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Hartlepool Local Flood Risk Management Strategy – Strategic Environmental Assessment

Environmental Report: Non-Technical Summary
January 2016

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Purpose

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Non-Technical Summary

Hartlepool BC (HBC) 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 November 2015. 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 H5 in particular has potential to provide a positive contribution to all of the SEA objectives and make a significant positive contribution to many of them, seeks to promote sustainable solutions that not only reduces flood risk but will also seek to improve environmental quality. In particular, 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, in particular N1 and N2, are 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 12.

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 HBC 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 Environmental Report was subject to a public consultation from the 19th January until 19th February 2016 alongside the draft Hartlepool BC LFRMS. There was no consultation responses received during this period. The preparation of a Post-Adoption Statement, will be finalised and formally approved once the LFRMS has been put forward and approved by Scrutiny Committee. 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
AStGWF.....	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
HBC	Hartlepool BC
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
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

Hartlepool BC (HBC or the Council) 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 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 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
Stage A:	Setting the context and objectives, establishing the baseline and deciding on the scope
Stage B:	Developing and refining alternatives and assessing effects
Stage C:	Preparing the Environmental Report
Stage D:	Consulting on the draft plan or programme and the Environmental Report
Stage E:	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’)¹. 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*’².

Local Government Association (LGA) guidance³ 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.

¹ 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

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

³ 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'*¹.

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, 2015), 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 November 2015 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

Hartlepool is a unitary authority with Borough status located in the ceremonial County Durham in northeast England (Figure 1-1). The Borough covers an area of approximately 98km² and has a population of approximately 92,590 people (2014) (Tees Valley Unlimited, 2015a). Hartlepool is generally low-lying and bounded to the east by the North Sea and shares its northern border with County Durham, to the south by Stockton-on-Tees.

The town of Hartlepool in the east of the Borough has a North Sea coast, 12km north of Middlesbrough and 27km south of Sunderland. The Borough also includes outlying suburban villages including Seaton Carew, Greatham, Hart village and Elwick.



Figure 1-1: Study area

1.5 SEA scoping

The SEA Scoping Report for the LFRMS was issued to the statutory consultation bodies on 12 November 2015. 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. Table 1-3 below summarises the comments received and how they have been addressed within this Environmental Report. Northumbrian Water confirmed that they had no comments to make on the SEA Scoping Report.

Table 1-3: SEA scoping consultation responses

Consultee	Comment received	Action taken
Natural England Letter dated 23 November 2015	In Section 4.2, there is no mention on the Durham Heritage Coast, which adjoins the Borough at Crimdon Denemouth.	A paragraph describing the Durham Heritage Coast has been included in Section 4.2.
	Contrary to what is presented in Section 4.3.1, there is only one National Nature Reserve (NNR) in the Borough (Teessmouth NNR). Durham Coast NNR lies several kilometres to the north of the Hartlepool boundary.	There is only one NNR within Hartlepool Borough; however Durham Coast NNR lies on the boundary of the Borough. Section 2.5.1 has been updated to state Teessmouth is the only NNR in Hartlepool.
	Section 4.3.4: We agree that "implementation of the LFRMS may also provide opportunity to enhance or create new habitats within the Borough" (section 4.3.4). In particular, flood storage schemes may have significant potential in this regard.	This has been included in Section 2.5.4 and in the assessment (Table 5-4).

Consultee	Comment received	Action taken
	Section 4.4.5: SuDS can contribute considerably to achieving habitat and ecological enhancements, for example by creating reedbeds.	This has been highlighted in the assessment (Table 5-4).
	Section 4.7.3: The health benefits that could flow from better access to and recreational use of green infrastructure provided by the LFRMS should not be underestimated.	This has been including in Section 2.9.3 and highlighted in the assessment (Table 5-4).
	Section 4.8.3: misunderstanding of the concept of green infrastructure. According to the RTPi website, "Green infrastructure is a phrase used to describe all green and blue spaces in and around our towns and cities". It should not be used (as here) in relation to green technologies or waste management facilities. However, we strongly agree that in Section 4.8.4 "opportunities to create and enhance green infrastructure assets could be incorporated into FRM measures implemented as part of the LFRMS".	The sub-title 'Green infrastructure' has been removed and the paragraph is now part of Section 2.10.2 Infrastructure.
	Natural England agrees with the scoping conclusions as set out in Section 4.11 and Table 4-7.	No action required.
	Section 4.1.2: We agree that a test of likely significant effect is required. However, likely significant effect should not be confused or conflated with adverse effect on integrity, as is implied here.	A Test of Likely Significant Effect has been undertaken and is included in Appendix A.
	We support the proposed SEA objectives and indicators, yet suggest that green infrastructure is specifically built into Objective 11 with the wording "maximise the creation and enhancement of green infrastructure delivered through the LFRMS", with an indicator of "area/type of green infrastructure created/enhanced".	Objective 10 has been amended to "Create new and enhance existing green infrastructure delivered through the LFRMS, including SuDS."
	Section 5.4.1: We look forward to having sight of the alternative options in the Environmental Report.	Alternatives have been included in Section 4.2.
	Natural England considers that the proposed structure of the Environmental Report as set out in Section 6.2 and Table 6-1 is fit for purpose.	No action required.
Environment Agency	[Awaiting comments]	
Historic England	[Awaiting comments]	

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 Hartlepool, 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 Hartlepool LFRMS may affect European sites which are located outside the administrative boundary of the strategy.

There is one Ramsar and SPA site within the Borough, and one Ramsar, two SPAs and four SACs within 15km of Hartlepool's boundary:

- Teesmouth and Cleveland Coast SPA and Ramsar
- Northumbria Coast SPA and Ramsar
- North York Moors SPA and SAC
- Durham Coast SAC
- Castle Eden Dene SAC
- Thrislington 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. 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 **Error! Reference source not found.** 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, 2015), 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
International
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
National
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)
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)
PPS5: Planning for the Historic Environment Practice Guide (2010)
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

Plan, Policy or Programme
Tees Catchment Flood Management Plan (2009)
Shoreline Management Plan 2 River Tyne to FlamBorough Head
Hartlepool Surface Water Management Plan (2013)
Northumbria River Basin Management Plan (2009)
Managing the risk of flooding in Northumbria River Basin District (2014)
Hartlepool Preliminary Flood Risk Assessment (2011)
Hartlepool BC Strategic Flood Risk Assessment Level 1 (2010)
Hartlepool Local Plan (2006)
Hartlepool BC Council Plan 2015/16
Delivery Plan for North East Regional Biodiversity Habitat Targets
Priority habitats and species in the Tees Valley – Update January 2012
Hartlepool Green Infrastructure Supplementary Planning Document (2014)
Biodiversity Report 2008
Environmental Sustainability Strategy (2005-2010)
Environmental Sustainability Action Plan (2006/6)

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

Hartlepool Borough’s landscape is influenced by the undulating upland Durham Magnesian Limestone plateau to the north and northwest, whilst the broad low-lying plain of the Tees lowlands dominates the southern landscape character. The west of the Borough is predominantly arable farmland, interspersed with a number of small village settlements and scattered farmsteads. Along the coastal strip and around the mouth of the River Tees there are a number of ecological sites of international and national importance, as described further in Section 2.5.1. These designations cover the extensive dunes, coastal mudflats and estuarine land. The eastern area of the Borough is dominated by the urban and industrial areas around Hartlepool town (see Figure 2-1). The industrial revolution brought many changes to the landscape character of Hartlepool, particularly in the east, where some land was increased by a height of five metres above sea level to create space for steel works and other industry (Landmark Partnership, 2000).

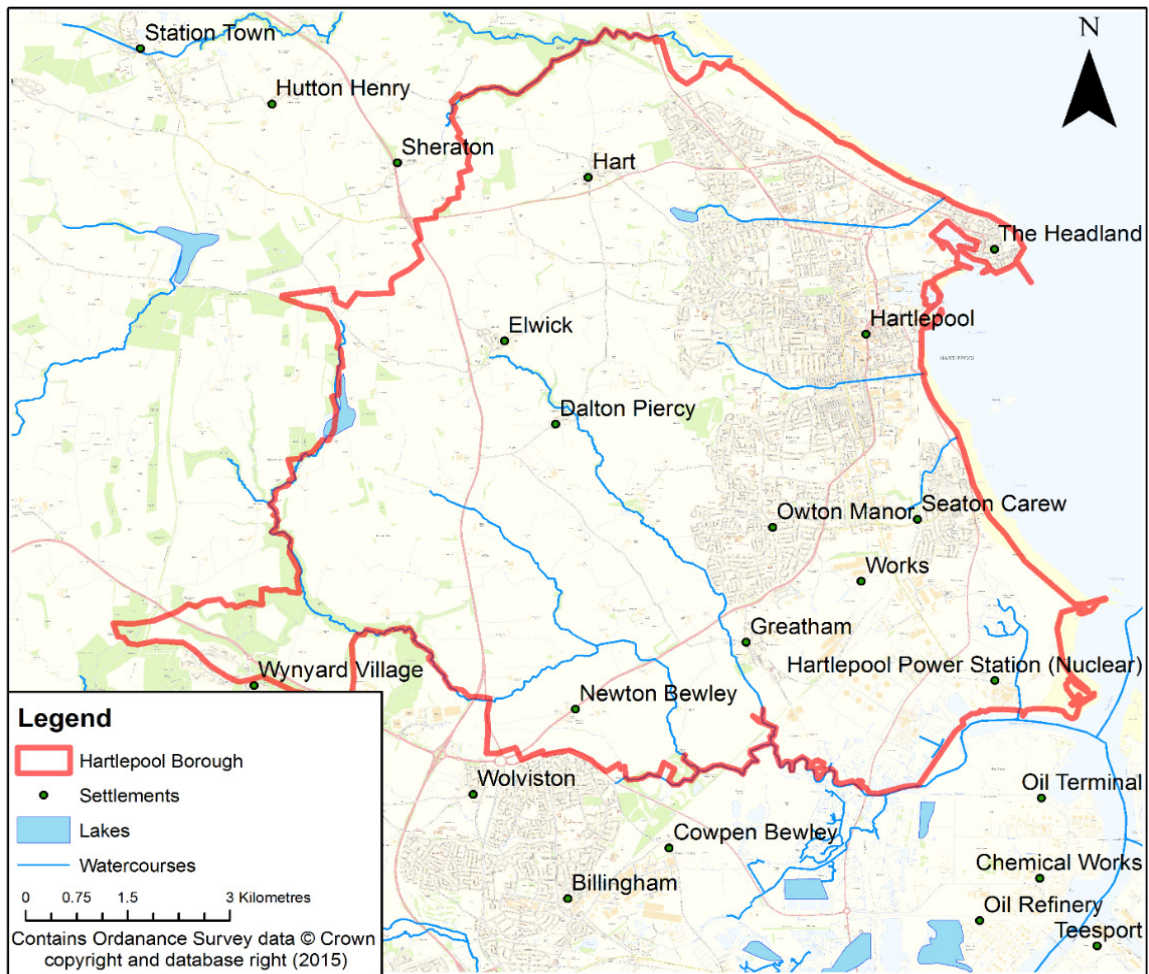


Figure 2-1: Main settlements and main river network in Hartlepool

The natural drainage system within the Borough follows a small number of Beck valleys, running from the north and northwest, towards the eastern coastline and the Tees basin. These river corridors run through agricultural and urban land. Areas of natural and semi-natural open water, marshland and mudflats exist around the Seaton Tees channel and Greatham Creek in the south of the Borough (Landmark Partnership, 2000).

The non-main rivers in Hartlepool BC shown in Figure 2-2 run north to east or north to south across the Borough and the majority of recorded flooding incidents are associated with urban areas of Hartlepool. The hydrology and interaction of both main rivers and non-main rivers is important to understand in terms of the Borough, the wider catchment and flood risk management policy and management approaches.

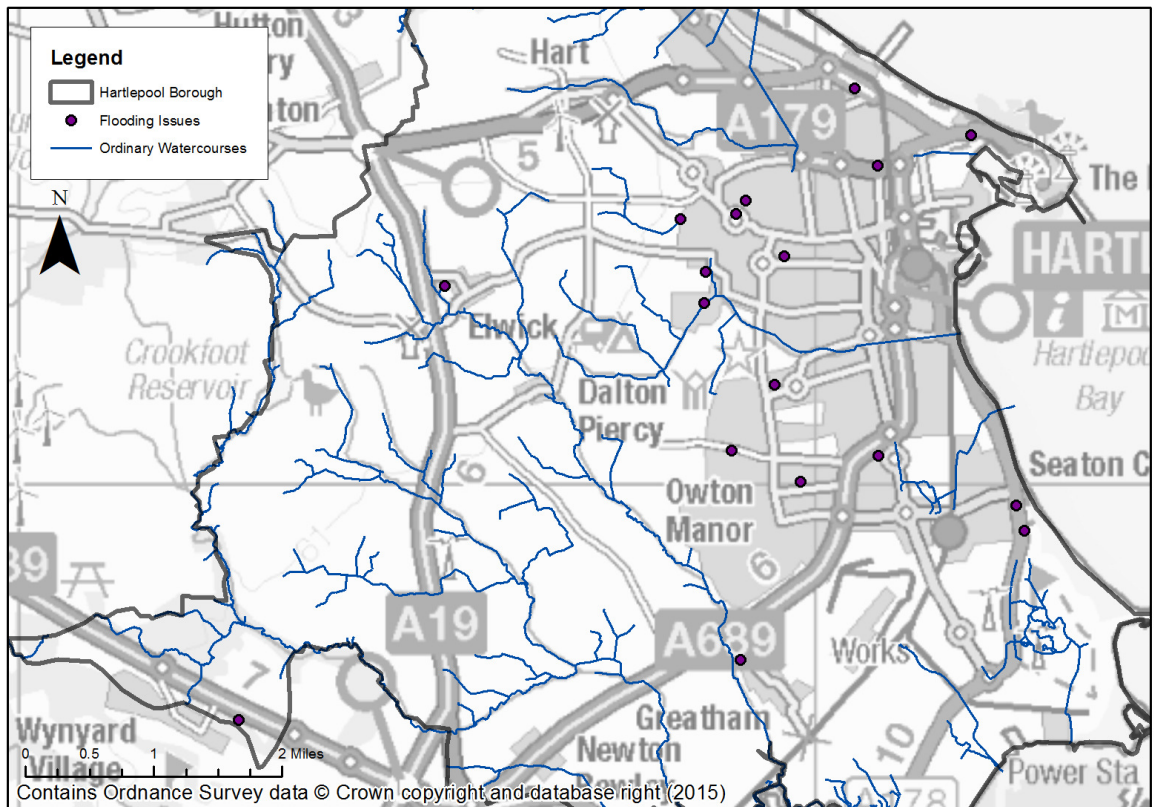


Figure 2-2 Non main rivers in Hartlepool BC

There are no AONBs or National Parks in the Borough. Hartlepool Borough is divided into two National Character Areas (NCA), the southern half being 23 Tees Lowlands NCA, the northern half 15: Durham Magnesian Limestone Plateau. NCAs are designated by Natural England to help communities inform their decision-making about their areas.

The Tees Lowlands NCA extends from the coast at Hartlepool and Redcar inland beyond Darlington, and covers the majority of Hartlepool Borough. The NCA forms a broad, open plan dominated by the meandering lower reaches of the River Tees and its tributaries. The large conurbation around the Lower Tees and Teesmouth contrast with the rural areas to the south and west, which is largely agricultural in character (Natural England, 2014a). In this NCA, climate change is likely to result in rising sea levels and higher tidal surges. Protection and expansion of wetland areas can help to reduce flood risk in urban areas. These wetlands are internationally designated and it is a key opportunity identified in the NCA profile that these areas should be protected, managed to maintain and enhance their unique ecology (Natural England, 2014a).

Durham Magnesian Limestone Plateau NCA covers the North Sea coast from Hartlepool north to South Shields. It is generally a narrow strip of land along the coast, although it extends inland at its southern boundary. The NCA is an open, agricultural landscape with sharply defined boundaries in the form of a steep limestone escarpment to the west and a dramatic coast of limestone cliffs, headlands and bays to the east. The Magnesian Limestone aquifer that sits below the area is an important source of drinking water for surrounding urban areas (Natural England, 2014b). It is noted in the NCA profile that increased frequency of heavy rainfall events could increase waterlogging of the soil, run-off and flooding, which could cause increased pollution, sedimentation of watercourses and flooding of vulnerable settlements. These factors could then have a detrimental effect on the ecology of watercourses (Natural England, 2014b)

The landscape of England has been further classified into National Landscape Typologies by Natural England (2015), which describe the landscape according to three definitive attributes and are used as a base unit in indicators of change for local Landscape Character Assessments. Hartlepool Borough has been divided into four landscape types as described in Table 2-2.

Table 2-2: Hartlepool's landscape typologies (Natural England, undated)

Landscape typology	Location	Attribute		
		Physiography	Landcover	Cultural pattern
URBAN	Hartlepool town	Extensive areas of predominantly built land where the rural settlement pattern has been completely subsumed by urban development.		
LWW	South east	Lowlands Low-lying areas, associated mainly with Mesozoic or Tertiary rocks of sedimentary origin, and glacial and fluvial drift.	Wetland Low-lying land associated with fluvial drift and supporting wetland. Land may be seasonally or perennially wet; often associated with ditches.	Wetland / waste unwooded Open, sparsely settled agricultural landscapes. Tree cover is usually restricted to watercourses, or groups of trees around buildings.
LCD	West		Clayland Heavy, often poorly draining landscape associated with base-rich, clayey and loamy soils developed on soft clay and chalky till. Seasonal waterlogging.	Dispersed unwooded Settled agricultural landscapes characterised by a moderate to high level of dispersal, comprising scattered farmsteads and frequent clusters of wayside dwellings. Tree cover is usually fairly sparse.
RLE	North west	Intermediate Rolling / undulating areas, associated mainly with Mesozoic or Tertiary rocks of sedimentary origin and glacial till.	Chalk and Limestone Light land associated with shallow, free-draining soils developed directly on chalk or limestone bedrock, typically distinguished by stoney soils with relic calcareous grassland on steeper slopes in soft rock areas and rock outcrops / limestone pavement with dry species-rich pasture / hay meadow in hard rock areas.	Wooded – estateland Settled agricultural characterised by estate plantations, parkland and belts of trees. Settlement is usually restricted to scattered farmsteads and small estate villages.

Durham Heritage Coast covers 14km of coastline north of Hartlepool town to Sunderland. It was established in 2001 to conserve the stretch of undeveloped coast that is present in this area. The coast aspires to include improving stretches of once degraded coast at Castle Eden Denemouth to form a continuous coastal strip (Land Use Consultants, 2006). The Heritage Coast Partnership, who manages the coast, aims to protect “the natural and cultural integrity of the area, whilst developing meeting the area’s social and economic needs” (Heritage Coast, 2015).

2.4.1 Key environmental issues

The coastal fringe of Hartlepool, particularly close to the River Tees mouth, has highly intrusive development, with visual damage caused by abandoned plant areas. This contrasts with the ecologically valuable wetlands adjacent to this development, which is open and flat. The flat landscape character of the area means that heavy industrial sites

can be viewed from a distance, creating a visually barren impression. There has been removal of hedgerows within the Borough, which has disrupted the aesthetic sense of scale and introduces a barren, industrial element to the landscape (Landmark Partnership, 2000). Therefore, the landscape character is at risk from industrial development, with a risk of new development and dilapidation of old development.

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 landscapes, and impacts on the setting of 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.

2.5 Biodiversity, flora and fauna

2.5.1 Designated nature conservation sites

Hartlepool supports a number of internationally designated nature conservation sites. There is one Ramsar and SPA site within the Borough, and one Ramsar, two SPAs and four SACs within 15km of Hartlepool’s boundary (Figure 2-2). Summary details of these sites is provided in Table 2-3.

Table 2-3: European sites within 15km of Hartlepool Borough

Site name	Distance from Hartlepool	Qualifying and Interest features
Teesmouth and Cleveland Coast SPA and Ramsar	Within – along the north eastern coastal boundary and south east of the Borough along the Tees Estuary.	The site includes a range of coastal habitats, including sand and mudflats, rocky shore, saltmarsh, freshwater marsh and sand dunes. These habitats provide feeding and roosting opportunities for important numbers of waterbirds in winter and during passage periods. The Ramsar is designated for assemblages of international importance with species peak counts in winter and species/populations occurring at levels of international importance. The species include the Common Redshank <i>Tringa tetanus tetanus</i> and Red Knot, <i>Calidris canutus islandica</i> (JNCC, 1995). The SPA is designated due to qualification under Article 4.1 of the Birds Directive, supporting populations of Little Tern <i>Sterna albifrons</i> . The site also qualifies under Article 4.2, regularly supporting at least 20,000 waterfowl and supporting the following migratory species (JNCC, 2005a): <ul style="list-style-type: none"> • Ringed Plover <i>Charadrius hiaticula</i> • Knot <i>Calidris canutus</i> • Redshank <i>Tringa tetanus</i>.
Northumbria Coast SPA and Ramsar	0.5km north	This site includes much of the coastline between the Tweed and Tees Estuaries in north east England. The site consists of mainly discrete sections of rocky shore with associated boulder and cobble beaches. The Ramsar is designated for species/populations occurring at levels of international importance of the following (JNCC, 2000): <ul style="list-style-type: none"> • Little Tern • Purple Sandpiper <i>Calidris maritima maritima</i> • Ruddy Turnstone <i>Arenaria interpres interpres</i>. The site qualifies as a SPA under Articles 4.1 and 4.2 of the Birds Directive by supporting populations of European importance of the above species (JNCC, 2005).
North York Moors SPA and SAC	14km south	The site is predominantly an upland area, dominated by open heather moorland, intersected by long valleys largely orientated north-west to south-east. The moors are important for breeding upland birds, notably raptors utilising the varied conditions from high moorland down to the valley sides and bottoms, and for breeding waders. The site qualifies as an SPA under Article 4.1 of the Birds Directive for supporting populations of European importance of the Golder Plover <i>Pluvialis apricaria</i> and Merlin <i>Falco columbarius</i> (JNCC, 2004).

Site name	Distance from Hartlepool	Qualifying and Interest features
		The site is designated as a SAC under Annex I for the Northern Atlantic wet heaths with <i>Erica tetralix</i> and European dry heaths habitats (JNCC, undated(a)).
Durham Coast SAC	0.5km north	The site is the only example of vegetated sea cliffs on Magnesian Limestone exposures in the UK. As such, this site is designated for the Annex I habitat of Vegetated sea cliffs of the Atlantic and Baltic Coasts. The vegetation is unique in the British Isles and consists of a complex mosaic of paramaritime, mesotrophic and calcicolous grasslands, tall-herb fen, seepage flushes and wind-pruned scrub (JNCC, undated(b)).
Castle Eden Dene SAC	3.1km north	The site is designated for its Annex I habitat of <i>Taxus baccata</i> woods of the British Isles. The site represents the most extensive northerly native occurrence of Yew <i>Taxus baccata</i> woods in the UK. Extensive yew groves are found in association with ash-elm <i>Fraxinus-Ulmus</i> woodland and it is the only site selected for yew woodland on Magnesian Limestone in northeast England (JNCC, undated(c)).
Thrislington SAC	9km west	The site has an Annex I habitat for which it is designated, Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (important orchid sites). Thrislington is a small site but contains the largest of the few surviving stands of CG8 <i>Sesleria albicans</i> – <i>Scabiosa columbaria</i> grassland. It covers less than 200ha and is found mainly in small-scattered stands (JNCC, undated(d)).

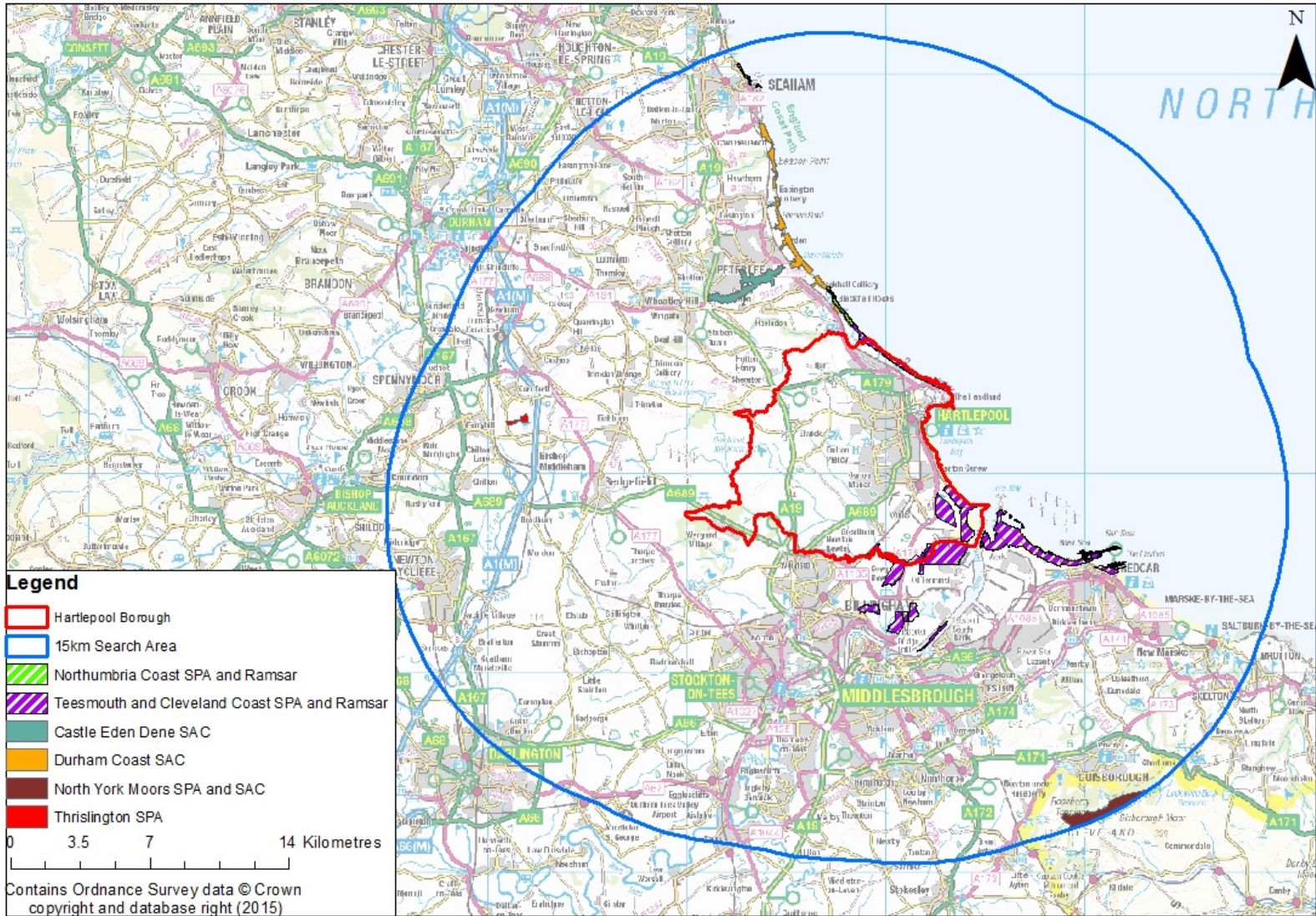


Figure 2-2: European sites within 15km of Hartlepool

There are seven Sites of Special Scientific Interest (SSSI) either wholly or partly in Hartlepool Borough (Figure 2-3). Summary information on these sites is provided in Table 2-4.

Table 2-4: SSSIs within Hartlepool Borough

SSSI name	Location	Interest features	SSSI condition
Hart Bog SSSI	Within north west part of the Borough.	The mire is of particular botanical, invertebrate and palaeobotanical interest. Four distinct types of plant community are readily identifiable; including bog mosses <i>Sphagnum</i> spp. and species-poor and species-rich fen. There is one nationally rare species of water beetle and three locally rare species of harvestmen (Natural England, 1983).	Unfavourable – Declining (100%)
Tees and Hartlepool Foreshore and Wetlands	Along the north west coast and southern boundary. Part of Teesmouth and Cleveland Coast SPA and Ramsar.	The site comprises several coastal areas, which are a complex of wetlands, estuarine and maritime sites supporting the internationally important population of wildfowl and waders on the Tees Estuary (Natural England, Tees and Hartlepool Foreshore and Wetlands).	Favourable (53.85%) Unfavourable – No change (0.05%) Unfavourable – Declining (46.10%)
Hartlepool Submerged Forest	Eastern part of the Borough along the coastline.	Identified as an area of national importance in the Flandrian Sea-Level Changes block of the Geological Conservation Review, and shows the pattern of relative sea-level change over the last 5000 years (Natural England, 1988a).	Favourable (100%)
Seaton Dunes and Common	South eastern part of Borough near Teesmouth.	An area of considerable importance for its flora, invertebrate fauna and bird life. The range of habitats include sandy, muddy and rocky foreshore, dunes, dune slacks and dune grassland, as well as relict saltmarsh, grazed freshwater marsh with dykes, pools and seawalls (Natural England, 1985).	Favourable (38.54%) Unfavourable – Recovering (13.92%) Unfavourable – No change (47.54%)
Seal Sands	South east borders the Seaton Dunes and Common SSSI.	The site is the only extensive area of intertidal mudflats, with tidal channels on the East coast of England between the Lindisfarne NNR to the north and the Humber Estuary to the south. The mudflats attract large numbers of migratory wildfowl and wading birds (Natural England, 1984).	Favourable (3.31%) Unfavourable – Recovering (82.43%) Unfavourable – No change (9.91%) Destroyed (4.35%)
Cowpen Marsh	Southern boundary. Part of Teesmouth and Cleveland Coast SPA and Ramsar.	The site includes the largest saltmarsh between Lindisfarne and the Humber Estuary and it provides an important wintering site for migratory wildfowl and wading birds (Natural England, 1988b).	Unfavourable – Recovering (100%)
Durham Coast	North east coastline. Part of Teesmouth and Cleveland Coast SPA and Ramsar.	The site contains six Geological Conservation Review sites: Marsden Bay, Whitburn, Blackhalls Rocks, Seaham Harbour, Shippersea Bay and Warren House Gill. It contains most of the paramaritime Magnesian Limestone vegetation in Britain.	Favourable (61.92%) Unfavourable – Recovering (38.08%)

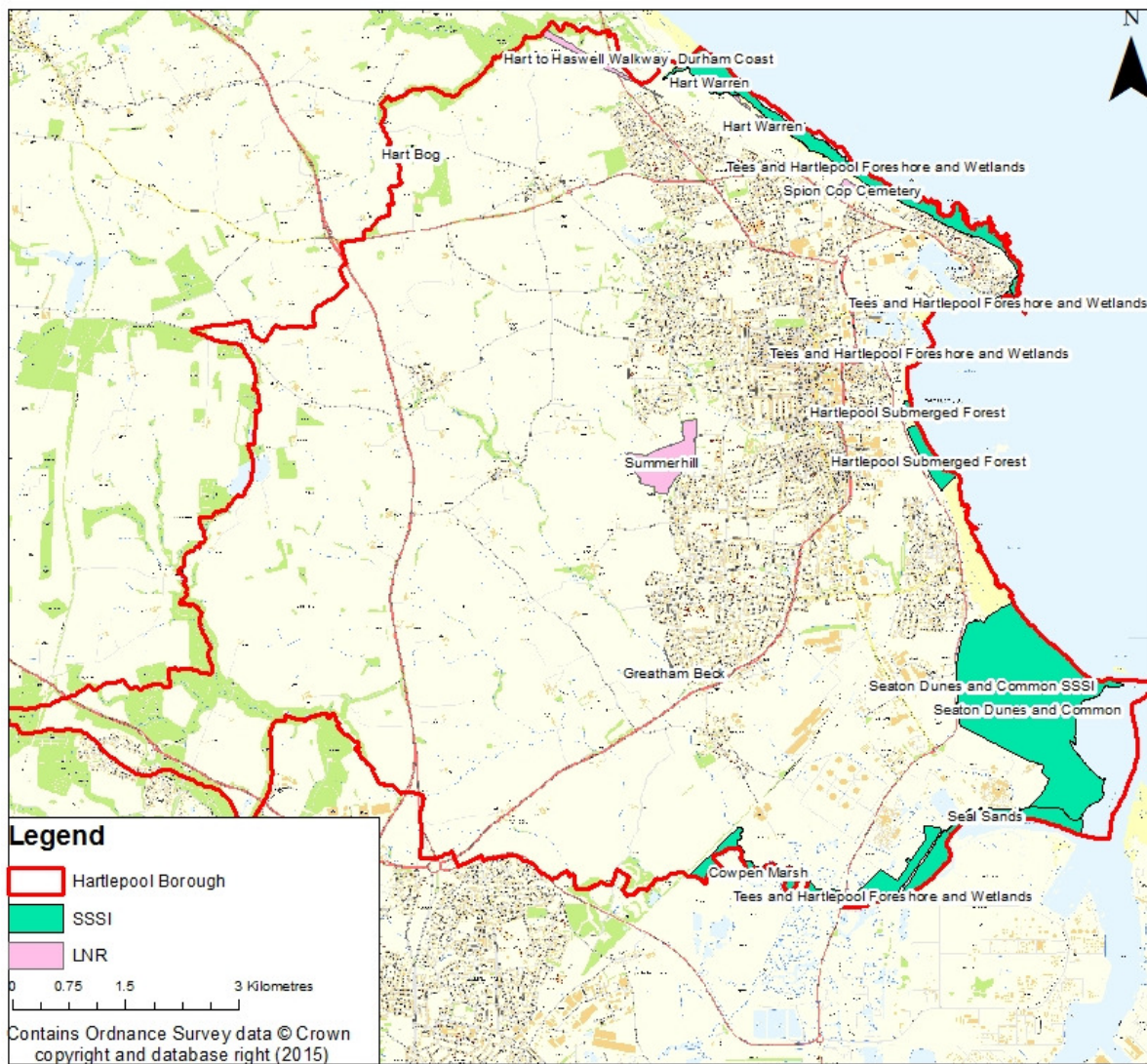


Figure 2-3: SSSIs and LNRs in Hartlepool

There is one National Nature Reserve (NNR) in Hartlepool, Teesmouth NNR. Teesmouth is located in the south east of the Borough and covers much of Seaton Dunes and Common SSSI. It has main habitats of sand dunes, grazing marsh, intertidal sand and mudflats. Harbour Seals *Phoca vitulina* and Grey Seals *Halichoerus grypus* bask beside the tidal channels and there are four different species of marsh orchid, along with thousands of migratory waterbirds (Natural England, 2014c). Durham Coast NNR borders the Borough in the north eastern point. The NNR is located along the coastline and is noted for its striking geological features and grassland that is home to numerous wild flowers and butterflies. The area is also home to many birds and supports an important breeding population of Little Terns *Sternula albifrons* (Natural England, 2014d).

2.5.2 Local designated sites

There are six Local Nature Reserves (LNR) within the Borough (Figure 2-3). These are summarised in Table 2-5 and shown in Figure 2-3.

Table 2-5: LNRs in Hartlepool Borough

Site name	Location	Qualifying and Interest features
Greatham Beck	South	A small one hectare wildlife corridor that is rich in plant-life and fringed with deciduous woodland, providing a rich and varied habitat for many species (Tees Valley Local Access Forum, 2015)

Site name	Location	Qualifying and Interest features
Hart Warren Dunes	North east coast	The only magnesium limestone dune system of any significance in the British Isles, and supports a rich variety of both flora and fauna (Natural England, 2013a).
Hart to Haswell Walkway	North east coast	This thin lime-rich soil enables a species rich meadow to flourish. The site also has several ponds and some of the most substantial mature deciduous woodland in Hartlepool (HBC, 2015a).
Seaton Dunes and Common	South east coast	This site is part of the Seaton Dunes and Common SSSI, and consists of two distinct components, Seaton Dunes to the east and Seaton Common further inland (Natural England, 2013b).
Spion Cop Cemetery	North East	This site is an area of species rich dune grassland that is home to many rare plants and animals including Thrift <i>Armeria maritima</i> , Birdsfoot Trefoil <i>Lotus corniculatus</i> , Skylark <i>Alauda arvensis</i> and Meadow Pipit <i>Anthus pratensis</i> (Natural England, 2013c).
Summerhill	Centre	The site has hay meadows, hedgerows, ponds and over 65,000 trees, which have been planted over the last eight years (Natural England, 2013d).

There are 46 Local Wildlife Sites (LWS) in Hartlepool (HBC, 2015b). These are sites that are of local importance and are designated by the local authority, however, they have no statutory protection. The LWSs include ancient woodland, railway embankments, quarries, marshland and grassland.

There is one nature reserve in Hartlepool that is managed by The Tees Valley Wildlife Trust, The Howls. This is located in the centre of the Borough at Dalton Piercy. It is a woodland nature reserve that is dominated by an Ash *Fraxinus excelsior* and Sycamore *Acer pseudoplatanus* canopy with Hawthorn *Crataegus monogyna* and Elder *Sambucus nigra* and in parts Gooseberry *Ribes uva-crispa*. At one time this deep wooded valley was going to be flooded to provide a reservoir, but plans were changed and the woodland has survived (Tees Valley Wildlife Trust, 2013).

2.5.3 Notable habitats and species

As described above, Hartlepool has a variety of habitats, including ancient woodland and sand dune systems. Ancient woodland is largely restricted to small fragmented remnants located mainly in the west and north of the Borough (see Figure 2-4).

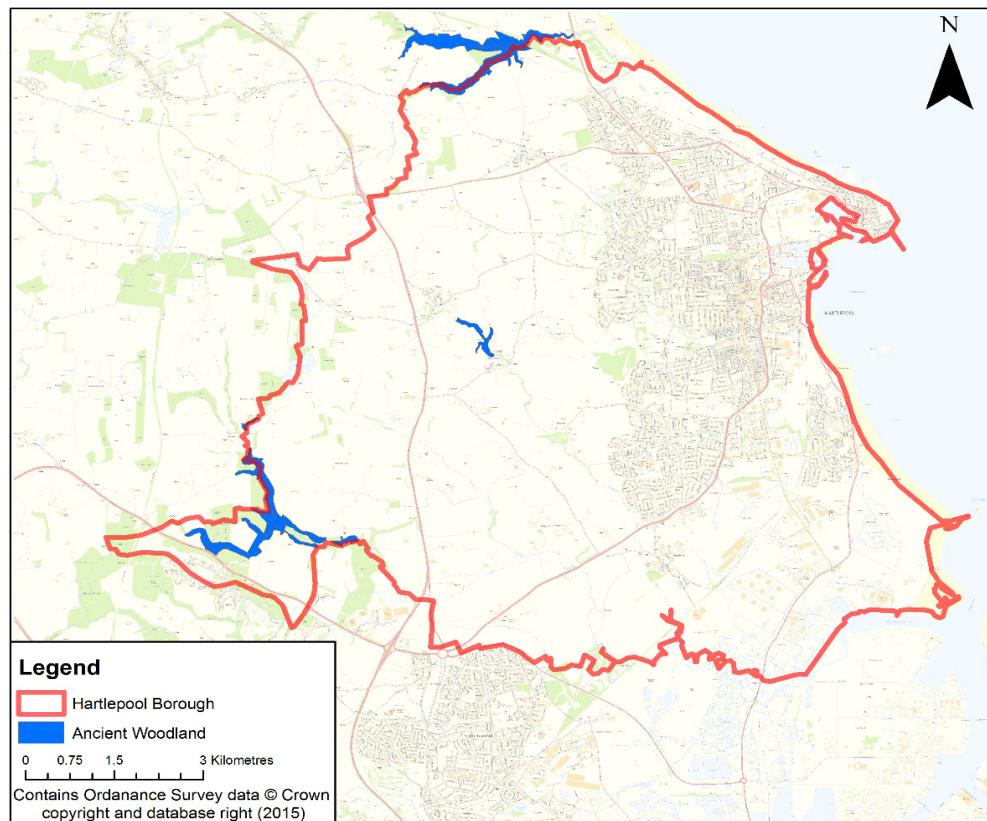


Figure 2-4: Ancient woodland in Hartlepool

The Tees Valley BAP covers Hartlepool, which also covers Stockton, MiddlesBorough and Redcar and Cleveland. The following priority habitats are listed in the Tees Valley BAP that have the potential to be affected by the LFRMS (Tees Valley Nature Partnership, 2012):

- Arable field margins
- Semi-natural broadleaved lowland woodland
- Brownfields
- Grazing marsh
- Hedgerows
- Lowland meadows
- Mudflats and saltmarsh
- Parks and recreation grounds
- Ponds, lakes and reservoirs
- Reedbeds
- Rivers and streams
- Saline lagoons
- Sand dunes.

The following priority habitats are listed as part of the Priority Habitat Inventory published by Natural England, which sets out the species and habitats that should be protected and enhanced within the Borough (Natural England, 2015):

- Coastal saltmarsh
- Coastal sand dunes
- Mudflats
- Coastal and floodplain grazing marsh

- Good quality semi-improved grassland
- Lowland meadows
- Intertidal substrate foreshore – Sand and mud, sand and rock platform.
- Reedbeds
- Deciduous woodland
- Woodland pasture and Parkland

The Tees Valley BAP lists 51 local priority species for the Tees Valley (Tees Valley Nature Partnership, 2012). These include a variety of birds such as the Barn Owl *Tyto alba*, Ringed Plover *Charadrius hiaticula* and Little Tern *Sterna albifrons*. Also included on the list is the Green-winged Orchid *Anacamptis morio* and Burnt Orchid *Neotinea ustulata*. Water dependent animal species include Great Crested Newt *Triturus cristatus*, Water Vole *Arvicola amphibius*, European Eel *Anguilla anguilla*, and Harbour (Common) Seal *Phoca vitulina*. All bat species with the exception of the Common Pipistrelle *Pipistrellus pipistrellus*, which is a European Protected Species, are included on the list.

White-clawed Crayfish *Austropotamobius pallipes*, Bullhead *Cottus gobio* and European Eel are known to be present in the Borough and are considered to be in decline locally. These species are particularly susceptible to changes and inputs from activities carried out on land, as well as watercourses (Hartlepool Water, 2014).

2.5.4 Key environmental issues

A large number of the designated sites, particularly those in the estuary and along the coastline, are under pressure from development and climate change. These sites are dependent on underlying hydrological conditions and are therefore vulnerable to flooding and changes in hydrology. These sites support a number of species that are reliant on tidal habitat, and are subsequently at risk from flooding events, poor water quality, changes to hydrological / tidal regimes and habitat changes. A number of the sites are particularly sensitive to changes in hydrological regimes and water quality, as they are important wetland habitats. The industry and development surrounding these ecological sites puts pressure through modifying the water bodies and introducing pollution sources.

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 FRM 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. New flood storage schemes have significant potential to enhance or create new habitats.

Flooding and FRM has the potential to significantly impact on a number of species of note in the Borough. Some, such as Water Vole, Bullhead, Eel and White-clawed 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. Great Crested Newt, a species protected under national and European law, are water dependent species found in the Borough.

2.6 Water environment

2.6.1 Water resources

Hartlepool Water supplies around 33 million litres of water to 90,000 people within the Borough. The drinking water is sourced from groundwater from 19 boreholes sunk into the Magnesian Limestone Aquifer (Hartlepool Water, 2015). Rainfall levels do not greatly influence the water levels. In the past, there have been issues with saline intrusion into the aquifer along the Hartlepool coastline as a result of over-abstraction and the abstractions responsible have now ceased (Hartlepool Water, 2014).

The main rivers in Hartlepool include:

- River Tees – located along the south eastern boundary. Its catchment is of high conservation value, although the lower section and its estuary are predominantly urban and industrial.
- Hart Beck – runs entirely within the Borough and runs through the north of Hartlepool town.
- Greatham Creek – located to the west of Hartlepool town, and runs south to the Tees estuary.
- Claxton Beck – runs south in the west of the Borough until it meets North Burn.
- North Burn – enters the Borough in the west having arisen around Crookfoot Reservoir.

Water resources within a catchment are assessed and monitored by the Environment Agency within a Catchment Abstraction Management Strategy (CAMS). Hartlepool is within the Tees CAMS area which has 114 abstraction licences, of which 45 are surface water and 69 are groundwater (Environment Agency, 2013). The most dominant use of licensed water (95%) is for power generation (Environment Agency, 2014a). The Permian rocks that include the Durham Magnesian Limestone are classed as a principal aquifer, which is a highly permeable rock formation capable of supporting large groundwater abstractions. The Magnesian Limestone is the most important aquifer in the Tees CAMS area (Environment Agency, 2013).

2.6.2 Water Framework Directive

Hartlepool is within the Northumbria River Basin District and is served by the Northumbria River Basin Management Plan (RBMP). The district covers an area of 9,029km² from the Scottish Border to just south of Guisborough, and from the Pennines in the east to the North Sea (Environment Agency, 2009a). The RBMP identifies the current water quality of the water bodies in the Borough and sets objectives for making further improvements to the ecological and chemical quality.

The River Tees flows along the south eastern boundary of Hartlepool Borough, which then follows Greatham Creek to the sea. Teeside's industry is notably one of the biggest sources of hazardous waste in the country and has the greatest concentration of authorised installations under the Environmental Permitting Regulations in England (Environment Agency, 2009a).

Water bodies are given an overall status of condition under the Water Framework Directive (WFD) and if it is designated as a Heavily Modified Water Body (HMWB) (Environment Agency, 2009a). One of the key objectives under the WFD is the requirement to prevent deterioration in the current status of water bodies, whilst HMWB must achieve 'good ecological potential' (GEP) within a set deadline. If an activity has the potential to impact on the ecology or morphology of the water body, the risk of causing deterioration in the status must be assessed. The RBMP identifies the Tees Estuary as being at moderate status (Environment Agency, 2014b). The Tees estuary is also a HMWB, and therefore the RBMP lists 16 mitigation measures to achieve GEP, of which eight are not in place. In 2014, the status of the water environment in the Tees catchment had deteriorated (Environment Agency, 2014b). This could be due to elevated tributyltin levels due to historical ship building industries. Dissolved organic nitrogen levels are elevated by effluents from agriculture in Teesside and further upstream and this is contributing to excessive growth of macroalgae (Environment Agency, 2014b). The WFD status of the water bodies in Hartlepool are provided in Table 2-6.

Table 2-6: WFD status of Hartlepool's water bodies (Environment Agency, 2009a)

Water body name	Water body number	Overall status	Ecological status	HWMB (Y/N)
Tees	GB510302509900	Moderate potential	Moderate potential	Y
Greatham Creek Catchment's (tributary of Tidal Tees)	GB103025076030	Bad	Bad	N
Claxton Beck from Source to North Burn	GB103025072460	Moderate	Moderate	N
North Burn from Source to Claxton Beck	GB103025072540	Good potential	Good potential	Y
Hart Beck from Source to Sea (Hartlepool)	GB103025075880	Moderate	Moderate	N

The RBMPs went through consultations in 2014 with updates provided. Table 2-7 shows the measures proposed during this consultation to improve the status of waterbodies within the Tees Lower and Estuary catchment. These mitigation measures are expected to supersede those listed in the 2009 RBMP once finalised. Since 2009, the Environment Agency has conducted investigations to help determine the reasons why the water bodies are not achieving good status. These include changes to the natural flow and levels of water, physical modifications and pollution (Environment Agency, 2014b).

Table 2-7: Types of measures proposed in the Tees Lower and Estuary catchment (Environment Agency, 2014b)

2015 Proposed Measure
Improve modified physical habitats
Removal or easement of barriers to fish migration
Removal or modification of engineering structure.
Improvement to condition of channel / bed and / or banks / shoreline.
Improvement to condition of riparian zone and / or wetland habitats.
Vegetation management
Managing pollution from waste water
Reduce point source pollution pathways (i.e. control entry to the water environment).
Mitigate / remediate point source impacts on receptor.
Reduce point source pollution at source.
Manage pollution from towns, cities and transport
Reduce diffuse pollution pathways (i.e. control entry to the water environment).
Reduce diffuse pollution at source.
Mitigate / remediate diffuse pollution impacts on receptor.
Mitigate / remediate point source impacts on receptor.
Vegetation management
Manage invasive non-native species
Mitigation, control and eradication (to reduce extent).
Manage pollution from rural areas
Reduce diffuse pollution at source
Reduce diffuse pollution pathways (i.e. control entry to the water environment).
Improvement to condition of riparian zone and / or wetland habitats.

2.6.3 Groundwater

Groundwater provides 100% of Hartlepool's drinking water and supports many of the rivers and wetland habitats (Environment Agency, 2009a). Hartlepool is covered by two groundwater bodies, the Tees Sherwood Sandstone and Wear Magnesian Limestone. The Wear Magnesian Limestone covers the northern half of the Borough. The Wear Magnesian

Limestone groundwater body (GB40301G701700) has been classified as having Poor overall status and Poor chemical and quantitative status under the WFD (Environment Agency, 2009a). There are various pressures that are having an impact on the quality of the principal aquifer in this catchment, namely the Magnesian Limestone. Since 2009, the water environment has not deteriorated (Environment Agency, 2014b). The Poor status is due to excess nitrate in the groundwater, which puts private water supply at risk (Environment Agency, 2014b). This aquifer is the sole supply of potable water for Hartlepool and it fails the specific test due to rising trends in sulphate (Environment Agency, 2009a).

The Tees Sherwood Sandstone groundwater body covers the southern half of the Borough, lying beneath a corridor of the lower River Tees between Hurworth-on-Tees and Teesmouth, and is designated as a drinking water protected area (Environment Agency, 2014b). The Tees Sherwood Sandstone groundwater body (GB40301G702000) is designated as Good under the WFD, for overall, quantitative and chemical status (Environment Agency, 2009a). Although at Good status, the groundwater remains at risk from saline intrusion and nitrate contamination

The EA have defined Source Protection Zones (SPZs) for 2000 groundwater sources in England such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk. There are show three main zones (inner, outer and total catchment) and a fourth zone of special interest, which the EA occasionally apply, to a groundwater source in Hartlepool, all three main zones are present. Three zones have typically been defined:

- SPZ1 – Inner Protection Zone is defined as the 50-day travel time from any point below the water table to the source. This zone has a minimum radius of 50 metres.
- SPZ2 – Outer Protection Zone is defined by a 400-day travel time from a point below the water table. The previous methodology gave an option to define SPZ2 as the minimum recharge area required to support 25 per cent of the protected yield. This option is no longer available in defining new SPZs.
- SPZ3 – Source Catchment Protection Zone is defined as the area around a source within which all groundwater recharge is presumed to be discharged at the source. In confined aquifers, the source catchment may be displaced some distance from the source.

A number of Groundwater Vulnerability Zones (GVZ) are present within Hartlepool Borough, including a major aquifer high over the northern half of Hartlepool town. From this point, it extends inland and becomes a major aquifer intermediate, with areas of major aquifer low. In the Seaton Carew area and Teesmouth, the groundwater is designated as a minor aquifer high. Groundwater vulnerability indicates areas that may be vulnerable due to surface activities.

The majority of bedrock aquifer within Hartlepool is designated as principal aquifer (Figure 2-5). The designations reflect the importance of aquifers in terms of groundwater as a resources and in supporting surface water flows and wetland ecosystems.

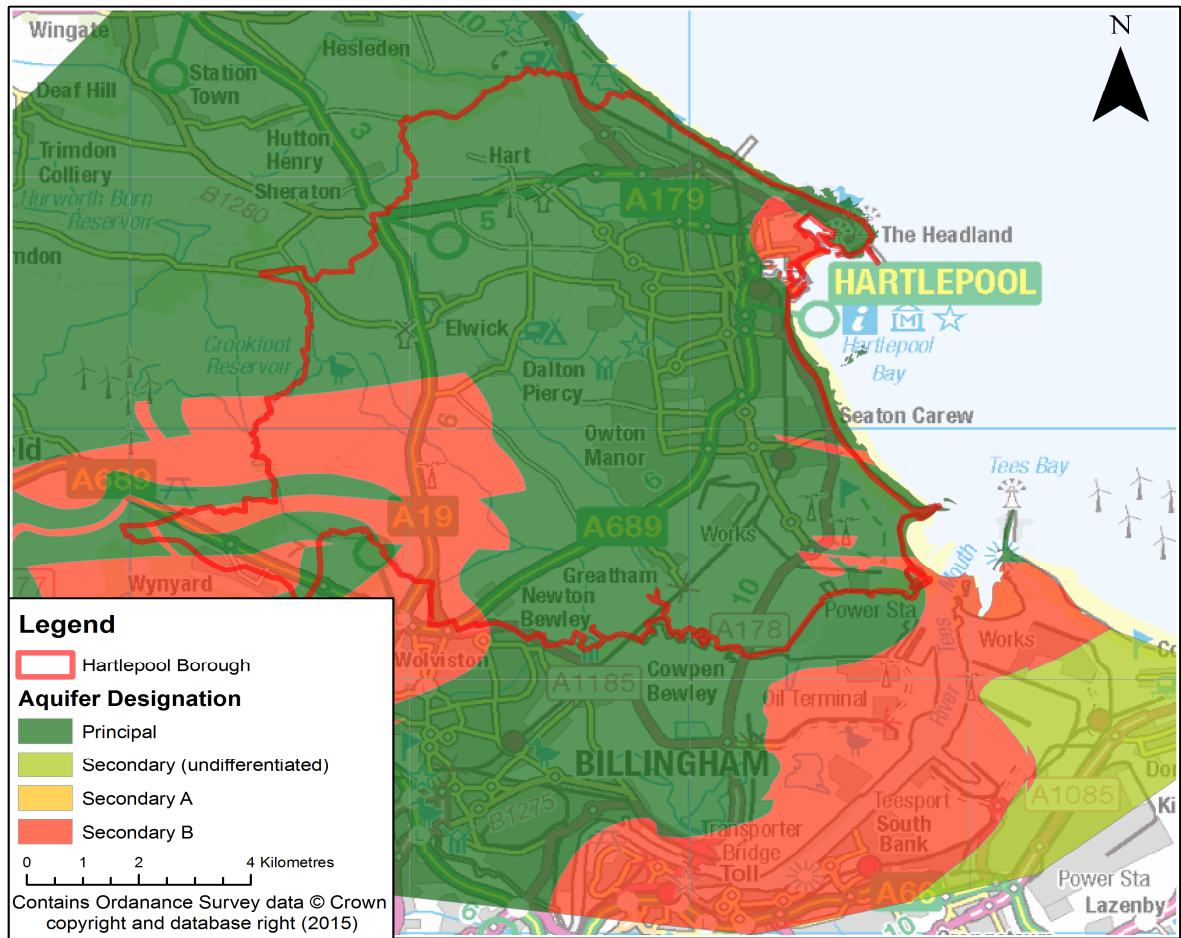


Figure 2-5: Aquifer Designations in Hartlepool

2.6.4 Flooding

The major overall risk of flooding for Hartlepool Borough comes from the risk of tidal flooding from the North Sea. Other sources of flooding include Burn Valley Beck, the Slake, sewerage system, highway drainage system, tidal ingress, overland flow and culvert blockages (JBA Consulting, 2010).

Areas Susceptible to Groundwater Flooding (AS_tGWF) is a strategic scale map showing groundwater flood areas on a 1km square grid. This data has used the top two susceptibility bands of the British Geological Society (BGS) 1:50,000 Groundwater Flood Susceptibility Map and thus covers consolidated aquifers (chalk, sandstone etc., termed 'clearwater' in the data attributes) and superficial deposits. Figure 2-6 shows that much of Hartlepool town is at risk of groundwater flooding.

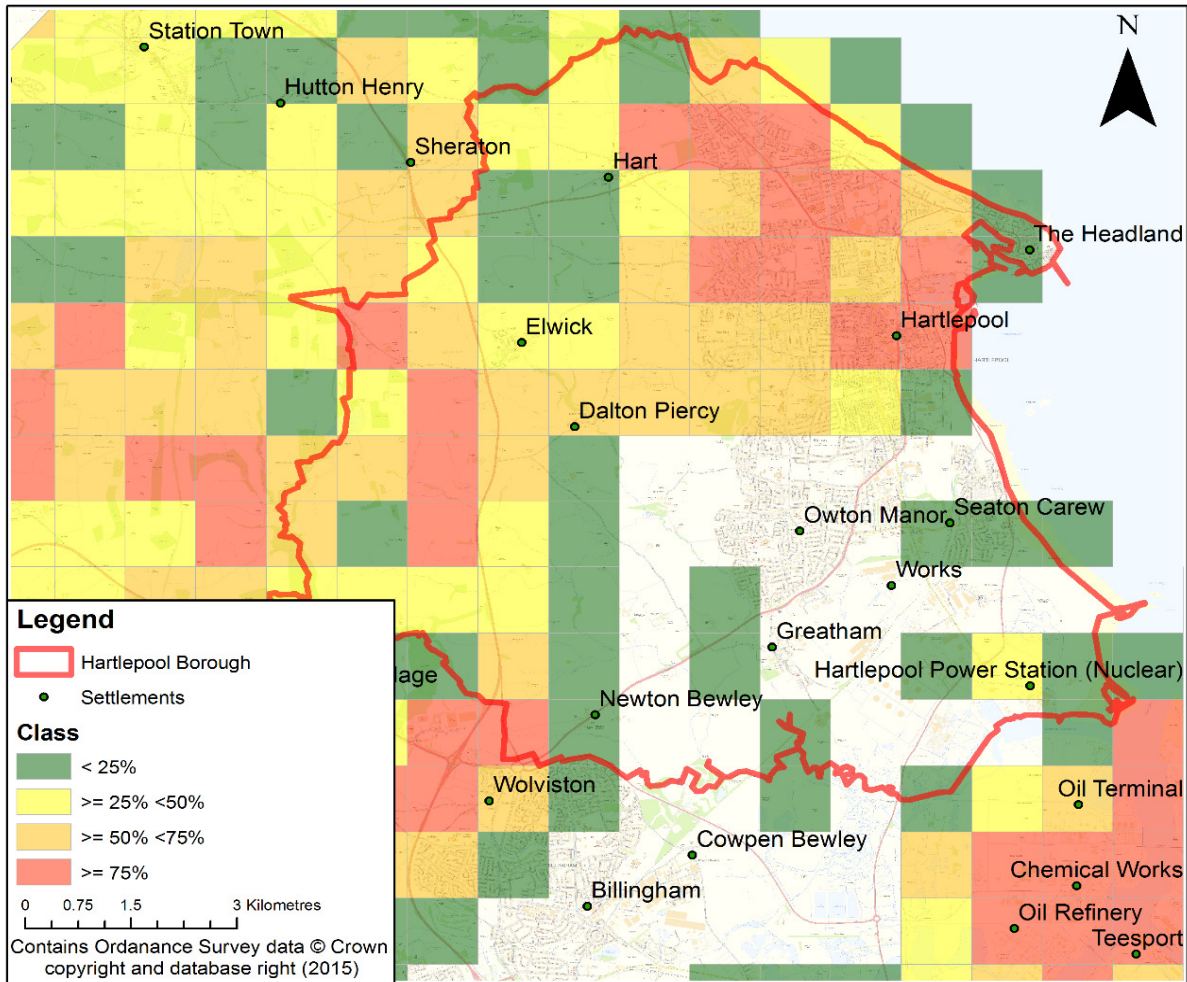


Figure 2-6: Areas Susceptible to Groundwater Flooding in Hartlepool

2.6.5 Key environmental issues

Within the Northumbria RBMP, the main pressure on the water environment is industry. Many of the failures on water body status under the WFD are due to point source discharges from water industry sewage works, diffuse source pollution from agriculture, minewaters, abstraction and physical modifications (Environment Agency, 2009a). Changes to natural flow and levels of water and physical modifications are a reason why water bodies are not achieving good WFD status.

Flooding has the potential to create pathways through which potential contamination sources (e.g. sewage treatment works) could result in pollution. Conversely, the LFRMS could help protect these contamination sources and improve water quality. The LFRMS is likely to provide a range of opportunities to support the RBMP by offering further protection to water quality of the rivers in the Borough and opportunities to achieve habitat and ecological enhancements, therefore the LFRMS has the potential to provide a key benefit to the WFD of Hartlepool's water bodies.

2.7 Soils and geology

The landscape of the Durham area, including Hartlepool and the lowland valley and estuary of the Teeside area is diverse, from the limestone cliffs and foreshores of the North Sea coast in the east, through coalfields, lowlands and dales to the ridges and plateaus of the North Pennines in the west.

The underlying geology is relatively simple and is dominated by rocks from four main periods of geological time; Carboniferous, Permian, Triassic and Jurassic, and the Quaternary. The rocks slope gently to the southeast, so that the oldest occur in the west and the youngest in the east. Rocks of Carboniferous age deposited in an area of shallow tropical seas and humid swamps outcrop in the west. These rocks are overlain in the east by younger rocks

belonging to the Permian Period when a hot and arid climate prevailed and this area of Britain was dominated by desert dunes and a large shallow, salty sea. These give way to red sandstones and mudstones deposited under arid, desert conditions during the Triassic and which underlie much of the area south and west of Hartlepool (Natural England, 2014e).

Immediately off the coast of Hartlepool are a series of sediments including a peat bed, which represent the remnants of a forest. Fossil material from the peat including snails, deer antlers and human-made stone tools show that this area was land approximately 5,000 years ago. The forests grew at a time after the ice had melted away to the North, and the climate was warming, but before the sea-level had risen to its current position (Natural England, 2014e).

There is one geological SSSI – Hartlepool Submerged Forest – which is described further in Table 2-4. The SSSI is an area of waterlogged peat intermittently exposed by the tides. There are six Regionally Important Geological Sites (RIGS) in Hartlepool: Crimdon Dene, Whelly Hill Quarry, Naisberry Quarry, Hartlepool Headland, Dalton Piercy and Long and Little Scar (Tees Valley Rigs Group, 2013). Of these sites, four are within close proximity to water bodies. Crimdon Dene follows the wooded valley of Bellow Burns watercourse. Dalton Piercy forms part of the river bank along Dalton Beck, from which heavy flow episodes continually erode the unconsolidated deposits. Hartlepool Headland covers the majority of the headland just off Hartlepool, and is formed of Magnesian Limestone. Long and Little Scar are just offshore Hartlepool, on intertidal wave cut platforms of a popular beach in Tees Bay.

Much of the geology within Hartlepool Borough is an important aquifer, as further described in Section 2.6.3.

Where urban areas are not present in Hartlepool, most of the soils are classified as being Grade 3, with a few areas of Grade 2 under agricultural land classification (Figure 2-7). Grade 2 is very good quality agricultural land, while Grade 3 is good to moderate quality. These soils are present in the east of the Borough, where a number of watercourses run through. Agricultural practices within the Borough, and further upstream, can lead to diffuse pollution from agricultural practices, which is a contributing factor to the poor water quality as described in Section 2.6.2.

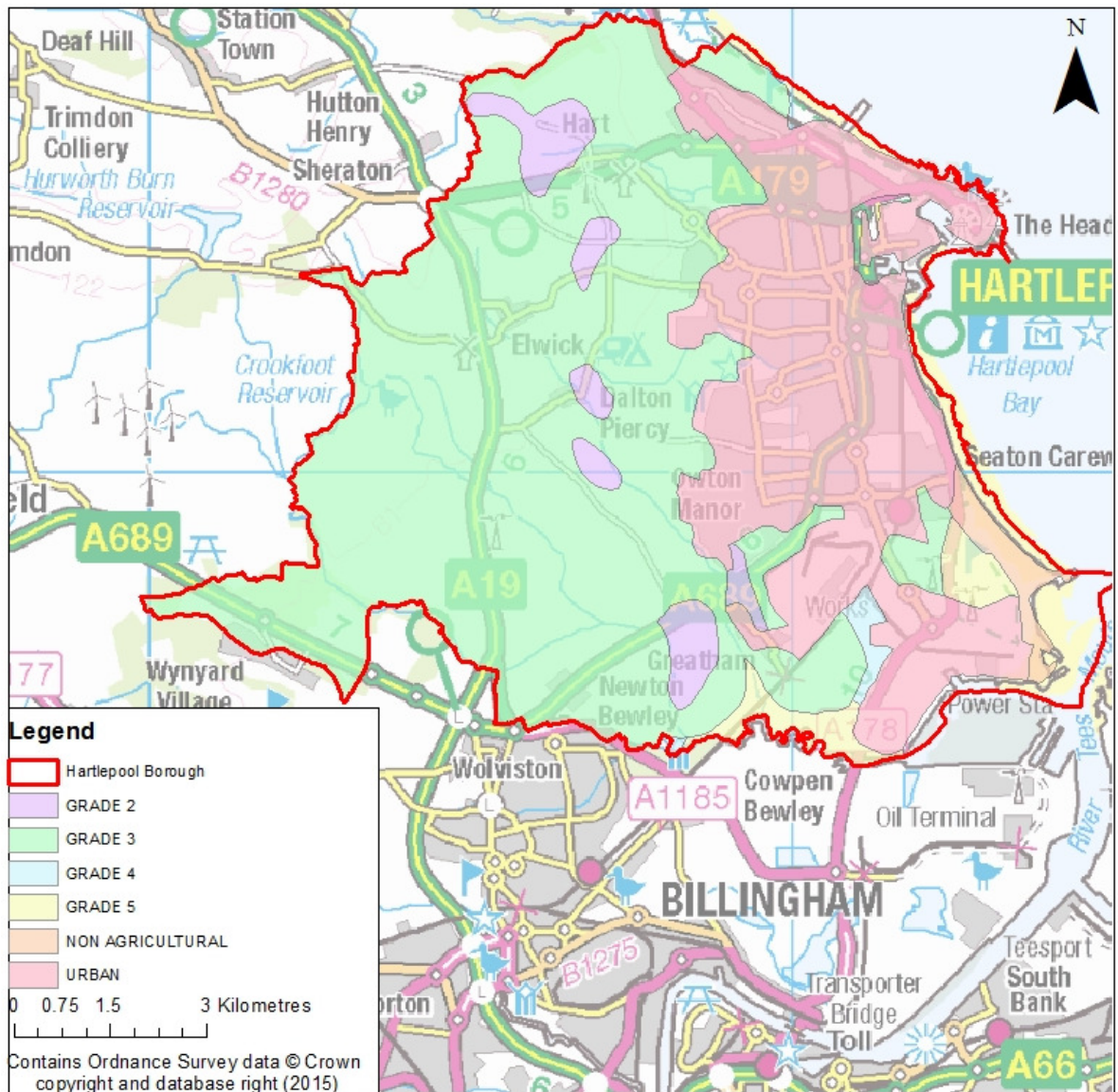


Figure 2-7: Agricultural Land Classification of Hartlepool

There are a number of historic landfill sites within the Borough (Figure 2-8), particularly clustered around the Seaton Carew, in areas where industry is generally present. One site, to the west of Seaton Carew, is a historic slag tip related to steel works, while two others in the south of the Borough close to the mouth of the River Tees, contain industrial waste at Leathers Chemical Works from a zinc works, which is at risk of flooding.

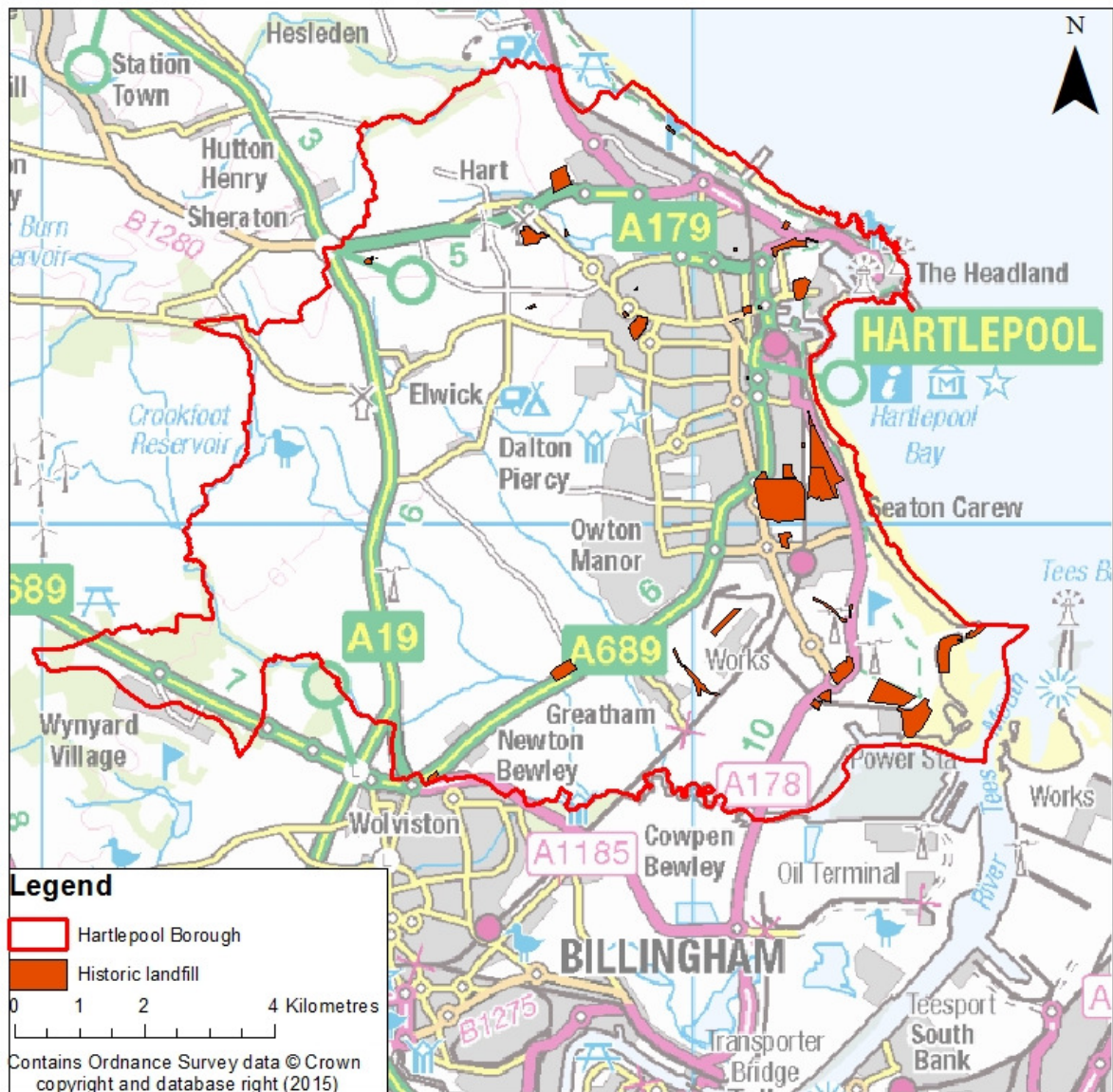


Figure 2-8: Historic landfill sites in Hartlepool Borough

2.7.1 Key environmental issues

Flood risk management could alter the extent or duration of flooding and therefore the LFRMS will need to consider implications for soil quality and the underlying geology, particularly in areas of heavy industry and landfill sites. 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 RIGS and designated geological SSSI, particularly those that may be affected by flooding or FRM measures.

2.8 Historic environment

Hartlepool began as an Anglo-Saxon settlement, but was founded as a village in the 7th century AD. By the later Middle Ages, Hartlepool had grown into a market town (History.uk.com, 2008). A major part of the reason for growth was that its harbour was improved to serve as the official port of the County Palatine of Durham. The main trade developed as fishing, making Hartlepool one of the major ports on the east coast of the UK (Localhistories.org, undated).

By the early nineteenth century, Hartlepool was still a relatively small town of around 900 people, with a declining port. In 1823, a new railway was built to make Hartlepool a coal port. The West Hartlepool Harbour and Dock opened in 1847. In 1852, a railway opened connecting West Hartlepool to Leeds, Manchester and Liverpool. This allowed the shipping of coal and wool products eastwards and the shipping of fish and fleeces westwards. This in turn resulted in the opening of the Swainson Dock in 1856 (Localhistories.org, undated).

By 1881, old Hartlepool's population had grown from 993 to 12,361, but West Hartlepool had a population of 28,000. In 1891, the two towns had a combined population of 64,000. By 1900 the two Hartlepool's were, together, one of the three busiest ports in England. What was West Hartlepool became the larger town and both were formally unified in 1967 (Localhistories.org, undated).

Historic assets found in Hartlepool include (see Figure 2-9):

- 150 listed buildings: There are three Grade I listed buildings; the Church of St Mary Magdalene, the Town Wall and Sandwell Gate, and the Church of St. Hilda.
- Eight scheduled monuments: these are historic sites of national importance and include 'Claxton medieval moated site' and 'Low Throston; deserted medieval village'.
- One registered park and garden: Ward Jackson Park
- There are eight conservation areas in Hartlepool, including Hartlepool Headland, Hartlepool Park and Seaton Carew.

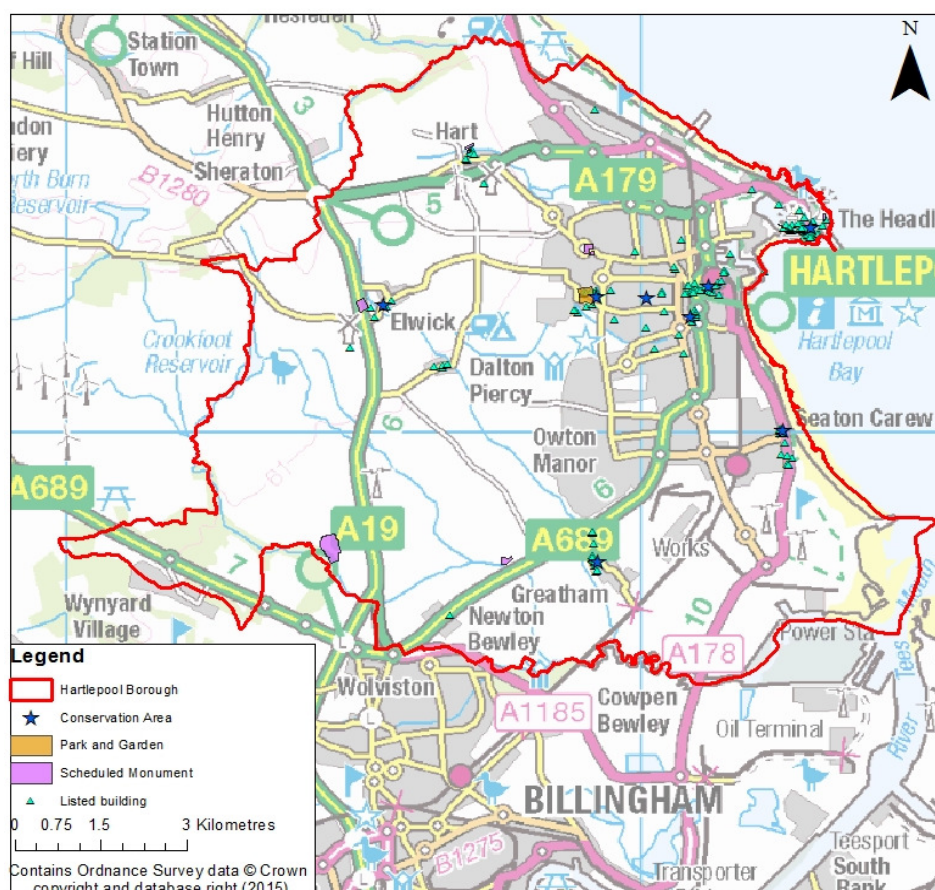


Figure 2-9: Historic assets in Hartlepool

Historic England's Heritage at Risk Register for the North East of England (Historic England, 2015) identifies eight historic assets at risk in Hartlepool Borough. None were identified as being at risk of flooding. The historic assets at risk in Hartlepool are (Historic England, 2015):

- Church Street, Hartlepool – Conservation area in a very bad condition, improving trend.
- Headland, Hartlepool – Conservation area in a very bad condition, deteriorating trend.
- Park, Hartlepool – Conservation area in a fair condition, deteriorating significantly.
- Seaton Carew – Conservation area in a very bad condition, deteriorating trend.
- Church of St Mary, Durham Street – Grade II listed building in a poor condition.
- Church of St Hilda, High Street – Grade I listed building in a poor condition.
- Low Throston deserted medieval village – Scheduled monument with extensive significant problems, with a declining trend in condition.
- Medieval farmstead and irregular open field system at High Burntoft Farm, Elwick – Scheduled monument with a generally unsatisfactory condition with major localised problems.

2.8.1 Key environmental issues

Hartlepool 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 Hartlepool's cultural heritage could arise from flooding and increased flood risk in the future, whilst the construction and implementation of the FRM options selected by the LFRMS could also have adverse effects. Potential benefits may also arise from reduced flood risk to assets as a result of implementation of the LFRMS.

2.9 Population

The population of Hartlepool is approximately 92,590 (2014 mid-year estimate) (Tees Valley Unlimited, 2015a), rising from 92,238 in 2012 (mid-year estimate) (HBC, 2015c), and has been steadily increasing over the decade 2001-2011 by approximately two per cent (Office for National Statistics, 2012). The balance of population has shifted towards older age groups, and Hartlepool's elderly population are forecast to increase by approximately 85% (8000 additional people), in part due to the emigration of working age people (HBC, 2011a). This will place strain on reduced public resources, and may also increase the vulnerability of Hartlepool's population to flooding, as older age groups tend to be more vulnerable to flooding.

2.9.1 Health

The health of people in Hartlepool is generally worse than the England average (Public Health England, 2015). The standardised mortality ratio is high, with death rates 26% above the national average, and 35% higher for under-75s (HBC, 2011a). Life expectancy is 10.8 years lower for men and 8.6 years lower for women in the most deprived areas of Hartlepool than in the least deprived areas (Public Health England, 2015). There is a disproportionately high number of early deaths from cancer, and in particular, circulatory diseases. The proportion of the population claiming health-related benefits is higher than national or regional figures (HBC, 2011a).

In Year 6, 24.4% of children are classified as obese, worse than the average for England. The adult obesity rate in 2012 was 30.6%, also worse than the England average. The rate of alcohol related harm hospital stays for both adults and under 18s are also worse than the England average, along with the rate of smoking related deaths (Public Health England, 2015).

Health services are presently concentrated at the University Hospital of Hartlepool, with additional facilities in Seaton Carew and a number of doctor and dentist surgeries (HBC, 2006) .

2.9.2 Deprivation

Deprivation is higher than average in Hartlepool, with 29.8% (5,300) children living in poverty (Public Health England, 2015). The Index of Multiple Deprivation (IMD), ranked Hartlepool as the 14th most disadvantaged district in the country in 2004 (HBC, 2006), however by 2007 this had improved to the 23rd most deprived (HBC, 2011a). In 2015, Hartlepool was assessed as being ranked 10th district with the highest proportion of neighbourhoods in the most deprived 10% of neighbourhoods nationally (Planning Resource, 2015).

Figure 2-10 shows differences in deprivation in Hartlepool based on national comparisons, using quintiles (fifths) of the IMD 2010, shown by lower super output area. The darkest coloured areas are some of the most deprived neighbourhoods in England (Public Health England, 2015). There is a strong correlation between the areas of older terraced and social housing and the areas of highest deprivation in Hartlepool, with significant differences of deprivation between different areas within the Borough (HBC, 2011a).

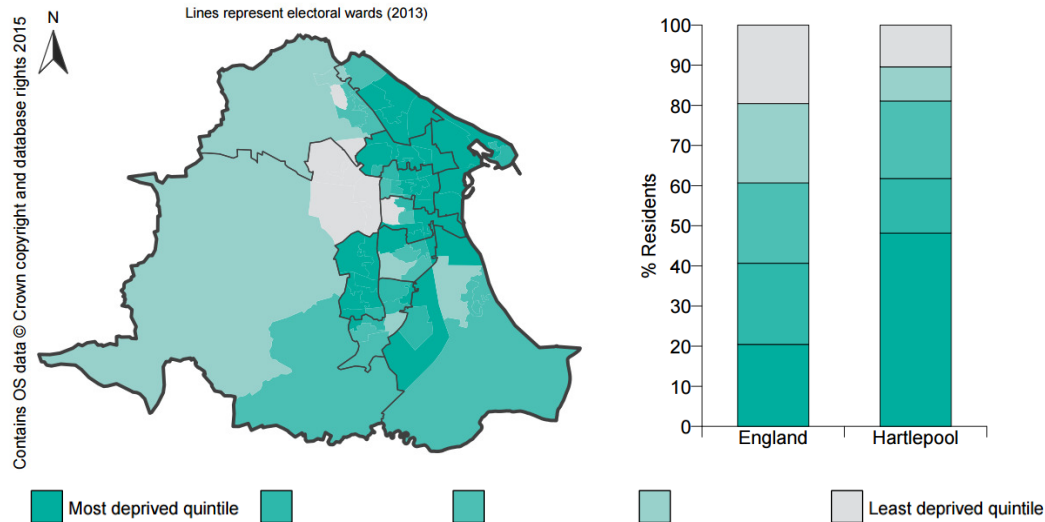


Figure 2-10: Hartlepool deprivation (source: Public Health England, 2015). The chart shows the percentage of population in England and Hartlepool who live in each of these quintiles.

2.9.3 Key environmental issues

Hartlepool is a deprived area, with the general health of the population being poorer than England’s average. There is a high level of deprivation, with some disparity throughout the Borough. Many of the deprived areas are those with older housing. These significant deprivation, obesity and health issues facing the community increases the vulnerability of these people to the impacts of flooding. The aging and growing population also increase the vulnerability of Hartlepool to flooding.

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. The LFRMS offers an opportunity to provide green infrastructure, which may have health benefits on the Borough’s population.

2.10 Material assets

2.10.1 Economy

Hartlepool prospered as an industrial centre until the decline in heavy industry such as shipbuilding, steel fabrication and manufacturing in the 1960s and 1970s. Hartlepool experienced major job losses in these key industrial sectors and moved towards increased employment within a diverse business community and strong public and third sector (HBC, 2011a).

The town is now recognised as a major retail, service and manufacturing centre, which significantly contributes to sub-regional and regional economic activity. Alongside this, the town has transformed key regeneration areas in the past 20 years including the docks and specific employment land sites. The Marina and areas such as Queens Meadow Business Park are acknowledged as flagship initiatives with the former offering excellent office, housing and maritime tourism facilities and the latter providing improved business infrastructure facilities, which have increased inward investment. In addition, the UK Steel Enterprise Innovation Centre and the redeveloped Hartlepool Enterprise Centre offer start-up units, which have increased the number of new businesses across the town (HBC, 2011a). However, Hartlepool still has higher than average unemployment (HBC, 2006).

The overall employment rate of working age residents increased in the period to 2006, peaking at 66.5%, halving the gap with the national rate. However, subsequent changes in economic conditions were accompanied by a sharp fall in employment rate, with 60.9% employed in 2011 (HBC, 2011a). In February 2015, the unemployment rate was 4.6%, a decreasing rate since February 2014, which had 6.7% unemployment (Tees Valley Unlimited, 2015b). Employment in manufacturing has decreased since 2004, with employment in public services being relatively high. However, employment in this sector is expected to decline in the long term as a consequence of public sector funding cuts (HBC, 2011a).

2.10.2 Infrastructure

Hartlepool is served by two primary routes which are the A179 road and the A689 road, both linking the town to the A19 road (Figure 2-11). The A19 runs through the west of the Borough and provides the key strategic road link north to south, linking Hartlepool with the rest of the region and country. This road has been identified as a Strategic National corridor by the Department for Transport (HBC, 2011b). The A179 road is the main road to the north-west, which leads to the A19 road, Durham, Sunderland and Tyneside. The A689 road is the main road to the south-west towards the A19, Billingham, Stockton, Middlesbrough and York. The A178 road leads south to Seaton Carew, Graythorp, Seal Sands, Port Clarence and Middlesbrough via the Transporter bridge. Local bus services are provided around the town mainly by Stagecoach. Other services are provided by Arriva and Go North East from Hartlepool to Peterlee, Durham, Seaham, Hetton-le-Hole,

Houghton-le-Spring and Sunderland. There is an identified need to improve the internal connectivity by public transport (HBC, 2011b)

Hartlepool is served by Hartlepool and Seaton Carew railway stations, both of which lie on the Durham Coast Line with hourly services to Sunderland, Newcastle and Middlesbrough, which are operated by Northern Rail, as shown in Figure 2-11.

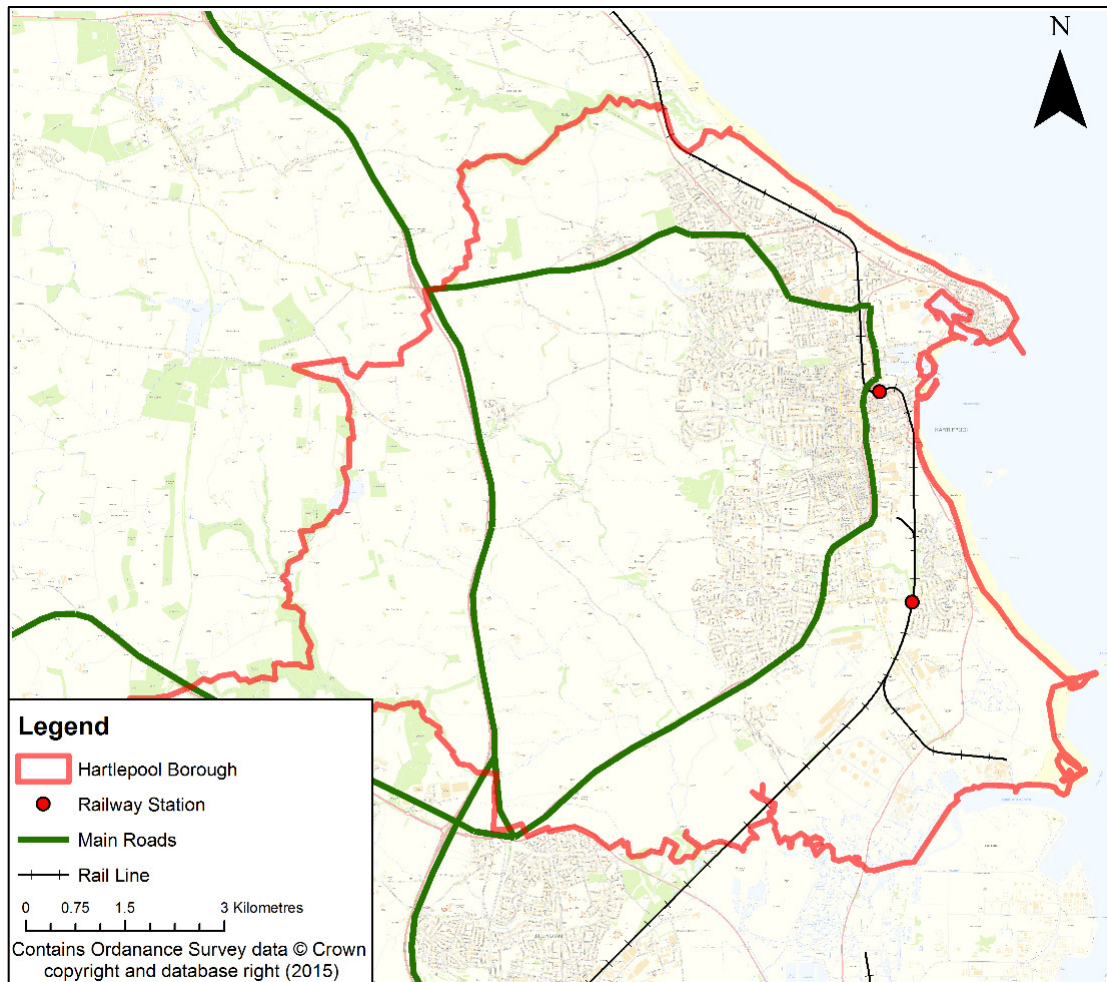


Figure 2-11: Transport infrastructure

Hartlepool has been a major seaport virtually since it was founded. Now owned by PD Ports, the docks are still in use today and still capable of handling large vessels. However, a large portion of the former dockland was converted into marina, capable of berthing 500 vessels. Hartlepool Marina is home to a wide variety of pleasure and working craft, with passage to and from the sea through a lock.

The North East, particularly the Tees Valley region is recognised for its “green” technology base with respect to energy recovery and carbon reduction emission, which includes the management of waste. This proactive approach has led to the setting up of the North East Sustainable Resources Board, the first organisation of its type outside London, which aims to turn the region into a national leader in maximising value from the 10.5m tonnes of waste it creates annually, creating business opportunities and hundreds of jobs in the process (HBC, 2011a).

2.10.3 Key environmental issues

The economic geography and peripheral nature of the North East region as a whole is a transport and infrastructure challenge to Hartlepool, which is clustered within the Tees Valley with a number of centres over a very small area (HBC, 2011b). This means the multiple directions of flows of transport centres mean that there is an over reliance on the private car,

which is likely to increase (HBC, 2011b), therefore putting pressure on the existing transport network.

The Borough has good internal and external transport links, with further improvements planned. Predicted population increases and an ageing population 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.

In addition, opportunities to create and enhance green infrastructure assets could be incorporated into FRM measures implemented as part of the LFRMS.

2.11 Air quality

There are no Air Quality Management Areas (AQMAs) in Hartlepool Borough (HBC, 2011b); however, road traffic is the major source of air pollution and has a significant impact on nitrogen dioxide and PM10 concentrations at ground level (HBC, 2011b).

The air quality in the Hartlepool BC area has improved over the last 40 years. The main reasons for this are:

- the introduction of natural gas as the main source of domestic and commercial fuel; and
- the closure or modification of the oldest industrial processes (HBC, 2015d).

However, the rapid rise in road transport has introduced a new range of pollutants and, more importantly, these pollutants are being emitted continuously at ground level. Newer industries, particularly chemical and industries linked to them, have also introduced a wider range of air pollutants.

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 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 FRM activity, are unlikely to be significant.

2.12 Climate

At present Hartlepool experiences a temperate climate with average winter temperatures of between 6 - 8 degrees Celsius and average summer temperatures of between 18 - 20 degrees Celsius. On average, winter rainfall in the region is between <150-200mm and summer rainfall between 150-200mm (Weather2, 2015).

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. Projections are based on the Intergovernmental Panel on Climate Change's 'business as usual' emissions scenario. The UKP09 projects that by the 2020s, under a medium emission scenario, mean winter temperature in North East England will increase by 2°C and mean summer temperature will increase by 2.5°C. Mean precipitation is projected to increase by 14% in the winter months and increase by 8% in the summer months (UK Climate Projections, 2014).

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, Hartlepool can expect warmer, wetter winters and hotter and wetter summers, with extreme events more frequent (Weather2, 2015).

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. In turn, this may increase pressure on drains, sewers and water quality. Rising sea or river levels may also increase local flood risk inland or away from major rivers because of interactions with drains, sewers and smaller watercourses.

2.12.1 Key environmental issues

With rainfall frequency and intensity set to increase significantly in the coming decades, the likelihood of river flooding and overwhelming of drains and sewers will rise due to 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.

If such climate change projections are realised, the adverse risk and impact toward Hartlepool's infrastructure, public health and the natural environment has the potential to be great. With regard to the natural environment changing climate, mainly that of changing temperatures poses the biggest threat. Species and habitat abundance and richness will become threatened as a result of changing habitats, drier soils and increased competition from non-native invasive species throughout the Borough's watercourses. Particularly vulnerable to climate change is the Borough's wetland habitats, which are protected under a range of European designations.

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. Hartlepool is also at risk of tidal flooding, which is expected to increase with climate change. Damage to infrastructure at the forecasted extent will inevitably incur large economic costs as well as social and public health implications as a result of the distress and risk to disruption caused.

Directly and indirectly, the LFRMS options could potentially 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.

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 in the Borough from implementation of the LFRMS. A summary of the scoping conclusions are given in Table 2-8.

Table 2-8: SEA scoping assessment summary

Receptor	Scoped In / Out	Conclusion
Landscape and visual amenity	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.
Biodiversity, flora and fauna	In	National and locally important biodiversity sites and species within the Borough, including SPA, Ramsar, SSSI, LNR and BAP habitats and species may be affected by the water environment and flooding. There is one Ramsar and SPA site within the Borough, and one Ramsar, two SPAs and four SACs within 15km of Hartlepool's boundary. 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 FRM measures.
Water environment	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. 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.
Soils and geology	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. Hartlepool contains a significant percentage of agricultural land. 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.
Historic environment	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 a large number of historic assets in the Borough that could be affected by changes to flooding and FRM measures. Opportunities may exist to protect important sites or negative impacts could occur due to increased flood risk to vulnerable sites.
Population	In	A range of socio-economic characteristics of the 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.
Material assets	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. Material assets could benefit from reduced flood risk, but the Borough could be significantly affected by increased flood risk to these assets.
Air quality	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 impacts.
Climate	In	Changes in flood risk could affect resilience to the potential impacts of future 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 adaptation responses and measures that could contribute to addressing the future impacts of climate change effects.

3 SEA assessment framework

3.1 Introduction

The SEA assessment 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 through 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 assessment framework to identify whether each option will support or inhibit achievement of each objective. Table 3-1 below summarises the purpose and requirements of the SEA objectives and indicators.

Table 3-1: Definition of SEA objectives and indicators

	Purpose
Objective	Provide a benchmark 'intention' against which environmental effects of the plan can be tested. They need to be fit-for-purpose.
Indicator	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 2-8). 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 life of the project.

Table 3-2: SEA objectives and indicators

Receptor	Objective	Indicator
Landscape	1 Protect the integrity of the Borough's urban and rural landscapes.	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.
Biodiversity, flora and fauna	2 Protect and enhance designated sites and BAP habitats and species in the Borough.	Area of designated sites adversely affected by flooding.
	3 Maintain and enhance habitat connectivity and wildlife corridors within the Borough.	Monitoring of reported status of designated nature conservation sites. Percentage of land designated as nature conservation sites as a result of LFRMS measures.
	4 Maintain existing, and where possible create new, riverine and estuarine habitat to benefit migratory and aquatic species and fisheries, and maintain upstream access.	Area of habitat created as a result of implementation of the LFRMS (e.g. flood storage areas creating wetland habitat).
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. 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.
	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. No deterioration in WFD status.

Receptor	Objective		Indicator
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, industrial sites) at risk from flooding.
Historic environment	8	Preserve and where possible enhance important historic 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.
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.
Material assets	10	Create new and enhance existing green infrastructure delivered through the LFRMS, including SuDS.	Number of SuDS schemes installed as part of the LFRMS. Area/type of green infrastructure created/enhanced.
	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.
Climate	12	Reduce vulnerability to climate change impacts and promote measures to enable adaptation to climate change impacts.	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).

4 Strategy alternatives

4.1 Developing alternatives

The SEA Directive requires an assessment of the plan and its 'reasonable alternatives'. In order 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 Hartlepool 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.	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 sites 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 as a result 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 as a result 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 estuarine 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 as a result 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 as a result 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 as a result of active management. Significant opportunities may exist for habitat creation as a result 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, as a result 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 possible enhance important historic 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 as a result 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	Create new and enhance existing green infrastructure delivered through the LFRMS, including SuDS.	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 may incorporate the greater use of SuDS schemes to reduce the rate and volume of surface water runoff. 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 as a result 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 a number of 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, in the future, as a result of 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

Reference	LFRMS objective
N1	Understanding the risks of flooding and coastal erosion, working together to put in place long-term plans to manage these risks and making sure that other plans take account of them.
N2	Avoiding inappropriate development in areas of flood and coastal erosion risk and being careful to manage land elsewhere to avoid increasing risks.
N3	Building, maintaining and improving flood and coastal erosion management infrastructure and systems to reduce the likelihood of harm to people and damage to the economy, environment and society.
N4	Increasing (building) public awareness of the risk that remains and engaging with people at risk to encourage them to take action to manage the risks that they face and to make their property more resilient.
N5	Improving the detection, forecasting and issue of warnings of flooding, planning and co-ordinating a rapid response to flood emergencies and promoting faster recovery from flooding.
H1	Understand the areas that flood.
H2	Manage the flood risk in Hartlepool.
H3	Enable people, communities, business and public bodies to work together more effectively.
H4	Put communities at the heart of what we do and help Hartlepool residents during flood events, and recover as quickly as possible after incidents.
H5	Promote sustainable solutions.

Table 4-3: LFRMS Measures

Area ID	Measure ID	Measure	Area
1	1	Maintaining the effective FRM approach to flood flow capacity of ordinary watercourse channels.	The Stell, Seaton
	2	Appraise adopt and monitor a range of full cost measures available to manage risks	
2	3	Multiple benefits minimise flood damage and make improvements, balance towards sustainable development objectives.	Riverston Close, Rural West
	4	Communication: Easily understood summaries, guidance and further information to raise awareness	
	5	Establish and maintain a register of assets or other features that help to manage flood risks	
3	6	Costs and measures are clear and understood and reflect expected change and impacts of climate change	Padstow Close, Jesmond

Area ID	Measure ID	Measure	Area
4	7	Partnership and co-ordination of risk management activities to ensure prioritisation of capital investment.	Bruntoft Avenue, De Bruce
5	6	Costs and measures are clear and understood and reflect expected change and impacts of climate change.	Northgate, Headland and Harbour
	5	Establish and maintain a register of assets or other features that help to manage flood risks.	
	8	Establish and maintain a maintenance regime of ditches and gullies.	
6	3	Multiple benefits, minimise flood damage and make improvements, balance towards sustainable development objectives.	Thorpe Street, Headland and Harbour
7	3	Multiple Benefits, minimise flood damage and make improvements, balance towards sustainable development objectives.	Bruce Crescent/Arkley Crescent, De Bruce
8	9	Natural FRM measures, channel restoration, use of farmland to temporarily store water, reinstating wetlands, maintenance of river systems for water quality purposes, reduction in run off and diffuse pollution, aquifer recharge, provision of urban biodiversity, and green amenity spaces through use of SuDS.	West Park, Rural West
	10	Linkages with land management activities, land use planning, infrastructure investment plans and agriculture.	
	12	Using Sustainable Drainage Systems in new developments and re-developments to manage surface water flood risk.	
Various	2	Appraise and adopt full range of whole life cost measures available to manage risks.	Various
	11	Proportionate risk based approaches to local FRM duties as a Lead Local Flood Authority.	

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 are 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 a particular 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	
N1	Understanding the risks of flooding and coastal erosion, working together to put in place long-term plans to manage these risks and making sure that other plans take account of them.	0	0	0	0	+	+	+	+	+	0	+	+	Improving the understanding of local flood risk and coastal erosion issues across the Borough has the potential to contribute to objectives 5 to 9, 11 and 12, which focus on the reduction of flood risk to the built environment and communities, and adaptation to climate change effects. There is likely to be a neutral impact in relation to all other SEA objectives. Opportunities may exist in the future, as with better understanding and cooperation the natural environment could benefit from flood alleviation schemes that enhance biodiversity.
N2	Avoiding inappropriate development in areas of flood and coastal erosion risk and being careful to manage land elsewhere to avoid increasing risks.	+	+	+	+	+	+	+	+	++	+	+	++	This objective seeks to promote better land management to avoid development in areas at risk of flooding and to reduce the impact that other development is having on flood risk. As such, this objective seeks to reduce flood risk and therefore could benefit people and property (SEA objectives 9, 11 and 12). This objective is also likely to promote the use of SuDS in both new and existing developments to reduce surface runoff and therefore could make an important contribution to achieving SEA objective 10. Better land management and the retention of remaining floodplain as undeveloped land could have positive effects in terms of maintaining or improving water quality and reducing soil erosion (SEA objective 7). The LFRMS objective is also likely to have a positive effect on the natural environment objectives, as moving development away from floodplains is likely to benefit aquatic, riverine and coastal ecology by means of protecting floodplain habitat and corridors. However, avoiding development on land with flood risk could mean that development will occur elsewhere, and as development land is finite, this could increase pressure for development on rural and greenfield land. The LFRMS should seek to ensure it does not promote development of greenfield sites as this could have significant adverse effects in relation to landscape quality and character, biodiversity and water quality.
N3	Building, maintaining and improving flood and coastal erosion management infrastructure and systems to reduce the likelihood of harm to people and damage to the economy, environment and society.	+	+	+	+	+	+	+	+	++	+	++	+	This LFRMS objective has a positive effect on all the SEA objectives. There is a significant positive impact on SEA objectives 9 and 11 as improving FRM will directly lead to a reduction in risk of flooding to communities and assets at a strategic scale. Reducing the impact of flooding through improvement of FRM may benefit a range of natural and built environment features by reducing the risk of damage, disturbance or habitat loss. There is the potential to reduce economic and social effects since reducing the risk of flooding will reduce the chance of damage to property. Socially, this will reduce stress and anxiety. The objective integrates the natural environment into managing flood risk, therefore having a positive effect on SEA objectives 1 to 8. Existing FRM infrastructure may be currently adversely affecting the natural environment and that modification of this infrastructure may be required where these effects are significant. If this infrastructure is modified, there is a risk that this LFRMS objective will not be fully realised as the negative effects will continue.
N4	Increasing (building) public awareness of the risk that remains and engaging with people at risk to encourage them to take action to manage the risks that they face and to make their property more resilient.	0	0	0	0	0	0	0	0	+	0	+	+	This objective seeks to improve public awareness of flooding and encourage people to be proactive in managing their own risk. It will therefore have a positive effect in relation to SEA objectives 9, 11 and 12. All other SEA objectives are unlikely to be affected by the objective.
N5	Improving the detection, forecasting and issue of warnings of flooding, planning and co-ordinating a rapid response to flood emergencies and promoting faster recovery from flooding.	0	0	0	0	+	+	0	0	+	0	+	+	This LFRMS objective contributes positively towards SEA objectives 9, 11 and 12 because it minimises the risk of flooding by improving the co-ordination of response and recovery from flooding. Reducing flood risk in this way could also benefit water quality, thereby contributing towards WFD objectives as it would reduce the risk of aquatic pollution as a result of flooding. This is due to the reduction in runoff from urban areas, therefore reducing the amount of pollution that enters the watercourses as a consequence of flooding urban areas. This LFRMS objective has the potential for an effect on SEA objectives 1 to 5, 7 and 10 by reducing damage to the environment caused by flooding, which, may reduce through this LFRMS objective. However, the effects from this are unlikely to be significant at a strategic scale, and therefore have been scored neutral.
H1	Understand the areas that flood.	0	0	0	0	0	0	0	0	+	0	+	+	This objective will help to improve understanding of flood risk within the Borough. This information will ultimately be used to inform FRM activities that are likely to benefit people and property. Potential effects on other SEA objectives relating to natural and historic environment features are not clear at this stage.
H2	Manage the flood risk in Hartlepool.	+	+	+	+	+	+	+	+	++	+	++	+	This objective will cause direct benefit to people, property and infrastructure by seeking to reduce flood risk through management. There is a significant positive impact on SEA objectives 9 and 11 as improving FRM will directly lead to a reduction in risk of flooding to communities and assets at a strategic scale. Reducing the impact of flooding may benefit a range of natural and built environment features by reducing the risk of damage, disturbance or habitat loss. There is the potential to reduce economic and social effects since reducing the risk of flooding will reduce the chance of damage to property. Socially, this will reduce stress and anxiety.
H3	Enable people, communities, business and public bodies to work together more effectively.	0	0	0	0	0	0	0	0	+	0	+	+	Working more effectively to reduce flood risk, as this objective intends, will have a benefit on SEA objectives 9, 11 and 12, as it will reduce the risk of flooding to people and property, as well as make the Borough more resilient against flood risk caused by climate change. This LFRMS objective could have an effect on SEA objectives 1 to 7 and 10 by reducing damage to the environment caused by flooding. However, the effects from this are unlikely to be significant at a strategic scale, and therefore have been scored neutral.
H4	Put communities at the heart of what we do and help Hartlepool residents during flood events, and recover as quickly as possible after incidents.	0	0	0	0	0	0	0	0	+	0	+	+	This objective will reduce damage and disruption caused by flooding, therefore having a positive effect on SEA objectives 9 and 11. It is unlikely to have an impact on the remaining SEA objectives, as it is a reactive objective rather than proactive so it is not expected to have direct effects on the natural environment.

LFRMS objective reference	LFRMS objectives	SEA objectives												Comments
		1	2	3	4	5	6	7	8	9	10	11	12	
H5	Promote sustainable solutions.	+	+	+	+	+	+	+	+	+	++	+	+	Promoting sustainable solutions to flood risk has the potential to have a significant effect on SEA objective 10, should this objective lead to greater implementation of SuDS type measures to manage flood risk would have the potential to provide a range of positive effects. Sustainable solutions will have a positive effect on the natural and historic environment, as these solutions will consider, and therefore more likely, to include benefits to rural and urban landscapes.

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.	+	Overall, the LFRMS objectives are likely to have a positive effect in relation to this SEA objective as the LFRMS includes a number of 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 sites and BAP habitats and species in the Borough.	+	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. 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.	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. 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.
	3 Maintain and enhance habitat connectivity and wildlife corridors within the Borough.			
	4 Maintain existing, and where possible create new, riverine and estuarine 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 possible enhance important historic 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 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.	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 details of the FRM measure being implemented and the nature, scale and location of this intervention.
Population	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. The majority of objectives seek to deliver improved FRM for local people, with objective N3 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. Objective H3 in particular could deliver community benefits, although it is not clear at this stage the scale to which FRM actions will contribute to this.	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.
Material assets	10 Create new and enhance existing green infrastructure delivered through the LFRMS, including SuDS.	+	Although not specifically addressed within the LFRMS objectives, SuDS is likely to play an important role in achieving a number of the objectives to reduce flood risk, promote better land management and influence the quality of new development. H5 in particular may increase the use of SuDS by promoting sustainable solutions.	SuDS may play a role in the delivery of a number 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.
	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 N3 and H2. 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 a number of 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.

Climate	12	Reduce vulnerability to climate change impacts and promote measures to enable adaptation to climate change impacts.	+	FRM measures that are introduced as a result 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

Area ID	Measure ID	Measure	Area	SEA objectives												Comments	
				1	2	3	4	5	6	7	8	9	10	11	12		
1	1	Maintaining the effective FRM approach to flood flow capacity of ordinary watercourse channels.	The Stell, Seaton	0	0	0	0	0	0	0	0	0	+	0	+	0	These measures will have a minor positive effect on SEA objectives 9 and 11 as it will improve the Borough's resilience to flooding. Adopting a full range of whole life cost measures will lead to reducing flood risk in the Borough by focusing spending on FRM. However, such actions to maintain flood flow capacity could have a range of effects on the natural environment, both positive and negative, depending upon the activities they deliver, and they should be subject to thorough environmental assessment at a project stage to ensure they are sustainable and are delivered in accordance with the wider objectives of the LFRMS. For example, biodiversity requirements should be considered to influence management actions, i.e. not clearing gullies if there is potential for biodiversity benefit. Particular regard should be given to contaminated land at The Stell in Seaton, which has a large historic landfill present, The Northworks Slag Tip, which holds industrial waste and sludge.
	2	Appraise, adopt and monitor a range of full cost measures available to manage risks.		0	0	0	0	0	0	0	0	+	0	+	0		
2	3	Multiple benefits, minimise flood damage and make improvements, balance towards sustainable development objectives.	Riverston Close, Rural West	0	0	0	0	0	0	0	0	+	+	+	0	Minimising flood damage will have a positive effect on SEA objectives 9 and 11 as it will make the population and Borough more resilient to flooding. By making improvements with a balance towards more sustainable methods will have a positive effect on SEA objective 10 as it provides an opportunity to create new green infrastructure and SuDS. However, this is only a minor positive as the effects are very localised within the Borough. Including the community in FRM will increase their understanding of flooding and therefore their resilience, which, if combined with increased implementation of green infrastructure, will have multiple benefits, including health and wellbeing. Any FRM activities planned should be subject to a thorough environmental assessment to ensure adverse effects to the SEA objectives are minimised.	
	4	Communication: Easily understood summaries, guidance and further information.		0	0	0	0	0	0	0	0	0	0	0	0		
	7	Partnership and co-ordination of risk management activities to ensure prioritisation of capital investment.		0	0	0	0	0	0	0	0	+	0	0	0		
3	6	Costs and measures are clear and understood and reflect expected change and impacts of climate change.	Padstow Close, Jesmond	0	0	0	0	0	0	0	+	+	++	+	+	This measure has the potential to promote the use of storage and other SuDS schemes and so could make an important contribution to achieving SEA objective 10. The use of such techniques may deliver a range of other benefits in terms of landscape and biodiversity value, improving water quality and achieving amenity benefits depending upon how and where such actions are implemented. Conversely, inappropriate development in sensitive areas could have a range of adverse effects. This action may also promote other forms of FRM activity including hard defence structures that could also lead to a range of adverse effects if delivered in an inappropriate manner. At this strategic level it is not clear how this actions will be delivered and so the action has been scored as neutral against the SEA objectives relating to the natural environment. Low Throston deserted medieval village Scheduled Monument is adjacent to the south of Padstow Close, therefore this measure has the potential to reduce the risk of flooding to the monument, thereby having a positive effect on SEA objective 8. However, full environmental and historic assessment should be given to any potential FRM measures in this area to ensure no adverse effects on the monument. Low Throston has existing significant problems, with a declining condition, therefore FRM could provide a large benefit to this monument to reduce its exposure to flooding.	
4	5 & 7	Establish and maintain a register of assets or other features that help to manage flood risks. Partnership and co-ordination of risk management activities to ensure prioritisation of capital investment.	Bruntoft Avenue, De Bruce	0	0	0	0	0	0	0	0	0	++	0	++	+	Prioritising capital investment to reduce flood risk will have a positive effect on Hartlepool's population and infrastructure as it is likely to reduce flood risk in Hartlepool. The measure is also likely to reduce vulnerability to climate change by reducing coastal flood risk, as Bruntoft Avenue is close to the shore, just inland from the Durham Coast line. Partnership and co-ordination will help to ensure an effective approach to reducing flood risk. Any proposed FRM measures should be subject to a thorough environmental assessment at project stage, particularly due to the close proximity of Teesmouth and Cleveland Coast SPA and Ramsar and Tees and Hartlepool Foreshore and Wetlands SSSI, less than 400m to the east of Bruntoft Avenue.
5	8 & 6	Establish and maintain a maintenance regime of ditches and gullies. Costs and measures are clear and understood and reflect expected change and impacts of climate change.	Northgate, Headland and Harbour	0	0	0	0	0	0	0	0	+	0	+	+	These measures are expected to increase the resilience of the Borough to climate change, by providing focus to FRM measures that are focused on climate change. The Headland and Harbour ward has a long extent of coastline, of which a portion is within Flood Zone 3, as designated by the Environment Agency. Adopting a full range of whole life cost measures will lead to reducing flood risk in the Borough by focusing spending on FRM. However, such actions to maintain gullies and ditches could have a range of effects on the natural environment, both positive and negative, depending upon the activities they require, and they should be subject to thorough environmental assessment at a project stage to ensure they are sustainable and are delivered in accordance with the wider objectives of the LFRMS. For example, biodiversity requirements should be considered to influence management actions, i.e. not clearing gullies if there is potential for biodiversity benefit. There is the potential for habitat and wildlife benefits through a maintenance regime of ditches if undertaken in accordance with LFRMS objective N3. However, benefits are likely to be localised and therefore have been scored neutral. At this strategic level it is not clear how the measures will be delivered and so the measure has been scored as neutral against the SEA objectives relating to the natural and historic environment. Teesmouth and Cleveland Coast SPA and Ramsar, and Tees and Hartlepool Foreshore SSSI are present along the coast in this ward, therefore, FRM measures could have a range of effects on the natural environment, both positive and negative, depending upon the activities they	
	9 & 5	Natural FRM measures, channel restoration, use of farmland to temporarily store water, reinstating wetlands, maintenance of river systems for water quality purposes, reduction in run off and diffuse pollution, aquifer recharge, provision of urban biodiversity, and green		0	0	0	0	0	0	0	0	0	0	0	0		0

Area ID	Measure ID	Measure	Area	SEA objectives												Comments	
				1	2	3	4	5	6	7	8	9	10	11	12		
		amenity spaces through use of SuDS. Establish and maintain a register of assets or other features that help to manage flood risks.															deliver. Northgate is within the Headland Conservation Area, with listed buildings in the area. Any measures should be subject to thorough environmental assessment at a project stage to ensure they are sustainable and are delivered in accordance with the wider objectives of the LFRMS.
	10 & 8	Linkages with land management activities, land use planning, infrastructure investment plans and agriculture. Establish and maintain a maintenance regime of ditches and gullies.		0	0	0	0	0	0	0	0	0	+	0	+	0	
6	3	Multiple benefits, minimise flood damage and make improvements, balance towards sustainable development objectives.	Thorpe Street, Headland and Harbour	0	0	0	0	0	0	0	0	0	+	+	+	0	Minimising flood damage will have a positive effect on SEA objectives 9 and 11 as it will make the population and Borough more resilient to flooding. By making improvements with a balance towards more sustainable methods will have a positive effect on SEA objective 10 as it provides an opportunity to create new green infrastructure and SuDS. However, this is only a minor positive as the effects are very localised within the Borough. Including the community in FRM will increase their understanding of flooding and therefore their resilience, which, if combined with increased implementation of green infrastructure, will have multiple benefits, including health and wellbeing. Any FRM activities planned should be subject to a thorough environmental assessment to ensure adverse effects to the SEA objectives are minimised.
7	3	Multiple benefits, minimise flood damage and make improvements, balance towards sustainable development objectives.	Bruce Crescent/Arkley Crescent, De Bruce	0	0	0	0	0	0	0	0	0	+	+	+	0	
8	11&9	Using Sustainable Drainage Systems in new developments and re-developments to manage surface water flood risk. Natural FRM measures, channel restoration, use of farmland to temporarily store water, reinstating wetlands, maintenance of river systems for water quality purposes, reduction in run off and diffuse pollution, aquifer recharge, provision of urban biodiversity, and green amenity spaces through use of SuDS.	West Park, Rural West	0	++	++	++	++	++	++	++	0	++	++	+	+	Although there are no designated sites in the area, flood storage schemes and SuDS have significant potential in creating new habitats and ecological enhancement, for example by created reedbeds and wetland areas, therefore scoring significantly positive on SEA objectives 2 to 7. This will have a significant positive effect on SEA objective 10 by enhancing existing green infrastructure and increasing the use of SuDS. Using farmland to store water has a positive effect on the soils in the area, as it reduces surface water runoff, and therefore soil erosion. This will also decrease potential pollution run off from farmland during times of flood, therefore contributing to surface water quality and WFD objectives. All of these schemes will minimise the risk of flooding to communities and social infrastructure, including the two schools present in the area, therefore having a significant positive effect on SEA objective 9. Creating linkages with land use management activities and planning will have a positive effect on landscape character, as it is likely that this will protect the integrity of the existing landscape. There is also a potential for land management to have a positive effect on biodiversity, habitats and wildlife. However, any schemes should be subject to an environmental assessment at project stage to ensure no adverse effects to landscape and biodiversity.
	10	Linkages with land management activities, land use planning, infrastructure investment plans and agriculture.		+	+	+	0	+	+	+	0	0	+	+	+	0	
	12	Using SuDS in new developments and re-developments to manage surface water flood risk.		0	+	+	+	+	+	+	0	++	++	+	+		
Various	11 & 2	Proportionate risk based approaches to local flood risk management duties as a Lead Local Flood Authority. Appraise, adopt and monitor a range of full cost measures available to manage risks.	Various	0	0	0	0	0	0	0	0	0	+	0	0	0	These measures aim to improve allocation of costs for FRM within the Borough, and as such, this will ultimately be used to undertake FRM activities that are likely to increase resilience of Hartlepool to flooding. The effects are expected to be fairly localised, as it will concentrate on at risk areas. Potential effects on other SEA objectives relating natural environment features are not clear at this stage.
	11 & 2	Proportionate risk based approaches to local FRM duties as a Lead Local Flood Authority.		0	0	0	0	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
Biodiversity, flora and fauna	1	Protect the integrity of the Borough's urban and rural landscapes.	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.
	2	Protect and enhance designated sites and BAP habitats and species in the Borough.	
	3	Maintain and enhance habitat connectivity and wildlife corridors within the Borough.	
	4	Maintain existing, and where possible create new, riverine and estuarine 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 possible enhance important historic and cultural sites in the Borough.	
Population	9	Minimise the risk of flooding to communities and social infrastructure.	
Material assets	10	Create new and enhance existing green infrastructure delivered through the LFRMS, including SuDS.	
	11	Minimise the impacts of flooding to the Borough's transport network and key critical infrastructure.	
Climate	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 HBC 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 H5 in particular has potential to provide a positive contribution to all of 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 improve environmental quality. In particular, 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 N2 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 N2, N3 and H2. 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, in particular N1 and N2, are 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 12.

At present, the potential effects associated with several of the LFRMS measures are neutral. LFRMS objectives N4, N5, H1, H3 and H4 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 (particularly LFRMS objectives H5 and N3) 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 9 that includes green spaces such as nature reserves and open spaces 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 8 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.

Measure 9 has the potential for a significant positive effect on SEA objectives 2 to 7, as there is significant potential to create new habitats and ecological enhancement through the natural FRM measures listed as part of Measure 9. Measure 9 also has a significant positive effect on SEA objective 10, as it aims to increase the green infrastructure of the Borough through FRM measures that make use of open space. The use of open space, for example to create flood storage areas, lead to positive impacts to the environmental SEA objectives through creation of habitat.

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 N4 – *Increasing (building) public awareness of the risk that remains and engaging with people at risk to encourage them to take action to manage the risks that they face and to make their property more resilient.*
- Objective N5 – *Improving the detection, forecasting and issue of warnings of flooding, planning and co-ordinating a rapid response to flood emergencies and promoting faster recovery from flooding.*
- Objective H1 – *Understand the areas that flood.*
- Objective H3 – *Enable people, communities, business and public bodies to work together more effectively.*
- Objective H4 – *Put communities at the heart of what we do and help Hartlepool residents during flood events, and recover as quickly as possible after incidents.*

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.

In addition, several of the LFRMS objectives have the potential to deliver significant benefits. These are:

- Objective N2 – *Avoiding inappropriate development in areas of flood and coastal erosion risk and being careful to manage land elsewhere to avoid increasing risks.*
- Objective N3 – *Building, maintaining and improving flood and coastal erosion management infrastructure and systems to reduce the likelihood to people and damage the economy, environment and society.*
- Objective H2 – *Manage the flood risk in Hartlepool.*
- Objective H5 – *Promote sustainable solutions.*

Four of the measures also have the potential to deliver significant benefits. These are:

- Measure 3 – *Better management of surface water flows to avoid damages to property and buildings.*
- Measure 7 – *Partnership and co-ordination of risk management activities to ensure prioritisation of capital investment.*
- Measure 9 – *Natural FRM measures, channel restoration, use of farmland to temporarily store water, reinstating wetlands, maintenance of river systems for water quality purposes, reduction in run off and diffuse pollution, aquifer recharge, provision of urban biodiversity, and green amenity spaces through the use of SuDS.*
- Measure 12 – *Using SuDS in new developments and re-developments to manage surface water flood risk.*

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	HBC recommendation	Final decision
LFRMS to be strengthened by considering the SEA objectives as a whole to ensure delivery of a sustainable approach.	The vision of strategy to be strengthened and objectives to be carefully monitored between delivery partners.	As recommended.
LFRMS objectives should be integrated so that delivery of individual measures do not conflict with achievement of the wider strategy objectives.	The vision of strategy to be strengthened and objectives to be carefully monitored between delivery partners.	As recommended.
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.	This was discussed with key delivery partners of EA and NWL and strategy role to informing this approach.	As recommended.
LFRMS should seek to maximise the potential environmental benefits associated with delivery of the objectives and actions.	The vision of strategy to be strengthened and objectives to be carefully monitored between delivery partners.	As recommended.

6.3 Monitoring

The SEA Regulations require HBC 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	SEA objective(s)	Potential significant effects	Monitoring indicator	Possible monitoring and/or delivery partners
Objective N2 <i>Avoiding inappropriate development in areas of flood and coastal erosion risk and being careful to manage land elsewhere to avoid increasing risks</i>	9 and 12	Promoting better land management to avoid development in areas at risk of flooding, and as such, reducing flood risk to communities and reducing vulnerability to climate change.	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 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).	HBC Hartlepool Water Environment Agency
Objective N3 <i>Building, maintaining and improving flood and coastal erosion management infrastructure and systems to reduce the likelihood of harm to people and damage to the economy, environment and society.</i>	9 and 11	Improving FCERM systems with the objectives of 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.	HBC Hartlepool Water Environment Agency
Objective H2 <i>Manage the flood risk in Hartlepool.</i>	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	HBC Hartlepool Water Environment Agency

LFRRS objective	SEA objective(s)	Potential significant effects	Monitoring indicator	Possible monitoring and/or delivery partners
			infrastructure assets at risk from flooding.	
Objective H5 <i>Promote sustainable solutions.</i>	10	Promoting sustainable solutions provides the opportunity to increase the use of SuDS and other green infrastructure.	Number of SuDS schemes installed as part of the LFRMS. Area/type of green infrastructure created/enhanced.	HBC Hartlepool Water Environment Agency
Measure 3: <i>Better management of surface water flows to avoid damages to property and buildings.</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.	HBC Hartlepool Water Environment Agency
Measure 7: <i>Partnership and co-ordination of risk management activities to ensure prioritisation of capital investment.</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.	HBC Hartlepool Water Environment Agency
Measure 9: <i>Natural FRM measures, channel restoration, use of farmland to temporarily store water, reinstating wetlands, maintenance of river systems for water quality purposes, reduction in run off and diffuse pollution, aquifer recharge, provision of urban biodiversity, and green amenity spaces through use of SuDS.</i>	2 to 7, 9 and 10	This measure will enhance and create habitat through natural FRM measures. This measure will also increase the amount of green infrastructure and SuDS in the Borough and also reduce flood risk.	Area of designated sites adversely affected by flooding. Monitoring of reported status of designated nature conservation sites. 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). Water quality of the Borough's watercourses. Number of pollution incidents. Number of SuDS schemes installed as part of the LFRMS. 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. Achievement of WFD objectives. Percentage of water bodies achieving 'Good' ecological status/potential. No deterioration in WFD status.	HBC Hartlepool Water Environment Agency Tees Valley Wildlife Trust

LFRMS objective	SEA objective(s)	Potential significant effects	Monitoring indicator	Possible monitoring and/or delivery partners
			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, industrial sites) 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. Number of SuDS schemes installed as part of the LFRMS. Area/type of green infrastructure created/enhanced.	
Measure 12: Using SuDS in new developments and re-developments to manage surface water flood risk.	9 and 10	There will be a reduction in flood risk to the population while increasing the use of SuDS.	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.	HBC Hartlepool 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 affect 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

Stage D of the SEA process involved the consultation of the draft LFRMS and draft SEA Environmental Report with statutory consultees, stakeholders and the public. No consultation responses were received, during the consultation period from 19th January until 19th February and the preparation of a Post-Adoption Statement, which will set out the findings of the Environmental Report and LFRMS once it has been directed through and approved by Scrutiny committee. The Post-Adoption Statement will also set out any additional monitoring requirements needed to track the significant environmental effects of the strategy.

7.1 Monitoring

The measures within the Environmental Report will need to be used, to monitor the implementation of the strategy once adopted. These measures will need to be monitored internally and externally by delivery partners and feed into the annual review of the LFRMS.

8 References

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

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

Part A: The Proposal

Table A-8-1: Assessment scope

Type or permission/activity	Local Flood Risk Management Strategy (LFRMS)
Project/File Ref. Number	Hartlepool BC
National Grid Reference (NGR)	NZ 508332
Brief Description of the project	<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 FRM. It notes that the strategy must identify or outline the following:</p> <ul style="list-style-type: none"> • The risk management authorities in the area; • The flood and coastal erosion risk management functions that may be exercised by those authorities in relation to the area; • The objectives for managing local flood risk (including any objectives included in the authority's FRM plan prepared in accordance with the Flood Risk Regulations 2009); • The measures proposed to achieve those objectives; • How and when the measures are expected to be implemented; • The costs and benefits of those measures, and how they are to be paid for; • The assessment of local flood risk for the purpose of the strategy; • How and when the strategy is to be reviewed; and • How the strategy contributes to the achievement of wider environmental objectives.
European Site Name and Status	Teesmouth and Cleveland Coast Special Protection Area (SPA)
Distance to European/International Site	Within Borough
Site EU Reference Number	UK90006061
Site Centre	54 37 50 N 01 07 07 W
List of Site Interest Features	Qualifies under Article 4.1 by supporting populations of European importance of Little Tern <i>Sterna albifrons</i> . The site also qualifies under Article 4.2 by supporting populations of importance of the following migratory species: Sandwich Tern <i>Sterna sandvicensis</i> , Ringed Plover <i>Charadrius hiaticula</i> , Knot <i>Calidris canutus</i> , Redshank <i>Tringa tetanus</i> . The site is a wetland of international importance by regularly supporting at least 20,000 waterfowl.
European Site Name and Status	Teesmouth and Cleveland Coast Ramsar
Distance to European/International Site	Within Borough
Site EU Reference Number	UK11068
Site Centre	54 37 50 N / 01 07 07 W
List of Site Interest Features	Site has species with peak counts in winter (Ramsar criterion 5) and species/populations occurring at levels of international importance (Ramsar criterion 6) of Common Redshank <i>Tringa totanus tetanus</i> and Knot.
European Site Name and Status	Northumbria Coast SPA
Distance to European/International Site	0.5km
Site EU Reference Number	UK9006131
Site Centre	55 27 59 N / 01 35 18 W
List of Site Interest Features	The site qualifies under Article 4.1 by supporting populations of European importance of Little Tern and under Article 4.2 for populations of Purple Sandpiper <i>Calidris marina</i> and Turnstone <i>Arenaria interpres</i> .
European Site Name and Status	Northumbria Ramsar
Distance to European/International Site	0.5km
Site EU Reference Number	UK11049

Site Centre	55 27 59 N / 01 35 18 W
List of Site Interest Features	Site has species/populations occurring at levels of international importance of Little Tern, Purple Sandpiper and Ruddy Turnstone <i>Arenaria interpres</i> .
European Site Name and Status	Durham Coast Special Area of Conservation (SAC)
Distance to European/International Site	0.5km
Site EU Reference Number	UK0030140
Site Centre NGR	NZ 455 407
List of Site Interest Features	Site designated for Annex I habitat of 1230 Vegetated sea cliffs of the Atlantic and Baltic Coasts. The cliffs extend along the North Sea coast for over 20km along magnesian limestone exposures.
European Site Name and Status	Castle Eden Dene SAC
Distance to European/International Site	3.1km
Site EU Reference Number	UK0012768
Site Centre NGR	NZ 435 397
List of Site Interest Features	Annex I habitat of 91J0 <i>Taxus baccata</i> woods of the British Isles. The most extensive northerly occurrence of the woodlands in the UK.
European Site Name and Status	Thrislington SAC
Distance to European/International Site	9km
Site EU Reference Number	UK0012838
Site Centre NGR	NZ 317 328
List of Site Interest Features	Annex I habitat of 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (*important orchid sites). Contains the largest of the few surviving strands of CG8 <i>Sesleria albicans</i> – <i>Scabiosa columbaria</i> grassland.
European Site Name and Status	North York Moors SPA
Distance to European/International Site	14km
Site EU Reference Number	UK9006131
Site Centre	55 27 59 N / 01 35 18 W
List of Site Interest Features	Site qualifies under Article 4.1 by supporting populations of Little Tern and under Article 4.2 by supporting populations of Purple Sandpiper and Turnstone.
European Site Name and Status	North York Moors SAC
Distance to European/International Site	14km
Site EU Reference Number	UK0030228
Site Centre NGR	NZ711021
List of Site Interest Features	Annex I habitats of 4010 Northern Atlantic wet heaths with <i>Erica tetralix</i> and 4030 European dry heaths. The site contains the largest continuous tract of upland heather moorland in England.

Part B: Activities:

Table A-8-2: Potential hazards and effects to European sites associated with the LFRMS

Hazards and Effects in reference to the individual elements and consented activities of the project. Describe any hazards or effects with potential to give rise to impacts on the European Site (either alone or in combination with other plans or projects).		
Sensitive Interest Features	Potential Hazard(s)	Potential Exposure to hazard and mechanism of effect/impact if known
Teesmouth and Cleveland Coast SPA and Ramsar <ul style="list-style-type: none"> • Little Tern • Sandwich Tern • Ringed Plover • Knot • Redshank • Important assemblages of waterfowl 	Disturbance (i.e noise, visual)	The LFRMS does not propose any coastal FRM schemes, and therefore no likely significant effects are predicted.

<p>Northumbria Coast SPA and Ramsar</p> <ul style="list-style-type: none"> • Little Tern • Purple Sandpiper • Turnstone • Important assemblages of waterfowl 	<p>Disturbance (i.e. noise, visual)</p>	<p>The LFRMS does not propose any coastal schemes that may affect the integrity of these sites; therefore, no likely significant effects are predicted.</p>
<p>Durham Coast SAC</p> <ul style="list-style-type: none"> • Annex I habitats: 1230 Vegetated sea cliffs of the Atlantic and Baltic Coasts 	<p>Habitat loss Physical damage Changes in water chemistry Changes in water levels or table</p>	<p>The vegetation communities present on the sea cliffs are largely maintained by natural processes including exposure to sea spray, erosion and slippage of the soft magnesian limestone bedrock and overlying glacial drifts, as well as localised flushing by calcareous water. Implementation of FRM LFRMS measures are not coastal in nature and are of a sufficient distance from the site. Therefore, no likely significant effects are predicted.</p>
<p>Castle Eden Dene SAC</p> <ul style="list-style-type: none"> • Annex I habitats: 91J0 Taxus baccata woods of the British Isles. 	<p>None</p>	<p>The SAC site is located a significant distance (3.1km) from the boundary of Hartlepool Borough. The site is not hydrologically linked with the district and is not designated for wetland /hydrological interest features.</p> <p>The LFRMS seeks to implement FRM measures in the district and does not aim to influence flood risk or FRM 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 City.</p> <p>No hazards will arise on the sensitive interest features as a result of implementation of the LFRMS.</p> <p>Therefore, no likely significant effects are predicted.</p>
<p>Thrislington SAC</p> <ul style="list-style-type: none"> • Annex I habitats: 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia (*important orchid sites) 	<p>None</p>	<p>The SAC site is located a significant distance (3.1km) from the boundary of Hartlepool Borough. The site is not hydrologically linked with the district and is not designated for wetland /hydrological interest features.</p> <p>The LFRMS seeks to implement FRM measures in the district and does not aim to influence flood risk or FRM 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>Therefore, no likely significant effects are predicted.</p>
<p>North York Moors SPA</p> <ul style="list-style-type: none"> • Little Tern • Purple Sandpiper • Turnstone • Important assemblages of waterfowl 	<p>None</p>	<p>The SAC site is located a significant distance (14km) from the boundary of Hartlepool Borough. The site is not hydrologically linked with the district and is not designated for wetland /hydrological interest features.</p> <p>The LFRMS seeks to implement FRM measures in the district and does not aim to influence flood risk or FRM 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>Therefore, no likely significant effects are predicted.</p>
<p>North York Moors SAC</p> <p>Annex I habitats:</p> <ul style="list-style-type: none"> • 4010 Northern Atlantic wet heaths 	<p>None</p>	<p>The SAC site is located a significant distance (14km) from the boundary of Hartlepool Borough. The site is not hydrologically linked with the district and is not designated for wetland /hydrological</p>

B Appendix B: Review of policies, plans and programmes

Plan/Policy/Programme	Overview	Relevance to LFRMS	Conflict with LFRMS	Primary SEA topic
International				
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"> • Biodiversity, flora and fauna • Water environment
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"> • Biodiversity, flora and fauna
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"> • Biodiversity, flora and fauna
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"> • Water environment • Climate
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"> • Water environment

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"> Biodiversity, flora and fauna
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"> Water environment
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"> Biodiversity, flora and fauna Water environment
National				
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"> Population Material assets
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"> Water environment Climate
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"> Water environment Climate

Plan/Policy/Programme	Overview	Relevance to LFRMS	Conflict with LFRMS	Primary SEA topic
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"> • Water environment • Population • Climate
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"> • Water environment
Making Space for Water – taking forward a new Government strategy for flood and coastal erosion risk management in England (2005)	Aims to provide strategic direction to deliver sufficient space for water and enable more effective management of coastal erosion and flooding to benefit both people and the economy. The aim being to address these issues to mitigate their impact and to achieve environmental and social benefits.	National guidance regarding FRM is directly relevant to the LFRMS. The LFRMS can contribute to its aims, including promoting greater land management and land use planning, and integrated urban drainage management.	None	<ul style="list-style-type: none"> • Water environment • Population • Climate
The National Flood and Coastal Erosion Risk Management Strategy for England (2011)	Provides strategic direction to manage and monitor flood and coastal erosion risks in England. It sets out responsibilities of different organisations including local authorities to reduce risks and sets out the requirements for LLFAs to develop LFRMS.	Key driver for implementing FRM strategies at the local level.	None	<ul style="list-style-type: none"> • Water environment • Population • Climate
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"> • Water environment
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"> • Water environment
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"> • Water environment

Plan/Policy/Programme	Overview	Relevance to LFRMS	Conflict with LFRMS	Primary SEA topic
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"> Climate change
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"> Climate change
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 greenhouse gases, and puts in place funding and mechanisms to reduce and alter activities which contribute to the emission of these gasses.	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"> Climate change
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"> Biodiversity, flora and fauna Water environment
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"> Biodiversity, flora and fauna Water environment
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"> Biodiversity, flora and fauna Water environment
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. Vitality, it will be a future where wetlands are valued both for the roles they play in	Preserving and restoring wetlands such as peatlands, rivers and lakes will help regulate surface water run-off, store flood water and recharge groundwaters. 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"> Biodiversity, flora and fauna Water environment

Plan/Policy/Programme	Overview	Relevance to LFRMS	Conflict with LFRMS	Primary SEA topic
	helping us deal with some of the challenges of the 21st century and in improving and sustaining our quality of life.			
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"> • Biodiversity, flora and fauna • Water environment
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"> • Biodiversity, flora and fauna • Water environment
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"> • Biodiversity, flora and fauna • Water environment
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 Hartlepool, 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"> • Biodiversity, flora and fauna • Water environment • Soils
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"> • Biodiversity, flora and fauna • Water environment • Landscape • Historic environment • Population • Soils
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"> • Historic environment.

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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.	• Historic environment
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.	• Historic environment
Regional / Local				
Tees Catchment Flood Management Plan (2009)	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 the Tees catchment.	The CFMP provides important context for the LFRMS and set the strategic direction for managing flood risk from main rivers.	None	• Water environment
Shoreline Management Plan 2 River Tyne to FlamBorough Head	The Shoreline Management Plan (SMP) provides a large-scale assessment of the risks associated with coastal evolution and presents a policy framework to address these risks to the area.	The SMP provides important context for the LFRMS regarding coastal flooding and sets the strategic direction for managing flood risk from the sea.	None	• Water environment • Biodiversity, flora and fauna
Hartlepool Surface Water Management Plan (2013)	The Surface Water Management Plan (SWMP) outlines the preferred surface water management strategy in Hartlepool. It establishes a long-term action plan to manage surface water in the area.	Enable the LFRMS to make appropriate decisions on the short and long term management of surface water flood risk.		• All
Northumbria River Basin Management Plan (2009)	The Northumbria 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 Thames 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.	• Water environment
Managing the risk of flooding in Northumbria River Basin District (2014)	Highlights the scope of the publication of future FRMPs and RBMPs, includes sources of flooding and what consultation the Environment Agency are carrying out on those plans.	Provides context for the LFRMS.	None	• Water environment
Tees Valley Climate Change Strategy	Sets the high-level framework for the Council's work to deliver the Community Strategy priority for promoting and protecting our clean and green environment.	Provides information on environmental priorities and vision.	The LFRMS may need to consider environmental policies, which may restrict certain FRM options.	• Biodiversity, flora and fauna

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				<ul style="list-style-type: none"> Water environment
Hartlepool 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"> Water environment
Hartlepool BC Strategic Flood Risk Assessment Level 1 (2010)	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"> Water environment
Hartlepool Local Transport Plan (2011 – 2026)	Sets out how the council can deliver a safe and sustainable transport system within Hartlepool.	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"> Material assets Population Air quality
Hartlepool Local Plan (2006)	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"> All
Hartlepool BC Council Plan 2015/16	The plan addresses the key priorities and issues facing HBC, and includes an action plan. This includes investigating flooding sites throughout the Borough, with a view to implementing schemes to relieve flooding.	The LFRMS identifies sites that require FRM, and provides actions to reduce flood risk at this sites.	None.	<ul style="list-style-type: none"> Water environment
Hartlepool's Ambition – The Sustainable Community Strategy for Hartlepool (2014 – 2020)	Sets out how Hartlepool will achieve its ambitions of a sustainable community.	The strategy provides direction for the future development of the Borough, particularly regeneration.	The LFRMS will need to consider development policies set out in the strategy.	<ul style="list-style-type: none"> All
Delivery Plan for North East Regional Biodiversity Habitat Targets	Forms an important part of the work programme for the North East Biodiversity Forum and sets out the North East region proposes to achieve its share of English biodiversity targets.	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 BAP are linked to those of the WFD to enhance biodiversity and improve water quality status.	<ul style="list-style-type: none"> Biodiversity, flora and fauna
Priority habitats and species in the Tees Valley – Update January 2012	Identifies key biodiversity habitats and species for the Tees Valley and aims to raise awareness.	Objectives include maintain existing areas of habitats and to ensure habitats are managed and maintained.	The LFRMS will need to demonstrate that it can deliver improved FRM whilst not adversely effecting BAP habitat.	<ul style="list-style-type: none"> Biodiversity, flora and fauna.
Tees Valley Climate Change Strategy	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"> Climate

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Hartlepool Green Infrastructure Supplementary Planning Document (2014)	Sets out the future strategy for the development of Green Infrastructure within Hartlepool and forms part of the Local Development Framework.	Provides a broad context to increase green infrastructure in the Borough, of FRM measures can be green infrastructure, such as flood storage and sustainable drainage.	May conflict with more traditional FRM measures.	<ul style="list-style-type: none"> • Water environment • Biodiversity flora and fauna
Biodiversity Report 2008	Provides a summary of the work that has been undertaken since the adoption of the strategy and looks at further opportunities for conservation and biodiversity enhancement.	Provides an overview of biodiversity within the Borough. The LFRMS can contribute measures to benefit biodiversity.	The LFRMS will need to demonstrate that it can deliver improved FRM whilst minimising the adverse effect on biodiversity.	<ul style="list-style-type: none"> •
Environmental Sustainability Strategy (2005-2010)	Provides an overview of the various areas of work delivered by the Council that contribute to environmental sustainability in the Borough.	Provides an overview of sustainability in Hartlepool.	The LFRMS will need to demonstrate that it can deliver improved FRM whilst not damaging the visions set out in this strategy.	<ul style="list-style-type: none"> • Biodiversity, flora and fauna • Water environment
Environmental Sustainability Action Plan (2006/6)	Outlines Hartlepool's plan for progress relating to the environment and people's quality of life.	Provides direction on sustainability progress, which the LFRMS must consider.	The LFRMS will need to demonstrate that it can deliver improved FRM whilst not damaging the visions set out in this plan.	<ul style="list-style-type: none"> • Biodiversity, flora and fauna • Water environment

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