The Influence of Flood Risk Management Within the Plan Area

Broadland Futures Initiative

Contents

1. Introduction

The Broadland Futures Initiative

The **Broadland Futures Initiative** (BFI) is a partnership for future flood risk management in the Broadland area. Our main goal is to agree a plan for future flood risk management that better copes with changing climate and rising sea level (see later pages for project information). The focus will be on what will happen from the mid-2020s onwards, however we need to start planning now to secure support and make well-informed decisions.

This document aims to inform you about the range of **assets and their benefits** across the study area which are influenced by the **current approaches** to flood risk management. For example, agricultural land (an asset) provides crops and enables livestock grazing (the benefits), activities which are supported by the network of embankments, ditches and pumps (flood risk management). However, climate change and other pressures mean that we may need to **adapt future approaches** to flood risk management.

Assets are things we value (e.g. infrastructure, environment or heritage). Benefits are what the asset provides (e.g. recreation or community). All important terms are in the glossary.

To provide an overview of how the local economy, as well as the social and natural environments, are influenced by current flood risk management, we explore links for the following groups of assets:

- Natural environment
- Heritage assets
- Recreation and leisure facilities
- Businesses and farming
- Residential buildings and public services
- Utility infrastructure

Strengthened flood bank at Breydon Water © Jeremy Halls

The Plan Area

There is a vast and diverse range of assets within the 370 km^2 BFI plan area, which includes the full extent of the Broads Authority executive area and key stretches of the coast which could influence flooding in the Broads. It also includes parts of Great Yarmouth. The plan area is predominantly in east Norfolk but also crosses into north east Suffolk; refer to the map on the following page. Spanning internationally-important inland and coastal environments, the area supports rural and urban economies with successful tourism, agriculture, recreation and technology businesses. As demonstrated by the significant cultural history of the area, it has always been a desirable place to live and relax. However, much of this now occurs on land that is already at or below mean sea level. Managing the continual risk of flooding requires substantial investment in planning and infrastructure. The next section describes how existing flood risk management influences different parts of the land across the plan area.


BFI plan area. The figure contains OS data © Crown copyright [and database right] 2020.
NORFOLK
SUFFOLK
NORWICH
GREAT YARMOUTH
LOWESTOFT
Stalham
R. Ant
Hickling
Hickling Broad
Horsey
R.Thurne
Barton Turf
Neatishead
Barton Broad
How Hill
R. Bure
Horstead
Hoveton
Ludham
Potter Heigham
Martham
Wroxham
Horning
Bure Marshes
Wroxham Broad
Ormesby
Rollesby
Filby
Trinity Broads
Caister on Sea
Woodbastwick
Salhouse
Ranworth
Upton
Stokesby
R. Bure
Acle
Brundall
Breydon Water
Halvergate Marshes
Burgh Castle
Cantley
Claxton
R. Yare
Reedham
Fritton
Chedgrave
R.Chet
Loddon
Haddiscoe Cut/New Cut
St Olaves
R. Waveney
Haddiscoe
Somerleyton
Burgh St Peter
Stanley Carrs
Carlton Marshes
Oulton Broad
Geldeston Lock
Shipmeadow
Beccles
Bungay
approx scale
0 2 km
0 2 miles
Legend
BFI Plan Area
Urban Areas

2. Areas Influenced by Flood Risk Management

Many different approaches to managing floods currently operate across the plan area. These range from planning policies steering development away from high flood risk areas, to structures modifying the flow of flood water; approaches influencing community-wide flood risk, to works improving the resilience of individual buildings; and responses before, during and after flood events through to approaches managing risk for decades into the future.

Some approaches such as flood forecasting and warning, are applied across the whole area, whereas those involving structures influence flooding in particular locations. The main structures are the network of over 270 km of earth embankments and walls along the rivers and coast, and the ditches and pumps draining the lowest areas. The locations of many of these are shown on the map on the next page.

The hatching on the map shows that these structures are often used to manage water levels on land which lies at or below current mean sea level, which could flood regularly from a combination of high river/tidal levels, groundwater and ponding surface water. There is also adjacent land which, although higher, benefits from the same flood management structures during larger flood events (e.g. tidal surges). This combination of the lowest land which is regularly kept dry, and the nearby higher land, is referred to as the area *more influenced by flood risk management*. This is the green shaded area on the map and covers 75% of the plan area.

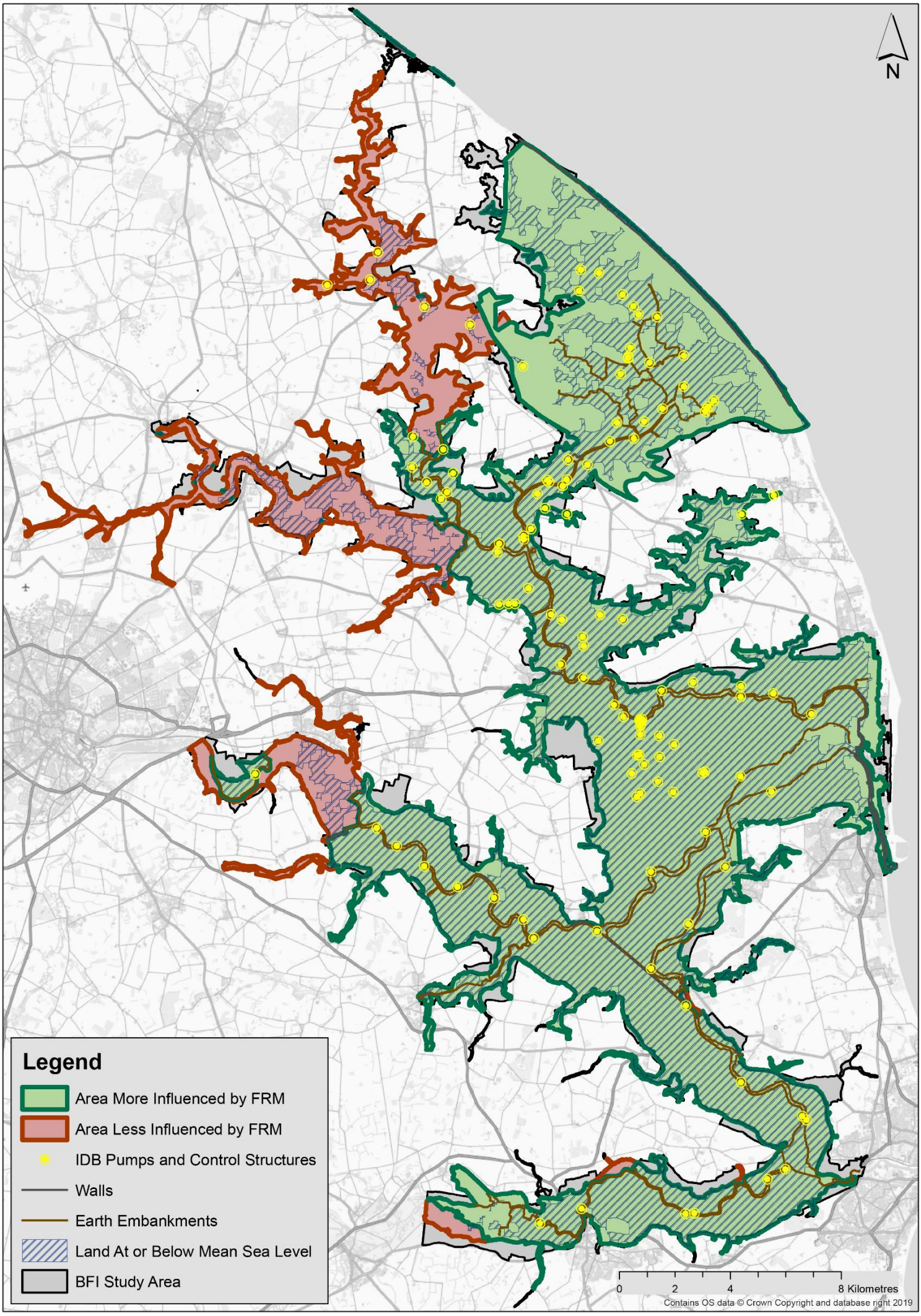
Nearly 75% (28,000 ha) of the plan area is *more* influenced by flood risk management. The effects are seen on a daily basis for land at or below mean sea level, and in storm events for higher ground.

The red shaded areas of the map are those referred to as *less influenced by flood risk management*. These include the upper reaches of the rivers Waveney, Yare, Bure and Ant. Although these areas do benefit from planning policies and the flood warning service, as well as some structures, these are generally fewer and their influence more localised.

The BFI plan will identify and mitigate any unintended consequences of flood risk management.

It is also possible that water levels in these upper reaches could be affected by the embankments which are a distance downstream. Such unintended consequences of flood risk management can be avoided through rigorous design and planning. This is just one reason why the BFI plan will seek natural solutions to managing flooding wherever possible.

Horsey Gap © Jeremy Halls


N
Legend
Area More Influenced by FRM
Area Less Influenced by FRM
IDB Pumps and Control Structures
Walls
Earth Embankments
Land At or Below Mean Sea Level
BFI Study Area
0
2
4
8 Kilometres
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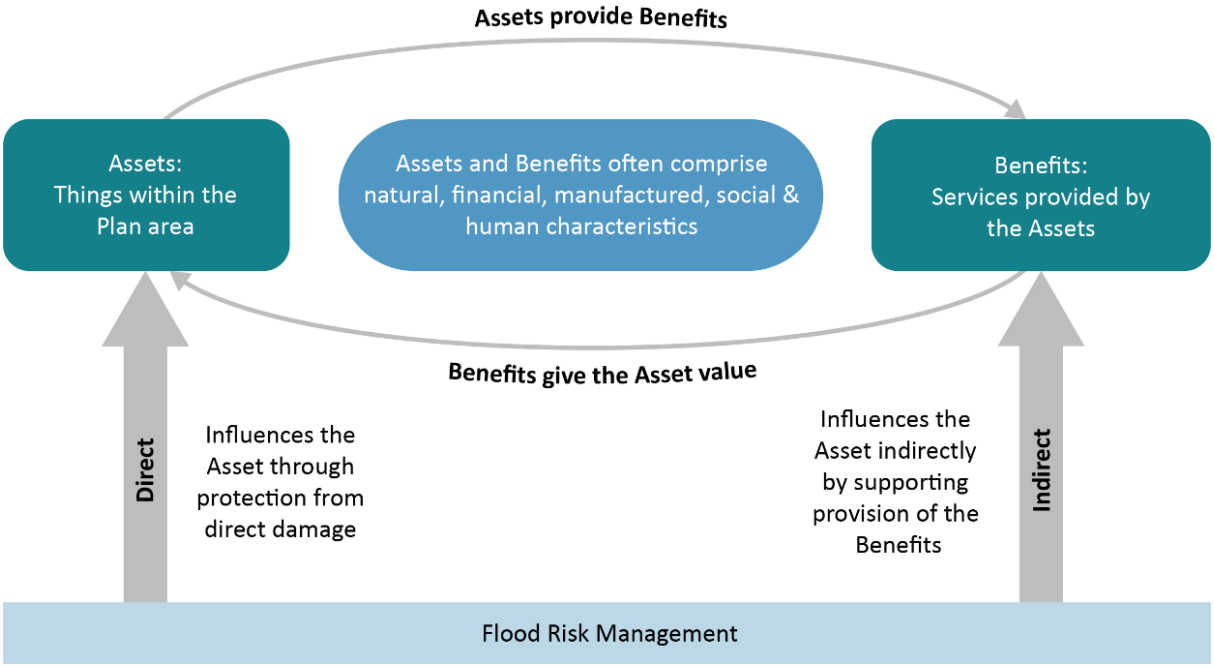
Together with planning policies, the flood warning service and emergency planning, the network of walls, embankments and pumps manage flooding that could otherwise have a greater impact on our lives through direct material damage (e.g. to homes and businesses) and indirectly through our health and wellbeing, economic growth etc.

Also, different flood risk management approaches can influence different characteristics of flooding. For example, greater depths in larger, but less frequent, flood events can strongly influence material damage (e.g. to buildings), whereas shallower, more frequently occurring, flooding could influence the ability of public services to operate (e.g. road closures). High salinity and nutrient flood water can strongly influence natural assets (e.g. freshwater habitats and agriculture).

The diverse range of assets and benefits identified in the following pages, and the sometimes complex links with flood risk management, highlights the interconnectivity within the plan area. We are, therefore, developing a broad understanding of flood risk and its interactions with climate and key aspects of the plan area. The following diagram provides a simplified way to explore this complexity.



Adaptation will be an important characteristic of the BFI plan.

The approaches to flood risk management, the influence these have and the broad classification of areas *more* or *less* influenced represents the existing situation which is partly a result of past land use decisions. We have an opportunity to consider whether a different picture of the influence of flood risk management is more appropriate in the future. We know that adapting approaches to future changes, including climate, will help us manage the challenges and realise opportunities. To inform our transition to these future approaches, the next sections summarise the breadth of influence that existing flood risk management structures currently have on various aspects of our lives.

3. What can be Influenced?

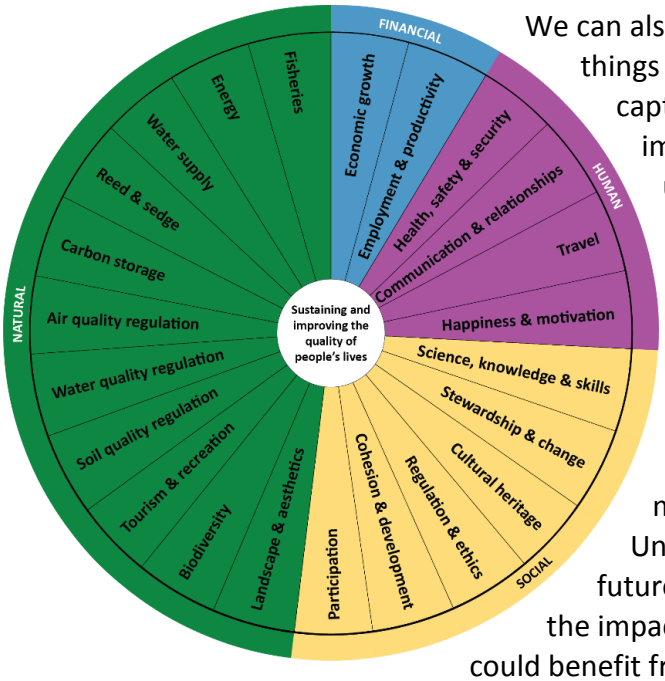
Direct and Indirect Influences

The consequences of flooding include direct material damage to homes (made worse by deeper and polluted flood water), businesses (where frequent or long duration flooding can severely impact their viability), transport and utility infrastructure (where danger can be increased by fast flowing water) and the natural environment (particularly freshwater habitats flooded by saline water). In addition to these direct impacts, flooding also indirectly impacts our lives, affecting aspects like health and wellbeing, the strength of communities and economic growth. The aim of flood risk management is to avoid or minimise any harmful direct and indirect consequences. Through careful planning, the aim is to achieve the benefits in one area without any unacceptable consequences elsewhere.

> Avoiding or minimising negative direct (e.g. damage to buildings) and indirect (e.g. health & wellbeing) impacts is the aim of flood risk management.

Assets and Benefits in the Plan Area

The direct and indirect influence of flood risk management can be described by looking at the range of assets across the plan area, and the benefits they provide. For example, our homes are material assets which offer many benefits, including health, safety & security. The following pages summarise the assets across the plan area which to some degree are influenced by flood risk management, including: assets in the natural environment; those that exist because of the heritage of the area; the natural and built assets which offer recreation and leisure opportunities; businesses which contribute to the economy; the communities within which we live and the supporting services and infrastructure which we rely on. This highlights many different stakeholders who we would like to involve in the BFI plan.



We can also begin to identify the benefits, which are the things we value in the assets. The wheel to the left captures a range of benefits which, together, improve our quality of life. Every asset provides us with a number of these benefits. Some are more strongly influenced by flood risk management than others. For example, travel (a benefit) is not possible safely if a road is flooded, whereas flooded soils are still able to store carbon from the atmosphere. The more strongly assets and their benefits are linked to flood risk management, the stronger the influence is. Understanding these links will guide the plan for future flood risk management, help us understand the impact of its actions and identify which partners could benefit from being involved in its delivery.

4. Natural Environment

Overview of the Assets and their Benefits

A diverse range of habitats is a well-recognised feature of the plan area. The Broads system is the UK's largest and most visited lowland wetland, comprising 275 km of larger rivers and an extensive network of smaller watercourses. There are over 60 broads and other permanent water bodies. The Broads is protected equivalent to a National Park for its exceptional landscapes and wildlife. The plan area also includes a section of the Norfolk Coast Area of Outstanding Natural Beauty, with its distinctive geology, unique wildlife and habitats, and cultural characteristics such as archaeology.

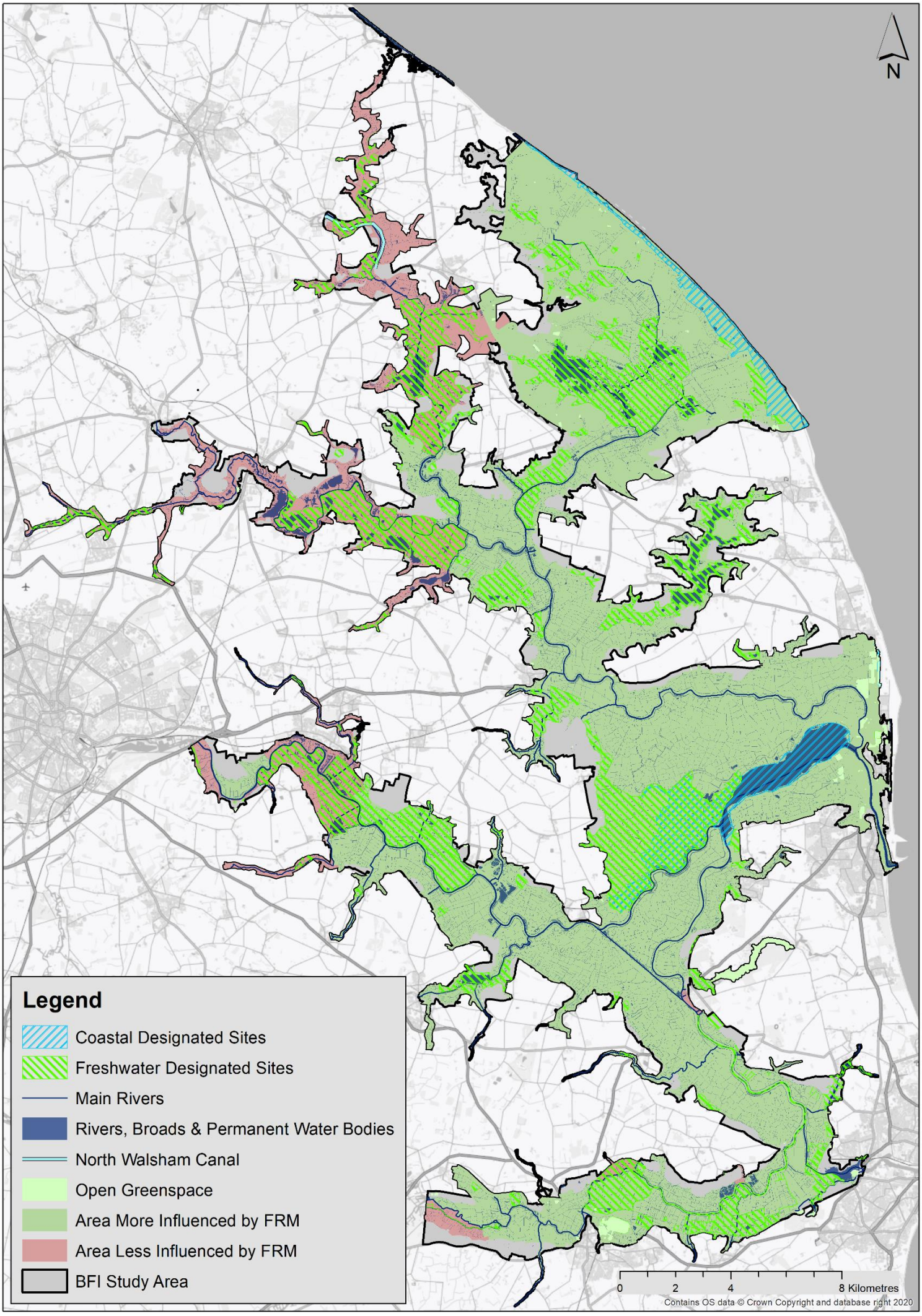
Environmental assets provide benefits which support biodiversity, as well as the social and economic quality of our lives.

Protected sites of international and national importance support both coastal and freshwater features. The internationally protected sites comprise Special Areas for Conservation, Special Protection Areas, and Ramsar sites. These include the coastal dunes at Horsey-Winterton and the intertidal flats of Breydon Water, together with the range of freshwater habitats and species further upstream within the rivers, broads, wet woodland, fens and grazing marshes of Broadland. National Nature Reserves also protect the most important habitats, species and geology, and there are over 30 Sites of Special Scientific Interest (including for rare species) and 130 Local Wildlife Sites. There are more than 200 open green spaces including parks, playing fields, play areas and allotments. Underlying all these are a range of soils, including the nationally-recognised fen peat soils.

The following map shows the location of natural environment assets. Benefits provided by the majority of these environmental assets, and which will be influenced by current flood risk management to varying degrees include: **biodiversity** (rich mosaic of habitats supports a quarter of the UK's rarest plants and animals), **landscape & aesthetics** (including unreclaimed fen, drained marshland, relict estuary and coastal dunes), and **regulation & ethics** (many characteristics are protected by international and national law). The assets also support outdoor-based **tourism & recreation** (e.g. boating, walking, wildlife watching, angling and visiting nature reserves).

Sunrise at Halvergate Marshes © Jeremy Halls

The following additional benefits are also influenced by flood risk management. Soils enable farming of **crops & livestock**, and **storage of carbon** which would otherwise contribute to climate change. Designated environmental sites are important for the advancement of **science, knowledge & skills**. And open green space encourages individual health & wellbeing and community **participation**.


N
Legend
Coastal Designated Sites
Freshwater Designated Sites
Main Rivers
Rivers, Broads & Permanent Water Bodies
North Walsham Canal
Open Greenspace
Area More Influenced by FRM
Area Less Influenced by FRM
BFI Study Area
0
2
4
8 Kilometres
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Influence of Flood Risk Management

Some coastal designated sites are highly influenced by flood risk management, whereas others are not. For example, Breydon Water has free exchange of water with the sea. However, on the coast between Eccles and Winterton the sea wall present has a strong influence in some places by preventing the full range of dune habitats developing and restricting their natural migration. Similarly influential are the off-shore reefs at Sea Palling and Waxham that have resulted in the growth of new dunes there.

Freshwater sites are consistently more strongly influenced by existing flood risk management, primarily keeping high salinity and nutrient water away to preserve the freshwater-dependent ecosystems. Without this influence of flood risk management, the sites may be subject to change which could compromise their unique biodiversity and international status.

Permanent water bodies (e.g. rivers and broads) are not highly influenced by flood risk management structures, as there are none within the channel, although embankments and pumps may affect water levels and changing the visual appearance of the landscape. Although soils are a natural asset, flood risk management has a relatively high influence as it reduces the impacts of flooding with high salinity and nutrient water. Artificial drainage of peat soils can unintentionally degrade the quality of the soils and release stored carbon. For the open green spaces, many of their benefits rely on people being able to use them, and so flood risk management has a moderate influence, reducing the frequency with which sites are inaccessible due to flooding.

Aerial photo of sea wall at Winterton © Mike Page

5. Heritage Assets

Overview of the Assets and their Benefits

The Broads is a low-lying wetland landscape which has evolved over centuries, shaped by physical, ecological, cultural, and historic factors. The lakes, dykes and in some cases the rivers are themselves archaeological features. Wind pumps, which are one of the characteristic heritage assets across the area, were themselves originally built in order to manage flood risk. The soil conditions in the Broads means that there is great potential for archaeology to be well preserved. Across the plan area, there are currently over 400 listed buildings including houses, farms, mills, churches, memorials and bridges and over 20 scheduled monuments including castles, roads, buildings and walls. There are 23 conservation areas to manage and protect the special architectural and historic interest of a place, and the Venetian Waterways in Great Yarmouth is a registered park and garden.

Historic England classify the area as having exceptional waterlogged heritage.

The following map shows the location of the heritage assets. Benefits provided by the heritage assets, and which will be influenced by current flood risk management to varying degrees include: **cultural heritage** (together with countryside and wildlife, this defines the special qualities of the area), **stewardship & change** (protecting the area's significant heritage for the present, and for future generations of communities and visitors) and **tourism & recreation** (the area welcomes over 10 million staying and day-trip tourism visits to its coast and seaside resorts, countryside and market towns every year).

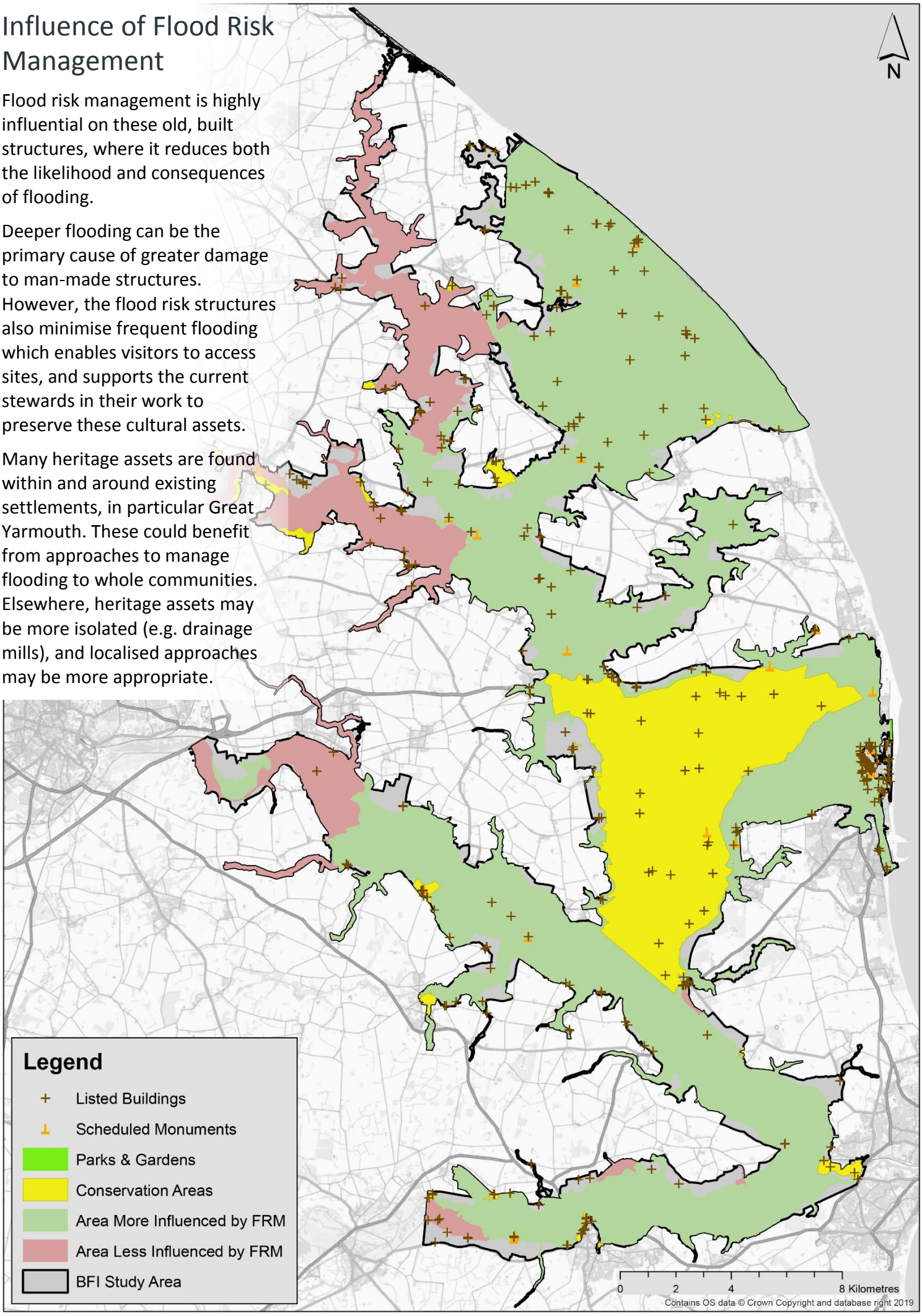
Lockgate Drainage Mill, Breydon Water © Jeremy Halls

Influence of Flood Risk Management

Flood risk management is highly influential on these old, built structures, where it reduces both the likelihood and consequences of flooding.

Deeper flooding can be the primary cause of greater damage to man-made structures. However, the flood risk structures also minimise frequent flooding which enables visitors to access sites, and supports the current stewards in their work to preserve these cultural assets.

Many heritage assets are found within and around existing settlements, in particular Great Yarmouth. These could benefit from approaches to manage flooding to whole communities. Elsewhere, heritage assets may be more isolated (e.g. drainage mills), and localised approaches may be more appropriate.



6. Recreation and Leisure Facilities

Rowers on the River Yare at Thorpe St Andrew © Jeremy Halls

Overview of the Assets and their Benefits

With a strong vibrant culture and diverse opportunities for leisure and recreation, the plan area is an attractive place to live, work and visit. Many opportunities exist to enjoy the natural and cultural environments, including boating, walking and angling. Boating is significant for the economy, with over 11,000 private and hire boats licensed to use the Broads. A unique asset is the 200 km of navigable lakes and rivers, supported by many moorings, including over eighty 24-hour mooring sites. Angling is a huge activity in the Broads, with significant benefits to the local economy. Angling is encouraged from boats, public mooring sites, as well as a number of key locations on the river banks. A network of public rights of way (including many that run along the crest of flood banks) supports walking, cycling and horse riding. There are approximately 340 km of footpaths within the plan area. There are high quality sandy beaches with easy access at, for example, Eccles, Sea Palling and Winterton. Opportunities are not just limited to the outdoor, however, with over 80 leisure facilities (including for equestrian, golf and water sports, and a number of sports centres) and 60 entertainment venues ranging from pubs, theatres and restaurants to amusement arcades.

The following map shows the location of recreation & leisure assets. Benefits provided by recreation & leisure assets, and which will be influenced by current flood risk management to varying degrees include: **tourism & recreation** (the range of outdoor and indoor opportunities is fundamental to why people come to the area), **economic growth** (e.g. £164 million of the annual income from tourism in the Broads was spent on recreation, food and drink and anglers contribute more than £100 million to the local economy each year), and **employment & productivity** (e.g. visitors to the Broads help support over 7,000 full time jobs and almost a third of Great Yarmouth's employment is related to tourism). Additional benefits of happiness & motivation and community cohesion & development are also influenced by flood risk management.

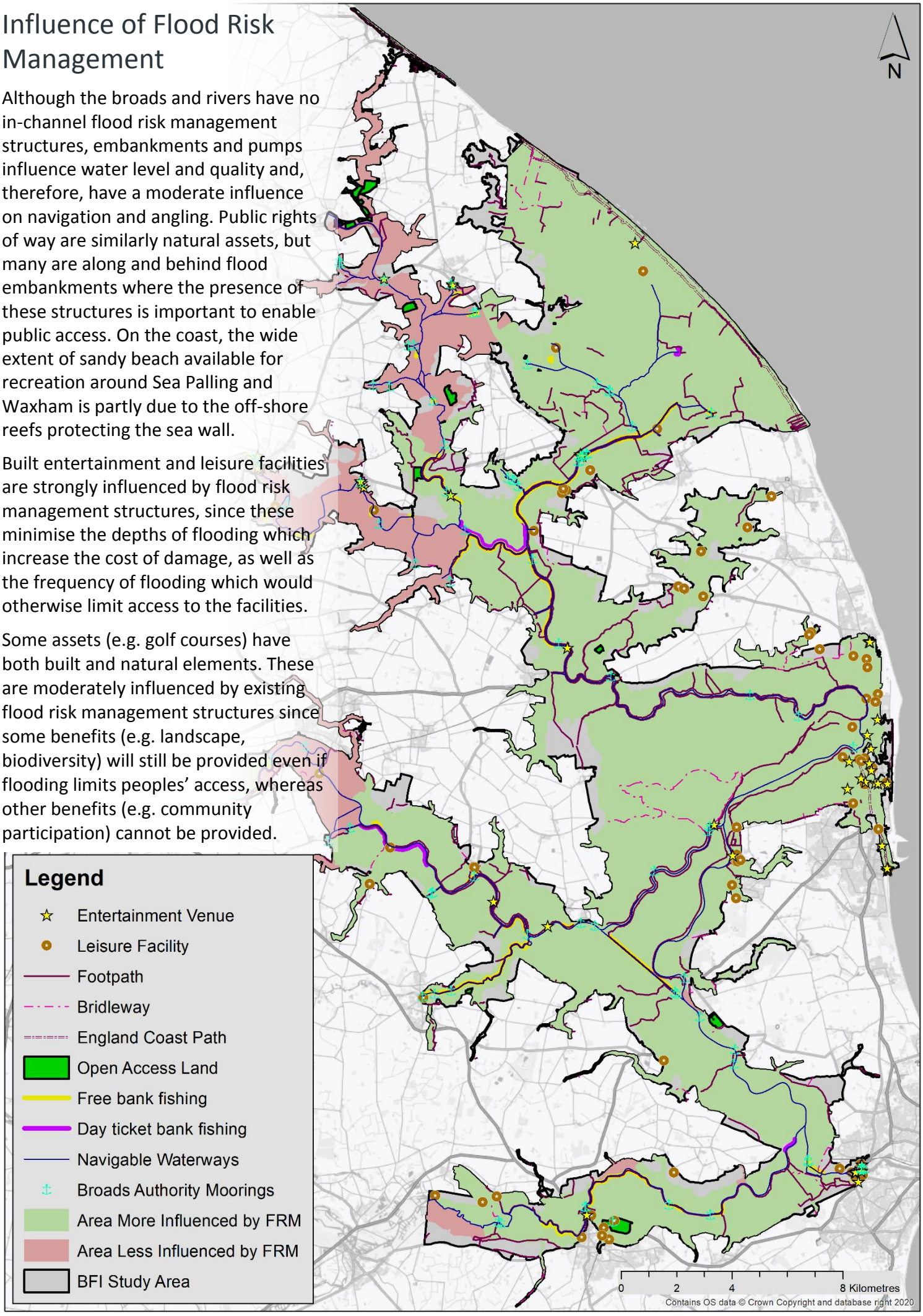
As well as adapting the way we approach flood risk management in the future, it is possible that the assets themselves can be adapted so that the influence of flood risk management need not be as strong, and their resilience to flooding and climate change improves.

Influence of Flood Risk Management

Although the broads and rivers have no in-channel flood risk management structures, embankments and pumps influence water level and quality and, therefore, have a moderate influence on navigation and angling. Public rights of way are similarly natural assets, but many are along and behind flood embankments where the presence of these structures is important to enable public access. On the coast, the wide extent of sandy beach available for recreation around Sea Palling and Waxham is partly due to the off-shore reefs protecting the sea wall.

Built entertainment and leisure facilities are strongly influenced by flood risk management structures, since these minimise the depths of flooding which increase the cost of damage, as well as the frequency of flooding which would otherwise limit access to the facilities.

Some assets (e.g. golf courses) have both built and natural elements. These are moderately influenced by existing flood risk management structures since some benefits (e.g. landscape, biodiversity) will still be provided even if flooding limits peoples' access, whereas other benefits (e.g. community participation) cannot be provided.



7. Local Businesses and Farming

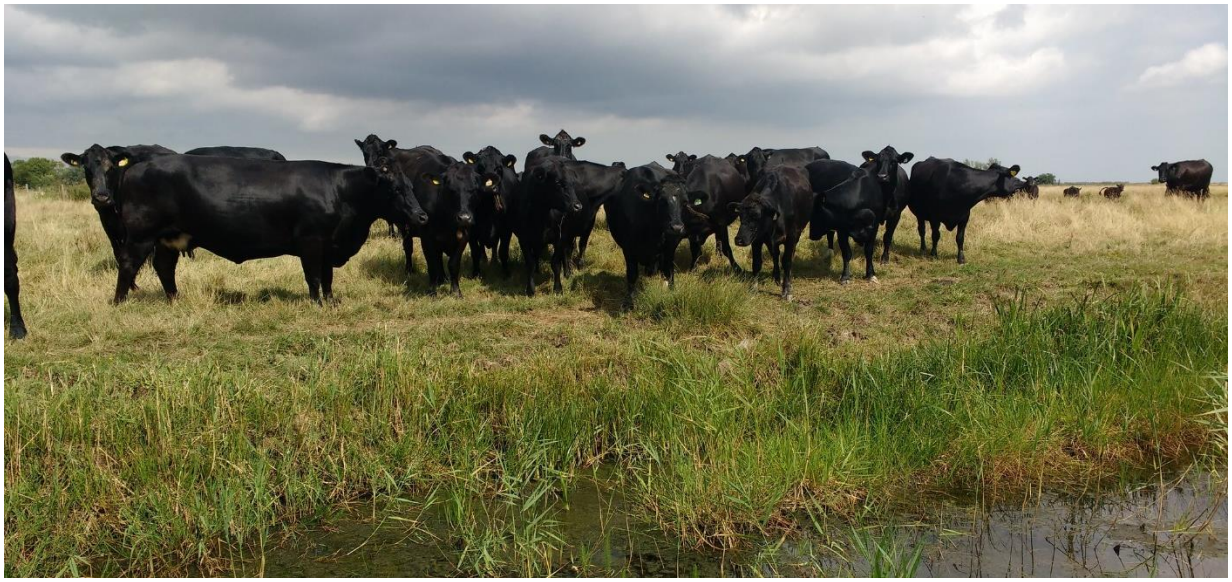
Overview of the Assets and their Benefits

Businesses within the plan area include agriculture, tourism, as well as pioneering technologies and industries in the food and energy sectors. Agriculture is fundamental to the environment and biodiversity of the Broads, as well as to its economy. Over three-quarters of the plan area is moderate to excellent quality agricultural land, with many farm buildings. There are many different farm types across the plan area, ranging from arable to livestock and dairy. One third of East Anglia's cattle grazing land is within the Broads, with nearly two-thirds of the agricultural land in the plan area used as grass for grazing. The National Farmers Union has estimated that farming in the wider Broadlands area contributes more than £150 million to the regional economy, which supports the wider Norfolk and Suffolk agri-food business, worth £3.5 billion.

Reed and sedge cutting remains a traditional local industry, supporting biodiversity, landscape character and cultural heritage. Across the plan area, and particularly clustered in Great Yarmouth, are over 1000 manufacturing, office and warehouse buildings. These include those using the port and in the Broads marine industries such as boat building. Tourism is a significant part of the economy, with hundreds of holiday accommodation assets within the plan area.

> The reed and sedge harvesting industry from the Broads fens continues to be an important part of the rural economy, linking to its cultural and industrial heritage.

The following map shows the location of local business & farming assets. Benefits provided by local business & farming assets, and which will be influenced by current flood risk management to varying degrees include: **economic growth** (the Norfolk and Suffolk economy contributes £36 billion to the nation) and **employment & productivity** (Norfolk and Suffolk have a higher proportion of people engaged in the labour market than the national average).



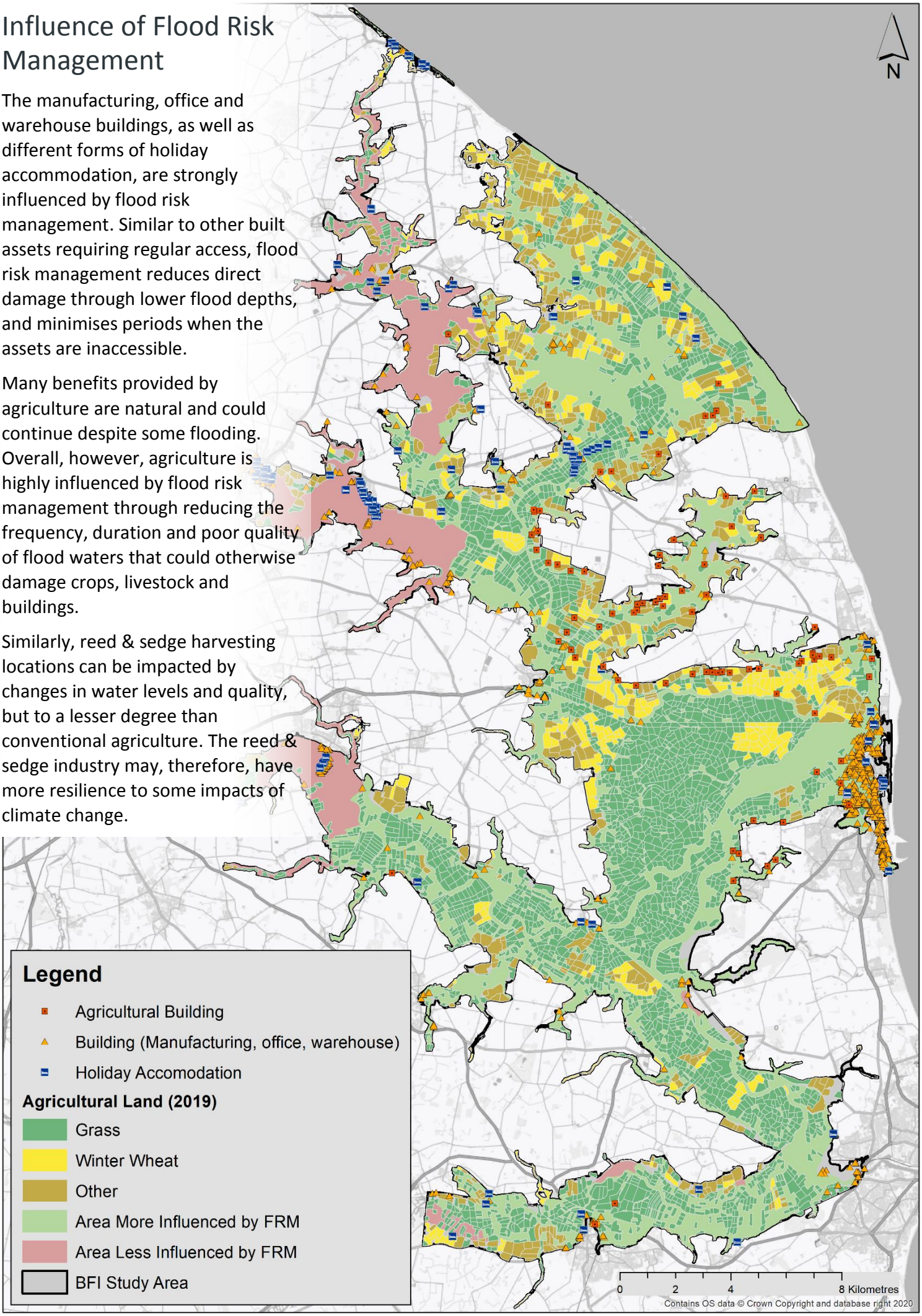
Black Limousin cattle grazing on Halvergate Marshes © Jeremy Halls

Influence of Flood Risk Management

The manufacturing, office and warehouse buildings, as well as different forms of holiday accommodation, are strongly influenced by flood risk management. Similar to other built assets requiring regular access, flood risk management reduces direct damage through lower flood depths, and minimises periods when the assets are inaccessible.

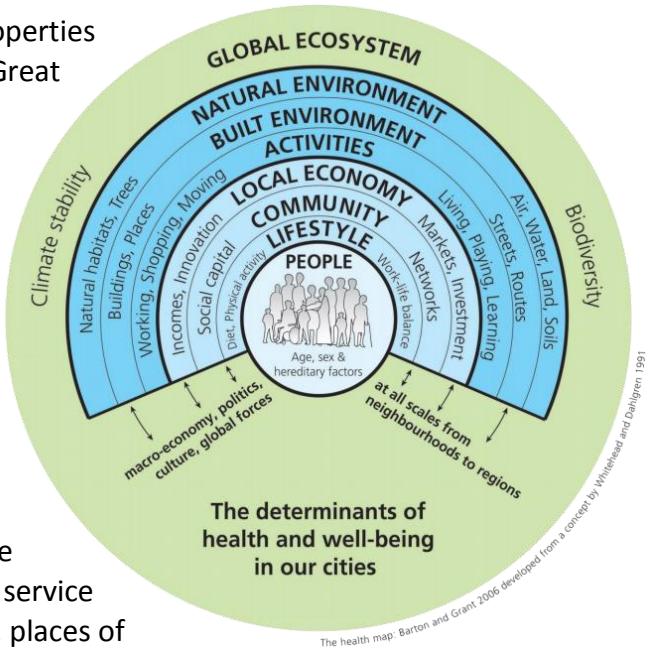
Many benefits provided by agriculture are natural and could continue despite some flooding. Overall, however, agriculture is highly influenced by flood risk management through reducing the frequency, duration and poor quality of flood waters that could otherwise damage crops, livestock and buildings.

Similarly, reed & sedge harvesting locations can be impacted by changes in water levels and quality, but to a lesser degree than conventional agriculture. The reed & sedge industry may, therefore, have more resilience to some impacts of climate change.



8. Residential Buildings and Public Services

Overview of the Assets and their Benefits

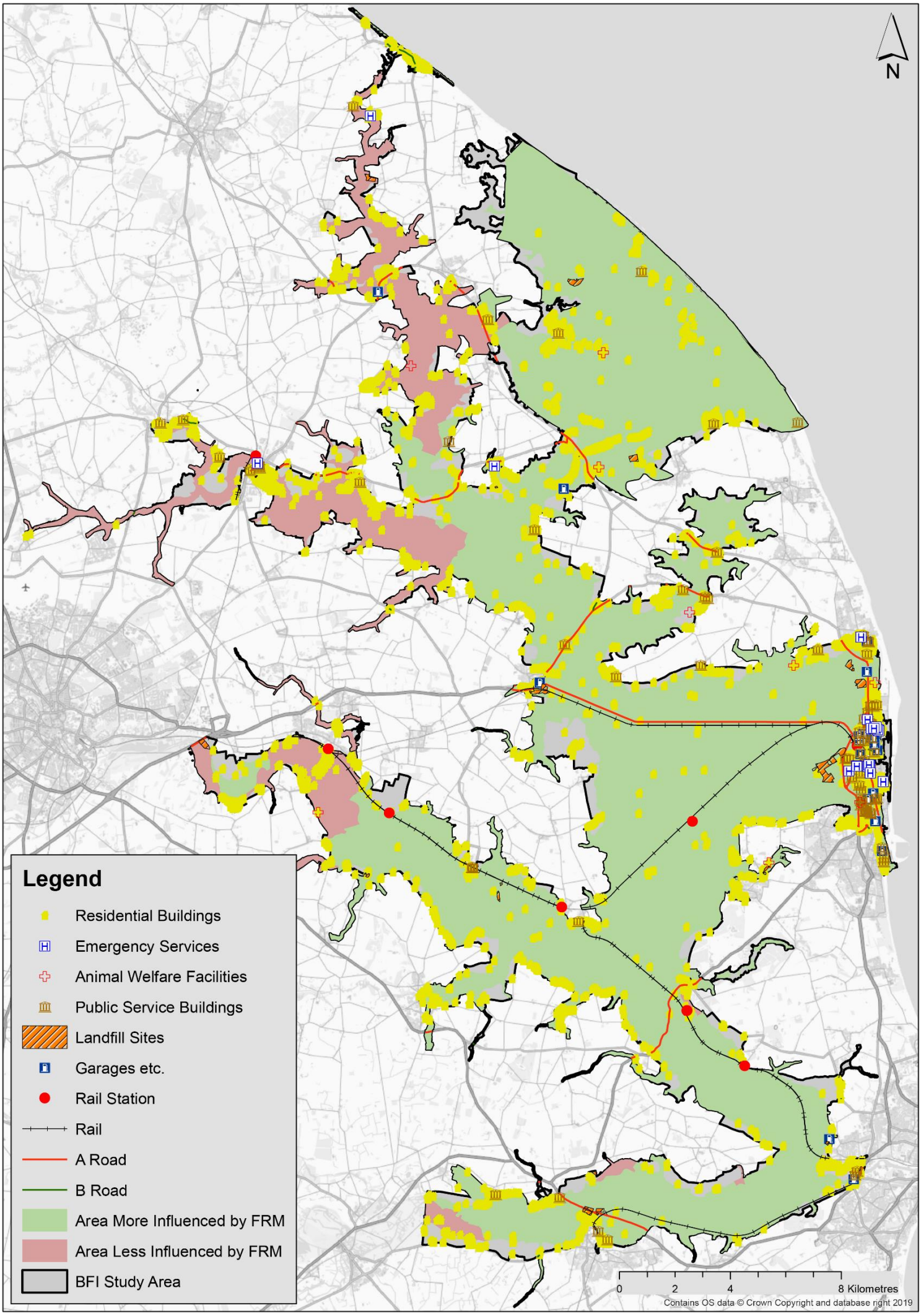


There are approximately 13,000 residential properties in the plan area, with the majority of these in Great Yarmouth. Elsewhere, homes are scattered relatively sparsely, with the resident population of the Broads Authority Executive Area being about 6,300. Whatever density the residential buildings, however, a spread of public services is fundamental to maintaining a desirable place to live, work and visit. Public services recognise the importance of lifestyle, social and community influences, living and working conditions and general socio-economic, cultural and environmental conditions, and seek to promote health and wellbeing. There are over 90 public service buildings across the plan area, including banks, places of worship, schools and education centres, post offices and community halls. There are also 20 hospitals and health care facilities and 10 animal welfare facilities (e.g. vets). There are two currently operating waste disposal sites and over 20 historic landfill sites. The area is crossed by major road transportation links, although access to villages, rivers and broads is typically off minor roads. Rail connections between Norwich, Great Yarmouth and Lowestoft cross the plan area in the Yare, lower Bure and Waveney areas.

The following map shows the location of residential buildings and public services. Benefits provided by residential buildings & public services, and which will be influenced by current flood risk management to varying degrees include: **health, safety & security** (authorities seek to provide natural, social and economic environments which promote health and wellbeing), **economic growth** (fundamental to supporting and growing the £36 billion economy of Norfolk and Suffolk) and **cohesion & development** (living in the plan area, particularly close to the water, is highly prized and local communities strongly identify with the area and value its special qualities).

St John's Church Waxham church © Jeremy Halls

Public services also bring the benefit of employment to the local community.


N
Legend
Residential Buildings
Emergency Services
Animal Welfare Facilities
Public Service Buildings
Landfill Sites
Garages etc.
Rail Station
Rail
A Road
B Road
Area More Influenced by FRM
Area Less Influenced by FRM
BFI Study Area
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8 Kilometres
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Influence of Flood Risk Management

Overall, these built assets are strongly influenced by existing flood risk management. Whilst depths of flooding mainly influence direct damage, the frequency of flooding most likely influences provision of the benefits.

Waste facilities have both natural and built aspects. Flooding of waste facilities risks releasing contaminants into air, ground and surface water and, therefore, flood risk management has a high influence.

Because the majority of benefits cannot be provided by the various types of buildings when they are flooded, flood risk management has a strong influence. Public service and emergency service buildings, as well as transport infrastructure (e.g. rail stations and garages), can be at greater risk of flooding than residential buildings since their ground floor access is closer to road level. In these situations, more frequent shallow flooding can cause damage and the asset to temporarily close.

Flooding at pub on River Yare in January 2019 © Jeremy Halls

9. Utility Infrastructure

Overview of the Assets and their Benefits

Provision to homes and businesses of electricity, gas, water and sewage relies on many assets across the plan area. Bacton Gas Terminal is a major component of UK energy infrastructure, providing one third of the UK supply. Three kilometres of the distribution pipeline crosses the Bure and Yare floodplains in the plan area. There are two 132kv electricity substations in Great Yarmouth, which are part of the national transmission system, four 33kv substations distributing this power to large factories, trains etc., and nearly 800 11kv substations serving smaller factories and, ultimately, our homes. There are nearly 100 water supply and waste water assets across the plan area, including pump stations and treatment works. These are in addition to over 100 pump stations, sluices etc. operated by the Internal Drainage Boards which help manage flood risk. There are a number of telecommunications buildings within the plan area.

Many of these assets are connected by a network of overground and underground pipes and cables that pass through, over and under low lying areas which could be difficult to access if flooded.

The following map shows the location of utility assets. Benefits provided by utility assets, and which will be influenced by current flood risk management to varying degrees include: **economic growth** (fundamental to supporting and growing the £36 billion economy of Norfolk and Suffolk) and **cohesion & development** (vital national infrastructure which is necessary for a country to function and upon which daily life depends).

The coast around the BFI area is at the centre of the world's largest market for offshore wind.

In addition, communications infrastructure facilitates **communication & relationships**, water infrastructure provides **water supply** and energy infrastructure provides **energy**.

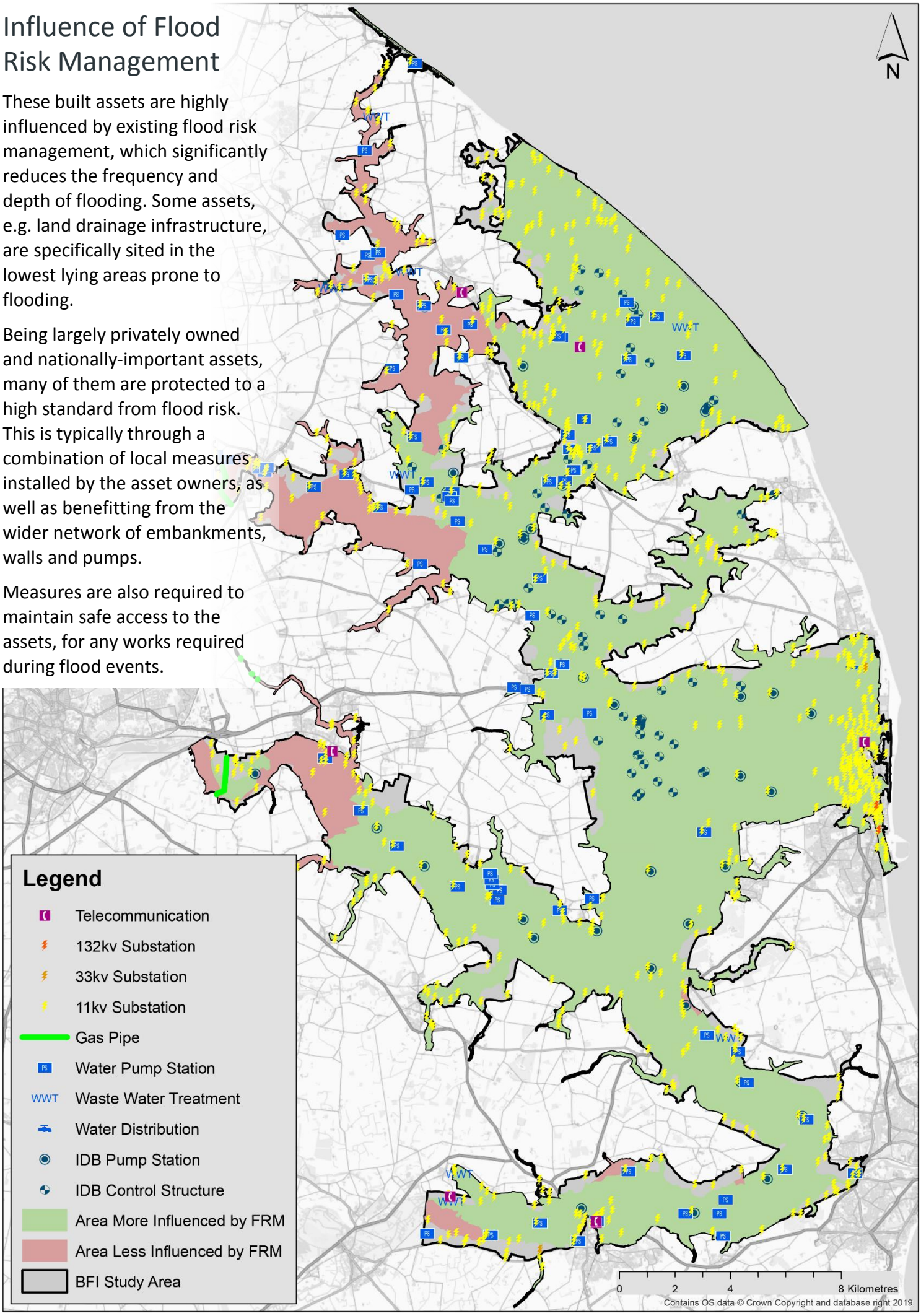
Cantley Marshes RSPB Reserve & British Sugar Factory © Jeremy Halls

Influence of Flood Risk Management

These built assets are highly influenced by existing flood risk management, which significantly reduces the frequency and depth of flooding. Some assets, e.g. land drainage infrastructure, are specifically sited in the lowest lying areas prone to flooding.

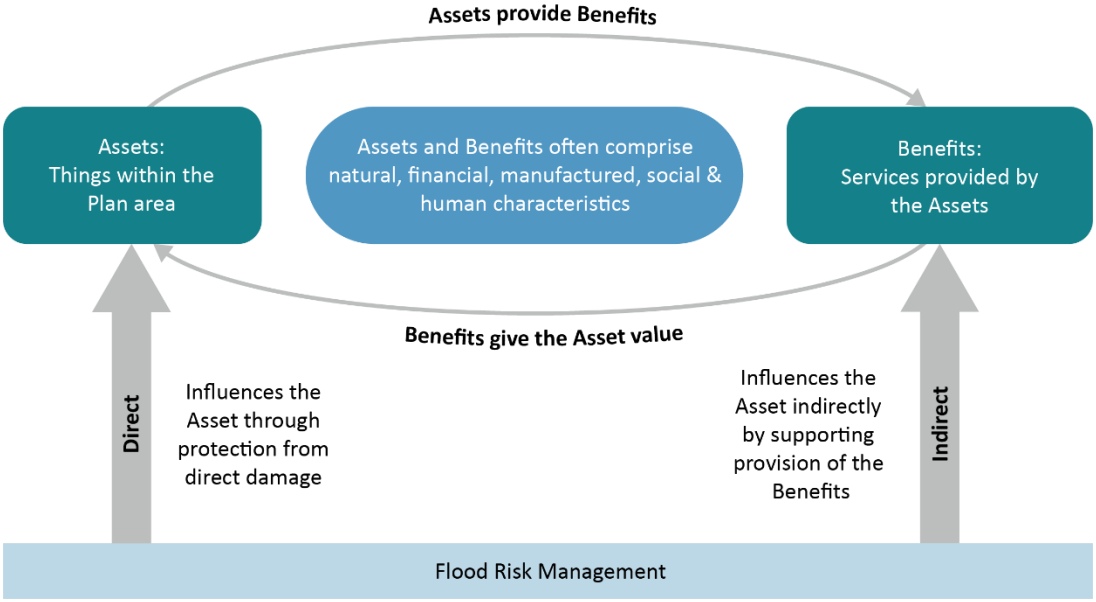
Being largely privately owned and nationally-important assets, many of them are protected to a high standard from flood risk. This is typically through a combination of local measures installed by the asset owners, as well as benefitting from the wider network of embankments, walls and pumps.

Measures are also required to maintain safe access to the assets, for any works required during flood events.



10. Summary of Current Flood Risk Management Influence

Almost all of the plan area is influenced to some degree by the existing network of flood risk management structures, primarily comprising embankments, walls and pumps. The majority of this land (75% of the plan area) is already at or below mean sea level, or is at risk of flooding in specific events and is, therefore, *more* influenced by flood risk management. Together with planning policies, the flood warning service and emergency planning, these structures manage flooding that could otherwise have a greater impact on our lives through direct material damage (e.g. to homes and businesses) and indirectly through our health and wellbeing, economic growth etc.



Identifying the range of assets and provided benefits which are influenced by existing flood risk management structures has demonstrated that these measures underpin much of what we consider important in the plan area. However, we also recognise that climate change and other pressures mean that we may need to adapt the way we deliver flood risk management in the future.

Adaptation will be an important characteristic of the BFI plan.

The breadth of assets & benefits influenced by flood risk management will be recognised in the BFI plan.

The assets and benefits which are influenced range from those which are statutory (e.g. designated environmental sites are protected by international and/or national laws) and those which the plan area needs to continue as a desirable place to live, work and visit (e.g. employment & productivity and social cohesion & development), to those which support special qualities of the area (e.g. cultural & spiritual values). This highlights the many different stakeholder groups which could be involved in developing and implementing the plan.

Different flood risk management approaches can influence different characteristics of flooding. For example, greater depths in larger, but less frequent, flood events can strongly influence material damage (e.g. to buildings), whereas shallower, more frequently occurring, flooding could influence the ability of public services to operate (e.g. road closures). High salinity and nutrient flood water can strongly influence natural assets (e.g. freshwater habitats and agriculture).

The BFI plan will include a mix of different approaches to flood risk management.

Breydon Water Saltmarsh © Jeremy Halls

Built assets and their benefits are influenced more strongly by flood risk management than natural ones. Where assets can be adapted over time to work more closely with our changing environment, the influence of flood risk management will reduce, which will improve resilience to flooding and climate change. For example, approaches to water resource management that store water in times of flood so that it can be re-used in times of drought, and 'wet' agriculture that selects crops and approaches more aligned to the native environment.

The diverse range of assets identified provide a number of common benefits, which highlights the interconnectivity within the plan area. Also, considering the indirect influences of flood risk management highlights that sometimes there can be unforeseen and unintended consequences (e.g. affecting wider water levels), which need to be understood and managed. We are, therefore, developing a broad understanding of flood risk and its interactions with climate and key aspects of the plan area. This is also important because successful adaptation to climate change is achieved when actions taken – or deliberately not taken – do not limit actions that may become necessary in the future.

The BFI plan is taking a broad view to identify and mitigate any unintended consequences, and so we can successfully adapt in the future.

These observations on the influential nature of existing flood risk management in the plan area will be used to help inform the development of the plan for future flood risk management, that prepares us for the challenge of changing climate and rising sea level.

11. What is the Broadland Futures Initiative?

The Broadland Futures Initiative (BFI) is a partnership for future flood risk management in the Broadland area. Our main goal is to agree a framework for future flood risk management that better copes with our changing climate and rising sea level. The focus is to define a flood risk management plan for Broadland over approximately the next 100 years putting people at the heart of decision making.

BFI has been set up by organisations responsible for managing flood risk, working together with partners. The Environment Agency, Natural England, County and District Councils, Internal Drainage Boards, Broads Authority, National Farmers Union, Water Resources East, the Royal Society for the Protection of Birds (RSPB) and the Wildlife Trusts will work together in developing the plan.

Elected members representing local communities will be the decision makers. This will be a democratic process, with local politicians making the core decisions in order to agree the future flood risk management plan, having considered the latest projections on our changing climate.

The plan will be developed over a number of stages. This document is part of establishing the background to the plan. For more information about the BFI and how it's organised see our Frequently asked questions document.

Other documents to be produced during this initial stage are shown below. Some of these are aimed at the general public while others are more technical in nature. They will be available through the BFI website: https://www.broads-authority.gov.uk/looking-after/climate-change/broadland-futures-initiative

- Origins of the study area
- Sources and nature of flood risk
- Coastal processes review
- Current approaches to flood risk management
- Strategic plans and documents review
- Existing key data sources and indicators
- The future impacts of climate change
- The result of initial stakeholder survey
- Objectives for the plan
- The methodology for options appraisal and preferred options selection
- Strategic environmental assessment scoping
- Frequently asked questions

12. Glossary

Agrifood: Includes agriculture, horticulture and food and drink processing.

Arable: Land used for growing crops.

Assets: Features in the plan area from which we derive value (e.g. houses, natural habitats and listed buildings).

Benefits: The value (e.g. economic growth, health & wellbeing, community participation) provided or facilitated by an asset.

Biodiversity: Variety of plant and animal life in the world or in a particular habitat. A high level of plant and animals is usually considered to be important and desirable and is referred to as being biodiverse.

Broadland Futures Initiative (BFI): A partnership formed to agree a framework for future flood risk management in the Broadland area. The strategy aims to better cope with our changing climate and rising sea level. Planning has started now with the strategy to be implemented from the mid-2020s onward.

Climate Change: Any significant long-term change in the expected patterns of average weather of a region (or the whole Earth) over a significant period of time.

Dyke: Water-filled ditches that provide wet fences and a source of drinking water for livestock in grazing marshes.

Embankment: An artificial, usually earthen, structure, constructed to prevent or control flooding, or for various other purposes including carrying roads and railways.

Erosion: Process by which particles are removed by the action of wind, flowing water or waves (opposite is accretion).

Floodplain: Area of low-lying ground adjacent to a river, formed mainly of river sediments and subject to flooding.

Flood Risk Management: Flood risk management aims to reduce the likelihood and/or the impact of floods. The primary FRM infrastructure operating in the plan area is the network of walls, embankments and pumps.

Habitat: Natural home or environment of an animal, plant, or other organism.

Internal Drainage Boards (IDBs): Independent locally funded and operated public bodies responsible for reducing flood risk for both rural and urban communities (including protection of businesses and infrastructure) and they also have duties in protecting and enhancing valuable wildlife habitats.

Listed Building: Buildings can be recognised and given protection for their architectural or historical merit. The older a building, and the fewer surviving of its kind, the more likely that it is or will be listed.

Main River: In England rivers are either designated Main or Ordinary. Main Rivers are usually larger rivers or streams. The Environment Agency manages flood risk from Main Rivers.

Brundall Moorings on the River Yare © Jeremy Halls

Marshland: Type of wetland characterized by being intermittently or continuously flooded with water that is not deep and with predominately soft-stemmed vegetation, such as grasses and sedges.

Peat: Accumulation of partially decayed vegetation or organic matter. It is unique to natural areas called peatlands, bogs, mires, moors, or muskegs.

Risk: Combination of the probability that an event will occur and the consequence to receptors associated with that event.

Scheduled Monument: A nationally important archaeological site or historic building, given protection against unauthorised change.

Sites of Special Scientific Interest: An area designated as an SSSI will usually be designated owing to the scientific value it holds in terms of the animal or plant species found there.

Stakeholder: An individual or group with an interest in, or having an influence over, the success of a proposed project or other course of action.

Wetland: Transitional habitat between dry land and deep water. Wetlands include marshes, swamps, peatlands (including bogs and fens), flood meadows, river and stream margins.

13. References

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