



Strategic Environmental Assessment (SEA) of the Waltham Forest Local Flood Risk Management Strategy



Environmental Report
January 2015

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INTRODUCTION

1 BACKGROUND

- 1.1.1 URS is commissioned to undertake Strategic Environmental Assessment (SEA) in support of the emerging Waltham Forest Local Flood Risk Management Strategy (LFRMS).
- 1.1.2 The LFRMS is being drawn by London Borough of Waltham Forest ('the Council'), which has a statutory duty to develop, maintain and apply a strategy for local flood risk - from surface water, groundwater and small rivers, streams and ditches – within the Borough. The Council is required to consult on this strategy with risk management authorities and the public. There is also a need for the strategy to be developed alongside a process of SEA.
- 1.1.3 SEA is a mechanism for considering and communicating the likely effects of a draft strategy, and alternatives, with a view to avoiding and mitigating adverse environmental effects and maximising the positives.

2 SEA EXPLAINED

- 2.1.1 Where a strategy requires SEA, as is the case for the Waltham Forest LFRMS, there is a need to follow the procedural steps prescribed by the Environmental Assessment of Plans and Programmes Regulations 2004, which were prepared in order to transpose into national law the European SEA Directive.¹
- 2.1.2 In-line with the Regulations, a report (**the 'Environmental Report'**) must be published for consultation alongside the draft strategy that presents certain information. The report must then be taken into account, alongside consultation responses, when finalising the strategy.
- 2.1.3 With a view to clearly providing the required information, the Environmental Report published for consultation alongside the Draft LFRMS must answer four questions:
 1. What's the scope of the SEA?
 - Parameters must be established through a 'scoping' process to include review of the environmental context / baseline; analysis of key issues / objectives; and consultation.
 2. What has the development of the LFRMS / SEA involved up to this point?
 - Preparation of the draft LFRMS must have been informed by an earlier stage of SEA and, in particular, 'reasonable alternatives' must have been assessed.
 3. What are the SEA findings at this stage?
 - i.e. in relation to the Draft LFRMS.
 4. What happens next (including monitoring)?

3 STRUCTURE OF THIS ENVIRONMENTAL REPORT

- 3.1.1 This is the Environmental Report published alongside the Draft LFRMS, and as such each of the four questions listed above is answered in turn.

¹ Directive 2001/42/EC

PART 1: WHAT'S THE SCOPE OF THE SEA?

4 INTRODUCTION (TO PART 1)

- 4.1.1 This part of the Report introduces the reader to the scope of the SEA. In particular, and as required by the Regulations, this Chapter answers the following questions below.
- What’s the LFRMS seeking to achieve?
 - What’s the ‘context’?
 - What’s the ‘baseline’?
 - What are the key issues and objectives that should be a focus of SEA?
- 4.1.2 Chapter 5 answers the first question by listing the aims of the LFRMS. The other three scoping questions are answered in Chapters 6 - 8, with each question answered for the following seven ‘topics’:
- Biodiversity
 - Climate change mitigation
 - Community and wellbeing
 - Economy
 - Flood risk
 - Heritage, landscape & townscape
 - Water
- 4.1.3 The seven topics were identified in-light of: 1) The ‘issues’ suggested by the SEA Regulations;² 2) the list of objectives used by Waltham Forest as part of the Sustainability Appraisal (SA) work for their Local Development Framework;³ and 3) an understanding of the Waltham Forest LFRMS objectives (i.e. an understanding of the ‘strategy scope’).
- 4.1.4 Rather than focusing strictly on the environment, the topics cover all three ‘pillars’ of sustainability, i.e. the environmental, social and economic pillars. This is appropriate given that sustainable flood risk management (rather than solely environmental protection) is the objective of the LFRMS. Extending the scope of an SEA in this way does not mean that environmental issues are less likely to achieve prominence in the development of the strategy.
- 4.1.5 Further information on the justification for these topics is presented below, in Chapter 6 (see the series of blue boxes).

² Schedule 2 suggests a focus on ‘issues such as’ biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage, and landscape.

³ **Appendix 1** lists the Waltham Forest SA objectives in full.

5 WHAT IS THE STRATEGY SEEKING TO ACHIEVE?

The Environmental Report must include...

- An outline of the contents, main objectives of the strategy and relationship with other relevant plans and programmes

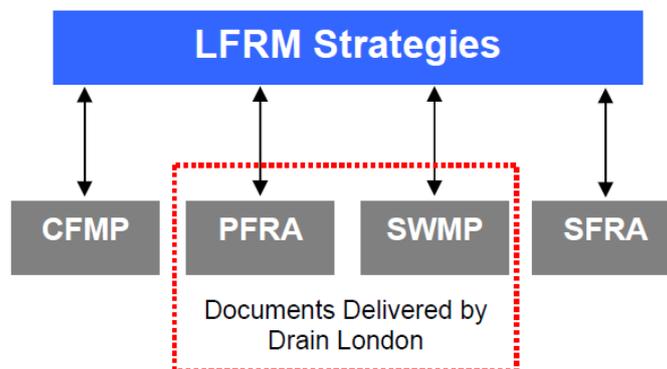
5.1.1 The purpose of the Waltham Forest LFRMS is to provide a strategic overview of the flood risk management work being undertaken and planned throughout the borough, to set out details of partnership working arrangements, and to provide a framework for a coordinated response to flood risk. More specifically, key aims of the strategy include:

- Developing a long term drainage management strategy
- Promoting flood resistance and resilience measures where properties are at risk of flooding
- Promoting the use of new technologies and innovation in flood mitigation measures
- Promoting the incorporation of Sustainable Drainage Systems (SuDS) into new developments and open space improvements
- Where possible ensuring that flood management measures secure wider environmental enhancements

5.1.2 The strategy must be in accordance with the national Flood and Coastal Erosion Management Strategy, and must also draw on a range of other strategic documents. The schematic diagram in Figure 5.1 below illustrates how the following reports will underpin the development of the Waltham Forest LFRMS:⁴

- *Thames Catchment Flood Management Plan (CFMP)*: this report sets out policies for the sustainable management of flood risk across the whole of the Thames catchment over the long-term (50 to 100 years) taking climate change into account.
- *Preliminary Flood Risk Assessment (PFRA)*: Required as part of the Flood Risk Regulations, this report gives an overview of all local sources of flood risk.
- *Surface Water Management Plans (SWMP)*: this report provides detailed information on the potential for surface water flooding, based on probabilistic 2-dimensional modelling.
- *Strategic Flood Risk Assessments (SFRA)*: Important tool to guide planning policies and land use decisions, with a strong emphasis on flooding from main rivers and sea.

Figure 5.1: Links between the Waltham Forest LFRMS and other strategic documents



⁴ LB Waltham Forest (2011) Surface Water Management Plan online] available at: <http://www.walthamforest.gov.uk/Documents/KE133%20Surface-water-management-plan-sept2011.pdf> (accessed 04/2014)

6 WHAT'S THE 'CONTEXT'?

The Environmental Report must include...

- The relevant sustainability objectives, established at international / national level
- Any existing sustainability problems / issues which are relevant to the strategy including, in particular, those relating to any areas / populations etc. of particular importance

6.1.1 An important step when seeking to establish the appropriate scope of an SEA involves reviewing context messages in relation to: broad problems / issues; and objectives. Messages from the review are presented below under the topic headings introduced above. Specific consideration is given to international and national context messages, in-line with requirements.⁵ Stand-alone consideration is also given to messages established by the National Planning Policy Framework (NPPF), which defines sustainable development for the planning system.⁶ It is recognised that planning for local flood risk management is not the same as spatial planning more generally, but there are major similarities between the two systems. Good LFRMS-making will have much in common with good Local Plan-making.

6.2 Biodiversity

Rivers and flood plains are often of importance for biodiversity, and so it follows that flood risk management strategy can lead to impacts. 'Hard' flood risk management measures can impact negatively on biodiversity, whilst 'soft' measures (e.g. those relating to Sustainable Drainage Systems, SuDS) can have positive effects. It is also the case that efforts to manage water in the 'upper catchment' – i.e. on higher ground, before it reaches the river valley – can tie-in with efforts to manage the landscape for biodiversity.

European context

6.2.1 The **EU Sustainable Development Strategy**, adopted in 2006, included an objective to halt the loss of biodiversity by 2010.⁷ An **EU Biodiversity Strategy**⁸ was then adopted in May 2011 in order to deliver on the established Europe-wide target to 'halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020'.

6.2.2 Adopted in 2013, the **EU Green Infrastructure Strategy** has been designed to promote the use of green infrastructure in policy areas such as nature, water, and land use, and to strengthen the GI knowledge base and promote innovative technologies.⁹

The National Planning Policy Framework (NPPF)

6.2.3 Key messages include -

- Contribute to the Government's commitment to halt the overall decline in biodiversity by minimising impacts and achieving net gains in biodiversity wherever possible.
- Protect internationally, nationally and locally designated sites, giving weight to their importance not just individually but as a part of a wider ecological network.
- Adopt proactive strategies to adaptation and manage risks through measures including multifunctional green infrastructure, giving consideration to ecological networks.

⁵ Schedule II(e)

⁶ DCLG (2012) National Planning Policy Framework [online] available at:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf

⁷ Council of the European Union (2006) The EU Sustainable Development Strategy [online] available at:

<http://register.consilium.europa.eu/pdf/en/06/st10/st10117.en06.pdf> (accessed 04/13)

⁸ European Commission (2011) Our life insurance, our natural capital: an EU biodiversity strategy to 2020 [online] available at:

http://ec.europa.eu/environment/nature/biodiversity/comm2006/pdf/2020/1_EN_ACT_part1_v7%5b1%5d.pdf (accessed 04/13)

⁹ European Commission (2013) Green Infrastructure (GI) - Enhancing Europe's Natural Capital [online] available at:

http://ec.europa.eu/environment/nature/ecosystems/docs/green_infrastructures/1_EN_ACT_part1_v5.pdf (accessed 04/2014)

Supplementing the NPPF

- 6.2.4 The **Natural Environment White Paper (NEWP)** sets out the importance of a healthy, functioning natural environment to sustained economic growth, prospering communities and personal well-being. The NEWP recognises green infrastructure as ‘one of the most effective tools available’ to manage ‘environmental risks such as flooding and heat waves’.¹⁰
- 6.2.5 The proposals set out in the NEWP are directly linked to the ground breaking research in the **National Ecosystem Assessment (NEA)**, a major project that was able to draw conclusions on the ‘substantial’ benefits that ecosystems provide to society directly and through supporting economic prosperity.¹¹
- 6.2.6 The Wildlife Trusts (with the TCPA) have produced guidance on ‘**Planning for Biodiversity**’. It notes that as well as benefiting biodiversity, green infrastructure can help to ‘deliver some of the services currently provided by hard engineering techniques’.¹²
- 6.2.7 The Landscape Institute’s **Position Statement on Green Infrastructure** recommends that developers are made aware of strategic GI goals and the potential to mitigate the environmental impacts of new development and create beautiful places.¹³

London specific context

- 6.2.8 The **London Plan** notes that planning for nature should occur from the beginning of the development process, taking opportunities to provide positive gains for nature through the layout, design and materials of development proposals. It also calls for enhancements in London’s green infrastructure to be sought during new development given GI’s potential role in protecting and enhancing biodiversity, climate adaptation, flood risk mitigation, recreation, walking, cycling, and food production.¹⁴
- 6.2.9 The **London Green Grid Supplementary Planning Guidance** aims to promote the concept of green infrastructure in order to increase delivery by boroughs, developers, and communities, by advocating an approach to the design and management of green and open spaces focused on delivering multiple benefits. It identifies a range of strategic opportunities.¹⁵

Waltham Forest specific context

- 6.2.10 The Waltham Forest **Biodiversity Action Plan** is in place to protect and enhance biodiversity in Waltham Forest, in particular those of international, national and regional importance, and to ensure the proper consideration of biodiversity conservation in the management of all open space and amenity land.¹⁶

¹⁰ Defra (2012) The Natural Choice: securing the value of nature (Natural Environment White Paper) [online] available at: <http://www.official-documents.gov.uk/document/cm80/8082/8082.pdf> (accessed 04/13)

¹¹ UNEP-WCMC (2011) UK National Ecosystem Assessment [online] available at: <http://uknea.unepwcmc.org/Resources/tabid/82/Default.aspx> (accessed 04/13)

¹² The Wildlife Trusts & TCPA (2012) Planning for a healthy environment: good practice for green infrastructure and biodiversity [online] available at: <http://www.wildlifetrusts.org/news/2012/07/06/planning-healthy-and-natural-environment> (accessed 04/13)

¹³ Landscape institute (2013) Green Infrastructure: An integrated approach to land use [online] available at: <http://www.landscapeinstitute.org/PDF/Contribute/2013GreenInfrastructureLIPositionStatement.pdf> (accessed 04/13)

¹⁴ GLA (2011) The London Plan: Spatial Development Strategy for Greater London [online] available at: <http://www.london.gov.uk/priorities/planning/publications/the-london-plan> (accessed 04/13)

¹⁵ GLA (2011) Green Infrastructure and open environments: The All London Green Grid – supplementary planning guidance [online] available at: https://www.london.gov.uk/sites/default/files/ALGG_SPG_Mar2012.pdf (accessed 04/2014)

¹⁶ LB Waltham Forest (2010) Biodiversity Action Plan 2010-2020 [online] available at: <http://www.walthamforest.gov.uk/Documents/wf-bap-30jun11.pdf> (accessed 04/2014)

6.3 Climate change mitigation

The potential for the LFRMS to impact directly on the achievement of climate change mitigation objectives is somewhat limited. However, there is some potential – primarily given the role of the LFRMS in planning for green infrastructure, and hence influencing walking/cycling - and given the importance of climate change mitigation as a topic it is appropriate to assign it stand-alone consideration within this SEA framework.

European context

- 6.3.1 In its 2007 strategy on climate change, the **European Commission** assesses the costs and benefits of combating climate change and recommends a package of measures to limit global warming to 2° Celsius.¹⁷

The National Planning Policy Framework (NPPF)

- 6.3.2 A key message from the NPPF is that supporting the transition to a low carbon future in a changing climate is to be considered 'core planning principle'. Specifically, there is a key role for planning in securing radical reductions in greenhouse gases (GHG), including in terms of meeting the targets set out in the Climate Change Act 2008. The Act sets targets for GHG emission reductions through action in the UK of at least 80% by 2050, and at least 26% by 2020, against a 1990 baseline.

Supplementing the NPPF

- 6.3.3 In the guidance document **How local authorities can reduce emissions and manage climate risk** notes that local authorities are well placed to drive and influence emissions reductions in their wider areas, with planning functions described as being a 'key lever in reducing emissions and adapting localities to a changing climate'.¹⁸
- 6.3.4 A Forest Research report on the **Benefits of green infrastructure** outlines the important role that green and open spaces can play in the adaptation to and mitigation of climate change. In terms of mitigation, the report highlights the potential for trees and other forms of vegetation to remove CO₂ from the air.¹⁹
- 6.3.5 In-line with the mandatory requirements of the Waste Framework Directive, the **Waste Management Plan for England** includes analysis of the current baseline in terms of waste management and the measures being taken to establish environmentally sound means of re-use, recycling, recovery and disposal of waste.²⁰

London specific context

- 6.3.6 The **London Plan** seeks to achieve an overall reduction in London's carbon dioxide emissions of 60% (below 1990 levels) by 2025. The Plan sets out a range of policies to underpin London's response to climate change, including calls for the use of innovative technologies. The Plan also notes that making better use of waste has a major role to play in tackling climate change and that London's waste is potentially a valuable resource that can be exploited.²¹

¹⁷ Commission of the European Communities (2007) Limiting Global Climate Change to 2 degrees Celsius: The way ahead for 2020 and beyond [online] available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0002:FIN:EN:PDF> (accessed 04/13)

¹⁸ Committee on Climate Change (2012) How local authorities can reduce emissions and manage climate risk [online] available at: http://hmccc.s3.amazonaws.com/Local%20Authorities/1584_CCC_LA%20Report_bookmarked_1b.pdf (accessed 04/13)

¹⁹ Forest Research (2010) Benefits of green infrastructure [online] available at: [http://www.forestry.gov.uk/pdf/urqp_benefits_of_green_infrastructure.pdf/\\$FILE/urqp_benefits_of_green_infrastructure.pdf](http://www.forestry.gov.uk/pdf/urqp_benefits_of_green_infrastructure.pdf/$FILE/urqp_benefits_of_green_infrastructure.pdf) (accessed 04/2014)

²⁰ Defra (2013) Waste Management Plan for England [online] available at: <https://www.gov.uk/government/publications/waste-management-plan-for-england> (accessed 03/14)

²¹ GLA (2011) The London Plan: Spatial Development Strategy for Greater London [online] available at: <http://www.london.gov.uk/priorities/planning/publications/the-london-plan> (accessed 04/13)

Waltham Forest specific context

- 6.3.7 The Waltham Forest **Climate Change Strategy** sets out what will be necessary in the local area to contribute to the battle against climate change through resource efficiency and emissions reductions to help reduce future climate change and to adapt to climate change impacts which are already inevitable.²²

6.4 Community and wellbeing

Rivers and flood plains are areas that people enjoy accessing for recreation, and it is also the case that important transport routes often follow or cross river valleys. More generally, it is understood that the LFRMS is likely to have a bearing on the delivery of green infrastructure locally, and in this way will have the potential to impact on the achievement of community and wellbeing related objectives. Planning for community and wellbeing is high on the agenda in Waltham Forest, given that pockets of notable deprivation exist.

NB. Whilst it is also the case that the LFRMS will have a bearing on community and wellbeing in the sense that it will seek to protect human life through minimising flood risk, this is an issue that is considered separately under the 'flood risk' topic.

European context

- 6.4.1 The **European Pact for Mental Health and Well-being** was launched in 2008 to encourage action on health challenges and inequalities. A 2011 paper presenting the first outcomes of the Pact notes that in order to realise its economic, social and environmental policy objectives, the EU must also protect and promote its human capital and the mental well-being of citizens.²³
- 6.4.2 The **EU Thematic Strategy on Air Pollution** aims to cut the annual number of premature deaths from air pollution-related diseases by 40% by 2020 (using 2000 as the base year).²⁴

The National Planning Policy Framework (NPPF)

- 6.4.3 Key messages include -
- The social role of planning involves 'supporting vibrant and healthy communities'.
 - A core planning principle is to 'take account of and support local strategies to improve health, social and cultural wellbeing for all'.
 - Access to high quality open spaces and opportunities for sport and recreation can make an important contribution to the health and well-being of communities.
 - Good design is a key aspect of sustainable development. Design should reinforce local distinctiveness, raise standards and address the connections between people and places
 - Higher levels of walking and cycling could reduce congestion, improve local environmental quality, improve personal health and reduce transport-related CO2 emissions.
 - Plans should contribute towards national objectives for pollutants, taking into account the presence of Air Quality Management Areas.

²² LB Waltham Forest (2008) Climate Change Strategy [online] available at: <http://www.walthamforest.gov.uk/Documents/ke29-wf-climate-change-strategy.pdf> (accessed 04/2014)

²³ European Commission (2011) Mental well-being: for a smart inclusive and sustainable Europe [online] available at: http://ec.europa.eu/health/mental_health/docs/outcomes_pact_en.pdf (accessed 04/2014)

²⁴ Commission of the European Communities (2005) Thematic Strategy on air pollution [online] available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2005:0446:FIN:EN:PDF> (accessed 04/2013)

Supplementing the NPPF

- 6.4.4 A supplementary report to **Fair Society, Healthy Lives** ('The Marmot Review') considered links between spatial planning and health on the basis that there is: 'overwhelming evidence that health and environmental inequalities are inexorably linked and that poor environments contribute significantly to poor health and health inequalities'. Suggested policy actions include prioritising policies and interventions that both reduce health inequalities and mitigate climate change by improving active travel and improving open and green spaces.²⁵
- 6.4.5 The **RIBA City Health Check** report assesses the impact of urban design and architecture on public health, through evidence from the nine most populated cities in England. The report shows a clear link between green space and health outcomes, with the less healthy areas tending to have a higher density of housing and a lower proportion of green space. This report puts emphasis on the responsibility of local authorities as stewards of good design.
- 6.4.6 The report **Natural Solutions** highlights recent evidence demonstrating the relationship between access to nature and physical and mental health benefits. The natural environment is also described as potentially being a resource to help reduce crime levels and increase community cohesion by providing a neutral space in which people can meet and interact. In addition, green spaces can provide environments for effective learning.²⁶
- 6.4.7 The report **Under the Weather** presents a toolkit to help Health and Wellbeing Boards take into account climate change adaptation. For example, the report highlights that heat related illness can be addressed through planning of the built environment.²⁷
- 6.4.8 The **Heatwave Plan for England** recommends a series of steps to reduce the risks to health from prolonged exposure to severe heat. In terms of strategic long term planning it notes that there is a need to adapt to and reduce the impact of climate change, including the greening of the built environment and increases in the shading around buildings.²⁸
- 6.4.9 The TCPA report **Creating Garden Cities and Suburbs Today** calls for at least 40% of a new community's total area to be allocated to green space. These spaces should be of a range of types and be multifunctional; for instance areas for walking, cycling, recreation and play, wildlife, or forming an element of an urban cooling and flood management system.²⁹
- 6.4.10 The report **Understanding Walking and Cycling** makes clear higher levels of walking and cycling could deliver community benefits by reducing congestion transport-related emissions, improving local environmental quality, and improving personal health.³⁰

London specific context

- 6.4.11 The **London Plan** has a strategic goal of ensuring equal life chances for all Londoners. The Plan notes that development proposals should 'protect and enhance facilities and services that meet the needs of particular groups and communities'. It notes that green and other open

²⁵ The Marmot Review (2011) The Marmot Review: Implications for Spatial Planning [online] available at: <http://www.nice.org.uk/nicemedia/live/12111/53895/53895.pdf> (accessed 04/13)

²⁶ New Economic Foundation (2012) Natural Solutions [online] available at: <http://www.neweconomics.org/publications/entry/natural-solutions> (accessed 02/14)

²⁷ Environment Agency (2014) Under the Weather, Improving Health, wellbeing and resilience in a changing climate.

²⁸ Public Health England (2013) Heatwave Plan for England [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/201039/Heatwave-Main_Plan-2013.pdf (accessed 04/2014)

²⁹ TCPA (2012) Creating garden cities and suburbs today [online] available at: http://www.tcpa.org.uk/data/files/Creating_Garden_Cities_and_Suburbs_Today.pdf (accessed 04/13)

³⁰ Lancaster University, University of Leeds & Oxford Brookes University (2011) Understanding Walking and Cycling: Summary of Key Findings and Recommendations [online] available at: http://www.its.leeds.ac.uk/fileadmin/user_upload/UWCRReportSept2011.pdf (accessed 08/2012)

spaces have a crucial part to play in ensuring good health and a high quality of life.³¹

- 6.4.12 The **Mayor's Air Quality Strategy** notes that air pollution harms both the environment and health, with its impacts felt most severely by vulnerable people such as children and older persons. The strategy highlights a package of measures to tackle air pollution, including working with boroughs to make better use of the planning process so that new developments are 'air quality neutral or better'.³²

Waltham Forest specific context

- 6.4.13 The Waltham Forest **Sustainable Community Strategy** focuses on measures to increase the prosperity of those living the borough. Priorities outlined in the strategy include transforming the design and quality of public space through the promotion of quality and innovation, and responding to climate change in a practical and effective way.³³
- 6.4.14 Waltham Forest's **Joint Strategic Needs Assessment** builds on a number of assessments that describe the health needs in Waltham Forest. It notes that good use of spatial planning offers opportunities to change the environment in which people make choices about their health, so making it easier to choose healthy options.³⁴
- 6.4.15 The **All London Green Grid Area Frameworks** have been established to expand on the implementation points and strategic opportunities identified in the All London Green Grid Supplementary Planning Guidance.³⁵ Waltham Forest falls within the Epping Forest Roding Valley Green Grid Area where opportunities are identified to improve links between the urban communities of Waltham Forest, Newham, Redbridge and Barking and Dagenham through Epping Forest to the Green Belt, Lea Valley and beyond to Essex.³⁶

6.5 Economy

The potential for the LFRMS to impact directly on 'the economy' is somewhat limited. However, there is some potential – given that economic land uses, including of rivers and flood plains, are often not conducive to flood risk management - and given the importance of 'the economy' as a topic it is appropriate to assign it stand-alone consideration within this SEA framework.

NB. Whilst it is also the case that the LFRMS will have a bearing on 'the economy' in the sense that it will seek to protect property through minimising flood risk, this is an issue that is considered separately under the 'flood risk' topic.

³¹ GLA (2011) The London Plan: Spatial Development Strategy for Greater London [online] available at:

<http://www.london.gov.uk/priorities/planning/publications/the-london-plan> (accessed 04/13)

³² GLA (2010) Clearing the air: The Major's Air Quality Strategy [online] available at:

http://www.london.gov.uk/sites/default/files/Air_Quality_Strategy_v3.pdf (accessed 04/13)

³³ LB Waltham Forest (2008) Sustainable Community Strategy [online] available at:

https://www.walthamforest.gov.uk/Documents/Waltham%20Forest%20SCS%20FINAL%202008_for%20web.pdf (accessed 04/2014)

³⁴ Public Health NHS outer north East London (2012) Waltham Forest Joint Strategic Needs Assessment 2012-13 [online] available at:

https://www.walthamforest.gov.uk/documents/waltham_forest_jsna_2012-13_final.pdf (accessed 04/2014)

³⁵ Greater London Authority – All London Green Grid Area Frameworks [online] available at:

<http://www.london.gov.uk/priorities/environment/greening-london/improving-londons-parks-green-spaces/all-london-green-grid/all-london-green-grid-area-frameworks> (accessed 04/2014)

³⁶ All London Green Grid – Epping Forest and River Roding Area Framework [online] available at:

<http://www.london.gov.uk/sites/default/files/AF02%20River%20Roding%20and%20Epping%20Forest.pdf> (accessed 04/2014)

=AF02%20River%20Roding%20and%20Epping%20Forest.pdf

Area Framework <http://www.london.gov.uk/sites/default/files/AF02%20River%20Roding%20and%20Epping%20Forest.pdf>

European context

- 6.5.1 In 2010, the European Union published **Europe 2020: A strategy for smart, sustainable and inclusive growth**. This strategy includes a focus on sustainable growth, based on a greener, more resource efficient economy.³⁷

The National Planning Policy Framework (NPPF)

- 6.5.2 A key message of the NPPF is that the planning system can make a contribution to building a strong, responsive economy by 'identifying and coordinating development requirements, including the provision of infrastructure'.

Supplementing the NPPF

- 6.5.3 **The Local Growth White Paper** notes that Government interventions should support investment that will have a long term impact on growth. The White Papers lists a number of elements on which the Government's approach to growing the green economy will be based, including green infrastructure, with Local enterprise partnerships called upon to consider what local green infrastructure issues they can address to enable growth in their area.³⁸
- 6.5.4 A recent review produced for Defra and Natural England on **Green Infrastructure's contribution to economic growth** found that there is the potential for a wide range of benefits to emanate from the provision and improvement of green infrastructure. These were found to include increased investment in the built environment in the surrounding area, business expansion or start-up on the back of increased visitor spending, and increased building occupancy rates due to enhanced attractiveness of area.³⁹

London specific context

- 6.5.5 The **Mayor's Economic Development Strategy** sets out a number of aims including: making London one of the leading low carbon capitals by 2025; giving all Londoners access to sustainable employment; and attracting investment in the infrastructure and regeneration which London needs and maximising its benefits.⁴⁰

Waltham Forest specific context

- 6.5.6 Waltham Forest's **Strategy for enterprise, employment and skills** seeks to ensure jobs and a decent living to all residents. The strategy sets out a number of broad objectives, including providing the infrastructure and environment that will make the Borough an accessible and attractive place to invest in and for firms to grow.⁴¹

6.6 Flood Risk

It is not 'a given' that the LFRMS will lead to optimal flood risk management benefits. The LFRMS will need to reflect competing objectives, and there may well be a need to 'trade-off' flood risk benefits given, for example, the need to contribute towards the achievement of economic or community related objectives.

³⁷ European Commission (2010) Europe 2020: A strategy for smart, sustainable and inclusive growth [online] available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF> (accessed 04/13)

³⁸ BIS (2010) Local Growth: Realising every place's potential [online] available at: <https://www.gov.uk/government/publications/local-growth-realising-every-places-potential-hc-7961> (accessed 02/14)

³⁹ Eftec (2013) Green Infrastructure's contribution to economic growth: a review [online] available at: <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=19056#Description> (accessed 04/2014)

⁴⁰ GLA (2010) Mayor's Economic Development Strategy [online] available at: <http://www.london.gov.uk/priorities/business-economy/publications/economic-development-strategy> (accessed 03/14)

⁴¹ LB Waltham Forest (2009) Strategy for enterprise, employment and skills 2009-14 [online] available at: <http://www.walthamforest.gov.uk/Documents/ke62-wf-strategy-%20for-enterprise-employment-and-skills.pdf> (accessed 04/2014)

European context

- 6.6.1 Agreed in 2007, the **European Union Directive on the Management of Flood Risks** (the 'Flood Risks Directive') has the aim of reducing and managing the risks of floods to human health, the environment, infrastructure and property. The Directive places greater emphasis on non-structural measures (soft engineering techniques), such as the use of natural flood plains and wetlands to store water during floods.⁴²

The National Planning Policy Framework (NPPF)

- 6.6.2 Key messages include -
- Use opportunities offered by new development to reduce the causes and impacts of flooding
 - Safeguard land from development that is required for current and future flood management
 - Take account of climate change over the longer term, including factors such as flood risk,
 - Encourage multiple benefits from the use of land in urban and rural areas, recognising that some open land can perform many functions, such as flood risk mitigation

Supplementing the NPPF

- 6.6.3 The **Flood and Water Management Act** sets out the following objectives regarding flood risk management:⁴³
- Incorporate greater resilience measures into the design of new buildings, and retro-fit at risk properties (including historic buildings);
 - Utilise the environment, e.g. utilise land to reduce runoff and harness wetlands to store water; and
 - Identify areas suitable for inundation and water storage.
- 6.6.4 In relation to Sustainable Drainage Systems (SuDS), further guidance is provided in the document **Planning for SuDS**. This report calls for greater recognition of the opportunities for multiple benefits that water management can present. It suggests that successful SuDS are capable of 'contributing to local quality of life and green infrastructure'.⁴⁴ Box 6.1 gives further consideration to SuDS.
- 6.6.5 Forest's Research's report on the **Benefits of green infrastructure** highlights how urban development and engineered flood defences have profoundly changed the natural environment, with these alterations potentially exacerbating the nature and seriousness of flood events. The report points to three main ways in which woodland and other vegetation in the urban or peri-urban environment can contribute to flood alleviation:⁴⁵
- By delaying the downstream passage of flood flows.
 - By reducing the volume of runoff through interception.
 - By promoting rainfall infiltration into the soil.

⁴² RSPB Scotland (2007) The new EU Flood Risks Directive [online] available at: https://www.rspb.org.uk/Images/floodsdirective_tcm9-163008.pdf (accessed 04/2014)

⁴³ Flood and Water Management Act (2010) [online] at: <http://www.legislation.gov.uk/ukpga/2010/29/contents> (accessed 02/2014)

⁴⁴ CIRIA (2010) Planning for SuDs – making it happen [online] available at: <http://www.ciria.org/service/knowledgebase/AM/ContentManagerNet/ContentDisplay.aspx?Section=knowledgebase&NoTemplate=1&ContentID=18465> (accessed 02/14)

⁴⁵ Forest Research (2010) benefits of green infrastructure [online] available at: [http://www.forestry.gov.uk/pdf/urqp_benefits_of_green_infrastructure.pdf/\\$FILE/urqp_benefits_of_green_infrastructure.pdf](http://www.forestry.gov.uk/pdf/urqp_benefits_of_green_infrastructure.pdf/$FILE/urqp_benefits_of_green_infrastructure.pdf) (accessed 04/2014)

Box 6.1: Sustainable Drainage Systems (SuDS)

The Local Flood Risk Management Strategy has the potential to promote the incorporation of Sustainable Drainage Systems (SuDS) into new developments and open space improvement projects, and the retrofitting of SuDS in existing areas of high flood risk.

The concept of SuDS is to introduce a sequence of management practices and control structures designed to drain surface water in a more sustainable fashion than conventional techniques.

SuDS are often multifunctional, and hence SuDS implementation can have implications for wide ranging sustainability objectives.

A SuDS drainage design should seek to balance the impact of drainage on the environment by addressing simultaneously the quantity, quality and amenity objectives of SuDS.

Quantity

- Minimise the impermeable surface area by good planning of the development layout.
- Control of runoff at source to reduce total runoff from the site.
- Limit peak discharge and volume to an agreed allowable runoff rate.
- Provide exceedence flow routes for extreme storm events via overland flood routes.

Quality

- Prevent pollution by good planning of the development layout and site management.
- Provide “first flush” treatment for all roads and hard pavements.
- Maximise treatment stages within the “management train“
- Use appropriate techniques in series to treat runoff from roads and hard pavements.

Amenity and biodiversity

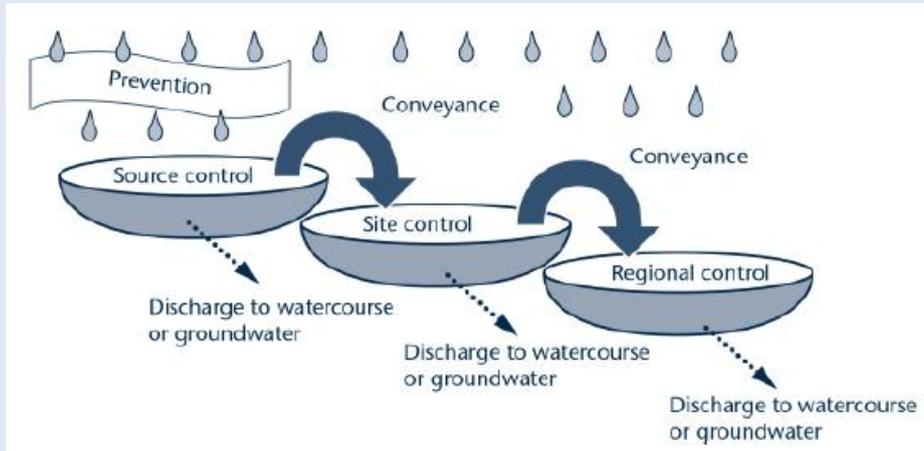
- SuDS techniques should improve local amenity and biodiversity where possible.
- Existing amenity should be protected.
- Surface water should be treated as a resource for reuse.

Designers of SuDS systems for residential developments should use **appropriate techniques**, giving consideration to the following:

- Simple construction and detailing for successful implementation.
- Robustness in use.
- Effective maintenance and long design life.
- Education of local residents to ensure they have a basic understanding of the SuDS techniques used.

A hierarchical approach to the selection of SuDS techniques:

1. **‘Source control’** - stresses the benefit of avoiding runoff in the first place, and also refers to the need to prevent pollution. Prevention of runoff can be achieved by measures such as avoiding paving a surface, or using acceptable alternatives, such as gravel, which allow rainfall to soak directly into the ground. Green roofs are another useful technique for reducing runoff from roofs.
2. **‘Site control’** - if prevention methods are not sufficient to avoid runoff measures such as permeable paving, where water is stored until it can be absorbed into the ground, can be used. Rainwater harvesting is another valuable technique, where rainfall is collected and then used as a substitute for mains water for activities such as watering lawns, so also reducing demand on the public water supply.
3. **‘Regional control’** - Where water cannot directly infiltrate into the ground, it may be conveyed before infiltration or, alternatively discharged into a watercourse. As runoff is conveyed further, it moves from source control to site control and then regional control. Infiltration is preferred over disposal to a watercourse or the public sewer system as this often deals with runoff nearer to source and serves to replenish groundwater.



London specific context

- 6.6.6 The **London Plan** states that proper consideration of flood risk is vital to ensuring that London is and continues to be a sustainable city. In light of this importance, the Plan calls for development to SuDS unless there are practical reasons for not doing so. It also notes that green infrastructure is able to perform many functions, including flood mitigation and reduced flood risk through sustainable urban drainage systems.⁴⁶
- 6.6.7 The **North London Strategic Flood Risk Assessment**⁴⁷ recommends a series of policy options for dealing with the range of flood risks. Amongst these recommendations the report makes clear that a key mitigation measure the Boroughs should consider is a potential increase in the use of surface water storage, including public open spaces and green roofs. The use of SuDS should also be promoted.⁴⁸

Waltham Forest specific context

- 6.6.8 The Waltham Forest **Level 2 Strategic Flood Risk Assessment** notes that additional investment in flood defence infrastructure will be required in the future to prevent the standard of protection reducing in the face of increasing urbanisation, climate change and an ageing defence network. It finds it unlikely that new, large scale flood defence infrastructure will provides a sustainable flood risk management in the borough given the potential for this to relocate flood risk to adjacent areas. It instead recommended the incorporation of flood storage and other onsite mitigation, such as use of sustainable drainage techniques to provide attenuation and reduce surface water runoff.
- 6.6.9 The **Waltham Forest Surface Water Management Plan** identified a number of opportunities for measures to be implemented across the borough to reduce the impact of surface water flooding. Ongoing maintenance of the drainage network and small scale improvements are already undertaken. In addition, there are opportunities for generic measures to be implemented through the establishment of a policy position on issues including the widespread use of water conservation measures (e.g. water butts and rainwater harvesting technology), use of soakaways, permeable paving, bioretention car park pods and green roofs. In addition, there are borough-wide opportunities to raise community awareness. Borough-wide, it is

⁴⁶ GLA (2011) The London Plan: Spatial Development Strategy for Greater London [online] available at: <http://www.london.gov.uk/priorities/planning/publications/the-london-plan> (accessed 04/13)

⁴⁷ The North London Boroughs of Barnet, Camden, Enfield, Hackney, Haringey, Islington and Waltham Forest

⁴⁸ Mouchel (2008) North London Strategic Flood Risk Assessment [online] available at: http://www.nlwp.net/downloads/north_london_sfra_final_august_08.pdf (accessed 04/2014)

recommended that in the short-to-medium term the LB of Waltham Forest:⁴⁹

- Engages with residents regarding the flood risk in the borough, to make them aware of their responsibilities for property drainage and steps available to improve flood resilience;
- Provides an 'Information Portal' via the LB of Waltham Forest website, for local flood risk information and measures that can be taken by residents to mitigate surface water flooding to/around their property;
- Prepares a Communication Plan to effectively communicate and raise awareness of surface water flood risk to different audiences using a clearly defined process for internal and external communication with stakeholders and the public; and
- Improves maintenance regimes, and targets those areas identified to regular flood or known to have blocked gullies.

6.6.10 The Waltham Forest **Climate Change Strategy** set out what needs to be done in the area to contribute to the battle against climate change. It calls for the Council to review the borough's blue corridors, particularly those that are concrete banked and based. This should be with a view to allowing public access for transport and recreation, particularly cycleways, the remodelling of stream banks to slow down flood runoff, and the creation of wetland habitat.⁵⁰

6.7 Heritage, landscape & townscape

Rivers and flood plains are often important from a landscape and heritage perspective. More generally, it is understood that the LFRMS is likely to have a bearing on the delivery of green infrastructure, and in this way will have the potential to impact on the achievement of heritage, landscape and townscape objectives.

European context

6.7.1 The **European Landscape Convention** (2007) defines landscape as: "*An area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.*" It recognises that the quality of all landscapes matters – not just those designated as 'best' or 'most valued' and commits all signatories to establishing and implementing policies aimed at landscape protection and integrating landscape into planning policies.

The National Planning Policy Framework (NPPF)

6.7.2 Key messages include -

- Recognise heritage assets as an 'irreplaceable resource' that should be conserved in a 'manner appropriate to their significance', whilst also recognising the positive contribution new development can make to local character and distinctiveness.
- Protect and enhance valued landscapes. Give particular weight to conserving scenic beauty.

Supplementing the NPPF

6.7.3 The Government's **Statement on the Historic Environment for England** calls for those who have the power to shape the historic environment to recognise its value and to manage it in an intelligent manner in light of the contribution that it can make to social, economic and cultural life.⁵¹

⁴⁹ LB Waltham Forest (2012) Surface Water Management Plan [online] available at:

<http://www.walthamforest.gov.uk/Documents/KE133%20Surface-water-management-plan-sept2011.pdf> (accessed 05/14)

⁵⁰ LB Waltham Forest (2008) Climate Change Strategy [online] available at: <http://www.walthamforest.gov.uk/Documents/waltham-forest-climate-change-strategy.pdf> (accessed 04/2014)

⁵¹ HM Government (2010) The Government's Statement on the Historic Environment for England [online] available at: http://webarchive.nationalarchives.gov.uk/+http://www.culture.gov.uk/reference_library/publications/6763.aspx (accessed 04/13)

- 6.7.4 English Heritage's **Heritage at Risk National Strategy** (2011-2015) sets out to reduce the overall number of heritage assets that are at risk or vulnerable of becoming so. A target is the removal of a quarter of nationally designated heritage at risk assets from the baseline 2010 Register by April 2015, representing a total of 1,137 buildings.⁵²
- 6.7.5 **Guidance on the Setting of Heritage Assets** provides the methodology for defining the extent of the setting of a heritage asset, and for determining how development in that setting may impact its historic significance.⁵³
- 6.7.6 **Seeing History in the View** presents a method for understanding and assessing heritage significance within views. The report can be used to supplement understanding of views that are already recognised as being important and worth protecting, including those identified in the Mayor's London View Management Framework.⁵⁴

London specific context

- 6.7.7 At the regional level, the **London Plan** requires London Boroughs to seek to 'maintain and enhance the contribution of built, landscaped and buried heritage to London's environmental quality, cultural identity and economy as part of managing London's ability to accommodate change and regeneration'. It also requires London Boroughs to seek to increase the accessibility of such cultural heritage to members of the public.⁵⁵

Waltham Forest specific context

- 6.7.8 Waltham Forest's **Culture Strategy** highlights the rich heritage which the borough possesses. In light this, the strategy sets out an ambition to promote the borough's history and heritage, including the preservation of its heritage assets.⁵⁶

6.8 Water

Management for flood risk can have a direct bearing on management of water quality, both within rivers and within groundwater. Flood risk and water quality objectives will often be compatible, but this may not be the case in some instances.

European context

- 6.8.1 The **Water Framework Directive** (2000/60/EC) drives a catchment-based approach to water management. The EA is currently seeking to establish 'Significant Water Management Issues' within catchments with a view to presenting second River Basin Management Plans to ministers in 2015. The Plans will seek to deliver the objectives of the WFD, including:
- Enhance and prevent further deterioration of aquatic and wetland ecosystems.
 - Reduce the pollution of water, especially by 'priority hazardous' substances; and
 - Ensure the progressive reduction of groundwater pollution.
 - The WFD has led to the setting up of various protected areas for groundwater such as drinking water protected areas, source protection zones and safeguard zones.

⁵² English Heritage (2011) *Heritage at Risk National Strategy 2011-2015* [online] available at: <http://www.english-heritage.org.uk/publications/eh-har-strategy-2011-15/har-strategy-11-15.pdf> (accessed 04/13)

⁵³ English Heritage (2011) *Guidance on the Setting of Heritage Assets* [online] available at: <http://www.english-heritage.org.uk/publications/setting-heritage-assets/> (accessed 03/14)

⁵⁴ English Heritage (2011) *Seeing History in the View* [online] available at: <https://www.english-heritage.org.uk/professional/advice/advice-by-topic/setting-and-views/seeing-the-history-in-the-view/> (accessed 03/14)

⁵⁵ GLA (2011) *The London Plan: Spatial Development Strategy for Greater London* [online] available at: <http://www.london.gov.uk/priorities/planning/publications/the-london-plan> (accessed 04/13)

⁵⁶ LB Waltham Forest (2010) *Taking Our Place in London: Waltham Forest's Culture Strategy* [online] available at: <http://www.walthamforest.gov.uk/documents/ke66-wf-cultural-strategy.pdf> (accessed 04/2014)

6.8.2 The EU's **Blueprint to Safeguard Europe's Water Resources** promotes the use of green infrastructure, such as wetlands, floodplains and buffer strips along water courses in order to reduce vulnerability to floods and droughts. It also emphasises the role water efficiency can play in reducing scarcity and water stress.⁵⁷

The National Planning Policy Framework (NPPF)

6.8.3 Key messages include -

- Prevent both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability.
- Produce strategic policies to deliver the provision of a variety of infrastructure, including that necessary for water supply and wastewater.
- Take account of the effects of climate change in the long term, including factors such as 'flood risk, coastal change, water supply and changes to biodiversity and landscape'. Planning authorities are encouraged to 'adopt proactive strategies' to adaptation.

Supplementing the NPPF

6.8.4 The **Water White Paper** sets out the Government's vision for a more resilient water sector, where water is valued as a precious resource. Measures must address poorly performing ecosystems, and the combined impacts of climate change and population growth on stressed water resources.⁵⁸ The Water White Paper led to a Government consultation on a national strategy on urban pollution in 2012. The consultation report notes that pollutants affecting waterbodies can be broken down into a number of categories including:⁵⁹

- Point Source Pollution: Permitted discharges from factories and wastewater treatment are currently responsible for about 36% of pollution related to failing water bodies; and
- Diffuse pollution: Unplanned pollution from urban and rural activity is responsible for 49% of the pollution related to failing water bodies.

6.8.5 An Environment Agency strategy implements the requirements of the WFD in relation to **groundwater**. The strategy highlights that groundwater is at risk from both point source and diffuse pollution. The good quality of groundwater is crucial for water-dependent plants and animals, and for the use of groundwater as a source of drinking water.⁶⁰

6.8.6 The TCPA report **Climate change adaptation by design** highlights that adaptation to changes in water availability and quality can be addressed at a variety of scales. At the catchment scale greenspace and bluespace strategies should influence development; whilst neighbourhood-level efforts should aim to enhance public spaces. Rainwater harvesting and storage schemes can reduce risk of urban flooding whilst providing additional water supplies.⁶¹

⁵⁷ European Commission (2012) A Blueprint to Safeguard Europe's Water Resources [online] available at http://ec.europa.eu/environment/water/blueprint/pdf/COM-2012-673final_EN_ACT-cov.pdf (accessed 03/2014)

⁵⁸ Defra (2011) Water for life (The Water White Paper) [online] available at <http://www.official-documents.gov.uk/document/cm82/8230/8230.pdf> (accessed 02/14)

⁵⁹ Defra (2012) Tackling water pollution from the urban environment [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/82602/consult-udwp-doc-20121120.pdf (accessed 02/2014)

⁶⁰ Environment Agency (2012) GP3: Groundwater Protection: Policy and Practice [online] available at: <http://www.environment-agency.gov.uk/research/library/publications/144346.aspx> (accessed 02/2014)

⁶¹ TCPA (2007) Climate change adaptation by design: guide for sustainable communities [online] available at: http://www.tcpa.org.uk/data/files/bd_cca.pdf (accessed 04/2013)

London specific context

- 6.8.7 The consultation document **Working Together – Thames River Basin District** considers 'Significant Water Management Issues' that will be priorities for action. The existing River Basin Management Plan for the Thames Basin identifies urban development as an issue that could 'have a wide range of impacts on virtually all aspects' of the water environment. However, the report also recognised that growth and regeneration can provide significant opportunities to improve the water environment.⁶²
- 6.8.8 The main aim of the **London Rivers Action Plan** is to provide a forum for identifying stretches of river that can be brought back to life through means such as river channel or riparian habitats improvement, by removing or modifying flood defence structures where safe, or by reclaiming 'lost' rivers buried under the surface. Its aspirations include improving flood management using more natural processes, reconnecting people to the natural environment, gaining better access for recreation, and enhancing habitat for wildlife.

⁶² Environment Agency (2012) River basin management: working together – Thames River Basin District [online] available at: <https://consult.environment-agency.gov.uk/portal/ho/wfd/working/together2012?pointId=1337591641879> (accessed 03/2014)

7 WHAT'S THE SUSTAINABILITY 'BASELINE'?

- The relevant aspects of the current state of the sustainability baseline and the likely evolution thereof
- The characteristics of areas / populations etc. likely to be significantly affected.
- Any existing sustainability problems / issues which are relevant to the strategy including, in particular,

7.1.1 The baseline review is about expanding on the consideration of problems/issues identified through context review so that they are locally specific. Establishing the baseline is about reviewing data-sets established through monitoring for specific 'indicators'. Numerous indicators are considered below, including those suggested by the SEA Practice Guide 2004.

7.2 Biodiversity

7.2.1 The borough contains a range of designated sites, including: 6 areas of Metropolitan Open Land, 3 Sites of Metropolitan Importance to Nature Conservation, 10 Sites of Borough Importance to Nature Conservation, 14 Sites of Local Importance to Nature Conservation, 4 Sites of Special Scientific Interest, 1 Local Nature Reserve, and Epping Forest and the Lee Valley Regional Park. The Lee Valley Special Protection Area (SPA) and RAMSAR site are situated along the western edge of the borough and the Epping Forest Special Area of Conservation (SAC) lies to the east (Figure 7.1). The borough has 2.46 ha of green corridor.⁶³

7.2.2 In 2013, Natural England reported that Chingford Reservoirs were assessed as 'unfavourable recovering'; 75% of Walthamstow Marshes as 'unfavourable declining'; and 29% of Epping Forest as 'unfavourable recovering', with 10% 'unfavourable declining'.⁶⁵

7.2.3 The Waltham Forest Biodiversity Action Plan identifies seven habitats in Waltham Forest which are a priority for London, five other habitats which are of importance in Waltham Forest, and five key species which best represent the plants and animals associated with the borough's priority habitats.⁶⁴ These are as follows:

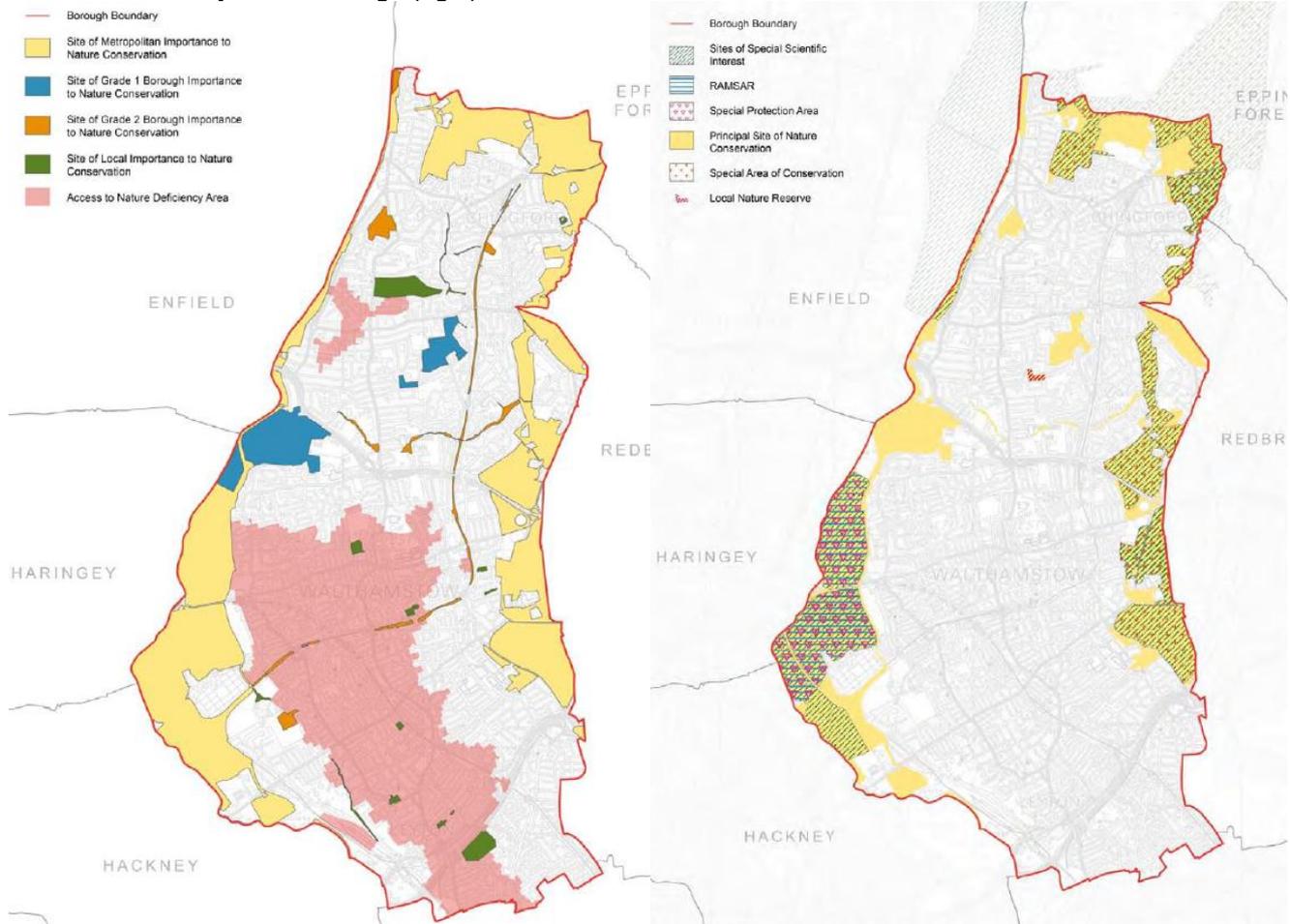
London Priority Habitats	Important Habitats	Flagship species
Acid Grassland	Built Environment	Bluebell
Churchyards and Cemeteries	Floodplain Grazing Marsh	Pipistrelle Bat
Parks and Urban Greenspaces	Green Corridors	Swift
Private Gardens	Neutral Grassland	Wall Brown Butterfly
Rivers and Streams	Wood Pasture	Song Thrush
Standing Water		
Woodland		

7.2.4 In terms of access to nature, the total area of Waltham Forest considered to be deficient in access amounts to 899 ha. The majority of this area is to be found in the central south of the borough (Figure 7.1).⁶³

⁶³ LB Waltham Forest (2013) Annual Monitoring report 2012/13 [online] available at: <http://www.walthamforest.gov.uk/Pages/Services/Planning-Local-Development-Framework.aspx> (accessed 04/2014)

⁶⁴ LB Waltham Forest (2010) Biodiversity Action Plan 2010-2020 [online] available at: <http://www.walthamforest.gov.uk/Documents/wf-bap-30jun11.pdf> (accessed 04/2014)

Figure 7.1: Areas with deficiency in access to nature (left, pink shading) and sites of importance for biodiversity in the borough (right)



7.3 Climate change mitigation

- 7.3.1 Waltham Forest has set a target to reduce CO2 emissions to 131,360 tonnes by 2016/17. In 2012/13 total emissions stood at 164,930 tonnes. CO2 emissions in the borough come from three sectors: homes, businesses and transport. Based on the most recent government data for 2011 from DECC (which has a 2 year time lag in release of the data) homes remain the biggest emitter in the borough at 50.3%, businesses emit 29.8% and transport emits 20.0%.⁶⁵
- 7.3.2 Emissions of CO2 per capita in the Waltham Forest have been falling in recent years. Total emissions per capita have fallen from 4.4 tonnes in 2005 to 3.2 tonnes by 2011 (Table 7.1). This decline can be broken down as follows: transport emissions have fallen by 0.3 tonnes, domestic emission by 0.6 tonnes and industrial emissions by 0.3 tonnes. Total emissions per capita are lower than the 2011 Greater London figure (4.8 tonnes), and the national average (5.1 tonnes).⁶⁶

⁶⁵ LB Waltham Forest (2013) Annual Monitoring report 2012/13 [online] available at: <http://www.walthamforest.gov.uk/Pages/Services/Planning-Local-Development-Framework.aspx> (accessed 04/2014)
⁶⁶ LB Waltham Forest (2013) Waltham Forest Council Borough Context [online] available at: <http://www.walthamforest.gov.uk/Documents/LBWF-BoroughContext-as-at-March2013.pdf> (accessed 04/2014)

Table 7.1: Annual per capita emissions in tonnes (2005 and 2011)⁶⁷

Per Capita Emissions (t)					
Area	Year	Industry & Commercial	Domestic	Road Transport	Total
Waltham Forest	2005	1.3	2.2	0.9	4.4
	2011	1.0	1.6	0.6	3.2
Greater London	2005	2.7	2.3	1.1	6.1
	2011	2.1	1.8	0.9	4.8
England	2005	2.9	2.5	1.2	6.5
	2011	2.2	2.0	1.1	5.1

7.3.3 The quantity of waste produced in Waltham Forest has been increasing over the past decades. Waltham Forest is responsible for managing 176,000 tonnes of waste in 2011, 226,000 tonnes of waste in 2021, and 283,000 tonnes in 2031.⁶⁸

7.4 Community and wellbeing

Population

7.4.1 According to a mid-year 2012 estimate by the Office for National Statistic the population of Waltham Forest increased to 262,600, a difference of 2,900 people (1.1%) compared with 2011. GLA 2012 Population Projections for the estimate that the borough's population will reach 314,745 in 2031. This figure represents population growth of 55,011 (21%) during 2011 – 2041 period.⁶⁹ The population density of Waltham Forest tends to be higher in the middle and southern wards of the borough when compared to the northern wards.⁷⁰

Deprivation

7.4.2 According to the Indices of Multiple Deprivation 2010, Waltham Forest is the 6th most deprived borough in London. Waltham Forest ranks as the 15th most deprived among the 326 local authorities in England. The 2010 data shows that 53,038 people in the Waltham Forest are experiencing income deprivation and 16,580 people employment-deprivation.

7.4.3 As shown by **Figure 7.2**, the most deprived Lower Super Output Area (LSOA) in Waltham Forest is ranked 508th nationally (where 1 = most deprived) and the least deprived (i.e. most affluent) LSOA is ranked 29,996st nationally. There are 34,753 LSOAs nationally. The most deprived LSOA in the borough is in the centre of the borough (highlighted in yellow in Figure 7.2 below). As can be seen in the graph to the right of Figure 7.2, the majority of the Waltham Forest's Super output areas are ranked in the bottom third of LSOAs nationally (i.e. they are in the bottom 10,000 LSOAs). Those LSOAs that perform better tend to be concentrate din the north of the borough.

⁶⁷ Ricardo-AEA (2013) Local and Regional CO2 Emissions Estimates for 2005-2011 [online] available at:

<https://www.gov.uk/government/publications/local-authority-emissions-estimates> (accessed 03/14)

⁶⁸ LB Waltham Forest (2012) Local Development Framework - Core Strategy [online] available at:

<http://www.walthamforest.gov.uk/Documents/adopted-core-strategy.pdf> (accessed 04/2014)

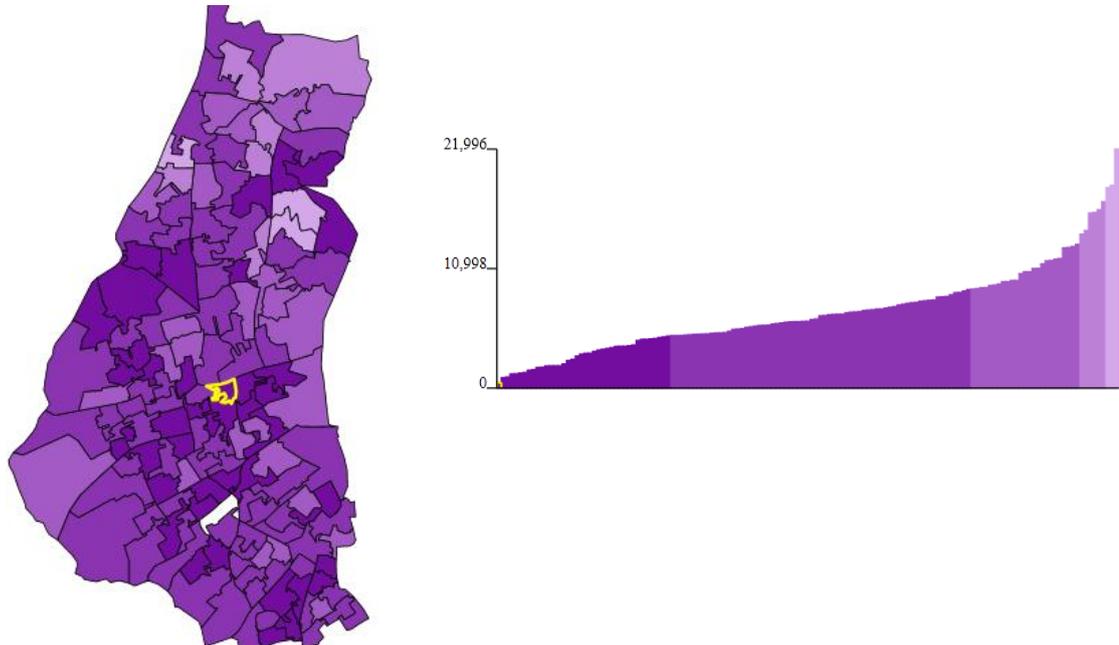
⁶⁹ LB Waltham Forest (2013) Annual Monitoring report 2012/13 [online] available at:

<http://www.walthamforest.gov.uk/Pages/Services/Planning-Local-Development-Framework.aspx> (accessed 04/2014)

⁷⁰ LB Waltham Forest (2013) Waltham Forest Council Borough Context [online] available at:

<http://www.walthamforest.gov.uk/Documents/LBWF-BoroughContext-as-at-March2013.pdf> (accessed 04/2014)

Figure 7.2: Indices of Multiple Deprivation for Lower Super Output Areas within Waltham Forest, with the most deprived LSOA highlighted in yellow⁷¹



Health

- 7.4.4 Health in the borough is worse than the average for London and England over a wide range of indicators. In Waltham Forest, life expectancy at birth is shorter than the London or England average. Around seven years of life expectancy is lost when comparing the wealthier west of London to Waltham Forest in the east. The borough also suffers from higher rates of self-reported limiting long term illness than the London average; a higher Mental Illness Needs Index than the England average; and higher mortality rates than London and England from circulatory diseases and lung cancers.⁷²
- 7.4.5 Average life expectancy for men and women in Waltham Forest stands at 79.2 and 83.4 respectively.⁷³ Life expectancy is 7.1 years lower for men and 5.5 years lower for women in the most deprived areas of Waltham Forest than in the least deprived areas.⁷⁴
- 7.4.6 In 2009/10, every fifth pupil (21.1%) in Year 6 in Waltham Forest was measured as being obese. Obesity is higher than the national average for all children among Asian or Asian British, Any Other Ethnic Group, Black or Black British and Mixed ethnic groups.⁷³
- 7.4.7 The entire of the borough has been designated as an Air Quality Management Area (AQMA) due to NO₂ pollution. Monitoring of air quality by the Council has found road traffic to be the main source of pollutants of nitrous oxides (NO_x particulates and PM₁₀).⁷⁵

⁷¹ See <http://neighbourhood.statistics.gov.uk/>

⁷² Waltham Forest (2013) Waltham Forest Council Borough Context [online] available at: <http://www.walthamforest.gov.uk/Documents/LBWF-BoroughContext-as-at-March2013.pdf> (accessed 04/2014)

⁷³ LB Waltham Forest (2013) Annual Monitoring report 2012/13 [online] available at: <http://www.walthamforest.gov.uk/Pages/Services/Planning-Local-Development-Framework.aspx> (accessed 04/2014)

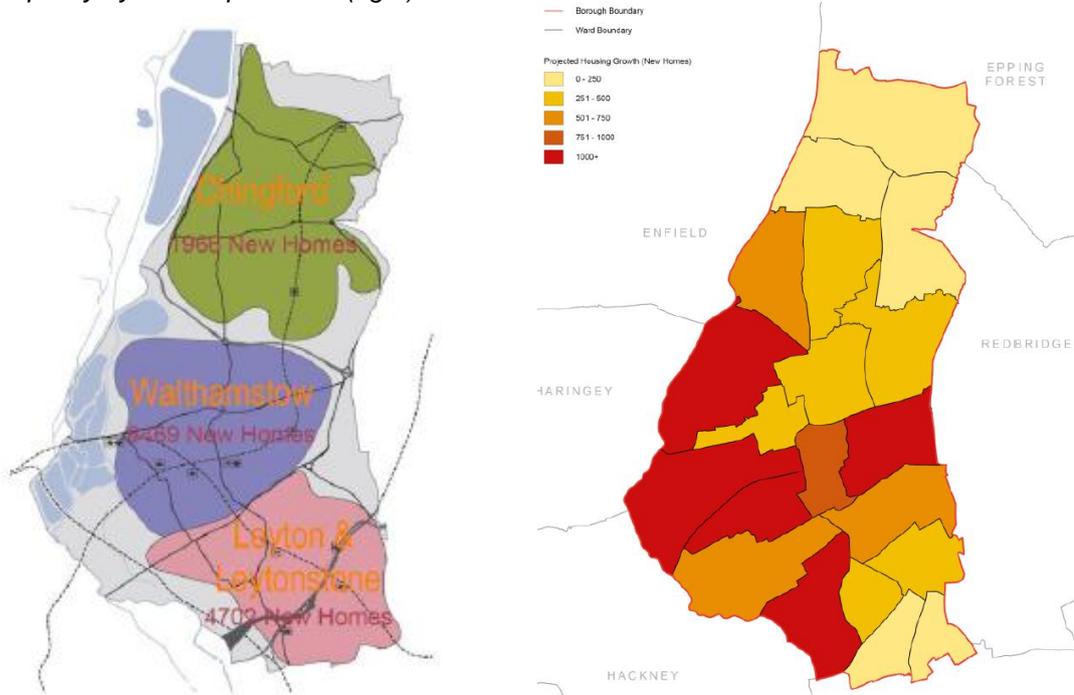
⁷⁴ Public Health England (2013) Waltham Forest – Public Health Profile [online] available at: <http://www.apho.org.uk/resource/item.aspx?RID=127150> (accessed 04/2014)

⁷⁵ LB Waltham Forest (2012) Local Development Framework - Core Strategy [online] available at: <http://www.walthamforest.gov.uk/Documents/adopted-core-strategy.pdf> (accessed 04/2014)

Housing

- 7.4.8 The provision of high quality and affordable homes is considered by Waltham Forest Council to be essential to quality of life. At present there is significant demand for homes to buy and rent in the borough, with this demand driven primarily by a growing population and smaller household sizes.⁷⁶ In order to address some of this demand a target of 10,320 new homes by 2027 has been set based on an assessment of housing capacity in the Borough.⁷⁷
- 7.4.9 It is estimated that the Key Growth Areas of Wood Street, the Northern Olympic Fringe and Blackhorse Lane will have the greatest potential to increase levels of housing provision. Opportunities for increasing housing supplies in these areas include intensifying residential uses, higher densities, and incorporating residential uses in mixed use developments.⁷⁸ 4188 units of estimated supply is expected to be from sites over 0.25 ha identified in Walthamstow, which contains three key growth areas – Blackhorse Lane, Walthamstow Town Centre and Wood Street (Figure 7.3).⁷⁹

Figure 7.3: 17-year projected housing completions 2014/15 - 2030/31 (left) and housing capacity by Ward up to 2026 (right)



⁷⁶ LB Waltham Forest (2012) Local Development Framework - Core Strategy [online] available at:

<http://www.walthamforest.gov.uk/Documents/adopted-core-strategy.pdf> (accessed 04/2014)

⁷⁷ LB Waltham Forest (2013) Waltham Forest Council Borough Context [online] available at:

<http://www.walthamforest.gov.uk/Documents/LBWF-BoroughContext-as-at-March2013.pdf> (accessed 04/2014)

⁷⁸ LB Waltham Forest (2012) Local Development Framework - Core Strategy [online] available at:

<http://www.walthamforest.gov.uk/Documents/adopted-core-strategy.pdf> (accessed 04/2014)

⁷⁹ LB Waltham Forest (2013) Annual Monitoring report 2012/13 [online] available at:

<http://www.walthamforest.gov.uk/Pages/Services/Planning-Local-Development-Framework.aspx> (accessed 04/2014)

Open spaces

7.4.10 The 2010 Waltham Forest Open Space Strategy identifies the following open spaces in the Borough:⁸⁰

Typology	Sites	Total Area (ha)
Parks and gardens	32	67.9
Natural and semi-natural greenspaces, including woodland	40	795.1
Green corridors	5	2.4
Amenity greenspaces	19	6.1
Provision for children and young people	22	2.9
Allotments, community gardens and urban farms	38	50.9
Cemeteries, disused churchyards and other burial grounds	10	35.9
Brownfield sites	1	14.72

7.4.11 The Waltham Forest Open Space Action Plan identified four opportunities to provide new open spaces in areas of deficiency.⁸¹ Whilst three of these have been pursued, there remains the need to seek opportunities for new public open space to reduce deficiency area near Essex Road, Wallwood Road and Murchison Road.⁸²

7.4.12 Five parks in Waltham Forest currently hold Green Flag awards, the national standard for parks and green spaces in England and Wales. These are Coronation Gardens, Langthorne Park, Ridgeway Park, Lloyd Park and Abbotts Park.⁸²

7.4.13 In terms of general satisfaction with the boroughs parks and open spaces, a 2008 survey of residents' attitudes towards these spaces found that:⁸⁰

- 38% felt that there were enough parks and open spaces close to where they live
- 22% felt that the quality of parks in Waltham Forest was improving
- 72% considered it easy to get to parks and open spaces from their home
- 61% believed that the parks in their local area improved their quality of life

7.4.14 There are around 518.3 ha of open space with limited or restricted access in Waltham Forest. This amounts to about 43% of the total area of open spaces in the Borough.⁸² These areas are shown below in Figure 7.4. Open space accessibility is often considered to be difficult in the west of the borough and the Lea Valley, where railways, canals and industrial areas are barriers to movement.⁸³

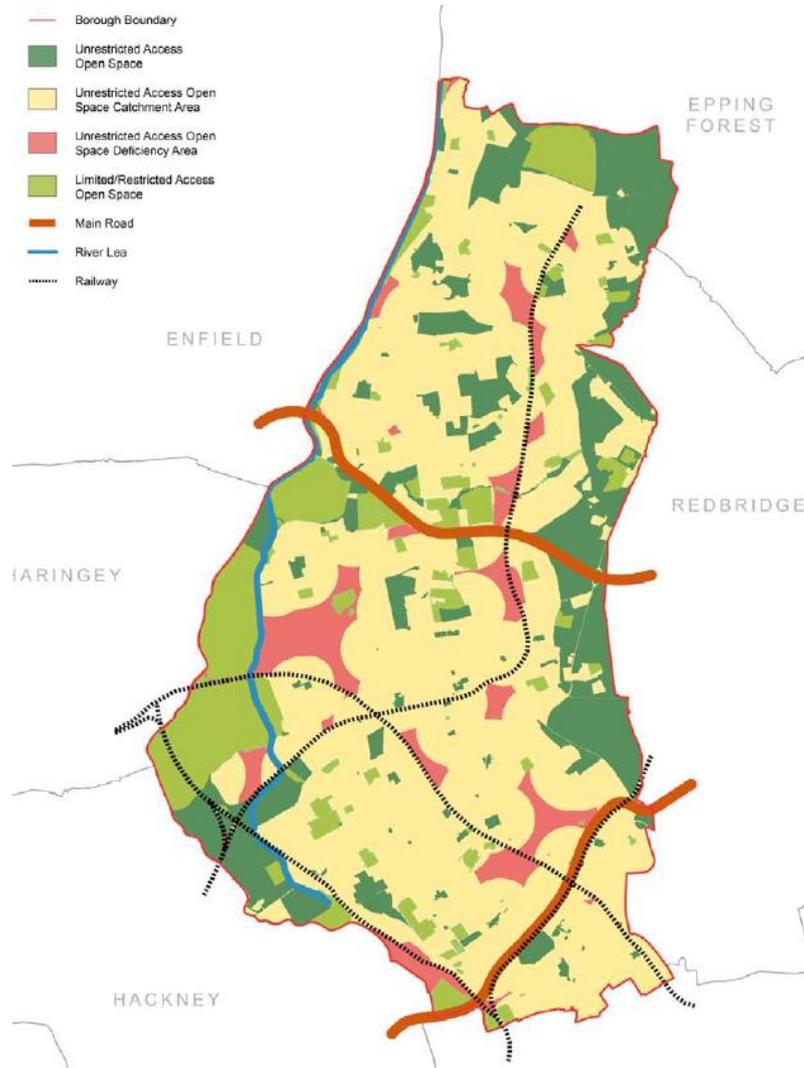
⁸⁰ LB Waltham Forest (2010) Open Space Strategy 2010-2020 [online] available at: <http://www.walthamforest.gov.uk/documents/open-spaces-strategy-september2010.pdf> (accessed 04/2014)

⁸¹ LB Waltham Forest (2010) Action plan for the open space strategy [online] available at: <http://democracy.walthamforest.gov.uk/documents/s8891/Z%204%20Open%20Space%20Strategy%20v%202.1%20AP.pdf> (accessed 04/2014)

⁸² LB Waltham Forest (2013) Annual Monitoring report 2012/13 [online] available at: <http://www.walthamforest.gov.uk/Pages/Services/Planning-Local-Development-Framework.aspx> (accessed 04/2014)

⁸³ All London Green Grid – Epping Forest and River Roding Area Framework [online] available at: <http://www.london.gov.uk/sites/default/files/AF02%20River%20Roding%20and%20Epping%20Forest.pdf>

Figure 7.4: Areas with limited or restricted access to open space within the borough- areas with a deficiency of open space with unrestricted access are shaded in red



7.5 Economy and employment

7.5.1 Waltham Forest currently has the smallest economy of all other London boroughs, and contains fewer businesses and jobs than most other outer Boroughs. Earnings and wages within the borough are amongst the lowest in London, there are also low employment rates and high levels of benefit dependent households.⁸⁴ In 2012/13, the employment rate in Waltham Forest was 70%, 1.1% below the average of Great Britain (71.1%). The Borough’s unemployment rate was 10.6%.⁸⁵

7.5.2 Those in the workless population tend to be concentrated in some of the borough’s most disadvantaged neighbourhoods. The highest percentages of out-of-work benefit claimants are found in Leyton, Lea Bridge, Markhouse, Wood Street, Hoe Street, Cathall and Higham Hill.⁸⁴

⁸⁴ LB Waltham Forest (2013) Waltham Forest Council Borough Context [online] available at: <http://www.walthamforest.gov.uk/Documents/LBWF-BoroughContext-as-at-March2013.pdf> (accessed 04/2014)

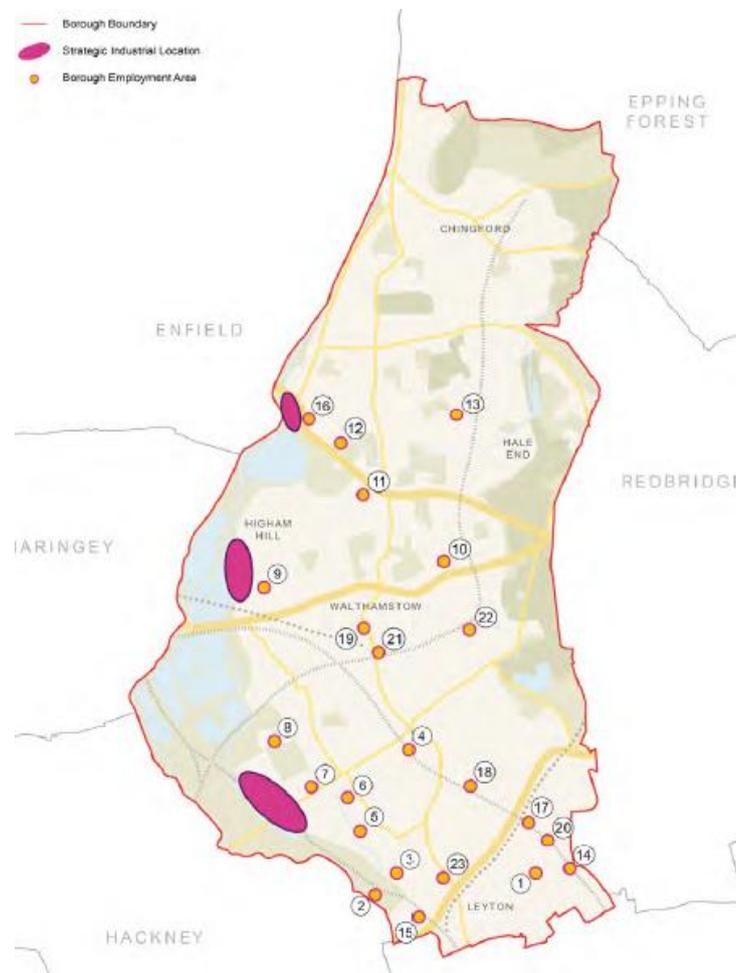
⁸⁵ LB Waltham Forest (2013) Annual Monitoring report 2012/13 [online] available at: <http://www.walthamforest.gov.uk/Pages/Services/Planning-Local-Development-Framework.aspx> (accessed 04/2014)

- 7.5.3 The population of the borough has lower than average levels of skills and tends to be disproportionately employed in lower occupational categories. The majority of jobs in the Waltham Forest are in small or micro businesses (i.e. firms employing less than 10 people).⁸⁶

- 7.5.4 Waltham Forest currently benefits from a large supply of employment land, with significant clusters focussed in the west and south west of the Borough. There are approximately 4000 shop units in the borough. Around 65% of these premises are located within designated centres / parades. Currently, there are 6 district centres, 9 neighbourhood centres and 19 local retail parades. Walthamstow is designated as a ‘major’ centre.⁸⁷ Due to the constrained urban context of the borough, existing employment areas need to be used more intensively to aid economic growth. Regeneration activities will also be focused on the key growth areas, with 1000 new jobs to be sought in Blackhorse Lane.⁸⁸

- 7.5.5 The borough is considered well placed in terms of developing a strong tourism sector. It benefits from good transport links to central London and has a number of attractions such as Epping Forest, Lea Valley Regional Park, and The William Morris Gallery.⁸⁹

Figure 7.5: Employment areas



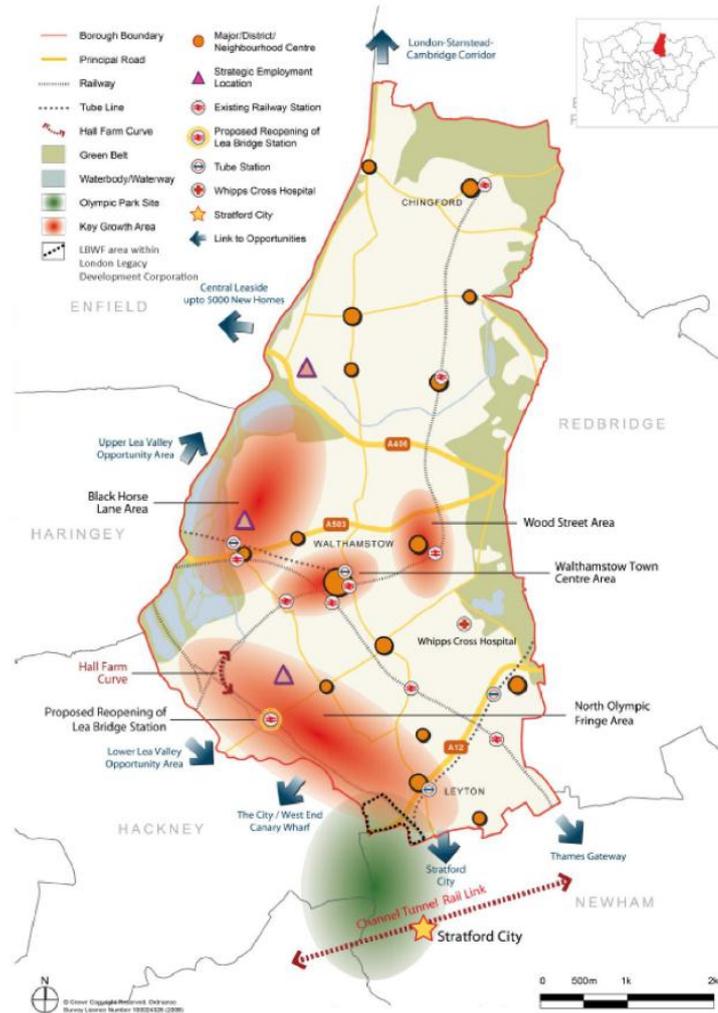
⁸⁶ LB Waltham Forest (2013) Waltham Forest Council Borough Context [online] available at: <http://www.walthamforest.gov.uk/Documents/LBWF-BoroughContext-as-at-March2013.pdf> (accessed 04/2014)

⁸⁷ Ibid

⁸⁸ LB Waltham Forest (2012) Local Development Framework - Core Strategy [online] available at: <http://www.walthamforest.gov.uk/Documents/adopted-core-strategy.pdf> (accessed 04/2014)

⁸⁹ LB Waltham Forest (2013) Annual Monitoring report 2012/13 [online] available at: <http://www.walthamforest.gov.uk/Pages/Services/Planning-Local-Development-Framework.aspx> (accessed 04/2014)

Figure 7.6: Key growth areas within the borough – shaded red



7.6 Flood risk

7.6.1 The following watercourses are to be found in Waltham Forest:⁹⁰

Watercourse	Classification	Responsibility under the FWMA 2010
River Lee	Main River	Environment Agency
The Ching Brook	Main River	
River Lee Flood Relief Chanel	Main River	
Dagenham Brook	Main River	
Coopermill Stream	Ordinary Watercourse	London Borough of Waltham Forest
Numerous unnamed ditches	Ordinary Watercourse	

⁹⁰ LB Waltham Forest (2011) Surface Water Management Plan [online] available at: <http://www.walthamforest.gov.uk/Documents/KE133%20Surface-water-management-plan-sept2011.pdf> (accessed 04/2014)

Fluvial flooding

- 7.6.2 The primary source of flood risk to Waltham Forest Borough has been found to be from fluvial flooding.⁹¹ In total, there are approximately 2,205 properties at risk of fluvial flooding in the borough. It should be noted that the Environment Agency (as the body responsible for managing risk from fluvial flooding) have an adopted strategy for the Lower Lee Catchment, and so to some extent plans are already in place to address the risk posed to these properties.
- 7.6.3 The Flood Risk Zones in the below map illustrates the distribution of land considered to be in the Environment Agency's medium and high probability Flood Zone 2 and 3a and 3b areas (Figure 7.7). Flood risk presents challenges for the delivery of social and economic regeneration in Blackhorse Lane, and the Northern Olympic Fringe and Lea Bridge area.⁹² At the same time as representing a challenge, development in the Northern Olympic Fringe also offers the opportunity to reduce flood risk in critical drainage areas.⁹³ The Environment Agency is currently updating their flood risk modelling in the Waltham Forest area; as a result of this Flood Zones 3a and 2 depicted in Figure 7.7 are liable to change in the near future.⁹⁴
- 7.6.4 The River Lee catchment is predominantly characterised by developed floodplain with built flood defences. The local catchment is influenced by urbanisation and low permeability of the underlying London Clay geology. Low infiltration into subsoils means that a large proportion of rainfall is conveyed into the River Lee. This results in a 'flashy' hydrograph profile, with limited time for flood warning and evacuation procedures.⁹⁵
- 7.6.5 The Ching Brook and Dagenham Brook are tributaries of the River Lee system, which are urbanised watercourses that often flow within culverts. The standard of protection associated with parts of the Ching Brook and Dagenham Brook is less than 1 in 20 years. The River Lee Flood Relief Channel offers a slightly improved standard of protection, estimated as approximately 1 in 50 years.⁹²

⁹¹ Environment Agency (2011) Waltham Forest - London Borough Environmental Fact Sheet [online] available at: http://test.environment-agency.gov.uk/static/documents/Research/Waltham_Forest_2011.pdf (accessed 04/2014)

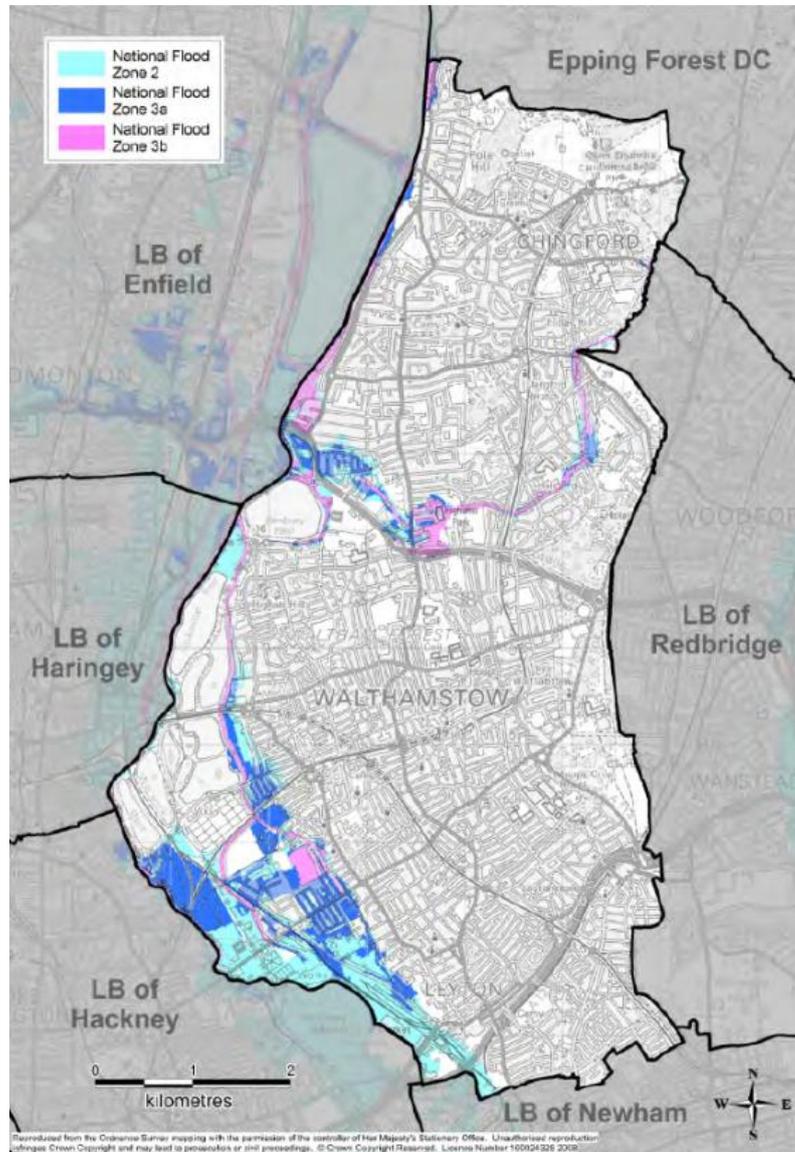
⁹² LB Waltham Forest (2012) Local Development Framework - Core Strategy [online] available at: <http://www.walthamforest.gov.uk/Documents/adopted-core-strategy.pdf> (accessed 04/2014)

⁹³ LB Waltham Forest (2011) Surface Water Management Plan [online] available at: <http://www.walthamforest.gov.uk/Documents/KE133%20Surface-water-management-plan-sept2011.pdf> (accessed 04/2014)

⁹⁴ Environmental Agency – Personal Communication (July 2014)

⁹⁵ LB Waltham Forest (2011) Level 2 Strategic Flood Risk Assessment [online] available at: <http://www.walthamforest.gov.uk/documents/ke78-level2-strategic-flood-risk-assessment-2.pdf> (accessed 04/2014)

Figure 7.7 - Flood risk zones in Waltham Forest⁹⁶



Other sources of flooding

7.6.6 Overland flow and surface water flooding typically arise because of intense rainfall, often of a short duration, that is unable to soak into the ground or enter drainage systems.⁹⁷ Surface water and sewer flooding are considered to pose a moderate flood risk in the borough.⁹⁸ Flood risk in some areas of the Borough is increased by a current lack of capacity within the existing drainage infrastructure.⁹⁹

⁹⁶ NB. The key to graph is incorrectly labels areas at risk as 'National' flood risk zones. This is an important distinction in the case of Flood Zone 3b as it was identified through the Waltham Forest Strategic Flood Risk Assessment

⁹⁷ LB Waltham Forest (2011) Level 2 Strategic Flood Risk Assessment [online] available at: <http://www.walthamforest.gov.uk/documents/ke78-level2-strategic-flood-risk-assessment-2.pdf> (accessed 04/2014)

⁹⁸ Mouchel (2008) North London Strategic Flood Risk Assessment [online] available at: http://www.nlwp.net/downloads/north_london_sfra_final_august_08.pdf (accessed 04/2014)

⁹⁹ LB Waltham Forest (2012) Local Development Framework - Core Strategy [online] available at: <http://www.walthamforest.gov.uk/Documents/adopted-core-strategy.pdf> (accessed 04/2014)

- 7.6.7 Pluvial modelling undertaken as part of the Surface Water Management Plan (SWMP) preparation process identified that flooding within the LB of Waltham Forest is heavily influenced by existing and historic river valleys, and impacts a number of regionally important infrastructure assets.
- 7.6.8 There are approximately 33,000 properties in Waltham Forest within areas at risk of surface water flooding at potential depths of >0.1m.¹⁰⁰ 6,400 residential properties and 3,600 non-residential properties in Waltham Forest could be at risk of surface water flooding of a depth greater than 0.03m (above an assumed 0.1m building threshold) during a 100 year rainfall event.¹⁰¹
- 7.6.9 Sewer flooding generally occurs as a result of localised short term flooding caused by intense rainfall events overloading the capacity of sewers, although maintenance and other factors may cause flood events. The majority of the incidents of sewer flooding are clustered in the south of the borough in Upper Walthamstow. High incidents of sewer flooding are also observed in Leytonstone, and in the north of the borough, south of Chingford.¹⁰²
- 7.6.10 Groundwater flooding has been assessed to be a low level risk that can be adequately mitigated on a sit-by-site basis.¹⁰³

Critical Drainage Areas

- 7.6.11 A Critical Drainage Area (CDA) is defined as ‘a discrete geographic area (usually a hydrological catchment) where multiple and interlinked sources of flood risk (surface water, groundwater, sewer and/or river) often cause flooding in a Flood Risk Area during severe weather thereby affecting people, property or local infrastructure.’ There are 13 CDAs located within Waltham Forest (Figure 7).¹⁰¹
- 7.6.12 Analysis of the number of properties at risk of flooding has been undertaken for the rainfall event with a 1 in 100 probability of occurrence in any given year. The CDAs at greatest risk of flooding in terms of the number of receptors at risk are as follows:¹⁰⁴

CDA ID	Infrastructure		Households				Commercial / Industrial		Total
			Non-Deprived		Deprived			>0.5m Deep	
	All	>0.5m Deep	All	>0.5m Deep		>0.5m Deep			
Group4_048	22	2	2691	35	1480	9	140	2	4333
Group4_064	15	3	2180	1	284	5	99	9	2578
Group4_054	16	3	1477	6	615	0	69	0	2177
Group4_047	18	1	609	0	1061	0	114	0	1802
Group4_067	8	2	543	0	371	0	41	0	963

¹⁰⁰ Environment Agency (2011) Waltham Forest - London Borough Environmental Fact Sheet [online] available at: http://test.environment-agency.gov.uk/static/documents/Research/Waltham_Forest_2011.pdf (accessed 04/2014)

¹⁰¹ LB Waltham Forest (2011) Surface Water Management Plan [online] available at:

<http://www.walthamforest.gov.uk/Documents/KE133%20Surface-water-management-plan-sept2011.pdf> (accessed 04/2014)

¹⁰² LB Waltham Forest (2011) Level 2 Strategic Flood Risk Assessment [online] available at:

<http://www.walthamforest.gov.uk/documents/ke78-level2-strategic-flood-risk-assessment-2.pdf> (accessed 04/2014)

¹⁰³ Ibid

¹⁰⁴ Ibid

The future baseline

- 7.6.14 It is widely expected that heavy storms with the potential to cause flooding will increase in frequency with climate change.¹⁰⁶
- 7.6.15 Box 7.1 below reveals the extent to which the borough may be affected by increased levels of precipitation as a result of climate change.

Box 7.1: Climate change projections for the UK and London

The 2009 UK Climate Change Projections predict that (by 2080):¹⁰⁷

- All areas of the UK will get warmer, more so in summer than in winter – across the UK central estimates of the average regional summer temperature rise in the 2080s are between 3 and 4°C;
- Summer precipitation tends to decrease across the UK – across the UK, central estimates of regional average summer precipitation change are projected to be between -17% to -23% in the 2080s; and
- Winter precipitation tends to increase across the UK – across the UK, central estimates of regional average winter precipitation change are projected to be in the region of +14% to +23% in the 2080s.

UK Climate Projections 2009 for London under a 2050s medium emissions scenario indicate that:¹⁰⁸

- The average summer day will be **2.7°C warmer** and very hot days 6.5°C warmer. By the end of the century the hottest day of the year could be 10°C hotter than the hottest day today.
- The average summer will be **19% drier** and the driest summer 39% drier than the baseline average.
- The average winter will be **14% wetter** and the wettest winter 33% wetter than the baseline average.

- 7.6.16 It is also important to note that further homes are set to be built in areas of flood risk on the basis that this is necessary in order to achieve priority regeneration objectives. Flood risk has been weighed against regeneration and other sustainability objectives as part of the process of preparing the Waltham Forest Core Strategy, Site Allocations Plan and Area Action Plans. Sites allocated for future homes that are in areas of fluvial flood risk are only acceptable because they have passed both the Sequential Test and (if required) Exception Test. This is done during the site allocations process.

7.7 Heritage, landscape and townscape

- 7.7.1 There are 12 conservation areas and 1 area of special character designated in Waltham Forest.¹⁰⁹ The borough also has over 100 statutorily Listed Buildings, approximately 140 locally Listed Buildings of architectural and historic interest, and 5 Parks and Gardens of Local Historic Interest namely Highams Park, Fairmead Park, Mallinson Park, and Coronation Gardens (Figure 7.).¹¹⁰ There were nine premises in Waltham Forest listed in the Heritage at Risk Register 2013.¹⁰⁹

- 7.7.2 Large areas of Waltham Forest are identified as Archaeological Priority Zones. These have particular archaeological interest although significant archaeological remains may survive outside of these designated areas. A number of these zones cover extensive areas, including The Ching and The Fillebrook Rivers, areas around former Saxon and Mediaeval settlements such as Chingford, Walthamstow, Leyton, Highams Park and Leytonstone (Figure 7.).¹¹¹

¹⁰⁶ LB Waltham Forest (2011) Surface Water Management Plan [online] available at:

<http://www.walthamforest.gov.uk/Documents/KE133%20Surface-water-management-plan-sept2011.pdf> (accessed 04/2014)

¹⁰⁷ Defra (2009) UK Climate Change Projections [online] available at: <http://ukclimateprojections.defra.gov.uk/22544> (accessed 04/13)

¹⁰⁸ GLA (2011) The draft climate change adaptation strategy for London: Public consultation draft [online] available at http://legacy.london.gov.uk/mayor/priorities/docs/Climate_change_adaptation_080210.pdf (accessed 04/13)

¹⁰⁹ LB Waltham Forest (2013) Annual Monitoring report 2012/13 [online] available at:

<http://www.walthamforest.gov.uk/Pages/Services/Planning-Local-Development-Framework.aspx> (accessed 04/2014)

¹¹⁰ LB Waltham Forest (2012) Local Development Framework - Core Strategy [online] available at:

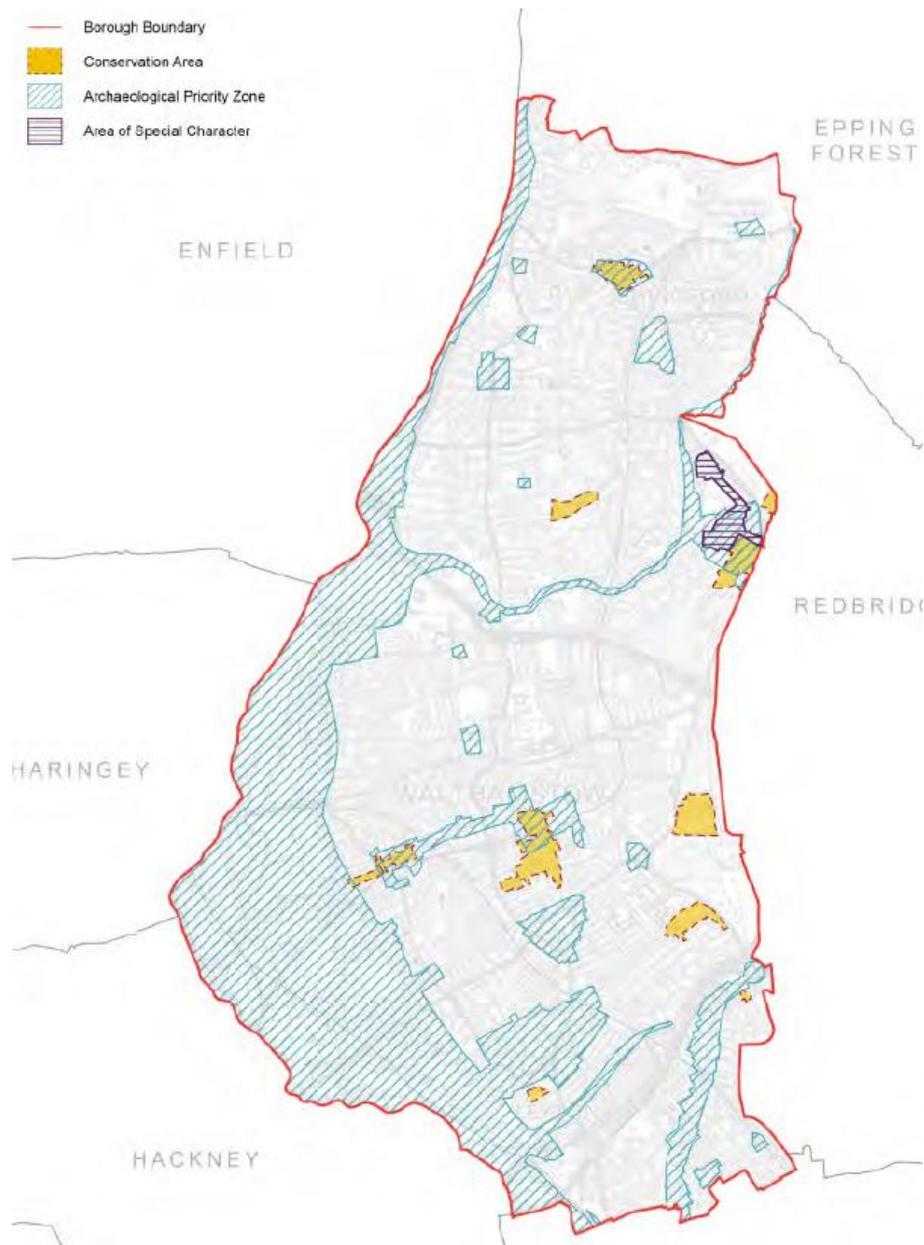
<http://www.walthamforest.gov.uk/Documents/adopted-core-strategy.pdf> (accessed 04/2014)

¹¹¹ Ibid

7.7.3 The landscape of Waltham Forest is characterised by three Natural Landscape Areas as set out in the London Landscape Framework. These are as follows:¹¹²

- East of the borough: Essex Plateau - Mosaics of ancient woodland, wood pasture and acid grassland within the former royal hunting ‘forest’ at Epping Forest
- Centre of the borough: North Thames Terraces | Flat, open grassland, stepping up from the Thames, with narrow sinuous strips of woodland marking the alignment of tributary creeks
- West of the borough: Lea River Valley - Braided tributary streams flowing across wide open marshes to join the River Lea and its sequence of reservoirs

Figure 7.9 - Conservation Areas and Archaeological Priority Zones within Waltham Forest



¹¹² Natural England (2011) London's Natural Signatures: The London Landscape Framework [online] available at: http://www.naturalengland.org.uk/Images/01-execsummary_tcm6-14408.pdf (accessed 04/2014)

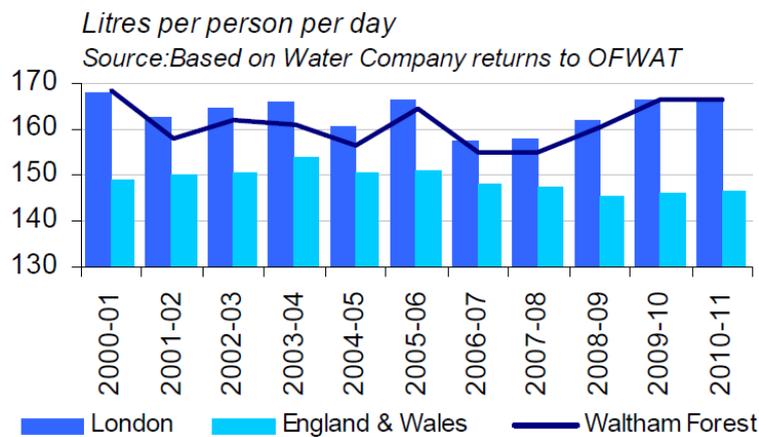
7.8 Water

Water Availability

7.8.1 Waltham Forest falls in Thames Water's London resource zone which is considered to be seriously water stressed.¹¹³ Water supply for Thames Water's London Resource Zone (WRZ) does involve some abstraction from the Lee Valley Reservoirs (including Walthamstow Reservoirs).¹¹⁴

7.8.2 Average water consumption in Waltham Forest during 2010-11 stood at 166.5 litres per person per day (l/p/d). This is against a five year average for the borough of 161 l/p/d (2006-07 to 2010-11). Figure 7. below illustrates that levels of water use in Waltham Forest and London and in access of usage levels over the whole of England and Wales.¹¹³

Figure 7.10 - Household water use in Waltham Forest



7.8.3 The Waltham Forest Climate Strategy identifies serious water stress as one of the most significant problems the borough will face in future.¹¹⁵ Due to increased storm events and increasing demands for water, it is considered important that the Borough improves its water efficiency and secures and protects its water resources and infrastructure.

7.8.4 There are seven active abstraction licences in Waltham Forest, with these being predominantly from groundwater sources. A majority of these abstraction licences are for the industrial, commercial and public services sector. Other abstractions are for public supply.¹¹⁶ The EA identifies the River Lee as being 'over abstracted', and as such no further consumptive abstraction licences will be issued except under conditions of very high flow.¹¹⁷

¹¹³ Environment Agency (2011) Waltham Forest - London Borough Environmental Fact Sheet [online] available at: http://test.environment-agency.gov.uk/static/documents/Research/Waltham_Forest_2011.pdf (accessed 04/2014)

¹¹⁴ LB Waltham Forest (2011) Walthamstow Town Centre Area Action Plan Preferred Options – Habitats Regulations Assessment [online] available at: <http://www.walthamforest.gov.uk/Documents/wtc-aap-hra.pdf> (accessed 04/2014)

¹¹⁵ LB Waltham Forest (2011) Climate Change Strategy [online] available at: <http://www.walthamforest.gov.uk/Documents/waltham-forest-climate-change-strategy.pdf> (accessed 04/2014)

¹¹⁶ Environment Agency (2011) Waltham Forest - London Borough Environmental Fact Sheet [online] available at: http://test.environment-agency.gov.uk/static/documents/Research/Waltham_Forest_2011.pdf (accessed 04/2014)

¹¹⁷ LB Waltham Forest (2011) Walthamstow Town Centre Area Action Plan Preferred Options – Habitats Regulations Assessment [online] available at: <http://www.walthamforest.gov.uk/Documents/wtc-aap-hra.pdf> (accessed 04/2014)

Water Environment

7.8.5 The Catchment Abstraction Management Strategy (CAMS) assessment of the Lower Lee reveals that there is only adequate water available to meet environmental needs 12% of the time. The largest single use of abstracted water from the Lower Lee is public water supply.¹¹⁸

7.8.6 There are three designated river water bodies in Waltham Forest. The table below details the current and predicted ecological status of these water bodies:¹¹⁸

Watercourse	2009 Classification Status	2015 prediction
River Lee (Wollen's Brook - Tottenham Lock)	Moderate	Moderate
River Lee (Tottenham Lock - Tideway)	Moderate	Moderate
Ching Brook	Poor	Poor

7.8.7 The biggest impacts upon the boroughs fish populations are poor water quality and habitat. Without improvement, these factors will limit the potential of the fish populations within the River Lee Navigation. Invasive non-native species have also been recorded on most watercourses in the borough, predominantly on the Ching and Lee flood relief channel.¹¹⁸

¹¹⁸ Environment Agency (2011) Waltham Forest - London Borough Environmental Fact Sheet [online] available at: http://test.environment-agency.gov.uk/static/documents/Research/Waltham_Forest_2011.pdf (accessed 04/2014)

8 WHAT ARE THE KEY ISSUES / OBJECTIVES THAT SHOULD BE A FOCUS OF SEA?

8.1.1 The following table presents the sustainability issues and objectives established through SEA scoping, i.e. in-light of context/baseline review and consultation. Issues / objectives are grouped under the ten sustainability ‘topic’ headings identified at the outset of scoping. Taken together, these sustainability topics, issues and objectives provide a methodological ‘framework’ for the assessment.

8.1.2 The objectives draw on those that have been identified through scoping work undertaken as part of Sustainability Appraisal (SA) for the Waltham Forest Local Development Framework. **Appendix I** presents the full list of sustainability objectives established within the Waltham Forest SA Report.

Table 8.1: The SEA Framework

Topic	Key issues	Key objectives
Biodiversity	<ul style="list-style-type: none"> • Areas of key wildlife sites in ‘unfavorable declining’ condition • Large parts of the central area of the borough deficient in access to nature 	<ul style="list-style-type: none"> • Protect and enhance natural habitats in the area, particularly those associated with priority species • Deliver targeted habitat creation, for example through the provision of open space and green roofs. • Protect and provide for the planting of more trees
Climate change mitigation	<ul style="list-style-type: none"> • There is a need to continue reducing CO₂ emissions in the borough • The amount of waste the borough has to handle is expected to increase 	<ul style="list-style-type: none"> • Promote designs that facilitate efficient use of energy and resources and support the generation and use of low carbon energy
Community and wellbeing	<ul style="list-style-type: none"> • The population of the borough s expected to grow by around a fifth by 2041 • The borough suffers from high levels of deprivation • Health in the borough is worse than the London and England average over a range of indicators • The entire borough has been designated as an Air Quality Management Area. • Access to many areas of the borough’s open space is limited 	<ul style="list-style-type: none"> • Maximise the benefits of development to promote sustainable communities, particularly in terms of addressing deprivation • Help to support the health of communities e.g. provision of walking, cycling and recreation facilities; reductions in pollution etc. • Ensure that all of the boroughs populations is able to obtain the multiple benefits that the provision of high quality greenspace can confer

Topic	Key issues	Key objectives
Economy	<ul style="list-style-type: none"> Waltham Forest has a small economy and relatively few businesses and jobs Existing employment areas need to be used more intensively to aid economic growth The borough is well placed in terms of developing a strong tourism sector 	<ul style="list-style-type: none"> Protect the local economy and new investment opportunities within it
Flood risk and wider climate change adaptation issues	<ul style="list-style-type: none"> 5% of properties are at risk of fluvial flooding, half of which are at significant risk Water and sewer flooding are considered to pose a moderate flood risk in the borough Heavy storms will increase in frequency with climate change 	
Heritage, landscape & townscape	<ul style="list-style-type: none"> There were nine premises in Waltham Forest listed in the Heritage at Risk Register in 2013 	<ul style="list-style-type: none"> Ensure the protection and enhancement of protected and wider historic assets and existing townscape, landscape and strategic views
Water		<ul style="list-style-type: none"> Protect and manage water resources to ensure water quality and availability Maintain and where necessary improve the quality of the water environment Encourage development that incorporates sustainable drainage

PART 2: WHAT HAS STRATEGY-MAKING / SEA INVOLVED UP TO THIS POINT?

9 INTRODUCTION (TO PART 2)

The Environmental Report must include...

- An outline of the reasons for selecting the alternatives dealt with
- The likely significant effects on the environment associated with alternatives / an outline of the reasons for selecting the preferred approach in-light of alternatives assessment (and hence, by proxy, a description of how environmental objectives and considerations are reflected in the draft LFRMS)

9.1.1 The ‘story’ of strategy development / SEA prior to preparation of the Draft LFRMS will be told in this Part of the Environmental Report. Specifically, this part of the report explains how preparation of the Draft LFRMS has been informed by assessment of **alternatives** for the following policy areas / issues:

- | | |
|---|---------------------------------------|
| • SuDs measures in new developments | • Water quality in the Dagenham Brook |
| • Mitigation in Critical Drainage Areas | • Ditch clearance |
| • Enhancing the natural environment | • Gully clearance |

Reasons for focusing on these policy issues

9.1.2 This list of policy issues was identified in conjunction with LB Waltham Forest planning policy and flood risk management specialists. These are issues where there is an opportunity for a revised LFRMS policy to deliver a differing suite of environmental, social, or economic effects. Other issues were discounted for a range of reasons, including the degree to which policies are based upon statutory requirements, and the extent to which policies are managerial (e.g. reviewing partner roles), rather than focused on delivering ‘on the ground’ action to address flood risk (i.e. where there will be a direct environmental, social, or economic effects).

9.1.3 Policy issues that have not been the focus of alternatives assessment, and hence are not a focus of this part of the Report, include the following:

- | | |
|-----------------------------------|---|
| • Sequential and exceptions tests | • Conventional drainage systems replacement |
| • Permeable / porous surfacing | • Assessments and plans |
| • Information on flood risk | • Roles and responsibilities |
| • Register of flood risk assets | • Surface water sewer maintenance |

Structure of this part of the report

9.1.4 Each of the six policy issues that has been a focus of alternatives assessment is assigned a chapter, below. Within each chapter, the following questions are answered:

- What are the reasons for selecting the alternatives dealt with?
 - When reading these sections, there is a need to bear in mind the strategy’s remit / objectives. For some policy issues the scope of alternatives is limited given the need to avoid straying into the scope of other regulatory mechanisms.
- What are the assessment findings (in relation to the set of alternatives in question)?
- What are the reasons for selecting the preferred approach in-light of assessment findings?

9.1.5 These questions reflect the regulatory requirement for the Environmental Report to present 1) assessment findings for ‘reasonable alternatives’ and 2) ‘an outline of the reasons for selecting the alternatives dealt with’.

10 SUDS MEASURES IN NEW DEVELOPMENTS

10.1 Introduction

10.1.1 A key aim of the LFRMS is to promote the incorporation of Sustainable Drainage Systems (SuDS) into new developments. This Chapter aims to tell the ‘story’ of alternatives consideration in relation to this issue.

10.2 Reasons for selecting the alternatives dealt with

10.2.1 The emerging preferred approach would call upon new developers to maximise the multifunctional benefits (such as recreational and biodiversity values) delivered through SuDs where possible; provided this does not unduly compromise flood protection. An alternative approach is simply focus on the achievement of greenfield runoff rates where possible, without emphasis on multifunctionality.

10.2.2 In light of this discussion, the following alternatives have been appraised:

Option 1) Incorporate SuDs measures into new developments to achieve greenfield runoff rates where possible

Option 2) As with Option 1, but with an additional requirement to maximise the multifunctional benefits delivered through SuDs where possible and where this does not unduly compromise flood protection

10.2.3 It is considered that these are the reasonable alternatives in relation to the issue of ‘SuDs measures in new developments’. Testing these alternatives helpfully enables consideration of wide-ranging sustainability issues.

10.3 Summary of the assessment findings

10.3.1 The table below presents a summary of the assessment findings. Detailed assessment findings can be found within **Appendix III**.

10.3.2 The methodology is explained in detail in the appendix, but in summary: Within each row (i.e. for each sustainable topic) the columns to the right hand side seek to both categorise the performance of each scenario in terms of ‘significant effects (using red / green shading) and also rank the alternatives in order of preference.

Summary of the assessment findings: SuDs measures in new developments

Topic	Categorisation / Rank of preference	
	Option 1	Option 2
Biodiversity	2	★1
Climate change mitigation	2	★1
Community and wellbeing	2	★1
Economy	★1	2
Flood risk and wider climate change adaptation issues	2	★1
Heritage, landscape & townscape	2	★1
Water	2	★1

Summary

SuDS approaches to water management are often multifunctional and deliver a range of benefits. As such, it can be expected that **Option 1** will deliver benefits across the sustainability topics covered in this assessment (with the exception of the Economic topic, where both Options can be expected to place a greater burden on developers in some circumstances). However, SuDS technologies vary in the degree to which they can be considered multifunctional and as a result, an additional criteria calling for the multifunctional benefits delivered through SuDs to be maximised should encourage greater consideration of the potential wider benefits of flood risk management work, with these additional benefits then secured where possible. As a result, **Option 2** is the strongest performer for the majority sustainability topics covered in this assessment, with its focus on multifunctional green infrastructure also supported by wider Government policy¹¹⁹.

10.4 Reasons for selecting the preferred approach

10.4.1 Option 2 is the Council's preferred as this scores higher than Option 1 on a range of sustainability factors. A key benefit of Option 2 is the environmental (including recreational and biodiversity) enhancements it can secure; which is embedded in national and local policy.

¹¹⁹ The NPPF calls for the adoption of 'proactive strategies to adaptation and manage risks through measures including multifunctional green infrastructure, giving consideration to ecological networks'

11 MITIGATION IN CRITICAL DRAINAGE AREAS

11.1 Introduction

11.1.1 Critical Drainage Areas are where multiple and interlinked sources of flood risk (surface water, groundwater, sewer, main river and/or tidal) cause flooding in one or more Local Flood Risk Zones in the borough during severe weather, thereby affecting people, property or local infrastructure. CDAs cover a significant amount of the borough, and so there is a need to consider how the impacts of new development on flood risk in these areas might be mitigated. This Chapter aims to tell the ‘story’ of alternatives consideration in relation to this issue.

11.2 Reasons for selecting the alternatives dealt with

11.2.1 The emerging preferred option would require developers within Critical Drainage Areas to contribute to measures to reduce surface water flood risk throughout the CDA. An alternative option in this respect is to narrow this requirement, so that developers have only to consider onsite flood risk.

11.2.2 In light of this discussion, the following alternatives have been appraised:

Option 1) Development in Critical Drainage Areas to contribute to measures to reduce surface water flood risk in that CDA

Option 2) Development in Critical Drainage Areas to only address onsite surface water flood risk rather than risks in the wider CDA

11.2.3 It is considered that these are the reasonable alternatives in relation to the issue of ‘Mitigation in Critical Drainage Areas’. Testing these alternatives helpfully enables consideration of wide-ranging sustainability issues.

11.3 Summary of the assessment findings

11.3.1 The table below presents a summary of the assessment findings. Detailed assessment findings can be found within **Appendix IV**.

11.3.2 The methodology is explained in detail in the appendix, but in summary: Within each row (i.e. for each sustainable topic) the columns to the right hand side seek to both categorise the performance of each scenario in terms of ‘significant effects (using red / green shading) and also rank the alternatives in order of preference.

Summary of the assessment findings: Mitigation in Critical Drainage Areas

Topic	Categorisation / Rank of preference	
	Option 1	Option 2
Biodiversity	-	-
Climate change mitigation	-	-
Community and wellbeing	-	-
Economy	2	★1
Flood risk and wider climate change adaptation issues	★1	2
Heritage, landscape & townscape	-	-
Water	-	-

Summary

There is a clear trade off associated with the two options put forward focused on surface flood risk mitigation in the boroughs Critical Drainage Areas. On the one hand **Option 1** is considered likely to lead to a much greater benefit in terms of flood risk mitigation than **Option 2**, with both onsite and wider surface flood risk to be tackled through their contributions. On the other hand, **Option 2**'s call for developers only to address the surface flood risk of their site is likely to be less onerous, and so could lead to improved viability in some instances with positive economic effects. On balance however it appears that **Option 1** is the stronger of the two put forward as it will protect the borough's population from the disruption caused by surface flooding, including the economic impacts of property loss and transport disruption (which may otherwise grow worse as climate change alters rainfall patterns). In terms of the potential negative effects of this Option on viability in some instances, it is suggested that contributions to wider surface flood risk measures should be scaled relative to the size of the development in question.

11.4 Reasons for selecting the preferred approach

11.4.1 Critical Drainage Areas have been identified as areas where there are interlinked sources of flood risk. Requiring development to contribute to measures to reduce surface water flood risk in the wider CDA is therefore preferable as it increases the chance of addressing the root cause of any issues. To focus solely on development site boundaries would not fully recognise the interlinked nature of flood risk and undermine the purpose of identifying CDAs. However, it is recognised that in practice there may be difficulties in ensuring developers contribute to reducing surface water flood risk in the wider area.

12 ENHANCING THE NATURAL ENVIRONMENT

12.1 Introduction

12.1.1 A main aim of the LFRS is to deliver environmental improvements where possible in order to ensure that flood management measures go beyond being functional and also deliver multiple additional benefits, such as improved water quality and biodiversity. This Chapter aims to tell the ‘story’ of alternatives consideration in relation to this issue.

12.2 Reasons for selecting the alternatives dealt with

12.2.1 The emerging preferred approach is to require that steps are taken to enhance the natural environment during flood risk management works, where this is both practical and appropriate. However, an alternative to this option is to provide more specific local requirements for incorporating green infrastructure into flood risk management works (for example, criteria setting out circumstances when GI will be preferred over grey infrastructure).

12.2.2 In light of this discussion, the following alternatives have been appraised:

Option 1) Where practical and appropriate, take steps to enhance the natural environment , in relation to flood risk management works

Option 2) Set out more specific local requirements for the incorporation of green infrastructure in relation to flood risk management works

12.2.3 It is considered that these are the reasonable alternatives in relation to the issue of ‘Enhancing the natural environment’. Testing these alternatives helpfully enables consideration of wide-ranging sustainability issues.

12.3 Summary of the assessment findings

12.3.1 The table below presents a summary of the assessment findings. Detailed assessment findings can be found within **Appendix V**.

12.3.2 The methodology is explained in detail in the appendix, but in summary: Within each row (i.e. for each sustainable topic) the columns to the right hand side seek to both categorise the performance of each scenario in terms of ‘significant effects (using **red** / **green** shading) and also rank the alternatives in order of preference.

Summary of the assessment findings: Enhancing the natural environment

Topic	Categorisation / Rank of preference	
	Option 1	Option 2
Biodiversity	2	★1
Climate change mitigation	-	-
Community and wellbeing	2	★1
Economy	2	★1
Flood risk and wider climate change adaptation issues	2	★1
Heritage, landscape & townscape	2	★1
Water	2	★1

Summary

Ensuring that where possible, flood management measures go beyond being merely functional and secure wider environmental enhancements is a main aim of the Waltham Forest LFRMS. **Option 1** will help to achieve this by ensuring that take steps are taken to enhance the natural environment in relation to flood risk management works where practical and appropriate. As a result of this focus on environmental improvement, positive effects are expected in terms of Biodiversity, Climate change mitigation, Community and wellbeing, Economy, and Heritage, Landscape & townscape, and Water. However, for each of these Topic areas **Option 2** has been found to be a stronger performer due to its focus on targeting the use of green infrastructure at those spatial areas that would most likely benefit from its use over hard engineering approaches. Green infrastructure may be more expensive than hard engineering approach in some cases and as such it will be important for Policy to set out under what circumstances flood risk management within an identified ‘opportunity area’ might be exempt from providing green infrastructure. This could require consideration of the wider economic benefits of each approach. It should be noted, however, that a greater outlay of resources would be required to identify such green infrastructure ‘opportunity areas’ under **Option 2** and as such, **Option 1** may currently be most practicable alternative.

12.4 Reasons for selecting the preferred approach

12.4.1 Whilst setting out more specific requirements for the incorporation of green infrastructure in relation to flood risk management works performs better against a number of the sustainability topics, there is currently insufficient evidence base and resources for the local flood risk management strategy to set out such requirements. As option 1 will still help achieve the core aim of ensuring future flood risk management measures go beyond being merely functional and secure wider environmental enhancements, and ensure practical and reasonable steps are taken to achieve this aim, this has been selected as the preferred approach.

13 WATER QUALITY IN THE DAGENHAM BROOK

13.1 Introduction

13.1.1 Water quality in the Dagenham brook is considered to be poor¹²⁰ and as such there is a need to work in partnership with the Environment Agency and Thames Water to improve water quality and enhance biodiversity within the Brook. This Chapter aims to tell the ‘story’ of alternatives consideration in relation to this issue.

13.2 Reasons for selecting the alternatives dealt with

13.2.1 The emerging preferred approach to addressing water quality issues within the Dagenham Brook is the use of dredging works and the correction of householder and business water misconnections. An alternative approach to this is the use of interceptors to treat water before it enters the Dagenham Brook, rather than focusing on correcting misconnections, with varying environmental and economic implications. A further alternative is to look at wider action to deal with urban diffuse pollution in the Dagenham Brook catchment by treating pollution at source using multistage treatment of runoff through SuDS ‘treatment trains’.

13.2.2 In light of this discussion, the following alternatives have been appraised:

Option 1) Improve water quality in the Dagenham Brook through dredging works, and correcting householder and business water misconnections

Option 2) Improve water quality through use of interceptors to treat water before it enters the Dagenham Brook

Option 3) Use SuDS ‘treatment trains’ to treat runoff at source within the Dagenham Brook catchment where possible

13.2.3 It is considered that these are the reasonable alternatives in relation to the issue of ‘Water quality in the Dagenham Brook’. Testing these alternatives helpfully enables consideration of wide-ranging sustainability issues.

13.3 Summary of the assessment findings

13.3.1 The table below presents a summary of the assessment findings. Detailed assessment findings can be found within **Appendix VI**.

13.3.2 The methodology is explained in detail in the appendix, but in summary: Within each row (i.e. for each sustainable topic) the columns to the right hand side seek to both categorise the performance of each scenario in terms of ‘significant effects (using red / green shading) and also rank the alternatives in order of preference.

Summary of the assessment findings: Water quality in the Dagenham Brook

Topic	Categorisation / Rank of preference		
	Option 1	Option 2	Option 3
Biodiversity	★ 1	3	2
Climate change mitigation	2	2	★ 1
Community and wellbeing	★ 1	2	★ 1

¹²⁰ A 2012 report on the status of Dagenham Brook by Capita Symonds identified exceedences of TPH fractions, selected PAHs, selenium and Ammoniacal Nitrogen as NH3.

Topic	Categorisation / Rank of preference		
	Option 1	Option 2	Option 3
Economy	★ 1	2	2
Flood risk and wider climate change adaptation issues	2	2	★ 1
Heritage, landscape & townscape	2	2	★ 1
Water	★ 1	2	2

Summary

Given the low water quality in the Dagenham Brook, the particular need to address human waste finding its way into this water course, and the large scale of the catchment involved, it is clear that **Option 1**'s proposed programme of correcting householder and business water misconnections is the preferred approach. This is as a result of its ability to ensure that human waste is directed to the foul network, the relative ease by which such changes can be made when compared to the fitting or retrofitting of interceptors (**Option 2**) or SuDS (**Option 3**), and evidence that such an approach is already leading to large gains in terms of water quality¹²¹. In addition to the direct benefit of improved water quality in the brook, Option 1 is also expected to lead to secondary benefits in terms of freshwater biodiversity, community and wellbeing (by potentially providing health and recreation benefits) and economy (by offering a cost effective approach to improving water quality). In terms of their ability to deliver water quality, both **Option 2** (the use of interceptors) and **Option 3** (the use of SuDS treatment trains) offer a different form of water treatment, with a focus on addressing silt, nitrogen, pesticides, hydrocarbons and other diffuse pollutants, but with little ability to treat more complex human wastes that require specialist treatment (i.e. in dedicated water treatment works). The removal of such pollutants is anticipated to have a smaller, albeit positive effect on water quality when compared to **Option 1**, whilst also being more expensive and time consuming to roll out over the large Dagenham Brook catchment. However, in terms of secondary benefits, it is important to note that the use of multistage SuDS proposed in **Option 3** (e.g. green roofs, permeable paving, and settling ponds in 'treatment trains') could lead to a wide range of secondary benefits. These include biodiversity, climate change mitigation, community and wellbeing, flood risk and climate adaptation, and heritage, landscape & townscape resulting from the potential creation of habitat and green space. Given these wider benefits, and the wider sources of pollution tackled, it appears that **Option 3** is complementary to **Option 1**. As such, it is advised that whilst efforts should be focused on correcting misconnections in the Dagenham brook catchment, there is also a need to promote the use of SuDs in new development and to install such measures in the public realm where appropriate. In particular, there are gains to be made where water drains not into the sewage network, but directly into waterways, so providing a basis for targeted action in the catchment.

13.4 Reasons for selecting the preferred approach

- 13.4.1 Option 1 provides wider social and environmental benefits in terms of educating local businesses and residents about how their actions can have unintended consequences in terms of the deterioration of water quality. It is also has economic benefits given that it represents a lower cost solution.

¹²¹ Waltham Forest LB Council, Senior Drainage Engineer – Personal communication

14 DITCH CLEARANCE PROGRAMME

14.1 Introduction

14.1.1 The Council's responsibilities relate to 'local' flood risk, including ditches. As such, it is important that the LFRMS sets out how these will be managed in future. This Chapter aims to tell the 'story' of the alternatives considered in relation to this issue.

14.2 Reasons for selecting the alternatives dealt with

14.2.1 The emerging preferred approach is for clearing of ditches at Overton Road, Chingford Lane, Rangers Road, Oak Hill, Brookfield Path and Leyton Common Sewer to be undertaken on an annual basis. However, there are options to increase or decrease the frequency of this clearing programme. As such, alternatives have been developed to reflect a more frequent (every six months) and less frequent (every 18 months) programme of clearance.

14.2.2 A further option would have been to test a 'little and often' approach to cleaning (as opposed to the specified timescales for clearance set out in the below Options), so that ditch systems are cleared gradually over a number of years. This alternative draws from RSPB guidance on 'wildlife friendly' approaches to ditch management¹²², which notes that diverse conditions within ditches (i.e. from recently cleared to silted and well vegetated) can encourage greater biodiversity. However, it is felt that given the low biodiversity value of the ditches present in the borough's urbanised areas and the potential cost of such an approach, this is not a 'reasonable' alternative to consider.

14.2.3 In light of this discussion, the following alternatives have been appraised:

Option 1) Annual clearing of ditches at Overton Road, Chingford Lane, Rangers Road, Oak Hill, Brookfield Path and Leyton Common Sewer

Option 2) As with Option 1, but with clearance undertaken every six months

Option 3) As with Option 1, but with clearance undertaken every 18 months

14.2.4 It is considered that these are the reasonable alternatives in relation to the issue of 'Ditch clearance programme'. Testing these alternatives helpfully enables consideration of wide-ranging sustainability issues.

14.3 Summary of the assessment findings

14.3.1 The table below presents summary of the assessment findings. Detailed assessment findings can be found within **Appendix VII**.

14.3.2 The methodology is explained in detail in the appendix, but in summary: Within each row (i.e. for each sustainable topic) the columns to the right hand side seek to both categorise the performance of each scenario in terms of 'significant effects (using red / green shading) and also rank the alternatives in order of preference.

¹²² RSPB – Farming for wildlife: Ditch management [online] available at http://www.rspb.org.uk/Images/Ditch%20management_tcm9-207644.pdf

Summary assessment findings: Ditch clearance programme

Topic	Categorisation / Rank of preference		
	Option 1	Option 2	Option 3
Biodiversity	★1	2	3
Climate change mitigation	-	-	-
Community and wellbeing	-	-	-
Economy	3	2	★1
Flood risk and wider climate change adaptation issues	★1	2	3
Heritage, landscape & townscape	-	-	-
Water	★1	2	3

Summary

In terms of overall performance across the SEA topic areas, **Option 1** is the strongest of those put forward. It is anticipated that a more frequent programme of ditch clearance could lead to benefits in terms of biodiversity (assuming a sensitive, staggered approach to clearance that preserves habitat diversity), flood risk, and water quality (assuming basic monitoring of water condition during any clearance works). However, this comes at an economic cost, with **Option 1** ranked lowest under the Economy topic and an 18 month programme of clearance (**Option 3**) ranked highest. The benefits of a more frequent approach area also unclear in some respects. For example, it is felt that the biodiversity value of the ditches in Waltham Forest’s heavily urbanised areas may not be particularly high¹²³, whilst there may also be diminishing returns in terms of the levels of surface flood risk protection offered by more frequent management. Given these uncertainties, and the disadvantages of an 18 month approach (**Option 3**) in terms of biodiversity, flood risk, and water quality, it may be most appropriate to pursue the annual approach outlined in **Option 2**. This presents a middle ground between the economic benefits of **Option 3** and the wider, but more unpredictable, benefits of **Option 3**. In terms of this unpredictability, **Option 2** could be strengthened by adding criteria which states that more frequent clearance can take place where benefits of doing so can be identified (e.g. in areas of the borough ditch system that are particularly biodiverse, or where flood risk or water quality issues are identified). There is also the opportunity to improve the policies performance in terms of biodiversity (regardless of the frequency chosen) by specifying that ditch clearance is undertaken in line with guidance on wildlife friendly ditch management.

14.4 Reasons for selecting the preferred approach

14.4.1 Option 1 is considered the best option as it provides an appropriate balance of what it is economically feasible to do, whilst still offering some opportunities for the potential environmental benefits of a ‘little and often’ approach.

¹²³ Waltham Forest LB Council – Personal communication

15 GULLY CLEARANCE PROGRAMME

15.1 Introduction

15.1.1 Programmes such as regular gully cleaning can help minimise the risk of localised flooding in the future. As such the LFRMS is seeking to establish a gully clearance programme. This Chapter aims to tell the ‘story’ of alternatives consideration in relation to this issue.

15.2 Reasons for selecting the alternatives dealt with

15.2.1 The emerging preferred approach is to develop and implement a programme of gully clearing on regular basis in order to ensure that drainage systems in the area are operating at capacity. However, an alternative to this would be to clean gullies out as and when blockages are reported to the Council.

15.2.2 In light of this discussion, the following alternatives have been appraised:

Option 1) Develop and implement a regular programme of gully cleaning to ensure drainage systems are operating at capacity

Option 2) Gully cleaning carried out as and when blockages are reported

15.2.3 It is considered that these are the reasonable alternatives in relation to the issue of ‘Gully clearance programme’. Testing these alternatives helpfully enables consideration of wide-ranging sustainability issues.

15.3 Summary of the assessment findings

15.3.1 The table below presents summary of the assessment findings. Detailed assessment findings can be found within **Appendix VIII**.

15.3.2 The methodology is explained in detail in the appendix, but in summary: Within each row (i.e. for each sustainable topic) the columns to the right hand side seek to both categorise the performance of each scenario in terms of ‘significant effects (using **red** / **green** shading) and also rank the alternatives in order of preference.

Summary of the assessment findings: Gully clearance

Topic	Categorisation / Rank of preference	
	Option 1	Option 2
Biodiversity	-	-
Climate change mitigation	-	-
Community and wellbeing	-	-
Economy	2	★1
Flood risk and wider climate change adaptation issues	★1	2
Heritage, landscape & townscape	-	-
Water	-	-

Summary

Given levels of surface water flood risk in the Waltham Forest area it is clear that a regular programme of gully cleaning (**Option 1**) will lead to benefits in terms of flood risk, as a proactive strategy will route out these potential causes of flooding before they can cause wider damage. Responding only to blockages when they are reported (**Option 2**) is likely to heighten surface water flood risk in the borough, particularly where multiple sources of surface flood risk have the potential to combine to produce flood events of greater impact. Whilst **Option 2** is likely to be cheaper from a basic economic perspective (i.e. it will not waste time and resources checking gullies that are not blocked), the wider impacts of increased flood risk are likely to far outweigh this cost. As a result, **Option 1** is considered to be the preferred approach. In terms of the frequency of clearance, once or twice annually is suggested. In areas of high sediment and/or within Critical Drainage Areas cleaning twice a year or more often might help to reduce surface flood risk.

15.4 Reasons for selecting the preferred approach

- 15.4.1 Option 1 is a proactive strategy that ensures gully cleansing is suitably prioritised according to the level of disturbance any blockage would cause, so those likely to affect matters such as highway safety for example are cleaned regularly. Furthermore, such a programme ensures cleansing is not based on external factors such as reporting of blockages.

PART 3: WHAT ARE THE SEA FINDINGS AT THIS STAGE?

16 INTRODUCTION (TO PART 3)

The Environmental Report must include...

- The likely significant effects associated with the draft LFRMS
- The measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects of implementing the strategies approach

16.1.1 This Part of the Environmental Report presents the assessment findings in relation to the draft LFRMS as it stands at the current time, i.e. as presented within the draft LFRMS consultation document.

17 METHODOLOGY

17.1.1 The assessment identifies and evaluates ‘likely significant effects’ of the preferred approach on the baseline, drawing on the sustainability topics and issues identified through scoping (see Part 1) as a methodological framework. To reiterate, the sustainability topics considered in turn below are as follows:

- | | |
|-----------------------------|-----------------------------------|
| • Biodiversity | • Flood risk |
| • Climate change mitigation | • Heritage, landscape & townscape |
| • Community and wellbeing | • Water |
| • Economy | |

17.1.2 Every effort is made to predict effects accurately; however, this is inherently challenging given the high level nature of the policy approaches under consideration, and understanding of the baseline.¹²⁴ Given uncertainties there is inevitably a need to make assumptions, e.g. in relation to strategy implementation and aspects of the baseline that might be impacted.

17.1.3 Assumptions are made cautiously, and explained within the text. The aim is to strike a balance between comprehensiveness and conciseness/accessibility to the non-specialist. In many instances, given reasonable assumptions, it is not possible to predict ‘significant effects’, but it is possible to comment on merits (or otherwise) of the draft strategy in more general terms.

17.1.4 It is important to note that effects are predicted taking account of the criteria presented within Schedule 1 of the SEA Regulations.¹²⁵ So, for example, account is taken of the probability, duration, frequency and reversibility of effects as far as possible. Cumulative effects are also considered, i.e. the potential for the draft strategy to impact an aspect of the baseline when implemented alongside other plans, programmes and projects. These effect ‘characteristics’ are described within the assessment as appropriate.

18 BIODIVERSITY

18.1 Introduction

18.1.1 The aim of this chapter is to present an assessment of the draft strategy in terms of the ‘biodiversity’ related issues established through scoping (see Part 1 above). In summary, these issues are:

- Areas of key wildlife sites in ‘unfavourable declining’ condition
- Large part of the central area of the borough deficient in access to nature

¹²⁴ The implication being that it is difficult, if not impossible, to identify a ‘cause-effect relationship’ with any certainty.

¹²⁵ Environmental Assessment of Plans and Programmes Regulations 2004

18.2 Assessment findings

- 18.2.1 The strategy is likely to result in positive effects on the biodiversity baseline. In particular, the strategy is set to lead to benefits through promotion of the use of SuDS in new developments and by calling for the enhancement of the natural environment during flood risk management. In addition, a programme working to correct householder and business water misconnections is likely to secure water quality improvements in the Dagenham Brook, with resulting gains in freshwater biodiversity. An annual clearance of the borough's ditches may also help to ensure that the biodiversity value of these areas is not reduced (assuming the sensitive clearance of vegetation and sediment takes place).
- 18.2.2 **However**, there are opportunities to improve the strategies ability to deliver biodiversity gains. There is an opportunity for setting more specific criteria on how the natural environment could be enhanced during flood risk management (e.g. focused on the strategic placement of green infrastructure); although it must be recognised that there are resource implications to this. Whilst a programme focused on addressing misconnections in the Dagenham Brook catchment is likely to deliver benefits to freshwater, there is also the potential to encourage SuDS use in the catchment (including in the public realm) in order to further reduce levels of pollution in the Brook, whilst potentially delivering additional habitat through the creation of green spaces. There is also the potential for a more 'little and often' approach to ditch management to result in gains for biodiversity, although it is acknowledged that the biodiversity value of the borough's urban ditches may be much lower than that found in their countryside counterparts.

19 CLIMATE CHANGE MITIGATION

19.1 Introduction

- 19.1.1 The aim of this chapter is to present an assessment of the draft strategy in terms of the 'Climate change mitigation' related issues established through scoping (see Part 1 above). In summary, these issues are:
- There is a need to continue reducing CO2 emissions in the borough
 - The amount of waste the borough has to handle is expected to increase

19.2 Assessment findings

- 19.2.1 The strategy is likely to result in some limited positive effects in relation to climate change mitigation, with the potential for the promotion of SuDS in the new developments and enhancement of the natural environment in relation to flood risk works to result in habitat creation, and so carbon sequestration.
- 19.2.2 **However**, it is noted that the potential for habitat creation and so carbon sequestration could be increased by encouraging the use of SuDS 'treatment trains' in the Dagenham Brook catchment.

20 COMMUNITY AND WELLBEING

20.1 Introduction

- 20.1.1 The aim of this chapter is to present an assessment of the draft strategy in terms of the 'Community and wellbeing' related issues established through scoping (see Part 1 above). In summary, these issues are:
- The population of the borough is expected to grow by around a fifth by 2041
 - The borough suffers from high levels of deprivation
 - Health in the borough is worse than the London and England average over a range of indicators

- The entire borough has been designated as an Air Quality Management Area.
- Access to many areas of the borough's open space is limited

20.2 Assessment findings

- 20.2.1 The strategy is likely to result in positive effects in terms of community and wellbeing. The promotion of SuDS in new developments may lead to community benefits through the creation of greenspaces and other wider features in the urban environment (e.g. the use of rain gardens as traffic calming measures). Call for steps to be taken, where appropriate, to enhance the natural environment in relation to flood risk could also lead to the creation of green spaces with resulting community benefits. A programme of water connection improvements in the Dagenham Brook could also lead to health and recreation benefits through improved quality.
- 20.2.2 **However**, there are opportunities to increase the benefits the strategy can deliver to Waltham Forest's communities. Targeting the enhancement of the natural environment during flood risk management through the use of criteria could result in greater benefits. For example, preference could be given to the use of green infrastructure over hard engineering approaches where there is limited open green space or other forms of deprivation in the flood risk area; although it is recognised that this needs to be balanced against other competing pressures such as resources and level of risk. The use of SuDS treatment trains could also result in some improvement in water quality (with health and recreation benefits), with wider gains potentially available through the provision of green space that can be used recreationally.
- 20.2.3 It should be noted that whilst a number of the measures set out in the draft strategy may have a bearing on community and wellbeing in the sense that it will seek to protect human life and property through minimising flood risk, this is considered separately under the Flood risk topic.

21 ECONOMY

21.1 Introduction

- 21.1.1 The aim of this chapter is to present an assessment of the draft strategy in terms of the 'Economy' related issues established through scoping (see Part 1 above). In summary, these issues are:
- Waltham Forest has a small economy and relatively few businesses and jobs
 - Existing employment areas need to be used more intensively to aid economic growth
 - The borough is well placed in terms of developing a strong tourism sector

21.2 Assessment findings

- 21.2.1 The strategy is likely to result in some positive effects on the Economy baseline, although the route taken is not always that which will be achieved at least cost or with least burden upon developers. Incorporating SuDs measures into new developments to achieve greenfield runoff rates where possible (the preferred option) is likely to deliver benefits over the alternative, where multifunctional benefits would also be encouraged (albeit with a requirement that this takes place only 'where possible'). There is the potential for improvements in the natural environment in relation to flood risk management works to lead to economic benefits, as green infrastructure can raise the attractiveness of an area. The proposed programme of water connection improvements in the Dagenham Brook area is also likely to be the most cost effective approach, whilst an annual monthly programme of gully clearance offers a middle route between more and less economically advantageous alternatives (six monthly and eighteen monthly clearance programmes).

21.2.2 **However**, it is noted that the expectation that developers will contribute to wider flood risk measures in the Critical Drainage Areas they are building may place additional financial pressures on them, potentially affecting viability in some instance if contributions are not tailored to the size of the development (with onsite mitigation alone being a less onerous alternative). In enhancing the environment through flood risk management work, there is the potential to further maximise the economic benefits of such works (e.g. through the establishment of area based criteria which promote the use of green approaches in Waltham Forest’s Key Growth areas).

21.2.3 It should be noted that whilst a number of the measures set out in the draft strategy may have a bearing on the economy in the sense that it will seek to protect property through minimising flood risk, this is an issue that is considered separately under the Flood risk topic.

22 FLOOD RISK AND WIDER CLIMATE CHANGE ADAPTATION ISSUES

22.1 Introduction

22.1.1 The aim of this chapter is to present an assessment of the draft strategy in terms of the ‘Flood risk and wider climate change adaptation issues’ related issues established through scoping (see Part 1 above). In summary, these issues are:

- Five percent of properties are at risk of fluvial flooding, half of which are at significant risk
- Water and sewer flooding are considered to pose a moderate flood risk in the borough
- Heavy storms will increase in frequency with climate change

22.2 Assessment findings

22.2.1 The strategy is likely to result in **significant positive effects** on the Flood risk and wider climate change adaptation baseline. For instance, requiring developers to contribute to measures that reduce surface water flood risk in wider parts of the Critical Drainage Area (as well as on site) should lead to reduced surface flood risk. This is expected to lead to significant positive effects in terms of flood risk and climate change adaptation, particularly given the number of properties at risk from surface flooding in the borough, the population densities of the areas covered by CDAs, and predictions that climate change will lead to more frequent and heavier rainfall events during the summer months. An annual ditch clearance programme is also considered likely to lead to positive effects by ensuring that excess surface water is able to drain away. In addition, a regular gully clearance programme is also anticipated to lead to benefits in terms of flood risk by proactively seeking to prevent blockages that might cause flooding to occur.

22.2.2 **However**, it is noted that there are potentially opportunities to improve on the preferred approach, particularly in terms of wider climate adaptation. The development of specific criteria focused on the ‘greening’ of flood risk management work may help to target the benefits of green infrastructure (e.g. by ensuring the green spaces are created in those areas most vulnerable to the effects of overheating). In addition, the use of SuDS treatment trains in the Dagenham Brook catchment could result in the creation of habitat, so potentially helping to reduce the risk of surface water flooding (e.g. with vegetation absorbing slowing the flow of rainwater) and provide cooling (e.g. through shade provided by canopy cover).

23 HERITAGE, LANDSCAPE & TOWNSCAPE

23.1 Introduction

23.1.1 The aim of this chapter is to present an assessment of the draft strategy in terms of the ‘Heritage, landscape & townscape’ related issues established through scoping (see Part 1 above). In summary, these issues are:

- There were nine premises in Waltham Forest listed in the Heritage at Risk Register in 2013

23.2 Assessment findings

- 23.2.1 The strategy is likely to result in some positive effects on the Heritage, landscape & townscape baseline. For instance, seeking to ensure the use of SuDS in new developments may lead to the creation of green spaces and areas (e.g. green roofs) with landscape and townscape value. Taking steps to enhance the natural environment in relation to flood risk management works should also lead to similar benefits through habitat creation and restoration.
- 23.2.2 **However**, it is noted that the development of specific criteria on how the natural environment might be enhanced in relation to flood risk benefits could lead to increased benefits (e.g. encourage the use of green infrastructure over hard engineering works in those areas most in need of landscape and townscape enhancements). The use of SuDS ‘treatment trains’ to address water quality issues in the Dagenham Brook could also result in benefits in terms of Waltham Forest’s landscape and townscape by resulting in the creation or improvement of green spaces.

24 WATER

24.1 Introduction

- 24.1.1 The aim of this chapter is to present an assessment of the draft strategy in terms of the ‘Water’ related issues established through scoping (see Part 1 above). In summary, these issues are:
- The borough is in an area considered to be seriously water stressed
 - Water use in the borough is above levels for England and Wales
 - The borough's water courses are of moderate or poor ecological status

24.2 Assessment findings

- 24.2.1 The strategy is likely to result in **significant positive effects** on the Water baseline. In particular, the strategy is set to lead to benefits in terms of the Dagenham Brook where a programme of correcting householder and business water misconnections is proposed. Such action has in the past led to large improvements in the water quality of the Brook, which is subject to a number of issues, including a high presence of total coliforms. This approach is also a practical approach given the size of the Brook’s catchment. As such, the proposed programme focused on of water misconnections is expected to lead to significant positive effects in terms of water quality. The use of SuDS measures to achieve Greenfield runoff rates where possible may also help to improve water quality in some cases, whilst call for steps to be taken, where appropriate, to enhance the natural environment in relation to flood risk could result in improvements in water quality in some instances (e.g. through the use of roadside swales).
- 24.2.2 **However**, it is noted that there are opportunities to increase the water quality benefits that could be obtained through the strategy. For instance, the use of SuDS ‘treatment trains’ (e.g. green roofs, permeable paving, and settling ponds) in addition to the correction of water misconnections could help to reduce wider sources of water pollution (e.g. nitrogen, pesticides, hydrocarbons and other diffuse pollutants) whilst delivering a range of additional secondary benefits (e.g. recreational benefits of new green spaces). In addition, specific criteria could be developed to specify where the ‘greening’ of flood risk management works could be prioritised or improved in order to deliver water quality benefits (e.g. in the use of particular forms of green infrastructure in the catchments of polluted water bodies). Again, it is recognised that such benefits do need to be carefully considered alongside other priorities.

25 CONCLUSIONS AND RECOMMENDATIONS**25.1 Conclusions**

25.1.1 It is clear from our assessment that the LFRMS should deliver benefits against all of the SEA topic covered. In particular the strategy is likely to lead to benefits in terms of the mitigation of flood risk throughout the borough and improvements in water quality in the Dagenham Brook. In addition, the strategy is expected to lead to wider environmental improvements, for instance through the incorporation of SuDS in private developments and the enhancement of the natural environment in relation to flood risk management works where possible.

25.2 Recommendations

25.2.1 No major recommendations are put forward at this stage. There could be opportunities for further work to be undertaken around some issues, with a view to adding further detail to the strategy, but it is recognised that time and resources are limited. For example, further work could be undertaken to understand how green infrastructure opportunities could be better maximised and targeted (e.g. the strategic use of SuDS that deliver numerous cobenefits beyond flood risk).

25.2.2 The main recommendation is to put in place a considered approach to monitoring, including in relation to surface flood risk levels, water quality, and the steps taken to enhance the natural environment during flood risk management works. Monitoring recommendations are discussed further in Part 4 ('What happens next?') below.

PART 4: WHAT ARE THE NEXT STEPS (INCLUDING MONITORING)?

27 INTRODUCTION (TO PART 4)

The report must include...

- Measures envisaged concerning monitoring.

27.1.1 This Part of the report explains next steps that will be taken as part of plan-making / SEA.

28 STRATEGY FINALISATION AND ADOPTION

28.1.1 Subsequent to the current consultation the LFRMS will be finalised in-light of consultation responses and assessment findings presented within this Environmental Report. Once finalised, the intention is that the LFRMS will be formally adopted by the Council. At the time of Adoption a 'Statement' must published that sets out (amongst other things) *the measures decided concerning monitoring*.

29 MONITORING

29.1.1 At the current stage there is a need to present 'a description of the measures envisaged concerning monitoring'. Listed below is a short selection of proposed monitoring indicators. The indicators are those particularly relevant given the assessment findings presented in Part 3, above, i.e. given the potential negative effects and uncertainties highlighted. The following is suggested:

- Number of planning permissions granted contrary to the advice of the Environment Agency on either flood defence or water quality grounds
- Percentage of flooding incidents reported through the call centre that are answered within target timescales
- Percentage of gully's cleansed in accordance with targets set out in gully cleansing programme
- Change in water quality in the Dagenham Brook

APPENDIX I – THE WALTHAM FOREST SA FRAMEWORK

The following table shows the ‘framework’ used to inform SA work undertaken alongside preparation of Local Plans / Local Development Documents for Waltham Forest in recent years.

SA Objectives
Social
1. Meet local housing needs through the provision of a range of tenures and sizes of new dwellings
2. Reduce crime and the fear of crime
3. Improve standard of health and wellbeing of those who live and work in the Borough
4. Increase the provision of and access to community facilities to meet local cultural, recreational and social needs
5. Improve educational attainment in schools
6. Improve opportunities for access to education and training for all residents
7. Reduce the overall level of deprivation
8. Improve opportunities for access to local services, facilities and employment through an integrated sustainable transport system
Environmental
9. Reduce production of waste and increase recycling
10. Reduce greenhouse gas emissions
11. Conserve energy
12. Improve air quality through a reduction in traffic-based emissions
13. Improve water quality and ensure the efficient use of water resources
14. Reduce the risk of flooding
15. Reduce contamination and safeguard soil quality and quantity
16. Make the best use of previously developed land (PDL) and existing buildings
17. Conserve and enhance biodiversity
18. Protect the ecological integrity of Natura 2000 sites
19. Maintain and enhance the quality of the green belt and open space areas.
20. Conserve and enhance the historic built and natural environment
Economic
21. Maintain and enhance the vitality and viability of the Borough’s town centres
22. Improve the local economy by attracting inward investment
23. Maintain stable levels of employment in the Borough

APPENDIX II – CONSULTATION RESPONSES

The following table summarises amendments made to the Environmental Report in-light of scoping consultation.

Consultee	Amendments made
Environment Agency	<p data-bbox="427 712 1487 775">Made clear that ‘soft’ and ‘hard’ approaches to flood risk management are not mutually exclusive.</p>
Natural England	<p data-bbox="427 792 1487 855">Edited the SEA framework to make clear that green roofs are an example of how habitat creation could be achieved.</p>
English Heritage and wider consultees	<p data-bbox="427 875 667 902">No comment made.</p>

APPENDIX III – ALTERNATIVES: SUDS MEASURES IN NEW DEVELOPMENTS

Chapter 10 above (within Part 2) explains how ‘reasonable alternatives’ were established and presents summary assessment findings. The aim of this chapter is to present detailed assessment findings.

Assessment methodology

For each of the options, the assessment identifies and evaluates ‘likely significant effects’ on the baseline, drawing on the sustainability themes / objectives / issues identified through scoping (see Part 1) as a methodological framework. **Red** text / shading is used to indicate significant negative effects, whilst **green** text / shading is used to indicate significant positive effects.

Effects are predicted taking into account the criteria presented within Regulations.¹²⁶ So, for example, account is taken of the duration, frequency and reversibility of effects as far as possible. Effects are described in terms of these criteria within the assessment as appropriate. The potential for ‘cumulative’ effects is also a consideration.

Every effort is made to predict effects accurately; however, this is inherently challenging given the high level nature of the options. The ability to predict effects accurately is also limited by understanding of the baseline (now and in the future under a ‘no strategy’ scenario). In light of this, there is a need to make considerable assumptions regarding how options will be implemented ‘on the ground’ and what the effect on particular receptors will be. Where there is a need to rely on assumptions, this is made explicit in the assessment text.

In many instances, given reasonable assumptions, it is not possible to predict likely significant effects, but it is possible to comment on the relative merits of the alternatives in more general terms and to indicate a **rank of preference**. This is helpful, as it enables a distinction to be made between the alternatives even where it is not possible to distinguish between them in terms of ‘significant effects’.

¹²⁶ Schedule 1 of the Environmental Assessment of Plans and Programmes Regulations 2004

Assessment findings

- (1) Incorporate SuDs measures into new developments to achieve greenfield runoff rates where possible
 (2) As with Option 1, but with an additional requirement to maximise the multifunctional benefits delivered through SuDs where possible and where this does not unduly compromise flood protection

Topic	Discussion of significant effects ... and relative merits in more general terms	Categorisation / Rank of preference	
		Opt 1	Opt 2
Biodiversity	The SuDS concept is founded on a more sustainable approach to drainage, which by virtue is often multifunctional (i.e. it goes beyond prevention of flood risk and provides wider benefits). As such, it is considered likely that Option 1 's encouragement of 'SuDs in new developments will lead to positive effects in terms of Waltham Forests biodiversity. However, SuDs technologies differ in the degree to which they are multifunctional. For instance, the differences in biodiversity value between below surface collectors and urban wetlands and ponds. As a result, Option 2 's additional requirement for developers to maximise the multifunctional benefits delivered through SuDs should help to ensure that those technologies that deliver the greatest degree of wider benefits are considered and adopted. This approach is therefore considered more likely to deliver benefits for biodiversity.	2	★1
Climate change mitigation	As noted above in the assessment associated with the Biodiversity topic, the degree to which SuDS delivers multifunctional benefits varies. As such, an approach that emphasises the need to deliver the greatest degree of wider benefits (Option 2) is more likely to deliver SuDS that contribute to climate change mitigation, for instance through an emphasis on tree planting which will store carbon, than one focused only on the delivery of SuDs without reference to wider benefits (Option 1).	2	★1
Community and wellbeing	SuDs can provide community benefits, for example the creation of green space to store runoff can provide areas for social and recreational activities, whilst rain gardens can also be used as traffic calming measures. Whilst Option 1 and Option 2 could lead to positive community benefits in Waltham Forest in this manner, it is considered likely that Option 2 will lead to greater consideration and uptake of technologies that deliver such community benefits. As such, this is the preferred option.	2	★1
Economy	A requirement to maximise multifunctional benefits (Option 2) may be more onerous for developers, who will have to think more widely about the technological choice available to them in terms of their onsite SuDs and may have to pursue options that are more expensive (although not necessarily so). However, the requirement to only deliver such benefits 'where possible' should ensure that development is not unduly compromised by this Option. Option 1 may be preferable from an economic perspective, as it could place a lesser burden on developers in the Borough. However, it	★1	2

	should be noted that green spaces, such as those provided by certain multifunctional SuDS measures (e.g. rain gardens) can result in an improved urban environment that is attractive to business.		
Flood risk and wider climate change adaptation issues	As Option 2 requires the delivery of multifunctional benefits to ‘not unduly compromise flood protection’ there is felt to be no difference between Option 1 and Option 2 in terms of flood risk. However, the ability of SuDS technologies to deliver climate adaptation benefits beyond reduced flood risk varies. For example, the creation of green spaces can provide evaporative cooling in urban areas and so help to mitigate the Urban Heat Island effect. As such, Option 2 ’s call for developers to maximise the multifunctional benefits of SuDS may deliver greater benefits in terms of climate adaptation than Option 1 .	2	★1
Heritage, landscape & townscape	Option 2 ’s call for developers to maximise the multifunctional benefits of SuDS should lead to greater consideration of green infrastructure-focused responses to flood risk than Option 1 , with resulting benefits in terms of Waltham Forest’s landscape and townscape (e.g. increased cover by vegetation).	2	★1
Water	The use of SuDS measures to achieve greenfield runoff rates where possible (Option 1) may help to improve water quality in some instances, so leading to positive effects. However, an approach that emphasises the need to deliver the greatest degree of wider benefits (Option 2) is more likely to deliver such benefits given that SuDS technologies will differ in their ability to deliver water quality benefits as well as flood alleviation (e.g. the use of sub-surface infiltration compared to roadside swales) ¹²⁷ . For instance, encouraging the use of SuDS approaches that deliver multifunctional benefits could be of particular relevance in the Dagenham Brook, where there is a need for action to be taken on the issue of urban diffuse pollution. In a particular there is a need to tackle pollution at source by encouraging the use of multi-stage SuDS ‘treatment trains.’ ¹²⁸ As such, Option 2 is preferred in terms of the Water topic.	2	★1

Summary

SuDS approaches to water management are often multifunctional and deliver a range of benefits. As such, it can be expected that **Option 1** will deliver benefits across the sustainability topics covered in this assessment (with the exception of the Economic topic, where both Options can be expected to place a greater burden on developers in some circumstances). However, SuDS technologies vary in the degree to which they can be considered multifunctional and as a result, an additional criteria calling for the multifunctional benefits delivered through SuDS to be maximised should encourage greater consideration of the potential wider benefits of flood risk management work, with these additional benefits then secured where possible. As a result, **Option 2** is the strongest performer for the majority sustainability topics covered in this assessment, with its focus on multifunctional green infrastructure also supported by wider Government policy¹²⁹.

¹²⁷ Stovin, V. et al. (2007) Retrofit SUDS for Urban Water Quality Enhancement [online] available at: <http://retrofit-suds.group.shef.ac.uk/downloads/EA&BOCF%20Retrofit%20SUDS%20Final%20Report.pdf>

¹²⁸ Waltham Forest LB Council, Senior Drainage Engineer – Personal communication

¹²⁹ The NPPF calls for the adoption of ‘proactive strategies to adaptation and manage risks through measures including multifunctional green infrastructure, giving consideration to ecological networks’

APPENDIX IV – ALTERNATIVES: MITIGATION IN CRITICAL DRAINAGE AREAS

Chapter 11 above (within Part 2) explains how ‘reasonable alternatives’ were established and presents summary assessment findings. The aim of this chapter is to present detailed assessment findings.

Assessment methodology

See Appendix III, above.

Assessment findings

(1) Development in Critical Drainage Areas to contribute to measures to reduce surface water flood risk in that CDA (2) Development in Critical Drainage Areas to only address onsite surface water flood risk rather than risks in the wider CDA			
Topic	Discussion of significant effects ... and relative merits in more general terms	Categorisation / Rank of preference	
		Opt 1	Opt 2
Biodiversity	Measures to address surface flood risk in the borough’s Critical Drainage Areas are not anticipated to have any direct relationship with the Biodiversity topic.	-	-
Climate change mitigation	Measures to address surface flood risk in the borough’s Critical Drainage Areas are not anticipated to have any direct relationship with the Climate change mitigation topic.	-	-
Community and wellbeing	Measures to address surface flood risk in the borough’s Critical Drainage Areas are not anticipated to have any direct relationship with the Community and wellbeing mitigation topic. NB. Whilst it is the case that measures to address surface flood risk in the Critical Drainage Areas will have a bearing on community and wellbeing in the sense that it will seek to protect human life and property through minimising flood risk, this is considered separately under the Flood risk topic.	-	-
Economy	The expectation that developers will contribute to wider measures in the CDAs they are building in (Option 1) may place additional financial pressures on them, potentially affecting viability in some instances if contributions are not tailored to the size of the development, so leading to negative economic effects. As a result, Option 2 is considered to be the preferred choice in this instance, as its focus on onsite mitigation will likely be less onerous on developers. NB. Whilst it is the case that that measures to address surface flood risk in the Critical Drainage Areas will have a bearing on have a bearing on the economy in the sense that it will seek to protect	2	

	property through minimising flood risk, this is an issue that is considered separately under the Flood risk topic.		
Flood risk and wider climate change adaptation issues	Under Option 1 developers will be required to contribute to measures to reduce surface water flood risk in wider parts of the Critical Drainage Area as well as on site, leading to a reduction in surface flood risk across the CDA. This is expected to lead to significant positive effects in terms of flood risk and climate change adaptation, particularly given the number of properties at risk from surface flooding in the borough, the population densities of the areas covered by CDAs, and predictions that climate change will lead to more frequent and heavier rainfall events during the summer months. Option 2 would also lead to positive effects by ensuring that onsite surface water flood risk is considered during development in CDAs. However, this more narrowly-focused approach would limit the potential for new development to help address critical areas of concern within these CDAs.	★ 1	2
Heritage, landscape & townscape	Measures to address surface flood risk in the borough's Critical Drainage Areas are not anticipated to have any direct relationship with the Heritage, landscape & townscape topic.	-	-
Water	Measures to address surface flood risk in the borough's Critical Drainage Areas are not anticipated to have any direct relationship with the Water topic.	-	-

Summary

There is a clear trade off associated with the two options put forward focused on surface flood risk mitigation in the boroughs Critical Drainage Areas. On the one hand **Option 1** is considered likely to lead to a much greater benefit in terms of flood risk mitigation than **Option 2**, with both onsite and wider surface flood risk to be tackled through their contributions. On the other hand, **Option 2's** call for developers only to address the surface flood risk of their site is likely to be less onerous, and so could lead to improved viability in some instances with positive economic effects. On balance however it appears that **Option 1** is the stronger of the two put forward as it will protect the borough's population from the disruption caused by surface flooding, including the economic impacts of property loss and transport disruption (which may otherwise grow worse as climate change alters rainfall patterns). In terms of the potential negative effects of this Option on viability in some instances, it is suggested that contributions to wider surface flood risk measures should be scaled relative to the size of the development in question.

APPENDIX V – ALTERNATIVES: ENHANCING THE NATURAL ENVIRONMENT

Chapter 12 above (within Part 2) explains how ‘reasonable alternatives’ were established and presents summary assessment findings. The aim of this chapter is to present detailed assessment findings.

Assessment methodology

See Appendix III, above.

Assessment findings

(1) Where practical and appropriate, take steps to enhance the natural environment, in relation to flood risk management works			
(2) Set out more specific local requirements for the incorporation of green infrastructure in relation to flood risk management works			
Topic	Discussion of significant effects ... and relative merits in more general terms	Categorisation / Rank of preference	
		Opt 1	Opt 2
Biodiversity	<p>Option 1's call for steps to be taken, where appropriate, to enhance the natural environment in relation to flood risk is expected to deliver positive benefits in terms of biodiversity through the creation of green infrastructure. However, there is an opportunity to go further, by setting more specific criteria on how green infrastructure might be incorporated in such works (Option 2). For example, areas of Waltham Forest are considered to be deficient in access to nature (particularly the south of the borough). In response to this Option 2's criteria could specify that green infrastructure should be considered in preference to hard engineering in nature deficient areas, so enhancing both biodiversity and public access to it. Green infrastructure could also be strategically placed in order to encourage habitat connectivity (as called for by the Lawton Review). As a result, Option 2 is considered more likely to lead to positive effects on biodiversity as a result of its more targeted approach.</p>	2	
Climate change mitigation	<p>As carbon mitigation is a global issue, it is not considered likely that spatially-specific criteria could be developed (Option 2) that would provide any advantage over the general requirement to take steps to enhance the natural environment in relation to flood risk management works set out through Option 1. As a result, there are no differences to appraise between these two Options in the topic area of Climate Change mitigation.</p>	-	-

Community and wellbeing	The call for steps to be taken, where appropriate, to enhance the natural environment in relation to flood risk set out under Option 1 is considered likely to lead to positive effects in terms of community and wellbeing as a result of the social benefits that can be gained through the provision of green infrastructure (e.g. green spaces for recreation). However, there is the potential to improve the provision of flood risk management-oriented green infrastructure through the use of criteria (Option 2). For example, preference could be given to the use of green infrastructure over hard engineering approaches where there is limited open green space or other forms of deprivation. As such, it is anticipated that Option 2 could deliver the greatest degree of benefit in terms of Community and wellbeing.	2	★ 1
Economy	There is the potential for improvements in the natural environment in relation to flood risk management works to lead to economic benefits, as green infrastructure can raise the attractiveness of an area and so make it more favourable to business. ¹³⁰ As a result Option 1 should lead to economic benefits in the borough. However, the establishment of criteria setting out specific areas where a green infrastructure approach should be prioritised over hard engineering approaches could lead to greater benefits (Option 2). For example, green infrastructure could provide particular benefits in Waltham Forest's Key Growth areas (see Figure 7.6, p.28). Whilst green infrastructure may be more expensive than hard engineering works in some instances, it will be important to ensure that this expense is considered in the context of the wider economic benefits on offer.	2	★ 1
Flood risk and wider climate change adaptation issues	It is expected that a green infrastructure will only be incorporated into flood risk management works where the effect of this is neutral in terms of the risk of flooding. As such, there are expected to be no differences between the Options in this respect. In terms of climate change adaptation beyond flood risk, Option 1 may lead to benefits by greening the urban environment through flood risk management works. However, criteria developed under Option 2 could deliver more positive effects by targeting the establishment of green infrastructure in locations where benefits such as urban cooling are most necessary.	2	★ 1
Heritage, landscape & townscape	Taking steps to enhance the natural environment in relation to flood risk management works through Option 1 should lead to improvements in the borough's townscape and landscape. However, the development of criteria under Option 2 may present an opportunity to encourage the use of green infrastructure over hard engineering works in those areas most requiring such landscape and townscape enhancements. As such, this is considered to be the strongest Option.	2	★ 1

¹³⁰ Natural Economy Northwest – The economic benefits of Green Infrastructure: The public and business case for investing in Green Infrastructure and a review of the underpinning evidence [online] available at: [http://www.forestry.gov.uk/pdf/nweeconomicbenefitsofqiinvestigating.pdf/\\$FILE/nweeconomicbenefitsofqiinvestigating.pdf](http://www.forestry.gov.uk/pdf/nweeconomicbenefitsofqiinvestigating.pdf/$FILE/nweeconomicbenefitsofqiinvestigating.pdf)

Water	<p>Option 1's call for steps to be taken, where appropriate, to enhance the natural environment in relation to flood risk could result in improvements in water quality in some instances (e.g. through the use of roadside swales). However, there is the potential to improve the use of green infrastructure that can deliver water quality benefits through the use of criteria (Option 2). For instance, criteria could be developed specifying where green infrastructure approaches might be used to address urban diffuse pollution that is causing water quality issues in the Dagenham Brook.</p>	2	
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Summary

Ensuring that where possible, flood management measures go beyond being merely functional and secure wider environmental enhancements is a main aim of the Waltham Forest LFRMS. **Option 1** will help to achieve this by ensuring that take steps are taken to enhance the natural environment in relation to flood risk management works where practical and appropriate. As a result of this focus on environmental improvement, positive effects are expected in terms of Biodiversity, Climate change mitigation, Community and wellbeing, Economy, and Heritage, Landscape & townscape, and Water. However, for each of these Topic areas **Option 2** has been found to be a stronger performer due to its focus on targeted the use of green infrastructure at those spatial areas that would most likely benefit from its use over hard engineering approaches. Green infrastructure may be more expensive than hard engineering approach in some cases and as such it will be important for Policy to set out under what circumstances flood risk management within an identified 'opportunity area' might be exempt from proving green infrastructure. This could require consideration of the wider economic benefits of each approach. It should be noted, however, that a greater outlay of resources would be required to identify such green infrastructure 'opportunity areas' under **Option 2** and as such, **Option 1** may currently be most practicable alternative.

APPENDIX VI – ALTERNATIVES: WATER QUALITY IN THE DAGENHAM BROOK

Chapter 13 above (within Part 2) explains how ‘reasonable alternatives’ were established and presents summary assessment findings. The aim of this chapter is to present detailed assessment findings.

Assessment methodology

See Appendix III, above.

Assessment findings

(1) Improve water quality in the Dagenham Brook through correcting householder and business water misconnections (2) Improve water quality through use of interceptors to treat water before it enters the Dagenham Brook (3) Use SuDS ‘treatment trains’ to treat runoff at source within the Dagenham Brook catchment where possible				
Topic	Discussion of significant effects ... and relative merits in more general terms	Categorisation / Rank of preference		
		Opt 1	Opt 2	Opt 3
Biodiversity	<p>Freshwater biodiversity is likely to be negatively affected by the poor water quality that currently affects the Dagenham Brook. On the alternative put forward to address this issue, the correction of householder and business water misconnections (Option1) appears the most likely to deliver benefits. This is due to the gains in water quality already seen through prior work on misconnections in the borough,¹³¹ with further positive effects considered likely as a result of future action in this area, so resulting in gains for Waltham Forest’s freshwater biodiversity.</p> <p>Benefits to Waltham Forest’s biodiversity are also predicted to occur through the wider use of SuDS ‘treatment trains’ in private developments and the wider public realm (Option 3). This is due to the fact that multistage treatment of water (e.g. through the use of green roofs, permeable paving, and settling ponds) could strip out some pollutants (e.g. hydrocarbons) and so support freshwater biodiversity, whilst also providing secondary benefits through habitat provision. However, this approach is less likely to deliver benefits in terms of reducing coliform pollution in the Brook and will be less easy to roll out quickly, given the scale of the Brook’s catchment areas. As</p>		3	2

¹³¹ Waltham Forest LB Council, Senior Drainage Engineer – Personal communication

	<p>such, this approach has been ranked lower than the work focused on misconnections.</p> <p>Option 2's suggested use of interceptors to address water quality issues in the Dagenham Brook has many of the same advantages (treats silt and some pollutants) and disadvantages (hard to roll out in a large catchment doesn't tackle human waste as a SuDS focused approach. However, it is also less likely to deliver secondary habitats (such as those provided by green roofs) and so has been ranked third in terms of biodiversity.</p>			
Climate change mitigation	<p>The use of SuDS 'treatment trains' to address water quality issues in the Dagenham Brook (Option 3) is more likely to deliver climate change mitigation benefits, as such approaches may create habitat which can act as a store of carbon (e.g. resulting from tree planting). Both Option 1 and Option 2 are expected to result in no creation of additional habitat, and so limited effects in terms of climate change mitigation.</p>	2	2	★1
Community and wellbeing	<p>Both Option 1 (a programme of connection improvements) and Option 3 (promotion of SuDS treatment trains) have the potential to deliver community and wellbeing benefits. Option 1 is anticipated to result in large improvements in the Dagenham Brook's water quality by reducing the amount of human waste entering the waterway. This could lead to health benefits¹³² and the increased use of the waterway for recreational purposes. Whilst less likely to tackle human waste, the use of SuDS treatment trains (Option 3) may result in some improvement in water quality (with health and recreation benefits), with wider gains potentially available through the provision of green space that can be used recreationally, with resulting health and wellbeing benefits. Option 2 (the use of interceptors) may be able to deliver pollution alleviation benefits in the same manner as SuDS (i.e. with the ability to treat some pollutants, but not human waste), but without potential wider gains through green space collection.</p>	★1	2	★1

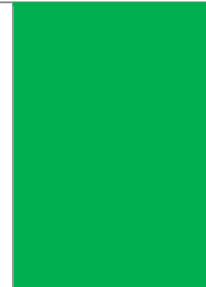
¹³² A 2011 study found that the Dagenham Brook (along with other tributaries of the River Lee) possessed 'considerably high levels of chemical oxygen demand with alarmingly high counts of total coliforms, in addition to some localised problems with faecal coliforms'. It goes on to note that 'although coliforms do not cause disease themselves, they can be used to assess the possible risk to human and pet health if individuals were to come into contact with water from these watercourses' and 'sources of faecal coliforms include seepage of faecal waste from domestic pets, untreated or poorly treated sewage effluent, in addition to seepage of agricultural silage or livestock waste' which 'therefore could indicate possible problems with pet waste disposal, sewage treatment processes, pipe misconnections from domestic and commercial foul sewers or poor waste management practices within local farms'.

Source: Grieg R Davies for Thames 21 (2011) A water quality analysis of the River Lee and major tributaries within the perimeter of the M25, from Waltham Abbey to Bow Locks. [online] available at: <http://www.thames21.org.uk/Downloads/A%20water%20quality%20analysis%20of%20the%20River%20Lee%20and%20major%20tributaries%20within%20the%20perimeter%20of%20the%20M25.%20from%20Waltham%20Abbey%20to%20Bow%20Locks%20-Thames21.pdf>

Economy	In terms of the economic implications of the approaches put forward, Option 1 is considered most likely to be cost effective given the relative ease by which it could be rolled out across the Dagenham Brook catchment and the relatively low cost of correcting misconnected pipes through a regular monitoring programme. In contrast Options 2 and 3 would require large scale work to install interceptors or SuDS treatment trains into new developments and the public realm, with this expense likely to be greater should a programme of retrofitting also be undertaken.		2	2
Flood risk and wider climate change adaptation issues	Option 3's proposed use of SuDS 'treatment trains' to address water quality issues in the Dagenham Brook is more likely to deliver flood risk and wider climate change adaptation benefits, as such approaches may reduce the risk of surface water flooding (e.g. with vegetation absorbing slowing the flow of rainwater) and provide cooling (e.g. through shade provided by canopy cover). Both Option 1 and Option 2 are expected to result in no creation of additional habitat, and so limited effects in terms of climate change mitigation and flood risk management.	2	2	
Heritage, landscape & townscape	The use of SuDS 'treatment trains' to address water quality issues in the Dagenham Brook may result in benefits in terms of Waltham Forest's landscape and townscape (e.g. increased cover by vegetation). Both Option 1 and Option 2 are expected to result in no creation of additional habitat, and so limited effects in terms of heritage, landscape & townscape.	2	2	
Water	The programme of correcting householder and business water misconnections set out under Option 1 is considered likely to lead to large gains in terms of water quality within the Dagenham Brook. The presence of total coliforms in the Brook is considered to be high ¹³² and as a result it is important that human waste is directed into the foul network. A regular monitoring programme focused on such misconnections is also considered to be the most practical option for addressing water quality issues in the Brook's large catchment, so suggesting that the effects of this approach will be felt more quickly than a programme focused on fitting infrastructure to new and existing development (such as under Option 2 and Option 3). In addition, previous work on addressing misconnections in the catchment has led to large gains in terms of water quality. ¹³³ Given the poor water quality of the Dagenham Brook, Option 1 is considered likely to lead to significant positive effects under the water topic.		2	2

¹³³ Waltham Forest LB Council, Senior Drainage Engineer – Personal communication

The use of interceptors in new and existing development (**Option 2**) can help to treat silt, nitrogen, pesticides, and other pollutants, but can't treat human waste, which is complex and requires sophisticated treatment works. The multistage SuDs advocated through **Option 3** (e.g. green roofs, permeable paving, and settling ponds in 'treatment trains') can also strip pollutants, but again are less able to handle complex human waste. Whilst it important that pollutants are treated on site where practical, the roll out of such technologies across the large Dagenham Brook catchment would be slower than **Option 1** and would be unlikely to result in such large scale positive changes in water quality (although the overall effect would still be positive).



Summary

Given the low water quality in the Dagenham Brook, the particular need to address human waste finding its way into this water course, and the large scale of the catchment involved, it is clear that **Option 1**'s proposed programme of correcting householder and business water misconnections is the preferred approach. This is as a result of its ability to ensure that human waste is directed to the foul network, the relative ease by which such changes can be made when compared to the fitting or retrofitting of interceptors (**Option 2**) or SuDS (**Option 3**), and evidence that such an approach is already leading to large gains in terms of water quality¹³⁴. In addition to the direct benefit of improved water quality in the brook, Option 1 is also expected to lead to secondary benefits in terms of freshwater biodiversity, community and wellbeing (by potentially providing health and recreation benefits) and economy (by offering a cost effective approach to improving water quality). In terms of their ability to deliver water quality, both **Option 2** (the use of interceptors) and **Option 3** (the use of SuDS treatment trains) offer a different form of water treatment, with a focus on addressing silt, nitrogen, pesticides, hydrocarbons and other diffuse pollutants, but with little ability to treat more complex human wastes that require specialist treatment (i.e. in dedicated water treatment works). The removal of such pollutants is anticipated to have a smaller, albeit positive effect on water quality when compared to **Option 1**, whilst also being more expensive and time consuming to roll out over the large Dagenham Brook catchment. However, in terms of secondary benefits, it is important to note that the use of multistage SuDS proposed in **Option 3** (e.g. green roofs, permeable paving, and settling ponds in 'treatment trains') could lead to a wide range of secondary benefits. These include biodiversity, climate change mitigation, community and wellbeing, flood risk and climate adaptation, and heritage, landscape & townscape resulting from the potential creation of habitat and green space. Given these wider benefits, and the wider sources of pollution tackled, it appears that **Option 3** is complementary to **Option 1**. As such, it is advised that whilst efforts should be focused on correcting misconnections in the Dagenham brook catchment, there is also a need to promote the use of SuDs in new development and to install such measures in the public realm where appropriate. In particular, there are gains to be made where water drains not into the sewage network, but directly into waterways, so providing a basis for targeted action in the catchment.

¹³⁴ Waltham Forest LB Council, Senior Drainage Engineer – Personal communication

APPENDIX VII – ALTERNATIVES: DITCH CLEARANCE PROGRAMME

Chapter 14 above (within Part 2) explains how ‘reasonable alternatives’ were established and presents summary assessment findings. The aim of this chapter is to present detailed assessment findings.

Assessment methodology

See Appendix III, above.

Assessment findings

(1) Annual clearing of ditches at Overton Road, Chingford Lane, Rangers Road, Oak Hill, Brookfield Path and Leyton Common Sewer (2) As with Option 1, but with clearance undertaken every six months (3) As with Option 1, but with clearance undertaken every 18 months				
Topic	Discussion of significant effects ... and relative merits in more general terms	Categorisation / Rank of preference		
		Opt 1	Opt 2	Opt 3
Biodiversity	Guidance on biodiversity friendly ditch clearance suggest that a little and often approach is best able to support wildlife ¹³⁵ , with ditches cleared gradually over a few years. A six monthly approach (Option 1) could therefore be most effective at preserving the biodiversity value of the borough’s ditches (should clearance be undertaken in a sensitive manner, with areas cleared gradually, so allowing for diverse conditions to emerge). Less frequent clearance under Option 3 (every 18 months) would be more likely to result in overgrown vegetation and shading in many of the borough’s ditch systems, potentially leading to adverse effects on biodiversity. Option 2 presents a middle ground between these two approaches, so leading to moderate benefits in terms of biodiversity (assuming the sensitive clearance of vegetation and sediment takes place).		2	3
Climate change mitigation	The borough’s ditch clearing programme is not anticipated to have any direct relationship with the Climate change mitigation topic.	-	-	-
Community and wellbeing	The borough’s ditch clearing programme is not anticipated to have any direct relationship with the Community and wellbeing topic.	-	-	-

¹³⁵ RSPB – Farming for wildlife: Ditch management [online] available at http://www.rspb.org.uk/Images/Ditch%20management_tcm9-207644.pdf

	NB. Whilst it is the case that the borough's ditch clearing programme will have a bearing on community and wellbeing in the sense that it will seek to protect human life and property through minimising flood risk, this considered separately under the Flood risk topic			
Economy	<p>The clearance of Waltham Forest's ditches every 18 months (Option 3) is most likely to be beneficial from an economic perspective, with less staff time and material input required as a result of less frequent maintenance. Conversely, Option 1 is likely to be the most expensive programme of clearing, with Option 2 forming a middle ground between the two.</p> <p>NB. Whilst it is the case that the borough's ditch clearing programme will have a bearing on have a bearing on the economy in the sense that it will seek to protect property through minimising flood risk, this is an issue that is considered separately under the Flood risk topic.</p>	3	2	★1
Flood risk and wider climate change adaptation issues	Most ditches are considered to require some degree of annual maintenance every year in order to ensure that excess surface water is able to drain appropriately ¹³⁶ . As such, Option 2 is likely to provide sufficient levels of surface flood risk management. By increasing the frequency of ditch clearing activities, Option 1 may increase levels of flood risk protection still further, although there may be diminishing returns in terms of the additional protection provided. Option 3 provides what appears to be a less than optimum level of clearance, and so could lead to negative effects in terms of surface flood risk across the borough and significant negative effects within Waltham Forest's Critical Drainage Areas where multiple sources of surface flood risk have the potential to combine to produce flood events of greater impact.	★1	2	3
Heritage, landscape & townscape	The borough's ditch clearing programme is not anticipated to have any direct relationship with the Heritage, landscape & townscape mitigation topic.	-	-	-
Water	According to guidance on biodiversity friendly ditch clearing, visual monitoring of water bodies can give an indication of quality, with clear water, a range of plants and abundance of insects considered signs of good water quality. Should ditch clearance works include basic monitoring of water quality by staff, a more frequent management regime (Option 1) would be preferable as issues could be highlighted at an early stage. Option 3 's less frequent clearance programme would result in a much later	★1	2	3

¹³⁶ Northamptonshire County Council – Ditch clearance guidelines [online] available at: <http://www.northamptonshire.gov.uk/en/councilservices/Environ/flood/Documents/PDF%20Documents/Ditch%20Clearance%20Gidelines.pdf>

flagging of water quality issues, with **Option 2** representing a middle ground.

Summary

In terms of overall performance across the SEA topic areas, **Option 1** is the strongest of those put forward. It is anticipated that a more frequent programme of ditch clearance could lead to benefits in terms of biodiversity (assuming a sensitive, staggered approach to clearance that preserves habitat diversity), flood risk, and water quality (assuming basic monitoring of water condition during any clearance works). However, this comes at an economic cost, with **Option 1** ranked lowest under the Economy topic and an 18 month programme of clearance (**Option 3**) ranked highest. The benefits of a more frequent approach area also unclear in some respects. For example, it is felt that the biodiversity value of the ditches in Waltham Forest’s heavily urbanised areas may not be particularly high¹³⁷, whilst there may also be diminishing returns in terms of the levels of surface flood risk protection offered by more frequent management. Given these uncertainties, and the disadvantages of an 18 month approach (**Option 3**) in terms of biodiversity, flood risk, and water quality, it may be most appropriate to pursue the annual approach outlined in **Option 2**. This presents a middle ground between the economic benefits of **Option 3** and the wider, but more unpredictable, benefits of **Option 3**. In terms of this unpredictability, **Option 2** could be strengthened by adding criteria which states that more frequent clearance can take place where benefits of doing so can be identified (e.g. in areas of the borough ditch system that are particularly biodiverse, or where flood risk or water quality issues are identified). There is also the opportunity to improve the policies performance in terms of biodiversity (regardless of the frequency chosen) by specifying that ditch clearance is undertaken in line with guidance on wildlife friendly ditch management.

¹³⁷ Waltham Forest LB Council – Personal communication

APPENDIX VIII – ALTERNATIVES: GULLY CLEARANCE

Chapter 15 above (within Part 2) explains how ‘reasonable alternatives’ were established and presents summary assessment findings. The aim of this chapter is to present detailed assessment findings.

Assessment methodology

See Appendix III, above.

Assessment findings

(1) Develop and implement a regular programme of gully cleaning to ensure drainage systems are operating at capacity (2) Gully cleaning carried out as and when blockages are reported			
Topic	Discussion of significant effects ... and relative merits in more general terms	Categorisation / Rank of preference	
		Opt 1	Opt 2
Biodiversity	The borough’s gully cleaning programme is not anticipated to have any direct relationship with the Biodiversity topic.	-	-
Climate change mitigation	The borough’s gully cleaning programme is not anticipated to have any direct relationship with the Climate change mitigation topic.	-	-
Community and wellbeing	<p>The borough’s gully cleaning programme is not anticipated to have any direct relationship with the Community and wellbeing topic.</p> <p>NB. Whilst it is the case that the borough’s gully cleaning programme will have a bearing on community and wellbeing in the sense that it will seek to protect human life and property through minimising flood risk, this considered separately under the Flood risk topic</p>	-	-
Economy	<p>It is expected that responding to gully blockages as and when they are reported (Option 1) would be advantageous from an economic perspective as fewer resources would have to be employed to check gullies which may not be blocked. Conversely, Option 2’s proposed programme of regular gully cleaning is likely to be the more expensive of the options put forward.</p> <p>NB. Whilst it is the case that that that the borough’s gully cleaning programme will have a bearing on have a bearing on the economy in the sense that it will seek to protect property through minimising flood risk, this is an issue that is considered separately under the Flood risk topic.</p>	2	

Flood risk and wider climate change adaptation issues	The Construction Industry Research and Information Association Report 183 suggests that gully cleaning programmes normally have a cleaning frequency of between once and twice per year, with gullies in those areas having heavy sediment loads potentially being cleaned more often. ¹³⁸ A failure to adequately clean gullies can lead to increased risk of surface water flooding. As such, reporting blockages (Option 2) may lead to negative effects in terms of flooding as by the time an issue is reported, there may already be flooding occurring (on the assumption that this is one of the first clear signs that a Gully is blocked. Option 2 may also lead significant negative effects in the borough's Critical Drainage Areas where multiple sources of surface flood risk have the potential to combine to produce flood events of greater impact. Given the number of properties at risk of surface flooding in Waltham Forest a regular programme of gully cleaning (Option1) is likely to lead to benefits in terms of flood risk by proactively seeking to prevent blockages that might cause flooding to occur.		2
Heritage, landscape & townscape	The borough's gully cleaning programme is not anticipated to have any direct relationship with the Heritage, landscape & townscape topic.	-	-
Water	The borough's gully cleaning programme is not anticipated to have any direct relationship with the Water topic.	-	-

Summary

Given levels of surface water flood risk in the Waltham Forest area it is clear that a regular programme of gully cleaning (**Option 1**) will lead to benefits in terms of flood risk, as a proactive strategy will route out these potential causes of flooding before they can cause wider damage. Responding only to blockages when they are reported (**Option 2**) is likely to heighten surface water flood risk in the borough, particularly where multiple sources of surface flood risk have the potential to combine to produce flood events of greater impact. Whilst **Option 2** is likely to be cheaper from a basic economic perspective (i.e. it will not waste time and resources checking gullies that are not blocked), the wider impacts of increased flood risk are likely to far outweigh this cost. As a result, **Option 1** is considered to be the preferred approach. In terms of the frequency of clearance, once or twice annually is suggested. In areas of high sediment and/or within Critical Drainage Areas cleaning twice a year or more often might help to reduce surface flood risk.

¹³⁸ Rotherham Borough Council: Gully cleansing summary report [online] available at: <http://moderngov.rotherham.gov.uk/mgConvert2PDF.aspx?ID=34032>