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# **Bradford Local Flood Risk Management Strategy – Strategic Environmental Assessment**

**Environmental Report**  
November 2016

**City of Bradford MDC**

[www.bradford.gov.uk](http://www.bradford.gov.uk)

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V1.0	Add HRA Test of Likely Significance as Appendix	Kirsty Breaks
V1.1	Add recommendations and contact details for Metropolitan BC	Kirsty Breaks
V1.2	Table 5.4 and Table 5.5 adjustments	Kirsty Breaks

## Contract

This report describes work commissioned by Bradford Council. Matthew Williams and Charlotte Beattie of JBA Consulting carried out this work.

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## Purpose

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## Non-Technical Summary

Bradford Metropolitan District Council (MDC) is currently preparing a Local Flood Risk Management Strategy (LFRMS). As part of this process, the Council is also carrying out a Strategic Environmental Assessment (SEA), which considers the potential environmental effects of the LFRMS. This Environmental Report sets out findings of the SEA. It has been produced to meet the requirements of *The Environmental Assessment of Plans and Programmes Regulations 2004* (hereafter referred to as the 'SEA Regulations') and follows the guidance contained within *A Practical Guide to the Strategic Environmental Assessment Directive* (ODPM, 2005).

The full range of environmental receptors has been considered through the SEA. This meets the requirements of the SEA Directive, which requires that an assessment identifies the potentially significant environmental impacts on *'biodiversity, population, human health, fauna, flora, soil, water, air, climatic, material assets including architectural and archaeological heritage, landscape and the interrelationship between the above factors'*.

The SEA Scoping Report for the LFRMS was issued to the statutory consultation bodies in October 2016. A number of comments were received on the scope of the assessment and assessment framework, which were incorporated into the preparation of this Environmental Report.

Assessment of the SEA objectives against three management options ('do nothing', 'maintain current flood risk management regime' and 'manage and reduce local flood risk') was undertaken. This identified the potential effects on the environment associated with these different management actions. The 'do nothing' option is likely to result in a number of significant adverse effects, particularly in relation to people and property, and other environmental assets including historic sites and biodiversity, where increased flooding may create new pathways for the spread of invasive non-native species. Surface water and groundwater quality could also be adversely affected, with increased flooding of contaminated sites leading to greater impacts on water resources. Conversely, increased flood risk may result in greater connectivity between watercourses and their floodplains, offering opportunities for habitat creation to benefit a range of protected and notable species.

The option to 'maintain current flood risk management regime' is likely to result in little or no change in the environmental baseline in the short to medium term as the existing flood risk management regime continues to maintain existing levels of flood protection. However, in the future, as a result of climate change, flood risk will increase, resulting in many of the impacts identified under 'do nothing', although potentially to a lesser extent and significance.

The option to 'manage and reduce local flood risk' has the potential to provide a range of environmental benefits. Flood risk management initiatives, if designed and implemented in an appropriate manner, could provide multiple benefits. This could include reducing flood risk to people and property, contributing to the protection of heritage assets, improvements in water quality, providing new opportunities for habitat creation and the provision of new recreation and amenity assets. Conversely, flood risk management measures, if implemented in an inappropriate manner, could result in adverse effects on a range of environmental features. However, this risk is managed through the preparation of this SEA and through the planning and consenting process, which is likely to require consideration of the sustainability of a project prior to its implementation.

Therefore, it is evident that by doing nothing or maintaining current levels of management, there are likely to be detrimental effects on the SEA objectives, which may be prevented by carrying out active flood risk management as proposed by the LFRMS.

Assessment of the LFRMS objectives and underpinning actions against the SEA objectives has been undertaken. No negative environmental effects were identified from the LFRMS objectives. Many of the proposed LFRMS objectives have the potential for both direct and indirect environmental benefits. LFRMS objective two in particular has potential to provide a positive contribution to all of the SEA objectives and make a significant positive contribution to two of them, the objective seeks to reduce the impact of flooding and therefore could benefit the environment, people, historic environment, property and material assets. There is opportunity through the

LFRMS to achieve a range of biodiversity benefits, including new habitat creation, enhancement of existing habitats and greater habitat connectivity.

In addition, as expected of a strategy for managing flood risk, the majority of objectives within the strategy will contribute to achievement of the SEA objectives that seek to reduce flood risk to people, property and infrastructure. As a result, the LFRMS is likely to have a significant positive effect on reducing flood risk to local communities.

Some of the LFRMS objectives, objective six in particular, is also likely to assist with climate change adaptation. In particular, measures that reduce flood risk, promote better use of water resources, seek to deliver new habitat creation and better connection between existing habitats (such as de-culverting), could make a significant positive contribution to achievement of SEA objective twelve.

A detailed assessment of the potential cumulative effects of the LFRMS actions should be undertaken when further details regarding specific project level measures and their implementation are known.

The SEA Regulations require Bradford MDC to monitor the significant environmental effects (positive and negative) upon the implementation of the LFRMS. Key potential environmental effects that require monitoring have been identified together with the monitoring indicators that can be applied to track whether such effects occur.

A Habitats Regulations Assessment (HRA) Test of Likely Significant Effect (TLSE) has also been prepared in accordance with the requirements of the Habitats Regulations to determine whether the LFRMS is likely to have a significant effect on a European site. The TLSE concluded that the LFRMS is not likely to have a significant effect on any of the European sites. This assessment does not preclude the requirements for further Habitats Regulations Assessments arising from LFRMS.

This Environmental Report will be subject to public consultation for five weeks alongside the previously consulted draft Bradford MDC LFRMS. All consultation responses received will be reviewed and taken into consideration for the next stage of appraisal process. This will involve the preparation of a Post-Adoption Statement, which will set out how the findings of the Environmental Report and the views expressed during the consultation period have been taken into account as the LFRMS has been finalised and formally approved. The Post-Adoption Statement will also set out any additional monitoring requirements needed to track the significant environmental effects of the strategy.

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## Abbreviations

AONB.....	Area of Outstanding Natural Beauty
AQMA .....	Air Quality Management Area
ASStGWF.....	Areas Susceptible to Groundwater Flooding
BAP .....	Biodiversity Action Plan
BGS .....	British Geological Society
CAMS.....	Catchment Abstraction Management Strategy
FWMA.....	Flood and Water Management Act
GEP .....	Good Ecological Potential
GVZ.....	Groundwater Vulnerability Zone
HMWB.....	Heavily Modified Water Body
HRA .....	Habitats Regulations Assessment
IMD .....	Index of Multiple Deprivation
JNCC .....	Joint Nature Conservation Committee
LFRMS.....	Local Flood Risk Management Strategy
LGA.....	Local Government Association
LLFA .....	Lead Local Flood Authority
LNR.....	Local Nature Reserve
LWS .....	Local Wildlife Site
MDC.....	Metropolitan District Council
NCA .....	National Character Area
NNR .....	National Nature Reserve
ODPM .....	Office of the Deputy Prime Minister
RBMP.....	River Basin Management Plan
RIGS .....	Regionally Important Geological Sites
RMA .....	Risk Management Authority
SAC.....	Special Area of Conservation
SEA.....	Strategic Environmental Assessment
SLA .....	Special Landscape Area
SPA.....	Special Protection Area
SPZ .....	Source Protection Zone
SSSI.....	Site of Special Scientific Interest
SuDS.....	Sustainable Drainage Systems
UKCP09 .....	UK Climate Projection
WFD.....	Water Framework Directive



# 1 Introduction

## 1.1 Background

Bradford MDC (or the Council) has prepared a draft Local Flood Risk Management Strategy (LFRMS). As part of this process, the Council is also carrying out a Strategic Environmental Assessment (SEA), which considers the potential environmental impacts of the LFRMS. This Environmental Report sets out findings of the SEA. It has been produced to meet the requirements of The Environmental Assessment of Plans and Programmes Regulations 2004 (hereafter referred to as the 'SEA Regulations') and follows the guidance contained within A Practical Guide to the Strategic Environmental Assessment Directive (ODPM, 2005).

The ODPM guidance sets out a five stage process (A to E) to be followed (see Table 1-1). This report addresses stages B and C of the SEA process wherein LFRMS options and alternatives are identified and the predicted environmental effects of the LFRMS are assessed.

Consultation (Stage D) on this Environmental Report will be conducted as outlined in Section 7.1 of this document, whilst monitoring of the significant effects of the LFRMS (Stage E) will be undertaken in accordance with the outline monitoring programme included in Section 6.3.

Table 1-1: Stages in the SEA process

SEA Stage	Purpose
<b>Stage A:</b>	Setting the context and objectives, establishing the baseline and deciding on the scope
<b>Stage B:</b>	Developing and refining alternatives and assessing effects
<b>Stage C:</b>	Preparing the Environmental Report
<b>Stage D:</b>	Consulting on the draft plan or programme and the Environmental Report
<b>Stage E:</b>	Monitoring the significant effects of implementing the plan or programme on the environment.

## 1.2 Strategic Environmental Assessment (SEA)

SEA is a statutory assessment process required under the *Environmental Assessment of Plans and Programmes Regulations 2004* (the 'SEA Regulations'). These regulations transpose into UK law the requirements of the European Directive 2001/42/EC *on the assessment of the effects of certain plans and programmes on the environment* (the 'SEA Directive')<sup>1</sup>. The SEA Directive requires formal assessment of plans and programmes which are likely to have significant effects (either positive or negative) on the environment. It applies to all plans and programmes which are '*subject to preparation and/or adoption by an authority at national, regional or local level*' or are '*required by legislative, regulatory or administrative provisions*'<sup>2</sup>.

Local Government Association (LGA) guidance<sup>3</sup> on the production of the LFRMS identifies the likely requirement for an SEA, stating that '*the Local [Flood Risk Management] FRM Strategy is likely to require statutory SEA, but this requirement is something the [Lead Local Flood Authority] LLFA must consider*'. A SEA screening process was therefore undertaken and the Council has confirmed the requirement for its LFRMS to undergo SEA.

<sup>1</sup> Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment

<sup>2</sup> Office of the Deputy Prime Minister (2004), Environmental Assessment of Plans and Programmes Regulations 2004 (No. 1633)

<sup>3</sup> Local Government Association (2011), Framework to Assist the Development of the Local Strategy for Flood Risk Management.

SEA involves the systematic identification and evaluation of the potential environmental impacts of the LFRMS. This information is then used to aid the selection of a preferred option(s) for the strategy, which are those that best meet its economic, environmental and social objectives, and legal requirements.

The full range of environmental receptors has been considered through the SEA. This meets the requirements of the SEA Directive, which requires that an assessment identifies the potentially significant environmental impacts on *'biodiversity, population, human health, fauna, flora, soil, water, air, climatic, material assets including architectural and archaeological heritage, landscape and the interrelationship between the above factors'*<sup>1</sup>.

Annex I of the SEA Directive sets out the scope of information to be provided by the SEA. This is described in Table 1-2 below, which also identifies where in the SEA process for the LFRMS that the relevant requirement will be met.

Table 1-2: Stages in the SEA process as identified within Annex I of the SEA Directive

SEA Directive requirements	Where covered in the SEA
(a) an outline of the contents, main objectives of the plan or programme and relationship with other relevant plans and programmes;	Section 1.3
(b) the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme;	Section 2
(c) the environmental characteristics of areas likely to be significantly affected;	Section 2
(d) any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC and 92/43/EEC;	Section 2
(e) the environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation;	Section 2
(f) the likely significant effects on the environment, including on issues such as biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors;	Sections 4 and 5
(g) the measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme;	Section 5
(h) an outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information;	Section 4
(i) a description of the measures envisaged concerning monitoring in accordance with Article 10;	Section 6.3
(j) a non-technical summary of the information provided under the above headings.	Executive summary

The first output from the SEA process is the production of a Scoping Report (JBA Consulting, 2016), which outlines the scope and methodology of the assessment. A proportionate approach was adopted towards establishing the scope of the SEA, reflecting the high-level nature of the LFRMS. Consultation with the statutory consultees (Historic England, Natural England and the Environment Agency) was undertaken in October 2016 to confirm the baseline environment of the study area and the assessment framework (see Section 1.5 for further information).

This Environmental Report has now been prepared to set out the likely significant effects on the environment of implementing the LFRMS.

### 1.3 Local Flood Risk Management Strategy

The Flood and Water Management Act (FWMA) was passed in April 2010. It aims to improve both flood risk management (FRM) and the way we manage our water resources. The FWMA creates clearer roles and responsibilities and instils a more risk-based approach to flood risk management. This includes a new lead role for the Council as a Lead Local Flood Authority (LLFA) in managing and leading on local FRM from surface water, groundwater and ordinary watercourses.

Under the requirements of the FWMA, the Council must develop, maintain, apply and monitor a LFRMS for its area. The LFRMS provides a delivery vehicle for improved FRM and supports the development of partnership funding and strategic investment programme.

The LFRMS will set out:

- The roles and responsibilities for each Risk Management Authority (RMA) and their FRM functions; and
- Opportunities, objectives and measures for flood risk reduction of existing communities, including ways to minimise the risk from future growth.

Development of the LFRMS provides considerable opportunities to improve and integrate land use planning and FRM. It is an important tool to protect vulnerable communities and deliver sustainable regeneration and growth.

### 1.4 Study area

The City of Bradford is a local government district of West Yorkshire, England, with the status of a city and metropolitan borough. It is named after its largest settlement, Bradford, but covers a far larger area which includes the towns of Keighley, Shipley, Bingley, Ilkley, Haworth, Silsden and Denholme. (Figure 1-1 Study area). It forms part of the West Yorkshire Urban Area conurbation which in 2011 had a population of 1.77 million and the city is part of the Leeds-Bradford Larger Urban Zone (LUZ). Bradford has a population of 528,200, making it the fourth-most populous metropolitan district and the sixth-most populous local authority district in England (City of Bradford MDC, 2015). The borough covers an area of approximately 370 km<sup>2</sup>. The City of Bradford is situated on the edge of the Pennines, and is bounded to the east by the City of Leeds, the south east by the Metropolitan Borough of Kirklees and the south west by the Metropolitan Borough of Calderdale. Three river systems serve the City of Bradford, along with 23 km of canal. The Airedale towns of Keighley, Bingley and Shipley lie on the River Aire. The River Wharfe runs through Ilkley and Burley in Wharfedale, and tributaries of the River Calder run through the district.



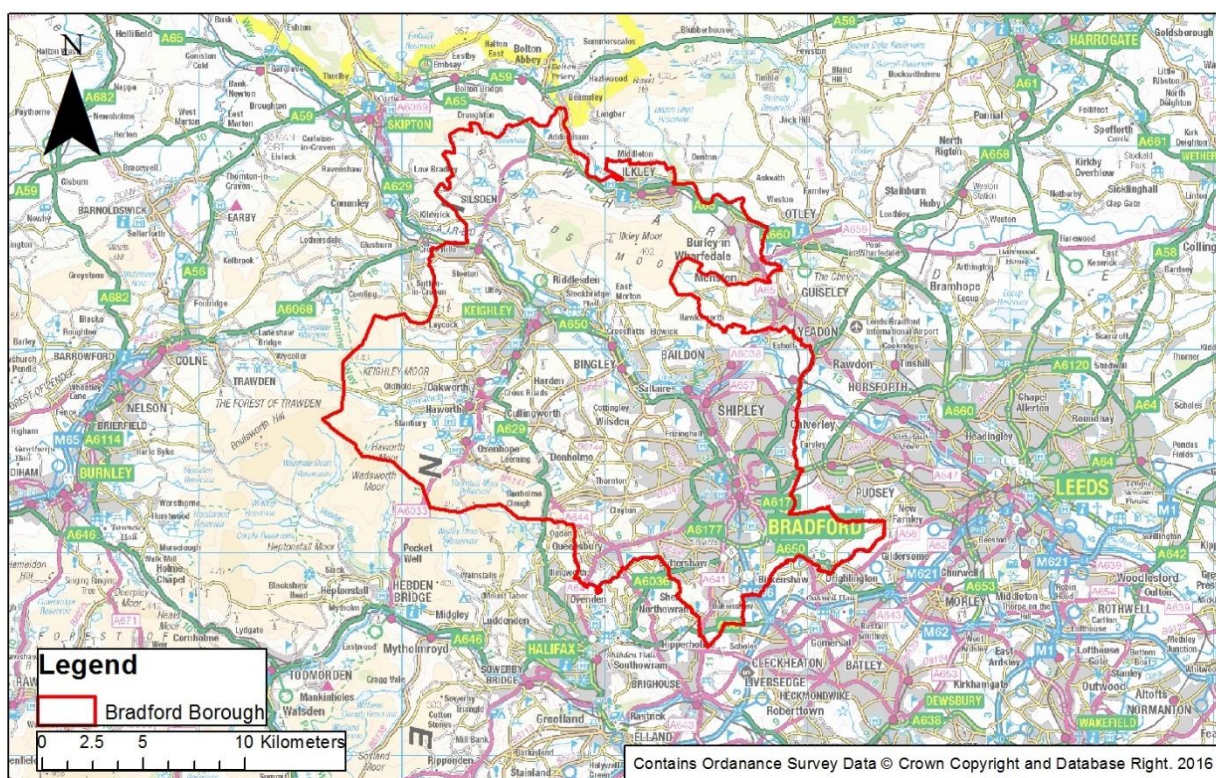


Figure 1-1: Study area

## 1.5 SEA scoping

The SEA Scoping Report for the LFRMS was issued to the statutory consultation bodies on 4 October 2016. Several comments were received on the scope of the assessment and assessment framework, which were incorporated into the preparation of this Environmental Report. Table 1-3 below summarises the comments received and how they have been addressed within this Environmental Report.

Table 1-3: SEA scoping consultation responses

Consultee	Comment received	Action taken
Natural England	No comments received.	n/a
Environment Agency: Email dated 13 October 2016	Section 4.4.5 Flooding gives a good overview of the district.	No action required
	In the paragraph at the top of page 29 I wonder where the data about the number of properties and business has been gained from? I had think the final numbers were more than this...the Leeds City Region Review documents record:  783 residential properties and 189 businesses.	Flooded property data reviewed and adjusted accordingly in description.
	On page 30, the Surface water section. I wondered if it would be useful to include specific reference to Surface Water Flooding at Florist Street (and surrounding streets) in Keighley.	Small additions to Surface Water section.
	On page 30 in the Reservoirs Section can I suggest Silsden Reservoir is included as a storage option.	Silsden reservoir is included in the list of reservoirs which can be used as storage options
Historic	Small changes identified to Table 3-1 For	The suggested literature was added to



Consultee	Comment received	Action taken
<b>England: Email received 14 October 2016</b>	<p>completeness, reference should also be made to the following: -</p> <p><i>International</i></p> <ul style="list-style-type: none"> <li>· European Landscape Convention (Florence Convention)</li> <li>· The Convention for the Protection of the Architectural Heritage of Europe (Granada Convention)</li> <li>· The European Convention on the Protection of Archaeological Heritage (Valetta Convention)</li> <li>· UNESCO World Heritage Convention 1972</li> </ul> <p><i>Regional/Local</i></p> <ul style="list-style-type: none"> <li>· Saltaire World Heritage Site Management Plan</li> </ul>	the list of references
	The following has been superseded by the NPPF and can be deleted: National PPS5 Planning for the Historic Environment.	The reference to superseded document was deleted
	Table 5-2 Objective 8 first line amended to read ""Preserve and, where appropriate enhance the historic and environment and cultural sites etc. Additional indicator " Number of heritage assets whose significance has been harmed through flood defence works".	The first line of Table 5-2 was amended
	Strongly advise that Councils conservation section and West Yorkshire Archaeology Service are closely involved throughout the preparation of the SEA of the strategy as they are best placed to advise/access data and identify conflicting priorities and shape policy. Advice is based on information provided to date.	Two additional internal consultee to SEA consultation of Environmental Report.
<b>Airedale Internal Drainage Board</b>	The risk of flooding should be reduced as far as practicable and surface water arising from development should mimic surface water flows. In areas of drainage problems, development should not be allowed at any location until the Authority is satisfied that the scheme will not adversely affect the surface water drainage of the area and the amenity of adjacent properties. Development within Flood Zone 3 is not considered desirable or sustainable in the longer term. The Board usually focusses on consultations from individual developments but if there are development areas which fall within the Boards drainage district, the Board would be happy to provide comments as appropriate.	Comments reflective of LFRMS objectives and measures. The details of the LLFA consultation role could be drawn up to potentially involve Airedale Internal Drainage Board where required.
<b>Aires River Trust</b>	References to population figures in 2001 suggested to be changed. Some small additional references to existing plans, and copy of Aire and Calder Partnership Actionable Plan provided, plus the Management Plan for Bradford Beck. Suggestion to include the Dales River Trust in draft of SEA. Some re-emphasis required for role of River Aire and definitions of main rivers. Potential impacts or relationship from climate	Some small changes, additional documents regionally within scope and minor changes or amendments.

Consultee	Comment received	Action taken
Pennine Prospects	change and flood protection measures for minimising pollution should be stated.	
	No comments received	n/a
Yorkshire Water	No comments received	n/a
Yorkshire Wildlife Trust	No comments received	n/a

## 1.6 Habitats Regulations Assessment

The European Council Directive *on the Conservation of Natural Habitats and of Wild Fauna and Flora* (92/43/EEC, 'the Habitats Directive') as implemented through the Conservation of Habitats and Species Regulation 2010 (as amended) ('the Habitats Regulations') requires a competent authority to carry out a Habitats Regulations Assessment (HRA) of a plan or project to establish whether it will have a 'likely significant effect' on sites designated for their nature conservation interest at an international level (known as European sites, which include Special Areas of Conservation (SAC), Special Protection Areas (SPA), and by UK Government policy, Ramsar sites). The LFRMS for Bradford, as a statutory plan, is subject to the requirements of the Habitats Directive.

Assessing the impacts of a plan under the Habitats Regulations is a separate process to SEA. However, there is overlap between these two types of assessment. A Test of Likely Significant Effect (TLSE) screening assessment was undertaken in accordance with the requirements of the Habitats Regulations to determine whether the LFRMS is likely to adversely affect the integrity of a European site (alone or in-combination with other plans, policies and projects). Consultation on the outcome of the screening assessment was undertaken as part of the SEA scoping consultation process.

All European sites lying partially or wholly within 15km of the Borough boundary were included in the assessment in order to address the fact that measures in the Bradford LFRMS may affect European sites which are located outside the administrative boundary of the strategy.

There are two SAC's and one SPA within Bradford borough. There is also three SACs and one SPA outside of the borough, within a 15km radius.

- North Pennine Moors SAC and SPA
- Denby Grange Colliery Ponds SAC
- Craven Limestone Complex SAC
- North Pennines Dales Meadows SAC
- South Pennine Moors Phase 2 SPA
- South Pennine Moors SAC

More detailed information on these European sites is provided in Section 2.5.1. The TLSE concluded that it is not likely that any of these designated sites would be adversely impacted by FRM activities undertaken in the Borough and as such, no further assessment is required under the Habitats Regulations for purpose of this LFRMS. Further details of this assessment are provided in the TLSE screening appraisal included in Appendix A of this report and a summary of its outcomes is provided in Section 6.4. Consultation with Natural England on the outcomes of this assessment has been undertaken as part of the consultation process outlined in Section 7.1 and it was agreed that the Borough is of a sufficient distance from these sites that no likely significant effect is identified and an Appropriate Assessment is not required.

## 2 Environmental baseline

### 2.1 Introduction

The following section presents the findings of the Scoping Report (JBA Consulting, 2016), which identified the context and objectives of the LFRMS and identified and the scope of the assessment.

### 2.2 Other relevant policies, plans and programmes

As part of the SEA process, an assessment of the integration of existing policies, plans and programmes on the proposed LFRMS is required. This is to address the requirement within the SEA Directive to determine the *'relationship [of the plan or programme] with other relevant plans and programmes'* (Annex I (a)), including, *'environmental protection objectives, established at international, [European] community or [national] level'* (Annex I (e)).

Identifying these relationships enables potential synergies to be determined, strengthening the benefits that can be gained from implementation of the LFRMS. This information is also used to inform the development of the environmental baseline and the identification of key issues and problems. In addition, any inconsistencies or constraints can be identified, which could hinder the achievement of the environmental protection objectives or those of the LFRMS, and therefore providing a broad appraisal of the strategy's compliance with international, national and local considerations.

The ODPM SEA guidance recognises that no list of plans or programmes can be definitive and as a result this report describes only the key documents that may influence the LFRMS. These are shown in Table 2-1.

Table 2-1: Policies, plans and programmes reviewed through this SEA process

Plan, Policy or Programme
<b>International</b>
EU Sustainable Development Strategy (revised 2006)
European Biodiversity Strategy to 2020
EC Birds Directive – Council Directive 2009/147/EEC on the conservation of wild birds
EU Floods Directive – Directive 2007/60/EC on the assessment and management of flood risks
EU Groundwater Directive – Directive 2006/118/EC on the protection of groundwater against pollution and deterioration
EC Habitats Directive – Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora
Urban Wastewater Treatment Directive – Directive 91/271/EEC concerning urban waste water treatment
EU Water Framework Directive – Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy
UNESCO World Heritage Convention (1972)
European Landscape Convention (Florence Convention)
The Convention for the Protection of the Architectural Heritage of Europe (Granada Convention)
The European Convention on the Protection of Archaeological Heritage (Valetta Convention)
<b>National</b>
Securing the Future – the UK Government Sustainable Development Strategy (2005)
Flood and Water Management Act (2010)
Flood Risk Regulations (2009)
Water for People and the Environment, Water Resources Strategy for England and Wales (2009)
Future Water, The Government's water strategy for England (2008)
Making Space for Water – taking forward a new Government strategy for flood and coastal erosion risk management in England (2005)
The National Flood and Coastal Erosion Risk Management Strategy for England (2011)
Water Act (2003)
Draft Water Bill (2012)
The National Flood Emergency Framework for England (2011)
The Carbon Plan (2011)
Building a Low Carbon Economy – the UK's Contribution to Tackling Climate Change (2008)

Plan, Policy or Programme
Climate Change Act (2008)
Biodiversity 2020: A Strategy for England's Wildlife and Ecosystems (2011)
England Biodiversity Framework (2008)
UK Biodiversity Action Plan (1994)
National Wetland Vision (2008)
Wildlife and Countryside Act (as amended) (1981)
Natural Environment and Rural Communities (NERC) Act (2006)
Salmon and Freshwater Fisheries Act (1975)
Contaminated Land (England) Regulations (2006)
National Planning Policy Framework (2012)
Historic Environment Good Practice Advice in Planning: Historic Environment Records (2014)
Historic Environment Good Practice Advice Guide in Planning: Note 3: The Setting of Heritage Assets.
Regional / Local
Aire Catchment Flood Management Plan (2010)
Ouse Catchment Flood Management Plan (2010)
Bradford Strategic Flood Risk Assessment Level 1 Report (2014)
Humber River Basin Management Plan (2015)
Managing Drought in the North West (2011)
City of Bradford Metropolitan District Council Preliminary Flood Risk Assessment (2011)
Bradford Air Quality Action Plan (2009)
Bradford Highways Infrastructure Asset Management Strategy (2015)
West Yorkshire Local transport plan 2011 – 2026 (2011)
City of Bradford Local Biodiversity Action Plan (2011)
Bradford Local Climate Impact Profile (2010)
Bradford Open Space and Built Recreation Facilities Scoping Report (2007)
Bradford Core Strategy DPD (2014)
Bradford City Centre Area Action Plan (2015)
Shipley and Canal Road Corridor Area Action Plan (2015)
Bradford District Local Flood Risk Management Strategy (2016)
Aire and Calder Partnership Actionable Plan (2016)
Fresh Aire Vision and Delivery Plan (2010)
The Management Plan for Bradford Beck (2012)
Saltaire World Heritage Site Management Plan (2014)

### 2.3 Environmental characteristics and key issues

A search of baseline environmental information was undertaken to identify the key environmental characteristics of the Borough. This included details of the environmental status and condition of notable environmental features; current and future predicted trends in the evolution of the environment; and issues and problems currently affecting the environment. The baseline information is used as the basis for predicting and monitoring the effects of the LFRMS implementation.

The information obtained through this desk study is broadly strategic in nature and reflects the high-level objectives of the LFRMS. It has been obtained from a broad range of sources and no new investigations or surveys were undertaken as part of the scoping process. The baseline may require updating throughout the duration of the SEA process as the LFRMS is developed further and new information becomes available.

### 2.4 Landscape and visual amenity

Bradford is a large metropolitan authority which forms one of the five districts within the West Yorkshire conurbation. The Bradford Metropolitan District is characterised by a mixture of urban and rural areas with distinctive character and attractive landscapes. The topography of Bradford means most of the industrial and residential development is in the south of the district and along the valley bottoms, with the majority of the population living in the urban centres of Bradford and within the freestanding settlements of Keighley, Bingley and Shipley, in Airedale, and Ilkley, in



Wharfedale. While the urban areas are quite densely developed, two-thirds of the District is rural with moorland and attractive valleys surrounding and penetrating into the urban areas.

Bradford City is not built on any substantial body of water but is situated at the junction of three valleys, one of them, that of the Bradford Beck which rises in moorland to the west, and is swelled by its tributaries, the Horton Beck, Westbrook, Bowling Beck and Eastbrook.

A large percentage of the district area is designated as Metropolitan Green Belt and a substantial areas of upland Heathland (3836ha) known as the Milestone Grits of the South Pennines and blanket bog (741ha).

Bradford District has approximately 210,000 dwellings (derived from Council Tax data, 2013) occupied by around 200,000 households (CLG 2011 based Interim Household Projections). The age of the housing stock also reflects the growth of the District, with a third of stock being built before 1919. Bradford District contains a rich and diverse built heritage which consists of the third highest number of designated assets in the Region and one of only two World Heritage Sites in Yorkshire. The District's 2,289 listed building entries on the National Heritage List for England range from 16th century farmsteads and parish churches to grand Victorian houses. The architectural and historic wealth of protected buildings and 59 designated conservation areas are highly valued for the essential contribution they make to local distinctiveness and environmental identity. The benefits of the built heritage to the economy and tourism have been demonstrated by successful regeneration projects.

The World Heritage Site of Saltaire stands as an example model town built with the wealth produced by the industries prevalent in this area. Saltaire is a Victorian model village located in Shipley. The Victorian Era Salt's Mill and associated residential district located by the River Aire and Leeds and Liverpool Canal is a designated UNESCO World Heritage Site and an Anchor Point of the European Route of Industrial Heritage.

The unique association of the Brontes with Haworth, the surrounding Pennine landscape and the wider district is demonstrated by sustained tourism. The District also benefits from designated historic landscapes and gardens, many of which are municipal parks, some restored to their Victorian glory and five with green flag status. A 16-mile navigable stretch of the Leeds and Liverpool Canal protected by conservation area designation with iconic historic structures such the Five Rise Locks, a historic battlefield and a complex assemblage of scheduled Bronze Age carved rocks demonstrate the wealth of heritage within the District.

One of the most striking features of the District is the quality of its landscape and in particular the proximity of the main urban areas to areas of high landscape value. The character of the District's landscape is very varied, ranging from the rugged open moorland of the South Pennine uplands to rolling farmland, and open river valleys to wooded hillsides.

The habitats in the Bradford District are largely influenced by their underlying geology. The Millstone Grits of the Southern Pennines to the west of the District give rise to substantial areas of upland heathland and blanket bog, whilst the softer shales of the Coal Measures have produced more woodlands, valley wetlands and unimproved grasslands. The uplands support a wide range of bird species. The demand for development on the lower-lying Coal Measures has fragmented these habitats, although unique habitats have also been created throughout the District as by-products of industrialisation, such as reservoirs, canals and quarries (City of Bradford MDC, 2016).

Most of the agricultural land in Bradford consists of improved and semi-improved pastures on the upland fringes of the north-west of the District or the neutral (neither alkaline nor acidic) grasslands to the east and south of Bradford City. Agriculture in Bradford District is generally based around rearing stock, mainly sheep, although cattle rearing takes place in areas along the river valleys and on lowlands to the east of the district (City of Bradford MDC, 2014).

The highest elevations of the borough are in the south-west, where ground levels reach approximately 450m Above Ordnance Datum (AOD). Dick Delf Hill is the highest point within the borough boundary at 452m AOD. There are natural low points along the River Aire in the north-east between Esholt Hall and Apperley Bridge (50m AOD).

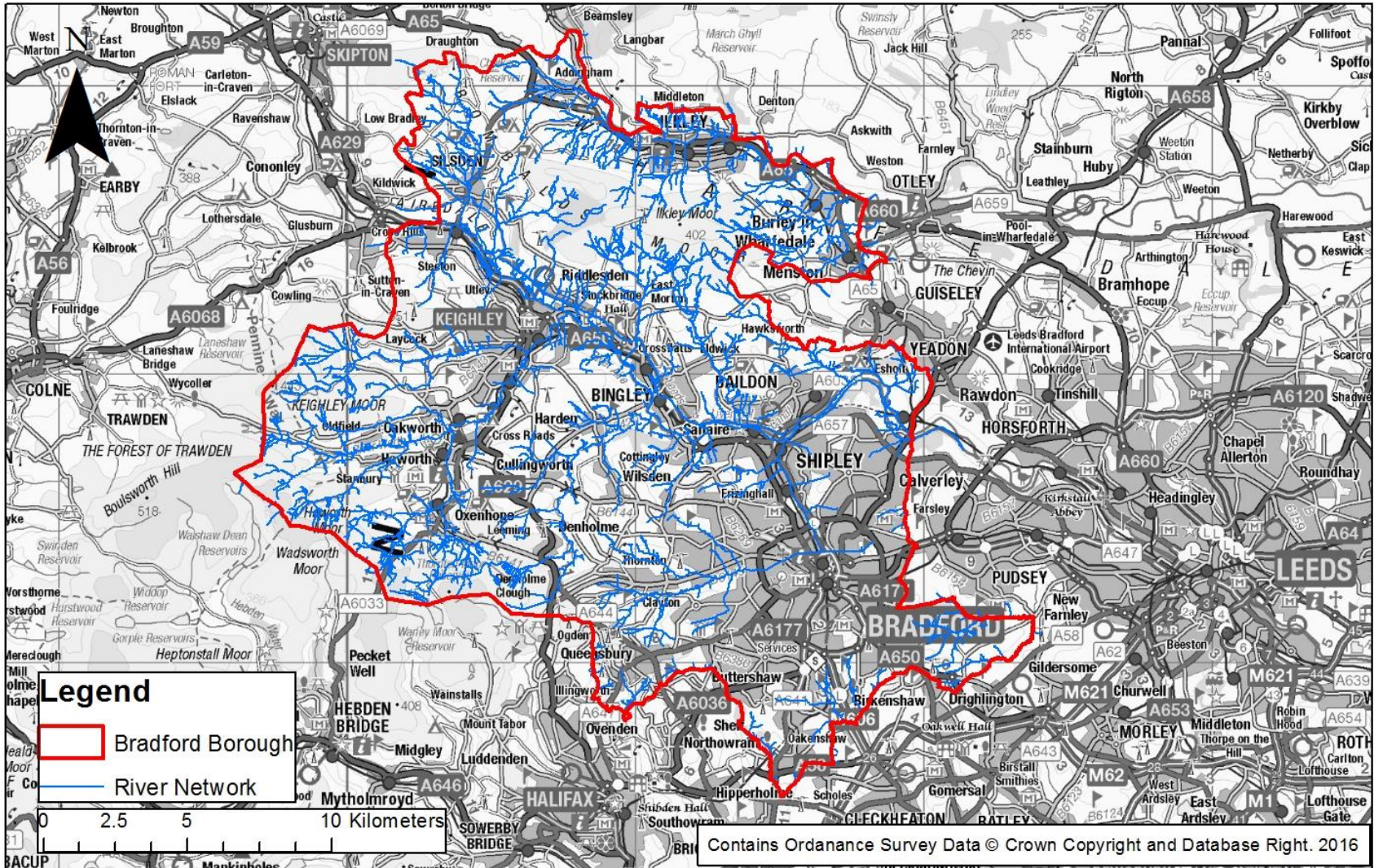


Figure 2-1: River Network in Bradford



There are no AONBs or National parks within the borough of Bradford, but the Yorkshire Dales National Park and Nidderdale AONB border the borough, just north of the town of Ilkey.

Bradford Borough is located in three National Character Areas (NCAs); Yorkshire Southern Pennine Fringe (coal measures), Nottinghamshire, Derbyshire and Yorkshire Coalfield (coal measures) and the Southern Pennines.

The Southern Pennines NCA (36) are part of the Pennine ridge of hills, lying between the Peak District National Park and Yorkshire Dales National Park. This is a landscape of large-scale sweeping moorlands, pastures enclosed by drystone walls, and gritstone settlements contained within narrow valleys. The area contains internationally important mosaics of moorland habitats which support rare birds such as merlin, short-eared owl and twite (Natural England, 2012).

The Yorkshire Southern Pennine Fringe NCA (37) is a transitional landscape from the upland areas of the Southern Pennines NCA in the west through to the low-lying land of the Nottinghamshire, Derbyshire and Yorkshire Coalfield NCA to the east. The landscape is dominated by industrial buildings and structures such as factories, chimneys, railways and canals. The NCA is characterised by steep slopes that are cut through by narrow rivers, which open up into valleys on lower land. The river corridors provide links through the NCA from the uplands into the towns and cities in the valleys, supplying not only water for the large population in these areas but also opportunities for people to access and enjoy the natural environment and for species movement through the landscape (Natural England, 2013).

The geological deposits of coal and iron, along with the water supply in the Nottinghamshire, Derbyshire and Yorkshire Coalfield NCA (38), brought mass industrialisation to the area to exploit these resources. A generally low-lying area, with hills and escarpments above wide valleys, the landscape embraces major industrial towns and cities as well as villages and countryside. Over half of the NCA (64%) is currently designated as greenbelt land (Natural England, 2013).

Work has taken place to identify the potential for increasing habitat linkages across the regions landscapes and within the District in relation to grassland, woodland, wetland and heathland networks. In future the effects of drought could result in greater fragmentation of habitats. To adapt to climate change the Yorkshire and Humber Climate Change Adaptation Study recommends improving connectivity and an overall expansion in habitat types currently suffering from isolation or fragmentation, to improve habitat permeability.

The Landscape Character SPD provides an existing statement of the landscape of Bradford District describing its distinctive attributes and features, which are desirable to preserve and enhance and ten landscape character areas. Each of the ten Landscape Character Assessment details the condition of the landscape and the sensitivity of the landscape to change, along with providing a set of policy guidelines for development (City of Bradford Metropolitan District Council, 2008). The ten landscape character areas in the Bradford District are summarised as follows:

- **Airedale;** The largest and most complex character area in the district. It is a distinctive broad U shaped valley, with contrasts between the open exposed upland pastures above 250m A.O.D. and the busy settlements and industrial areas of the valley floor. There is also a contrast between the valley sides with the south facing side containing enclosed pastures with settlements and the north facing steeper slopes dominated by woodlands.
- **Esholt;** characterised by a strong, well defined, sense of enclosure created by the valley landform and the woodland blocks. It has a lush, green, lowland character because of the combination of the high amounts of tree cover present in the form of woodlands, tree clumps, and hedgerow trees; and the significant areas of hedgerow-bounded pastures.
- **Pennine Upland;** a sparsely inhabited landscape characterised by a large tract of elevated open moorland and sweeps of upland pastures whose landform is highlighted by the strong field patten of stone walls across the rolling contours of the land.
- **Rombalds Ridge;** a primarily high level plateau with an upland character dominated by moorland. Strong cultural association, archaeological interest, ecological importance and recreation value add depth and meaning to this Character Area.
- **South Bradford;** It contains a wide range of different land uses within a relatively small area but is, in general degraded and fragmented by pockets of urban/industrial development which have wakened its character. The landscape is an open lowland,

typical of the Yorkshire Coalfield landscape and has few characteristics which could be applied over the whole area because of its variability.

- **Thornton / Queensbury**; an area of relatively high, but settled land sloping east towards the centre of Bradford from the uplands of the South Pennines. It is an exposed landscape with scattered tree cover, mainly in the small interconnecting valleys.
- **Tong Valley**; a green, relatively well wooded, and gently undulating, lowland landscape in between the Leeds and Bradford conurbations. In general, it is an enclosed landscape with a ring of estate and high-rise flat developments featuring on distant skylines.
- **Wharfedale** has a strong visual connection with the adjoining Yorkshire Dales National Park and Nidderdale AONB. This is partly due to its physical separation from Airedale by Rombalds Moor, but also because Wharfedale has avoided the full impact of the Industrial Revolution, possibly due to the better quality of soils and gently sloping valley sides which has supported a stronger agricultural land use.
- **Wilsden**; a sheltered, settled landscape dominated by the three principle settlements of Harden, Wilsden and Cullingworth which nestle in the concave landform of sheltered hollows and dips
- **Worth & North Beck Valley**; the area comprises three settled valleys running west, south west and south from Keighley and dissecting the moorland of the Pennine Upland and South Pennine Moors (City of Bradford Metropolitan District Council, 2008).

#### 2.4.1 Key environmental issues

Key issues and challenges arising from current and anticipated forces for change in the Bradford landscape are:

- Ensuring that any potential new development is sited to minimise impacts on landscape character, designations and visual amenity of international, national and local significance.
- Addressing the adverse impacts of small-scale incremental changes on the character and quality of the landscape.
- Preserving and enhancing the unique heritage and character of the World Heritage Site of Saltaire.

Pressure from new development and associated infrastructure are likely to present significant challenges as the area responds to an increasing population and the demands of economic development and climate change.

Flood risk management measures have the potential to affect the landscape characteristics in the borough. This includes changes to the river corridors, impacts on existing open spaces, and impacts on the setting of local landmarks and landscape features. Many of these aspects are protected through regional and local policies and as such could restrict the implementation of LFRMS objectives if they are shown to present a risk to the quality of the landscape. There are LFRMS management measures which could contribute towards the preserving and enhancement of landscape character areas and features and NCA's.

## 2.5 Biodiversity, flora and fauna

### 2.5.1 Designated nature conservation sites

Bradford supports internationally designated nature conservation sites and whilst there are no Ramsar sites in the borough or within 15km of the borough. There are two SAC's and one SPA within Bradford borough. There is also three SACs and one SPA outside of the borough, within a 15km radius. (Figure 2-2 and Figure 2-3 ). European sites within the borough and within 15km of the borough are listed and briefly described in Table 2-2.



Table 2-2: European sites within 15km of Bradford borough

Site name	Distance from Bradford Borough	General Site Character
North Pennine Moors SAC and SPA	1.6km north of Bradford Borough	SAC Summary: Bogs, Marshes, Water fringed vegetation, Fens (41%); Heath, Scrub, Maquis and Garrigue, Phygrana (32%); Dry grassland, Steppes (26.5%) Broad-leaved deciduous woodland (0.5%) (JNCC, 2015) SPA Summary: It encompasses extensive tracts of semi-natural moorland habitats. The site is of European importance for several upland breeding species, including birds of prey and waders.
Denby Grange Colliery Ponds SAC	14.4km south-east of Bradford Borough	SAC Summary: Inland water bodies (Standing water, running water) (5%); Improved grassland (12%); Broad-leaved deciduous woodland (75%); Coniferous woodland (5%); Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites) (3%) (JNCC, 2015)
Craven Limestone Complex SAC	14.6km north-west of Bradford Borough	SAC Summary: Inland water bodies (Standing water, running water) (1%); Bogs, Marshes, Water fringed vegetation, Fens (3%); Dry grassland, Steppes (85%) Broad-leaved deciduous woodland (1%); Inland rocks, Screes, Sands, Permanent Snow and ice (10%) (JNCC, 2015)
North Pennines Dales Meadows SAC	Within Bradford borough	SAC Summary: Dry grassland, Steppes (1%); Humid grassland, Mesophile grassland (99%) (JNCC, 2015)
South Pennine Moors Phase 2 SPA	Within Bradford borough	SPS Summary: It covers extensive tracts of semi-natural moorland habitats including upland heath and blanket mire. The site is of European importance for several upland breeding species, including birds of prey and waders. Both Merlin <i>Falco columbarius</i> and Golden Plover <i>Pluvialis apricaria</i> spend some of their time feeding outside the SPA on adjacent areas of in-by-land (JNCC, 2016).
South Pennine Moors SAC	Within Bradford borough	SAC Summary: Inland water bodies (Standing water, running water) (1%); Bogs, Marshes, Water fringed vegetation, Fens (43%); Heath, Scrub, Maquis and Garrigue, Phygrana (46%); Dry grassland, Steppes (5%); Humid grassland, Mesophile grassland (5%); Broad-leaved deciduous woodland (1%)

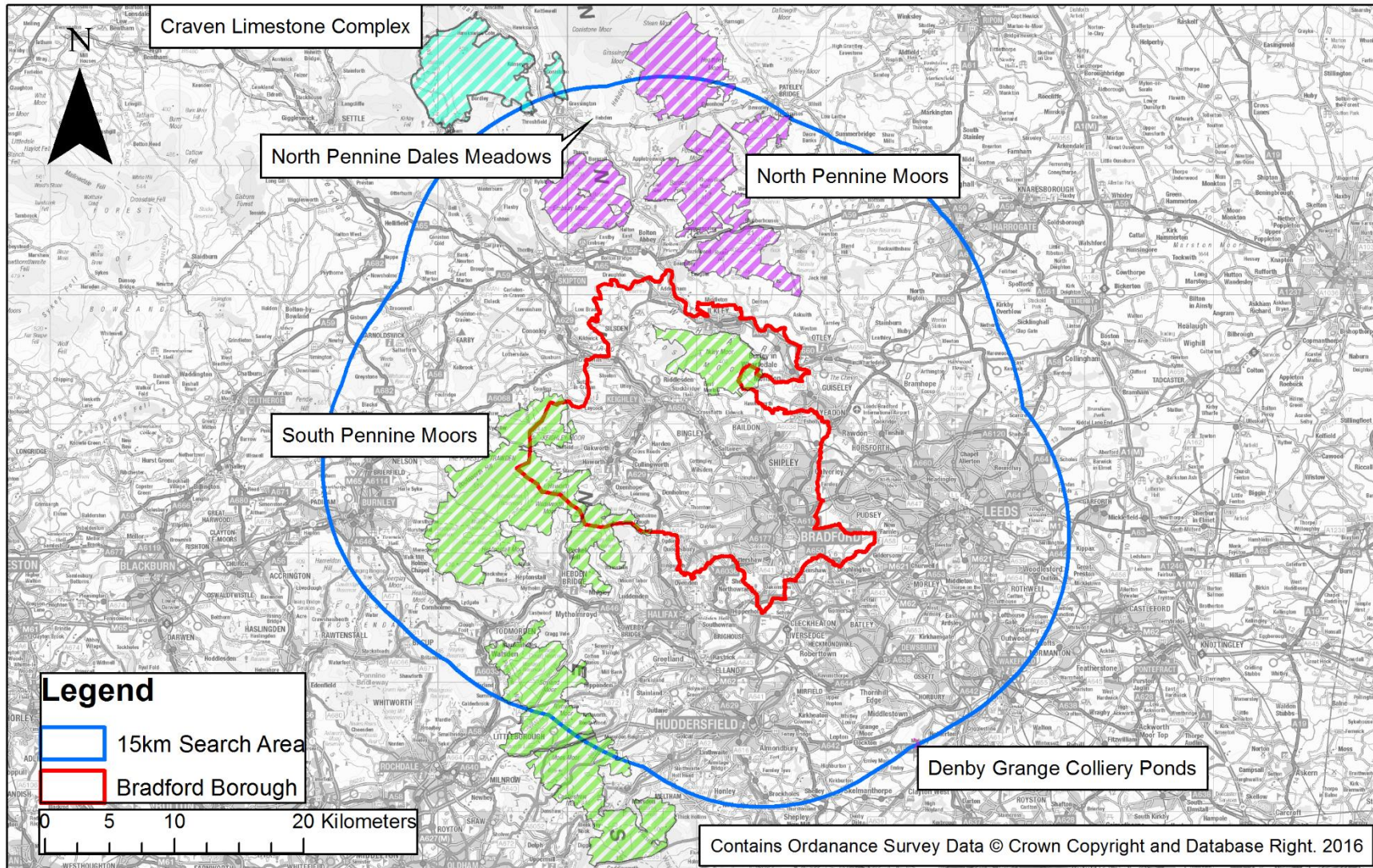


Figure 2-2: Special Areas of Conservation (SAC) within 15km of Bradford



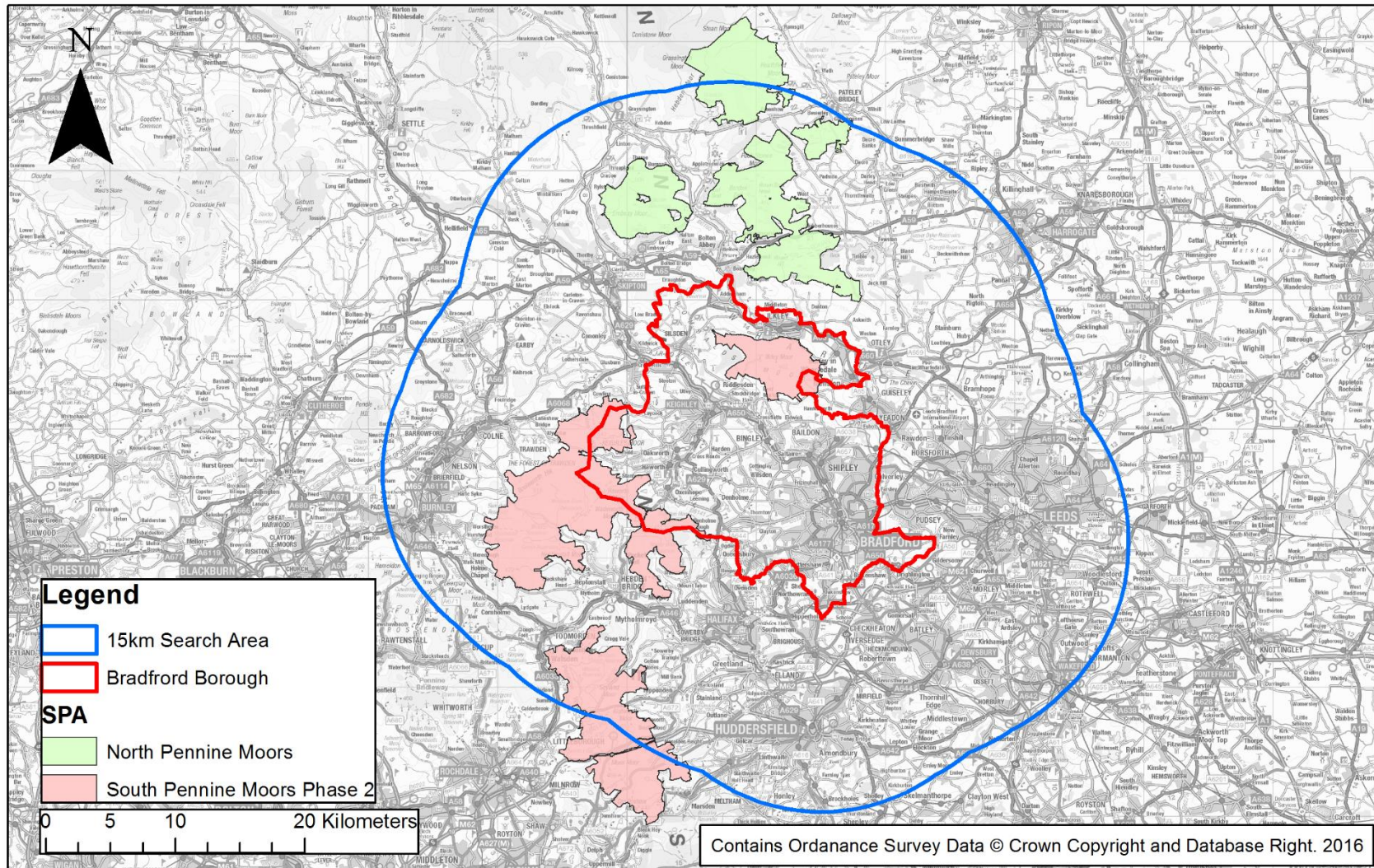


Figure 2-3: Special Protection Areas (SPA) within 15km of Bradford

There are four Sites of Special Scientific Interest (SSSI) in Bradford (Figure 2-4) with only one of these sites classified by Natural England as in a favourable condition (Natural England, 2016). Bradford’s SSSIs are listed and described in Table 2-3. Favourable sites are defined as sites with habitats and features which are in a healthy state and are being conserved by appropriate management.

Table 2-3: SSSIs within Bradford borough

SSSI name	Location	Interest features	SSSI condition
Bingley South Bog	This small mire occupies a peat-filled hollow in undulating ground between the Leeds Liverpool Canal and the River Aire, at Bingley, north of Bradford.	The surviving wetland provides a transition from fen to dam neutral grassland, maintained in a species-rich condition, probably by grazing. Open water occurs in a depression caused by the weight of an aqueduct embankment.	Unfavourable – Recovering (87.05%) Destroyed (12.95%)
South Pennine Moors	This site forms part of the Southern Pennines lying between Ilkley in the north and the Peak District National Park boundary in the south. Most the site is within West Yorkshire but it also covers areas of Lancashire, Greater Manchester and North Yorkshire.	The site is the largest area of unenclosed moorland within West Yorkshire and contains the most diverse and extensive examples of upland plant communities in the county. Extensive areas of blanket bog occur on the upland plateaux and are punctuated by species rich acidic flushes and mires. There are also wet and dry heaths and acid grasslands.	Unfavourable - No change (4.16%) Unfavourable – Recovering (94.68%) Favourable (1.16%)
Trench Meadows	Trench Meadows are situated in the River Aire valley between the towns of Shipley and Bingley, on the fringe of the Southern Pennines.	The meadows are of special interest for their neutral grassland, which occurs with smaller areas of acid grassland and rush pasture, the latter associated with a number of flushes which run downslope through the fields.	Unfavourable – Recovering (100%)
Yeadon Brickworks & Railway Cutting	This site is situated in New Scarborough, north of Spring Wood.	This quarry and adjacent railway cutting display an excellent section through the rocks of late Namurian age, and the importance of this site is recognised by its being the type locality for the Yeadonian Stage	Favourable (100%)



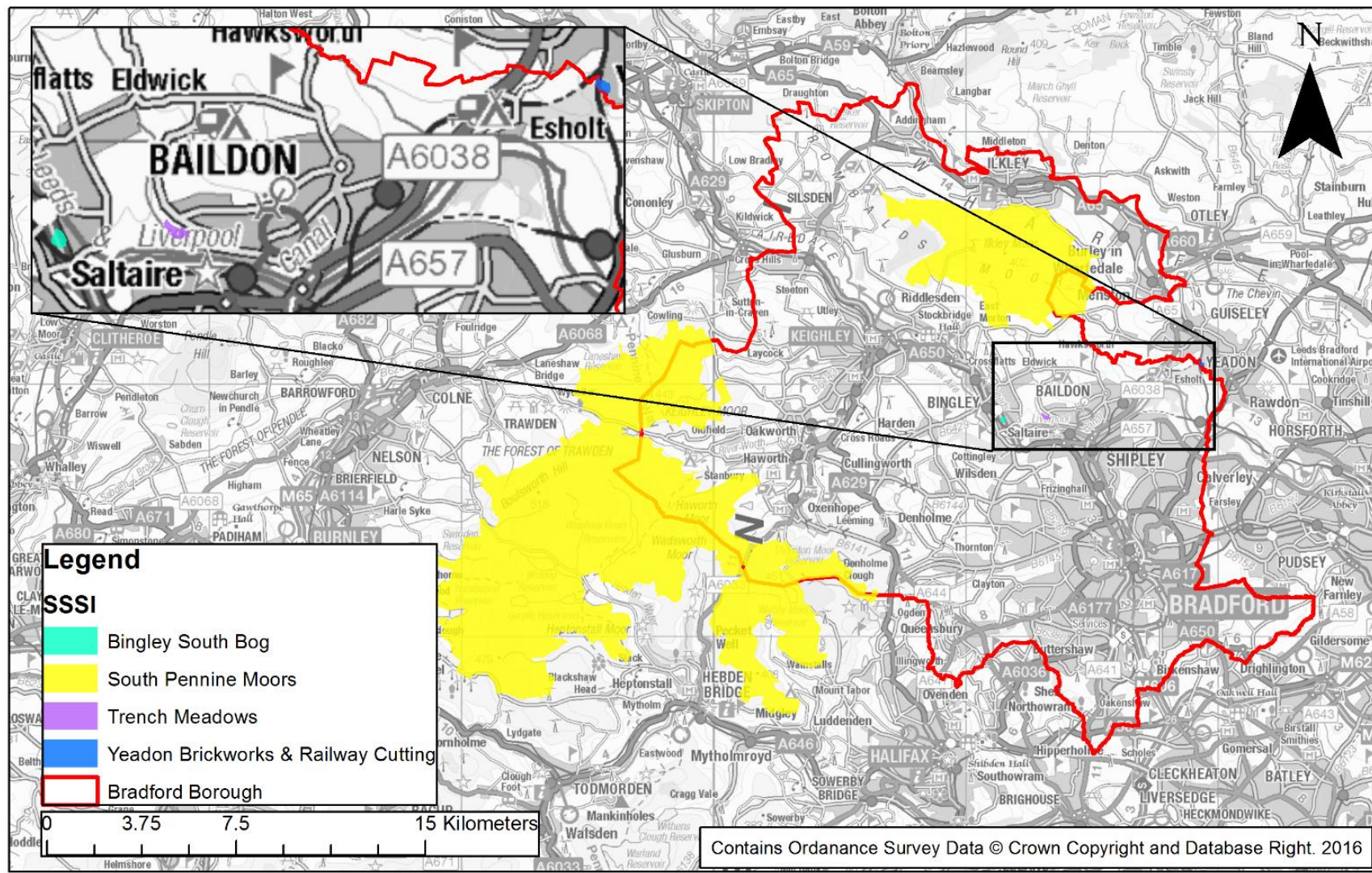


Figure 2-4: Sites of Special Scientific Interest (SSSI) in Bradford

There are no identified National Nature Reserves (NNR) in Bradford, or within 15km of Bradford

### 2.5.2 Local designated sites

There are three Local Nature Reserves (LNRs) within the Bradford Borough Boundary (as shown in Figure 2-5 and Figure 2-6). These are Ben Rhydding Gravel Pits LNR, and Sun Lane (Burley in Wharfedale) LNR in the North, and Railway Terrace LNR in the South.

Ben Rhydding Gravel Pits LNR is a former gravel pit characterised in some area by, undisturbed by the gravel extraction, and mature trees. Elsewhere in the workings colonization, has resulted in tree cover, mostly birch and willow approximately 40 years old. There are lagoons in the centre of the site and several informal paths (Bradford MDC, 2016).

The 12-acre Sun Lane LNR is on the site of the old Village Tip which was in use until 1975. In the early 1990's pollution was found to be leaching from the site and contaminating the River Wharfe. This necessitated the installation of an anti-pollution system by Bradford Council (who own the site) incorporating reedbeds, willow carr and water courses (Burley-in-Wharfedale Village, 2016).

Railway Terrace (locally known as Raw Nook) LNR was designated an LNR in 2008. The site is an old railway goods yard and engine shed, and is locally important for lowland heathland and wildflower meadows (Natural England, 2008).

There are 48 Local Wildlife Sites (LWS) (WYJS), as shown in Figure 2-7. These are sites that are of local importance and are designated by the local authority, however, they have no statutory protection. The LWSs include areas of ancient woodland, hedgerows and green lanes, post-industrial brownfield sites, reedbeds and chalk grassland.

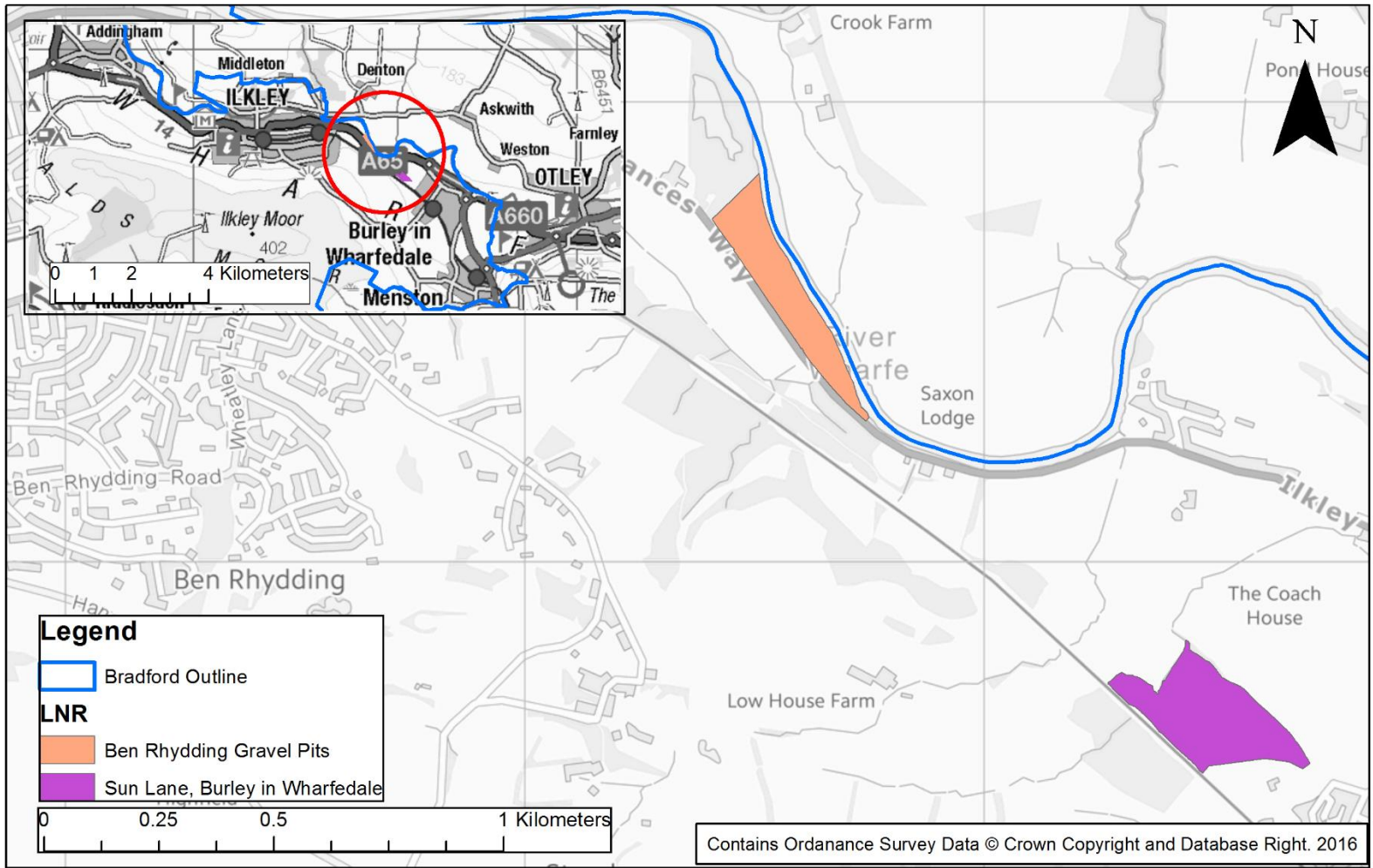


Figure 2-5: Local Nature Reserves (LNR) in the North of Bradford



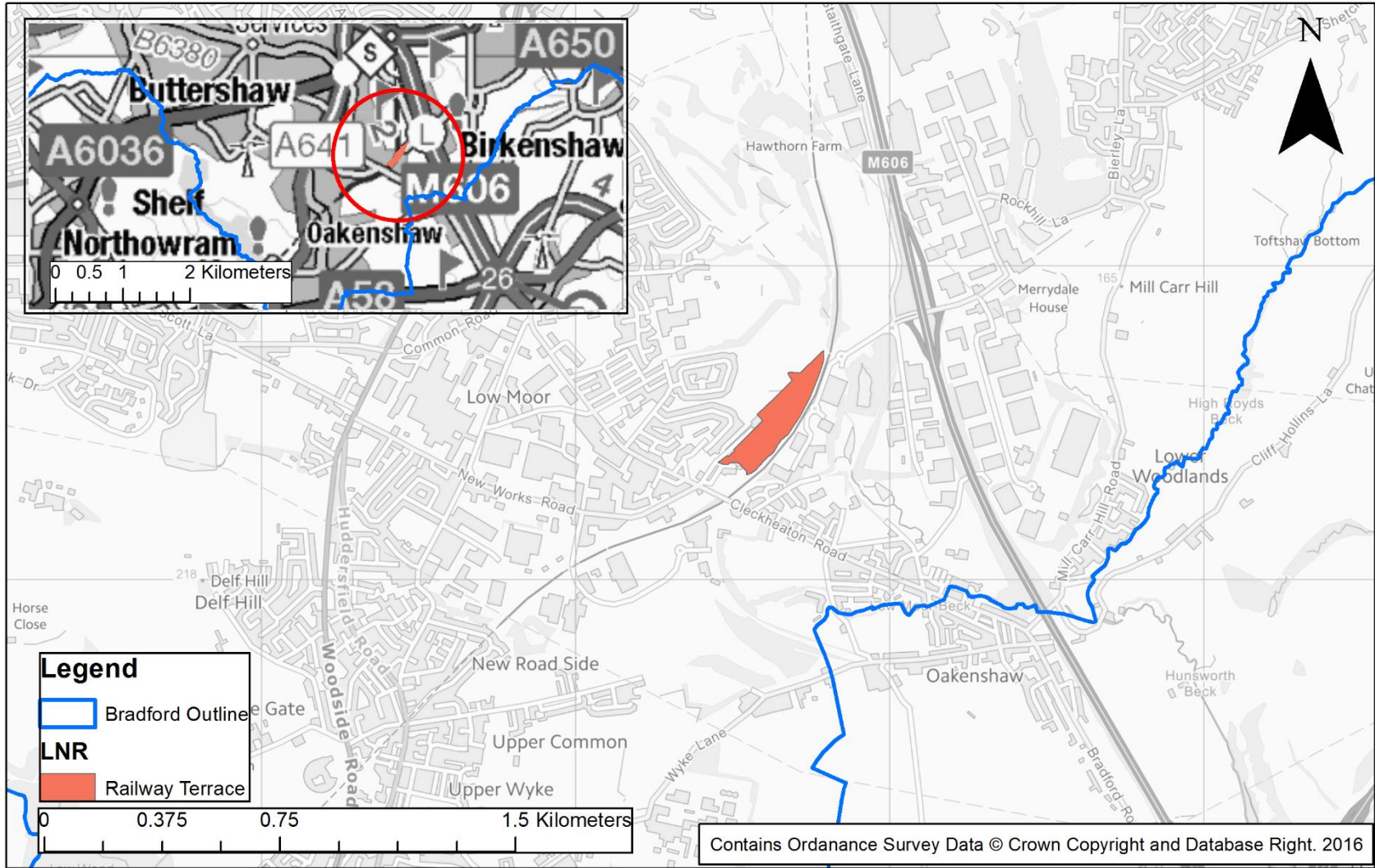


Figure 2-6: Local Nature Reserves (LNR) in the South of Bradford

### 2.5.3 Notable habitats and species

As described above, Bradford has a variety of habitats, including ancient woodland, heathland, meadows, and lagoons. Ancient woodland does not cover a large amount of Bradford, being mainly fragmented in the centre and north (Figure 2-7).

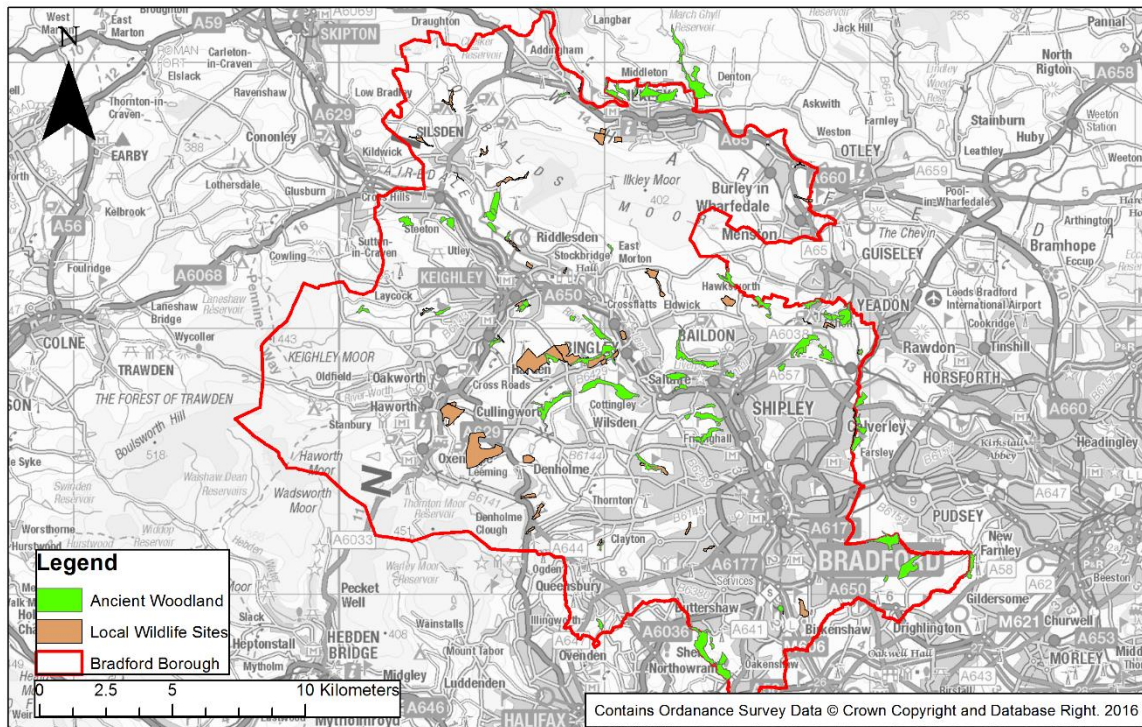


Figure 2-7: Ancient Woodland and Local Nature Reserves (LNRs) in Bradford

An ancient woodland is a woodland that has existed continuously since 1600 or before in England, Wales and Northern Ireland. Before those dates, planting of new woodland was uncommon, so a wood present in 1600 was likely to have developed naturally. There is approximately 720 hectares of ancient woodland in Bradford as shown in Figure 2-7. There are also 48 local wildlife sites including; St Paul’s Wood, Chellow Dean Woods and Reservoir, Elam Wood and Bingley North Bog. These sites are mainly present in the centre of the district, south of Keighley and North of Bradford, as shown in Figure 2-7.



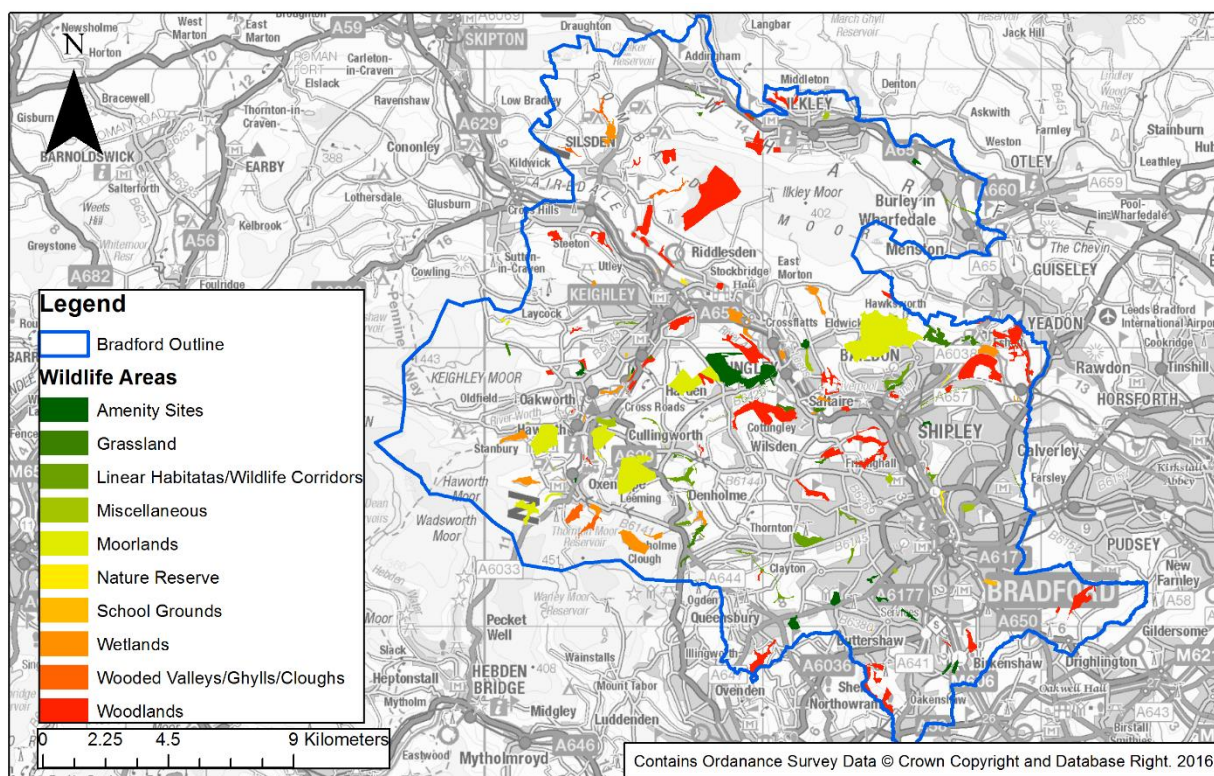


Figure 2-8: Wildlife areas in Bradford

Less than 5% of the Bradford District is woodland compared to a national average of 10%, as shown in Figure 2-8. The Forest of Bradford Project has planted over 270,000 trees (135 hectares) of new native woodland and hedgerows since 1998.

The City of Bradford Local Biodiversity Action Plan whilst somewhat out of date is still relevant. Its overarching aim is to conserve and enhance wildlife species and habitats of the district as part of Bradford's contribution to the conservation of UK and global biodiversity. Its six objectives of plan, protection, policy, partnerships and public awareness are still applicable. As described earlier in section 4.2. The habitats in Bradford District are largely influenced by their underlying geology where the Milestone Grits of Southern Pennines give rise to substantial areas of upland heathland and blanket bog. The softer shales of the Coal Measures have produced more woodlands, valley wetlands and unimproved grasslands. The demand for development and industrialisation has fragmented these habitats and created unique habitats of reservoirs, quarries and canals. Many field boundaries consist of dry stone walls and some hedgerows provide important habitats and wildlife corridors. Urban habitats in area are important and the many brownfield sites and landscaped urban areas area's support range of wildlife species.

The following habitats have Biodiversity Action Plans (BAP) to protect and enhance their status in the Bradford District (City of Bradford MDC, 2016).

#### Habitats

- Upland Oak Woodland
- River Corridors
- In Bye Pasture
- Hedgerows

Furthermore, the following habitats have Habitat Action Plans

- Enclosed pasture and hay meadow below open moorland
- Rushes and wet flushes
- Wide variety of invertebrates
- Important for wading birds – snipe, curlew, lapwing and redshank

## Species

The wildlife in Bradford is influenced by climate topography and latitude. The network of river and beck corridors and In-bye pasture form local key habitats important for species like migratory fish, otters and white-clawed crayfish which depend on continuity of habitat. The upland peatlands, valleys and associated dykes are important water and wetland habitats, as are smaller features such as ponds, lakes, millponds and reservoirs that form part of a wider ecological network with other habitat types. The following local key species have Biodiversity Action Plans (BAP) to protect and enhance their status in the Bradford District (City of Bradford MDC, 2016).

- Otter
- Water Vole
- Pipistrelle
- Brown Hare
- Crayfish
- Grayling (fish)
- White Letter Hairstreak Butterfly
- Green Hairstreak Butterfly
- Blue Butterflies
- Twite
- Yellowhammer
- Lapwing
- Lesser Twayblade
- Marsh Fern

Some species within the Bradford District are protected by national and international laws:

- Bats  
Eight species of bat are found in the Bradford District. Their roosts are sometimes destroyed by insensitive development, house repairs or tree felling.
- Badgers
- Otters
- Water voles  
Water voles are now rare in the Bradford District due to:
  - Competition from illegally-released mink
  - Loss of bankside habitat and disturbance
- White Clawed Crayfish

### 2.5.4 Fisheries

Bradford has over 50km of main rivers and 23km of canal running through the district. Both the River Wharfe, which supports a variety of fish, including a salmon, brown trout and grayling and the Leeds Liverpool Canal are designated as Sites of Ecological or Geological Interest (SEGIs) for their nature conservation value. The other main river that flows through the district, the River Aire has been affected by years of pollution, although water quality has recently improved significantly through a variety of infrastructure initiatives (City of Bradford MDC, 2014). The River Aire now supports a sustainable coarse and brown trout fishery and, as evidenced by sightings downstream of the Bradford boundary, appears capable of supporting migratory species as and when the remaining barriers to fish passage are eliminated.

### 2.5.5 Key environmental issues

The rural areas within Bradford are under increasing pressure from development and changes in land use, particularly because of changes in farming practice, alternative uses for buildings in the countryside and pressure for outdoor recreation, leisure and commercial uses.

Many designated sites are under pressure from climate change and development. These are dependent on underlying hydrological conditions and are therefore vulnerable to flooding and changes in hydrology. These sites support several species that are reliant on riverine habitat, and are subsequently at risk from flooding events, poor water quality, changes to hydrological regimes and habitat changes.

Future incidences of flooding could potentially damage and change the nature of habitats and supporting species composition within the designated nature conservation sites both within and outside the borough. The LFRMS will need to consider whether any flood risk management measures will lead to adverse impacts on the water bodies within the borough and whether the LFRMS can help contribute to delivering any mitigation measures such as through improvements to fish passage. Implementation of the LFRMS may also provide opportunity to enhance or create new habitats within the borough.

Flooding and flood risk management has the potential to significantly impact on many species of note in the borough. Some, such as water vole and crayfish, are dependent upon aquatic and riparian habitats, and are sensitive to changes in habitat conditions, changes in water quality, flow, vegetation cover and bank profile.

## 2.6 Water environment

### 2.6.1 Water resources

Bradford District includes the catchment areas of the River Aire and the River Wharfe.

Bradford is not built on any substantial body of water but is situated at the junction of three valleys, one of them, that of the Bradford Beck which rises in moorland to the west, and is swelled by its tributaries, the Horton Beck, Westbrook, Bowling Beck and Eastbrook.

Rivers in Bradford include:

- River Aire; a major river in Yorkshire, 71 miles (114 km) in length.
- Bradford Beck; a river that flows through Bradford and on to the River Aire at Shipley. As it reaches Bradford city centre it runs underground after being built over in the 19th century.
- Harden Beck; a stream that flows from Hewenden Reservoir, over Goit Stock Waterfall to the River Aire in Bingley, West Yorkshire
- River Worth; It flows from minor tributaries on the moors above Watersheddles Reservoir down the Worth Valley to Haworth, where it is joined by Bridgehouse Beck which flows from Oxenhope. The River Worth is itself a tributary of the River Aire, which it joins at the end of the Worth Valley in Keighley.

In addition to the two river systems, there are several smaller watercourses, ditches and drains within the borough. The Leeds and Liverpool canal also runs through Bradford. Over a distance of 127 miles (204 km), it crosses the Pennines, and includes 91 locks on the main line. It has several small branches, and in the early 21st century a new link was constructed into the Liverpool docks system.

The Humber RBMP has identified that the objectives for drinking water protected areas are to ensure that:

- under the water treatment regime applied, the drinking water produced meets the standards of the Drinking Water Directive plus any UK requirements to make sure that drinking water is safe to drink
- the necessary protection to prevent deterioration in the water quality in the protected area to reduce the level of purification treatment required

These objectives are at risk when increasing pollution levels caused by human activity could lead to more treatment being needed in the future and where measures are needed to reduce pollution.

### 2.6.2 Water Framework Directive (WFD)

Bradford is covered by the Humber River Basin Management Plan (RBMP), which identifies the current quality of water bodies in the borough and sets objectives for making further improvements to the ecological and chemical quality.

The Humber river basin district (Figure 1) covers an area of 26,100km<sup>2</sup> and extends from the West Midlands in the south, northwards to North Yorkshire and from Staffordshire in the west to part of Lincolnshire and the Humber Estuary in the east.

The WFD indicator of the health of the water environment is whether a water body is at good status or potential. This is an assessment of a range of quality elements relating to the biology and chemical quality of surface waters and quantitative and chemical quality of groundwater. To achieve good ecological status or potential, good chemical status or good groundwater status every single element assessed must be at good status or better. If one element is below its threshold for good status, then the whole water body's status is classed as less than good. Within the Aire and Calder Catchment there are 125 waterbodies, Table 4 shows that the ecological status for most of these waterbodies is determined to be 'moderate and the chemical status for almost all of the waterbodies is 'Good'.

Number of water bodies	Ecological status or potential				Chemical status		
	Bad	Poor	Moderate	Good	High	Fail	Good
125	0	5	113	7	0	1	124

Table 4-1: Number of water bodies in the Aire and Calder catchment area

### 2.6.3 Surface water quality

Work by the Council has started on producing development control standards for drainage design and surface water treatment. To achieve high water quality standards, the council has identified that, surface runoff should be passed through the correct levels of treatment prior to discharging to an outfall. The levels of treatment are dependent on the pollution risk from the development and the sensitivity of the receiving outfall.

The Council will continue to work with partner organisations to safeguard ground and surface water resources and to protect and improve water quality. Proposals for development are only acceptable provided there is no adverse impact on water bodies and groundwater resources, in terms of their quantity, quality and the important ecological features they support. In the longer term, the aim will be to improve the ecological status of water within Bradford.

The Humber RBMP has identified that 38% of waterbodies are at risk of pollution from waste water. Waste water, or sewage, can contain large amounts of nutrients (such as phosphorus and nitrates), ammonia, bacteria, harmful chemicals and other damaging substances. It can enter water bodies where sewage treatment technology to remove enough of the phosphorus and harmful chemicals doesn't exist, from leakages from privately owned septic tanks and, in wet weather, storm overflows can discharge untreated sewage having a significant impact on bathing waters. Population growth and changes in rainfall patterns are increasing the pressure on the sewer network.

Rainwater from draining roofs, roads and pavements carries pollutants, including grit, bacteria, oils, metals, vehicle emissions, detergent and road salt drains to surface water. Many homes and workplaces have 'misconnected' drains, meaning that dirty water often enters surface waters and groundwater rather than foul sewer drains.

In rural areas, the objective of the Nitrates Directive is to reduce water pollution caused by nitrates from agricultural sources and to prevent further such pollution occurring. Nitrate vulnerable zones (NVZs) are designated where nitrate concentrations in water bodies are high or increasing, or water bodies are, or may become, eutrophic due to agricultural nitrate pollution. Farmers within NVZs must comply with mandatory action programme measures to reduce agricultural nitrate losses. In addition, a code of good agricultural practice has been established for voluntary implementation by all farmers. There is a large surface water Nitrate Vulnerable Zone (NVZ) just to the south of the city of Bradford. These zones are designated where land drains and contributes to the nitrate found in 'polluted' waters (Environment Agency, 2016).

### 2.6.4 Groundwater quality

Groundwater provides vital resources for public water supply in the borough. The impacts on groundwater are broadly related to land use, with agricultural areas representing a source of nitrates.

Groundwater aquifers in Bradford are all considered to be minor, providing provide modest amounts of water. They support water supplies at a local rather than strategic scale (such as for private supplies)



and remain important for rivers, wetlands and lakes and have a wide range of water permeability and storage. In the north and west of the district the vulnerability of these aquifers is low because of the characterisation of low leaching soils and/or the presence of low permeability drift deposits. In the east and south of Bradford, the groundwater vulnerability is high. High areas can easily transmit pollution to groundwater and they are characterised by high leaching soils and the absence of low permeability drift deposits.

For groundwater bodies, not meeting the Humber RBMP objectives can result in the water body is classed as poor chemical status. Safeguard zones are non-statutory areas identified for 'at risk' abstractions where land use management practices and other activities can affect the quality of the untreated water. Measures to prevent and reduce pollution are targeted within these zones.

There are four areas in Bradford which are covered by groundwater source protection zones (SPZ) located in Harden, south of Haworth, south of Yeadon and north of Silsden. These zones show the risk of contamination from any activities that might cause pollution in the area.

According to the RBMP the predicted chemical status for groundwater in Bradford was 'Poor' and the predicted quantitative status for groundwater was 'Good'. For groundwater quality, the main reasons for poor status are high or rising nitrate concentrations with failures for pesticides and chemicals associated with mine working.

A ground water body will only be classified as having poor quantitative status in the following circumstances; where low ground water levels are responsible for an adverse impact on rivers and wetlands normally reliant on ground water; where abstraction of ground water has led to saline intrusion; where it is possible that the amount of groundwater abstracted will not be replaced each year by rainfall (Environment Agency, 2009).

### 2.6.5 Flooding

Bradford has experienced significant flooding and has a history of land and property being flooded through heavy downpours of rain and watercourses overflowing their banks. Potential sources of flooding usually result from a combination of high river and watercourse levels, associated with rivers Aire and Wharfe, excessive surface water runoff and saturated ground, high groundwater and exceeded sewer and localised surface water drainage incidents.

Whilst major parts of urban Bradford lie outside the flood plain, the Strategic Flood Risk Assessment (SFRA) identifies where built up areas are at risk of flooding from many different sources. Flooding has been recorded when the River Aire overtops into the Leeds-Liverpool Canal, causing increased flood risk to communities located close to the canal network (JBA Consulting, 2014). Shipley is identified as an area at risk from several different sources of flooding, as is Keighley which has experienced groundwater and surface water flooding as well as fluvial flooding.

The city of Bradford is a heavily urbanised area, important to the economic growth of the Yorkshire and Humber region. Its regionally important role to economic growth places significant pressure for development in the area, particularly along the riverside where, due to its industrial history, previously developed sites are located and the floodplain is very constrained by development. River flooding from Bradford Beck, Clayton Beck and Pitty Beck has occurred (Environment Agency, 2010). Flooding in Bradford also comes from sewers and the urban drainage system, including culverts. There are currently 1,047 properties at risk of river flooding, assuming no defences from the one per cent probability flood event. This rises to 1,086 in the future. Further north in the areas surrounding Keighley, many of the rivers are steep leading to rapid onset of flooding from rivers, surface water and sewer flooding. Currently there are just over 3,630 properties at risk from the one per cent flood event not taking into consideration defences. In the future, this risk could increase to almost 3,880 properties in the sub area. Potential flooding from the canal, surface water and sewers is also likely to increase in the future (Environment Agency, 2010) .

Not all historical flooding events have been recorded and the available evidence and/or data about events is limited. The draft Local Flood Risk Management Strategy (2016) identifies six separate major flooding events. The most recent occurring in November-December 2015 Boxing Day floods was caused by river and surface water flooding. According to the Leeds City Region Review, the area affected included 972 properties of which 783 were residential properties and 189 were businesses. Infrastructure damages were recorded to retaining walls, bridges and roads and data on the event is still being recorded.

## Fluvial

The metropolitan Borough district of Bradford includes the catchment areas of the River Aire. The Bradford MDC area includes reaches of the following rivers:

Aire Catchment
River Aire
River Worth
North Beck
Silsden Beck
Bridgehouse Beck
Eastburn Beck
Providence Lane

The River Aire within Bradford District is characterised by several swift flowing upland streams which then flow down through the towns along the valley. The upper reaches of the River Aire within Bradford District have a largely rural character and the floodplain in the Silsden and Steeton with Eastburn area is quite extensive. The River Worth is one of the larger contributing catchments and joins the River Aire at Keighley. The middle reaches of the River Aire are heavily urbanised and contain the towns of Keighley, Bingley, Shipley and the City of Bradford. Between Keighley and Leeds, the valley floor steepens and becomes narrower.

The density of development within the valley has resulted in significant restrictions to the natural floodplain. Periods of heavy rainfall in the uplands can therefore produce high flows in the tributary catchments between Keighley and Bradford. This problem becomes most acute in densely developed areas where gradients are steep, for example within the Bradford Beck corridor. (City of Bradford MDC, 2014)

There are two flood storage areas in the form of controlled washlands in the upper Aire catchment at Skipton and Cononley. These washlands are flooded on several occasions throughout the year and significantly reduce levels during medium and high floods through Bingley, Shipley and Leeds. In some flood events, the distribution of rainfall produces high flows on the tributary catchment between Keighley and Leeds. The most urbanised catchments, like the River Worth and Bradford Beck, can react very quickly to rainfall, with a time to peak of one to three hours. These tributary flows cannot be attenuated by the washlands upstream of Keighley.

On some of the tributaries of the River Aire there is a risk of localised bank side walls collapsing. This is due to a combination of undermining by erosion and poor maintenance by private landowners. Damaged or breached walls will greatly increase the risk of flooding to properties situated behind the affected area. Possible locations where this could occur include Silsden Beck and the upper reaches of the River Worth.

It is also worth noting that significant weirs on both the main Aire spine and its tributaries, such as at Saltaire, could have a significant impact on fluvial flooding in the Bradford district.

## Surface water

Surface water is most common in urban areas, because of the shape of the local landform can result in water flowing across hard impermeable surfaces in large volumes, which cause flooding or to pond in low spots and resulting in localised or widespread flooding. This type of flooding can be and is sometimes more, devastating than fluvial or tidal flooding. The topography of the Bradford MDC area, especially in and around a number of the built-up areas make them potentially prone to flooding caused by direct rainfall due to the number of impermeable surfaces and the lack of sufficient sewer capacity.

Surface water and drainage related issues are known to occur flood risk in the following locations:

- Idle (Haigh Beck) - Residential properties affected by flooding within lower reaches. Complex combined sewer network of unknown capacity;

- Apperley Bridge (Carr Beck) - Properties affected by watercourses within lower reaches near the confluence with the Aire;
- Addingham (Town Beck) – Residential properties affected by watercourse and drainage flooding within constrained upper reaches;
- Silsden (Silsden Beck Tributaries) - Residential properties affected by localised flooding within constrained upper reaches; • Cross Hills on Skipton Road;
- Bradford City Centre (Bradford Beck) - High value commercial properties affected by localised flooding within the city centre. Complex combined sewer network upstream.

Surface water flooding can also occur in rural areas where either land management or the intensity of rainfall results in water running straight off fields without entering the drainage or river systems. This situation has been noted to occur in Keighley and Castlefields industrial estate, Bingley.

### Groundwater

Within the Bradford MDC area there are several locations where groundwater flooding has been reported. Between 1999 and 2004, Bradford MDC received between 550 and 725 calls per year regarding flooded cellars (JBA Consulting, 2014). Possible sources of this flooding include:

- Rising groundwater;
- Springs;
- Defective drains or sewers;
- Burst water mains.

Bradford has a high proportion of properties with cellars compared to many other cities in the UK. There are unconfirmed records of groundwater flooding within Bradford, where Keighley is known to suffer from groundwater flooding. Groundwater flooding within the Bradford MDC area is not thought to be a major problem due to the geology of the catchment.

### Reservoirs

There are several reservoirs located within the boundaries of Bradford MDC, these include, Silsden, Keighley Moor, Water Sheddles, Ponden, Lower Laithe, Thornton Moor, Reva, Doe Park and Hewenden. Reservoirs can both store and attenuate flows in a similar manner to washlands and floodplains, depending upon how they are managed. At present these reservoirs are often full in winter and therefore provide little potential flood attenuation (JBA Consulting, 2014).

Furthermore, the prime use for many of these reservoirs is for a water supply, which may limit their application for flood storage.

### Canals

Non-natural or artificial sources of flooding can include canals where water is retained above natural ground level. Canal flooding may occur either because of the facility being overwhelmed or as a result of dam or bank failure. This can happen suddenly resulting in rapid-flowing and deep water that can cause significant threat to life and major property damage. Flooding has been recorded when the River Aire overtops into the canal causing increased flood risk to communities located close to the canal network (JBA Consulting, 2014). Shipley has been identified as an area at risk.

## 2.6.6 Key Environmental Issues

The water environment in the Bradford district is key to the development of LFRMS measures, and actions, and whilst there are several relevant plans and policies relevant to this water environment at the local, regional, catchment and nation scale. It will be important to identify the interactions. The Humber RBMP has identified that physical modifications affect 42% of waterbodies in the river basin district, pollution from wastewater affects 38% of water bodies and pollution from towns, cities and transport affects 16% of waterbodies. Bradford has pressures relating to pollution and development therefore the LFRMS must ensure that any future development does not exacerbate these issues. LFRMS measures or policies to prevent or limit physical modifications could positively impact on water environment.

Flooding has the potential to create pathways through which potential contamination sources (e.g. sewage treatment works) could result in pollution. The LFRMS could help protect or adapt these sites to future flood risk and improve water quality or status of waterbodies in the district.

Some of the water bodies in Bradford currently fail to meet good ecological status/potential under the WFD. The LFRMS will need to consider whether any flood risk management measures will lead to adverse impacts on the watercourses within the borough and whether the LFRMS can help contribute to achieving WFD objectives and improving water quality

## 2.7 Soils and geology

Bradford City, Keighley and Silsden primarily have slowly permeable, seasonally wet, acid loamy and clayey soils. This is interspersed with freely draining, slightly acid, loamy soils. In the uplands, the soil type is either very acid loamy upland soils with a wet peaty surface, or blanket bog peat soils. In the river valley and the floodplains soil is primarily loamy and clayey floodplain soils with naturally high groundwater (Cranfield University, 2016). Generally, the soils are not particularly fertile in the Bradford District with most agricultural land classifications being classified as 'Urban' or 'Grade 4' agricultural land, where Grade 1 is 'excellent quality' and Grade 5 is 'poor quality' (Figure 2-9).

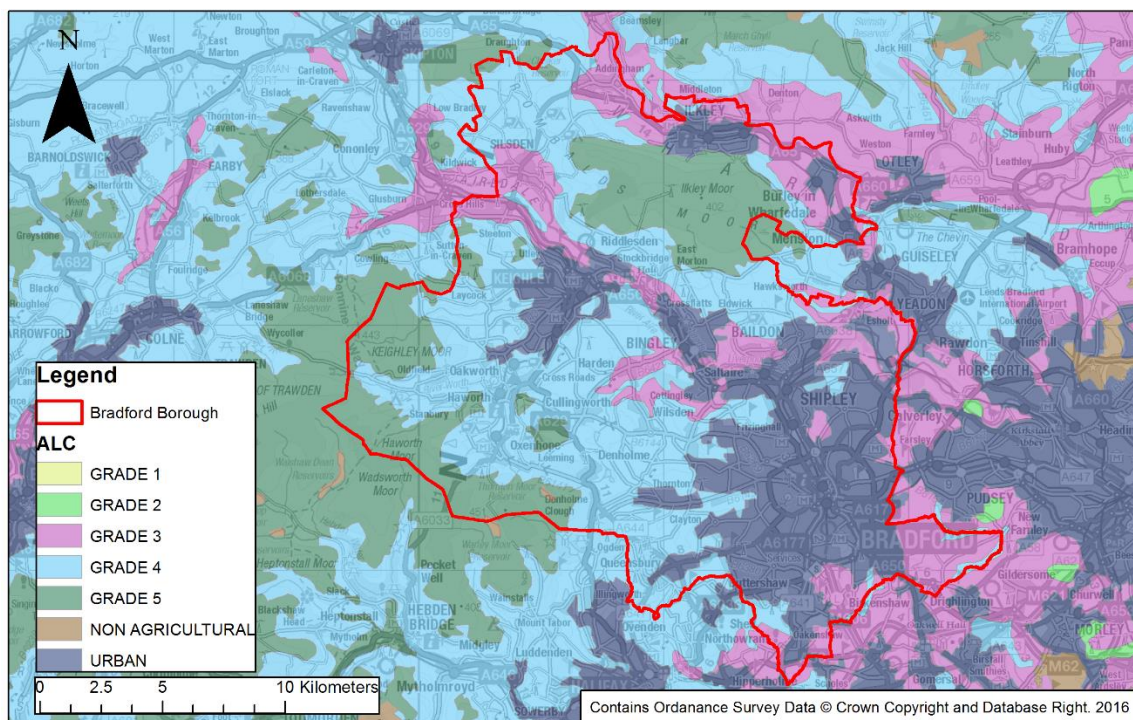


Figure 2-9: Agricultural Land Classification (ALC) of Bradford

The underlying bedrock of the south of the Bradford district is primarily Pennine Lower Coal Measures Formation, as shown in Figure 2-10. The lithological description for Pennine Lower Coal Measure Formation is; interbedded grey mudstone, siltstone and pale grey sandstone, commonly with mudstones containing marine fossils in the lower part, and more numerous and thicker coal seams in the upper part. The underlying bedrock of the south of the Bradford district is primarily Millstone Grit Group, which is; Fine- to very coarse-grained feldspathic sandstones, interbedded with grey siltstones and mudstones, with subordinate marine shaly mudstone, claystone, coals and seatearths.

The superficial geology of the borough is primarily made up of till, peat and alluvium, as shown in Figure 2-11. The superficial geology consists of till in the south of the borough. Alluvium is also present within the floodplain of River Aire; in the northern part of Bradford. Alluvium consists of clays, silts, sands and gravels and the permeability can be highly variable depending on the exact composition of the material.



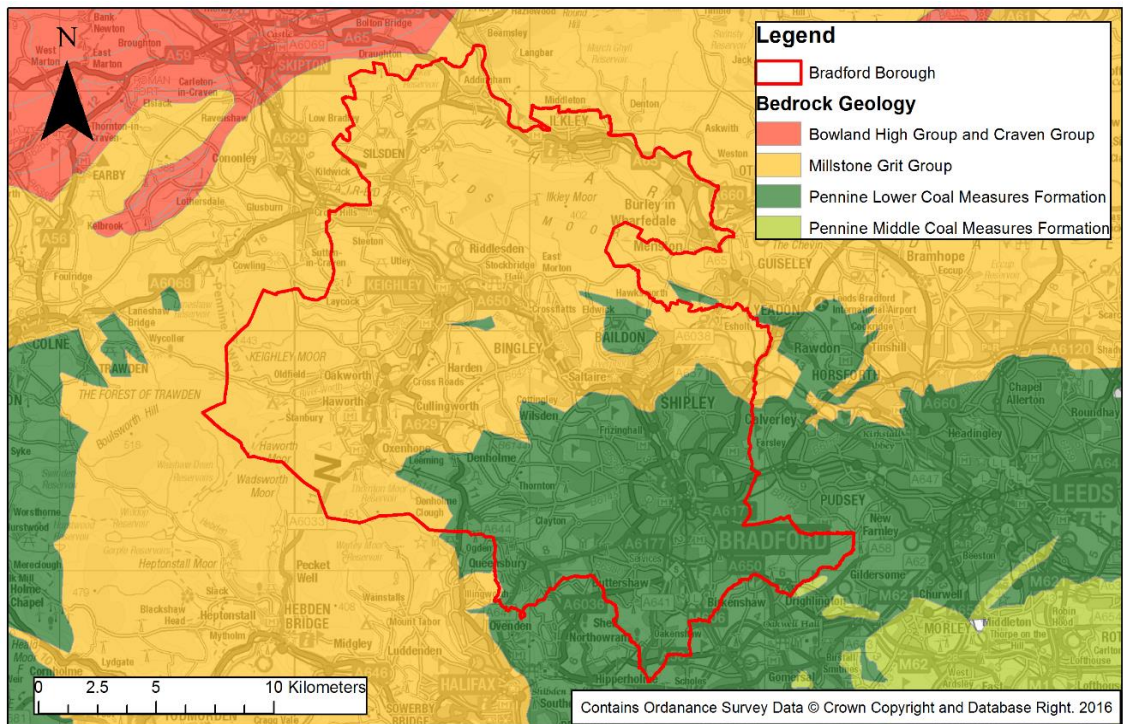


Figure 2-10: Bedrock geology of Bradford

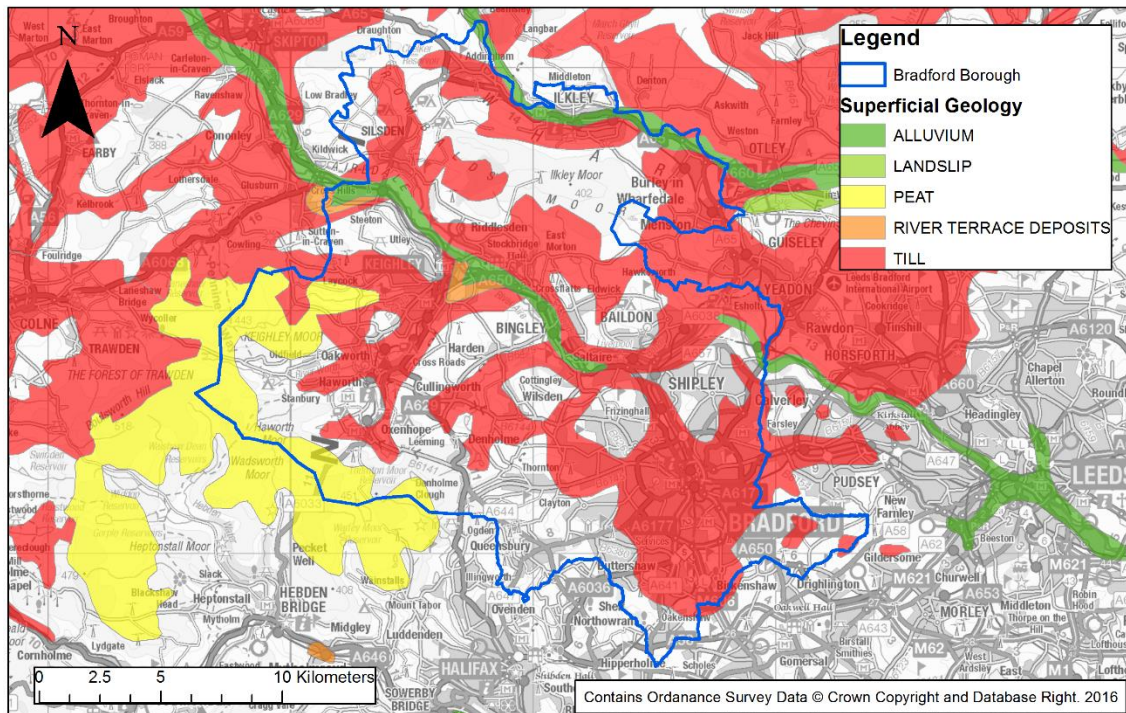


Figure 2-11: Superficial geology of Bradford

Regionally Important Geological Sites (RIGS) have been designated by the West Yorkshire RIGS Group, part of a nation-wide network of groups established by English Nature, to protect and produce a register of geological and geomorphological sites. RIGS are important sites in the West Yorkshire region and therefore have the equivalent protection and status as SEGI's in Bradford's Unitary Development Plan (UDP). There are in total 69 RIGS in the Bradford district.

### 2.7.1 Key environmental issues

Flood risk management could alter the extent or duration of flooding and impacts and therefore the LFRMS will need to consider implications for soil quality and the underlying geology. Impacts on soil quality could affect other environmental receptors, such as nature conservation sites that are reliant

on the underlying soil characteristics. Impacts on soil quality could affect other environmental receptors, such as nature conservation sites that are reliant on the underlying soil characteristics.

There is a need for the protection and maintenance of the integrity of the designated geological sites.

## 2.8 Historic environment

A settlement grew in Saxon times around the site of Bradford Cathedral. This was recorded as "Bradeford" in 1086. By the middle ages Bradford, had become a small town centred on Kirkgate, Westgate and Ivegate. In 1316 there is mention of a fulling mill, a soke mill and a market. In the reign of Henry VIII Bradford exceeded Leeds as a manufacturing centre. Bradford grew slowly over the next two-hundred years as the woollen trade gained in prominence. The launch of manufacturing in the early 18th century marked the start of the town's development while new canal and turnpike road links encouraged trade. In 1801, Bradford was a rural market town of 6,393 people, where wool spinning and cloth weaving was carried out. Bradford was thus not much bigger than nearby Keighley (5,745) and was significantly smaller than Halifax (8,866) and Huddersfield (7,268). Historic assets in the borough (Figure 2-12 and Figure 2-13) include:

- 195 scheduled monuments: these are historic sites of national importance and include the Roman Fort in Ilkley and the late prehistoric enclosed settlement known as Round Dykes Camp on Addingham Low Moor
- 2,291 listed buildings: these are statutorily designated and include 21 Grade I listed buildings, 76 Grade II\* (particularly important buildings of more than special interest) and the rest are Grade II listed buildings. The Grade I listed buildings are primarily Halls, Churches/Cathedrals and Manor Houses.
- There are 15 registered parks and gardens in the borough, two of which are listed as Grade II\*, the rest of which are listed as Grade II.
- Eight conservation areas; Esholt, Ilkley, Leeds Liverpool Canal, Middleton, Saltaire, Addingham, Bingley, and Burley In Wharfedale
- One World Heritage Site: Saltaire; a complete and well-preserved industrial village of the second half of the 19th century. Its textile mills, public buildings and workers' housing are built in a style of high architectural standards and the urban plan survives intact, giving a vivid impression of Victorian philanthropic paternalism.



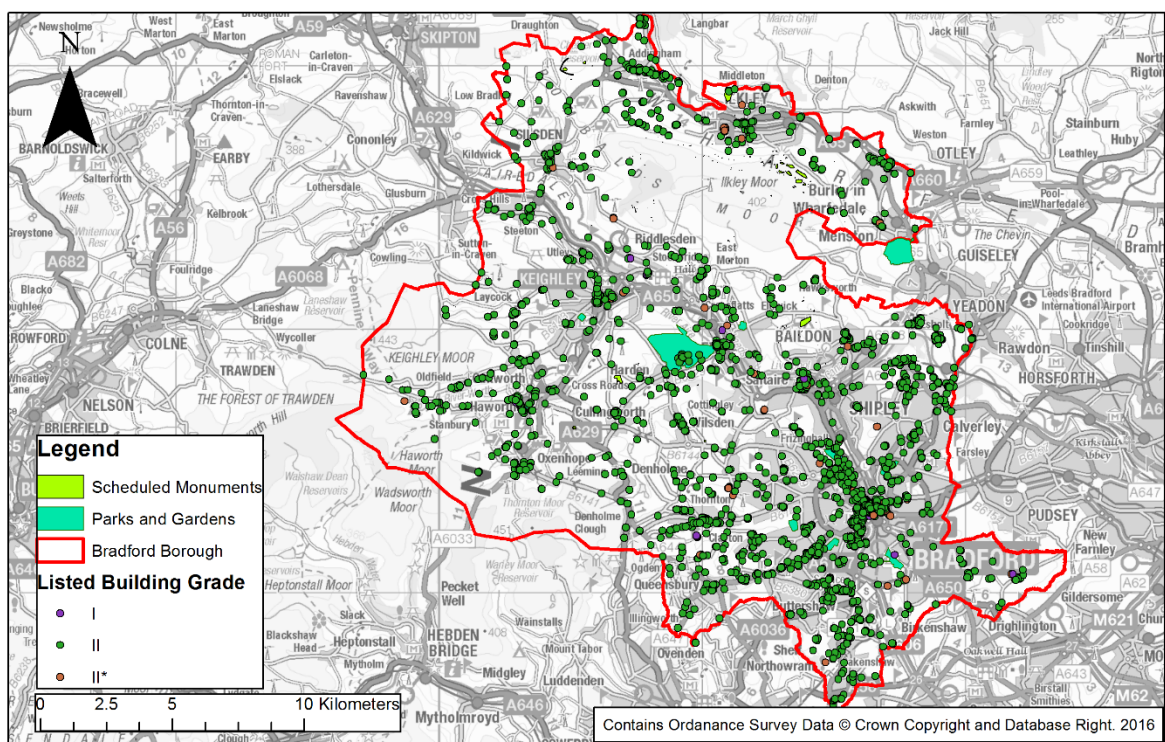


Figure 2-12: Historic assets in Bradford

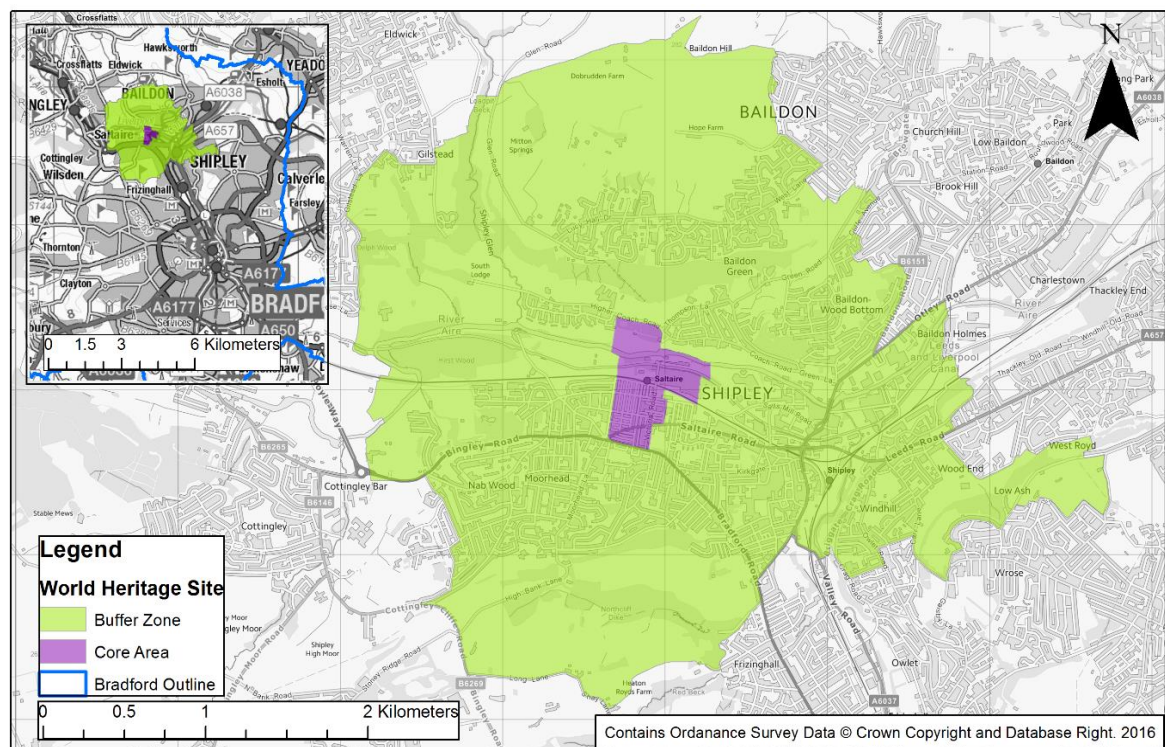


Figure 2-13: World Heritage Site; Saltaire (the designated core area and the surrounding buffer area)

### 2.8.1 Key environmental issues

Bradford contains a wealth of historic assets. However, some of the most important of these sites are currently assessed as being under threat. There is a risk that adverse impacts upon aspects of Bradford's cultural heritage could arise from flooding and increased flood risk in the future, whilst the construction and implementation of the flood risk management options selected by the LFRMS could also have adverse effects. Potential benefits may also arise from reduced flood risk to assets because of implementation of the LFRMS.



## 2.9 Population

The latest population figures produced by the Office for National Statistics (ONS) on 25 June 2015 show that an estimated 528,200 people live in Bradford District.

Bradford District is the fourth largest metropolitan district (in terms of population) in England, after Birmingham, Sheffield and Leeds although the District's population growth is lower than other major cities. In the last three years Bradford's population, has grown at 0.3% which is slower than the regional average of 0.8% and the national average of 1.5% (City of Bradford MDC, 2015).

Bradford is a youthful district with the third highest number of 0 -15 year olds (124,650) in England; only Birmingham and Leeds have higher numbers. Nearly one-quarter (23.6%) of the District's population is aged under 16.

The population of Bradford is ethnically diverse. The largest proportion of the district's population (63.9%) identifies themselves as White British. The district has the largest proportion of people of Pakistani ethnic origin (20.3%) in England (City of Bradford MDC, 2015).

### 2.9.1 Health

Life expectancy is 9.6 years lower for men and 8.0 years lower for women in the most deprived areas of Bradford than in the least deprived areas. 22.3% (1,330) of children are classified as obese, worse than the average for England. The rate of alcohol-specific hospital stays among those under 18 was 32.5 (per 100,000 population), better than the average for England. This represents 45 stays per year. In 2012, 26.7% of adults are classified as obese. The rate of alcohol related harm hospital stays was 787 (per 100,000 population), worse than the average for England. This represents 3,700 stays per year. The rate of self-harm hospital stays was 261.7 (per 100,000 population), worse than the average for England. This represents 1,420 stays per year. The rate of smoking related deaths was 354 (per 100,000 population), worse than the average for England. This represents 825 deaths per year. Estimated levels of adult smoking are worse than the England average (Public Health England, 2015).

This critical social infrastructure such as hospitals and health centres, along with residential and nursing homes, would be put under increased pressure if flood risk increased locally and regionally.

### 2.9.2 Deprivation

The Index of Multiple Deprivation (IMD) provides a measure of relative deprivation across England and was most recently published in 2015. Bradford District ranks 19th most deprived local authority in England (where 1 is the worst deprived local authority and 326 is the least deprived) and 2nd most deprived in the Yorkshire and Humber region (after the City of Kingston upon Hull). This compares to the ranking of 26th most deprived for IMD 2010. Bradford's position relative to other English districts has worsened by 7 places since the last index was published in 2010 (Figure 2-14) (City of Bradford MDC, 2015).

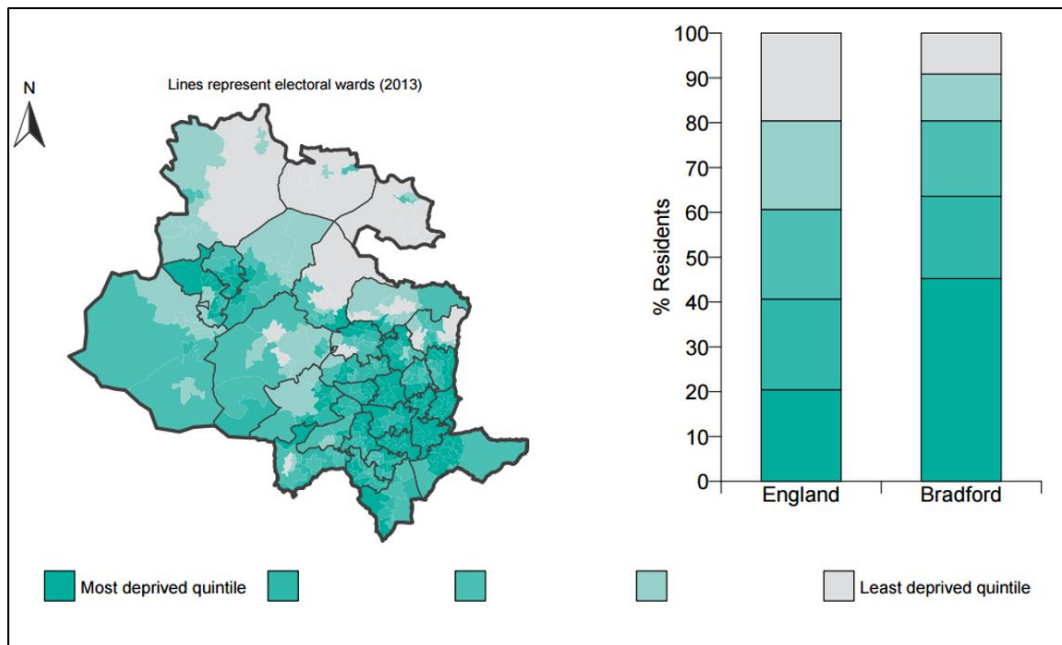


Figure 2-14: Bradford deprivation (source: Public Health England, 2014). The chart shows the percentage of population in England and Bradford who live in each of these quintiles.

### 2.9.3 Key environmental issues

The population of Bradford is set to increase in the future. The general health of the population is generally not good in comparison with national averages. Health levels do vary across the borough, with poorer health linked to areas of higher social deprivation and vulnerability to flood risk will affect the way in which households are aware of risks, it could limit the preparation or adaptation to risk through building resilient measures or uptake of flood insurance and it could affect the time and costs involved in recovery from a flood event.

The growing population will have a substantial need for further housing and improved social, green and transportation infrastructure, as well as increased demand for water. Pressure on this infrastructure also arises from increased flood risk.

This growing population will place increased demand on a range of resources and the borough's water and sewerage infrastructure, which could be exacerbated by the effects of climate change. Linked to this may be increased demands for development and pressure on the existing housing provision, which may result in greater need for development in areas at risk of flooding.

## 2.10 Material assets

### 2.10.1 Economy

The Metropolitan district of Bradford has a large and important economy worth over £8.3bn, the third largest in the Yorkshire region after Leeds and Sheffield. Economic growth since 2008 has outstripped the regional and national averages. Bradford is forecast to contribute 15.4% of the total growth within the Leeds City Region to 2020. There are 15,200 businesses employing 192,200 people in Bradford. Bradford accounts for 15% of the total employment in the Leeds City Region.

Information from the Annual Population Survey (December 2014) found that Bradford has 214,800 people aged 16-64 in employment. At 65.3% this is significantly lower than the national rate (72.4%). 114,300 (around 1 in 3 people) aged 16-64, are not in work. The claimant count rate is 3.3% which is higher than the regional and national averages.

Skill levels are improving with 25.3% of 16 to 74 year olds educated to degree level. 16.5% of the district's employed residents work in retail/wholesale. The percentage of people working in manufacturing has continued to decrease from 13.2% in 2012 to 12.5% in 2013. This is still higher than the average for Great Britain (8.5%) (City of Bradford MDC, 2015).

### 2.10.2 Infrastructure

Bradford is in a strategic location within the Leeds City Region with three rail routes providing public transport connectivity across the District and beyond, access to Leeds Bradford International Airport outside of the District within Leeds, and connections to the strategic highway network via the M606 and M62 (Figure 2-15). The road network in Bradford's urban area is characterised by a radial pattern of routes leading to the City Centre, though there is an outer and an inner ring road. There is also a relatively high level of bus use throughout the urban area. Rail patronage in the District has increased significantly over the years and is expected to continue to be the dominant public transport mode in those corridors where it exists, notably in Airedale, where the rail network is at capacity in peak times. Car ownership in Bradford is also set to rise at a faster rate than nationally, due to a lower baseline level. Air travel to and from Bradford is set to increase as the City is now connected to more frequent and wider national and international destinations through the Leeds-Bradford International Airport and Manchester Airport. The LBIA is expected to play a much more important regional role in the future and thereby directly contributing to the economy of the region (City of Bradford MDC, 2014).

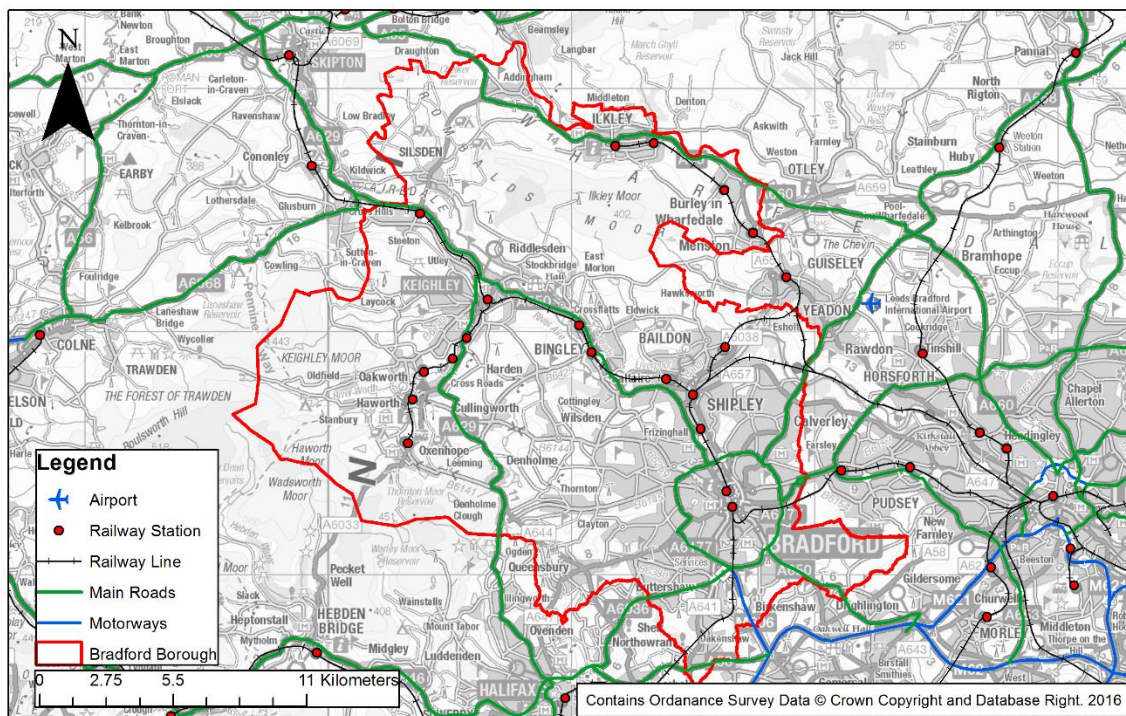


Figure 2-15: Transport infrastructure

### 2.10.3 Green infrastructure

The Bradford district has a wide variety of different types of open space, ranging from parks and gardens, natural and semi-natural green spaces, green corridors, amenity green space, outdoor sports facilities, provision for children and civic spaces, exist within the district and are valued by local communities.

Within the Bradford Core Strategy, Strategic Core Policy 6 (SC6) identifies the importance of green infrastructure. The River Corridors of the Aire and Wharfe and the South Pennine Moors are identified as strategic Green Infrastructure assets due to the opportunities offered to enhance the living landscape as a resource for people and wildlife and to address future needs for flood alleviation, water management, carbon capture and recreation (City of Bradford MDC, 2014).

### 2.10.4 Key environmental issues:

The borough has good internal and external transport links, with further improvements planned. Predicted population increases will place greater pressure on the transport network, which could be exacerbated by an increase in future development pressure. In addition, development and commercial pressures are set to place increased demand on land availability, which will in turn affect the existing transport network.



The effects of a changing climate are predicted to result in increased disruption to transport infrastructure, waste sites and utilities services. Possible impacts include significant deterioration of road surfaces and reduced capacity of rail network due to hot track conditions.

Opportunities to create and enhance green infrastructure assets could be incorporated into flood risk management measures implemented as part of the LFRMS.

## 2.11 Air quality

Bradford has identified areas where air quality objectives are exceeded, which have been designated air quality management areas (AQMA). There are four AQMAs in the Bradford District, where air pollution levels from roads, industry and property is monitored. Traffic emissions, especially those from heavy goods vehicles, are the major contributor to poor air quality in most of these areas, despite the presence of large scale industry (DEFRA, 2016). These are primarily found in the city of Bradford, close to busy roads. These have been declared as a result of heavy traffic, primarily for nitrogen dioxide, with four AQMAs also included for PM<sub>10</sub> as well

Air quality is predicted to improve for in the Manningham Lane and Thornton Road AQMAs under business as usual projections meaning additional local measures to reduce emissions in these AQMAs are of lower priority in terms of local air quality management. However, air quality in the remaining two AQMAs – Mayo Avenue and Shipley Airedale Road is predicted to exceed the objective unless action is taken to reduce pollutant contributions (NO<sub>2</sub> in particular) from road transport by 25-40%.

### 2.11.1 Key environmental issues

Greater pressures on air quality may occur in the future through increases in the population of the borough, greater development and increased traffic congestion. This could lead to the designation of additional AQMAs to address local impacts on air quality. However, the LFRMS is not likely to impact on air quality in the borough, and any impacts, such as through increased flood risk management activity, are unlikely to be significant. Indirect impacts from a strategic approach to green infrastructure and regeneration projects which link locally important wildlife corridors and habitats, through urban tree planting schemes could in the future contribute to improvements to air quality.

## 2.12 Climate

Bradford has a temperate climate, with limited seasonal temperature ranges, and generally moderate rainfall throughout the year. Rainfall averages around 870 mm (34 in) per year with over 1 mm falling on 139 days. Sunshine amounts of 1250 hours per year is low, as one would expect of an inland location in Northern England located amongst upland areas (Met Office, 2016).

The UK Climate Projection (UKCP09) provides probability-based projections of key climate variables, such as temperature and rainfall at a higher geographic resolution than has previously been available. Current projections point to significant and more variable temperature and rainfall levels in future, with greater peak temperatures and prolonged hot periods forecast. In general, warmer weather, wetter winters and hotter and drier summers, with extreme events more frequent. Climate changes can affect local flood risk in several ways with impacts depending on local conditions. Wetter winters may increase river flooding with more intense rainfall leading to more surface runoff, increasing localised flooding and erosion may increase pressure on drains, sewers and water quality. There is also a potential relationship between longer hotter summers and water quality in that the initial runoff during a rain event after a long dry summer can be very heavily polluted. Flood protection measure may have a role to play in minimising this.

With rainfall frequency and intensity set to significantly increase in the coming decades, the likelihood of river flooding and overwhelming of drains and sewers will rise due increased surface runoff. This in turn will lead to localised flood events and increased erosion. To accommodate the increased likelihood of such events, the LFRMS must implement measures aimed at adaptation or resilience to flood risks (City of Bradford MDC, 2014).

More frequent severe storms with higher intensity periods of rainfall will increase run-off from land and buildings, will cause rivers and streams to experience higher than normal flood flows and levels, and sewers and drains to discharge more frequently than at present. Bradford is particularly vulnerable to flooding caused by direct rainfall. Climate change could therefore increase the numbers of properties at risk and the incidence of blockages in watercourses, drains and culverts. It could also cause disruptions to low lying sections of roads and railways.

The LFRMS options, could potentially, both directly and indirectly, lead to an increase in greenhouse gas emissions because of construction and maintenance activities. Emissions could be reduced by selecting, sustainable building practices and materials, sources of materials and methods of construction. Water consumption and flood risk mitigation measures could influence local building regulation standards for range of development types.

### 2.12.1 Key environmental issues

With rainfall frequency and intensity set to significantly increase in the coming decades, the likelihood of river flooding and overwhelming of drains and sewers will rise due increased surface runoff. This in turn will lead to localised flood events and increased erosion. To accommodate the increased likelihood of such events the LFRMS must implement measures aimed at coping with them.

Climate change projections are realised, the adverse risk and impact toward Bradford’s infrastructure, public health and the natural environment has the potential to be great. The natural environment changing climate, and changing temperatures poses the biggest threat. Species and habitat abundance and richness will become threatened because of changing habitats, drier soils and increased competition from non-native invasive species throughout the borough’s watercourses.

Flooding derived from increased rainfall and storm events of greater severity is expected to result in significant adverse impacts on utility, residential and transport infrastructure with subsequent economic consequences. Damage to infrastructure at the forecasted extent will inevitably incur large economic costs as well as social and public health implications because of the distress and risk to disruption caused which could impact on local and regional economy.

The LFRMS options, could potentially, both directly and indirectly, lead to an increase in greenhouse gas emissions because of construction and maintenance activities. Emissions could be reduced by selecting, sustainable building practices and materials that benefit flood risk and carbon emissions.

### 2.13 Scoping conclusion

Following a review of this environmental baseline data it was possible to scope out air quality as an SEA issue as it is unlikely that there will be a significant environmental impact on air quality and only indirect impacts in the borough from implementation of the LFRMS. A summary of the scoping conclusions is given in Table 2-5 below.

Table 2-5: SEA scoping assessment summary

Receptor	Scoped In / Out	Conclusion
<b>Landscape and visual amenity</b>	In	The landscape qualities and integrity of the borough could be affected by changes to flood risk or land use/management, including new development, whilst increased flood risk could impact on locally important urban and rural landscapes and landscape features. Flood risk management could potentially impact on local landscape features, potentially within the rural areas and other locally important landscape areas both positively and negatively.
<b>Biodiversity, flora and fauna</b>	In	National and locally important biodiversity sites and species within the Borough, including SPA, SSSI, LNR and BAP habitats and species may be affected by the water environment and flooding. There is one SPA and two SAC’s, many SSSIs and LNRs within Bradford at risk from flooding or are water dependent. Future incidences of flooding could potentially change the underlying nature of habitats and the LFRMS policies may present opportunities for biodiversity gain. LFRMS measures could improve the river channel by removal of blockages, which would be of benefit to fish passage. Habitat creation or enhancement could also be incorporated into LFRMS measures, for example through the implementation of more natural flood risk management measures.
<b>Water environment</b>	In	Flooding has the potential to impact on water availability, the water quality of the watercourses within the borough and WFD objectives. There is the potential for indirect impacts on water dependent designated sites/species and habitats. Flood risk management measures could potentially affect the water environment both positively and negatively. The LFRMS could give rise to changes in flood risk and water quality, and could affect provision of water resources.
<b>Soils and geology</b>	In	Changes to flood risk could affect soil quality and underlying geology. Subsequent erosion of these lands could give rise to pollution pathways, increasing the risk of an adverse effect on other environmental receptors. Flooding has the potential to erode soils and cause waterlogging impacting on agricultural productivity. Impacts on soil quality could then affect other aspects of the environment such as biodiversity and water quality, protected species and habitats.

Receptor	Scoped In / Out	Conclusion
<b>Historic environment</b>	in	Changes to flood risk could have positive or negative impacts on historic sites including scheduled monuments and listed buildings. This includes damage to the fabric of the structures through waterlogging or drought and impacts on their historic value or setting. There are many historic assets in the borough that could be affected by changes to flooding and flood risk management measures. Opportunities may exist to protect important sites from overland flows and improved permeability of urban areas or negative impacts could occur due to increased flood risk to vulnerable sites.
<b>Population</b>	in	A range of socio-economic characteristics of the Bradford borough including social deprivation levels, health and wellbeing, access and recreation, and employment opportunities influence vulnerability to flooding. Critical social infrastructure, including hospitals, schools, and residential and nursing homes could benefit from reduced flood risk. The LFRMS has the potential to provide significant positive benefits to the population of the borough through reduced levels of flood risk to population generally and also vulnerable groups, and increased community resilience, flood awareness and measures to adapt to changes in flood risk.
<b>Material assets</b>	in	Critical infrastructure including the transport network, waste sites, utilities services and emergency services could benefit from reduced flood risk. Conversely, increased flood risk to these sites could cause significant disruption to the borough, impacting on human and economic activity and the environment both in terms of the regional and local economy. Material assets could benefit from reduced flood risk, but the borough could be significantly affected by increased flood risk to these asset, health and wellbeing and economy.
<b>Air quality</b>	Out	The LFRMS is not likely to have a significant effect on air quality in the borough due to the localised nature of any potential indirect impacts.
<b>Climate</b>	In	Changes in flood risk could affect resilience of existing and future population response to climate change. This could have knock-on effects on a range of environmental aspects including biodiversity, water resources and the local landscape. Flood risk management measures could also result in increased carbon emissions associated with new development or increased management activities. The LFRMS may include mitigation, resilience and adaption responses and measures that could contribute to addressing the future impacts of climate change effects. Opportunities to improve climate change adaptation will be considered in the SEA and proposed monitoring indicators in LFRMS.

## 3 SEA assessment framework

### 3.1 Introduction

The SEA framework is used to identify and evaluate the potential environmental issues associated with the implementation of the LFRMS. The framework comprises a set of SEA objectives that have been developed to reflect the key environmental issues identified from the baseline information review. These objectives are supported by a series of indicators, which are used as a means to measure the potential significance of the environmental issues and can also be used to monitor implementation of the LFRMS objectives. These LFRMS objectives are tested against the SEA framework to identify whether each option will support or inhibit achievement of each objective.

The purpose and requirements of the SEA objectives and indicators are referred to briefly in Table 3-1.

Table 3-1: Definition of SEA objectives, indicators and targets

	Purpose
<b>Objective</b>	Provide a benchmark 'intention' against which environmental effects of the plan can be tested. They need to be fit-for-purpose.
<b>Indicator</b>	Provide a means of measuring the progress towards achieving the environmental objectives over time. They need to be measurable and relevant and ideally rely on existing monitoring networks.

### 3.2 SEA objectives and indicators

SEA objectives and indicators have been compiled for each of the environmental receptors (Table 3-2) (or groups of environmental receptors) scoped into the study during this phase of the project (see Table 2-5). These objectives are currently in draft form and can be refined or revised in response to comments received during the consultation phase on this SEA



Scoping Report and in light of any additional information obtained during the completion of Environmental Report and monitoring indicators of adopted Bradford Council LFRMS.

Table 3-2: SEA objectives and indicators

Receptor	Objective	Indicator
Landscape	1 Protect the integrity of the Borough's urban and rural landscapes, and promote the key characteristics of the NCA's, LCA's, the Green Belt and the World Heritage Site in Saltaire.	Changes in the condition and extent of existing characteristic elements of the landscape. The condition and quality of new characteristics introduced to the environment. Percentage of open countryside, Green Belt or Green Infrastructure.
Biodiversity, flora and fauna	2 Protect and enhance designated and BAP habitats and species in the borough.	Area of designated sites adversely affected by flooding. Monitoring of reported status of designated nature conservation sites.
	3 Maintain and enhance habitat connectivity and wildlife corridors within the borough.	Percentage of land designated as nature conservation sites as a result of LFRMS measures. Area of habitat created as a result of implementation of the LFRMS (e.g. flood storage areas creating wetland habitat).
	4 Maintain existing, and where possible create new, riverine and wetland habitat to benefit migratory and aquatic species and fisheries, and maintain upstream access.	Review of maintenance regimes annually. Number of habitat improvement projects delivered through flood risk management projects.
Water environment	5 Improve the quality and quantity of the water in the borough's rivers.	Water quality of the borough's watercourses. Number of pollution incidents. Number of SuDS schemes installed as part of the LFRMS and registered on the asset register. Number and volume of Environment Agency licensed abstractions. Numbers of sites with high pollution potential (e.g. landfill sites, waste water treatment works) at risk from flooding. Number of ordinary watercourse consents and main river permits within the district.
	6 Do not inhibit achievement of the WFD objectives and contribute to their achievement where possible.	Achievement of WFD objectives. Percentage of water bodies achieving 'Good' ecological status/potential. Number of physical modifications approved by other consent processes Number of enforcement cases on physical modifications affecting land drainage No deterioration in WFD status.
Soils and geology	7 Reduce the risk of soil erosion and pollution.	Area of agricultural, rural and greenfield land affected by flooding or LFRMS measures. Numbers of sites with high pollution potential (e.g. landfill sites, waste water treatment works) at risk from flooding.
Historic environment	8 Preserve and, where appropriate enhance historic, environmental and cultural sites in the borough.	Number of historic assets at risk from flooding, and assessment of impact. Number of vulnerable historic assets protected from flooding by implementation of the LFRMS. Number of heritage assets whose significance has been harmed through flood defence works
Population	9 Minimise the risk of flooding to communities and social infrastructure.	Number of residential properties at risk of flooding. Number of key services (e.g. hospitals, health centres, residential/care homes, schools etc.) at risk from flooding. Number of property level protections schemes per year. Number of community flood plans in place. Number of exercises completed annually on flood response plans.
	10 Increase the use of SuDS, particularly in all new developments.	Number of SuDS schemes installed as part of the LFRMS.
Material assets	11 Minimise the impacts of flooding to the borough's transport network and key critical infrastructure.	Length of road and rail infrastructure at risk from flooding. Number of key infrastructure assets at risk from flooding. Number of reviewed and existing flood warning systems in the district.
Climate	12 Reduce vulnerability to climate	Number of residential properties at risk of flooding.

Receptor	Objective	Indicator
	change impacts and promote measures to enable adaptation to climate change impacts.	Number of key services (e.g. hospitals, health centres, residential/care homes, schools etc.) at risk from flooding. Area of habitat created as a result of implementation of the LFRMS (e.g. flood storage areas creating wetland habitat).

## 4 Strategy alternatives

### 4.1 Developing alternatives

The SEA Directive requires an assessment of the plan and its 'reasonable alternatives'. To assess reasonable alternatives, different strategy options for delivering the LFRMS have been assessed at a strategic level against the SEA objectives, and the environmental baseline as detailed in Section 2. The results of this assessment will be used to inform the decision-making process in choosing a preferred way of delivering the LFRMS.

### 4.2 Appraisal of actions to improve flood risk

The LFRMS has the purpose of managing and reducing local flood risk in the Bradford Borough. The strategy objectives have been assessed against the SEA objectives for each of the following options as shown in Table 4-1.

1. **Do nothing:** where no action is taken and existing assets and ordinary watercourses are abandoned.
2. **Maintain current FRM regime:** where existing assets and watercourses are maintained as present in line with current levels of flood risk. Existing infrastructure is not improved over time and the effects of climate change are not taken into account; and
3. **Manage and reduce local flood risk:** take action to reduce the social, economic and environmental impact due to flooding.

Table 4-1: Assessment of the strategy and alternative options against the SEA objectives

SEA Objectives		Options and Effects		
		Do Nothing	Maintain current FRM regime	Manage and reduce local flood risk
1	Protect the integrity of the Borough's urban and rural landscapes, and promote the key characteristics of the NCA's, LCA's, the Green Belt and the World Heritage Site in Saltaire.	Potential negative effect resulting from no management that could adversely impact on sensitive urban landscape character. However, abandonment of assets may allow for the development of a more natural watercourse which may enhance the local landscape character of the Borough, particularly in rural areas.	No change to the baseline in the short to medium term. However, with increasing flood risk, negative effects could occur on sensitive urban landscape character, whilst positive effects may occur in rural areas as the Borough's watercourses increasingly reconnect to their floodplain.	Potential for managing and promoting this objective through sensitively designed FRM schemes, which enhance local landscape character, historic assets and open land. Conversely, inappropriate management schemes could damage key landscape features and characteristics.
2	Protect and enhance designated and BAP habitats and species in the borough.	Potential for both adverse and beneficial impacts. For example, abandonment of assets may allow for the development of a more natural watercourse (enhancing certain notable species and habitats). However, there would be an increased risk of spreading non-native invasive species and potential impacts on water quality through increased flooding.	No change to baseline in the short to medium term. Increased flooding in the future may provide opportunities for new habitat creation, but may also result in the spread non-native invasive species or adversely impact on habitats intolerant of increased inundation or changes in water quality.	Potential for both adverse and beneficial impacts because of active management. Opportunities may arise to enhance habitats and species through the implementation of multi-functional FRM measures, such as the provision of new green infrastructure.
3	Maintain and enhance habitat connectivity and wildlife corridors within the borough.	Potential for both adverse and beneficial impacts. Abandonment of assets would allow for corridors to develop that would be unrestricted by flood risk assets. However, the increased risk of spreading non-native invasive species would inhibit the biodiversity	No change to baseline in the short to medium term. Increased flooding in the future may provide opportunities for new habitat creation, but may also result in the spread non-native invasive species or adversely impact on habitats	Potential for both adverse and beneficial impacts because of active management. Opportunities may arise to enhance habitats and species through the implementation of multi-functional FRM measures, such as the provision of new green infrastructure.



SEA Objectives		Options and Effects		
		Do Nothing	Maintain current FRM regime	Manage and reduce local flood risk
		value of wildlife corridors.	intolerant of increased inundation or changes in water quality.	
4	Maintain existing, and where possible create new, riverine and wetland habitat to benefit migratory and aquatic species and fisheries, and maintain upstream access.	Potential for both adverse and beneficial impacts. For example, existing habitat may deteriorate because of increased flooding (however, this will often depend on what the site is designated for) and blockages may occur due to the movement of sediment. However, abandonment of assets may allow a more natural riverine system to develop.	No change to baseline. However, because of increased flooding in the future due to climate change new habitats may be created or existing wetland habitats enhanced. However, habitats intolerant of increased inundation or changes in water quality may be adversely affected.	Potential for both adverse and beneficial impacts because of active management. Significant opportunities may exist for habitat creation because of implementing measures to reduce local flood risk. Conversely, the introduction of new assets may damage riverine habitat and introduce blockages for fish access to upstream watercourses if not implemented appropriately.
5	Improve the quality and quantity of the water in the borough's rivers.	Potential for both adverse and beneficial impacts. For example, abandonment of assets may allow for the development of a more natural watercourse and fewer assets are likely to reduce constrictions on water flow and hence water availability and quantity. However, there would be no management of water quality issues such as runoff, whilst flood risk to contaminated sites may increase, leading to increased surface and groundwater contamination.	No change to baseline levels in the short to medium term. However, increased flood risk in the future may result in a reduction in surface water and groundwater quality due to contamination from surface water runoff or from contaminated sites.	Management of watercourses allows water quality to be monitored and potentially improved. Taking further action to reduce local flood risk may also improve water quality through reduced flood risk to potentially contaminated sites. However, the introduction of further flood risk assets to watercourses may result in constrictions to water flow, reducing water availability. Careful management of the implementation of such assets can prevent these adverse effects.
6	Do not inhibit achievement of the WFD objectives and contribute to their achievement where possible.	Potential for both adverse and beneficial impacts. For example, abandonment of assets may allow for the development of more natural watercourses. However, there would be an increased risk of spreading non-native, invasive species through flooding and pollution to watercourses could become more widespread.	No change to current measures to meet WFD objectives.	Potential for both adverse and beneficial impacts depending upon the specific statuses and objectives of the waterbody as identified in the RBMP. Opportunities for achieving WFD objectives may arise through the implementation of measures to reduce local flood risk.
7	Reduce the risk of soil erosion and pollution.	Potential negative effect on soil quality, particularly in areas of high land quality, resulting from increased erosion of soils from flooding and no management of land contamination risks and subsequent effects.	No change to baseline. However, in the future, because of climate change, adverse impacts may arise through erosion and land contamination from increased flooding.	Potential for managing and promoting this objective through reduced flood risk.
8	Preserve and, where appropriate enhance historic, environment and cultural sites in the borough.	Potential for both adverse and beneficial impacts. Historic, environment assets and cultural heritage assets may be exposed to greater damage and deterioration through increased flood risk. Conversely, increased water inundation may help preserve some assets dependent on waterlogging, whilst the declining condition of FRM assets from no management and greater connectivity to the floodplain	No change to baseline. However, in the future historic environment assets and cultural heritage may be exposed to increased flooding and damage due to climate change.	Potential for both adverse and beneficial impacts because of active management, for example through increased protection to vulnerable historic environment assets or improvements to their settings.

SEA Objectives		Options and Effects		
		Do Nothing	Maintain current FRM regime	Manage and reduce local flood risk
		could improve the setting of historic assets.		
9	Minimise the risk of flooding to communities and social infrastructure.	Increased exposure to flood risk from a combination of no management and climate change. This could lead to a greater number of people and their properties at risk of flooding, causing greater damage and disruption, and increases in social exclusion, deprivation and health risks.	No improvements to health and well-being as existing risk maintained and risk may increase in the future as a result of climate change.	Active management to reduce local flood risk should help to protect residential properties and key social infrastructure services from flooding. This has the potential to create a range of social benefits including reducing associated health impacts and social deprivation.
10	Increase the use of SuDS, particularly in all new developments.	This option would result in no increase in the use of SuDS in the future. Surface runoff volumes would be likely to increase, further exacerbating flood risk events. In addition, the declining condition from no management of existing SuDS schemes and lack of additional schemes may reduce the ability to manage future impacts of climate change.	No change to the baseline in the short to medium term. However, with increasing flood risk, the lack of additional SuDS schemes may reduce the ability to manage future impacts of climate change.	Active management to reduce flood risk would incorporate the greater use of SuDS schemes to reduce the rate and volume of surface water runoff, particularly in new developments. This will contribute to climate change mitigation and adaptation initiatives and can provide a range of other environmental benefits, including biodiversity enhancements and the provision of new recreation and amenity opportunities.
11	Minimise the impacts of flooding to the borough's transport network and key critical infrastructure.	This option is likely to result in increased flood risk to key infrastructure, which would cause significant disruption to the Borough, impacting on human and economic activity and the environment.	This option would maintain the current risk levels, although risk may increase in the future because of climate change.	FRM options may reduce flood risk to key critical infrastructure, reducing disruption during flood events and enabling a more effective response.
12	Reduce vulnerability to climate change impacts and promote measures to enable adaptation to climate change impacts.	This option would result in no active adaptation or response to climate change (specifically, FRM). This would lead to a risk of adverse impacts to all receptors in the short, medium and long-term. However, the loss of existing FRM assets may result in a greater reconnection of the river to its floodplain, which could benefit a range of habitats and species.	No adaptation or response to climate change in terms of FRM. High risk for adverse impacts to all receptors in the short, medium and long-term.	The LFRMS includes full consideration of climate change adaptation in terms of FRM. This will reduce the overall risk of flooding and the potential for flood damages in the short, medium and long-term future, benefiting both people and property.

The assessment described in Table 4-1 indicates that Option 1 (do nothing) is likely to result in several significant adverse impacts, particularly in relation to people and property, and other environmental assets including historic assets and biodiversity, where increased flooding may create new pathways for the spread of invasive non-native species. Surface water and groundwater quality could also be adversely affected, with increased flooding of contaminated sites leading to greater impacts on water resources. Conversely, increased flood risk may result in greater connectivity between watercourse and their floodplains, offering opportunities for habitat creation of benefit to a range of protected and notable species.

Option 2 (maintain current FRM regime) is likely to result in little or no change in the environmental baseline in the short to medium term as the existing FRM regime continues to maintain existing levels of flood protection. However, because of future climate change, flood risk will increase, resulting in many of the impacts identified under Option 1, although potentially to a lesser extent and significance.

Option 3 (manage and reduce local flood risk) has the potential to provide a range of environmental benefits. FRM initiatives, if designed and implemented in an appropriate manner, could have multiple benefits. This could include reducing flood risk to people and property, contributing to the protection of heritage assets and improvements in water quality, and providing new opportunities for habitat creation and the provision of recreation and amenity assets. Conversely, FRM measures, if implemented in an inappropriate manner, could result in adverse effects on a range of environmental features. However, this risk is managed through the preparation of this SEA and through the planning and consenting process, which is likely to require consideration of the sustainability of a project prior to its implementation. Therefore, it is evident that by doing nothing or maintaining current levels of management, there are likely to be detrimental effects on the SEA objectives, which are likely to be prevented by carrying out active FRM as proposed by the LFRMS.

### 4.3 Strategy objectives and measures

The following LFRMS objectives and delivery actions ('measures') have been developed. The SEA appraises these objectives (Table 4-2) and measures (Table 4-3) to determine whether they would inhibit achievement of the SEA objectives, or conversely, contribute to their delivery.

Table 4-2: LFRMS objectives

Objective ID	LFRMS objective
1	Improve Understanding of Flood Risk within Bradford District (Section 8.1)
2	Reduce the Impact of Flooding (Subject to Available Resources) (Section 8.2)
3	Communicate Flood Risk to Partners and Stakeholders (Section 8.3)
4	Targeted Maintenance (Section 8.4)
5	Ensure Appropriate Development in Bradford District (Section 8.5)
6	Improve Flood Response and Post Flood Recovery (Section 8.6)

Table 4-3: LFRMS Measures

Objective ID	Measure ID	Measure
1	BD1	Maintain a statutory register of significant obstructions to flow within Districts watercourse, based on flood risk (recording location, capacity, condition, ownership etc. Significant obstructions to flow include bridges, culverts, trash screens, flumes, weirs etc.
	BD2	Maintain a statutory register of other watercourses structures and features (Walls and embankments etc.) that are deemed to act as flood defences.
	BD3	Ensure that future reports of watercourse, surface water and groundwater flooding are responded to by carrying out appropriate site investigations to capture relevant flood detail, including the mechanisms of flooding and resulting impact.
	BD4	Maintain effective communication links with external and flood risk management authorities to share information on flood risk and arrive at effective flood responses. Maintain open communication with internal risk management teams and ensure that relevant flooding records are held in order to improve overall understanding of flood risk.
	BD5	Capture all available recorded and reported information on significant flooding incidents caused by watercourse, surface water runoff and groundwater. Ensure relevant records are held and complete and publish SFRA.
2	BD6	Utilise potential funding sources to undertake necessary investigations, which will identify risk areas where there are capital needs. Investigations will utilise local flood risk information and where appropriate employing computer modelling analysis to assess flood mechanisms within each of these areas to arrive at cost effective flood management solutions, subject to available resources.
	BD7	Maintain engagement with riparian owners and significant land owners to negotiate the effective use of watercourses and open land for flood storage, subject to available resources.
3	BD8	To effectively communicate information on managing flood risk in the CBMDC required to publish the summary of the LFRMS and maintain open communication with other flood risk management authorities, including neighbouring LLFA's. The



		Council will continue to liaise with West Yorkshire Flood Risk Management Partnership (WYFRMP) and attend and hold LLFA meetings.
	BD9	To communicate directly with communities, businesses and organisations, landowners and the general public to contribute to community forums in identified risk areas to raise awareness and provide guidance on flood risk management.
	BD15	Produce community flood and emergency plans. Ensure ongoing communication with all internal and external RMA's. Plan and attend community forums to raise awareness. Apply legislation to guide residents regarding their flood risk.
4	BD10	Continue to target investigation and clearance works of watercourses and associated assets (highway trash screens, bridges and culverts) managed by CBMDC. The frequency of works based on flood risk and available resources. Ensure private riparian owners are contacted when maintenance works are required to maintain unimpeded flow within privately managed watercourses.
5	BD11	To ensure future developments are sustainable and do not increase flood risk and contribute towards sustainable development. LLFA acting as a statutory consultee to the planning authority on major developments (greater than ten units) and other developments (less than ten units) to ensure robust sustainable drainage systems are provided wherever appropriate and develop a robust local policy and clear guidance on consenting for works in watercourse. Utilise all available flood risk and climate change information to deliver sustainable drainage outcomes for the sites that become development through the local plan process through the Strategic Flood Risk Assessment and Bradford Core Strategy. Securing developer contributions where appropriate to mitigate increased flood risk resulting from development. Providing advice or mitigation measures to offset the environmental impact of development by enhancing biodiversity and water quality within areas designated for flood storage.
	BD12	Engage with significant developers to raise awareness of catchment wide flood risk management initiatives and potentials for aligning with benefits from them. Manage applications for consents of ordinary watercourses and local consents policy.
6	BD13	13 Maintain effective communication links with the Met office and the EA to ensure the most accurate forecast information on rainfall and anticipated flood impact is received. Maintain regular liaison with flood risk partners, emergency services, Bradford Council Emergency Planning Team, other service areas and Bradford Council contact centre before during and after significant rainfall events. Provide clear messages and regular updates via an internal indicative flood forecast and the media.
	BD14	Maintain the use of on the ground observers to feedback and record information on flood extents and impact during the post event. Investigate opportunities to establish volunteer flood wardens within the district. In conjunction with other Council departments and EA to develop Community Emergency and Flood Plans for Parish and Town Councils within Bradford District.

## 5 Appraisal of LFRMS objectives to improve flood risk

### 5.1 Impact significance

The unmitigated impacts of the LFRMS objectives on achieving the SEA objectives were identified through the analysis of the baseline environmental conditions and use of professional judgement. The significance of effects was scored using the five-point scale summarised in Table 5-1. If a high level of uncertainty regarding the likelihood and potential significance of an impact (either positive or negative) was identified, it was scored as uncertain.

Table 5-1: SEA appraisal codes

Impact significance	Impact symbol
Significant positive impact	++
Minor positive impact	+
Neutral impact	0
Minor negative impact	-
Significant negative impact	--
Uncertain impact	?

Throughout the assessment the following approach was applied:

- Positive, neutral and negative impacts are assessed, with uncertain impacts highlighted.
- The duration of the impact is considered over the short, medium and long term.
- The reversibility and permanence of the impact are assessed (e.g. temporary construction impacts, impacts which can be mitigated against/restored over time or completely irreversible changes to the environment).
- In-combination effects are also considered.

### 5.2 LFRMS impacts assessment

Table 5-2 and Table 5-4 provides a summary of the outcomes of the environmental assessment of the draft LFRMS objectives and measures respectively. Table 5-3 shows the results of the assessment of cumulative effects of the LFRMS objectives on achievement of the SEA objectives, whilst Table 5-5 assesses the cumulative effects associated with the LFRMS measures.

These are qualitative assessments that identify the range of potential effects that the LFRMS may have on delivering the SEA objectives. Where an LFRMS objective is underpinned by a series of actions, each of which may give rise to a range of environmental effects, an overall impact has been identified for each SEA objective

Table 5-2: Assessment of LFRMS objectives against SEA objectives

LFRMS objective reference	LFRMS objectives	SEA objectives												Comments
		1	2	3	4	5	6	7	8	9	10	11	12	
1	Improve Understanding of Flood Risk within Bradford District (Section 8.1 of the LFRMS)	0	0	0	0	0	0	+	+	+	0	+	+	Improving the understanding of flood risk within Bradford District has the potential to contribute to objectives 7 8, 9, 11 and 12 which focus on the reduction of flood risk to soil and geology, the built environment and communities, and adaptation to climate change effects. All of these SEA objectives would require a strong understanding of flood risk to be achieved properly. There is likely to be a neutral impact in relation to all other SEA objectives.
2	Reduce the Impact of Flooding (Subject to Available Resources) (Section 8.2 of the LFRMS)	+	+	+	+	+	+	+	+	+	++	++	+	This objective seeks to reduce the impact of flooding in the borough through investigation where there are capital needs, assessing flood risk mechanisms and by negotiating the effective use of watercourses and open land for flood storage. As such, this objective seeks to reduce flood risk and therefore could benefit people, historic environment and property (SEA objectives 8 to 12). Engagement with riparian owners and significant land owners will protect the rural landscape (SEA objective 1) and is likely to have some beneficial impacts on biodiversity and the water environment (SEA objective 2 to 6). However, conducting cost-effective flood management solutions could mean that some communities are favoured over others, the LFRMS must ensure that consideration is given to all communities and social infrastructure.
3	Communicate Flood Risk to Partners and Stakeholders (Section 8.3 of the LFRMS)	+	+	+	+	+	+	+	+	+	0	+	+	This LFRMS objective seeks to communicate flood risk information to authorities, communities, businesses, organisations, landowners and the public. It also aims to produce community flood and emergency plans. This objective will directly benefit communities and social infrastructure (SEA Objective 9). Through adequate planning there will also be indirect benefits to the landscape, material assets, historic environment and critical infrastructure. This should be conducted through communication with key stakeholders and effective emergency planning which considered future climate change. There is likely to be a neutral impact to SEA objective 10, as there is no direct link to the increased use of SuDS.
4	Targeted Maintenance (Section 8.4 of the LFRMS)	+	+	+	+	+	+	+	+	+	0	++	0	This objective aims to continue to target investigation and clearance works of watercourses and associated assets. This objective will benefit the boroughs transport network and critical infrastructure (SEA objective 11). There is also opportunity to have indirect benefits to SEA objectives 5 to 7. If the waterways are being maintained regularly this will reduce the likelihood of soil erosion, pollution and contamination. There is likely to be a neutral impact to SEA objective 10, as there is no direct link to the increased use of SuDS or to climate change vulnerability.
5	Ensure Appropriate Development in Bradford District (Section 8.5 of the LFRMS)	0	+	+	+	+	+	+	0	+	++	+	++	This objective has the potential to have many benefits to several SEA objectives. The objective aims to ensure appropriate development in the Bradford District and to offset the environmental impact of development by enhancing biodiversity and water



LFRMS objective reference	LFRMS objectives	SEA objectives												Comments	
		1	2	3	4	5	6	7	8	9	10	11	12		
	LFRMS)														quality within the areas designated for flood storage. This will directly benefit SEA objectives 2 to 6. The objective also aims to ensure robust sustainable drainage systems are provided wherever appropriate, which is in accordance with SEA objective 10. Furthermore, the objective will reduce climate change vulnerability (SEA objective 12) by utilising all available flood risk climate change information to deliver sustainable drainage outcomes. There is likely to be a neutral impact to SEA objective 1 and 8 as any development may affect the integrity of the borough's urban and rural landscape, including its historic environment, if the development is not appropriate for the area.
6	Improve Flood Response and Post Flood Recovery (Section 8.6 of the LFRMS)	0	0	0	0	0	0	0	+	+	0	++	++	This LFRMS objective will strongly benefit SEA objectives 9 and 11 because it aims to provide clear and regular updates on flood risk to the public, flood risk partners and emergency services thereby minimising the risk of flooding to communities, social infrastructure and critical infrastructure. The objective also aims to use ground observers to feedback and record information on flood extents which will reduce the vulnerability to climate change impacts (SEA objective 12). The objective will have mostly neutral effects for the rest for the SEA objectives as there is no direct links with landscape, biodiversity, water environment, soils or geology.	

Table 5-3: Cumulative effects of the LFRMS objectives on SEA objectives

Receptor	SEA objective	Assessment score	Justification	Timescale, probability and permanence of effects
Landscape	1 Protect the integrity of the Borough's urban and rural landscapes, and promote the key characteristics of the NCA's, LCA's, the Green Belt and the World Heritage Site in Saltaire.	+	Overall, the LFRMS objectives are likely to have a positive effect in relation to this SEA objective as the LFRMS includes several objectives that seek to deliver improvements to the environmental quality of the Borough or avoid inappropriate development. Objectives H5 in aims to improve the standard of design and promote environmental protection, by promoting sustainable solutions. No adverse effects on this SEA objective were identified.	Whilst several LFRMS objectives promote protection of the environment through FRM activities it is unclear what the outcomes of this are likely to be. This will depend upon the type and scale of interventions and the specific locations in which they are delivered. However, the LFRMS aims to achieve long term flood risk benefits by influencing the location and quality of development proposals. It is therefore likely that any wider environmental benefits could also be delivered for the long term, although it is equally possible that such benefits would be delivered over a variety of timescales. In addition, the permanence of any wider environmental effects are likely to be dependent upon many other factors and influenced by a range of other proposals.
Biodiversity, flora and fauna	2 Protect and enhance designated and BAP habitats and species in the borough.	+	<p>The LFRMS includes several objectives that have the potential to deliver benefits to the wider environment. These benefits will be achieved by discouraging development in areas at risk of flooding, such as river floodplains, and influencing new development to deliver wider environmental gains, particularly by promoting sustainable solutions.</p> <p>In general, actions to reduce flood risk and promote sustainable solutions are likely to benefit water quality and water resources in the Borough, by reducing the risk of contaminated materials, fuels, chemical and sediments from entering local watercourses.</p>	<p>The positive effects are likely to occur over a range of timescales. The LFRMS may influence development proposals in the short term and in the longer term, and the outcomes of this may be both temporary and permanent depending upon the location and scale of effects that are achieved.</p> <p>At this stage, the scale and permanence of any effects is generally uncertain as the LFRMS objectives encourage sustainable design rather than expressly inhibiting bad design. This means that development could be consented that does not improve environmental quality. There are also many variables on the type of development, from geographic scale and location to the type of environmental receptors of the development. For positive effects to be more certain, a robust planning process that considers the LFRMS objectives is required.</p>
	3 Maintain and enhance habitat connectivity and wildlife corridors within the borough.			
	4 Maintain existing, and where possible create new, riverine and wetland habitat to benefit migratory and aquatic species and fisheries, and maintain upstream access.			
Water environment	5 Improve the quality and quantity of the water in the borough's rivers.	+		
	6 Do not inhibit achievement of the WFD objectives and contribute to their achievement where possible.			
Soils and geology	7 Reduce the risk of soil erosion and pollution.	+		
Historic environment	8 Preserve and, where appropriate enhance historic, environment and cultural sites in the borough.	+	The LFRMS objectives have a generally positive impact on this SEA objective as the LFRMS aims to reduce risk of flooding to the Borough. A reduction in risk of flooding within the Borough generally will reduce the risk of flooding to important historic and cultural sites, now and in	The effects of the LFRMS are likely to occur over a range of timescales. However, the LFRMS seeks to deliver long-term flood risk benefits and so any historic assets protected may benefit in the longer term. The permanence of any effects will depend upon the specific

				the future. There are no LFRMS objectives that specifically aim to protect and enhance historical and cultural assets, which lessens the positive impact on this SEA objective, and therefore an overall minor positive effect has been identified. However, any FRM measure that is likely to impact on a historic or cultural asset should be fully assessed, as some assets may require waterlogged conditions for protection. Any development proposed should also be assessed individually as the development itself could affect the fabric or setting of a known or unknown historic asset.	details of the FRM measure being implemented and the nature, scale and location of this intervention.
<b>Population</b>	9	Minimise the risk of flooding to communities and social infrastructure.	++	The LFRMS is likely to provide a significant positive effect in relation to this SEA objective. Most objectives seek to deliver improved FRM for local people, with objective 5 perhaps the objective most focused on achieving this. Improving FRM and reducing flood risk across the Borough could deliver a range of benefits to the local community including alleviating the cost and disruption associated with flooding, whilst reducing stress and anxiety associated with the risk of flooding. In addition, wider societal benefits could be achieved by reducing flood risk and improving the environmental quality of the Borough. Benefits could include reduced social deprivation and greater community cohesion.	Most of the LFRMS objectives directly seek to reduce flood risk and therefore it is very likely that positive effects will occur. Given the range of objectives, it is also likely that effects will occur over a range of timescales and will include both temporary and permanent effects.
	10	Increase the use of SuDS, particularly in all new developments.	+	Although not specifically addressed within the LFRMS objectives, SuDS is likely to play an important role in achieving several of the objectives to reduce flood risk, promote better land management and influence the quality of new development. Objective 5 may increase the use of SuDS by ensuring robust sustainable drainage systems are provided wherever appropriate.	SuDS may play a role in the delivery of some of the LFRMS objectives, particularly in relation to influencing the design and new development, and therefore it is likely that the LFRMS will contribute towards achieving this SEA objective. The timescale for achieving this is likely to vary depending upon the scale of development proposals and the resources available to deliver the LFRMS actions. The effects are likely to be permanent if SuDS schemes can be successfully incorporated into these new development proposals.
<b>Material assets</b>	11	Minimise the impacts of flooding to the borough's transport network and key critical infrastructure.	++	The LFRMS objectives are likely to have a significant positive effect on this SEA objective as many of the LFRMS objectives are aimed at reducing the risk of flooding to people and property, particularly LFRMS objectives 2 and 4. Implementing FRM measures will reduce the risk of flooding to the Borough, which will include a reduction in the risk of flooding to the Borough's transport networks.	The LFRMS includes several objectives to reduce flood risk and therefore it is very likely that the positive effects will occur. Given the range of relevant LFRMS objectives, it is likely that effects will occur over a range of timescales.



<b>Climate</b>	12	Reduce vulnerability to climate change impacts and promote measures to enable adaptation to climate change impacts.	+	FRM measures that are introduced because of this LFRMS will consider climate change in their design, providing a positive effect on this SEA objective. However, measures to enable adaptation to climate change could be more expressly promoted within the LFRMS. Therefore, the LFRMS only has a minor positive effect on this SEA objective.	The nature of the effects will be influenced by a wide range of factors outside the direct control of the LFRMS. Therefore, it is difficult to predict at this stage the likely timescale, probability or permanence of effects. It is likely that effects will be achieved over a variety of timescales and their significance will be linked to the scale and nature at which climate change occurs. However, the LFRMS will promote better FRM and will reduce flood risk across the Borough and there are significant drivers requiring climate change considerations to be built into these FRM actions. Therefore, it is likely that the LFRMS will provide an important means for monitoring the flood risk effects of climate change and implementing actions to address these effects.
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Table 5-4: Assessment of LFRMS measures against SEA objectives

LFRMS Objective Reference	Measure ID	Measure	SEA objectives												Comments
			1	2	3	4	5	6	7	8	9	10	11	12	
1	BD1	Maintain a statutory register of significant obstructions to flow within Districts watercourse, based on flood risk (recording location, capacity, condition, ownership etc. Significant obstructions to flow include bridges, culverts, trash screens, flumes, weirs etc.	0	+	+	0	+	+	+	+	++	0	+	+	Up-to-date information about obstructions to flow, watercourse structures and flood risk (BD1 and BD2) are important to reduce the risk of soil erosion, water contamination and pollution, preserve the historic environment, minimise risk of flooding and reduce climate change vulnerability. It is also important to carry out appropriate site visits to be fully aware of the flood risk to the borough (BD3). This is because the register will allow the acting body to see which defences need maintenance before a flood event occurs. These measures are unlikely to have a significant effect on the integrity of the boroughs urban and rural landscape, and there is no mention of SuDS or creating new riverine habitats. These measures are expected to reduce the impact of flooding in the community. This will have a positive effect on SEA objectives 7, 8, 9, 11 and 12. As these measures are primarily focused on communication it is unlikely that they will have a positive or negative impact on SEA objectives 1 to 7 and 10.
	BD2	Maintain a statutory register of other watercourses structures and features (Walls and embankments etc.) that are deemed to act as flood defences.	0	+	+	0	+	+	+	+	++	0	+	+	
	BD3	Ensure that future reports of watercourse, surface water and groundwater flooding are responded to by carrying out appropriate site investigations to capture relevant flood detail, including the mechanisms of flooding and resulting impact.	0	+	+	0	+	+	+	+	++	0	+	+	
	BD4	Maintain effective communication links with external and flood risk management authorities to share information on flood risk and arrive at effective flood responses. Maintain open communication with internal risk management teams and ensure that relevant flooding records are held in order to improve overall understanding of flood risk.	0	0	0	0	0	0	+	+	+	0	+	+	
	BD5	Capture all available recorded and reported information on significant flooding incidents caused by watercourse, surface water runoff and groundwater. Ensure relevant records are held and complete and publish SFRA.	0	0	0	0	0	0	+	+	+	0	+	+	
2	BD6	Utilise potential funding sources to undertake necessary investigations, which will identify risk areas where there are capital needs. Investigations will utilise local flood risk information and where appropriate employing computer modelling analysis to assess flood mechanisms within each of these areas to arrive at cost effective flood management solutions, subject to available resources	++	+	+	+	+	+	+	+	+	+	++	+	These measures seek to reduce the impact of flooding in the borough through investigation where there are capital needs, assessing flood risk mechanisms and by negotiating the effective use of watercourses and open land for flood storage. As such, these measures seek to reduce flood risk and therefore could benefit people, historic environment and property (SEA objectives 8 to 12). Engagement with riparian owners and significant land owners will protect the rural landscape (SEA objective 1) and is likely to have some beneficial impacts on biodiversity and the water environment (SEA objective 2 to 6). However, conducting cost-effective flood management solutions could mean that some communities are favoured over others, the LFRMS must ensure that consideration is given to all communities and social infrastructure.
	BD7	Maintain engagement with riparian owners and significant land owners to negotiate the effective use of watercourses and open land for flood storage, subject to available resources.	++	+	+	+	+	+	+	+	+	+	++	+	
3	BD8	To effectively communicate information on managing flood risk in the CBMDC required to publish the summary of the LFRMS and maintain open communication with other flood risk management authorities, including neighbouring LLFA's. The Council will continue to liaise with West Yorkshire Flood Risk Management Partnership (WYFRMP) and attend and hold LLFA meetings.	+	+	+	+	+	+	+	+	++	0	+	+	This LFRMS measures seek to communicate flood risk information to authorities, communities, businesses, organisations, landowners and the public. They also aim to produce community flood and emergency plans. This objective will directly benefit communities and social infrastructure (SEA Objective 9). Through adequate planning there will also be indirect benefits to the landscape, material assets, historic environment and critical infrastructure. This should be conducted through communication with key stakeholders and effective emergency planning which considered future climate change. There is likely to be a neutral impact to SEA objective 10, as there is no direct link to the increased use of SuDS. Furthermore, community flood and emergency plans are unlikely to have positive or negative effects in the natural environment (SEA objectives 1 to 7).
	BD9	To communicate directly with communities, businesses and organisations, landowners and the general public to contribute to community forums in identified risk areas to raise awareness and provide guidance on flood risk management.	+	+	+	+	+	+	+	+	++	0	+	+	
	BD15	Produce community flood and emergency plans. Ensure ongoing communication with all internal and external RMA's. Plan and attend	0	0	0	0	0	0	0	+	++	0	+	+	

LFRMS Objective Reference	Measure ID	Measure	SEA objectives												Comments			
			1	2	3	4	5	6	7	8	9	10	11	12				
		community forums to raise awareness. Apply legislation to guide residents regarding their flood risk.																
4	BD10	Continue to target investigation and clearance works of watercourses and associated assets (highway trash screens, bridges and culverts) managed by CBMDC. The frequency of works based on flood risk and available resources. Ensure private riparian owners are contacted when maintenance works are required to maintain unimpeded flow within privately managed watercourses.	+	+	+	+	++	++	++	+	+	0	++	0		This measure aims to continue to target investigation and clearance works of watercourses and associated assets. This objective will benefit the boroughs transport network and critical infrastructure (SEA objective 11). There is also opportunity to have indirect benefits to SEA objectives 5 to 7. If the waterways are being maintained regularly this will reduce the likelihood of soil erosion, pollution and contamination. There is likely to be a neutral impact to SEA objective 10, as there is no direct link to the increased use of SuDS or to climate change vulnerability.		
5	BD11	To ensure future developments are sustainable and do not increase flood risk and contribute towards sustainable development. LLFA acting as a statutory consultee to the planning authority on major developments (greater than ten units) and other developments (less than ten units) to ensure robust sustainable drainage systems are provided wherever appropriate and develop a robust local policy and clear guidance on consenting for works in watercourse. Utilise all available flood risk and climate change information to deliver sustainable drainage outcomes for the sites that become development through the local plan process through the Strategic Flood Risk Assessment and Bradford Core Strategy. Securing developer contributions where appropriate to mitigate increased flood risk resulting from development. Providing advice or mitigation measures to offset the environmental impact of development by enhancing biodiversity and water quality within areas designated for flood storage.	0	++	+	+	++	++	+	0	++	++	+	++		The measures aim to offset the environmental impact of development by enhancing biodiversity and water quality within the areas designated for flood storage, this will directly benefit SEA objectives 2 to 6. The objective also aims to ensure robust sustainable drainage systems are provided wherever appropriate, which is in accordance with SEA objective 10. Furthermore, the objective will reduce climate change vulnerability (SEA objective 12) by utilising all available flood risk climate change information to deliver sustainable drainage outcomes. There is likely to be a neutral impact to SEA objective 1 and 8 as any development may affect the integrity of the borough's urban and rural landscape, including its historic environment, if the development is not appropriate for the area.		
	BD12	Engage with significant developers to raise awareness of catchment wide flood risk management initiatives and potentials for aligning with benefits from them. Manage applications for consents of ordinary watercourses and local consents policy.	0	++	+	+	++	++	+	0	++	+	+	+				
6	BD13	Maintain effective communication links with the Met office and the EA to ensure the most accurate forecast information on rainfall and anticipated flood impact is received. Maintain regular liaison with flood risk partners, emergency services, Bradford Council Emergency Planning Team, other service areas and Bradford Council contact centre before during and after significant rainfall events. Provide clear messages and regular updates via an internal indicative flood forecast and the media.	0	0	0	0	0	0	0	+	++	0	++	++		These measures will strongly benefit SEA objectives 9 and 11 because they aim to provide clear and regular updates on flood risk to the public, flood risk partners and emergency services thereby minimising the risk of flooding to communities, social infrastructure and critical infrastructure. The measures also aim to use ground observers to feedback and record information on flood extents which will reduce the vulnerability to climate change impacts (SEA objective 12). These measures will have mostly neutral effects for the rest for the SEA objectives as there is no direct links with landscape, biodiversity, water environment, soils or geology.		
	BD14	Maintain the use of on the ground observers to feedback and record information on flood extents and impact during the post event. Investigate opportunities to establish volunteer flood wardens within the district. In conjunction with other Council departments and EA to develop Community Emergency and Flood Plans for Parish and Town Councils within Bradford District.	0	0	0	0	0	0	0	+	++	0	++	++				



Table 5-5: Summary of impacts of LFRMS measures on SEA objectives

Receptor	SEA Objective	Summary of impacts	Timescale, probability and permanence of effects	
<b>Landscape</b>	1	Protect the integrity of the Borough's urban and rural landscapes, and promote the key characteristics of the NCA's, LCA's, the Green Belt and the World Heritage Site in Saltaire.	<p>There is a general lack of information at this stage to identify the types of effects that are likely to occur. Therefore, it is not possible to make a judgement as to the timescale over which they might occur or their likely probability or permanence. It is reasonable to assume that any environmental effects might occur over a range of timescales and will comprise both temporary and permanent effects. It is important that individual actions are assessed at the project stage to determine their potential environmental impacts and that due regard is made to the LFRMS objectives that seek to protect and enhance the environment.</p>	
	<b>Biodiversity, flora and fauna</b>	2		Protect and enhance designated and BAP habitats and species in the borough.
		3		Maintain and enhance habitat connectivity and wildlife corridors within the borough.
<b>Water environment</b>	4	Maintain existing, and where possible create new, riverine and wetland habitat to benefit migratory and aquatic species and fisheries, and maintain upstream access.		
	5	Improve the quality and quantity of the water in the borough's rivers.		
	6	Do not inhibit achievement of the WFD objectives and contribute to their achievement where possible.		
<b>Soils and geology</b>	7	Reduce the risk of soil erosion and pollution.		
<b>Historic environment</b>	8	Preserve and, where appropriate enhance historic, environment and cultural sites in the borough.		
<b>Population</b>	9	Minimise the risk of flooding to communities and social infrastructure.		<p>The LFRMS measures seek to reduce flood risk through maintaining a variety of assets and minimise flood damage. These will improve local flood risk, and by understanding costs, provide a mechanism through which appropriate solutions can be developed. These actions are primarily focused on delivering benefits to people and property and each has the potential to contribute positively to these SEA objectives.</p> <p>Measure BD11 aims to reduce climate change vulnerability by utilising all available flood risk climate change information to deliver sustainable drainage outcomes, and therefore has positive effects on both SEA objectives 10 and 12 (to increase the use of SuDS and reduce climate change vulnerability).</p> <p>At this stage, there is a general lack of information regarding how these actions may be delivered and what effects they might have, and therefore it is difficult to determine the scale or significance of any environmental benefits that might be achieved. Further assessment is required for each action as it is delivered so that the environmental effects, both positive and negative, in relation to the receptors encompassed by these SEA objectives, can be identified.</p>
<b>Material assets</b>	10	Increase the use of SuDS, particularly in all new developments.		
	11	Minimise the impacts of flooding to the borough's transport network and key critical infrastructure.		
<b>Climate</b>	12	Reduce vulnerability to climate change impacts and promote measures to enable adaptation to climate change impacts.		

## 6 Conclusion and recommendations

### 6.1 Conclusions

The LFRMS aims to promote objectives and measures that reduce flood risk within the Borough, while understanding the costs and resources available. The LFRMS objectives aim to provide a mechanism through which appropriate FRM activities can be delivered, such as enabling people and public bodies to work together. The LFRMS is an important tool to protect vulnerable communities and help deliver sustainable regeneration and growth.

This SEA has been undertaken to identify the likely significant environmental effects of implementation of the LFRMS. A proportionate approach was adopted towards establishing the scope of the SEA, reflecting the high-level nature of the LFRMS.

A range of different strategy options for delivering the LFRMS have been assessed at a strategic level against the SEA objectives. These alternatives include the 'do nothing' scenario, where no action is taken and existing assets and ordinary watercourses are abandoned, and the 'maintain current flood risk' scenario, where existing assets and watercourses are maintained as present in line with current levels of flood risk.

The assessment indicates that the 'do nothing' approach is likely to result in a number of significant adverse effects, particularly due to increased flood risk to people and property, and effects on other environmental assets including water quality, historic assets and biodiversity, where increased flooding may create new pathways for the spread of invasive non-native species. These impacts would be likely to increase over time, as responsible bodies will be unable to incorporate precautionary measures in existing or new developments in a response to climate change pressures. Conversely, increased flood risk may result in greater connectivity between watercourses and their floodplains, offering opportunities for habitat creation/enhancement of benefit to a range of protected and notable species.

The option to 'maintain current flood risk' is likely to result in little or no additional impact on the environment in the short to medium term as the existing FRM regime continues to maintain existing levels of flood protection. However, in the future, as a result of climate change, flood risk will increase, resulting in many of the impacts identified under the 'do nothing' scenario, although potentially to a lesser extent and significance.

Therefore, the SEA identifies that implementation of the LFRMS to 'understand and manage flood risk from localised sources' is the only realistic approach to be employed by Bradford Council as it has the potential to provide a range of environmental benefits and offers a pro-active approach to managing flood risk.

#### 6.1.1 LFRMS objectives

Assessment of the LFRMS objectives against the SEA objectives was undertaken (see Table 5-2). No negative environmental effects have been identified. Many of the proposed LFRMS objectives have the potential for both direct and indirect environmental benefits. LFRMS objective 5 in particular has potential to provide a positive contribution to all the SEA objectives and make a significant positive contribution to many of them, as it seeks to promote sustainable solutions that not only reduces flood risk but will also seek to reduce climate change vulnerability. However, the LFRMS objectives could improve; none of the objectives aim to directly benefit the landscape, biodiversity or the soil and geology (SEA objectives 1, 2, 3, 4, and 7) in Bradford. These SEA objectives will have marginal benefits from some of the LFRMS objectives, however these are not direct benefits. The LFRMS could achieve a range of biodiversity benefits, including new habitat creation, enhancement of existing habitats and greater habitat connectivity.

Assessment of LFRMS objective 5 against the SEA objectives has highlighted a risk in avoiding inappropriate development in areas of flood and coastal risk, which could lead to increased development pressure on rural and greenfield land. This risk is likely to be mitigated due to existing planning laws.

In addition, as expected of a strategy for managing flood risk, all of objectives within the strategy will contribute to achievement of the SEA objectives that seek to reduce flood risk to people, property and infrastructure. Significant positive effects to SEA objective 9 result from LFRMS objectives 2, 3, 5 and 6. As a result, the LFRMS is likely to have a significant positive effect on reducing flood risk to local communities.

Some of the LFRMS objectives are likely to assist with climate change adaptation. In particular, measures that reduce flood risk, promote better use of water resources, seek to deliver new habitat creation and better connection between existing habitats (such as de-culverting), could make a significant positive contribution to achievement of SEA objective 12.

At present, the potential effects associated with several of the LFRMS measures are neutral. LFRMS objectives 1 and 6 are largely neutral as they are principally focused on social and flood risk benefits rather than delivering environmental objectives. There is a potential that to achieve these LFRMS objectives it may result in physical interventions that could affect achievement of several of the SEA objectives, depending upon how they are implemented. These risks are directly associated with the type and scale of development or measures to achieve the objectives, and their location in relation to important or sensitive environmental features. However, given that the LFRMS includes objectives to deliver sustainable solutions, such interventions, if delivered in an inappropriate manner, would be likely to conflict with delivery of the LFRMS. Therefore, the LFRMS should ensure integration of its objectives across all underpinning actions so that delivery of individual measures does not conflict with achievement of the wider strategy objectives, but instead seeks to contribute towards these objectives at all stages of the strategy's implementation. Achievement of reducing flood risk can also help to achieve the LFRMS's social objectives, as it would alleviate the cost and disruption associated with flooding, while also reducing the stress and anxiety associated with the risk of flooding.

A detailed assessment of the potential cumulative effects of the LFRMS measures should be undertaken when further details regarding specific project level measures and their implementation are known.

### **6.1.2 LFRMS measures**

Assessment of the LFRMS measures against the SEA objectives was undertaken (Table 5-4). No negative environmental effects have been identified, with the majority having a neutral effect.

As expected of a strategy for managing flood risk, the majority of the LFRMS measures have a positive effect on SEA objective 9, which seeks to reduce flood risk in the Borough. The measures mainly relate to maintaining existing FRM structures and managing surface water flows. As a result, the LFRMS is likely to have a significant positive effect on reducing flood risk to local communities. Many of the LFRMS actions have a neutral effect on the remaining objectives as they are focused on flood risk reduction and understanding costs rather than implementation of new FRM measures. Measures to reduce flood risk could have a range of effects on the natural environment, and have the potential for indirect environmental benefits. LFRMS measure BD11 that includes offsetting the environmental impact of development by enhancing biodiversity has the potential to provide a positive contribution to the SEA objectives concerned with biodiversity.



The reduction of flood risk that many of the LFRMS measures will provide will contribute towards SEA objective 12 by increasing resilience to the effects of climate change. Measure BD11 particularly aims to understand the change and impacts of climate change. This increased understanding has the potential to lead to development and implementation of management measures that will reduce vulnerability to climate change.

The physical interventions that could come as a result of the LFRMS actions could affect the achievement of the SEA objectives, depending on how the actual FRM measures are implemented. These risks are directly associated with the type and scale of the FRM and their location in relation to environmental features. Therefore, the LFRMS should ensure that delivery of these measures does not adversely affect the achievement of the SEA objectives. These physical interventions should be subject to a thorough environmental assessment at the project stage to ensure they are sustainable and are delivered in accordance with the LFRMS objectives.

## 6.2 Recommendations

The assessment of the LFRMS objectives and measures has identified a number of areas where the LFRMS could be strengthened to ensure delivery of a sustainable approach. These areas are associated with social and financial aspects to managing flood risk within the Borough, and not directly aiming to implement FRM measures. Specifically, these apply to the following LFRMS objectives:

- Objective 1 – *Improve Understanding of Flood Risk within Bradford District*
- Objective 3 – *Communicate Flood Risk to Partners and Stakeholders*
- Objective 6 – *Improve Flood Response and Post Flood Recovery*

The LFRMS primarily benefits SEA objectives 9 and 11, but could also include a wider environmental focus that could help to deliver multiple benefits including improvements to the natural and historic environment, which may also help secure FRM funding.

In order to ensure that the LFRMS does not result in adverse effects, all strategy objectives should be integrated so that delivery of individual actions does not conflict with achievement of the wider strategy objectives. In addition, development and implementation of these actions should be effectively managed by ensuring that, where necessary, proposals are assessed to determine their potential environmental effects (positive and negative) in advance of their implementation and that appropriate mitigation measures are built into their delivery as required.

The LFRMS should seek to maximise the potential environmental benefits associated with delivery of these objectives and measures. This can be best achieved through the integration of LFRMS objectives and through close partnership working, so that appropriate resources and funding are effectively allocated.

Table 6-1 summarises the recommendations made by the SEA and shows how the recommendations have been responded to in the LFRMS. The table will be completed following review of the draft Environmental Report, during production of the final Environmental Report.

Table 6-1: How the environmental report has been taken into account in the LFRMS

SEA recommendation	Final decision
LFRMS to be strengthened by considering the SEA objectives as a whole to ensure delivery of a sustainable approach.	The LFRMS has been updated to take account of the SEA objectives to ensure that LFRMS actions will be delivered in a sustainable way.
LFRMS objectives should be integrated so that delivery of individual measures do not conflict with achievement of the wider strategy objectives.	LFRMS actions will be undertaken with consideration of the wider Strategy objectives.

SEA recommendation	Final decision
Proposals should be assessed to determine their potential environmental effects (positive and negative) in advance of implementation and appropriate mitigation measures are built into their delivery as required.	As actions identified in the strategy are investigated in more detail, further environmental assessment will be undertaken during the feasibility stages to identify what appropriate mitigation measures may be required for their delivery.
LFRMS should seek to maximise the potential environmental benefits associated with delivery of the objectives and actions.	LFRMS has been updated to include more explicit reference to WFD and the environment and how the Strategy will seek to maximise environmental benefits during deliver of the objectives and actions.

### 6.3 Monitoring

The SEA Regulations require Bradford Council to monitor the significant environmental effects (positive and negative) upon the implementation of the LFRMS. Key potential environmental effects that require monitoring are listed in Table 6-2. Several of these monitoring requirements are likely to require a partnership approach to effectively track the effects of the strategy. Possible partners for monitoring responsibility are therefore highlighted.

The monitoring indicators will enable the LFRMS to be monitored and any problems or shortfalls to be highlighted and remedied at an early stage. If failings are evident, it will be necessary for the LFRMS to be revised so that the achievement of the SEA objectives is not compromised. Of note, it is unlikely that any effects negative or otherwise will be seen immediately and that the relative time scale for monitoring will vary for each indicator/target.

Table 6-2: SEA monitoring framework

LFRMS objective or measure	SEA objective(s)	Potential significant effects	Monitoring indicator	Possible monitoring and/or delivery partners
Objective 2: Reduce the impact of flooding	9 and 11	Managing flood risk will increase the Borough's resilience to flooding.	Number of residential properties at risk of flooding. Number of key services (e.g. hospitals, health centres, residential/care homes, schools etc.) at risk from flooding. Length of road and rail infrastructure at risk from flooding. Number of key infrastructure assets at risk from flooding.	Bradford MDC, Yorkshire Water Environment Agency
Objective 4: <i>Targeted maintenance</i>	9 and 11	Improving FCERM systems with the objectives of also reducing harm to people, economy, environment and society assists with the achievement of all the SEA objectives.	Number of residential properties at risk of flooding. Number of key services (e.g. hospitals, health centres, residential/care homes, schools etc.) at risk from flooding. Length of road and rail infrastructure at risk from flooding. Number of key infrastructure assets at risk from flooding.	Bradford MDC, Yorkshire Water Environment Agency
Objective 5: <i>Ensure appropriate development in Bradford District</i>	9 and 12	Promoting better land management to avoid development in areas at risk of flooding, and as	Number of residential properties at risk of flooding. Number of key services	Bradford MDC, Yorkshire Water

LFRRMS objective or measure	SEA objective(s)	Potential significant effects	Monitoring indicator	Possible monitoring and/or delivery partners
		such, reducing flood risk to communities and reducing vulnerability to climate change.	(e.g. hospitals, health centres, residential/care homes, schools etc.) at risk from flooding. Number of residential properties at risk of flooding. Number of key services (e.g. hospitals, health centres, residential/care homes, schools etc.) at risk from flooding. Area of habitat created as a result of implementation of the LFRMS (e.g. flood storage areas creating wetland habitat).	Environment Agency
Measure BD11: <i>Utilise all available flood risk and climate change information to deliver sustainable drainage outcomes for the sites that become development through the local plan process through the SFRA and Bradford Core Strategy.</i>	10	Increase of SuDS schemes within the Borough through introducing ways to manage runoff.	Number of SuDS schemes installed as part of the LFRMS. Area/type of green infrastructure created/enhanced.	Bradford MDC, Yorkshire Water Environment Agency
Measure BD6: <i>Investigations will utilise local flood risk information and where appropriate employing computer modelling analysis to assess flood mechanisms within each of these areas to arrive at cost effective flood management solutions, subject to available resources.</i>	9 and 11	Co-ordination will lead to an effective approach to FRM.	Number of residential properties at risk of flooding. Number of key services (e.g. hospitals, health centres, residential/care homes, schools etc.) at risk from flooding. Length of road and rail infrastructure at risk from flooding. Number of key infrastructure assets at risk from flooding.	Bradford MDC, Yorkshire Water Environment Agency
Measure BD10: Continue to target investigation and clearance works of watercourses and associated assets (highway trash screens, bridges and culverts) managed by CBMDC.	9 and 10	There will be a reduction in flood risk to the population while clearance of waterways continues.	Number of residential properties at risk of flooding. Number of key services (e.g. hospitals, health centres, residential/care homes, schools etc.) at risk from flooding. Number of SuDS schemes installed as part of the LFRMS. Area/type of green infrastructure created/enhanced.	Bradford MDC, Yorkshire Water Environment Agency

## 6.4 Habitats Regulations Assessment

A Test of Likely Significant Effect (screening assessment) has been prepared in accordance with the requirements of the Habitats Regulations to determine whether the LFRMS is likely to have a significant effect on a European site (alone or in combination). This is summarised in Section 1.6 and described in Appendix A. The screening assessment concluded that the LFRMS is not likely to have a significant effect on any of the European sites.

Consultation with Natural England on the outcomes of the screening assessment was undertaken as part of the SEA scoping consultation exercise. Natural England confirmed that a TLSE is required.

Following development of the draft strategy objectives and measures, the screening assessment was reviewed to determine whether the LFRMS would be likely to have a significant effect on the European sites. The outcomes of this screening assessment are documented in Appendix A of this report. The screening assessment concludes that the LFRMS is not likely to have a significant adverse effect on a European site.

Consultation with Natural England on the outcomes of this assessment will be undertaken as part of the consultation process outlined in Section 7.



## 7 Next Steps

The next stage of the SEA process (Stage D) involves consulting on the draft SEA Environmental Report, alongside previously consulted draft LFRMS. This consultation will be with statutory consultees, stakeholders and the public, to help identify any necessary amendments and updates to the documents. All consultation responses received will be reviewed and taken into consideration for the next stage of appraisal process. This will involve the preparation of a Post-Adoption Statement, which will set out how the findings of the Environmental Report and the views expressed during the consultation period have been taken into account as the LFRMS has been finalised and formally approved. The Post-Adoption Statement will also set out any additional monitoring requirements needed to track the significant environmental effects of the strategy.

### 7.1 Consultation

This Environmental Report will be subject to public consultation for five weeks alongside the previously consulted LFRMS. All public consultation comments on the content of this Environmental Report should be sent to:

On the Web [www.bradford.gov.uk](http://www.bradford.gov.uk)

Email: [drainage@bradford.gov.uk](mailto:drainage@bradford.gov.uk)

By Post:

**Land Drainage,  
4th Floor,  
Britannia House,  
Bradford  
BD1 1HX**

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# A Appendix A: Habitats Regulations Assessment Test of Likely Significant Effect

## A.1 Record of Assessment of Likely Significant Effect on a European/International Site(SAC/SPA/Ramsar)

This assessment identifies and considers the likely adverse effects of the LFRMS, either individually or in combination with other plans or projects, upon a European site and considers whether these impacts are likely to be significant. It comprises a series of tables that identify the European sites of relevance to this assessment (Table A-1); the potential hazards associated with the LFRMS objectives and measures and their relevance to these European sites (Tables A-2 and A-3); and the likelihood that these hazards would cause a significant adverse effect on a European site (Table A-4, A-5).

Table A-1: Details of European Sites Within and Adjacent to Bradford Borough

<b>Type of Activity</b>	Local Flood Risk Management Strategy (LFRMS)
<b>Project Area</b>	Bradford Borough
<b>Brief Description of the project</b>	<p>The LFRMS is a requirement under the Flood and Water Management Act (2010). The Act outlines the responsibility of the lead local flood authority to 'develop, maintain, apply and monitor' a strategy for local flood risk management. It notes that the strategy must identify or outline the following:</p> <ul style="list-style-type: none"> <li>• The risk management authorities in the area;</li> <li>• The flood and coastal erosion risk management functions that may be exercised by those authorities in relation to the area;</li> <li>• The objectives for managing local flood risk (including any objectives included in the authority's flood risk management plan prepared in accordance with the Flood Risk Regulations 2009;</li> <li>• The measures proposed to achieve those objectives;</li> <li>• How and when the measures are expected to be implemented;</li> <li>• The costs and benefits of those measures, and how they are to be paid for;</li> <li>• The assessment of local flood risk for the purpose of the strategy;</li> <li>• How and when the strategy is to be reviewed; and</li> <li>• How the strategy contributes to the achievement of wider environmental objectives.</li> </ul>
<b>European Site Name and Status</b>	<b>North Pennine Moors SAC</b>
<b>Distance to European/International Site</b>	1.6km north
<b>Site EU Reference Number</b>	UK0030033
<b>Site Centre NGR</b>	SE137749
<b>List of Site Interest Features</b>	<p><b>Designated primarily for the following Annex 1 habitats:</b></p> <p>4030 European dry heaths  5130 <i>Juniperus communis</i> formations on heaths or calcareous grasslands  7130 Blanket bogs (an extensive area of which is active)  7220 Petrifying springs with tufa formation (<i>Cratoneurion</i>)  8220 Siliceous rocky slopes with chasmophytic vegetation  91A0 Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles</p> <p><b>Other qualifying Annex 1 habitats within the SAC:</b></p> <p>4010 Northern Atlantic wet heaths with <i>Erica tetralix</i>  6130 Calaminarian grasslands of the <i>Violetalia calaminariae</i>  6150 Siliceous alpine and boreal grasslands</p>

	<p>6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites)</p> <p>7230 Alkaline fens</p> <p>8110 Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>)</p> <p>8210 Calcareous rocky slopes with chasmophytic vegetation</p> <p><b>Annex II species present as a qualifying feature, but not a primary reason for site selection</b></p> <p><b>1528 Marsh saxifrage <i>Saxifraga hirculus</i></b></p>
<b>European Site Name and Status</b>	<b>North Pennine Moors SPA</b>
<b>Distance to European/International Site</b>	1.6km north
<b>Site EU Reference Number</b>	UK9006272
<b>Site Centre NGR</b>	SE137749
<b>List of Site Interest Features</b>	<p>This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:</p> <p>During breeding season:</p> <ul style="list-style-type: none"> <li>- Golden Plover <i>Pluvialis apricaria</i>, 1,400 pairs representing at least 6.2% of the breeding population in Great Britain</li> <li>- Hen Harrier <i>Circus cyaneus</i>, 11 pairs representing at least 2.2% of the breeding population in Great Britain (Estimated population)</li> <li>- Merlin <i>Falco columbarius</i>, 136 pairs representing at least 10.5% of the breeding population in Great Britain</li> <li>- Peregrine <i>Falco peregrinus</i>, 15 pairs representing at least 1.3% of the breeding population in Great Britain</li> </ul> <p>This site also qualifies under <b>Article 4.2</b> of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:</p> <p>During breeding season:</p> <ul style="list-style-type: none"> <li>- Curlew <i>Numenius arquata</i>, 3,930 pairs representing at least 3.3% of the breeding Europe - breeding population (1992/3/4 survey)</li> <li>- Dunlin <i>Calidris alpina schinzii</i>, 330 pairs representing at least 3.0% of the breeding Baltic/UK/Ireland population (Estimate based on 92-94 counts)</li> </ul>
<b>European Site Name and Status</b>	<b>Denby Grange Colliery Ponds SAC</b>
<b>Distance to European/International Site</b>	14.4km south-east
<b>Site EU Reference Number</b>	UK0030036
<b>Site Centre NGR</b>	SE271153
<b>List of Site Interest Features</b>	<p><b>Designated primarily for the following Annex 2 species:</b></p> <p><b>1166 Great crested newt <i>Triturus cristatus</i></b></p>
<b>European Site Name and Status</b>	<b>Craven Limestone Complex SAC</b>
<b>Distance to European/International Site</b>	14.6km north-west
<b>Site EU Reference Number</b>	UK0014776
<b>Site Centre NGR</b>	SD924673
<b>List of Site Interest Features</b>	<p><b>Designated for the following Annex 1 habitats:</b></p> <p>3140 Hard oligo-mesotrophic waters with benthic vegetation of</p>

	<p><i>Chara</i> spp. 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (important orchid sites) 6410 <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) 7230 Alkaline fens 7110 Active raised bogs 7220 Petrifying springs with tufa formation (<i>Cratoneurion</i>) 8240 Limestone pavements</p> <p><b>Other qualifying Annex 1 habitats within the SAC:</b></p> <p>6130 Calaminarian grasslands of the <i>Violetalia calaminariae</i> 9180 <i>Tilio-Acerion</i> forests of slopes, screes and ravines</p> <p><b>Designated for the following Annex 2 species:</b></p> <p>1092 White-clawed (or Atlantic stream) crayfish <i>Austropotamobius pallipes</i> 1163 Bullhead <i>Cottus gobio</i> 1902 Lady's-slipper orchid <i>Cypripedium calceolus</i></p>
<b>European Site Name and Status</b>	<b>North Pennine Dales Meadows SAC</b>
<b>Distance to European/International Site</b>	Within
<b>Site EU Reference Number</b>	UK0014775
<b>Site Centre NGR</b>	NY931256
<b>List of Site Interest Features</b>	<p><b>Designated for the following Annex 1 habitats:</b></p> <p>6520 Mountain hay meadows</p> <p><b>Other qualifying Annex 1 habitats within the SAC:</b></p> <p>6410 <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>)</p>
<b>European Site Name and Status</b>	<b>South Pennine Moors Phase 2 SPA</b>
<b>Distance to European/International Site</b>	Within
<b>Site EU Reference Number</b>	UK9007022
<b>Site Centre NGR</b>	SE137749
<b>List of Site Interest Features</b>	<p>This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:</p> <p><b>During the breeding season:</b></p> <ul style="list-style-type: none"> <li>- Golden Plover <b>Pluvialis apricaria</b>, 752 pairs representing at least 3.3% of the breeding population in Great Britain (Count as at 1990)</li> <li>- Merlin <b>Falco columbarius</b>, 77 pairs representing at least 5.9% of the breeding population in Great Britain</li> <li>- Peregrine <b>Falco peregrinus</b>, 16 pairs representing at least 1.4% of the breeding population in Great Britain</li> <li>- Short-eared Owl <b>Asio flammeus</b>, 25 pairs representing at least 2.5% of the breeding population in Great Britain</li> </ul> <p>This site also qualifies under <b>Article 4.2</b> of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:</p> <p>During the breeding season: Dunlin <b>Calidris alpina schinzii</b>, 140 pairs representing at least 1.3% of the breeding Baltic/UK/Ireland population</p>
<b>European Site Name and Status</b>	<b>South Pennine Moors SAC</b>

<b>Distance to European/International Site</b>	Within
<b>Site EU Reference Number</b>	UK0030280
<b>Site Centre NGR</b>	SK144960
<b>List of Site Interest Features</b>	<p><b>Designated for the following Annex 1 habitats:</b></p> <p>4030 European dry heaths 7130 Blanket bogs 91A0 Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles</p> <p><b>Other qualifying Annex 1 habitats within the SAC:</b></p> <p>4010 Northern Atlantic wet heaths with <i>Erica tetralix</i> 7140 Transition mires and quaking bogs</p>

Table A-2: Potential Hazards and Effects to European Sites Associated with the LFRMS

Sensitive Interest Features (grouped based on their sensitivity to similar hazards)	Potential Hazard(s)	Potential Exposure to hazard and mechanism of effect/impact if known
<p><b>Fens and wet habitats (not sensitive to acidification)</b></p> <p>North Pennine Moors SAC</p> <p>Craven Limestone Complex SAC</p> <p>North Pennine Dales Meadows SAC</p>	<p>Habitat loss</p> <p>Physical damage</p> <p>Changes in water levels or table</p> <p>Surface water flooding changes</p>	<p>Craven Limestone Complex SAC is located a significant distance (14.6km) from the boundary of Bradford Borough.</p> <p>The LFRMS seeks to implement flood risk management measures in the district and does not aim to influence flood risk or flood risk management activities at a wider regional level. Flood risk management activities introduced by the LFRMS will therefore have a local impact and will not extend a significant distance beyond the boundary of the Borough.</p> <p>No hazards will arise on the sensitive interest features as a result of implementation of the LFRMS.</p> <p><b>Therefore, no likely significant effects are predicted on Craven Limestone Complex SAC.</b></p> <p>North Pennine Moors SAC is located 1.6km outside of the boundary, but is hydrologically linked to the Borough. North Pennine Dales Meadows SAC is located within Bradford Borough.</p> <p>Potential effects linked to the hazards identified associated with the LFRMS comprise the following:</p> <ul style="list-style-type: none"> <li>Flood events, or flood risk management measures such as defence construction, result in the loss or separation of available habitats or split extensive areas of suitable habitat. This hazard is most likely to affect species and could result in community simplification.</li> <li>Changes to surface and groundwater flow in the Borough, which could impact water availability in the SAC</li> </ul> <p>Assessment of each LFRMS objective and its underpinning actions has been undertaken to identify any potential likely significant effects on North Pennine Dales Meadows SAC and North Pennine Moors SAC in Tables A-3, A-4 and A-5.</p>
<p><b>Bogs and wet habitats (sensitive to acidification)</b></p> <p>North Pennine Moors SAC</p> <p>Craven Limestone Complex SAC</p> <p>South Pennine Moors SAC</p>	<p>Habitat loss</p> <p>Physical damage</p> <p>Changes in water levels or table</p> <p>Changes in water chemistry</p> <p>Surface water flooding changes</p>	<p>Craven Limestone Complex SAC is located a significant distance (14.6km) from the boundary of Bradford Borough.</p> <p>The LFRMS seeks to implement flood risk management measures in the district and does not aim to influence flood risk or flood risk management activities at a wider regional level. Flood risk management activities introduced by the LFRMS will therefore have a local impact and will not extend a significant distance beyond the boundary of the Borough.</p> <p>No hazards will arise on the sensitive interest features as a result of implementation of the LFRMS.</p> <p><b>Therefore, no likely significant effects are predicted on Craven Limestone Complex SAC.</b></p> <p>North Pennine Moors SAC is located 1.6km outside of the boundary, but is hydrologically linked to the Borough. South Pennine Moors SAC is located within Bradford Borough.</p> <p>Potential effects linked to the hazards identified associated with the LFRMS comprise the following:</p> <ul style="list-style-type: none"> <li>Flood events, or flood risk management measures such as defence construction, result in the loss or separation of available habitats or split</li> </ul>



		<p>extensive areas of suitable habitat. This hazard is most likely to affect species and could result in community simplification.</p> <ul style="list-style-type: none"> <li>• Changes to surface and groundwater flow in the Borough, which could impact water availability in the SAC</li> <li>• Physical modifications to watercourses in the Borough or changes in surface runoff from land that could affect water quality in the SAC.</li> </ul> <p>Assessment of each LFRMS objective and its underpinning actions has been undertaken to identify any potential likely significant effects on South Pennine Moors SAC and North Pennine Moors SAC in Tables A-3, A-4 and A-5.</p>
<p><b>Riverine habitats and running waters</b></p> <p>North Pennine Moors SAC</p> <p>Craven Limestone Complex SAC</p>	<p>Physical damage</p> <p>Changes in water levels or table</p> <p>Changes in water chemistry</p> <p>Toxic contamination</p> <p>Changes in flow regime</p>	<p>Craven Limestone Complex SAC is located a significant distance (14.6km) from the boundary of Bradford Borough.</p> <p>The LFRMS seeks to implement flood risk management measures in the district and does not aim to influence flood risk or flood risk management activities at a wider regional level. Flood risk management activities introduced by the LFRMS will therefore have a local impact and will not extend a significant distance beyond the boundary of the Borough.</p> <p>No hazards will arise on the sensitive interest features as a result of implementation of the LFRMS.</p> <p><b>Therefore, no likely significant effects are predicted on Craven Limestone Complex SAC.</b></p> <p>North Pennine Moors SAC is located 1.6km outside of the boundary, but is hydrologically linked to the Borough.</p> <p>Potential effects linked to the hazards identified associated with the LFRMS comprise the following:</p> <ul style="list-style-type: none"> <li>• Flood events, or flood risk management measures such as defence construction, result in the separation of available habitats or split extensive areas of suitable habitat. This hazard is most likely to affect species and could result in community simplification.</li> <li>• Changes to surface and groundwater flow in the Borough, which could impact water availability in the SAC</li> <li>• Physical modifications to watercourses in the Borough or changes in surface runoff from land that could affect water quality in the SAC.</li> <li>• Toxic contamination as a result of construction activities.</li> <li>• Physical modifications to watercourses that may cause changes in river flow velocities and overall hydrological regime.</li> </ul> <p>Assessment of each LFRMS objective and its underpinning actions has been undertaken to identify any potential likely significant effects on North Pennine Moors SAC in Tables A-3, A-4 and A-5.</p>
<p><b>Standing waters (not sensitive to acidification)</b></p> <p>Craven Limestone Complex SAC</p>	<p>None</p>	<p>Craven Limestone Complex SAC is located a significant distance (14.6km) from the boundary of Bradford Borough.</p> <p>The LFRMS seeks to implement flood risk management measures in the district and does not aim to influence flood risk or flood risk management activities at a wider regional level. Flood risk management activities introduced by the LFRMS will therefore have a local impact and will not extend a significant distance beyond the boundary of the Borough.</p> <p>No hazards will arise on the sensitive interest features as a result of implementation of the LFRMS.</p> <p><b>Therefore, no likely significant effects are predicted on Craven Limestone Complex SAC.</b></p>
<p><b>Dry woodlands and scrub</b></p> <p>North Pennine Moors SAC</p> <p>Craven Limestone Complex SAC</p> <p>South Pennine Moors SAC</p>	<p>Habitat loss</p> <p>Physical damage</p>	<p>Craven Limestone Complex SAC is located a significant distance (14.6km) from the boundary of Bradford Borough.</p> <p>The LFRMS seeks to implement flood risk management measures in the district and does not aim to implement flood risk management activities at a wider regional level. Flood risk management activities introduced by the LFRMS will therefore have a local impact and will not extend a significant distance beyond the boundary of the Borough.</p> <p>No hazards will arise on the sensitive interest features as a result of implementation of the LFRMS.</p> <p><b>Therefore, no likely significant effects are predicted on Craven Limestone Complex SAC and North Pennine Moors SAC.</b></p> <p>North Pennine Moors SAC is located 1.6km outside of the boundary, but is hydrologically linked to the Borough. South Pennine Moors SAC is located within Bradford Borough.</p> <p>Potential effects linked to the hazards identified associated with the LFRMS comprise the following:</p> <ul style="list-style-type: none"> <li>• Flooding may cause introduction or spread of non-native species, particularly plants, which could result in changes to community composition and even to the complete loss of native communities</li> <li>• Flood risk management measures such as defence construction, result in the separation of available habitats or split extensive areas of suitable</li> </ul>

		<p>habitat. This hazard is most likely to affect species and could result in community simplification.</p> <p>Assessment of each LFRMS objective and its underpinning actions has been undertaken to identify any potential likely significant effects on South Pennine Moors SAC and North Pennine Moors SAC in Tables A-3, A-4 and A-5.</p>
<p><b>Dry grassland</b></p> <p>North Pennine Moors SAC</p> <p>Craven Limestone Complex SAC</p>	<p>Change in water levels or table</p> <p>Habitat loss</p> <p>Physical damage</p>	<p>Craven Limestone Complex SAC is located a significant distance (14.6km) from the boundary of Bradford Borough.</p> <p>The LFRMS seeks to implement flood risk management measures in the district and does not aim to influence flood risk or flood risk management activities at a wider regional level. Flood risk management activities introduced by the LFRMS will therefore have a local impact and will not extend a significant distance beyond the boundary of the Borough.</p> <p>No hazards will arise on the sensitive interest features as a result of implementation of the LFRMS.</p> <p><b>Therefore, no likely significant effects are predicted on Craven Limestone Complex SAC.</b></p> <p>North Pennine Moors SAC is located 1.6km outside of the boundary, but is hydrologically linked to the Borough.</p> <p>Potential effects linked to the hazards identified associated with the LFRMS comprise the following:</p> <ul style="list-style-type: none"> <li>• Changes to surface and groundwater flow in the Borough, which could impact water availability in the SAC</li> <li>• Flooding may cause introduction or spread of non-native species, particularly plants, which could result in changes to community composition and even to the complete loss of native communities</li> <li>• Flood events, or flood risk management measures such as defence construction, result in the loss, separation of available habitats or split extensive areas of suitable habitat. This hazard is most likely to affect species and could result in community simplification.</li> </ul> <p>Assessment of each LFRMS objective and its underpinning actions has been undertaken to identify any potential likely significant effects on North Pennine Moors SAC in Tables A-3, A-4 and A-5.</p>
<p><b>Dry heathland habitats</b></p> <p>North Pennine Moors SAC</p> <p>South Pennine Moors SAC</p>	<p>Change in water levels or water table</p> <p>Habitat loss</p> <p>Physical damage</p>	<p>North Pennine Moors SAC is located 1.6km outside of the boundary, but is hydrologically linked to the Borough. South Pennine Moors SAC is located within Bradford Borough.</p> <p>Potential effects linked to the hazards identified associated with the LFRMS comprise the following:</p> <ul style="list-style-type: none"> <li>• Changes to surface and groundwater flow in the Borough, which could impact water availability in the SAC</li> <li>• Flooding may cause introduction or spread of non-native species, particularly plants, which could result in changes to community composition and even to the complete loss of native communities</li> <li>• Flood events, or flood risk management measures such as defence construction, result in the loss, separation of available habitats or split extensive areas of suitable habitat. This hazard is most likely to affect species and could result in community simplification.</li> </ul> <p>Assessment of each LFRMS objective and its underpinning actions has been undertaken to identify any potential likely significant effects on South Pennine Moors SAC and North Pennine Moors SAC in Tables A-3, A-4 and A-5.</p>
<p><b>Upland</b></p> <p>North Pennine Moors SAC</p> <p>Craven Limestone Complex SAC</p> <p>North Pennines Dales Meadows SAC</p>	<p>Habitat loss</p> <p>Physical damage</p>	<p>Craven Limestone Complex SAC is located a significant distance (14.6km) from the boundary of Bradford Borough.</p> <p>The LFRMS seeks to implement flood risk management measures in the district and does not aim to influence flood risk or flood risk management activities at a wider regional level. Flood risk management activities introduced by the LFRMS will therefore have a local impact and will not extend a significant distance beyond the boundary of the Borough.</p> <p>No hazards will arise on the sensitive interest features as a result of implementation of the LFRMS.</p> <p><b>Therefore, no likely significant effects are predicted on Craven Limestone Complex SAC.</b></p> <p>North Pennines Dales Meadows SAC is located within Bradford Borough. North Pennine Moors SAC is located 1.6km outside of the boundary, but is hydrologically linked to the Borough.</p> <p>Potential effects linked to the hazards identified associated with the LFRMS comprise the following:</p> <ul style="list-style-type: none"> <li>• Flood events, or flood risk management measures such as defence construction, result in the loss, separation of available habitats or split extensive areas of suitable habitat. This hazard is most likely to affect species and could result in community simplification.</li> </ul>

		<p>Assessment of each LFRMS objective and its underpinning actions has been undertaken to identify any potential likely significant effects on North Pennines Dales Meadows SAC and North Pennine Moors SAC in Tables A-3, A-4 and A-5.</p>
<p><b>Vascular plants, lower plants and invertebrates of wet habitats</b></p> <p>North Pennine Moors SAC</p>	<p>Change in water levels or water table</p> <p>Habitat loss</p> <p>Physical damage</p> <p>Surface water flooding changes</p>	<p>North Pennine Moors SAC is located 1.6km outside of the boundary, but is hydrologically linked to the Borough.</p> <p>Potential effects linked to the hazards identified associated with the LFRMS comprise the following:</p> <ul style="list-style-type: none"> <li>• Changes to surface and groundwater flow in the Borough, which could impact water availability in the SAC</li> <li>• Flooding may cause introduction or spread of non-native species, particularly plants, which could result in changes to community composition and even to the complete loss of native communities</li> <li>• Flood events, or flood risk management measures such as defence construction, result in the loss, separation of available habitats or split extensive areas of suitable habitat. This hazard is most likely to affect species and could result in community simplification.</li> </ul> <p>Assessment of each LFRMS objective and its underpinning actions has been undertaken to identify any potential likely significant effects on North Pennine Moors SAC in Tables A-3, A-4 and A-5.</p>
<p><b>Vascular plants of grassland</b></p> <p>Craven Limestone Complex SAC</p>	None	<p>Craven Limestone Complex SAC is located a significant distance (14.6km) from the boundary of Bradford Borough.</p> <p>The LFRMS seeks to implement flood risk management measures in the district and does not aim to influence flood risk or flood risk management activities at a wider regional level. Flood risk management activities introduced by the LFRMS will therefore have a local impact and will not extend a significant distance beyond the boundary of the Borough.</p> <p>No hazards will arise on the sensitive interest features as a result of implementation of the LFRMS.</p> <p><b>Therefore, no likely significant effects are predicted on Craven Limestone Complex SAC.</b></p>
<p><b>Non-migratory fish and invertebrates of rivers</b></p> <p>Craven Limestone Complex SAC</p>	None	<p>Craven Limestone Complex SAC is located a significant distance (14.6km) from the boundary of Bradford Borough.</p> <p>The LFRMS seeks to implement flood risk management measures in the district and does not aim to influence flood risk or flood risk management activities at a wider regional level. Flood risk management activities introduced by the LFRMS will therefore have a local impact and will not extend a significant distance beyond the boundary of the Borough.</p> <p>No hazards will arise on the sensitive interest features as a result of implementation of the LFRMS.</p> <p><b>Therefore, no likely significant effects are predicted on Craven Limestone Complex SAC.</b></p>
<p><b>Amphibia</b></p> <p>Denby Grange Colliery Ponds SAC</p>	None	<p>Denby Grange Colliery Ponds SAC is located a significant distance (14.4km) from the boundary of Bradford Borough.</p> <p>The LFRMS seeks to implement flood risk management measures in the district and does not aim to influence flood risk or flood risk management activities at a wider regional level. Flood risk management activities introduced by the LFRMS will therefore have a local impact and will not extend a significant distance beyond the boundary of the Borough.</p> <p>No hazards will arise on the sensitive interest features as a result of implementation of the LFRMS.</p> <p><b>Therefore, no likely significant effects are predicted on Denby Grange Colliery Ponds SAC.</b></p>
<p><b>Birds of Uplands</b></p> <p>North Pennine Moors SPA</p> <p>South Pennine Moors Phase 2 SPA</p>	<p>Disturbance (noise or visual)</p> <p>Habitat loss</p>	<p>South Pennine Moors Phase 2 SPA is located within Bradford Borough. North Pennine Moors SPA is located 1.6km outside of the boundary and is hydrologically linked to the Borough.</p> <p>Potential effects linked to the hazards identified associated with the LFRMS comprise the following:</p> <ul style="list-style-type: none"> <li>• Human activity (construction or other) may adversely impact on the qualifying features of the site directly (physical disturbance) or indirectly (visual or noise) associated with flood management activities.</li> <li>• Flood risk management measures such as defence construction, result in the separation of available habitats or split extensive areas of suitable habitat. This hazard is most likely to affect species and could result in community simplification.</li> </ul> <p>Assessment of each LFRMS objective and its underpinning actions has been undertaken to identify any potential likely significant effects South Pennine Moors Phase 2 SPA and North Pennine Moors SPA in Tables A-3, A-4 and A-5.</p>

<p><b>Birds of lowland wet grasslands</b></p> <p>North Pennine Moors SPA</p> <p>South Pennine Moors Phase 2 SPA</p>	<p>Change in water levels or table</p> <p>Disturbance</p> <p>Habitat loss</p> <p>Toxic contamination</p>	<p>South Pennine Moors Phase 2 SPA is located within Bradford Borough. North Pennine Moors SPA is located 1.6km outside of the boundary and is hydrologically linked to the Borough.</p> <p>Potential effects linked to the hazards identified associated with the LFRMS comprise the following:</p> <ul style="list-style-type: none"> <li>• Changes to surface and groundwater flow in the Borough, which could impact water availability in the SPA and therefore foraging activities.</li> <li>• Human activity (construction or other) may adversely impact on the qualifying features of the site directly (physical disturbance) or indirectly (visual or noise) associated with flood management activities.</li> <li>• Flood risk management measures such as defence construction, result in the separation of available habitats or split extensive areas of suitable habitat. This hazard is most likely to affect species and could result in community simplification.</li> <li>• Toxic contamination may result from construction activities.</li> </ul> <p>Assessment of each LFRMS objective and its underpinning actions has been undertaken to identify any potential likely significant effects South Pennine Moors Phase 2 SPA and North Pennine Moors SPA in Tables A-3, A-4 and A-5.</p>
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Table A-2: Potential hazards to the European sites associated with the LFRMS objectives and actions (Key: X = no potential hazard; ✓ = potential hazard)

LFRMS Objectives	LFRMS Actions	Potential Hazards							
		Habitat loss	Physical damage	Disturbance (noise and visual)	Changes in water levels or table	Changes in water chemistry	Surface water flooding changes	Toxic contamination	Changes in flow regime
1 – Improve understanding of flood risk within Bradford District	Maintain a statutory register of significant obstructions to flow within Districts watercourse, based on flood risk (recording location, capacity, condition, ownership etc. Significant obstructions to flow include bridges, culverts, trash screens, flumes, weirs etc.	X	X	X	X	X	X	X	X
	Maintain a statutory register of other watercourses structures and features (Walls and embankments etc.) that are deemed to act as flood defences.	X	X	X	X	X	X	X	X
	Ensure that future reports of watercourse, surface water and groundwater flooding are responded to by carrying out appropriate site investigations to capture relevant flood detail, including the mechanisms of flooding and resulting impact.	X	X	X	X	X	X	X	X
	Maintain effective communication links with external and flood risk management authorities to share information on flood risk and arrive at effective flood responses. Maintain open communication with internal risk management teams and ensure that relevant flooding records are held in order to improve overall understanding of flood risk.	X	X	X	X	X	X	X	X
	Capture all available recorded and reported information on significant flooding incidents caused by watercourse, surface water runoff and groundwater. Ensure relevant records are held and complete and publish SFRA.	X	X	X	X	X	X	X	X

2 – Reduce the impact of flooding	Utilise potential funding sources to undertake necessary investigations, which will identify risk areas where there are capital needs. Investigations will utilise local flood risk information and where appropriate employing computer modelling analysis to assess flood mechanisms within each of these areas to arrive at cost effective flood management solutions, subject to available resources	X	X	X	X	X	X	X	X
	Maintain engagement with riparian owners and significant land owners to negotiate the effective use of watercourses and open land for flood storage, subject to available resources.	✓	✓	X	✓	X	✓	X	✓
3 - Communicate flood risk to partners and stakeholders	To effectively communicate information on managing flood risk in the CBMDC required to publish the summary of the LFRMS and maintain open communication with other flood risk management authorities, including neighbouring LLFA's. The Council will continue to liaise with West Yorkshire Flood Risk Management Partnership (WYFRMP) and attend and hold LLFA meetings.	X	X	X	X	X	X	X	X
	To communicate directly with communities, businesses and organisations, landowners and the general public to contribute to community forums in identified risk areas to raise awareness and provide guidance on flood risk management.	X	X	X	X	X	X	X	X
	Produce community flood and emergency plans. Ensure ongoing communication with all internal and external RMA's. Plan and attend community forums to raise awareness. Apply legislation to guide residents regarding their flood risk.	X	X	X	X	X	X	X	X
4 – Targeted maintenance	Continue to target investigation and clearance works of watercourses and associated assets (highway trash screens, bridges and culverts) managed by CBMDC. Frequency of works based on flood risk and available resources. Ensure private riparian owners are contacted when maintenance works are required to maintain unimpeded flow within privately managed watercourses.	✓	✓	✓	✓	X	✓	X	✓

5 – Ensure appropriate development in Bradford District	To ensure future developments are sustainable and do not increase flood risk and contribute towards sustainable development. LLFA acting as a statutory consultee to the planning authority on major developments (greater than ten units) and other developments (less than ten units) to ensure robust sustainable drainage systems are provided wherever appropriate and develop robust local policy and clear guidance on consenting for works in watercourse. Utilise all available flood risk and climate change information to deliver sustainable drainage outcomes for the sites that become development through the local plan process through the Strategic Flood Risk Assessment and Bradford Core Strategy. Securing developer contributions where appropriate to mitigate increased flood risk resulting from development. Providing advice or mitigation measures to offset environmental impact of development by enhancing biodiversity and water quality within areas designated for flood storage.	X.	X	X	x	x	x	X	X
	Engage with significant developers to raise awareness of catchment wide flood risk management initiatives and potentials for aligning with benefits from them. Manage applications for consents of ordinary watercourses and local consents policy.	X	X	X	X	X	X	X	X
6 – Improve flood response and post flood recovery	Maintain communication links with the Met office and the EA to ensure accurate forecast information on rainfall and anticipated flood impact is received. Maintain regular liaison with flood risk partners, emergency services, Bradford Council Emergency Planning Team, other service areas and Bradford Council contact centre before during and after significant rainfall events. Provide clear messages and regular updates via internal indicative flood forecast and media.	X	X	X	X	X	X	X	X
	Maintain use of on the ground observers to feedback and record information on flood extents and impact during post event. Investigate opportunities to establish volunteer flood wardens within district. In conjunction with other Council departments and EA to develop Community Emergency and Flood Plans.	X	X	X	X	X	X	X	X

5 – Ensure appropriate development in Bradford District	To ensure future developments are sustainable and do not increase flood risk and contribute towards sustainable development. LLFA acting as a statutory consultee to the planning authority on major developments (greater than ten units) and other developments (less than ten units) to ensure robust sustainable drainage systems are provided wherever appropriate and develop robust local policy and clear guidance on consenting for works in watercourse. Utilise all available flood risk and climate change information to deliver sustainable drainage outcomes for the sites that become development through the local plan process through the Strategic Flood Risk Assessment and Bradford Core Strategy. Securing developer contributions where appropriate to mitigate increased flood risk resulting from development. Providing advice or mitigation measures to offset environmental impact of development by enhancing biodiversity and water quality within areas designated for flood storage.	X.	X	X	x	x	x	X	X
	Engage with significant developers to raise awareness of catchment wide flood risk management initiatives and potentials for aligning with benefits from them. Manage applications for consents of ordinary watercourses and local consents policy.	X	X	X	X	X	X	X	X
6 – Improve flood response and post flood recovery	Maintain communication links with the Met office and the EA to ensure accurate forecast information on rainfall and anticipated flood impact is received. Maintain regular liaison with flood risk partners, emergency services, Bradford Council Emergency Planning Team, other service areas and Bradford Council contact centre before during and after significant rainfall events. Provide clear messages and regular updates via internal indicative flood forecast and media.	X	X	X	X	X	X	X	X
	Maintain use of on the ground observers to feedback and record information on flood extents and impact during post event. Investigate opportunities to establish volunteer flood wardens within district. In conjunction with other Council departments and EA to develop Community Emergency and Flood Plans.	X	X	X	X	X	X	X	X
5 – Ensure appropriate	To ensure future developments are sustainable and do not increase flood risk and contribute	X.	X	X	x	x	x	X	X



development in Bradford District	towards sustainable development. LLFA acting as a statutory consultee to the planning authority on major developments (greater than ten units) and other developments (less than ten units) to ensure robust sustainable drainage systems are provided wherever appropriate and develop robust local policy and clear guidance on consenting for works in watercourse. Utilise all available flood risk and climate change information to deliver sustainable drainage outcomes for the sites that become development through the local plan process through the Strategic Flood Risk Assessment and Bradford Core Strategy. Securing developer contributions where appropriate to mitigate increased flood risk resulting from development. Providing advice or mitigation measures to offset environmental impact of development by enhancing biodiversity and water quality within areas designated for flood storage.								
	Engage with significant developers to raise awareness of catchment wide flood risk management initiatives and potentials for aligning with benefits from them. Manage applications for consents of ordinary watercourses and local consents policy.	X	X	X	X	X	X	X	X
6 – Improve flood response and post flood recovery	Maintain communication links with the Met office and the EA to ensure accurate forecast information on rainfall and anticipated flood impact is received. Maintain regular liaison with flood risk partners, emergency services, Bradford Council Emergency Planning Team, other service areas and Bradford Council contact centre before during and after significant rainfall events. Provide clear messages and regular updates via internal indicative flood forecast and media.	X	X	X	X	X	X	X	X
	Maintain use of on the ground observers to feedback and record information on flood extents and impact during post event. Investigate opportunities to establish volunteer flood wardens within district. In conjunction with other Council departments and EA to develop Community Emergency and Flood Plans.	X	X	X	X	X	X	X	X
5 – Ensure appropriate development in Bradford	To ensure future developments are sustainable and do not increase flood risk and contribute towards sustainable development. LLFA acting as a statutory consultee to the planning authority on	X.	X	X	x	x	x	X	X

District	<p>major developments (greater than ten units) and other developments (less than ten units) to ensure robust sustainable drainage systems are provided wherever appropriate and develop robust local policy and clear guidance on consenting for works in watercourse. Utilise all available flood risk and climate change information to deliver sustainable drainage outcomes for the sites that become development through the local plan process through the Strategic Flood Risk Assessment and Bradford Core Strategy. Securing developer contributions where appropriate to mitigate increased flood risk resulting from development. Providing advice or mitigation measures to offset environmental impact of development by enhancing biodiversity and water quality within areas designated for flood storage.</p>								
	<p>Engage with significant developers to raise awareness of catchment wide flood risk management initiatives and potentials for aligning with benefits from them. Manage applications for consents of ordinary watercourses and local consents policy.</p>	X	X	X	X	X	X	X	X
6 – Improve flood response and post flood recovery	<p>Maintain communication links with the Met office and the EA to ensure accurate forecast information on rainfall and anticipated flood impact is received. Maintain regular liaison with flood risk partners, emergency services, Bradford Council Emergency Planning Team, other service areas and Bradford Council contact centre before during and after significant rainfall events. Provide clear messages and regular updates via internal indicative flood forecast and media.</p>	X	X	X	X	X	X	X	X
	<p>Maintain use of on the ground observers to feedback and record information on flood extents and impact during post event. Investigate opportunities to establish volunteer flood wardens within district. In conjunction with other Council departments and EA to develop Community Emergency and Flood Plans.</p>	X	X	X	X	X	X	X	X

Table A-4: Assessment of likely significant effects on the European sites associated with relevant LFRMS actions

Relevant LFRMS actions	Potential hazards	Potential for likely significant effect
Maintain engagement with riparian owners and significant land owners to negotiate the effective use of watercourses and open land for flood storage, subject to available resources.	<ul style="list-style-type: none"> <li>• Habitat loss</li> <li>• Physical damage</li> <li>• Changes in water levels or table</li> <li>• Changes in surface water flooding</li> <li>• Changes in flow regime</li> </ul>	<p>This action aims to decrease the regularity of flooding and reduce the impact of flooding to highways and properties. The risk and extent to which potential adverse effects are likely to occur is directly linked to the implementation of this action; in particular, the scale and location of any proposed works or changes in water management practices. It is likely that any planned works on private land will be relatively small-scale and local in impact. Therefore, it is unlikely that hazards will arise on the sensitive interest features as a result of implementation of the LFRMS.</p> <p>On implementation, flood storage schemes are likely to be subject to further authorisations, either through the planning process and/or another consenting process. Before any physical works or water management actions are implemented, they will be subject to the requirements of the Habitats Regulations as a matter of law and government policy. An Appropriate Assessment would be required where such works/actions are likely to have a significant adverse effect on the integrity of a European site. Therefore, it can be reasonably concluded at this stage that implementation of this measure is not likely to have a significant adverse effect on the interest features of the European sites.</p> <p><b>Conclusion: No likely significant effect on the European sites</b></p>
Continue to target investigation and clearance works of watercourses and associated assets (highway trash screens, bridges and culverts) managed by CBMDC. The frequency of works based on flood risk and available resources. Ensure private riparian owners are contacted when maintenance works are required to maintain unimpeded flow within privately managed watercourses.	<ul style="list-style-type: none"> <li>• Habitat loss</li> <li>• Physical damage</li> <li>• Disturbance (noise or visual)</li> <li>• Changes in water levels or table</li> <li>• Surface water flooding changes</li> <li>• Changes in flow regime</li> </ul>	<p>This action aims to reduce flood risk to properties and highways by ensuring the maintenance of unimpeded flow in watercourses. This action will maintain natural flow within watercourses by removing temporary obstructions and so is not likely to have a significant adverse effect on the interest features of the European sites.</p> <p>However, on implementation, these works are likely to be subject to further authorisations, through the consenting process. Before any physical works or water management actions are implemented, they will be subject to the requirements of the Habitats Regulations as a matter of law and government policy. An Appropriate Assessment would be required where such works/actions are likely to have a significant adverse effect on the integrity of a European site. Therefore, it can be reasonably concluded at this stage that implementation of this measure is not likely to have a significant adverse effect on the interest features of the European sites.</p> <p><b>Conclusion: No likely significant effect on the European sites</b></p>

Table A-5: Assessment Conclusions

<p><b>In reference to the site interest features and their conservation objectives, describe any likely direct, indirect or secondary effects from the uncompleted and/or continuing consented activities of the project (either alone or in combination with other plans or projects) likely to give rise to significant effects on the European/Ramsar Site.</b></p>	<p>The LFRMS seeks to promote more sustainable flood risk management and includes objectives that aim to reduce the impacts of surface water flooding, promote better management of water resources and deliver a range of wider environmental benefits.</p> <p>Only a small number of LFRMS actions could potentially result in physical interventions or construction work, or directly affect water management practices.</p> <p>At this stage, the works are still under investigation and are relatively small-scale and local in impact. Therefore, it is unlikely that hazards will arise on the sensitive interest features as a result of implementation of the LFRMS.</p> <p>Until these measures are developed further, it is not possible to reasonably predict whether any potential adverse effects are likely to occur. Nonetheless, implementation of any measures that could result in significant adverse effects on a European site would therefore conflict with the objectives of the LFRMS. Therefore, it can be reasonably concluded at this stage that the LFRMS is not likely to have a significant adverse effect on the European sites. This conclusion does not preclude the need for further HRA at subsequent stages of the development and implementation of the LFRMS.</p>
<p><b>Is the project likely to have a significant effect 'alone'?</b></p>	<p><b>No</b></p>
<p><b>If there is no likely significant effect 'alone', are there other projects or plans that in-combination with the project being assessed could affect the site?</b></p>	<p><b>No</b></p>
<p><b>Is the project likely to have a significant effect 'in-combination'?</b></p>	<p><b>No</b></p>



## Appendix B: Review of policies, plans and programmes

Table B-1 Review ow of plan policy and programme against LFRMS objectives and measures and relevant SEA topic

Plan/Policy/Programme	Overview	Relevance to LFRMS	Conflict with LFRMS	Primary SEA topic
<b>International</b>				
EU Sustainable Development Strategy (revised 2006)	Outlines the need for economic growth to support social progress and respect the environment to achieve sustainable development.	The strategy aims to limit climate change and manage natural resources more responsibly, issues which are directly relevant to flood risk. Provides direction for the LFRMS in the managing of natural resources for flood risk	The LFRMS should seek to promote objectives that deliver sustainable FRM and sustainable development.	<ul style="list-style-type: none"> <li>• Biodiversity, flora and fauna</li> <li>• Water environment</li> </ul>
European Biodiversity Strategy to 2020	Outlines strategy to halt the loss of biodiversity and ecosystem services in the EU by 2020.	Aims include the provision of better protection for ecosystems and fish stocks, promotion of green infrastructure and tighter controls on invasive alien species.	The LFRMS may contribute to the aims of the strategy through the provision of new green infrastructure to manage flood risk. In contrast, the strategy may limit certain FRM objectives if they are shown to be likely to adversely affect biodiversity or ecosystem services.	<ul style="list-style-type: none"> <li>• Biodiversity, flora and fauna</li> </ul>
EC Birds Directive – Council Directive 2009/147/EEC on the conservation of wild birds	Provides for protection of all naturally occurring wild bird species and their habitats, with particular protection of rare species.	Designates Special Protection Areas (SPAs) to protect birds and their habitats. The LFRMS objectives should avoid any significant adverse effect on these sites and supporting features. Requires LFRMS to be assessed for potential impact.	May restrict certain FRM objectives if they are shown to be likely to have a significant effect on a SPA.	<ul style="list-style-type: none"> <li>• Biodiversity, flora and fauna</li> </ul>
EU Floods Directive – Directive 2007/60/EC on the assessment and management of flood risks	Aims to reduce and manage the risk of flooding and associated impacts on the environment, human health, heritage and economy. Principle requirement is the preparation of FRM plans at River Basin District level, together with preliminary flood risk assessments and hazard/risk maps.	Provides strategic direction to reduce impacts of flooding and promote enhanced FRM. The LFRMS will need to demonstrate compliance with the requirements of the Directive.	None likely as the LFRMS will seek to contribute to achieving the Directive.	<ul style="list-style-type: none"> <li>• Water environment</li> <li>• Climate</li> </ul>
EU Groundwater Directive – Directive 2006/118/EC on the protection of groundwater against pollution and deterioration	Establishes a regime that sets underground water quality standards and introduces measures to prevent or limit inputs of pollutants into groundwater. Implemented in the UK through the Environmental Permitting Regulations (2010).	Water quality is relevant to the LFRM as flooding is linked to water pollution and a reduction in surface water and groundwater quality.	Improved FRM may benefit groundwater quality by reducing the risk of water pollution during a flood event. LFRMS objectives would need to consider potential impacts on groundwater and may be restricted if they contribute to an adverse impact.	<ul style="list-style-type: none"> <li>• Water environment</li> </ul>

Plan/Policy/Programme	Overview	Relevance to LFRMS	Conflict with LFRMS	Primary SEA topic
EC Habitats Directive – Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora	Principle aim is to promote the maintenance of biodiversity by requiring Member States to take measures to restore habitats and species to favourable conservation status. Introduces robust protection for habitats and species of European importance. Enables the creation of Special Areas of Conservation (SACs) in order to establish a coherent ecological network of protected sites. Encourages protection and management of flora and fauna and supporting landscapes through planning and development policies.	Designates SACs to protect and promote biodiversity. The LFRMS objectives should avoid any significant adverse effect on these sites and supporting features. Requires LFRMS to be assessed for potential impact.	May restrict certain FRM objectives if they are shown to be likely to have a significant effect on a SAC.	<ul style="list-style-type: none"> <li>• Biodiversity, flora and fauna</li> </ul>
Urban Wastewater Treatment Directive – Directive 91/271/EEC concerning urban waste water treatment	Aims to protect the environment from the adverse effects of urban waste water discharges and discharges from certain industrial sectors.	Defines requirements for the collection and treatment of waste water in line with the population equivalent. LFRMS would need to consider potential impact of FRM objectives on water treatment sites.	The LFRMS could support the aims of the Directive by reducing the risk of flooding to water treatment sites. However, LFRMS objectives may be restricted if they are shown to be likely to effect on wastewater discharges during flood events.	<ul style="list-style-type: none"> <li>• Water environment</li> </ul>
EU Water Framework Directive – Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy	Establishes framework for protection of inland surface waters, transitional waters, coastal waters and groundwater to prevent pollution, promote sustainable water use, protect the aquatic environment, improve the status of aquatic ecosystems and mitigate the effects of floods and droughts.	Member states must prepare River Basin Management Plans and programme of measures for each River Basin District that sets out a timetable approach to achieving the WFD objectives. Places requirements on all relevant authorities to ensure their actions do not contravene the objectives of the Directive.	May restrict certain FRM options if likely to inhibit achievement of WFD objectives and detailed programme of measures. FRM options may be strengthened if they actively contribute to meeting the WFD requirements.	<ul style="list-style-type: none"> <li>• Biodiversity, flora and fauna</li> <li>• Water environment</li> </ul>
<b>National</b>				
Securing the Future – the UK Government Sustainable Development Strategy (2005)	Establishes a broad set of actions and priorities to support the achievement of sustainable development. It includes measures to enable and encourage behaviour change, measures to engage people, and ways in which the Government can promote sustainability.	Includes high level aims to promote sustainable development and sets out how local authorities can contribute to delivering this and the improvement of the local environment.	The LFRMS can contribute to sustainable development through the promotion of better FRM to benefit people, the economy and the environment.	<ul style="list-style-type: none"> <li>• Population</li> <li>• Material assets</li> </ul>
Flood and Water Management Act (2010)	Designates Lead Local Flood Authorities (LLFAs) who <i>‘must develop, maintain, apply and monitor a strategy for flood risk management in its area’</i> . Applies to ordinary watercourses, surface runoff and groundwater.	Provides key driver for production of LFRMS and sets strategic direction.	None	<ul style="list-style-type: none"> <li>• Water environment</li> <li>• Climate</li> </ul>
Flood Risk Regulations (2009)	Implements the requirements of the EU Floods Directive, which aims to manage the risk of flooding and associated socio-economic and environmental impacts. Requires LLFAs to manage flooding from surface runoff.	Key driver for implementing FRM strategies at the local level.	None	<ul style="list-style-type: none"> <li>• Water environment</li> <li>• Climate</li> </ul>

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Water for People and the Environment, Water Resources Strategy for England and Wales (2009)	Sets out the approach to sustainable water resources management throughout England and Wales to 2050 and beyond to ensure that there will be sufficient water for people and the environment.	FRM measures are linked to wider water resources management issues and both aspects can actively contribute to achieving corresponding objectives.	None	<ul style="list-style-type: none"> <li>• Water environment</li> <li>• Population</li> <li>• Climate</li> </ul>
Future Water, The Government's water strategy for England (2008)	Future Water defines future objectives for the water sector by 2030 and implementation steps on achieving the objectives. It includes objectives to reduce flood risk from rivers and the coast; improve the sustainable delivery of water supplies; improve the quality of the water environment through greater protection; and more effective management of surface water, which includes the promotion of SuDS, water reuse and above-ground storage;	The strategy includes provisions that seek to better manage surface water drainage and reduce flood risk, and the LFRMS could actively contribute to achieving these objectives.	The strategy promotes greater protection of the water environment, reduced water pollution and enhanced ecological quality of watercourses. The strategy may restrict certain FRM options if they are likely to inhibit achievement of these wider environmental objectives.	<ul style="list-style-type: none"> <li>• Water environment</li> </ul>
Water Act (2003)	Sets out the framework for abstraction licensing, impoundments, water quality standards and pollution control measures, and includes measures for drought management and flood defence work in England and Wales.	FRM is one of the themes addressed by the LFRMS.	The strategy promotes greater protection of water resources and may restrict LFRMS objectives if they are likely to adversely affect water quality or sustainable resource management.	<ul style="list-style-type: none"> <li>• Water environment</li> </ul>
Draft Water Bill (2012)	Emerging national strategy aimed at improved regulation of the water industry, whilst increasing its resilience to natural hazards such as drought and floods. It includes provisions to better manage sustainable water abstraction and encourage the use of SuDS.	Aims to promote better management of water resources and reduce the risks of flooding.	The strategy promotes greater protection of water resources and may restrict LFRMS objectives if they are likely to adversely affect water quality or sustainable resource management.	<ul style="list-style-type: none"> <li>• Water environment</li> </ul>
The National Flood Emergency Framework for England (2011)	Sets out a strategic approach to emergency response planning to reduce the impacts of flooding and improve resilience.	The framework sets out organisational responsibilities and promotes a multi-agency approach to managing flooding events.	None	<ul style="list-style-type: none"> <li>• Water environment</li> </ul>
The Carbon Plan (2011)	The carbon plan sets out a vision for Britain powered by cleaner energy used more efficiently, with more secure energy supplies and stable energy prices and benefits from jobs and growth that a low carbon economy will bring. Key areas are electricity generation, eating homes and businesses and travel.	Carbon emissions, and the resulting climate change impacts, are highly relevant to the issue of FRM due to the likely increased flood risk resulting from climate change.	None	<ul style="list-style-type: none"> <li>• Climate change</li> </ul>
Building a Low Carbon Economy – the UK's Contribution to Tackling Climate Change (2008)	Puts forward a framework for adapting to climate change and associated threats as well as a case for increased resilience to climate change.	Emphasises the commitment to sustainable development and consideration of the potential impacts of climate change, including increased flooding.	The LFRMS may contribute to the aims of the strategy through the provision of measures to adapt to an increase in flood risk due to future climate change.	<ul style="list-style-type: none"> <li>• Climate change</li> </ul>
Climate Change Act (2008)	Establishes a definite target to reduce UK national carbon emissions by 80% by 2050, relative to a 1990 baseline. Requires the government to publish five yearly carbon budgets starting with the period 2008-2012. Sets targets to reduce	Emphasises the commitment to sustainable development.	The LFRMS will need to consider the carbon implications of its objectives and should seek to minimise emissions whilst promoting sustainable FRM.	<ul style="list-style-type: none"> <li>• Climate change</li> </ul>



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	greenhouse gases, and puts in place funding and mechanisms to reduce and alter activities which contribute to the emission of these gasses.			
Biodiversity 2020: A Strategy for England's Wildlife and Ecosystems (2011)	Sets out the Government's strategy for improving biodiversity in England up to 2020.	Flooding can have adverse impacts on biodiversity. However, there may be opportunities for the LFRMS to provide for biodiversity enhancements, as well as reducing risks to habitats and species from flood events.	The strategy could restrict LFRMS objectives if they are shown to have a significant adverse impact on water quality or local biodiversity.	<ul style="list-style-type: none"> <li>• Biodiversity, flora and fauna</li> <li>• Water environment</li> </ul>
England Biodiversity Framework (2008)	The framework encourages a number of conservation aspects including the adoption of an ecosystem approach and to embed climate change adaptation principles in conservation action.	The LFRMS may include measures that would result in biodiversity enhancements across landscapes and restoring / improving habitats.	The strategy could restrict LFRMS objectives if they are shown to have a significant adverse impact on water quality or local biodiversity.	<ul style="list-style-type: none"> <li>• Biodiversity, flora and fauna</li> <li>• Water environment</li> </ul>
UK Biodiversity Action Plan (1994)	The UK BAP aims to maintain and enhance biological diversity within the UK and contribute to the conservation and enhancement of global diversity.	The LFRMS will need to consider the potential impacts of measures within it on important species and habitats that are within the District, including the various Sites of Special Scientific Interest.	The strategy could restrict LFRMS objectives if they are shown to have a significant adverse impact on water quality or local biodiversity.	<ul style="list-style-type: none"> <li>• Biodiversity, flora and fauna</li> <li>• Water environment</li> </ul>
National Wetland Vision (2008)	The Wetland Vision is of a future where wetlands are a significant feature of the landscape in which wildlife can flourish. It will be a future in which wetland heritage is recognised and safeguarded; where everyone can enjoy wetlands for quiet recreation and tranquillity. Vtally, it will be a future where wetlands are valued both for the roles they play in helping us deal with some of the challenges of the 21st century and in improving and sustaining our quality of life.	Preserving and restoring wetlands such as peatlands, rivers and lakes will help regulate surface water run-off, store flood water and recharge groundwater. These actions that are part of the wetland vision could potentially link with measures within the LFRMS.	May restrict certain FRM objectives if they are shown to be likely to have a significant effect on wetland habitats within the Borough.	<ul style="list-style-type: none"> <li>• Biodiversity, flora and fauna</li> <li>• Water environment</li> </ul>
Wildlife and Countryside Act (as amended) (1981)	The Act is the principle mechanism for legislative protect of wildlife in Great Britain. The Act deals with the protection of birds, other animals and plants.	The Act provides for the notification of Sites of Special Scientific Interest and their protection and management. Any potential impacts of the LFRMS, including on SSSIs, will need to be considered through the SEA.	May restrict certain FRM objectives if they are shown to be likely to have a significant effect on a SSSI.	<ul style="list-style-type: none"> <li>• Biodiversity, flora and fauna</li> <li>• Water environment</li> </ul>
Natural Environment and Rural Communities (NERC) Act (2006)	Provides guidance for the protection and enhancement of important habitat and species.	Requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England.	May restrict certain FRM objectives if they are shown to be likely to have a significant effect on priority species or habitats.	<ul style="list-style-type: none"> <li>• Biodiversity, flora and fauna</li> <li>• Water environment</li> </ul>

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Salmon and Freshwater Fisheries Act (1975)	Aims to regulate practice relating to freshwater fisheries and salmon fishing.	The Act's main purpose is to protect fish species. However, it does indirectly affect flood risk. Restricting the obstruction to passage of fish may have implications for flood risk, as this will prohibit the use of fish weirs and mill dams.	May restrict certain FRM objectives if they are shown to be likely to have an adverse effect on fish passage or compromise a waterbody from achieving Good status under the WFD.	<ul style="list-style-type: none"> <li>• Biodiversity, flora and fauna</li> <li>• Water environment</li> </ul>
Contaminated Land (England) Regulations (2006)	Sets out provisions relating to the identification and remediation of contaminated land. The regulations identify contaminated land issues and pathways to pollution of surface, ground, estuarine and coastal water environments.	Although there is no heavy industry in Bromley, other light industries may have contaminated the land.	Flooding of contaminated land can have adverse impacts on factors such as biodiversity, water and soils	<ul style="list-style-type: none"> <li>• Biodiversity, flora and fauna</li> <li>• Water environment</li> <li>• Soils</li> </ul>
National Planning Policy Framework (2012)	The National Planning Policy Framework (NPPF) has replaced the set of national planning policy statements and national planning policy guidance notes, bringing them into one document. It sets high level national economic, environmental and social planning policy and includes a new presumption in favour of sustainable development.	The NPPF has replaced PPS25 along with the other PPSs and PPGs, and so comprises the national policy framework in relation to planning in areas of higher flood risk. The NPPF restricts development that would adversely affect sites European sites, designated sites, including Green Belt, Sites of Special Scientific Interest (SSSIs) and Areas of Outstanding Natural Beauty (AONB), as well as locations at risk of flooding or coastal erosion.	The strategy could restrict LFRMS objectives if they are shown to have a significant adverse effect on sensitive ecological and landscape sites in the Borough.	<ul style="list-style-type: none"> <li>• Biodiversity, flora and fauna</li> <li>• Water environment</li> <li>• Landscape</li> <li>• Historic environment</li> <li>• Population</li> <li>• Soils</li> </ul>
PPS5: Planning for the Historic Environment Practice Guide (2010)	The guide assists local authorities, owners, applicants and other interested parties in implementing the policy <i>Planning Policy Statement 5 (Planning for the Historic Environment)</i> .	Provides guidance on how to conserve historic assets. This will provide advice on how to develop around historic assets, as well as ways best to conserve them from flooding.	May restrict certain FRM objectives if they are shown to be likely to have an adverse effect on historic assets in the Borough.	<ul style="list-style-type: none"> <li>• Historic environment.</li> </ul>
Historic Environment Good Practice Advice in Planning: Historic Environment Records (2014)	Provides information on good practice to assist local authorities, planning and other consultants, owners, applicants and other interested parties in implementing historic environment policy in the NPPF. Assists with access to Historic Environment Records.	Guide helps to assist in sustainable development, in helping with access to Historic Environment Records which has information about various historic assets.	None.	<ul style="list-style-type: none"> <li>• Historic environment</li> </ul>

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Historic Environment Good Practice Advice Guide in Planning: Note 3: The Setting of Heritage Assets.	Provides information on good practice to assist local authorities, planning and other consultants, owners, applicants and other interested parties in implementing historic environment policy in the NPPF. Provides advice on the setting of historic assets, and how to understand the setting.	Understanding the setting of a historic assets will assist in design development of FRM measures.	May restrict certain FRM objectives if they are shown to be likely to have an adverse effect on historic assets in the Borough.	<ul style="list-style-type: none"> <li>Historic environment</li> </ul>
<b>Regional / Local</b>				
Ouse Catchment Flood Management Plan (2010) and Aire Catchment Flood Management Plan (2010)	The CFMP provides an overview of the flood risk in these catchments and set out the preferred surface water management strategy for future years. They outline the wider context for managing flood risk in Yorkshire.	The CFMP provides important context for the LFRMS and set the strategic direction for managing flood risk from main rivers.	None	<ul style="list-style-type: none"> <li>Water environment</li> </ul>
Managing Drought in the North West (2011)	Provides levels of strategic assessment of drought risk across the region.	Provide broad context for the LFRMS.	None	<ul style="list-style-type: none"> <li>Water environment</li> </ul>
Humber River Basin Management Plan (2015)	The Humber River Basin Management Plan (RBMP) has been prepared to meet the requirements of the EU Water Framework Directive. It focuses on actions to address the protection, improvement, sustainable use of water and other pressures facing the water environment in the Humber River Basin.	Water quality and quantity is linked to the LFRMS as flooding events can lead to water pollution and changes in water levels.	May restrict certain FRM options if likely to inhibit achievement of WFD objectives and detailed programme of measures. FRM options may be strengthened if they actively contribute to meeting the WFD requirements.	<ul style="list-style-type: none"> <li>Water environment</li> </ul>
Bradford Air Quality Action Plan (2009)	Details how Bradford Council intends to improve air quality within its four AQMAs.	Provides information on regional policies to improve air quality in the borough.	None	<ul style="list-style-type: none"> <li>Air quality</li> </ul>
City of Bradford Metropolitan District Council Preliminary Flood Risk Assessment (2011)	Provides a high level review of flood risk from surface water, groundwater and ordinary watercourses across the county.	The flood risk assessment provides an important local context for the LFRMS.	None	<ul style="list-style-type: none"> <li>Water environment</li> </ul>
Bradford Strategic Flood Risk Assessment Level 1 Report (2014)	Provides a review of flood risk across the borough, steering all development towards areas of lowest risk.	The flood risk assessment provides an important local context for the LFRMS.	None	<ul style="list-style-type: none"> <li>Water environment</li> </ul>
West Yorkshire Local transport plan 2011 – 2026 (2011)	Sets out the aims, objectives and a series of policies for delivering transport improvements in West Yorkshire.	Important transport infrastructure may be at risk of flooding and the LFRMS offers potential benefits through better FRM.	None	<ul style="list-style-type: none"> <li>Material assets</li> <li>Population</li> <li>Air quality</li> </ul>
Bradford Local Development Framework Core Strategy and Policies for Management of Development (2014)	The policies cover spatial development issues in relation to education, health, community safety, energy management, sustainable development, climate change and flood management.	The strategy provides direction for the future development of the Borough, and includes policies relating to flooding.	The LFRMS will need to consider development policies set out in the strategy. May restrict certain FRM options if likely to inhibit achievement of the strategy objectives.	<ul style="list-style-type: none"> <li>All</li> </ul>

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City of Bradford Metropolitan District Council Local Biodiversity Action Plan (2011)	Details the priorities for habitats and species and offers practical measures which can be implemented to achieve the conservation of the areas biodiversity heritage. The content of the plan is informed and guided by national and international targets so that its implementation is firmly linked to national priorities and local objectives of Plan, Protection, Policy, Partnerships and Public Awareness.	Objectives include the improvement of water quality, removal of barriers to aquatic species and enhancement of wetland and riverine habitats and connectivity and the issue of invasive species.	Objectives of the City of Bradford District Council LBAP are linked to those of the WFD to enhance biodiversity and improve water quality status.	<ul style="list-style-type: none"> <li>• Biodiversity, flora and fauna</li> </ul>
Bradford Local Climate Impact Profile (2010)	Highlights the types of severe climatic events possible in the future and the impact these could have on services. Sets out measures to adapt and build resilience to these types of events.	FRM actions can contribute to the provision of adaptation measures to benefit people and biodiversity. FRM activities will generate carbon emissions.	The LFRMS will need to demonstrate that it can deliver improved FRM whilst minimising the level of associated carbon dioxide emissions.	<ul style="list-style-type: none"> <li>• Climate</li> </ul>



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