i>Buellia asterella</i>	Grassland	Decreasing	The Starry Breck Lichen was the first British lichen to be included on the IUCN list. It is now believed to be extinct in the UK and is thought to survive in only three or four locations globally, all in Germany or Norway. This lichen used to occur in small, isolated populations, endemic to the dry grasslands of Western Europe [118].
Interrupted Brome (Extinct in the Wild)	<i>Bromus interruptus</i>	Artificial/Terrestrial	Unspecified	Extinction of species in the wild occurred in 1972, with the last known population in Cambridgeshire. This plant, once found in southern Lincolnshire and Cambridgeshire, was reintroduced to Whittlesford, Cambridgeshire, in 2003. The reintroduction marked a significant conservation milestone as the first known reintroduction of an extinct plant in Britain [119].
Allis Shad (Critically Endangered)	<i>Alosa alosa</i>	Wetlands (inland), Marine Neritic, Marine Oceanic	Decreasing	The species is native to the northeastern Atlantic Ocean and considered rare within most of its range. The species is considered possibly extinct with the catchment.
Balearic Shearwater (Critically Endangered)	<i>Puffinus mauretanicus</i>	Marine Neritic, Marine Oceanic, Marine Coastal/Supratidal	Decreasing	The fully migratory species congregates off the Atlantic coasts of southwest Europe during the summer and autumn, after breeding in the Mediterranean [120]. Since the 1990s, an apparent increase in Balearic Shearwaters in north-west European waters, including north-west France and south-west Britain, was noted [121].
European Eel (Critically Endangered)	<i>Anguilla anguilla</i>	Wetlands (inland), Marine Neritic, Marine Oceanic, Marine Intertidal, Artificial/Aquatic & Marine	Decreasing	European Eel has been recorded at multiple locations on River Great Ouse the therefore assumed to be present in catchment [122]. Barriers to migration may be present in catchment.

Common Name and Status (IUCN Global Red List)	Scientific Name	Habitat and ecology	Population Trend	Relevance to the catchment
Depressed River Mussel (Endangered)	<i>Pseudanodonta complanata</i>	Wetlands (inland)	Decreasing	The species has been lost from at least 50% of its previously known sites over the past 20 years. Threats are likely related to habitat degradation and loss, including poor river management, water pollution (organic and inorganic), siltation, channelling, water abstraction, drought, and poaching for private collections and aquaria [123].
White-clawed Crayfish (Endangered)	<i>Austropotamobius pallipes</i>	Wetlands (inland), Artificial/Aquatic & Marine	Decreasing	Chalk streams have been identified as highly suitable habitats for white-clawed crayfish due to the high calcium levels [124]. Native white-clawed crayfish have been in decline since the introduction of the non-native American signal crayfish [124].
Freshwater Pearl Mussel (Endangered)	<i>Margaritifera margaritifera</i>	Wetlands (inland)	Decreasing	It is possible that some scattered individuals are present within the catchment study area however the only viable populations are in Scotland.
Glistening waxcap (Endangered)	<i>Gloioxanthomyces vitellinus</i>	Grassland	Decreasing	The IUCN red list distribution indicates that this species range falls within the catchment study area however the presence of this species is unconfirmed at present.

4.6 Cultural heritage

This section outlines the cultural heritage baseline in the catchment. Table 24 outlines the key terminology used in this section.

Table 24: Glossary of cultural heritage terminology

Terminology	Summary Definition
Designated heritage asset	A World Heritage Site, Scheduled Monument, Listed Building, Protected Wreck Site, Registered Park and Garden, Registered Battlefield or Conservation Area designated under the relevant legislation.
Non-designated heritage asset	A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. It includes designated heritage assets and assets identified by the local planning authority (including local listing).
Historic environment	All aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged, and landscaped and planted or managed flora.
Historic Landscape Character	The Historic Landscape Character of Lincolnshire is interpreted on two scales: Character Area and Character Zone. There are 10 Character Area's across the county. Character Areas are large, regional parts of the county's landscape and are known as, for example, 'The Fens', 'The Wash', and 'The Southern Cliff'. Each Character Area comprises between two and five Character Zones, for example, 'The East Fen' and 'The West Fen' are the two Character Zones of 'The Fen's' Character Area. Character Zones can still cover large parts of the landscape and are assessed in greater detail than Character Areas which communicate the broad trends of the component Character Zones. The major urban centres of exclude the major urban centres of Lincoln, Scunthorpe, and Grimsby are excluded and have their own urban assessments.
Setting of a heritage asset	The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral.
Significance (for heritage policy)	The value of a heritage asset to this and future generations because of its heritage interest. The interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting. For World Heritage Sites, the cultural value described within each site's Statement of Outstanding Universal Value forms part of its significance.

4.6.1 Archaeological and historical background

The catchment historic environment is best understood through the evidence of the long interaction of people, the land and the sea which can be read in the settlements, fields, place names and the layers of soil in this area.

The coastal zone of Lincolnshire and north Cambridgeshire changed dramatically throughout the Prehistoric (1,000,000BCE-43CE) period. During the Palaeolithic (1,000,000BCE-10,000BCE), the fenlands and intertidal zones of the catchment had not yet formed [125] and did not emerge until after the last Ice Age approximately 10,000 years ago at the start of the Mesolithic (10,000BCE-4,000BCE) period. As the ice sheets retreated and sea levels rose, the vast plains of Doggerland (which once linked Britain with north-western Europe) were submerged and a coastline more akin to that of today emerged [126].

For most of the Later Prehistoric (4,000BCE-43CE) period, the catchment would have been an expanse of marshes and creeks influenced by seasonal inundation by the sea, the flooding of the Rivers Nene and Ouse and their tributaries. These characteristics are reflected in dominance of Tidal Flat (Clays and Silts) Deposits across the northern part of the catchment, and peat in the south and east. This area of the fens is in a basin of clay bedrock surrounded by higher ground, with islands and spurs of river terrace gravels and glaciofluvial deposits which became the focus for prehistoric and later settlement.

The fen and coastal marshland landscape of the catchment would have been an excellent resource for Prehistoric people for fishing, fowling, and foraging, and for the provision of materials such as rushes and reeds. The northern edge of this landscape appears to have formed an important place for Prehistoric people in the Bronze Age. At this time the landscape was becoming successively wetter, becoming an area of marsh and fen with smaller islands of drier ground within it. The people living there used logboat canoes to travel, built timber causeways to cross between drier areas and built piled houses on stilt above the water. The wetland conditions created the conditions for organic materials to survive, meaning that archaeological investigations have been able to record extensive evidence of this lost landscape. Near Whittlesey on the northern edge of the Middle Level sub-catchment, recent excavations at Must Farm found pile-driven stilted roundhouses and numerous logboat canoes, associated with what has been described as possibly the largest Late Bronze Age assemblage of domestic material, including wooden artefacts, fibres and textiles [127]. Approximately 2km north, in the Lower Nene catchment area, excavations at Flag Fen in the 1980s recorded a timber post alignment representing the surviving remains of a causeway and a timber platform. Associated with these were a large number of artefacts, including weapons and personal ornaments, which had been deliberately deposited into the water – a practice we believe to have been ceremonial [128]. On areas of higher ground within the Great Ouse catchment there are a number of Bronze Age burial mounds. It is possible that similar sites to Flag Fen and Must Farm could be found in other parts of the fenland in the catchment, a wetland landscape of settlement and ceremony mirroring the evidence found on the higher, drier ground.

There is also Iron Age and Roman evidence from the catchment area. In the south and east there are a number of Roman settlements and villas, occupying higher ground and with access to both the fenland and the agricultural land beyond it. In the lower lying parts of the catchment there is some evidence of drainage in this period, and there is also a causeway which the Romans built across the fens from near Peterborough into Norfolk, via March. Also close to March, on a slight promontory of higher ground overlooking Latches Fen, is Britain's lowest-lying Iron Age 'hillfort', Stonea Camp (NHLE: 1012539). The site is a fortified enclosure, with both late Iron Age and Roman artefacts and some have suggested a link between the Iceni, the tribe led by Boudicca who staged a rebellion against the Roman occupation [129].

In the early and later medieval period, the fenland, and particularly the islands within it, became a focus for Christians seeking to separate from wider society and a number of monasteries were established. Most famous of these is Ely, which was founded by the Northumbrian princess and abbess Æthelthryth in the 7th century. The 11th century cathedral now located there (NHLE: 1331690) is described as the 'ship of the Fens' due to the way it rises above the landscape around it. Ely was not the only monastery in the catchment, however, with houses at Chatteris and Ramsey and multiple other sites.

In parallel to the religious developments within the catchment, there was also the development of Kings Lynn as one of Britain's most important ports. It was the first in England to become part of the Hanseatic League, a community of traders from northern Europe who imported herring, timber, wax, iron and pitch and exported wool, skins, cloth and lead through the town [130]. The 15th

century Hanse House, within the King's Lynn sub-catchment, is the only surviving example of a Hanseatic warehouse in the county (NHLE: 1195393).

While there had been piecemeal attempts at drainage since the Roman period, it wasn't until the 17th century that large-scale drainage began in the catchment. Early plans were delayed by the English Civil Wars, but began in earnest following them, led by the major landowner in the catchment, the Earl of Bedford and a group of other wealthy landowners known as 'the Gentlemen Adventurers'. They appointed the engineer Cornelius Vermuyden who undertook major works in the catchment, creating the Middle and South levels by straightening the natural rivers and creating new channels to more rapidly carry water out of the fens to The Wash [129]. The drainage of the fens was intended to allow arable cultivation, which would greatly enrich the landowners but which was deeply unpopular with local people, who relied on the resources of the fens, particularly sedge for thatching and eels, for their livelihood. At Wicken Fen, in the South Level, a small area of natural fen was saved from drainage after locals rioted in resistance. In 1899 this became the National Trust's first nature reserve [131].

4.6.2 Historic Landscape Character

Historic Landscape Characterisation data and information for Cambridgeshire, Norfolk and Suffolk is not publicly available and has not been consulted within this Appendix. Additionally, data and information for Lincolnshire have been excluded due to its minimal representation in the catchment area, accounting for 1.1%.

4.6.3 Designated heritage assets

In total, over 2300 designated heritage assets are located throughout the catchment. Table 25 shows the breakdown of the types of asset by sub-catchment.

Table 25: Designated heritage assets by sub-catchment

Sub-catchment	Scheduled monuments	Listed Buildings	Registered Parks and Gardens	Conservation areas
Middle Level	35	502 (12 are GI and 27 GII*)	0	14
South Level	50	1031 (50 are GI and 55 GII*)	1 Grade II*, 1 Grade II	35
West of Ouse	5	164 (13 are GI and 12 GII*)	0	2
East of Ouse	14	119 (12 are GI and 11 GII*)	2 Grade II	8
Kings Lynn	26	343 – 17 are GI and 41 are GII*	1 Grade II	1

There are no World Heritage Sites, Grade 1 registered park and gardens, registered battlefields, or protected wreck sites within the catchment. Figure 20 sets out the designated heritage assets within the catchment.

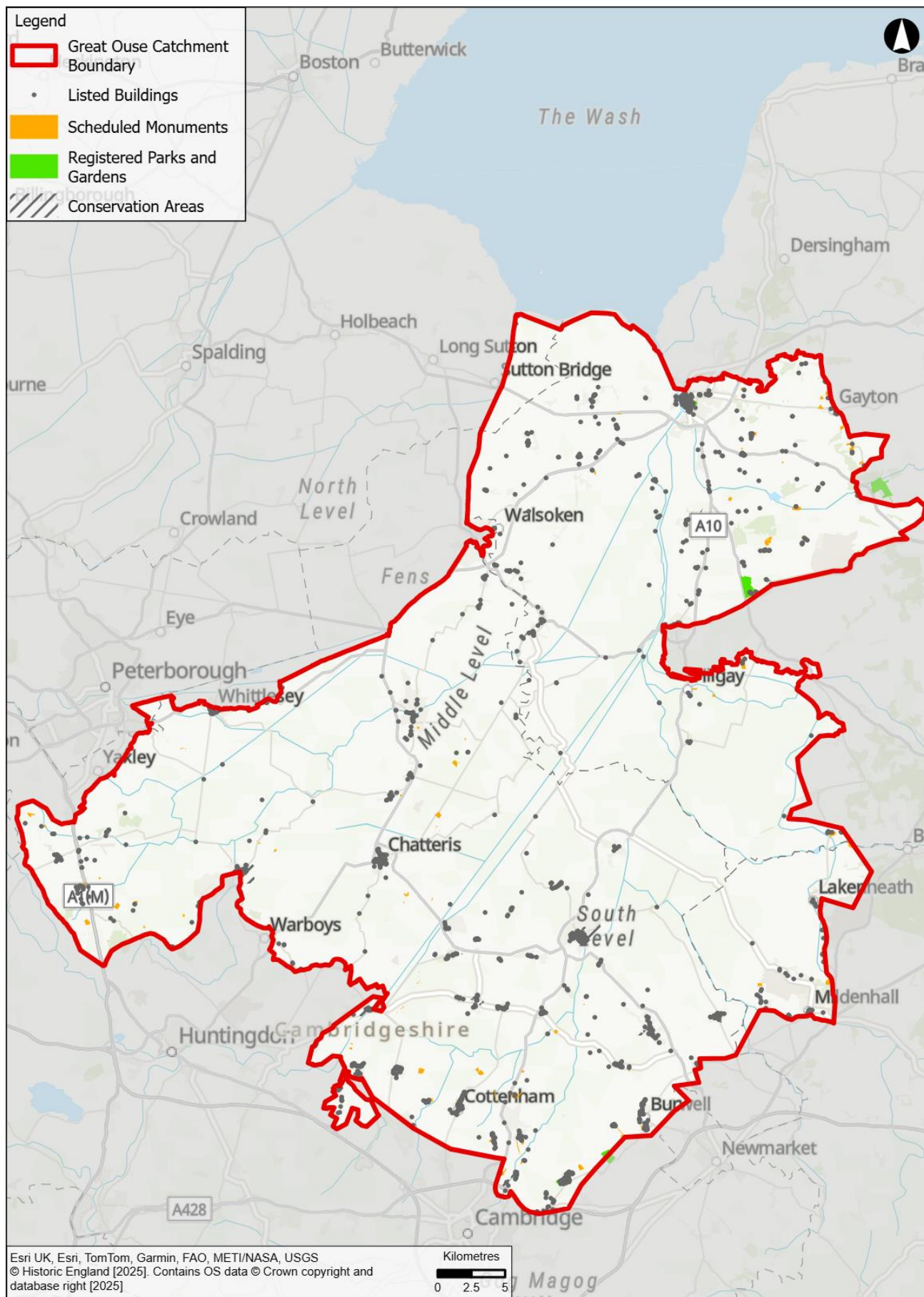


Figure 20: Designated sites for heritage within the catchment

4.6.4 Non-designated heritage assets

While specific non-designated heritage assets have not been identified as part of this study, the following are known or likely to be present:

- Unrecorded archaeological features and remains and palaeoenvironmental deposits are likely to be present throughout the catchment. Because of the waterlogged and anaerobic environments of the catchment, it is likely that ecofacts and composite, organic, and inorganic artefacts will survive.
- There are extensive areas of Peat in the catchment, particularly in the south and in the vicinity of Peterborough. There is also the potential for areas of Peat to survive in sealed environments beneath the fertile topsoil and Tidal Flat (Clays and Silts) Deposits of the rest of the catchment. Peat has a high potential for paleoenvironmental deposits and organic and composite archaeological remains in the form of artefacts, structures, and large objects.
- Unrecorded early Prehistoric, Bronze Age, Iron Age, and Roman archaeology is likely to be present throughout the catchment. Unlike later archaeological remains, these may be found in all areas of the catchment, including the lower lying areas, as demonstrated at sites like Must Farm and Flag Fen.
- Many of the catchment's settlements are likely to have Early Medieval (and in some cases Roman) origins and may represent a continuation of occupation within a localised area since that time. Recorded and unrecorded archaeology associated with potentially Roman, but more likely Early Medieval and Medieval occupation, are likely to survive within and in proximity to the towns and villages of the catchment and, potentially, around their edges – although later Post Medieval and 20th Century expansion may have resulted in the truncation or loss of some remains and landscape features.
- Some of the isolated farms, farmsteads, and farm buildings of the catchment, if not listed buildings, may be recorded as non-designated built heritage assets. Such assets are typically Post Medieval in date.

Prehistoric remains are likely to date from the Mesolithic period onward. These are likely to comprise scatters of stone tools or the detritus from tool manufacture and are most commonly recovered from higher drier parts of the landscape, beyond the fen-edge. Overall, Mesolithic remains are rare across the county and there is little known evidence of seasonal occupation sites; although these would have existed.

It is possible that the known Neolithic settlement sites of the county have Mesolithic origin or connections. Remains likely to be encountered from the Neolithic period include examples of tools (including weapons), and pottery - although fewer examples of this have been recovered north of the River Welland. Burial monuments for inhumed remains are also built during this period. Often, evidence for the Bronze Age transition is found near these monuments and at the same settlement sites.

The Bronze Age is notable not only the wider adoption of metal (resulting in the presence of metalworking sites and metal artefacts) but also changes in burial practice with community burial monuments falling out of use in favour of individual burial mounds. There are also observable changes in pottery typologies. These trends continue into and throughout the Iron Age, although burial in monuments disappears from practice.

The Iron Age also brings with it evidence for possible landscape division through the marking of territorial boundaries and salt production. Important archaeological remains, such as trackways or

walkways, boats, and metal and wooden objects such as swords and shields and jewellery, survive well in waterlogged environments and, when found, are often of national importance.

Roman influence in rural Lincolnshire is most observable through the presence of large-scale engineering works such as Carr Dyke, and other navigable canals and waterways, and the roads network. There are shifts in religious and burial practice during the Roman period with inhumation and cremation cemeteries replacing the Iron Age preference for excarnation. It is likely that the 'Romanisation' of the Iron Age settlements occurred steadily during the period with existing settlements and societal structures being absorbed into the more structured rural Roman economy and practices of land and people management. Industry expands during this period with remains of metal working sites, evidence of large-scale quarrying, and the production of pottery and presence of kilns becoming common. Salt production also continues.

4.7 Population and health

This section outlines the population and health baseline for the catchment. Table 26 outlines the key terminology used in this section.

Table 26: Glossary of population and health terminology

Terminology	Summary Definition
Indices of Multiple Deprivation (IMD) [132]	These datasets are small area measures of relative deprivation across each of the constituent nations of the United Kingdom and is part of a suite of outputs that form the Indices of Deprivation (IoD). The IoD2019 is based on 39 separate indicators, organised across seven distinct domains of deprivation which are combined and weighted to calculate the Index of Multiple Deprivation 2019. Areas are ranked from the most deprived area (rank 1) to the least deprived area. Some of these separate indicators include Employment Deprivation, Income Deprivation, Health Deprivation and Disability, Education Skills and Training Deprivation, Crime, Living Environment Deprivation and Barriers to Housing and Services.
Lower Layer Super Output Area (LSOAs) [133]	These are defined geographical areas which comprise between 400 and 1,200 households and have a usually resident population of between 1,000 and 3,000 persons. These LSOAs are a neat aggregation or split of wards, or may be exactly the same as wards in some areas. Unlike wards whose population sizes vary widely, the LSOAs provide a consistently sized statistical unit. There are 32,844 LSOAs in England.
Middle Layer Super Output Areas (MSOAs)	Middle layer Super Output Areas (MSOAs) are made up of groups of LSOAs, usually four or five. They comprise between 2,000 and 6,000 households and have a usually resident population between 5,000 and 15,000 persons. MSOAs fit within local authorities. There are 6,856 MSOAs in England.

Different classes of administrative unit each have their own datasets and are ordered from smallest to largest in terms of the geographical scale at which they operate. Data for the population and health baseline is collected at the level of Wards, Lower Layer Super Output Area (LSOAs), and Middle Layer Super Output Areas (MSOAs). All of these administrative areas which intersect with the catchment have been included in the analysis and are listed in Appendix A.

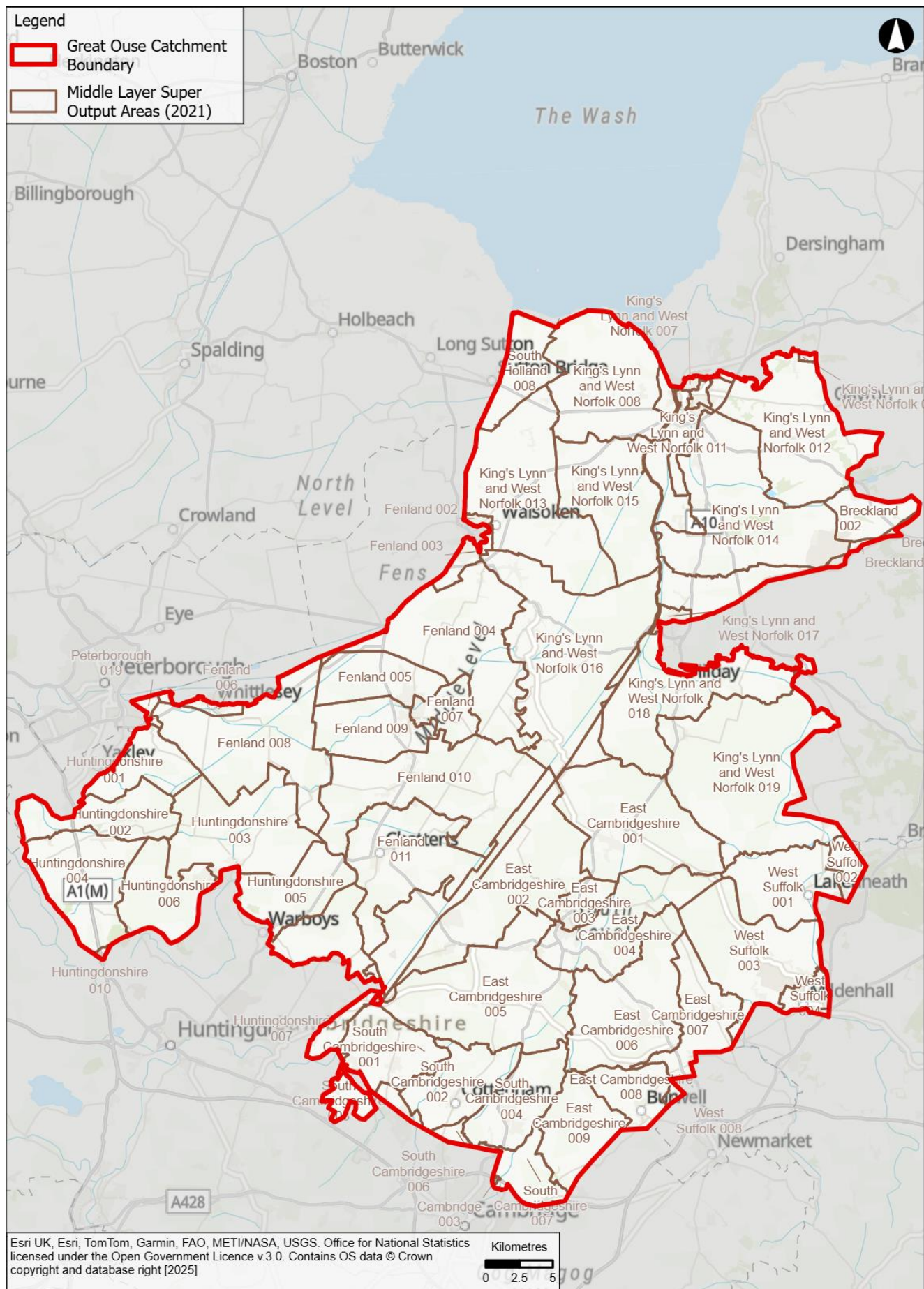
In most of England, including the Fens, there is a two-tier system of local government sitting at larger scales than the MSOAs: county and district. In two-tier areas, each county council area is subdivided into districts, for which there is an independent district council. The eight local authority areas in the catchment are governed by three separate 'upper-tier' authorities as seen in Figure 4:

- East Cambridgeshire District Council, Fenland District Council, Huntingdonshire District Council and South Cambridgeshire District Council are governed by Cambridgeshire County Council;
- King's Lynn and West Norfolk Borough Council and Breckland District Council are both governed by Norfolk County Council;
- West Suffolk Council is a district of Suffolk County Council; and
- South Holland District Council is governed by Lincolnshire County Council.

4.7.1 Overview

The catchment is located in the county of Lincolnshire. Figure 21 and Figure 22 show the MSOA and LSOA areas within the catchment.

There are 60 MSOA areas and 250 LSOA areas that intersect the catchment, which are listed in Table 27. These will henceforth be used to analyse and report the demographic and health profile. Where summary values were not available at the LSOA or MSOA level, data for the relevant district and county council areas have also been provided.



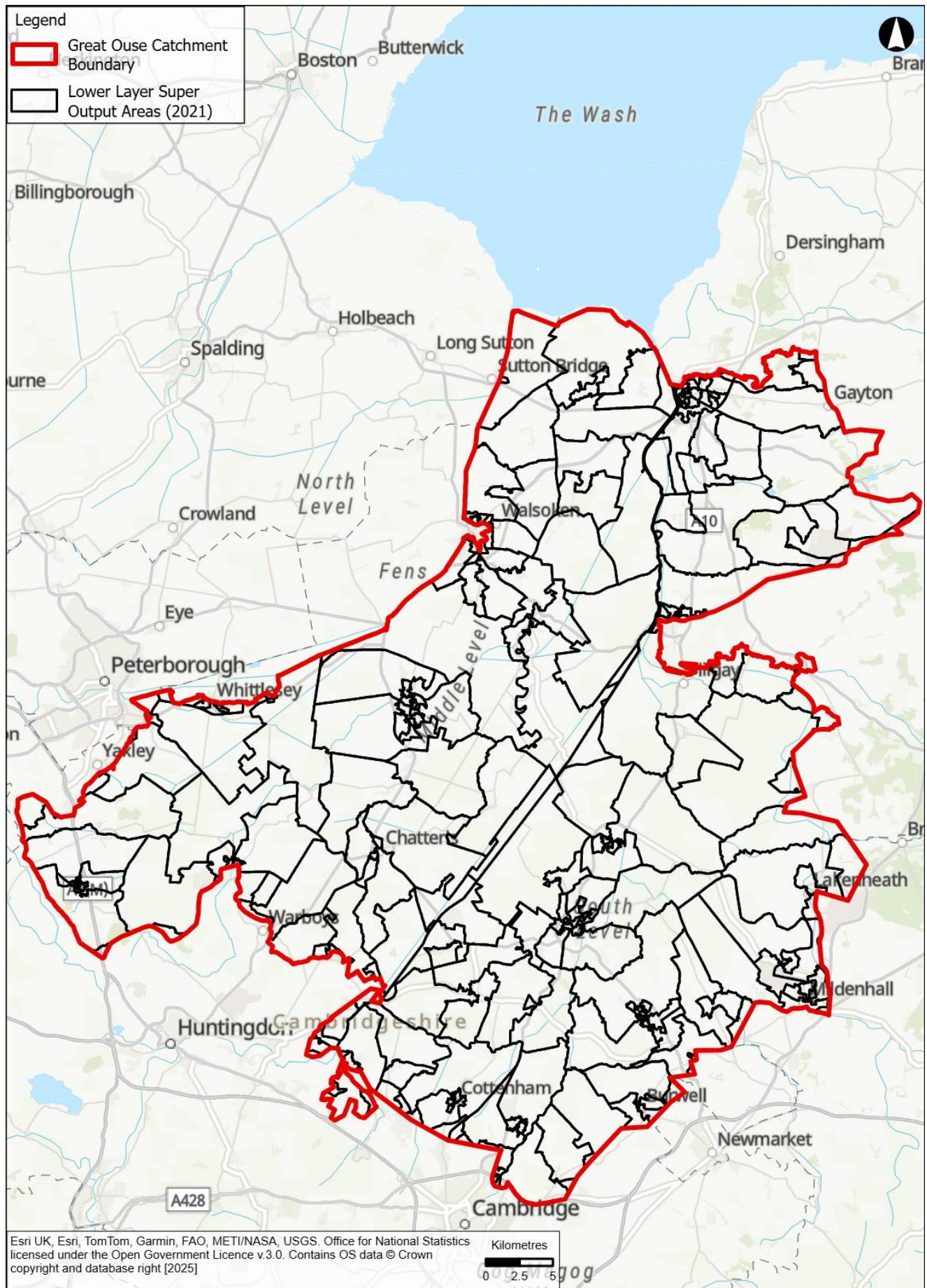


Figure 22: LSOAs which intersect with the catchment boundary

Table 27: LSOAs and MSOAs which intersect with the catchment boundary

LSOA		MSOA	
Peterborough 019A	E01015667	Peterborough 019	E02003255
Peterborough 019E	E01015672	Cambridge 003	E02003721
Cambridge 003B	E01017971	East Cambridgeshire 001	E02003732
East Cambridgeshire 009A	E01018011	East Cambridgeshire 002	E02003733
East Cambridgeshire 009B	E01018012	East Cambridgeshire 003	E02003734
East Cambridgeshire 008A	E01018013	East Cambridgeshire 004	E02003735
East Cambridgeshire 008B	E01018014	East Cambridgeshire 005	E02003736
East Cambridgeshire 008C	E01018015	East Cambridgeshire 006	E02003737
East Cambridgeshire 008D	E01018016	East Cambridgeshire 007	E02003738
East Cambridgeshire 002A	E01018020	East Cambridgeshire 008	E02003739
East Cambridgeshire 002B	E01018021	East Cambridgeshire 009	E02003740
East Cambridgeshire 002C	E01018022	Fenland 002	E02003743
East Cambridgeshire 004A	E01018024	Fenland 003	E02003744
East Cambridgeshire 004B	E01018025	Fenland 004	E02003745
East Cambridgeshire 004C	E01018026	Fenland 005	E02003746
East Cambridgeshire 003A	E01018027	Fenland 006	E02003747
East Cambridgeshire 003D	E01018032	Fenland 007	E02003748
East Cambridgeshire 003E	E01018033	Fenland 008	E02003749
East Cambridgeshire 007A	E01018034	Fenland 009	E02003750
East Cambridgeshire 007B	E01018035	Fenland 010	E02003751
East Cambridgeshire 005A	E01018036	Fenland 011	E02003752
East Cambridgeshire 005B	E01018037	Huntingdonshire 001	E02003753
East Cambridgeshire 005C	E01018038	Huntingdonshire 002	E02003754
East Cambridgeshire 005D	E01018039	Huntingdonshire 003	E02003755
East Cambridgeshire 007C	E01018040	Huntingdonshire 004	E02003756
East Cambridgeshire 007D	E01018041	Huntingdonshire 005	E02003757
East Cambridgeshire 001A	E01018042	Huntingdonshire 006	E02003758
East Cambridgeshire 001B	E01018043	Huntingdonshire 007	E02003759
East Cambridgeshire 001C	E01018044	Huntingdonshire 010	E02003762
East Cambridgeshire 001D	E01018045	South Cambridgeshire 001	E02003775
East Cambridgeshire 006A	E01018047	South Cambridgeshire 002	E02003776
East Cambridgeshire 006C	E01018049	South Cambridgeshire 003	E02003777
East Cambridgeshire 006D	E01018050	South Cambridgeshire 004	E02003778
East Cambridgeshire 006E	E01018051	South Cambridgeshire 006	E02003780
East Cambridgeshire 006F	E01018052	South Cambridgeshire 007	E02003781
East Cambridgeshire 005E	E01018053	South Holland 008	E02005472
East Cambridgeshire 005F	E01018054	Breckland 002	E02005504
East Cambridgeshire 002D	E01018055	Breckland 007	E02005509
East Cambridgeshire 002E	E01018056	Breckland 012	E02005514
East Cambridgeshire 009C	E01018057	King's Lynn and West Norfolk 004	E02005554
Fenland 008B	E01018059	King's Lynn and West Norfolk 006	E02005556
Fenland 008C	E01018060	King's Lynn and West Norfolk 007	E02005557
Fenland 008D	E01018061	King's Lynn and West Norfolk 008	E02005558
Fenland 011A	E01018062	King's Lynn and West Norfolk 009	E02005559
Fenland 002A	E01018063	King's Lynn and West Norfolk 010	E02005560

LSOA		MSOA	
Fenland 006A	E01018064	King's Lynn and West Norfolk 011	E02005561
Fenland 010A	E01018065	King's Lynn and West Norfolk 012	E02005562
Fenland 004A	E01018066	King's Lynn and West Norfolk 013	E02005563
Fenland 004B	E01018067	King's Lynn and West Norfolk 014	E02005564
Fenland 004C	E01018068	King's Lynn and West Norfolk 015	E02005565
Fenland 003A	E01018069	King's Lynn and West Norfolk 016	E02005566
Fenland 003B	E01018070	King's Lynn and West Norfolk 017	E02005567
Fenland 003C	E01018071	King's Lynn and West Norfolk 018	E02005568
Fenland 006B	E01018072	King's Lynn and West Norfolk 019	E02005569
Fenland 002B	E01018073	North Northamptonshire 010	E02005630
Fenland 006C	E01018074	West Suffolk 001	E02006239
Fenland 006D	E01018075	West Suffolk 002	E02006238
Fenland 010B	E01018076	West Suffolk 003	E02006240
Fenland 007A	E01018077	West Suffolk 004	E02006241
Fenland 007B	E01018078	West Suffolk 008	E02006243
Fenland 007C	E01018079		
Fenland 007D	E01018080		
Fenland 005A	E01018081		
Fenland 005B	E01018082		
Fenland 005C	E01018083		
Fenland 005D	E01018084		
Fenland 009A	E01018085		
Fenland 009B	E01018086		
Fenland 009C	E01018087		
Fenland 009D	E01018088		
Fenland 006E	E01018098		
Fenland 006F	E01018099		
Fenland 006G	E01018100		
Fenland 006H	E01018101		
Fenland 003F	E01018103		
Fenland 003G	E01018104		
Fenland 011C	E01018105		
Fenland 011D	E01018106		
Fenland 002C	E01018107		
Fenland 002D	E01018108		
Fenland 002E	E01018109		
Fenland 011E	E01018110		
Fenland 010C	E01018111		
Huntingdonshire 010B	E01018113		
Huntingdonshire 007A	E01018121		
Huntingdonshire 007B	E01018122		
Huntingdonshire 007C	E01018123		
Huntingdonshire 007D	E01018124		
Huntingdonshire 002A	E01018127		
Huntingdonshire 003A	E01018156		
Huntingdonshire 003B	E01018157		
Huntingdonshire 003C	E01018158		

LSOA		MSOA
Huntingdonshire 003D	E01018159	
Huntingdonshire 003E	E01018160	
Huntingdonshire 004A	E01018191	
Huntingdonshire 004B	E01018192	
Huntingdonshire 004C	E01018193	
Huntingdonshire 004D	E01018194	
Huntingdonshire 004E	E01018195	
Huntingdonshire 006A	E01018196	
Huntingdonshire 006B	E01018197	
Huntingdonshire 006C	E01018198	
Huntingdonshire 006D	E01018199	
Huntingdonshire 002C	E01018200	
Huntingdonshire 002D	E01018201	
Huntingdonshire 006E	E01018206	
Huntingdonshire 006F	E01018207	
Huntingdonshire 005A	E01018208	
Huntingdonshire 005B	E01018209	
Huntingdonshire 005C	E01018210	
Huntingdonshire 005D	E01018211	
Huntingdonshire 001A	E01018212	
Huntingdonshire 001B	E01018213	
Huntingdonshire 001E	E01018216	
Huntingdonshire 001F	E01018217	
South Cambridgeshire 002A	E01018233	
South Cambridgeshire 002B	E01018234	
South Cambridgeshire 002C	E01018235	
South Cambridgeshire 002D	E01018236	
South Cambridgeshire 003A	E01018237	
South Cambridgeshire 006A	E01018257	
South Cambridgeshire 006B	E01018258	
South Cambridgeshire 006C	E01018259	
South Cambridgeshire 006F	E01018262	
South Cambridgeshire 007A	E01018272	
South Cambridgeshire 007B	E01018273	
South Cambridgeshire 003C	E01018284	
South Cambridgeshire 003D	E01018285	
South Cambridgeshire 007D	E01018297	
South Cambridgeshire 004A	E01018298	
South Cambridgeshire 004B	E01018299	
South Cambridgeshire 004C	E01018300	
South Cambridgeshire 004D	E01018301	
South Cambridgeshire 001A	E01018304	
South Cambridgeshire 001B	E01018305	
South Cambridgeshire 001C	E01018306	
South Cambridgeshire 001D	E01018307	
South Holland 008D	E01026277	
South Holland 008E	E01026278	

LSOA		MSOA
Breckland 012B	E01026444	
Breckland 002C	E01026445	
King's Lynn and West Norfolk 014A	E01026642	
King's Lynn and West Norfolk 014B	E01026643	
King's Lynn and West Norfolk 014C	E01026644	
King's Lynn and West Norfolk 008A	E01026647	
King's Lynn and West Norfolk 019A	E01026648	
King's Lynn and West Norfolk 019B	E01026649	
King's Lynn and West Norfolk 019C	E01026650	
King's Lynn and West Norfolk 019D	E01026651	
King's Lynn and West Norfolk 019E	E01026652	
King's Lynn and West Norfolk 016A	E01026659	
King's Lynn and West Norfolk 016B	E01026660	
King's Lynn and West Norfolk 016C	E01026661	
King's Lynn and West Norfolk 010A	E01026662	
King's Lynn and West Norfolk 010B	E01026663	
King's Lynn and West Norfolk 010C	E01026664	
King's Lynn and West Norfolk 012A	E01026665	
King's Lynn and West Norfolk 009A	E01026666	
King's Lynn and West Norfolk 009B	E01026667	
King's Lynn and West Norfolk 009C	E01026668	
King's Lynn and West Norfolk 006A	E01026669	
King's Lynn and West Norfolk 006B	E01026670	
King's Lynn and West Norfolk 006C	E01026671	
King's Lynn and West Norfolk 006D	E01026672	
King's Lynn and West Norfolk 006E	E01026673	
King's Lynn and West Norfolk 012B	E01026674	
King's Lynn and West Norfolk 012C	E01026675	
King's Lynn and West Norfolk 018A	E01026679	
King's Lynn and West Norfolk 013A	E01026684	
King's Lynn and West Norfolk 013B	E01026685	
King's Lynn and West Norfolk 007A	E01026687	
King's Lynn and West Norfolk 007B	E01026688	
King's Lynn and West Norfolk 007C	E01026689	
King's Lynn and West Norfolk 007D	E01026690	
King's Lynn and West Norfolk 009D	E01026693	
King's Lynn and West Norfolk 012D	E01026694	
King's Lynn and West Norfolk 015A	E01026696	
King's Lynn and West Norfolk 015B	E01026697	
King's Lynn and West Norfolk 011B	E01026699	
King's Lynn and West Norfolk 011C	E01026700	
King's Lynn and West Norfolk 011D	E01026704	
King's Lynn and West Norfolk 011E	E01026705	
King's Lynn and West Norfolk 011F	E01026706	
King's Lynn and West Norfolk 008B	E01026711	
King's Lynn and West Norfolk 008C	E01026712	
King's Lynn and West Norfolk 008D	E01026713	

LSOA		MSOA
King's Lynn and West Norfolk 010D	E01026714	
King's Lynn and West Norfolk 016D	E01026715	
King's Lynn and West Norfolk 016E	E01026716	
King's Lynn and West Norfolk 016F	E01026717	
King's Lynn and West Norfolk 004D	E01026718	
King's Lynn and West Norfolk 013C	E01026719	
King's Lynn and West Norfolk 013D	E01026720	
King's Lynn and West Norfolk 013E	E01026721	
King's Lynn and West Norfolk 015C	E01026722	
King's Lynn and West Norfolk 014D	E01026723	
King's Lynn and West Norfolk 014E	E01026724	
King's Lynn and West Norfolk 014F	E01026725	
King's Lynn and West Norfolk 015D	E01026726	
King's Lynn and West Norfolk 018B	E01026727	
King's Lynn and West Norfolk 018C	E01026728	
North Northamptonshire 010B	E01027044	
West Suffolk 002E	E01029930	
West Suffolk 008A	E01029937	
West Suffolk 004A	E01029938	
West Suffolk 004B	E01029939	
West Suffolk 004C	E01029940	
West Suffolk 001A	E01029942	
West Suffolk 001B	E01029944	
West Suffolk 003A	E01029945	
West Suffolk 004D	E01029946	
West Suffolk 004E	E01029947	
West Suffolk 003B	E01032523	
West Suffolk 003C	E01032524	
West Suffolk 003D	E01032526	
King's Lynn and West Norfolk 017E	E01033036	
King's Lynn and West Norfolk 017F	E01033037	
King's Lynn and West Norfolk 017G	E01033038	
King's Lynn and West Norfolk 017H	E01033039	
Fenland 003H	E01033111	
Fenland 003I	E01033112	
East Cambridgeshire 004F	E01033425	
East Cambridgeshire 003F	E01033426	
East Cambridgeshire 006G	E01033427	
East Cambridgeshire 006H	E01033429	
East Cambridgeshire 003G	E01033430	
West Suffolk 001C	E01034561	
West Suffolk 001D	E01034562	
West Suffolk 001E	E01034563	
West Suffolk 003E	E01034564	
West Suffolk 003F	E01034565	
King's Lynn and West Norfolk 011G	E01034768	
King's Lynn and West Norfolk 011H	E01034769	

LSOA		MSOA
King's Lynn and West Norfolk 017I	E01034770	
King's Lynn and West Norfolk 017J	E01034771	
King's Lynn and West Norfolk 017K	E01034772	
Breckland 007G	E01035134	
East Cambridgeshire 001F	E01035531	
East Cambridgeshire 001G	E01035532	
East Cambridgeshire 003H	E01035533	
East Cambridgeshire 003I	E01035534	
East Cambridgeshire 004H	E01035535	
Fenland 011F	E01035536	
Fenland 011G	E01035537	
Peterborough 019H	E01035547	
Peterborough 019I	E01035548	
South Cambridgeshire 003E	E01035555	
South Cambridgeshire 003F	E01035556	
South Cambridgeshire 003G	E01035557	
South Cambridgeshire 003H	E01035558	

4.7.2 Demographic Profile

Population

In 2022, the population of the catchment was 325,828^{*10}. Table 28 highlights that between 2011 and 2021, six out of the eight local authority districts which intersect with the catchment have seen rates of population growth above the overall rate for England (6.6%).

Table 28: Population growth between 2011 and 2021 for the local authorities in the catchment [134]

Local authorities	Mid-2011 population	Mid-2021 population	Percentage increase (%)
East Cambridgeshire	83,800	87,700	4.6
Fenland	95,300	102,500	7.6
Huntingdonshire	169,500	180,800	6.7
South Cambridgeshire	148,800	162,000	8.9
King's Lynn and West Norfolk	147,500	154,300	4.6
Breckland	130,500	141,500	8.4
West Suffolk ^{*11}	170,800	179,800	5.3
South Holland	88,300	95,100	7.7

¹⁰ This population figure has been calculated using the total population of every LSOA that fully or partially overlaps with the Great Ouse catchment area. It considers the proportion of the LSOA which intersects with the study area, such that the same percentage of the population of an LSOA will be counted as the percentage area which overlaps with the catchment study area. It is assumed that the population density across each LSOA is uniform.

¹¹ West Suffolk was established in 2019 as a merger of the previous Forest Heath District with the Borough of St Edmundsbury. This figure is based on 2018 projections, so the figures given here represent the sum of the numbers for both the predecessor districts combined.

The population within three of the eight districts (Fenland, Breckland and South Holland) are anticipated to continue to grow, above the England average growth rate (6%) between 2025 and 2043, at 10.1%, 11% and 10.2% respectively [135]. Table 29 shows the projected population increase in the next 18-year period between 2025 and 2043 across the local authorities in the catchment.

Table 29: Population predictions (2018-based) for the local authorities in the catchment [135]

Local authorities	Mid-2025 population	Mid-2043 population	Percentage increase (%)
East Cambridgeshire	93,046	98,475	5.8
Fenland	108,029	118,939	10.1
Huntingdonshire	182,199	191,170	4.9
South Cambridgeshire	162,053	165,605	2.2
King's Lynn and West Norfolk	154,447	160,186	3.7
Breckland	148,093	164,432	11.0
West Suffolk* ¹²	183,576	192,274	4.7
South Holland	100,043	110,272	10.2

Population density

The population density within the local authorities intersecting with the catchment are displayed in Table 30 [136]. The highest density area in the catchment is the King's Lynn and West Norfolk 011C LSOA (located in King's Lynn between the town centre and the River Nar) where there are 9,804 residents per km². The majority of the catchment is much less densely populated, with 76 of the 250 LSOAs within the catchment recording a very low density of fewer than 100 people per km². Breckland 012B near Swaffham in the far east of the catchment has the lowest density of all, at just 20 residents per km².

Table 30: Population Density by LSOA Area (2021) [136]

Local authorities	Mid-2022 population	Population Density (residents per km ²)
East Cambridgeshire	90,172	138
Fenland	102,080	187
Huntingdonshire	178,985	198

¹² West Suffolk was established in 2019 as a merger of the previous Forest Heath District with the Borough of St Edmundsbury. This figure is based on 2018 projections, so the figures given here represent the sum of the numbers for both the predecessor districts combined.

Local authorities	Mid-2022 population	Population Density (residents per km ²)
South Cambridgeshire	160,904	178
King's Lynn and West Norfolk	151,245	106
Breckland	141,255	108
West Suffolk	177,302	171
South Holland	95,857	129
England	56,550,138	434

Age distribution

The age distribution within the local authorities within the catchment are shown in Table 31. Breckland has the largest proportion of elderly residents (aged 65+) in the Great Ouse catchment, at 25.0%, which is nearly 7% more than England. It is also the local authority with the lowest proportion of children, at 16.7%.

Table 31: Age distribution by local authority [137]

Local authorities	Age Band		
	Aged 0-15 (%)	Aged 16-64 (%)	Aged 65+ (%)
East Cambridgeshire	18.6	60.7	20.7
Fenland	17.1	59.9	22.9
Huntingdonshire	18.0	61.7	20.3
South Cambridgeshire	19.6	60.8	19.6
King's Lynn and West Norfolk	18.5	63.2	18.3
Breckland	16.7	58.3	25.0
West Suffolk	17.7	61.7	20.8
South Holland	18.5	63.0	18.3
England	18.5	63.0	18.3

Although currently high, the proportion of elderly residents in the catchment is set to increase in all the local authorities in the catchment, as shown in Table 32 [138]. As an average across the eight local authority areas, the catchment will see a predicted increase of 7.7% in the proportion of elderly residents.

Table 32: Projected percentage of residents aged 65+ by local authority [138]

Local authorities	Residents aged 65+ in 2020 (%)	Residents aged 65+ in 2043 (%)
East Cambridgeshire	20.7	27.4
Fenland	22.9	28.2
Huntingdonshire	20.3	26.7
South Cambridgeshire	19.6	26
King's Lynn and West Norfolk	18.3	32.8
Breckland	25	31.8
West Suffolk*	20.8	25.9
South Holland	18.3	29

Ethnicity

The catchment has a much higher proportion of ethnically white residents than England. Across the 250 LSOA areas which wholly or partially overlap with the catchment, an average of 93.8% of the residents are white, compared to a national average of approximately 82% [139]. Of those white residents, the vast majority (90.5%) identified as 'English, Welsh, Scottish, Northern Irish or British', with 8.4% identified as 'other white' and less than 0.5% as 'Gypsy or Irish Traveller' and 'Roma'. The second largest ethnic group in the catchment is Asian (including Bangladeshi, Chinese, Indian, Pakistani, or other), making up approximately 2.1% of the population.

4.7.3 Employment status

Employment

The largest employment sector in the catchment is 'Wholesale and retail trade; repair of motor vehicles and motorcycles', which constitutes an average of 14.7% across the sixty MSOAs which intersect with the catchment [140]. This is slightly lower than the England average of 15.0% for this sector. Another large sector is 'human health and social work activities', employing 13.1% of working adults in the catchment. This is lower than the England average of 14.6% for this sector. In King's Lynn and West Norfolk 010 this sector employs a far greater share, at 20.9%, perhaps unsurprisingly given that The Queen Elizabeth Hospital lies within this MSOA.

For information on employment within the agricultural sector, refer to Section 4.2.

Travel

Across the catchment, there is a high reliance on private vehicles for getting to and from places of work. The most common commute mode is in a car or van (either as a driver or passenger) with an average of approximately 59.3% travelling to work in this way. This is significantly higher than the England figure of 44.5%. Some areas of the catchment have even higher reliance on private vehicles for commuting: in South Holland 008 in the far north-west of the catchment at the mouth of the River Nene, the percentage of those commuting in a car or van is 74.0%, and in West Suffolk 001 (covering Lakenheath, east of Ely) the rate is even higher, at 75.1%.

In terms of active travel modes, an average of 9.2% of workers choose to walk or cycle to work. More specifically, an average of 3.1% of commuters in the catchment travel to work by bicycle (which is higher than the England average of 2.1%). Rates of cycling as a commute mode are highest in Cambridge 003 (covering Chesterton and the north-west of the city) where 18.1% of workers cycle to work. Cycling to work is also popular in South Cambridgeshire 006 (just to the

west of Cambridge 003) and King's Lynn and West Norfolk 007 (North Lynn and the docklands) with 10.8% of workers cycling to work in both areas. Across the catchment, 6.1% of workers commute on foot, but again there are pockets where walking is a much more popular mode. The highest rates of commuting on foot are 21.4% recorded in King's Lynn and West Norfolk 010 (covering the eastern neighbourhoods of King's Lynn, including the Queen Elizabeth Hospital).

Unemployment

There is significant variation in unemployment (measured as a percentage of the working age population claiming out of work benefits) across the catchment [141]. Fenland has the highest unemployment rate for 2021-2022, measured as a percentage of the working age population claiming out of work benefit, at 4.8%. Although this is still lower than the England average of 5.0%. However, at MSOA level there are six areas where the unemployment rate is higher than the England average, with the highest unemployment rate recorded in North Lynn and the dockland area, where 6.9% of the working age population claim out of work benefit.

Long-term unemployment rates are lower than the England average in all local authorities. However, in four MSOAs in the catchment, rates are higher, including in Swaffham, northern Wisbech, and the two MSOAs which cover central and southern King's Lynn. Of these areas, Swaffham has the highest rate of long-term unemployment, at 3.4 people per 1,000 in the working age population.

4.7.4 Health profiles

Life expectancy

Life expectancy at birth by gender, in the period 2016-2020 for each of the local authorities within the catchment is shown in Figure 23. Life expectancy for males and females within Fenland is the lowest in the catchment, at 82.2 years for females and 78.4 years for males [142]. This is lower than the England averages of 83.7 and 80.2 years respectively.

However, these local authority level figures conceal some significant variation in life expectancy at the local level. For example, the MSOA in the catchment with the lowest life expectancy for both genders is King's Lynn and West Norfolk 007 (North Lynn). Life expectancy in this MSOA is the lowest in the catchment, with females in this neighbourhood expected to live to just 77.6 years and males just 72.2 years. This is eight years lower than the average life expectancy for males in England. The poor life expectancy in towns such as King's Lynn and Wisbech contrasts starkly with the rural area of Huntingdonshire 005 (Warboys and Bury) in the south-west of the catchment, where females are expected to live to the age of 97.5. Strikingly this is 19.9 years longer than their counterparts in North Lynn.

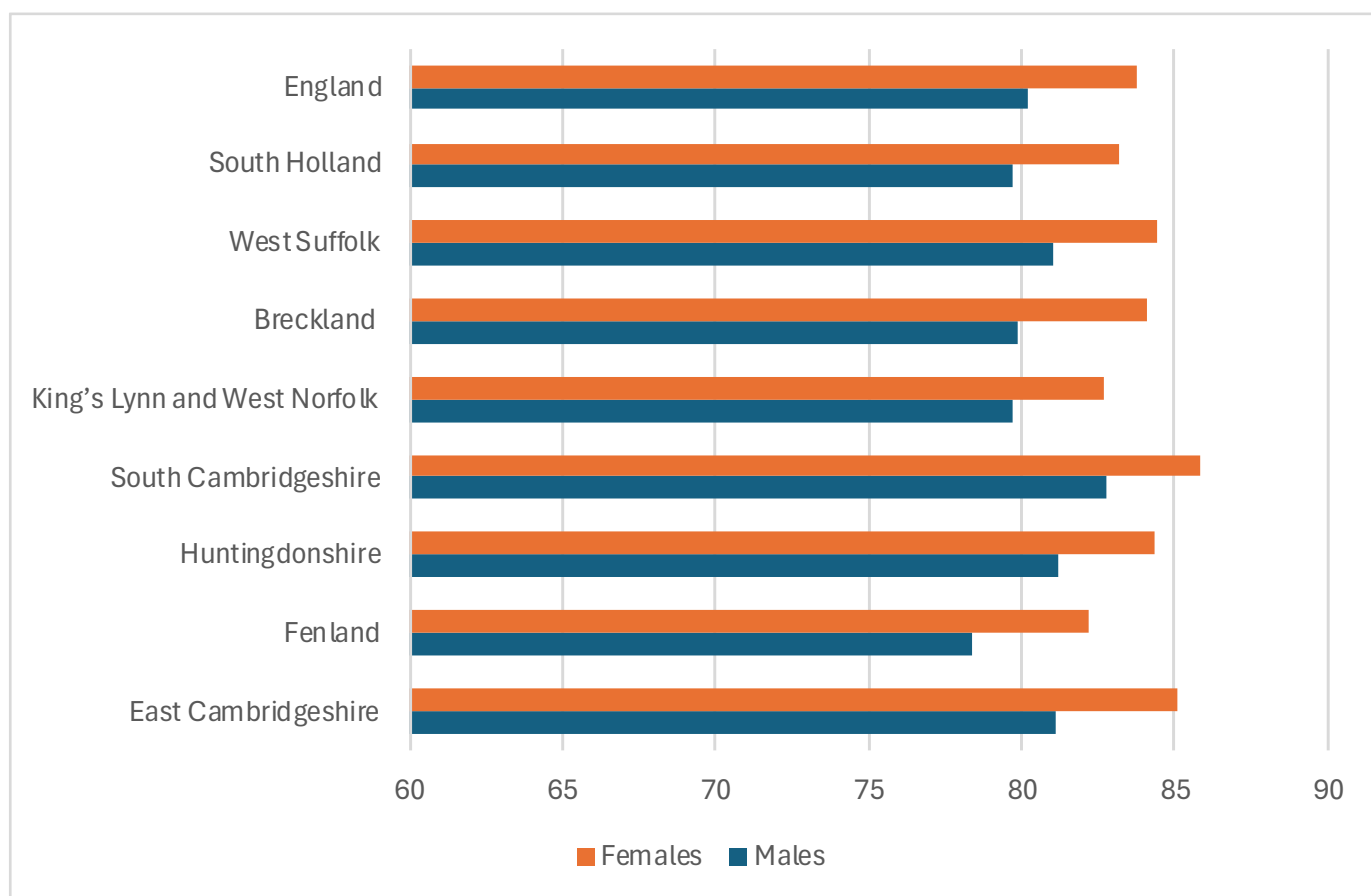


Figure 23: Life expectancy at birth by gender, 2016-2020

Mortality and cause of death

Health indicators relating to mortality are assessed using the Standardised Mortality Ratio (SMR). This ratio illustrates whether a study population is more or less likely to die than a reference population (in this case the reference population is England, which has a SMR of 100). Wherever the SMR is greater than 100, there are a higher number of deaths than expected.

Deaths from causes considered preventable in those residents aged 75 or younger have an average SMR of 83.8 [143] and are significantly lower than expected in every local authority except Fenland, where preventable deaths are slightly more likely than in England as a whole. King's Lynn and West Norfolk 007 (North Lynn) displays much poorer mortality statistics than elsewhere in the catchment, with an SMR of preventable deaths in those aged under 75 of 223.5, showing that preventable deaths are more than twice as likely here than would be expected. Huntingdonshire 007 in the far south-west of the catchment has the lowest SMR of preventable deaths, at just 34.9 showing that it performs significantly better than the national average.

Long-term illness or disability

As an average across the 25 MSOAs which overlap with the catchment, approximately 5.1% of the population are classed as being in either bad or very bad health [144]. This compares to an average of 5.2% across England as a whole. In terms of the percentage of residents living with a limiting long-term illness or disability, the percentage is generally highest in the north of the catchment. Breckland 007 (Swaffham) has the highest percentage of residents with a limiting long-term illness or disability, at 26.8%. South Holland 008 in the far north-west of the catchment at the coast, and King's Lynn and West Norfolk 017 (Downham Market) both have high rates, at 25.3% and 24.4% respectively.

Obesity

Obesity is prevalent across the wider Fens study area, and the catchment is no exception. Fifty-one of the sixty MSOAs in the catchment are ranked in the top 40% in England for adult obesity, with twenty-six of these within the highest 20% nationally [145]. The prevalence of obesity (including severe obesity) among year six students in the catchment is also high in parts of the catchment, particularly in King's Lynn, Wisbech, and in two rural areas of the catchment located west of Downham Market, and further south near Lakenheath and Mildenhall. For example, 30.9% of year six students in King's Lynn and West Norfolk 007 (North Lynn and the docklands) are obese or severely obese. This is far higher than the average for England of 21.6% [145].

Mental wellbeing

The estimated prevalence of common mental disorders (aged 16 and over) is lower than the prevalence of 16.9% reported for England in all four counties which overlap with the Great Ouse catchment. The prevalence is lowest in Cambridgeshire (14.2%) followed by Suffolk (14.8%), and in Lincolnshire and Norfolk, the prevalence is higher, at 5.8% in each [146].

Self-reported wellbeing

Self-reported wellbeing status of people within the UK is now measured by the Office for National Statistics. This data is only available at county and unitary authority level.

Cambridgeshire had the highest levels of self-reported wellbeing of all counties in the catchment. Reports for Cambridgeshire reflected more people with a low satisfaction score than the England average, at 7.7% compared to 5.6% [147]. And a lower percentage of people in the county reported unhappiness, worthlessness and anxiety than in England as a whole.

In Lincolnshire, 4.5% of residents reported low life satisfaction, which is lower than the England average [147]. The percentage of people with a high anxiety score was only marginally higher than the England average of 24.2%, with the Lincolnshire score being 25.5%.

In Norfolk feelings of worthlessness were higher than the other three counties, with 4.8% of residents reporting a low worthwhile score [147]. It was also the only county to report greater rates of unhappiness than the England average.

Suffolk reported greater levels of self-reported wellbeing for all measures except unhappiness, for which it had the highest percent of respondents reporting unhappiness out of all in the catchment, at 9.4% [147].

4.7.5 Deprivation

Overall deprivation

Ten LSOAs in the catchment fall within the 10% most deprived in the country (see Figure 24) [132]. Six of these are in King's Lynn, three are in Wisbech, and Fenland 007B (just east of March) is the most southerly LSOA in the catchment to fall in the most deprived decile. Deprivation levels in the south of the catchment are much lower, than in the north and north-western areas, with many of the LSOAs in South Cambridgeshire and Ely in the least deprived decile.

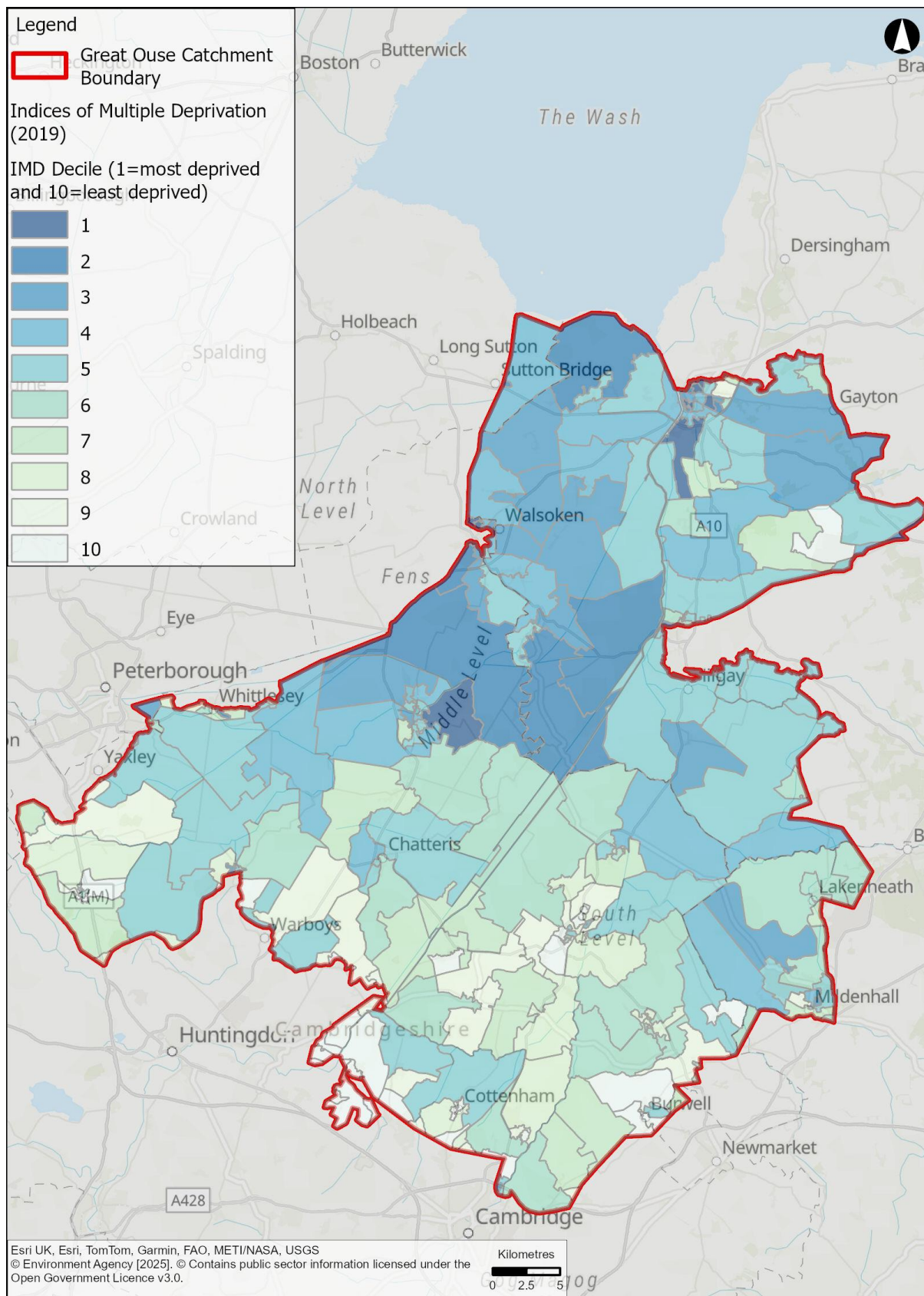


Figure 24: Map of deprivation across the catchment

Education, skills and training deprivation

In terms of education, skills and training, the pattern of deprivation is similar for other measures, with Wisbech, King's Lynn faring the worst, and the majority of the southern catchment, and far north-eastern catchment facing very low levels of deprivation. Fenland 002D includes the most northerly neighbourhood of Wisbech around Osborne Road and is the most deprived neighbourhood in the catchment for education, skills and training. It is ranked just 72 out of 32,844 LSOAs in England, with 1 being the most deprived. The most deprived neighbourhood for this measure in King's Lynn is the area around Columbia Way north-east of the town centre, which is ranked 132 in England. The least deprived LSOA is South Cambridgeshire 002B, located in Cottenham in the very south of the catchment. The wider South Cambridgeshire area faces very low levels of educational deprivation.

Taken as an average across all MSOAs in the catchment, 20.6% of residents have no qualifications [144]. West Suffolk 001 (Lakenheath) in the area of the catchment with the highest percentage of residents with no qualifications, at 34.9%. But again, Wisbech and King's Lynn also score badly for this measure, with 31.9% of residents in King's Lynn 007A, and 33.4% in Fenland 002 (northern Wisbech) having no qualifications. These areas contrast starkly with South Cambridgeshire 003 in the far south-west of the catchment, between Cambridge and St Ives, where only 10.3% of residents have no qualifications.

Income deprivation

The income deprivation domain measures the proportion of the population experiencing deprivation relating to low income. This included those people who are out of work as well as those who are in work but who have low earnings. Generally, the catchment does not have high levels of income deprivation. The IMD 2019 identified that the least income deprived LSOA in the catchment was King's Lynn and West Norfolk 014C, covering RAF Marham between Downham Market and Swaffham. This LSOA is ranked 32,826 out of 32,844 in England, placing it in the least 1% deprived in the country for this measure [132]. Wisbech and King's Lynn are the only places in the catchment with LSOAs in the most deprived decile for income deprivation. King's Lynn and West Norfolk 007A covering Columbia Way in north-east King's Lynn was the most deprived LSOA in the Great Ouse catchment, ranked 1,981 out of 32,844 LSOAs in England.

4.7.6 Housing and private property

The Huntingdonshire Local Plan [50] outlines that at least 20,100 new homes (both market and affordable) will be provided by 2036. Ramsey has been identified as one of four spatial planning areas in the district in which to concentrate the majority of future housing, employment and retail growth. Ramsey is located on the southern boundary of the Great Ouse catchment and has been allocated 895 homes and 2ha of employment land.

The emerging Fenland Local Plan Policies Map [148] has designated several large sites for residential or residential-led development within the Great Ouse catchment, mostly clustered around larger existing towns such as March, Chatteris and Wisbech, as well as a few smaller sites in Manea, Doddington, and Friday Bridge. Wisbech, March and Chatteris have also been identified as sites for employment/ non-residential development.

The King's Lynn and West Norfolk Local Plan [149] has several allocations for housing within the catchment. The largest of these is located between West Winch and North Runcton, adjacent to the A10 as it approaches King's Lynn from the south. The second largest site allocated for housing is located north of King's Lynn, in South Wootton. Downham Market also has two smaller sites allocated for housing.

Narborough is the only village within the Great Ouse catchment boundary to have a site allocated for housing in the Breckland Local Plan [53], with a total allocation of 40.

Housing allocations in East Cambridgeshire, for settlements within, or partially located within the

Great Ouse catchment are outlined in the East Cambridgeshire Local Plan [150]. A large area north of Ely between the railway and the A10 is the largest site allocated in this district within the catchment. There are further sites concentrated around existing settlements such as Soham, Littleport and Sutton.

4.7.7 Social infrastructure

There are a range of community resources located within the catchment:

- Most of the larger villages in the catchment have a primary school and/or a pre-school [151]. The secondary schools in the northern catchment are located in Wisbech, King's Lynn, Downham Market and Terrington St Clement. In the southern catchment, many of the larger settlements have secondary schools, including Methwold, Mildenhall, Ramsey, Chatteris, March, Soham, Ely, Cottenham, Northstowe, Willingham, Swavesey and Somersham. The College of West Anglia is one of the largest providers of education and training in Norfolk and Cambridgeshire. It offers a range of further education and higher education courses and has campuses in King's Lynn and Wisbech.
- There are nine special schools within the catchment providing support to primary and secondary aged pupils with social, emotional and mental health difficulties [151]. These are located in Wisbech, King's Lynn, Terrington St Clement, Ely, and in the villages of Cottenham, Girton and Impington just north of Cambridge.
- As outlined in Section 4.7.5, Wisbech and King's Lynn have some of the highest levels of deprivation in the country. There are a number of organisations which aim to promote more positive outcomes for communities in these areas, including the Benjamin Foundation in central King's Lynn, which focuses on supporting children, young people and families. There are also several community centres, including North Lynn Discovery Centre, South Lynn Community Centre, and Gaywood Community centre. In Wisbech, Youths of Fenland C.I.C. are committed to providing positive activities for young people across Fenland, including those in the most disadvantaged communities.
- There are three NHS hospitals within the catchment, located in King's Lynn, Ely, and Doddington, just north of Chatteris [158]. There are further hospitals outside the catchment boundary in Wisbech, Cambridge and Huntingdon.
- Playing fields and other sports facilities are spread fairly evenly across settlements in the area, with most large villages having access to at least one sports and active recreation facility [152] (see Figure 25).

The key challenges identified in the local plans which have prevented better provision of leisure facilities are the ageing population, low population density and small settlement sizes, heavy reliance on private transport, and significant levels of deprivation and poor health.

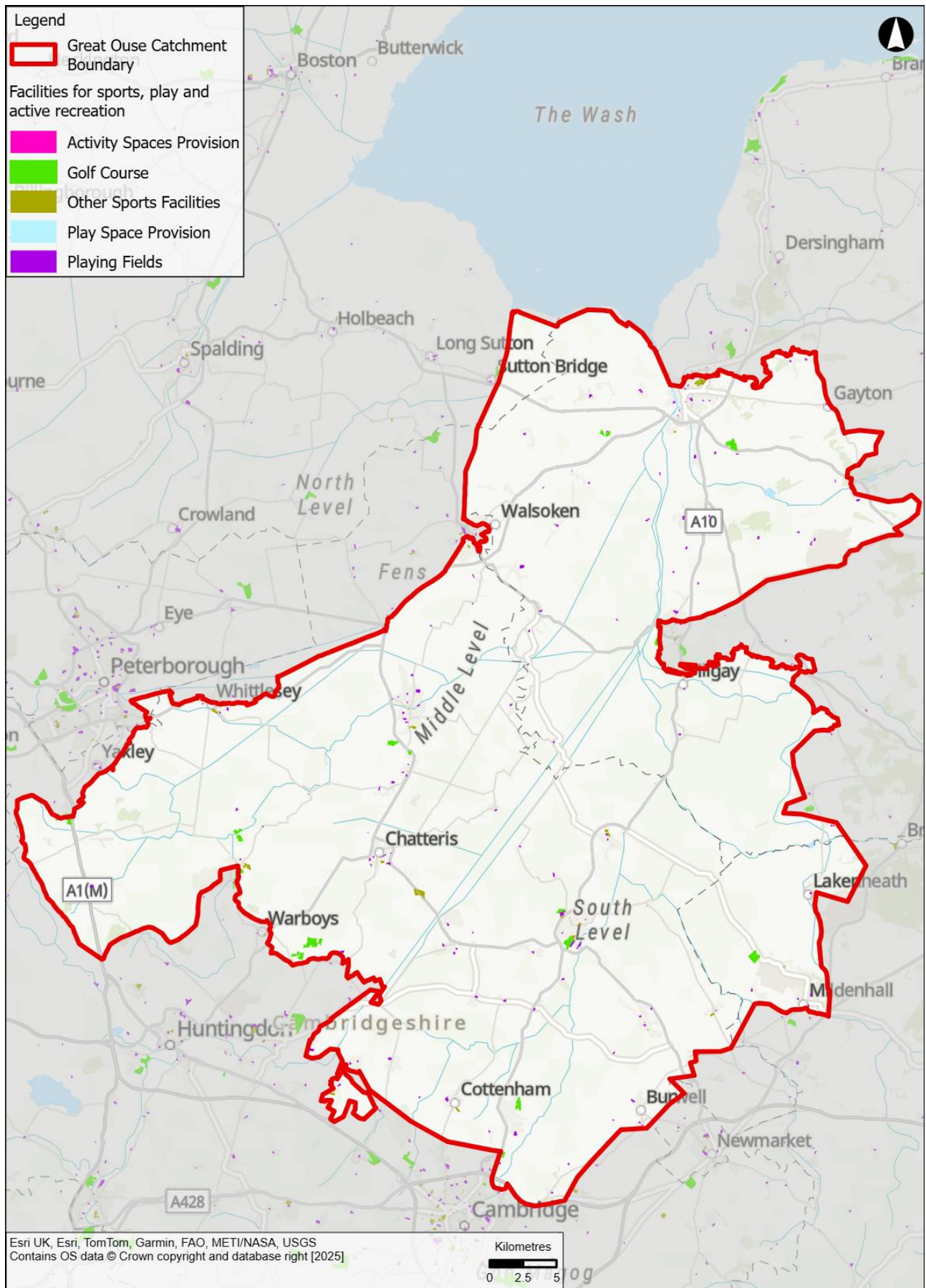


Figure 25: Facilities for sports, play and active recreation within the catchment

4.7.8 Transport Infrastructure

The catchment is poorly served for active travel routes (refer to Figure 4):

- There are approximately 1,839.5 km of Public Rights of Way within the catchment boundary, comprising 1,129.2 km of footpaths, 365.0 km of bridleways and 267.3 km of byways open to all traffic [153]. Generally, routes are well provided along the banks of the River Great Ouse itself and are concentrated around Downham Market and the southern part of the catchment around Ely, Soham and Wicken.
- There are approximately 332.3 km of National Cycle Network routes within the catchment boundary. For example, Route 1 of the National Cycle Network passes through the north of the catchment, connecting King's Lynn with Wisbech via minor roads [154]. Additionally, Route 11 connects King's Lynn to Downham Market, and Ely to Cambridge in the South of the catchment. In the central area of the catchment, around Chatteris and Manea, the network is much less extensive.
- The King Charles III England Coast Path National Trail follows the coastline of the catchment, including the tidal banks of the River Great Ouse from the mouth of the river to the footbridge in King's Lynn which forms the first available crossing point of the route over the river [155]. This section of the route extends continuously around The Wash coastline from Mablethorpe in Lincolnshire to Hunstanton in Norfolk.

4.8 Air quality

This section outlines the air quality baseline in the catchment. Table 33 outlines the key terminology used in this section.

Table 33: Glossary of air quality terminology

Terminology	Summary Definition
Air quality management area (AQMA)	A geographically defined area designated by a local authority where national air quality objectives are not likely to be met. This may cover an area from one street or much larger where the Local Authority is required to develop an Air Quality Action Plan to improve air quality in the that area.
Air Quality Action Plan	The action plan developed by a local authority setting out measures to address achieving air quality objectives in a designated AQMA.
Background concentrations	The levels of air pollutants for a reference year including nitrogen, nitrogen dioxide and particulate matter, published by Defra for support the review and assessment of local air quality under the Environment Act (2021) [3]
Sensitive receptors	A receptor that is potentially sensitive to changes in air quality such as residential property, schools, hospitals, and statutory designated ecological sites.
NO _x , NO ₂	Nitrogen oxides (NO _x) refers to nitric oxide (NO) and nitrogen dioxide (NO ₂), both of which are mainly formed during the combustion of fossil fuels.
PM ₁₀ and PM _{2.5}	Particulate matter (PM) is everything in the air that is not a gas. It consists of a huge variety of chemical compounds and materials, some of which can be toxic. Particulates are classified according to size. The UK is currently focused on measuring the fractions of PM where particles are less than 10 micrometres in diameter (PM ₁₀) and less than 2.5 micrometres in diameter (PM _{2.5}).
Units - µg/m ³	The units are in microgrammes of pollutant per cubic metre of air.

4.8.1 AQMAs

There are six AQMAs within the catchment, designated due to specific air pollution concerns:

- **Whittlesey AQMA No.1** (SO₂) – Declared in 2006, this AQMA covers roads, cycle routes, residential areas, schools, and public spaces surrounding the Whittlesey brickworks.
- **Wisbech AQMA No.1** (SO₂) and **Wisbech AQMA No.2** (PM₁₀) – Both declared in 2001, these areas include central Wisbech, particularly around the canning factory.
- **Wisbech AQMA No.3** (NO₂) – Declared in 2006, this AQMA extends along the B198 Lynn Road between Freedom Bridge Roundabout and Mount Pleasant Road, as well as along the A1101 from Sandylands to just past Westmead Avenue.
- **Railway Road AQMA** (NO₂) – Declared in 2003, this AQMA includes properties on the east side of Railway Road in King's Lynn, between Blackfriars Road/Street and Stanley Street, and on the west side between Blackfriars Street and up to, but not including, 26a Railway Road.
- **Gaywood Clock AQMA** (NO₂) – Declared in 2009, this AQMA was introduced due to concerns over air quality in the Gaywood Clock area of King's Lynn.

Four of these AQMAs are within the Fenland District Council Area, with the other two located in King's Lynn and West Norfolk council area. Fenland District Council is reviewing all AQMAs, considering pollution changes and new developments. The council is working with local industries to remodel Whittlesey's AQMA.

4.8.2 Air quality monitoring

A review of the existing air quality conditions in the catchment area has been undertaken using the Fenland District Council 2024 Air Quality Status Report [156], East Cambridgeshire District Council 2024 Annual Status Report [157], South Cambridgeshire District Council 2024 Annual Status Report [158], Huntingdonshire District Council 2024 Air Quality Status Report [159], King's Lynn and West Norfolk 2024 Air Quality Status Report [160], West Suffolk Council 2024 Air Quality Status Report [161], South Holland District Council 2024 Air Quality Status Report [162] and Breckland Council 2024 Air Quality Status Report [163]. This is the most recently available air quality monitoring data.

Within the catchment area, there are multiple monitoring sites, including diffusion tubes and automatic monitors. The number of monitoring sites operated by each local authority is as follows: Fenland (28), East Cambridgeshire (4), South Cambridgeshire (18), Huntingdonshire (3), West Suffolk (6), and King's Lynn and West Norfolk (73). There are no monitoring sites in South Holland and Breckland within the catchment^{*13}.

From 2019 to 2023, all monitoring sites within the catchment area recorded concentrations below than the NO₂ annual mean objective (40µg/m³). The highest NO₂ concentrations were recorded at King's Lynn and West Norfolk's roadside diffusion tube site 2, which measured 32.5 µg/m³ in 2023, which is below the annual mean objective (40µg/m³). As the area is largely rural, the roadside monitoring locations are not considered representative of the overall catchment area and it is likely that concentrations across the wider catchment will be below this.

There is one industrial automatic monitoring site (OS1 PS) within the catchment operated by King's Lynn and West Norfolk that measures PM₁₀ and PM_{2.5} (6.6 µg/m³). In 2023, the monitoring site OS1 PS recorded concentrations below than the PM₁₀ (11.3 µg/m³) and PM_{2.5} (6.6 µg/m³), annual mean objective. The 2023 PM_{2.5} concentration is also below the Environmental Improvement Plan target (12 µg/m³) and the Environmental Target (10 µg/m³) for PM_{2.5}.

4.8.3 Background concentrations

Background concentrations refer to the existing levels of pollution in the atmosphere, produced by a variety of stationary and non-stationary sources, such as roads and industrial processes. Defra publishes background pollutant mapping [164] for every 1km x 1km OS grid square across the UK for NO_x, NO₂ and PM₁₀ and PM_{2.5}, as well as national air quality objectives for each pollutant.

The catchment spans across 1,996 grid squares. The background pollutant mapping has been reviewed for those grid squares and an average of the 2024 Defra background concentrations has been used for the area. The average Defra background concentration for NO₂ is 5.4 µg/m³, for NO_x (relevant to ecological receptors) it is 6.8 µg/m³, for PM₁₀ it is 12.8 µg/m³ and for PM_{2.5} it is 6.0 µg/m³. All concentrations are well below the annual air quality standards for NO₂, NO_x, PM₁₀ and PM_{2.5}. The PM_{2.5} Defra background concentration is also below the Environmental Improvement Plan target (12µg/m³) and the Environmental Target (10µg/m³) for PM_{2.5}.

Within the catchment area, there are 14 urban background diffusion tubes monitoring sites, located across each Local Authority, except South Cambridgeshire. The most recent data available for these sites is from 2023.

An average of the 2023 annual mean NO₂ concentration from Defra's background concentrations were compared with the average^{*14} across all 14 urban background monitoring sites. Defra's

¹³ South Holland and Breckland District Council have been excluded from analysis on air quality monitoring in the catchment as there are no monitoring sites located in these areas.

¹⁴ The average is used as the project is in an early stage, while a more detailed assessment of the monitoring data will be conducted at a later stage.

predicted average concentration for these sites was $8.1\mu\text{g}/\text{m}^3$, which was lower than the measured average concentration of $11.3\mu\text{g}/\text{m}^3$.

4.8.4 Sources of Air Pollution

Industrial air pollution sources are regulated through a system of operating permits or authorisations, requiring stringent emission limits to be met, and ensuring that any releases to the environment are minimised or rendered harmless. Regulated (or prescribed) industrial processes are classified as Part A(1), A(2), Part B of Medium Combustion Plant processes and are regulated through the Pollution Prevention and Control (PPC) system [165] [166]. The larger more polluting processes are regulated by the Environment Agency and the smaller, less polluting ones by the local authorities. Local authorities focus on regulation for emissions to air, whereas the Environment Agency regulates emissions to air, water, and land.

There are several Part A(1) and MCP processes within the catchment listed on the EA website [167], however only four have releases to air and relevant combustion activities. These sites are Smurfit Kappa UK Ltd, EPR ELY Limited, Sutton Bridge Power Generation, EP UK Power Development Limited, and National Gas Transmission plc. It is assumed that these processes are included in the Defra background concentrations. The impact of other smaller industrial processes further from the catchment are also assumed to be represented in the background concentrations used in this assessment.

Traffic is a significant contributor to air pollution. Pollution from traffic includes vehicle exhaust emissions, secondary pollutants formed in the atmosphere, evaporative emissions from vehicles and non-combustion emissions such as tyre wear and road dust. There are very few A-roads within the catchment: the A141, A142 and A10 spanning approximately 23.5km, 29.4km and 56.6km, respectively.

4.8.5 Sensitive Receptors

Sensitive human receptors are defined as those residential properties, schools and hospitals that are likely to experience a change in pollutant concentrations with potential exposure relevant to the averaging periods set out in the air quality standards.

Below is a list with sensitive receptors within the catchment, although this is not an exhaustive list:

- Individual properties and residential areas within the catchment e.g. Chatteris, Littleport, March, Outwell and Waterbeach;
- Nelson Academy;
- Westwood Primary School;
- Lionel Walden Primary School;
- Glebelands Primary School;
- Kingsfield Primary School;
- Wilburton C Of E Primary School;
- The Queen Elizabeth Hospital King's Lynn NHS Foundation Trust;
- Doddington Hospital; and
- Princess of Wales Hospital.

Sensitive ecological receptors are defined as those sites whose qualifying features have been designated as sensitive to air pollutants. There are sensitive nationally and internationally designated ecological receptors within the catchment, such as The Nene Washes Site of Special Scientific Interest (SSSI), Special Protection Area (SPA), Special Area of Conservation (SAC) and Ramsar located on the west side of the Catchment. The Ouse Washes SSSI, SPA and SAC is located in the middle of the catchment area.

In total there are 69 SSSIs, 15 SPAs, nine SACs, six Ramsar sites, and nine National Nature Reserves (NNR). Please see Section 4.5 for further information.

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