



JBA
consulting

**Thurrock Local
Flood Risk
Management
Strategy –
Strategic
Environmental
Assessment**

Scoping Report
March 2015

Thurrock Council
Civic Offices
New Road Grays
Essex
RM17 6SL

JBA Project Manager

Claire Gardner
JBA Consulting
The Library
St Philips Courtyard
COLESHILL
Warwickshire
B46 3AD

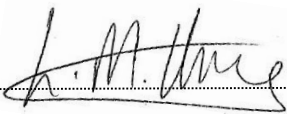
RH16 4NG Revision history

Revision Ref / Date Issued	Amendments	Issued to
Draft v0-2 / March 2015		Claire Gardner
Final		Thurrock Council Environment Agency Natural England English Heritage

Contract

This report describes work commissioned by Thurrock Council. Rachel Drabble and Laura Thomas of JBA Consulting carried out this work.

Prepared by  Rachel Drabble BSc (Hons)
Environmental Consultant

Reviewed by  Laura Thomas BA MRes MCIEEM
Senior Ecologist

Purpose

This document has been prepared as a SEA Scoping Report for Thurrock Council. JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

JBA Consulting has no liability regarding the use of this report except to Thurrock Council.

Copyright

© Jeremy Benn Associates Limited 2015

Carbon footprint

A printed copy of the main text in this document will result in a carbon footprint of 223g if 100% post-consumer recycled paper is used and 283g if primary-source paper is used. These figures assume the report is printed in black and white on A4 paper and in duplex.

JBA is aiming to reduce its per capita carbon emissions.

Contents

1	Introduction	1
1.1	The Local Flood Risk Management Strategy	1
1.2	Strategic Environmental Assessment (SEA)	1
1.3	Study area	2
2	SEA process and methodology	3
2.1	Meeting the requirements of the SEA Directive	3
2.2	Stages in the SEA process	3
2.3	Scope of the SEA	4
2.4	Habitats Regulations.....	6
3	Other relevant policies, plans and programmes	7
3.1	Introduction	7
3.2	Summary of the review	8
4	Environmental characteristics and key issues	10
4.1	Introduction	10
4.2	Landscape and visual amenity	10
4.3	Biodiversity, flora and fauna	13
4.4	Water environment	21
4.5	Soils and geology	24
4.6	Historic environment	25
4.7	Population	27
4.8	Material assets.....	28
4.9	Air quality	30
4.10	Climate.....	30
4.11	Scoping conclusion	31
4.12	Habitats Regulations Assessment.....	32
5	SEA framework	33
5.1	Introduction	33
5.2	SEA objectives and indicators	33
5.3	Impact significance	34
5.4	SEA assessment approach	34
6	Next steps in the SEA process	36
6.1	Consultation	36
6.2	The Environmental Report.....	36
7	References	37
A	Appendix A: Review of policies, plans and programmes	39

List of Figures

Figure 1-1: Study area	2
Figure 4-1: Main settlements and river network in Thurrock	11
Figure 4-2: European sites within 15km of Thurrock	14
Figure 4-3: SSSIs and LNRs in Thurrock	16
Figure 4-4: Ancient woodland in Thurrock	18
Figure 4-5: Coastal and floodplain grazing marsh in Thurrock (Source: Thurrock Council)	19
Figure 4-6: Priority BAP Habitats in Thurrock	19
Figure 4-7: Agricultural land classification of Thurrock	24
Figure 4-8: Bedrock geology of Thurrock	25
Figure 4-9: Historic assets in Thurrock	26
Figure 4-10: Thurrock deprivation (source: Public Health England, 2014). The chart shows the percentage of population in England and Thurrock who live in each of these quintiles.	28
Figure 4-11: Transport infrastructure	29

List of Tables

Table 2-1: Stages in the SEA process as identified within Annex I of the SEA Directive	3
Table 2-2: Stages in the SEA process	4
Table 2-3: Environmental topics to be covered in the SEA	5
Table 3-1: Policies, plans and programmes reviewed through this SEA process	7
Table 3-2: Key themes	8
Table 4-1: European sites within 15km of Thurrock borough	13
Table 4-2: SSSIs within Thurrock borough	15
Table 4-3: NNRs within 15km of Thurrock	17
Table 4-4: SEA scoping assessment summary	31
Table 5-1: Definition of SEA objectives, indicators and targets	33
Table 5-2: SEA objectives and indicators	33
Table 5-3: Impact significance key	34
Table 6-1: Proposed Structure of the Environmental Report	36

Abbreviations

AOD	Above Ordnance Datum
AONB.....	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
BAP	Biodiversity Action Plan
CAMS.....	Catchment Abstraction Management Strategy
FWMA.....	Flood and Water Management Act
GEP	Good Ecological Potential
HAP.....	Habitat Action Plan
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
NERC.....	Natural Environment and Rural Communities Act (2006)
NIA	Nature Improvement Area
NNR	National Nature Reserve
NVZ.....	Nitrate Vulnerable Zone
ODPM	Office of the Deputy Prime Minister
RBMP.....	River Basin Management Plan
RMA	Risk Management Authority
rMCZ.....	Recommended Marine Conservation Zone
SAC.....	Special Area of Conservation
SAP.....	Species Action Plan
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
WRMU	Water Resource Management Units

1 Introduction

Thurrock 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 Scoping Report sets out the scope of, and assessment framework for undertaking, the SEA. It provides a description of the baseline environmental characteristics and key environmental issues in and around Thurrock, and identifies other relevant plans, programmes and policies that may influence the development of the LFRMS. This report also sets out a framework to be used to examine the environmental impacts of implementing the LFRMS and comprises a series of SEA objectives and indicators that have been developed to reflect the key environmental issues of relevance to Thurrock.

1.1 The 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 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 flood risk management 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 flood risk management 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 flood risk management 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 flood risk management. It is an important tool to protect vulnerable communities and deliver sustainable regeneration and growth.

1.2 Strategic Environmental Assessment (SEA)

A SEA is a statutory assessment process required under the Environmental Assessment of Plans and Programmes Regulations 2004 (the 'SEA Regulations'). These regulations transpose into United Kingdom (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' (ODPM, 2004).

Local Government Association (LGA) guidance (LGA, 2011) on the production of the LFRMS identifies the likely requirement for an SEA, stating that *'the Local FRM Strategy is likely to require statutory SEA, but this requirement is something the LLFA must consider'*. A SEA screening process was therefore undertaken and the Council has confirmed the requirement for its LFRMS to undergo SEA.

The first output from the SEA process is the production of a Scoping Report, which outlines the scope and methodology of the assessment. A proportionate approach has been adopted towards establishing the scope of the SEA, reflecting the high-level nature of the LFRMS. Consultation with the statutory consultees (English Heritage, Natural England and the Environment Agency) will be undertaken to refine and confirm the methodology and scope of the assessment. These

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

aspects will be reviewed iteratively as the LFRMS develops so as to ensure the strategy fully considers the environmental impacts of its implementation before it is adopted.

Once consultation on the scope of the SEA has been completed, an Environmental Report will be prepared that assesses and describes the likely significant impacts on the environment of implementing the LFRMS.

1.3 Study area

Thurrock is a unitary authority with borough status located in the county of Essex in east England, 32km east of central London (Figure 1-1). The borough is part of the London commuter belt and within the Thames Gateway redevelopment zone. The borough covers an area of approximately 163km² and has a population of approximately 157,750 people (2011) (Thurrock Council, 2014). Thurrock is generally low lying and bounded to the south by the Thames Estuary and bordered to the north by the boroughs of Castle Point, Basildon and Brentwood.

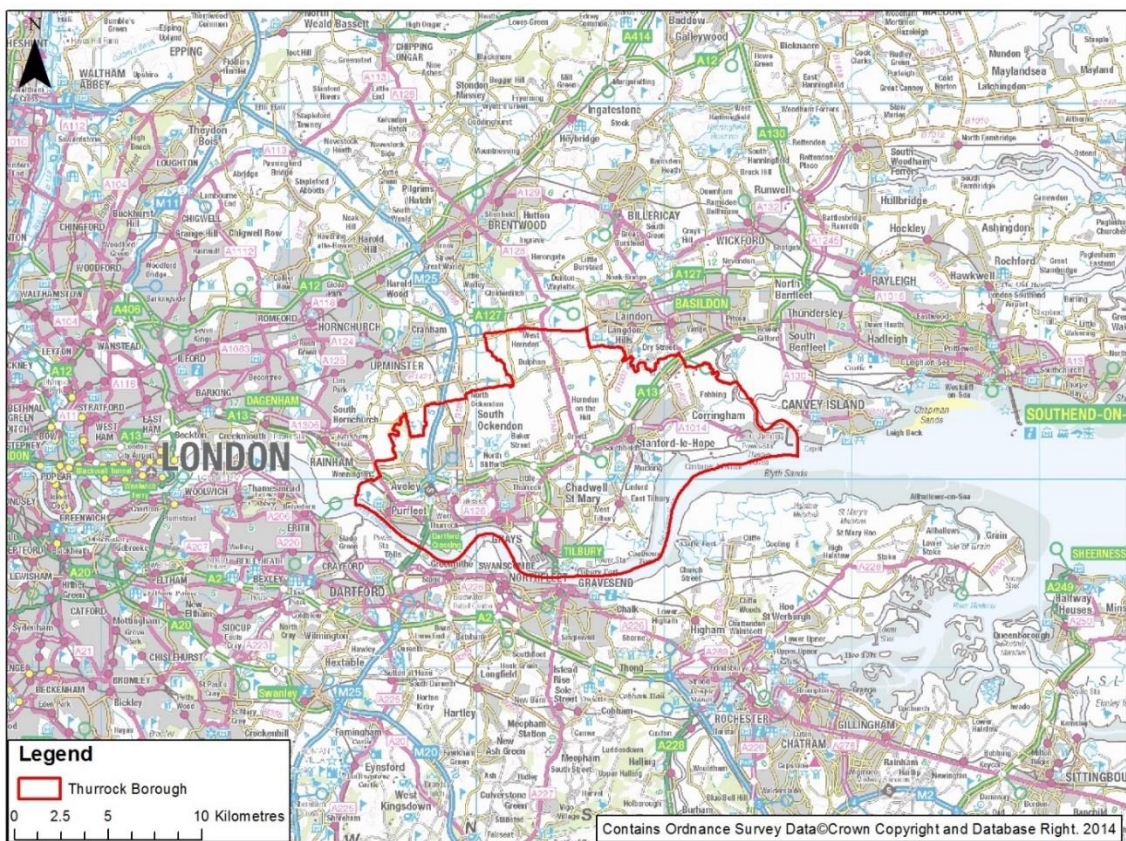


Figure 1-1: Study area

2 SEA process and methodology

2.1 Meeting the requirements of the SEA Directive

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 when developing the scope of 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 2-1 below, which also identifies where in the SEA process for the LFRMS that the relevant requirement will be met.

Table 2-1: 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;	SEA Scoping Report (Section 3)
(b) the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme;	SEA Scoping Report (Section 4)
(c) the environmental characteristics of areas likely to be significantly affected;	SEA Scoping Report (Section 4)
(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;	SEA Scoping Report (Section 4)
(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;	SEA Scoping Report (Sections 3 and 4)
(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;	SEA Environmental Report (to be prepared)
(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;	SEA Environmental Report (to be prepared)
(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;	SEA Environmental Report (to be prepared)
(i) a description of the measures envisaged concerning monitoring in accordance with Article 10;	SEA Environmental Report (to be prepared)
(j) a non-technical summary of the information provided under the above headings.	SEA Environmental Report (to be prepared)

2.2 Stages in the SEA process

This report has been prepared in accordance with the requirements of the SEA Regulations and follows good practice guidance produced by the Office of the Deputy Prime Minister (ODPM) (ODPM, 2005). The ODPM guidance sets out a five stage process (A to E) to be followed (see Table 2-2). This Scoping Report addresses Stage A of the process wherein the context and objectives of the SEA are identified and the scope of the assessment is determined. For the purpose of this assessment, stages A1 to A4 will be completed, whilst stage A5 comprises

consultation on this Scoping Report, which will be conducted as outlined in Section 6 of this document.

Table 2-2: Stages in the SEA process

SEA stages and tasks	Purpose	Where covered in the SEA
Stage A	Setting the context and objectives, establishing the baseline and deciding on the scope	SEA Scoping Report
(A1) Identifying other relevant plans, programmes and environmental protection objectives	To establish how the plan or programme is affected by outside factors, to suggest ideas for how any constraints can be addressed and to help to identify SEA objectives.	SEA Scoping Report (Section 3)
(A2) Collecting baseline information	To provide an evidence base for environmental problems, prediction of effects, and monitoring; to help in the development of SEA objectives.	SEA Scoping Report (Section 4)
(A3) Identifying potential environmental problems	To help focus the SEA and streamline the subsequent problems, prediction of effects, and monitoring; to help in the development of SEA objectives.	SEA Scoping Report (Section 4)
(A4) Developing SEA objectives	To provide a means by which the environmental performance of the plan or programme and alternatives can be assessed.	SEA Scoping Report (Section 5)
(A5) Consulting on the scope of SEA	To ensure that the SEA covers the likely significant environmental effects of the plan or programme.	SEA Scoping Report (Section 6)
Stage B	Developing and refining options and assessing effects	SEA Environmental Report (to be prepared)
Stage C	Preparing the Environmental Report	SEA Environmental Report (to be prepared)
Stage D	Consulting on the draft LFRMS and the Environmental Report	SEA Environmental Report (to be prepared)
Stage E	Monitoring the significant effects of implementing the LFRMS	SEA Environmental Report (to be prepared)

2.3 Scope of the SEA

2.3.1 Task A1: Identifying other relevant policies, plans and programmes, and environmental protection objectives

The relationship between various policies, plans, programmes and environmental protection objectives may influence the LFRMS. The relationships are analysed to:

- Identify any external social, environmental or economic objectives that should be reflected in the SEA process;
- Identify external factors that may have influenced the preparation of the plan; and
- Determine whether the policies in other plans and programmes might lead to cumulative or synergistic effects when combined with policies in the plan.

The plans and programmes that need to be considered include those at the international, national, regional and local scale. These are identified and evaluated in Section 3.

2.3.2 Task A2: Collecting baseline information

The SEA Directive identifies a range of environmental topics that must be considered for all environmental assessments. These are shown in Table 2-3.

Baseline information has been collected in relation to each of these topics, many of which are inter-linked. A desk study was undertaken to identify baseline environmental information, which was used to determine the key environmental characteristics of the LFRMS area. This information provides the basis for assessing the potential effects of the LFRMS options and will aid development of appropriate mitigation measures, together with a future monitoring

programme. The information search included information from a wide range of sources including the following organisations:

- Thurrock Council
- Natural England
- Environment Agency
- Office for National Statistics
- English Heritage
- Joint Nature Conservation Committee (JNCC)

Where information is available, key environmental targets and objectives have been identified; established and predicted trends in the status or condition of environmental features have been described; and significant environmental and sustainability issues have been highlighted. Trends evident in the baseline information have been used to predict the future baseline situation, which has assumed a continuation of the existing trends in some cases.

Table 2-3: Environmental topics to be covered in the SEA

SEA Directive requirements	Where covered in the Scoping Report	Definition in relation to this report
Air	Air quality	Air quality patterns.
Biodiversity (including flora and fauna)	Biodiversity, flora and fauna	Rare and notable species and habitats; trends in condition and status.
Climate	Climate	Regional climate patterns; trends in greenhouse gas emissions and the sources of these emissions; mitigation measures and adaptation options to manage climate change.
Cultural heritage	Historic environment	Protected and notable heritage features; human induced physical changes to the environment.
Human health	Population	Trends and patterns in human health; key community facilities and recreation opportunities.
Landscape	Landscape and visual amenity	The local landscape character; protected and notable landscapes; key local landscape features.
Material assets	Material assets	Critical infrastructure.
Population	Population	Where people live and work; population trends and demographics; economic prosperity; relative levels of advantage, disadvantage and inequality; key community facilities; accessibility and recreation opportunities.
Soil	Geology and soils	Variety of rocks, minerals and landforms; the quantity and distribution of high quality soil.
Water	Water environment	Chemical and biological water quality; water resources; water body hydromorphology; flood risk.
The interrelationship between the above factors	Throughout the Scoping Report	The relationship between environmental features and issues.

2.3.3 Task A3: Identifying environmental issues and problems

The identification of significant environmental issues is an important step in establishing an appropriate assessment framework. Such issues have been identified directly through the baseline information search or can be identified by evaluating the relationship between the aims of the LFRMS and the established environmental baseline.

2.3.4 Task A4: Developing the SEA objectives

SEA objectives are a key tool used to assess the potential positive and negative environmental effects of the LFRMS. Together with associated indicators, they form an assessment framework that provides a means to predict, describe and analyse the environmental effects that are likely to arise from the implementation of the strategy. The strategy objectives are appraised

individually against each SEA objective, thereby allowing environmental, economic and social effects, in particular those which are significant, to be identified. The use of comparable alternatives can also be incorporated into the assessment once the assessment framework has been established to aid in the identification of the most appropriate option for each of the strategy objectives.

2.4 Habitats Regulations

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 Thurrock borough, 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 (Screening Assessment) has been 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). If a likely significant adverse effect is identified, an Appropriate Assessment must be carried out to assess the potential impacts and determine whether it is possible to demonstrate that there would not be an adverse effect on the integrity of the European site.

A Screening Assessment will be undertaken Stage B (Table 2-2). More details of European sites in and around Thurrock is provided in Section 4.12. Consultation with Natural England on the outcomes of this assessment will be undertaken as part of the consultation process outlined in Section 6.

3 Other relevant policies, plans and programmes

3.1 Introduction

An important aspect of the SEA process is the assessment of other policies, plans and programmes and their environmental protection objectives, to identify how these strategic objectives may influence the development of the LFRMS. 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 3-1.

Table 3-1: 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)

Plan, Policy or Programme
Historic Environment Good Practice Advice Guide in Planning: Note 3: The Setting of Heritage Assets.
Regional / Local
Thames Catchment Flood Management Plan (2009)
Thames Estuary 2100 Strategy (2002)
Thames Gateway Delivery Plan (2009)
Managing Water Resources & Flood Risk in the South East (2005)
London Rivers Action Plan (2009)
Thames River Basin Management Plan
Thurrock Council Local Air Quality Action Plan (2004)
Thurrock Environmental Vision and Policy (2013)
Essex County Council Preliminary Flood Risk Assessment (2011)
Thurrock Strategic Flood Risk Assessment Level 1 Report (2009) and Level 2 Report (2010)
Thurrock Transport Strategy 2013-2026 (2013)
Thurrock Local Development Framework Core Strategy and Policies for Management of Development (2011)
Sustainable Community Strategy Thurrock 2020 (2009)
Essex Biodiversity Action Plan (2011)
Thurrock Biodiversity Action Plan 2007-2012
Essex County Council Adapting for Climate Change – Action Plan (2014)
Open Spaces Strategy 2006 – 2011 (2006)
Riverscapes – An environmental vision for Thurrock 2013-2023 (2013)

3.2 Summary of the review

The key themes identified by this review are shown in Table 3-2. A summary of the policy documents and their relevance to the Thurrock LFRMS is set out in Appendix A.

Table 3-2: Key themes

SEA topic	Key themes
Landscape and visual amenity	Protecting sensitive landscape assets (including Special Landscape Areas (SLA) and Areas of Outstanding Natural Beauty (AONB)); promoting the conservation and enhancement of natural beauty and amenity of important landscapes, including inland waters; definition and protection of regional and local landscape character; and the provision and enhancement of green infrastructure to benefit people and the environment.
Biodiversity, flora and fauna	Protection of international and national designated sites and their qualifying features; preservation and enhancement of notable habitats and species, particularly those noted for their conservation value or under threat; identification of the roles and responsibilities of organisations including local authorities to protect and enhance biodiversity including the creation of local Biodiversity Action Plan (BAP) habitats and species and promotion of BAP species; provision of new/restored habitat to enable species to adapt to the future impacts of climate change.
Water environment	Promote the sustainable use of water resources to meet future growth in demand and impacts of climate change; better regulation and management of the water environment to benefit water resources and flood risk, and reduce water pollution; and promotion of sustainable drainage systems (SuDS).
Geology and soils	Long term protection, improvement and sustainable management of soil quality and quantity, including the preservation of best and most versatile land; and the management and remediation of contaminated land to reduce the risk to human health and the environment, particularly soils and water quality.
Historic environment	Protection and enhancement of nationally and locally important heritage assets and historic landscapes; better integration of heritage protection within the planning regime; and providing better access to heritage sites including their promotion as an economic asset.
Population	Protect and improve human health, wellbeing and living standards; greater integration of socio-economic and environmental objectives to deliver sustainable development; promotion of prosperous, sustainable and coherent communities; provision of better public transport and access; reduction of flood risk; enhancement of recreation and amenity resources to benefit health and wellbeing; and

SEA topic	Key themes
	development and provision of measures to enable adaptation to the impacts of climate change.
Material assets	Improvement and better management of material assets including highways and utilities infrastructure; greater provision and enhancement of green infrastructure to deliver benefits to people and the environment; and provision of better public services to deliver socio-economic benefits.
Air quality	Protection of air quality in urban areas through enhanced management of polluting emissions.
Climate	Requirements to reduce future greenhouse gas emissions across all socio-economic sectors to limit the impacts of climate change of people and the environment; and provision of measures to enable future adaptation to the impacts of climate change and increase resilience.

4 Environmental characteristics and key issues

4.1 Introduction

A search of baseline environmental information has been undertaken to identify the key environmental characteristics of the borough. This includes 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 information obtained through this desk study is set out in the following topic-specific sections, many of which are inter-linked. The information used to characterise the baseline environment 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 have been 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.

4.2 Landscape and visual amenity

Much of the riverside area of Thurrock is highly urbanised, with a mixture of industrial and residential development at the western and eastern ends. The landscape character of Thurrock is not uniform, with the main physical feature being the River Thames, which forms the southern border of the borough, with the bank of the Thames being heavily urbanised between Aveley Marshes and Tilbury, and again around Holehaven Creek (Thurrock Council, 2006). The landscape of the borough divides roughly into industrial/urban land south of the A13 and mixed urban, village and rural land to the north of the A13. Approximately 60% of the borough is open countryside, predominantly agricultural land and dispersed villages. Approximately 70% of Thurrock is designated as Metropolitan Green Belt (URS, 2014).

The built environment of Thurrock is very varied, with redevelopment and renewal of the area creating mainly residential developments along the banks of the Thames. Old industrial sites have also been developed into new housing areas and the Lakeside retail development. Historically, the main urban centres have grown up around the riverbank industries including oil, aggregate, cement works, scrapyards, power stations and docks (Scott Wilson, 2009a). The main settlements include Grays, Stanford-le-Hope, Corringham, South Ockendon and Tilbury (Figure 4-1). Post-war suburban residential areas have expanded and, in some cases, merged with others. Villages in open countryside have not expanded due to Green Belt restrictions, and have therefore retained a small scale and rural character (Thurrock Council, 2006).

Farmland is the major land use in Thurrock, with a mosaic of ditches, hedgerows, woods, ponds, pasture and field margins (Thurrock Council, 2007). There are also the Thames Terraces, of which the Purfleet-Grays ridge rises from the Thames to 25m above sea level, forming a central belt of sands and gravels across the borough (Thurrock Council, 2007).

There are two SLAs classified for their landscape importance in a regional and countrywide context; the Mardyke Valley and Langdon Hills (Thurrock Council, 2011a). These areas are designated by Thurrock Council to safeguard areas of regional or local landscape importance from inappropriate developments.

The highest elevations of the borough are in the north-east, where ground levels reach approximately 50m Above Ordnance Datum (AOD). There are natural low points along the fluvial floodplain of the River Mardyke in the north-west, and Stanford Brook in the south-east corner, with ground levels between 2 and 6m AOD (URS, 2014)

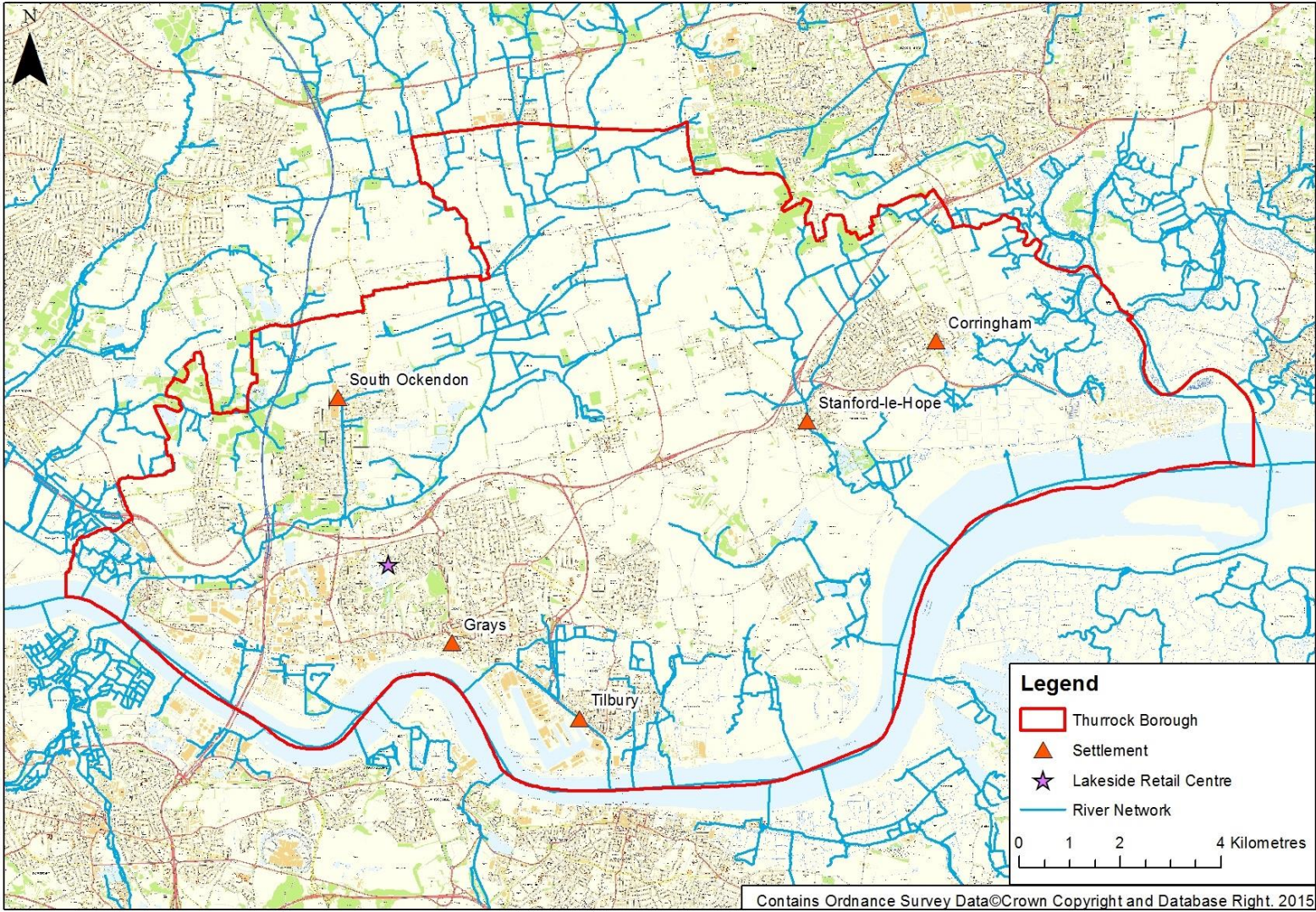


Figure 4-1: Main settlements and river network in Thurrock

There are no AONBs or National Parks in the borough of Thurrock. Thurrock is in the Northern Thames Basin (111) National Character Area (NCA), which extends from Hertfordshire in the west to the Essex coast in the east (Natural England, 2013). The countryside has suffered from the effects of mineral working and the landfilling of waste, and continues to be affected by other land use changes associated with urban fringe activities and changing agricultural land management practices (Chris Blandford Associates, 2005). However, there are strategies to improve the landscape character of the borough, such as the South Essex Green Grid Strategy, which was launched in 2008 to create five major green infrastructure projects in South Essex, including the creation of Thurrock Thameside Nature Park in Mucking (Parklands South Essex, 2009).

Thurrock's landscape character can be divided into five distinct types and areas (Thurrock Council, 2006):

- Fenland – North Thurrock around Bulphan.
- Rolling farmland/wooded hills – North Thurrock around Langdon Hills and Horndon on the Hill.
- Marshland – to the east of Thurrock along the Thames Estuary.
- Urban fringe – Thurrock's urban areas apart from Stanford-Le-Hope and Corringham.
- Urban areas – Aveley, Chadwell St Mary, Corringham, Grays, Purfleet, Stanford-Le-Hope, Tilbury and West Thurrock.

The Thames forms a distinctive 'riverscape' along the southern edge of the borough. In the west near Aveley Marshes, the Thames is narrow, widening towards Holehaven Creek in the east. The banks of the river are penetrated by large creeks, smaller inlets and bays. The river bank is heavily industrialised between Aveley Marshes and Tilbury, and again around Holehaven Creek (Chris Blandford Associates, 2005).

4.2.1 Key environmental issues

Key issues and challenges arising from current and anticipated forces for change in the Thurrock landscape are (Chris Blandford Associates, 2005):

- Arresting the further dilution of landscape character resulting from current farming practices.
- Ensuring that any potential new peripheral urban development is sited to minimise impacts on landscape character and visual amenity.
- Improving the transport network in an effort to reduce high traffic levels that create noise intrusion and barriers to movement within the borough.
- Addressing the adverse impacts of small-scale incremental changes on the character and quality of the landscape.

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

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

4.3 Biodiversity, flora and fauna

4.3.1 Designated nature conservation sites

Thurrock supports internationally designated nature conservation sites. There is one Ramsar and SPA site within the borough, and three Ramsars and SPAs within 15km of Thurrock's boundary (Figure 4-2). These sites are all designated as both SPA and Ramsar and are all estuary sites to the east of the borough. The borough does not support any SACs, but there are three within 15km (Figure 4-2). European sites within 15km of Thurrock are described in Table 4-1.

Table 4-1: European sites within 15km of Thurrock borough

Site name	Distance from Thurrock	Qualifying and Interest features
Thames Estuary and Marshes SPA and Ramsar	Within – borders the coastline around Stanford-le-Hope and Tilbury	The site is a complex of brackish, floodplain grazing marsh, ditches, saline lagoons and intertidal saltmarsh and mudflat. The Ramsar is designated for one endangered plant species (least lettuce <i>Lactuca saligna</i>) and at least 14 nationally scarce plants of wetland habitats. The site also supports more than 20 British Red Data Book invertebrates. The site also supports a bird assemblage of international importance, and a variety of bird species occur at levels of international importance. These include the ringed plover <i>Charadrius hiaticula</i> ; black-tailed godwit <i>Limosa limosa islandica</i> ; grey plover <i>Pluvialis squatarola</i> ; red knot <i>Calidris canutus islandica</i> ; dunlin <i>Calidris alpina alpina</i> ; and common redshank <i>Tringa tetanus tetanus</i> (JNCC, 2000).
Benfleet and Southend Marshes SPA and Ramsar	3.6km east	This site comprises an extensive series of saltmarshes, mudflats and grassland which support a diverse flora and fauna, including internationally important numbers of wintering waterfowl. It is designated for waterfowl assemblages of international importance and populations occurring at levels of international importance (JNCC, 1994).
Medway Estuary and Marshes SPA and Ramsar	8.6km south-east	This site has a complex of rain-fed, brackish, floodplain grazing marsh with ditches, and intertidal saltmarsh and mudflat. The site is designated for its rare plants and animals, with at least 12 British Red Data Book species of wetland invertebrates. There are also waterfowl assemblages of international importance and populations of several bird species at levels of international importance (JNCC, 1993).
North Down Woodlands SAC	9km south	Designated for two Annex I habitats, <i>Asperulo-Fagetum</i> beech forests and yew <i>Taxus baccata</i> woods (JNCC, 2014a).
Crouch and Roach Estuaries SPA and Ramsar	10km north-east	The site is designated for its assemblage of rare, vulnerable or endangered species or sub-species of plant and animal including 13 nationally scarce plant species. As with the other sites, there are waterfowl assemblages of international importance and populations at levels of international importance (JNCC, 1998).
Essex Estuaries SAC	10km north-east	Designated for the habitats that exist at the site, for example estuaries, mudflats, sandflats and Atlantic salt meadows, among others (JNCC, 2014d). Epping Forest SAC is approximately 16km north-west of Thurrock. The site has an Annex I habitat that is a qualifying feature; Atlantic beech forests (JNCC, 2014e). This site overlaps the Crouch and Roach SPA and Ramsar.
Peters Pit SAC	12km south	Designated for the presence of the great crested newt <i>Triturus cristatus</i> , an Annex II species (JNCC, 2014b).

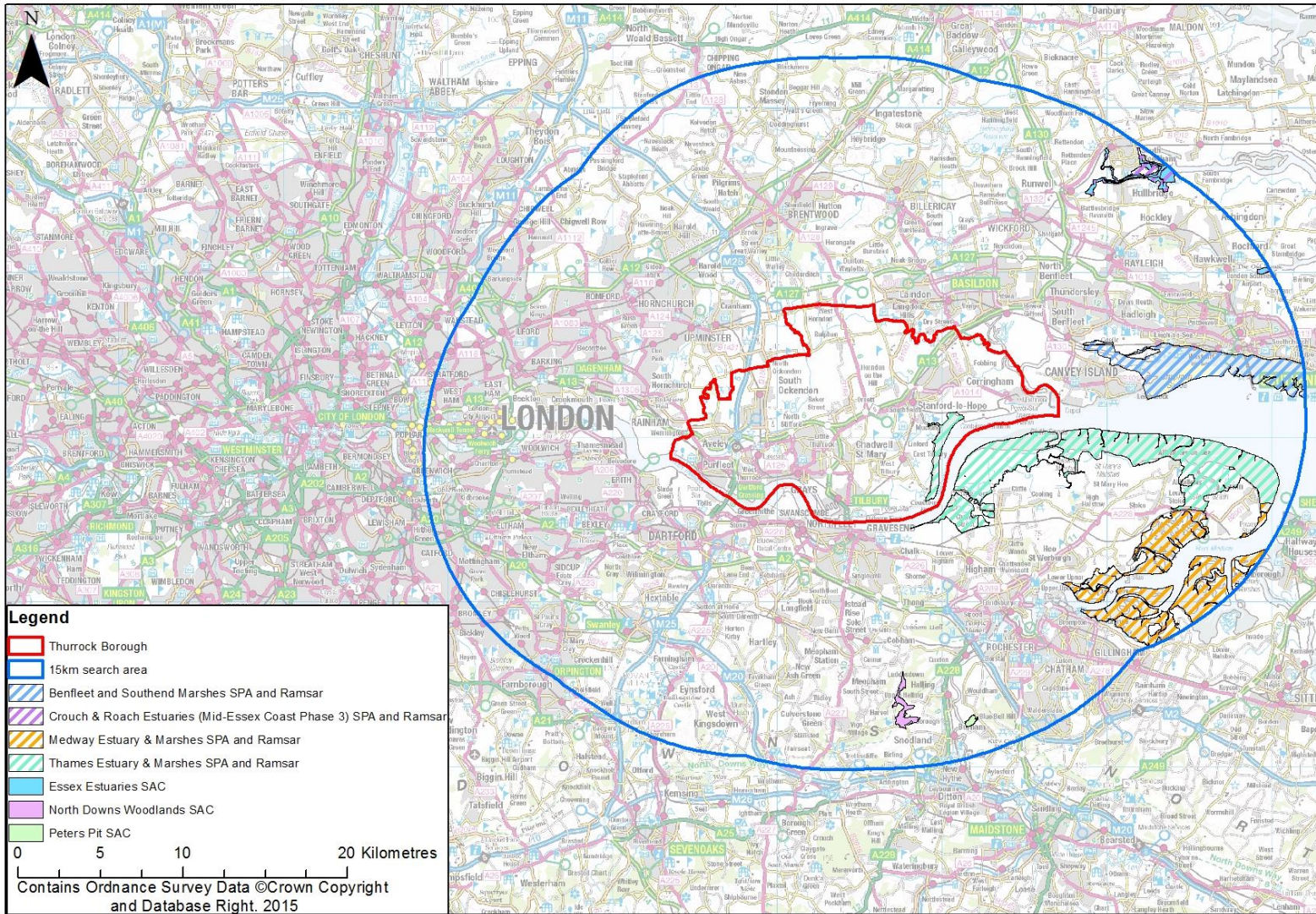


Figure 4-2: European sites within 15km of Thurrock

There are 12 SSSIs in Thurrock (Figure 4-3) with 57% of these sites classified by Natural England as in a favourable condition (Thurrock Council, 2011a). Thurrock's SSSIs are described in Table 4-2.

Table 4-2: SSSIs within Thurrock borough

SSSI name	Location	Interest features	SSSI condition
Mucking Flat and Marshes SSSI	South-east. Covers a portion of the Thames Estuary and Marshes Ramsar and SPA.	Waterfowl and estuarine habitats. The mudflats form the largest intertidal feeding area for wintering wildfowl and waders west of Canvey Island.	Favourable (94.13%) Unfavourable – recovering (5.87%)
Holehaven Creek SSSI	Eastern border, extending to the Thames.	Regularly supports nationally important numbers of wintering black-tailed godwit.	Favourable (100%)
Inner Thames Marshes SSSI	Western border, extending to the Thames	Forms the largest remaining expanse of wetland bordering the upper reaches of the Thames Estuary.	Favourable (42.37%) Unfavourable – recovering (17.8%) Unfavourable – no change (5.73%) Unfavourable – declining (31.36%) Destroyed (1.15%)
Vange and Fobbing Marshes SSSI	Eastern border	Unimproved coastal grassland and associated dykes and creeks support a diversity of maritime grasses and herbs.	Favourable (85.69%) Unfavourable – recovering (14.31%)
West Thurrock Lagoon and Marshes SSSI	Borders the Thames close to Grays	One of the most important sites for wintering waders and wildfowl on the Inner Thames Estuary.	Unfavourable – no change (33.31%) Unfavourable – declining (66.69%)
Basildon Meadows SSSI	North-east	Three unimproved herb-rich meadows lying on neutral soils, among the few areas of old pasture known to remain in Essex.	Favourable (100%)
Gray's Thurrock Chalk Pit SSSI	Grays	Active mineral extraction which ceased in the 1920s has led to a natural colonisation of the pit with woodland, scrub and calcareous grassland habitats important for assemblage of invertebrate fauna.	Unfavourable – recovering (100%)
Purfleet Chalk Pits SSSI	West	Contains complex lithostratigraphical and biostratigraphical evidence indicates the importance of evolution of Thames and Northern European interglacial sequences.	Favourable (56.57%) Unfavourable – declining (35.48%) Destroyed (7.96%)
Lion Pit SSSI	Grays	Exhibits a complex sequence of Pleistocene Thames deposits, which have yielded molluscs, ostracods and pollen.	Favourable (100%)
Purfleet Road, Aveley SSSI	West	Aveley silts and sands have yielded important assemblages of molluscs, insects, pollen and mammal remains which are indicative of temperate, or interglacial, conditions.	Favourable (23.75%) Unfavourable – no change (76.25%)
Globe Pit SSSI	Grays	An important site for the interrelationship of archaeology with geology, since it provides	Favourable (100%)

SSSI name	Location	Interest features	SSSI condition
		correlation of the Lower Palaeolithic chronology with Pleistocene Thames Terrace sequence.	
Hangman's Wood Deneholes SSSI	Grays	Contains remains of medieval chalk mines, which provide the most important underground hibernation site for bats in Essex, with three species of bat recorded. Hangman's Wood is an area of semi-natural habitat in which bats can feed and is a relict fragment of ancient woodland and is a scheduled monument	Favourable (100%)

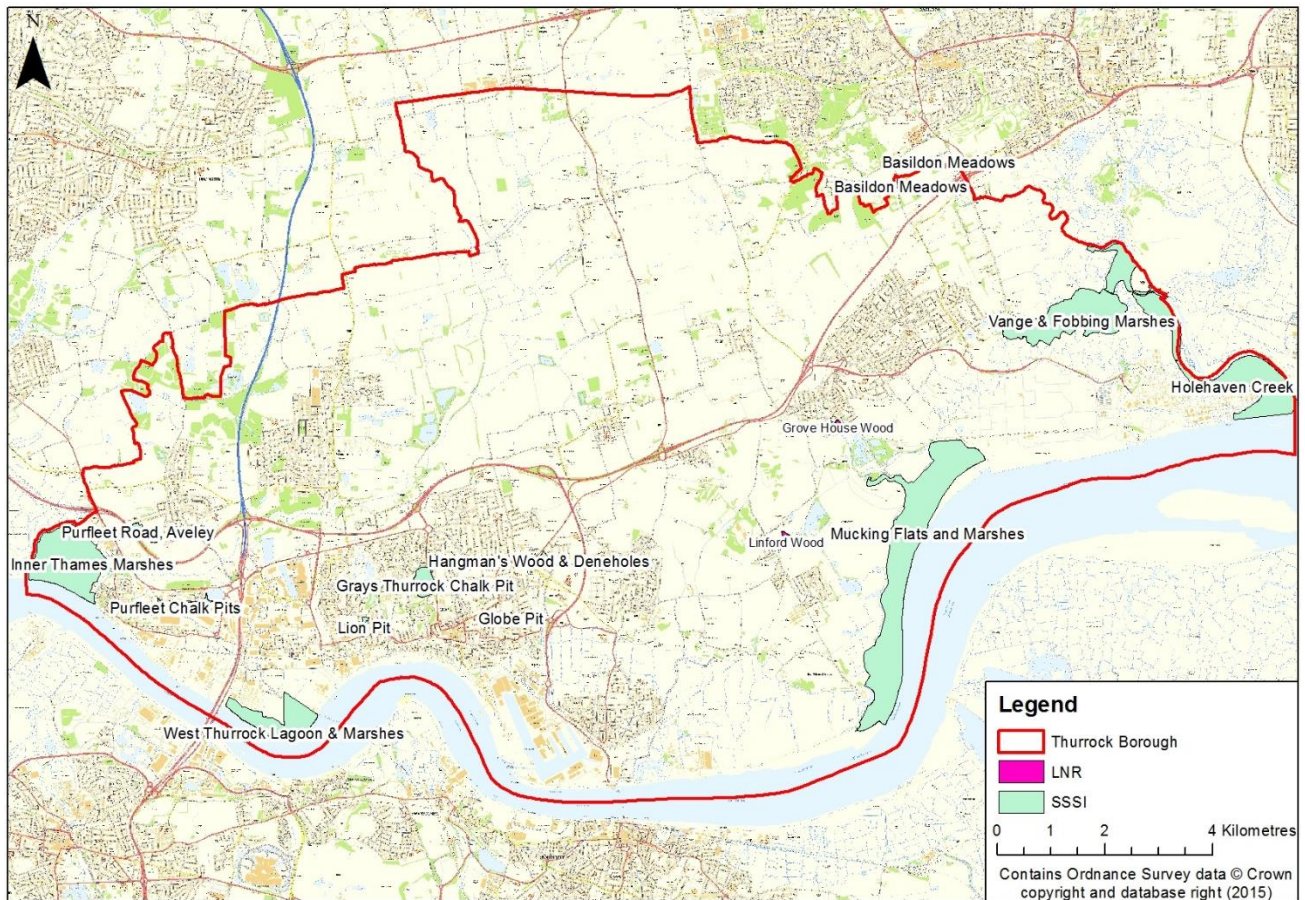


Figure 4-3: SSSIs and LNRs in Thurrock

There are no National Nature Reserves (NNR) in Thurrock, but three NNRs within 15km (Table 4-3).

Table 4-3: NNRs within 15km of Thurrock

Site name	Distance from Thurrock	Qualifying and Interest features
Swanscombe Skull Site NNR	2km south	Site is of national importance because of the prehistoric fossils discovered here, including one of the oldest human skulls ever found in the UK.
Leigh NNR	5km east	The flats at Leigh NNR support a wide variety of birds, particularly migratory species.
High Halstow NNR	6km south-east	The NNR is a complex mosaic of scrub and woodland habitat, dominated by hawthorn scrub and ancient oak woodlands, with regenerating elm woodland. The most important feature of this site is the heronry, which has over 200 pairs, making it the largest heronry in Britain.

Thurrock borders the Thames Estuary recommended Marine Conservation Zone (rMCZ), a site that is proposed to be designated for the many fish species that breed in the river, including eel and smelt (The Wildlife Trusts, 2012).

Part of the Thurrock borough is also located within the Greater Thames Marshes Nature Improvement Area (NIA), one of 12 areas funded by the Government to bring key partners together to plan and deliver significant improvements for wildlife and people. The NIA covers over 50,000ha of marshland and estuarine habitat (Greater Thames Marshes, 2015). The biodiversity of the NIA is considered to be underperforming as biodiversity is in decline and struggling to compete with the increasing pressures of climate change and development (Natural England, 2014).

4.3.2 Local designated sites

There are only two Local Nature Reserves (LNR) within the borough (Figure 4-3). These are Linford Wood and Grove House Wood in the eastern half of the borough. Linford Wood LNR is a woodland that consists of hedgebank, mixed woodland willow plantation, ditches and open area, surrounded by arable farmland. Grove House Wood LNR has reedbeds, a pond and a brook as well as woods, and is an important local habitat for wildlife.

There are 70 Local Wildlife Sites (LWS) (Thurrock Council, 2011a). 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, hedgerows and green lanes, post-industrial brownfield sites, reedbeds and chalk grassland. Of the 70 LWSs, 33 sites have positive management plans in place (URS, 2013).

There are six nature reserves managed by the Essex Wildlife Trust in Thurrock, mainly in the east of the borough. Fobbing Marsh nature reserve, in the east of the borough, is one of the few remaining Thameside grazing marshes, part of which was dammed in the aftermath of the 1953 floods. It also support the nationally rare least lettuce (Essex Wildlife Trust, 2014a). Also in the east is Thurrock Thameside Nature Park which includes a landfill site that is being transformed into a Living Landscape with views over Mucking Flats SSSI and Thames Estuary SPA (Essex Wildlife Trust, 2014b). Stanford Warren nature reserve is located adjacent to the River Thames, and consists of one of the largest reedbeds in Essex. The reeds provide habitat for many birds over the year (Essex Wildlife Trust, 2014c). Hornden Meadow is also in the east of the borough, and is less than one hectare in size, but has about 80 species of wildflowers (Essex Wildlife Trust, 2014d). Chafford Gorges nature reserve in Greys is the only site in the west of Thurrock. The park provides green space for wildlife and the population of Chafford Hundred and overlooks Warren Gorge (Essex Wildlife Trust, 2014e).

4.3.3 Notable habitats and species

As described above, Thurrock has a variety of habitats, including ancient woodland and coastal and floodplain grazing marsh. Ancient woodland does not cover a large amount of Thurrock, being mainly fragmented in the west and north (Figure 4-4).

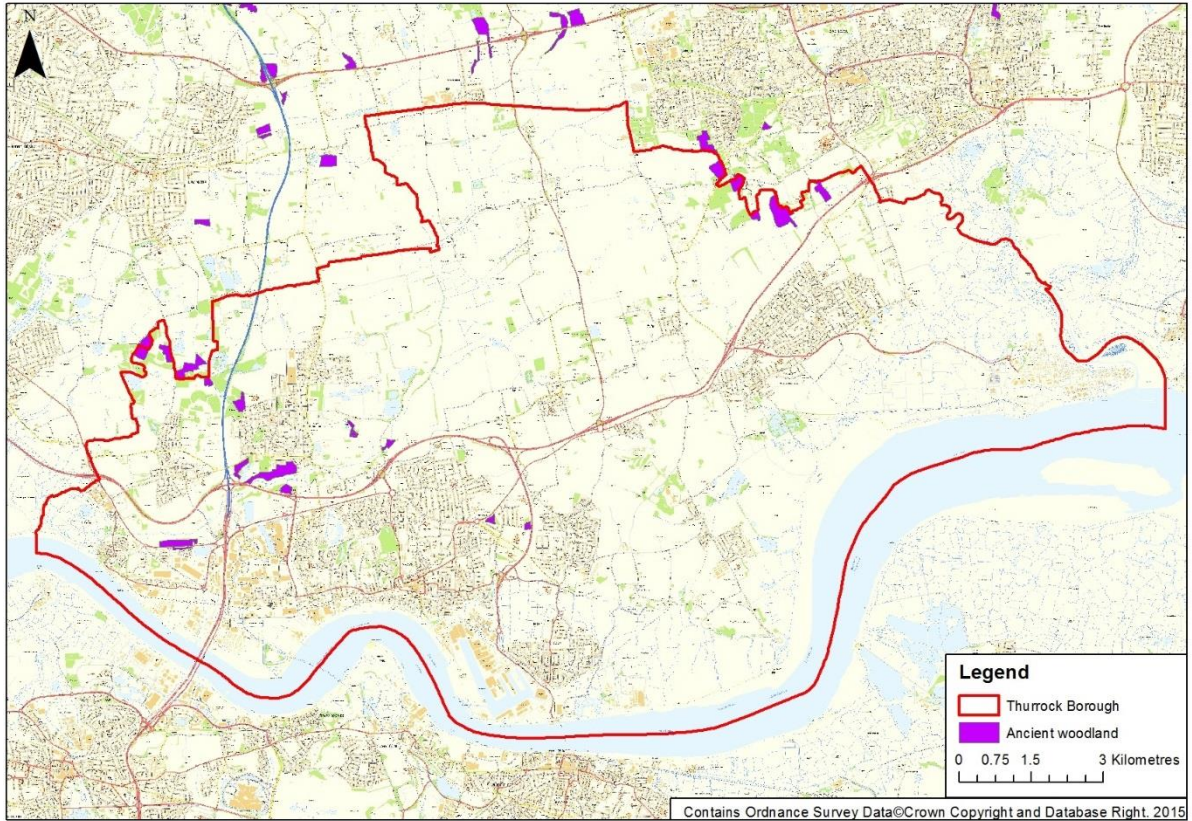


Figure 4-4: Ancient woodland in Thurrock

Coastal and floodplain grazing marsh data was provided by Thurrock Council. This marsh is periodically inundated pasture, or meadow, usually mesotrophic, with ditches which maintain water levels and contain standing brackish or fresh water. This habitat type is generally present along watercourses, and is particularly prevalent in the east of the borough (Figure 4-5). These ditches are especially rich in plants and invertebrates. Grazing marshes are particularly important for breeding waders such as snipe *Gallinago gallinago*, lapwing *Vanellus vanellus* and curlew *Numenius arquata*.

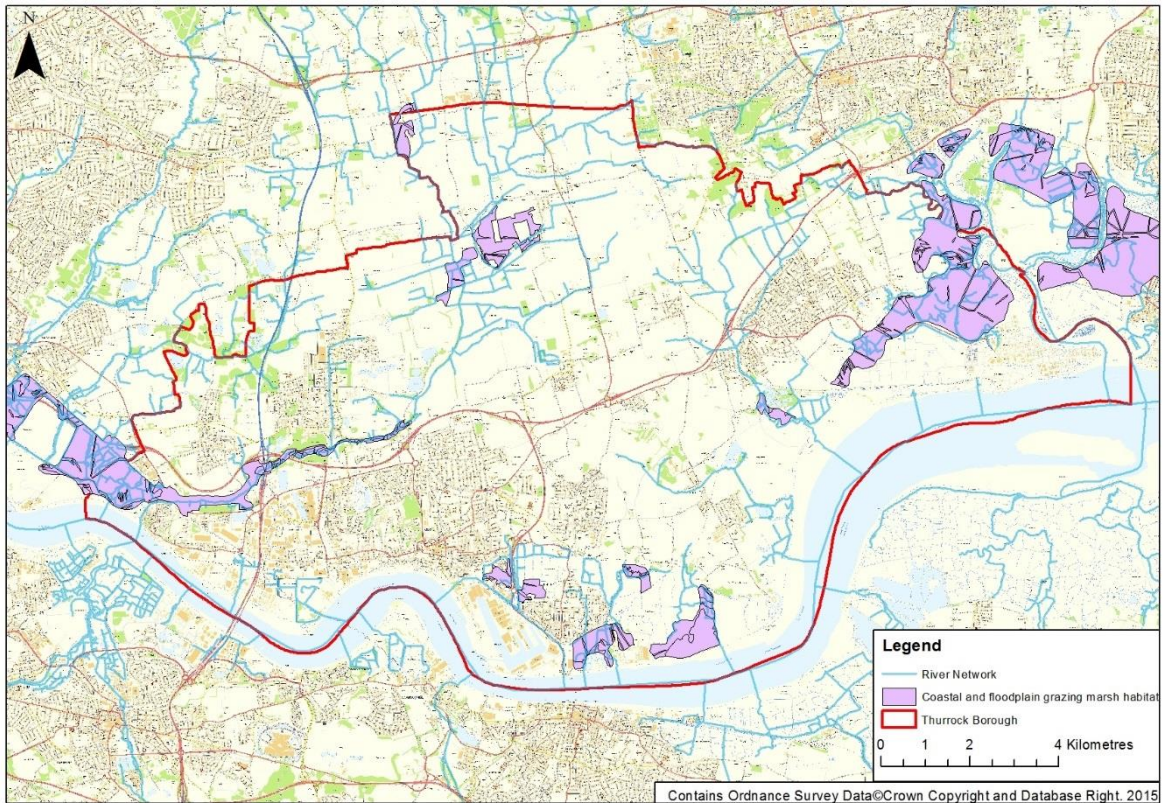


Figure 4-5: Coastal and floodplain grazing marsh in Thurrock (Source: Thurrock Council)

Other priority BAP habitats that are present include wet woodland, grassland, reedbeds, purple moor grass rush pastures, mudflats, lowland meadows and lowland heath. These habitats are mainly present in the east and south of the borough (Figure 4-6).

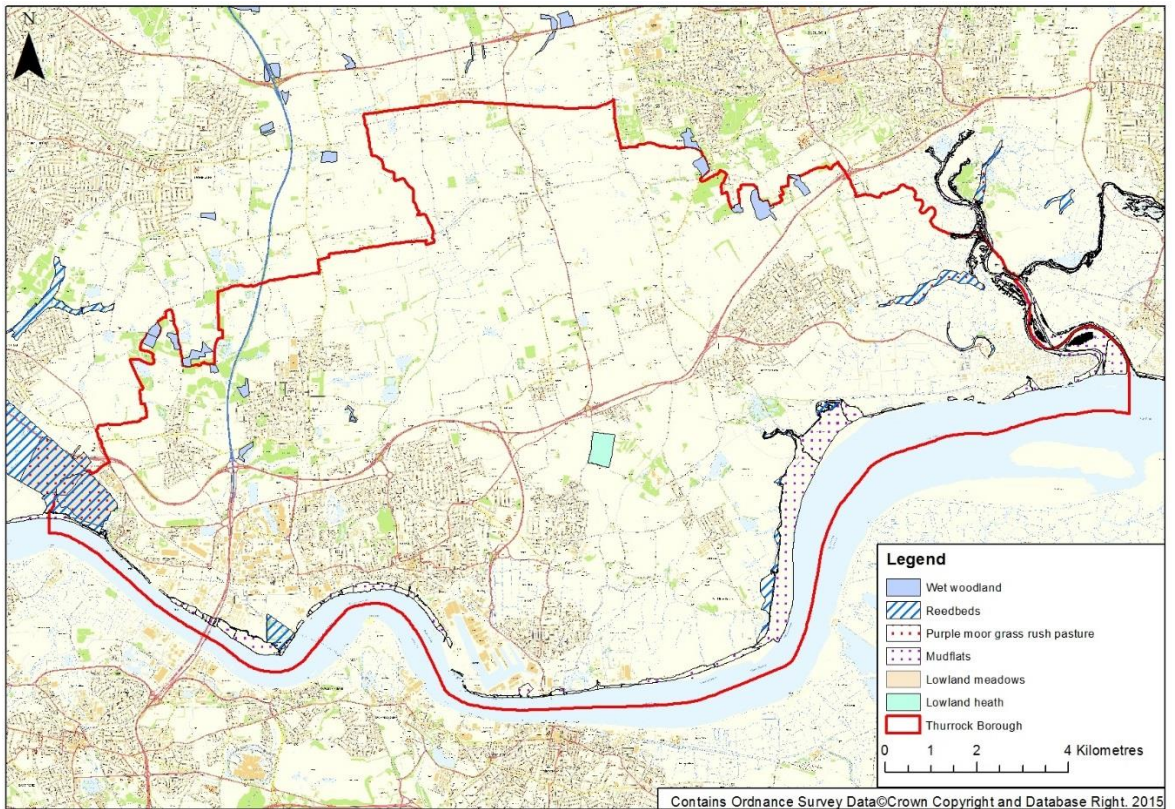


Figure 4-6: Priority BAP Habitats in Thurrock

The following priority habitats are listed as part of the Essex BAP, which sets out the species and habitats that should be protected and enhanced within the borough. Each habitat has an independent Habitat Action Plan (HAP) (Essex Biodiversity Project, 2012a):

- Arable field margins
- Hedgerows
- Traditional orchards (and Essex Apple varieties)
- Lowland dry acid grassland
- Lowland meadows
- Lowland heathland
- Ponds
- Floodplain and coastal grazing marsh
- Lowland raised bog
- Reedbeds
- Coastal saltmarsh

More locally, key habitats for Thurrock include (URS, 2013):

- Estuarine: coastal areas from Corringham to East Tilbury provide nationally important feeding grounds for a wide variety of over-wintering waders and wildfowl.
- Farmland: as the major land use within Thurrock, sympathetic management of farmland is considered to be vital to the conservation of the areas wildlife and landscape.
- Thames terraces: the Purfleet-Grays ridge rises from the Thames, forming a central belt of sands and gravels across the borough, where short acidic grassland can develop.
- Woodland: there are many semi-natural broad-leaved woods in the north of the borough, covering 2% of the land area.

The coastal zone supports some of Thurrock's most important wildlife sites, particularly at Stanford and Corringham which provide national important feeding grounds for a wide variety of over-wintering waders and wildfowl. The estuarine habitat in Thurrock borough supports a complex of coastal grassland, watercourses and fringing saltmarsh that supports numerous invertebrates, birds and nationally rare plants (Thurrock Council, 2007).

On the Thames Terraces, where the soils remain unimproved or the underlying minerals are exposed due to extraction, short acidic grasslands can develop. These areas of grassland and short scrub support nationally important assemblages of insects (Thurrock Council, 2007).

Semi-natural broad-leaved woodlands cover about 2% of the land area in Thurrock, mostly in the north of the borough. Most of these are former coppice woods that were managed to produce an annual harvest of wood. Typically, the woodlands are hazel, hornbeam or sweet chestnut coppice with pedunculate oak and ash standards (Thurrock Council, 2007).

The following priority species are listed as part of the Essex BAP and each species has an independent Species Action Plan (SAP) (Essex Biodiversity Project, 2012b):

- Badger *Meles meles*
- Barn owl *Tyto alba*
- Bats
- Nesting birds
- Dormouse *Muscardinus avellanarius*
- Great crested newt
- Invertebrates
- Otter *Lutra lutra*
- Reptiles
- Water vole *Arvicola amphibius*

- White-clawed crayfish *Austropotamobius pallipes*
- Wildflowers.

4.3.4 Fisheries

The River Mardyke is designated a cyprinid freshwater fishery. Many species of fish occur in the Mardyke river valley, the most common are roach *Rutilus rutilus*, carp *Cyprinus carpio*, eel *Anguilla anguilla*, perch *Perca fluviatilis* and chub *Squalius cephalus* in the upper reaches and tench *Tinca tinca*, rudd *Scardinius erythrophthalmus* and flounder *Platichthys flesus* mainly restricted to lower river sections. Problems with water and habitat quality are believed to be the main contributory factors to poor fish stocks in the Mardyke (Scott Wilson, 2009a).

4.3.5 Key environmental issues

The rural areas within Thurrock are under increasing pressure from development and changes in land use, particularly as a result of changes in farming practice, alternative uses for buildings in the countryside and pressure for outdoor recreation, leisure and commercial uses. Development pressure is arising from the Thames Gateway, which is developing marshland. Some brownfield land has high biodiversity value, and promoting development on brownfield land that is sympathetic to biodiversity is a key challenge.

A large number of designated sites, particularly those within the NIA, are under pressure from climate change and development. These are dependent on underlying hydrological conditions and are therefore vulnerable to flooding and changes in hydrology. These sites support a number of species that are reliant on tidal habitat, and are subsequently are at risk from flooding events, poor water quality, changes to hydrological/tidal regimes and habitat changes.

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

Flooding and flood risk management has the potential to significantly impact on a number of species of note in the borough. Some, such as water vole 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.

4.4 Water environment

4.4.1 Water resources

The East of England is the driest region in England and is one of the fastest growing in terms of development, and consequently water resource availability is limited, with supply-demand issues in parts of the region. There is little or no water available from existing sources within Thurrock and therefore future development will be served by the increase in storage at Abberton Reservoir near Colchester, which was completed in 2014 (URS, 2013). Water supply in Thurrock is supplemented via the Thames Water Utilities raw water bulk supply from Lea Valley reservoirs to Chigwell Water Treatment Works, along with two local water supply boreholes in Thurrock itself at Linford and Stifford (Scott Wilson, 2009a).

Thurrock is part of the fully integrated Essex water resources zone, which is controlled by Essex and Suffolk Water. There are no identified pressure or capacity issues in the water supply infrastructure, with local reinforcements provided within Thurrock (Scott Wilson, 2009a).

Chalk is the principal underlying aquifer of the region (Scott Wilson, 2009a). However, the impermeable London Clay precludes infiltration of rainfall over large areas of the chalk aquifer in the north of the district and beyond, thereby restricting its use in water resource development. Despite this, the aquifer is unconfined and chalk groundwater is utilised for public water supply (Scott Wilson, 2009a).

In some areas of the borough, groundwater levels are rising in response to the cessation of long-term water abstraction in the 1970s (Scott Wilson, 2009a). This has not caused an increase in flood risk from groundwater.

Main rivers in Thurrock include:

- Mardyke, located in the west of the borough, running from the north, before flowing westwards to where it enters the Thames at Purfleet. It is a fenland stream system, with two main sources at Langdon Hills and Cranham. The Mardyke catchment is 111.6km² and has a main river length of 18.5km (Scott Wilson, 2009a).
- Tidal River Thames flowing along the southern boundary of the borough, and is entirely tidal along this stretch.

In addition to the two main river systems, there are several smaller watercourses, ditches and drains within the borough:

- Stanford Brook, Manor Way Creek and Fobbing Creek in the east of borough.
- Gabbions Sewer, Stone House Sewer, East Tilbury Dock Sewer and West Thurrock Sewer. These are low flow channels with no additional capacity to accept surface water runoff.

Water resources within a catchment are assessed and monitored by the Environment Agency within a Catchment Abstraction Management Strategy (CAMS). There are two water resource management units (WRMU) covering the Thurrock area; The Mardyke and Thameside Chalk. Throughout the Mardyke catchment, London Clay heavily confines the chalk aquifer resulting in a lack of hydraulic connection between river and aquifer. Abstraction in the Mardyke has developed significantly and water is utilised for a range of purposes. Agriculture is the dominant sector in the upper reaches of the catchment, while industrial abstraction dominates the lower reaches (Scott Wilson, 2009a).

The Thameside Chalk catchment is exposed at or near the ground surface near Thurrock, with flow from other areas of the Upper Chalk likely to be a significant source of recharge. The unit has been assessed as having no water available for further abstractions (Scott Wilson, 2009a).

4.4.2 Water Framework Directive

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

The River Mardyke drains a significant proportion of the borough and flows south and then south-west through Thurrock to its confluence with the River Thames at Purfleet. The Mardyke catchment is generally low-lying with low channel gradients and is predominantly agricultural. The Mardyke is generally not designated as a Heavily Modified Water Body (HMWB), and has an overall status of Moderate under the Water Framework Directive (WFD) (Environment Agency, 2009). 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 Mardyke generally has a Moderate ecological status, however, the Mardyke (West Tributary) and Mardyke (East Tributary) have a Poor overall status and Poor ecological status, although it is not designated as a HMWB. The Mardyke and Fobbing water body is designated as a HMWB and has Moderate ecological potential under the WFD. Overall, Mardyke and Fobbing are classed as Moderate. Issues to the WFD status of the Mardyke catchment arise from its significant physical modifications to facilitate flood conveyance and land drainage (Environment Agency, 2009).

The section of Thames south of Thurrock extending east to Stanford-le-Hope is classed as the 'Thames Middle' water body, and is designated as a HMWB, with a current overall potential of Moderate. The Thames Lower water body runs east from Stanford-le-Hope and is also designated as a HMWB, with an ecological and overall status of Moderate.

4.4.3 Surface water quality

Water quality within the lower stretches of the River Mardyke, which flows through Thurrock's urban area, is currently moderate to poor quality and fails to meet 'good ecological status' under the WFD (URS, 2013). The very shallow gradient and low river flows exacerbates the poor water quality (Scott Wilson, 2009a).

Chemical water quality of the River Mardyke in the years 2005-2007 has been recorded as poor or bad, whilst the biological value has been recorded as good or fairly good. Nitrates are moderately low to moderate and phosphates are excessively high (Scott Wilson, 2009a). The lower reaches of the Mardyke have a history of suffering from low dissolved oxygen levels as a result of 'ponding' which occurs when the tidal flap at the outfall is closed on the highest tides and freshwater begins to back up. In some cases, saline water enters the freshwater system and exacerbates the problem (Scott Wilson, 2009a).

The Thames Estuary is the main watercourse within Thurrock that will be affected by the planned growth within the area, as it is the receiving watercourse for the effluent discharge from Tilbury waste water treatment works. Additionally, there is poorly managed surface water runoff from Purfleet, West Thurrock and Lakeside, Tilbury and London Gateway. Further upstream of the Thames, water quality monitoring observations show levels of Ammonia, Total Organic Nitrogen and Dissolved Oxygen decrease downstream, with no evidence suggesting that surface water inputs from Thurrock increases these parameters (Scott Wilson, 2010).

Much of northern Thurrock is within a surface water Nitrate Vulnerable Zone (NVZ). These zones are designated where land drains and contributes to the nitrate found in 'polluted' waters. Thurrock is not covered by a drinking water safeguard zone.

4.4.4 Groundwater quality

Groundwater provides vital resources for public water supply in the borough. Impacts on groundwater are broadly related to land use, with agricultural areas representing a major source of nitrates. There are two main risks that affect aquifers in Thurrock; salinity and nitrate. The main source of nitrate is from agricultural inputs in the northern part of Thurrock, and excessive pumping from groundwater may also increase salinity as a result of drawing poorer quality water up from depth (Scott Wilson, 2010).

Groundwater quality in the Thameside Chalk is generally good in Thurrock, with recent infiltration to the aquifer, but becomes poor to the north and east of the WRMU where older water containing high concentrations of chloride and sodium can be found within the confined chalk (Scott Wilson, 2009a).

Thurrock is within the South Essex Thurrock Chalk groundwater body for WFD, with a current quantitative quality of good, but a chemical quality rated poor (and deteriorating). This results in a current overall status of poor (Environment Agency, 2009).

The Lakeside area and the area between Grays, Tilbury and Stanford-le-Hope are covered by groundwater source protection zones (SPZ). These zones show the risk of contamination from any activities that might cause pollution in the area. Thurrock also lies within a groundwater vulnerability zone, which highlights the importance of groundwater resources in the area.

4.4.5 Flooding

The main sources of flooding for Thurrock are the River Thames Estuary, River Mardyke, the Stanford Brook and the arterial drainage network which drains low lying areas of Thurrock. The most significant events tend to be storm surges coupled with high spring tides, as the Thames Estuary poses the greatest flood risk to Thurrock. River Mardyke poses some fluvial flood risk in the northern part of the district, however the area is predominantly rural, therefore there are few population centres under threat from flooding from this river (Scott Wilson, 2009b).

4.4.6 Key environmental issues

Within the Thames RBMP, high population densities cause a number of pressures on the water environment, such as discharges from sewage networks and high demand for water. Diffuse pollution is a major pressure on the water environment, coming from urban and rural areas. Specific pressures include abstraction and artificial flow regulation; organic pollution; pesticides; phosphate; and urban and transport pollution (Environment Agency, 2009). Thurrock has particular pressures relating to development within the Thames Gateway area, therefore

increasing pressure on water resources and also increasing risk of pollution incidents and declines in water quality.

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 sites and improve water quality.

The water bodies in Thurrock currently fail to meet good ecological status/potential under the WFD. This is partly due to the installation of structures for flood conveyance and land drainage. The LFRMS will need to consider whether any flood risk management measures will lead to adverse impacts on the watercourses within the borough and whether the LFRMS can help contribute to achieving WFD objectives and improving water quality.

4.5 Soils and geology

Chalk underlies the whole of Thurrock, and is near to ground surface in the south-west of the borough. This chalk dips southward beneath the Thames and northward beneath deep deposits of London Clay (Scott Wilson, 2009a).

There are three main soil types in Thurrock, which include groundwater dominated gley soils. Gley soils are characteristically a mixture of coarse and fine loamy permeable soils affected by groundwater. In the north-east of the borough brown soil dominates, except within flood zones. These soils are loamy or clayey with reddish or reddish mottled, clay-enriched soil.

The soils along the coastal zone are predominantly alluvial with a significant clay content and are periodically or permanently waterlogged, whereas the soils inland are predominantly clay but also exhibit a loamy characteristic making them more suitable for cultivation (Scott Wilson, 2009a). Generally the soils are fertile with the majority classified as Grade 3 or above under agricultural land classification, where Grade 1 is 'excellent quality' (Figure 4-7).

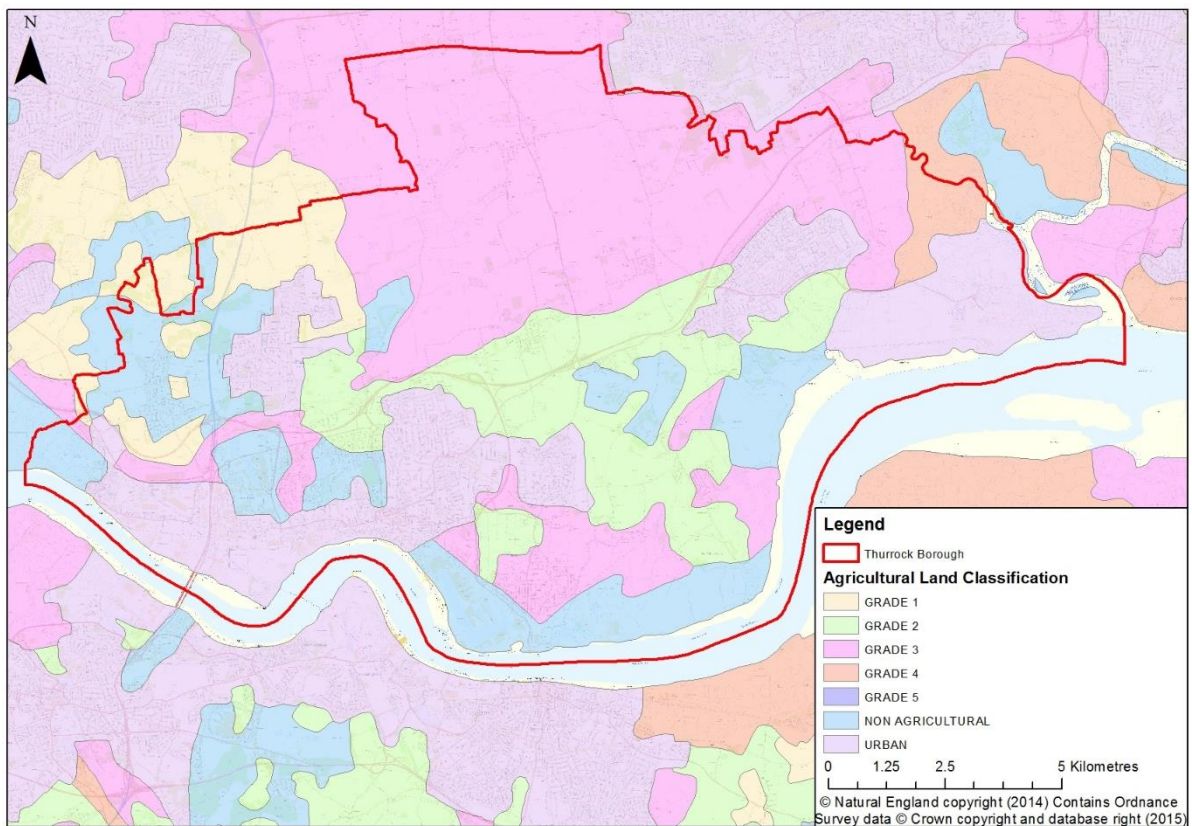


Figure 4-7: Agricultural land classification of Thurrock

The underlying geology of Thurrock is Chalk and Red Chalk, with a band to the north comprising Oldhaven, Blackheath, Lambeth Group and Thanet Beds (Figure 4-8). To the north of the A13, these layers are overlain by London Clay (Scott Wilson, 2009a). The surface geology of the borough has been strongly influenced by the natural migration of the River Thames (Chris Blandford Associates, 2005).

Adjacent to the shores of the River Thames and the Mardyke is low lying floodplain dominated by groundwater gley soils, whereas the north of the borough is seasonally waterlogged slowly permeable surface water gley soils intersected by a network of drainage ditches (Chris Blandford Associates, 2005).

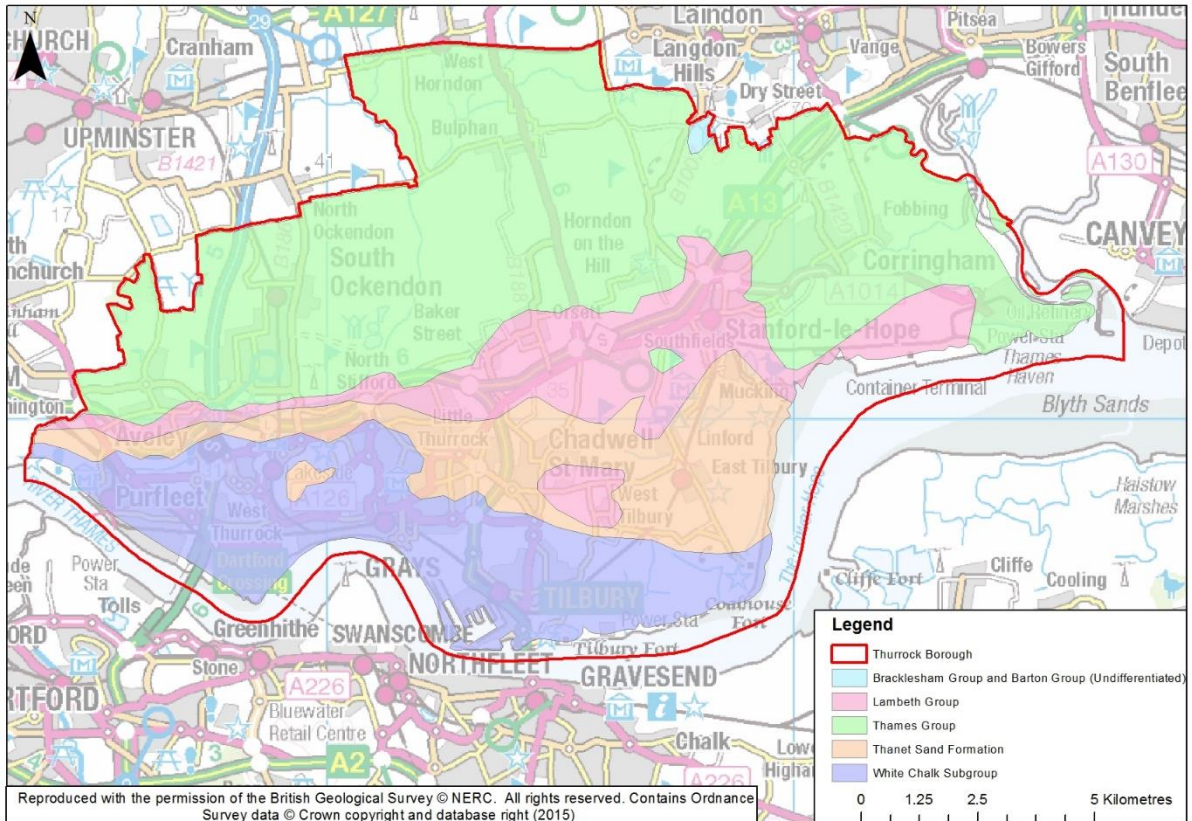


Figure 4-8: Bedrock geology of Thurrock

The drift deposit geology consists of alluvium in the south of the borough. Alluvium is also present within the floodplain of River Mardyke in the northern part of Thurrock. Alluvium consists of clays, silts, sands and gravels and the permeability can be highly variable depending on the exact composition of the material (Scott Wilson, 2010).

There are no Local Geological Sites (GeoEssex, 2015) with the borough, however there are five SSSIs that have a geological interest: Gray's Thurrock Chalk Pit SSSI; Lion Pit SSSI; Globe Pit SSSI; Purfleet Road, Aveley SSSI; and Purfleet Chalk Pits SSSI, as discussed above.

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

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

4.6 Historic environment

There is evidence that people first began to settle in the area 300,000 years ago. Thurrock was a favoured area due to the rich and fertile river valleys. This history moves on to Roman times, where some fields retain prehistoric and Roman field systems. Roman settlement was centred on the Roman road towards Tilbury (Chris Blandford Associates, 2005). The name Thurrock is thought to derive from the Saxon word 'turruc', which described the bottom of a ship where water collects. The 17th century marked a new threshold in the architectural development of manor houses, consequently Thurrock has a rich and diverse historic environment ranging from

prehistoric sites, medieval buildings and Tudor and Victorian forts. Historic assets in the borough (Figure 4-9) include:

- 16 scheduled monuments: these are historic sites of national importance and include Tilbury Fort and a crop mark complex.
- 241 listed buildings: these are statutorily designated and include 13 which are Grade I. These are all churches, with the exception of Government powder magazine, the only survivor of a group of five magazines built 1763-5.
- One registered park and garden: Belhus Park, designed by Capability Brown.
- Seven conservation areas: Horndon-on-the-Hill; Corringham; Orsett; Fobbing; Purfleet; West Tilbury; and East Tilbury (Thurrock Council, 2011a).

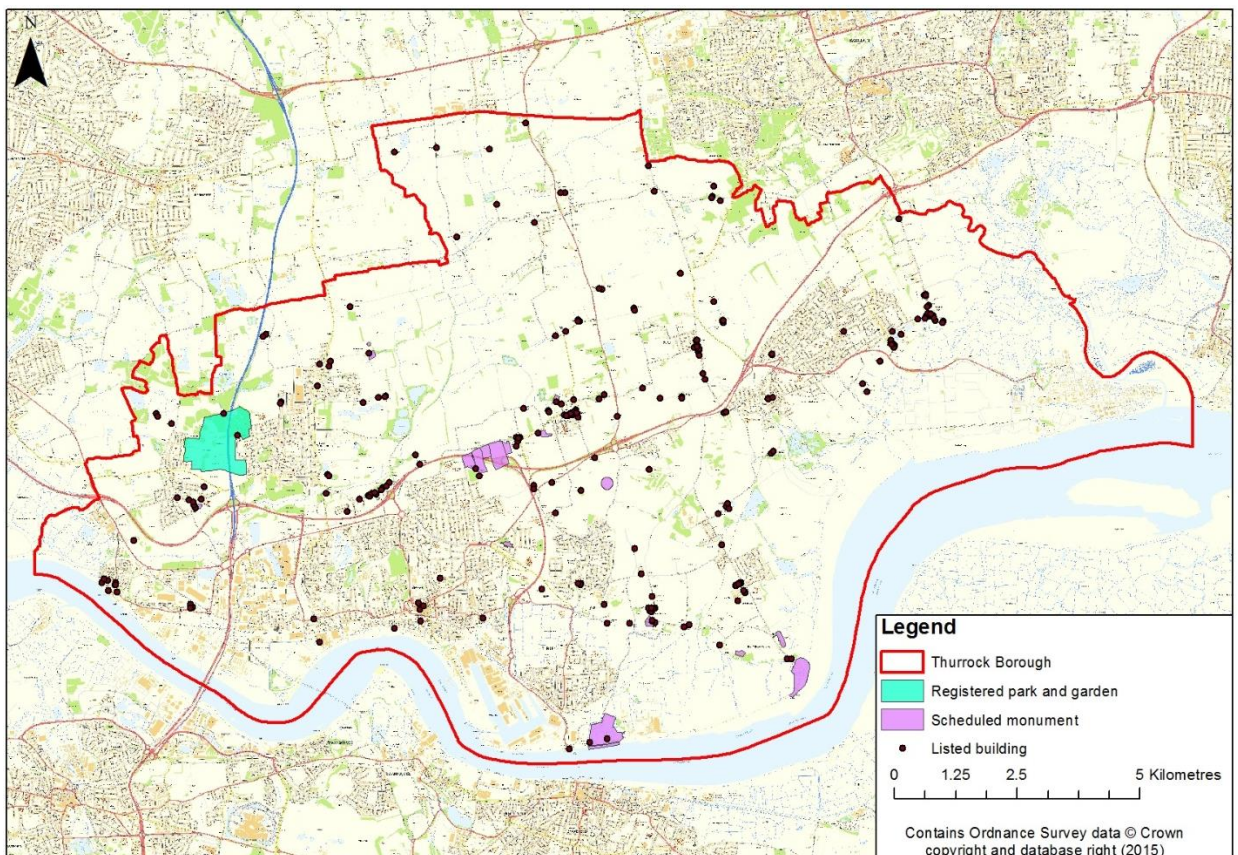


Figure 4-9: Historic assets in Thurrock

English Heritage’s ‘Heritage at Risk Register’ (English Heritage, 2014) identifies two buildings, two archaeology entries and one conservation area as at risk. The archaeological entries are scheduled monuments, although they are not at risk from flooding. East Tilbury conservation area is described as in a ‘very bad’ condition. The listed buildings are not described as at risk by flooding, however Coalhouse Fort, Tilbury has a problem of water ingress to casemates (English Heritage, 2014).

4.6.1 Key environmental issues

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

4.7 Population

The population of Thurrock is currently 157,705 (2011) (Thurrock Council, 2013) and is predicted to reach 183,200 in 2031, an increase of 34,300 (23%) over a 25 year period from 2006 (Thurrock Council, 2011a). This rapidly growing population is partly influenced by international immigration (Thurrock Council, 2011b).

Thurrock is expected to experience a significantly ageing population, as the proportion of people aged over 65 will increase by 13,800 people (75% increase) and people aged over 85 will more than double (141% increase) (Thurrock Council, 2011a). However, compared to the rest of England and Wales, Thurrock has a relatively young population, with an average age of 36, it is the eighth youngest in the east of England (Thurrock Council, 2014). As a result of this younger age structure, Thurrock has a higher birth rate than the national and regional average of 14.8 births per 1000 population compared to 12.5 nationally and 11.62 regionally (Thurrock Council, 2013).

Thurrock has lower proportions of people from minority ethnic communities than the national average (Thurrock Council, 2011a). However, the ethnic profile of Thurrock has changed dramatically since 2000, as in the 2001 census the ethnic minority population was 4.7%, but in 2011 had increased to 19.1%. The largest minority group were Black/African/Caribbean/Black British comprising 7.8% of the local population (Thurrock Council, 2013).

4.7.1 Health

Estimated levels of adult smoking and obesity are worse than the England average, with the rate of smoking related deaths worse than the England average (Public Health England, 2014). Life expectancy is similar to the England average, however it is 8.2 years lower for men and 7.7 years lower for women in the most deprived areas of Thurrock in comparison to the least deprived areas (Public Health England, 2014). Life expectancy is rising for both men and women in Thurrock, as well as a reduction in early deaths (Public Health England, 2014). Obesity among children is an issue in Thurrock, with approximately 20.3% of Year 6 children classified as obese (URS, 2013).

There is an identified lack of a major centre providing integrated medical services, with the Core Strategy (Thurrock Council, 2011a) stating that the network of health centres throughout Thurrock needs to be progressively extended and upgraded. This critical social infrastructure, along with residential and nursing homes, would be put under more pressure if flood risk increased.

4.7.2 Deprivation

The Index of Multiple Deprivation (IMD) provides a measure of relative deprivation across England and was most recently published in 2010. Thurrock is ranked 146th out of 354 councils in England in 2010 (Department for Communities and Local Government, 2014), where one is the most deprived. This is an increase from 2007, where Thurrock was 124th. Pockets of deprivation are evident in some wards, with the most deprived being Tilbury St Chads, Grays, Belhus, Chadwell St Mary, Ockendon and West Thurrock (Thurrock Council, 2011b) (Figure 4-10). These areas represent 12% of Thurrock's population. Although deprivation is lower than average, about 22% (7,500) children live in poverty (Public Health England, 2014).

Over 16% of Thurrock's working age population have no qualifications, compared with 10% nationally.

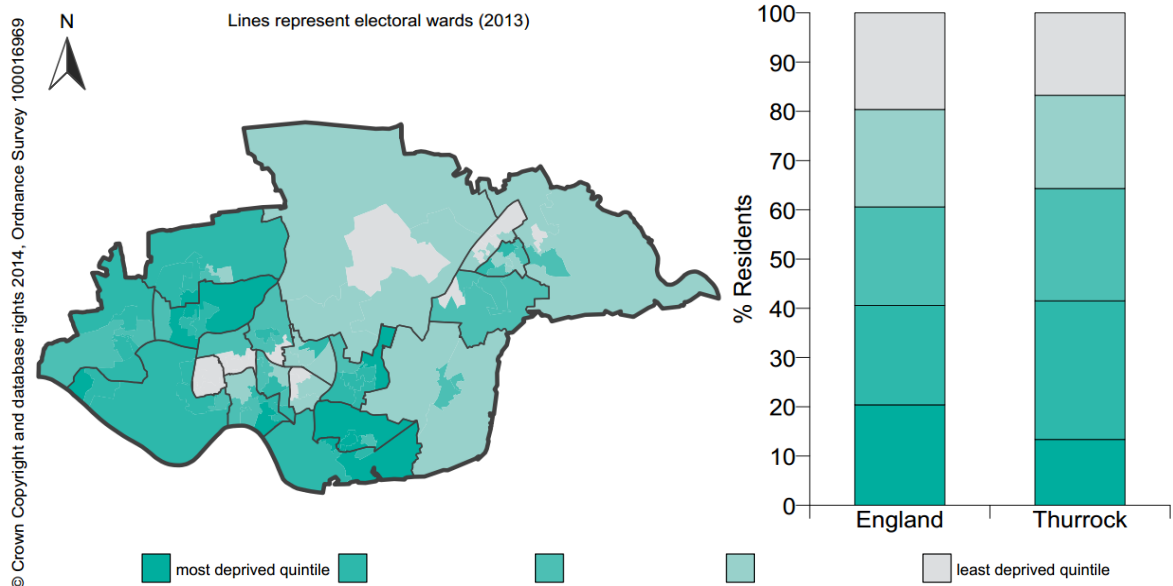


Figure 4-10: Thurrock deprivation (source: Public Health England, 2014). The chart shows the percentage of population in England and Thurrock who live in each of these quintiles.

4.7.3 Key environmental issues

The population of Thurrock is set to increase in the future and is predicted to comprise a significantly larger proportion of older people. The general health of the population is generally good, with increased life expectancy leading towards an ageing population. Health levels do vary across the borough, with poorer health linked to areas of higher social deprivation.

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.

4.8 Material assets

4.8.1 Economy

Historically, Thurrock was prosperous due to its riverfront, which became a strategic point for trade and industry. The decline in traditional industry has affected Thurrock, but regeneration, such as Thames Gateway, is presenting more opportunities (Thurrock Council, 2011b). Thurrock is within the Thames Gateway, which is the biggest of four growth areas outlined in the UK Government's Communities Plan 'Building for the Future', launched in 2003 (Thurrock Council, 2011a). The Thames Gateway is a national priority area for social and economic regeneration.

The employment rate for working age residents of Thurrock for 2008/2009 was 74.6%, which is in line with regional and national rates. Employment in Thurrock was projected to fall slightly between 2008 and 2013, but grow over the ten year period to 2018 (Thurrock Council, 2011b). In 2008, Thurrock had a distinctive jobs profile, with distribution, hotels and restaurants (including retail) providing almost 29% of employment in Thurrock. Public administration, education and health account for the second largest proportion with over 22%.

In 2012, the jobs profile had changed significantly with distribution, hotels and restaurants (including retail) provided almost 40% of employment, primarily due to the distribution functions centred at Tilbury and the retail located at Lakeside. There are 16.6% of people employed in public administration, education and health (URS, 2013).

4.8.2 Infrastructure

Thurrock occupies a strategic position in the East of England and enjoys good transport access to London (Figure 4-11). The M25 motorway and A13 road act as strategic cross roads 'of national importance' (Thurrock Council, 2011a). Regular rail services operate between London and Southend on Sea, serving seven stations and the Channel Tunnel Rail Link also passes through Thurrock. The Port of Tilbury provides international connections for both passengers and freight. Waste sites and utility services are also importance infrastructure within the borough, to which there is a risk of flooding.

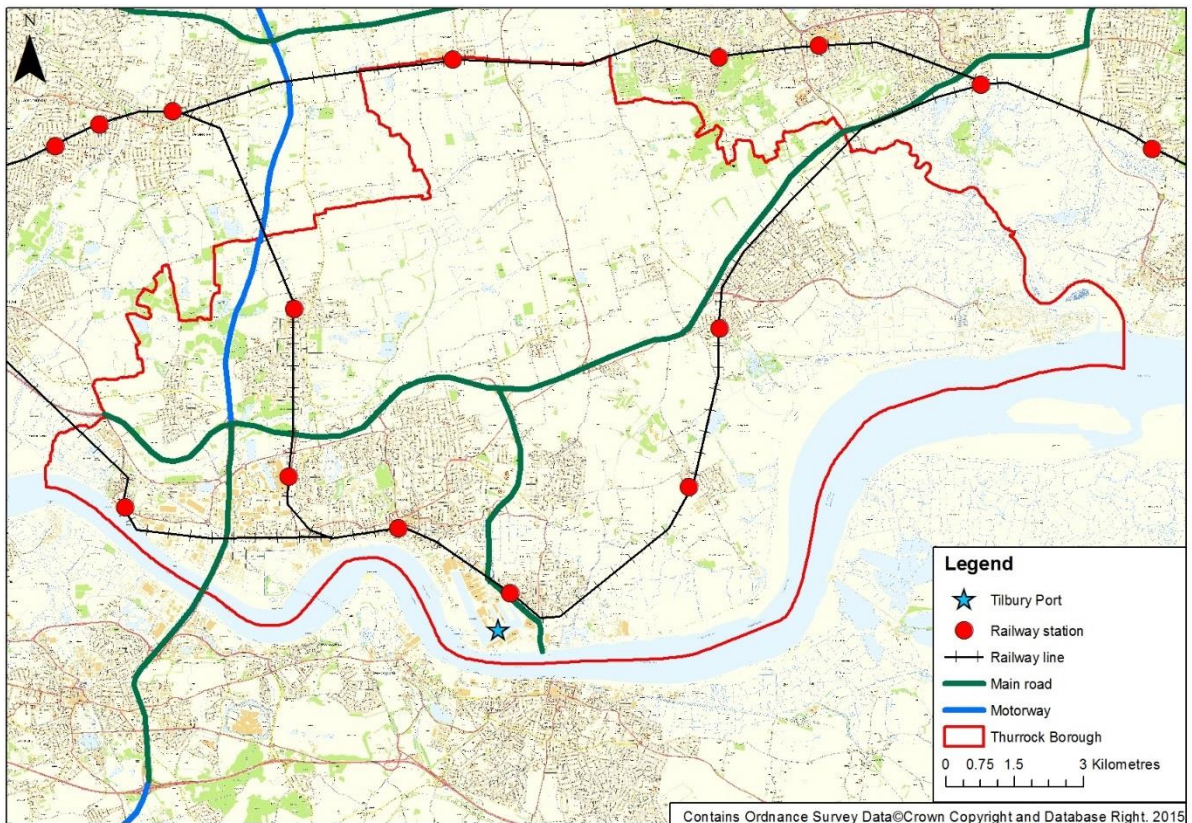


Figure 4-11: Transport infrastructure

4.8.3 Green infrastructure

Thurrock has more than 60% of its land in the Green Belt (Thurrock Council, 2011a). In 2007/8, only 59% of residents were satisfied with parks and open spaces in the borough, however, in March 2011 the area of green space was 515.9ha, compared to 80.9ha in 2010 (URS, 2013).

The South Essex Green Grid Strategy, which aims to create five green infrastructure projects in South Essex, includes the Thurrock Thameside Nature Park. Footpaths and cycleways are present in the park, which currently has an area of 49ha, although this will expand to 342ha once complete, likely to be 2016 (Essex Wildlife Trust, 2014b).

4.8.4 Key environmental issues:

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. Possible impacts include significant deterioration of road surfaces and reduced capacity of rail network due to hot track conditions (URS, 2013).

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

4.9 Air quality

Thurrock has identified areas where air quality objectives are exceeded, which have been designated air quality management areas (AQMA). There are 15 AQMAs in Thurrock, where air pollution levels from roads, industry and property is monitored. Traffic emissions, especially those from heavy goods vehicles, are the major contributor to poor air quality in most of these areas, despite the presence of large scale industry (Thurrock Council, 2015). These are found in the west of the borough, close to busy roads. These have been declared as a result of heavy traffic, primarily for nitrogen dioxide, with four AQMAs also included for PM₁₀ as well (Essex Air, 2011).

Generally, air quality is not improving at the rate at which it was expected, due to increasing numbers of vehicles on the road (Essex Air, 2011).

4.9.1 Key environmental issues

Air quality in Thurrock is poor, particularly along major roads. Greater pressures on air quality may occur in the future through increases in the population of the borough, greater development and increased traffic congestion. This could lead to the designation of additional AQMAs to address local impacts on air quality. However, the LFRMS is not likely to impact on air quality in the borough, and any impacts, such as through increased flood risk management activity, are unlikely to be significant.

4.10 Climate

The climate of Thurrock is one of low rainfall, averaging about 600mm, with evapotranspiration averaging 380mm. Evapotranspiration mostly occurs during the summer months and exceeds rainfall totals over this period. However, winter rainfall and recharge provides the water required to offset this seasonal imbalance (Scott Wilson, 2009a).

Grays experiences a temperate climate with average maximum winter temperatures of eight degrees Celsius (°C) and minimum winter temperature of 1.6°C. Average maximum summer temperatures are 22.2°C, minimum 10.5°C. On average, winter rainfall in the region is between 36.7mm and 53.8mm, and summer rainfall between 41.1mm and 52.5mm (Met Office, 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. UKP09 projects that London's sea level will rise by 8.2cm by 2020 under a low emission scenario, rising to 11.5cm under a high emission scenario (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, Essex can expect warmer, wetter winters and hotter and drier summers, with extreme events more frequent. The low-lying land and geographical location on the Thames Estuary makes Essex and Thurrock vulnerable to various natural hazards, such as flooding and drought (Essex County Council, 2014).

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.

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

The LFRMS options, could potentially, both directly and indirectly, lead to an increase in greenhouse gas emissions as a result of construction and maintenance activities. Emissions could be reduced by selecting, sustainable building practices and materials.

4.10.1 Key environmental issues

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

If such climate change projections are realised, the adverse risk and impact toward Thurrock’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. 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.

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

4.11 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 4-4 below.

Table 4-4: SEA scoping assessment summary

Receptor	Scoped In / Out	Conclusion
Landscape and visual amenity	Scoped 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	Scoped 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 SPA and Ramsar, a number of SSSIs and LNRs within Thurrock at risk from flooding or are water dependent. Future incidences of flooding could potentially change the underlying nature of habitats and the LFRMS policies may present opportunities for biodiversity gain. LFRMS measures could improve the river channel by removal of blockages, which would be of benefit to fish passage. Habitat creation or enhancement could also be incorporated into LFRMS measures, for example through the implementation of more natural flood risk management measures.
Water environment	Scoped 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	Scoped in	Changes to flood risk could affect soil quality and underlying geology, which supports six geological SSSIs. Subsequent erosion of these lands could give rise to pollution pathways, increasing the risk of an adverse effect on other environmental receptors. Thurrock contains a significant percentage of high grade 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.

Receptor	Scoped In / Out	Conclusion
Historic environment	Scoped 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 flood risk management measures. Opportunities may exist to protect important sites or negative impacts could occur due to increased flood risk to vulnerable sites.
Population	Scoped 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	Scoped 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	Scoped 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	Scoped 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 adaption responses and measures that could contribute to addressing the future impacts of climate change effects. Opportunities to improve climate change adaptation will be considered in the SEA.

4.12 Habitats Regulations Assessment

Thurrock does support one SPA and Ramsar site; the Thames Estuary and Marshes. There are also six more European sites within 15km of the borough boundary:

- Benfleet and Southend Marshes SPA and Ramsar
- Medway Estuary and Marshes SPA and Ramsar
- Crouch and Roach Estuaries SPA and Ramsar
- North Downs Woodlands SAC
- Peters Pit SAC
- Essex Estuaries SAC

More detail on the European sites is provided in Section 4.3.1.

Due to the presence of a European site within the borough, a Test of Likely Significant Effect (Screening Assessment) is required 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).

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

5 SEA framework

5.1 Introduction

The SEA framework is used to identify and evaluate the potential environmental issues associated with the implementation of the LFRMS. The framework comprises a set of SEA objectives that have been developed to reflect the key environmental issues identified 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 framework to identify whether each option will support or inhibit achievement of each objective.

Table 5-1 below summarises the purpose and requirements of the SEA objectives and indicators.

Table 5-1: Definition of SEA objectives, indicators and targets

	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.

5.2 SEA objectives and indicators

SEA objectives and indicators have been compiled for each of the environmental receptors (Table 5-2) (or groups of environmental receptors) scoped into the study during this phase of the project (see Table 4-4). 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 5-2: SEA objectives and indicators

Receptor	Objective	Indicator
Landscape	1 Protect the integrity of the Borough's urban and rural landscapes, and promote the key characteristics of the SLAs and Green Belt.	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 and BAP habitats and species in the borough.	Area of designated sites adversely affected by flooding. Monitoring of reported status of designated nature conservation sites.
	3 Maintain and enhance habitat connectivity and wildlife corridors within the borough.	Percentage of land designated as nature conservation sites as a result of LFRMS measures. Area of habitat created as a result of implementation of the LFRMS (e.g. flood storage areas creating wetland habitat).
	4 Maintain existing, and where possible create new, riverine and estuarine habitat to benefit migratory and aquatic species and fisheries, and maintain upstream access.	Number of barriers to fish migration removed.
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) 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.
	10 Increase the use of SuDS, particularly in all new developments.	Number of SuDS schemes installed as part of the LFRMS.
Material assets	11 Minimise the impacts of flooding to the borough's transport network and key critical infrastructure.	Length of road and rail infrastructure at risk from flooding. Number of key infrastructure assets at risk from flooding.
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). Number of barriers to fish migration removed.

5.3 Impact significance

The unmitigated impacts of the LFRMS objectives on achieving the SEA objectives will be identified through the analysis of the baseline environmental conditions and use of professional judgement. The significance of effects will be scored using the five point scale summarised in Table 5-3. If there is high uncertainty regarding the likelihood and potential significance of an impact (either positive or negative), it will be scored as uncertain.

Table 5-3: Impact significance key

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

5.4 SEA assessment approach

5.4.1 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 will be developed and assessed at a strategic level against the above SEA objectives and environmental baseline as detailed in Section 4. The results of this assessment will be used to inform the decision-making process in choosing a preferred way of delivering the LFRMS.

The LFRMS objectives and measures (in SEA terms called 'alternative options') are not yet sufficiently developed to detail in this scoping report. However, they will be assessed at a later stage, with details of each provided in the Environmental Report.

The SEA will also consider a 'do nothing' scenario (i.e. how the situation would develop in relation to each environmental receptor without implementation of the LFRMS).

5.4.2 Assessment Approach

The LFRMS measures will be evaluated in light of its potential cumulative, synergistic and indirect environmental effects on the different SEA receptors selected for further assessment (see Table 4-4). The assessment of these environmental effects will be informed by the baseline data collected at this scoping stage, professional judgement and experience with other flood risk related SEAs, as well as an assessment of national, regional and local trends. In some cases, the assessment will draw upon mapping data and GIS to identify areas of potential pressure, for example due to flood risk or presence of environmental designations.

Throughout the assessment the following will apply:

- Positive, neutral and negative impacts will be assessed, with uncertain impacts highlighted.
- The duration of the impact will be considered over the short, medium and long term.
- The reversibility and permanence of the impact will be 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 will also be considered.

The significance of effects upon each of the SEA objectives will then be evaluated and used to inform option selection.

6 Next steps in the SEA process

6.1 Consultation

A key aspect of the SEA process is consultation (See Table 2-1 stage A5), which is also a requirement under Article 10 (1) and (2) of the Floods Directive. The SEA process provides a mechanism to ensure that stakeholder engagement requirements are achieved by providing interested parties/organisations and the public an opportunity to inform the process and comment on decisions taken. Stakeholder engagement also ensures that environmental and social issues, constraints and opportunities are identified and assessed at an early stage of the project. The Scoping Report will be subject to a five week consultation period, after which the comments received will be taken into account in the Environmental Report. The Environmental Report will be the next output in the SEA process and it will document the assessment of the LFRMS against the SEA objectives.

6.2 The Environmental Report

Following the consultation period on the SEA Scoping Report, the LFRMS will be developed, concurrently with the SEA, following the framework outlined above. The results of this will be summarised in an Environmental Report. A proposed structure for the Environmental Report is outlined below.

Table 6-1: Proposed Structure of the Environmental Report

Section	Information to be included
Non-technical summary	<ul style="list-style-type: none"> Non-technical summary of the SEA process
Methodology	<ul style="list-style-type: none"> Who carried out the SEA, how, who was consulted, and when Difficulties in collecting data or assessment
Background	<ul style="list-style-type: none"> Purpose of the SEA and integration with LFRMS objectives
Environmental baseline	<ul style="list-style-type: none"> Baseline environmental data, including the future baseline without the plan. This will be updated from the Scoping Stage with information brought to light during the consultation period. Links to other plans, programmes and relevant environmental protection objectives, and how they have been incorporated Existing and foreseeable future environmental problems Limitations of the data, assumptions etc.
SEA objectives, baseline and context	<ul style="list-style-type: none"> SEA objectives and indicators
Plan issues and alternatives	<ul style="list-style-type: none"> Description of significant environmental effects of the strategies Assessment matrix for each strategy/alternative How environmental problems were considered in developing the strategies and choosing the preferred alternatives Other alternatives considered, and why these were rejected Proposed mitigation and enhancement measures to deliver objectives
Implementation	<ul style="list-style-type: none"> Links to project environmental impact assessment, design guidance etc. Proposals for monitoring and reporting

7 References

- Chris Blandford Associates, 2005. *Thurrock Landscape Capacity Study*, Uckfield: Chris Blandford Associates.
- Department for Communities and Local Government, 2014. *Index of Multiple Deprivation 2010, Local Authority District Rank of Average Rank*. [Online] Available at: <http://opendatacommunities.org/data/societal-wellbeing/deprivation/imd-rank-la-2010> [Accessed 16 December 2014].
- English Heritage, 2014. *Heritage at risk register - East of England*, London: English Heritage.
- Environment Agency, 2009. *River Basin Management Plan Thames River Basin District*, Bristol: Environment Agency.
- Essex Air, 2011. *Air Quality in Thurrock*. [Online] Available at: <http://www.essexair.org.uk/AQInEssex/LA/Thurrock.aspx> [Accessed 24 February 2015].
- Essex Biodiversity Project, 2012a. *Essex Biodiversity Action Plan 2011*. [Online] Available at: <http://www.essexbiodiversity.org.uk/biodiversity-action-plan> [Accessed 16 December 2014].
- Essex Biodiversity Project, 2012b. *Protected species in Essex*. [Online] Available at: <http://www.essexbiodiversity.org.uk/app/webroot/files/ibd/protectedspecies.pdf> [Accessed 16 December 2014].
- Essex County Council, 2014. *Adapting to Climate Change Action Plan*, Chelmsford: Essex County Council.
- Essex Wildlife Trust, 2014a. *Fobbing Marsh Nature Reserve*. [Online] Available at: <http://www.essexwt.org.uk/reserves/fobbing-marsh> [Accessed 17 December 2014].
- Essex Wildlife Trust, 2014b. *Thurrock Thameside Nature Park*. [Online] Available at: <http://www.essexwt.org.uk/reserves/thurrock-thameside> [Accessed 17 December 2014].
- Essex Wildlife Trust, 2014c. *Stanford Warren Nature Reserve*. [Online] Available at: <http://www.essexwt.org.uk/reserves/stanford-warren> [Accessed 17 December 2014].
- Essex Wildlife Trust, 2014d. *Horndon Meadow Nature Reserve*. [Online] Available at: <http://www.essexwt.org.uk/reserves/horndon-meadow> [Accessed 17 December 2014].
- Essex Wildlife Trust, 2014e. *Chafford Gorges Nature Park*. [Online] Available at: <http://www.essexwt.org.uk/reserves/chafford-gorges> [Accessed 17 December 2014].
- European Parliament, 2001. *Directive (EC) 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment*, s.l.: OJ L197/30.
- GeoEssex, 2015. *Thurrock*. [Online] Available at: <http://www.geoessex.org.uk/thurrock.html> [Accessed 11 February 2015].
- Greater Thames Marshes, 2015. *About Us*. [Online] Available at: <http://greaterthamesmarshes.com/about-us/> [Accessed 10 February 2015].
- JNCC, 1982. *Information Sheet on Ramsar Wetlands - The Swale*, Peterborough: JNCC.
- JNCC, 1993. *Information Sheet on Ramsar Wetlands*, Peterborough: JNCC.
- JNCC, 1994. *Information Sheet on Ramsar Wetlands - Benfleet and Southend Marshes*, Peterborough: JNCC.
- JNCC, 1996. *Information Sheet on Ramsar Wetlands*, Peterborough: JNCC.
- JNCC, 1998. *Information Sheet on Ramsar Wetlands*, Peterborough: JNCC.
- JNCC, 2000. *Information Sheet on Ramsar Wetlands - Thames Estuary and Marshes*, Peterborough: JNCC.
- JNCC, 2014a. *North Downs Woodlands*. [Online] Available at: <http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0030225> [Accessed 17 December 2014].
- JNCC, 2014b. *Peter's Pit*. [Online] Available at: <http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0030237> [Accessed 17 December 2014].

- JNCC, 2014c. *Queendown Warren*. [Online]
Available at: <http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0012833>
[Accessed 17 December 2014].
- JNCC, 2014d. *Essex Estuaries*. [Online]
Available at: <http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0013690>
[Accessed 17 December 2014].
- JNCC, 2014e. *Epping Forest*. [Online]
Available at: <http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0012720>
[Accessed 17 December 2014].
- LGA, 2011. *Framework to Assist the Development of the Local Strategy for Flood Risk Management*, London: LGA.
- Met Office, 2015. *Grays climate*. [Online]
Available at: <http://www.metoffice.gov.uk/public/weather/climate/u10hz6jite>
[Accessed 24 February 2015].
- Natural England, 1985. *Basildon Meadows*, Sheffield: Natural England.
- Natural England, 1986a. *Lion Pit*, Sheffield: Natural England.
- Natural England, 1986b. *Globe Pit*, Sheffield: Natural England.
- Natural England, 1992. *Hangman's Wood and Deneholes*, Sheffield: Natural England.
- Natural England, 2013. *111: Northern Thames Basin*, Sheffield: Natural England.
- Natural England, 2014. *Greater Thames Marshes NIA*. [Online]
Available at:
<http://webarchive.nationalarchives.gov.uk/20140711133551/http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/funding/nia/projects/thames.aspx>
[Accessed 10 February 2015].
- ODPM, 2004. *Environmental Assessment of Plans and Programmes Regulations 2004 (No. 1633)*, London: HMSO.
- Parklands South Essex, 2009. *Overview*. [Online]
Available at: <http://parklands.greengrid.co.uk/index.php/overview>
[Accessed 19 December 2014].
- Public Health England, 2014. *Health Profile 2014 Thurrock*, London: Department of Health.
- Scott Wilson, 2009a. *Thurrock Water Cycle Study Scoping Study*, Basingstoke: Scott Wilson.
- Scott Wilson, 2009b. *Thurrock Strategic Flood Risk Assessment Level 1 Report*, Basingstoke: Scott Wilson.
- Scott Wilson, 2010. *Thurrock Water Cycle Study Outline Study*, Basingstoke: Scott Wilson.
- The Wildlife Trusts, 2012. *Thames Estuary Recommended Marine Conservation Zone (MCZ)*, Newark: The Wildlife Trusts.
- Thurrock Council, 2006. *Open Spaces Strategy 2006-2011*, Grays: Thurrock Council.
- Thurrock Council, 2007. *Thurrock Biodiversity Action Plan*, Grays: Thurrock Council.
- Thurrock Council, 2011a. *Thurrock Local Development Framework*, Grays: Thurrock Council.
- Thurrock Council, 2011b. *Thurrock Local Economic Assessment*, Grays: Thurrock Council.
- Thurrock Council, 2011b. *Thurrock Local Economic Assessment*, Grays: Thurrock Council.
- Thurrock Council, 2013. *Coalhouse Fort Park Management Plan*, Grays: Thurrock Council.
- Thurrock Council, 2014. *Our publications*. [Online]
Available at: <https://www.thurrock.gov.uk/our-publications/facts-about-thurrock>
[Accessed 9 December 2014].
- Thurrock Council, 2015. *Air quality*. [Online]
Available at: <https://www.thurrock.gov.uk/air-quality/air-quality-monitoring>
[Accessed 24 February 2015].
- UK Climate Projections, 2014. *East of England*. [Online]
Available at: <http://ukclimateprojections.metoffice.gov.uk/21708?projections=23827>
[Accessed 24 February 2015].
- URS, 2013. *SA of Thurrock Core Strategy Focused Review Scoping Report Update*, London: URS.
- URS, 2014. *Surface Water Management Plan*, London: URS.

A Appendix A: 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
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	Carbon emissions, and the resulting climate change impacts, are highly relevant to the	None	<ul style="list-style-type: none"> • Climate change

Plan/Policy/Programme	Overview	Relevance to LFRMS	Conflict with LFRMS	Primary SEA topic
	a low carbon economy will bring. Key areas are electricity generation, eating homes and businesses and travel.	issue of FRM due to the likely increased flood risk resulting from 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. Vitally, it will be a future where wetlands are valued both for the roles they play in helping us deal with some of the challenges of the 21st century and in improving and sustaining our quality of life.	Preserving and restoring wetlands such as peatlands, rivers and lakes will help regulate surface water run-off, store flood water and recharge 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
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 Bromley, other light industries may have contaminated the land.	Flooding of contaminated land can have adverse impacts on factors such as biodiversity, water and soils	<ul style="list-style-type: none"> • 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.

Plan/Policy/Programme	Overview	Relevance to LFRMS	Conflict with LFRMS	Primary SEA topic
Historic Environment Good Practice Advice in Planning: Historic Environment Records (2014)	Provides information on good practice to assist local authorities, planning and other consultants, owners, applicants and other interested parties in implementing historic environment policy in the NPPF. Assists with access to Historic Environment Records.	Guide helps to assist in sustainable development, in helping with access to Historic Environment Records which has information about various historic assets.	None.	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> Historic environment
Regional / Local				
Thames 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 London.	The CFMP provides important context for the LFRMS and set the strategic direction for managing flood risk from main rivers.	None	<ul style="list-style-type: none"> Water environment
Thames Estuary 2100 Strategy (2002)	Provides recommendations for FRM for London and the Thames Estuary.	Provide important context for the LFRMS.	None	<ul style="list-style-type: none"> Water environment
Thames Gateway Delivery Plan (2009)	Europe's largest regeneration project, which stretches along the Thames Estuary. The plan provides a structure for positive change in the area, a strong economy, improvements in quality of life and development of the Gateway as an eco-region.	Developing an eco-region could include water courses and wetland areas.	The LFRMS will need to consider development policies set out in the plan. May restrict certain FRM options if likely to inhibit achievement of the strategy objectives.	<ul style="list-style-type: none"> All
Managing Water Resources & Flood Risk in the South East (2005)	Provides levels of strategic assessment of flood risk across the region.	Provide broad context for the LFRMS.	None	<ul style="list-style-type: none"> Water environment
London Rivers Action Plan (2009)	A tool to help restore rivers for people and nature. Provides guidance regarding improving the wildlife and amenity value of London rivers. Key aspirations include the improvement of flood management using more natural processes; reducing the likely negative impacts of climate change; reconnecting people to the natural environment through urban regeneration; and enhancing habitats for wildlife.	The watercourses within Bromley and surface water flooding are a key feature of the LFRMS.	The LFRMS will need to consider these aspirations in a local context and should seek ways	<ul style="list-style-type: none"> Water environment Biodiversity, flora and fauna
Thames River Basin Management Plan	The Thames 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.	<ul style="list-style-type: none"> Water environment

Plan/Policy/Programme	Overview	Relevance to LFRMS	Conflict with LFRMS	Primary SEA topic
Thurrock Council Local Air Quality Action Plan (2004)	Details how Thurrock Council intends to improve air quality within its fifteen AQMAs.	Provides information on regional policies to improve air quality in the borough.	None	<ul style="list-style-type: none"> • Air quality
Thurrock environmental Vision and Policy (2013)	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.	<ul style="list-style-type: none"> • Biodiversity, flora and fauna • Water environment
Essex County Council Preliminary Flood Risk Assessment (2011)	Provides a high level review of flood risk from surface water, groundwater and ordinary watercourses across the county.	The flood risk assessment provides an important local context for the LFRMS.	None	<ul style="list-style-type: none"> • Water environment
Thurrock Strategic Flood Risk Assessment Level 1 Report (2009) and Level 2 Report (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
Thurrock Transport Strategy 2013-2026 (2013)	Sets out the aims, objectives and a series of policies for delivering transport improvements in Thurrock.	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
Thurrock Local Development Framework Core Strategy and Policies for Management of Development (2011)	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
Sustainable Community Strategy Thurrock 2020 (2009)	Sets out how Thurrock 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
Essex Biodiversity Action Plan (2011)	Details the priorities for habitats and species and offers practical measures which can be implemented to achieve the conservation of the areas biodiversity heritage. The content of the plan is informed and guided by national targets so that its implementation is firmly linked to national priorities.	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 Essex 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
Thurrock Biodiversity Action Plan 2007-2012	Identifies key biodiversity habitats and species for Thurrock and aims to raise awareness, outline an action programme and encourage developers to integrate biodiversity.	Objectives include maintain existing areas of habitats and to ensure habitats are managed and maintained.	Objectives of the Thurrock BAP are linked to WFD measures to enhance biodiversity.	<ul style="list-style-type: none"> • Biodiversity, flora and fauna.
Essex County Council Adapting for Climate Change – Action Plan (2014)	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

Plan/Policy/Programme	Overview	Relevance to LFRMS	Conflict with LFRMS	Primary SEA topic
Open Spaces Strategy 2006 – 2011 (2006)	Thames Gateway is a key growth area which is seeking significant improvement to the quality of life for present and future communities, where providing open space is a key element.	Provides a broad context to aims to increase and enhance open spaces within the borough. The LFRMS provides an opportunity to contribute to the objectives of the plan.	Protects amenity value of public open spaces.	<ul style="list-style-type: none"> • Human Health • Socio-economic • Biodiversity flora and fauna
Riverscapes – An environmental vision for Thurrock 2013-2023 (2013)	Outlines Thurrock's approach to improve the borough's riverside landscapes and surrounding environment, based on the notion that the natural environment needs to connect and function as a whole system.	Provides direction in how riversides should be managed, with an aim to increase biodiversity and connectivity.	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

Offices at

Coleshill

Doncaster

Edinburgh

Exeter

Haywards Heath

Leeds

Limerick

Newcastle upon Tyne

Newport

Saltaire

Skipton

Tadcaster

Thirsk

Wallingford

Warrington

Registered Office

South Barn

Broughton Hall

SKIPTON

North Yorkshire

BD23 3AE

t:+44(0)1756 799919

e:info@jbaconsulting.com

Jeremy Benn Associates Ltd

Registered in England

3246693



Visit our website
www.jbaconsulting.com