

Lower Lee Flood Risk Management Strategy

Strategic Environmental Assessment

Non-Technical Summary



August 2006



**ENVIRONMENT
AGENCY**

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1. Introduction

The Lower Lee Flood Risk Management Strategy is being carried out to investigate flood risk management options for the Lower Lee catchment (Figure 1) through modelling, economic and technical appraisal and Strategic Environmental Assessment (SEA). The Strategy is intended to guide those involved in flood risk management and planning for the next 100 years. The Strategy will make recommendations for short, medium and long term actions.

This non-technical summary of the Strategy will assist with consultation on the SEA and the proposed options for flood risk management. The purpose of this consultation is to consult on the Strategy by presenting the SEA findings in terms of the key issues, the environmental constraints and opportunities, and the proposed strategy options.

2. Strategy Objectives

The key objectives of the Strategy are:

- To develop a 100 year flood risk management strategy for the Lower Lee system, taking account of flood risk and increased risks associated with climate change and development.
- To identify and appraise flood risk management options for implementation in the short, medium and long term, including structural and non-structural solutions.
- To scope and investigate significant environmental impacts of these options and related opportunities for environmental enhancement.

3. The River Lee Catchment

The River Lee rises just north of Luton, and its confluence with the Thames is 2.5 km upstream of the Thames Barrier, at Bow Creek. The Upper Lee is mainly rural, with arable farming the most common land-use. Major urban areas include Luton, Wheathampstead, Hertford and Ware.

The river character changes south of Hertford, where it becomes navigable and increases in size significantly with the flows from the main tributaries. The Lower Lee flows through an increasingly urbanised environment, including Waltham Abbey, Grange Park, Edmonton, Walthamstow, Chingford, Hackney and Stratford.

The area covered by this Strategy is approximately one third of the Lee Valley catchment and much of the developed area at risk of flooding. The strategy boundaries are shown on Figure 1 and include the following:

- River Lee from its confluence with the River Thames at Bow Creek to just south of Wheathampstead.
- The Lower Lee tributaries, which include Lynch Brook, Spital Brook, Small Lee, Nazeing Brook, Cobbin's Brook, Turkey Brook, Salmons Brook, Ching Brook, Pymmes Brook and Moselle Brook.

4. Flood Risk

The Lower Lee catchment is heavily urbanised with large parts of the floodplain developed. The combination of man-made surfaces and clayey soils means the local rivers respond rapidly to rainfall and are liable to sudden flooding after storms. The Lower Lee also drains a large, mainly rural, area upstream. Flood risk areas are identified throughout the Lee Valley catchment, although the principal flood risks are associated with the Lower Lee tributaries.

Major flooding in 1947 led to the construction of the Lee Flood Relief Channel (FRC), which became operational in 1976. Since then there has been no major flooding, although the river

system has almost reached full capacity in 1987, 1993 and 2000. In contrast, flooding in the tributaries, such as Salmons Brook, Cobbin's Brook and Ching Brook, has been frequent in the last 20 years. There is also a flood threat at Hertford on the Upper Lee.

The main flood risk areas are indicated in Figure 2 and include:

- River Lee: Enfield Lock to Sewardstone, Waltham Forest, Lee Valley trading estate, Walthamstow, Hertford;
- Lower Lee tributaries: Waltham Abbey (Cobbin's Brook); Grange Park (Salmons Brook); Chingford (Ching); Upper Edmonton (Pymmes); Walthamstow (Dagenham Brook).

Table 1 gives an indication of the scale of the flood risks within the strategy area. The data are based on computer modelling of 5%, 2%, and 1% annual probability (AP) floods, i.e. the chance of such a flood occurring in any one year. Within the Strategy area, our modelling estimates that there are approximately 6,910 properties currently at risk of fluvial flooding in a 1% annual probability event.

Table 1 Existing Flood Risks	Numbers of Properties 'At Risk' in 5%, 2% and 1% Annual Probability (AP) floods events		
	5% AP	2% AP	1% AP
River Lee (incl Hertford)*	359	1,485	2,604
Lower Lee Tributaries**			
Pymmes Brook	139	198	1,474
Ching Brook	207	440	568
Small Lee	12	102	201
Lynch/Spital Brooks	69	75	78
Turkey Brook	10	47	115

* includes Enfield Lock to Sewardstone area, Waltham Forest, Lee Valley trading estate, Walthamstow area

** main flood risks; excludes Salmons/Cobbin's/Nazeing as subject to separate studies

5. Existing Flood Defences

The flood relief channel (FRC) is a critical flood defence asset in the complex Lee catchment. A continuation of current investment to maintain this is a key consideration. Modelling has identified under-capacity as the main weakness of the FRC.

Flood defences also benefit the Lower Lee tributaries and other flood risks areas, and improvements may be justified. The existing flood defences generally provide protection against flood events with a 2% chance of occurring in any year, but in some areas the level of protection is as low as 5%.

6. Environmental Objectives, Constraints and Opportunities

Environmental objectives have been set to provide a basis for environmental appraisal. These are listed in Table 2. These objectives were consulted on and agreed with internal and external consultees in Autumn 2005, then used as a benchmark for assessing the flood risk management options. They will also be used to monitor the strategy.

The main environmental constraints and opportunities specific to the Lower Lee catchment were identified through an evaluation of baseline conditions and consultation with stakeholders. Broadly these may be summarised as follows:

- The network of water and wetland habitats associated with the floodplains (most significantly the Lee Valley Special Protection Area (for birds) and Ramsar (wetland) site) must be protected, and might be added to.
- Relevant spatial plans generally require protection and enhancement of the nature conservation value and landscape value of river corridors and floodplains.
- Options which open up the river corridor, set back flood defences and/or establish new washlands, floodplains and wetlands could contribute to habitat and wildlife value.
- Prominent areas for recreation (Lee Valley Regional Park, Lee Navigation) need to be preserved, and there may be opportunities for improvement. Additional recreational access to the river could be achieved by opening up the river corridor and setting back defences, contributing in particular to London's greenspace initiatives.
- River corridor habitat, landscape and access improvements which could be associated directly with some flood management options would be compatible with relevant spatial planning concepts such as the Blue Ribbon network (enhancing London's waterways) and the Green Grid concept (maximising and enhancing greenspace in East London).

Table 2: Environmental Objectives

Theme	Purpose <i>(Relevant factor from Annex I of SEA Directive)</i>	Objective
<i>"An enhanced environment for wildlife, a better quality of life"</i>	Protect and enhance biodiversity <i>(Biodiversity, flora and fauna)</i>	<ol style="list-style-type: none"> 1. Avoid damage to designated wildlife sites including those of international, national, regional and local importance and protect or enhance the favourable condition status of habitats or species listed within them. 2. Protect and where possible enhance species and habitats listed in relevant Biodiversity Action Plans (national, local, EA) in line with targets for areas encompassed by the Lower Lee Catchment. 3. Protect and where possible improve the status of fisheries.
<i>"A better quality of life"</i>	Avoid effects on human health and population <i>(Human health, population).</i>	<ol style="list-style-type: none"> 4. Reduce the impacts on humans (the local population) from the effects of flooding related in particular to storm events and channel under capacity. 5. Protect and enhance recreational and amenity facilities.
<i>"Improved and protected inland and coastal waters"</i>	Protect and improve inland waters <i>(Water)</i>	<ol style="list-style-type: none"> 6. Maintain and improve surface water quality where feasible. 7. Ensure that groundwater resources are protected. 8. Reduce the amount of waste and opportunities for waste disposal associated with the river (e.g. fly-tipping). 9. Restore riparian corridors, including floodplain connectivity and natural processes.
<i>"Limiting and adapting to climate change"</i>	Mitigate impacts from climate change <i>(Climatic factors)</i>	<ol style="list-style-type: none"> 10. Reduce vulnerability of the human population & property to changes in flooding patterns/risks resulting from climate change
<i>"A better quality of life"</i>	Protect and enhance features cultural heritage <i>(Cultural heritage).</i>	<ol style="list-style-type: none"> 11. Prevent damage to statutory archaeological / heritage sites (Scheduled Monuments, Registered Historic Parks and Gardens, Listed structures) and non-statutory sites.
<i>"A better quality of life"</i>	Protect and enhance landscape character / visual amenity <i>(Landscape)</i>	<ol style="list-style-type: none"> 12. Protect, enhance and encourage enjoyment of the landscape

- Known cultural heritage features in the river corridors and floodplains are generally considered sensitive to flooding and disturbance. The Lee valley in Hertfordshire has no archaeological designations but may offer particular archaeological value. Additional unknown heritage may be sensitive to water levels both above and below ground.
- Spatial plans relevant to the Strategy area recognise a requirement to provide adequate flood protection to support existing economic uses.
- There are a number of significant development areas (throughout the lower catchment in particular) for which flood management has also been identified as critical, but which might also provide opportunities to make additional space for water beyond the needs of the immediate developments themselves.

Environmental constraints maps have been produced to display information on features of regional or greater importance in respect of: nature conservation; heritage and archaeology; water resources/quality; and open space. Significant proposed or on-going developments have also been identified. These are included in the main Environmental Report.

The Lower Lee catchment falls within the boundaries of two counties, two London sub-regions and several local authorities. The lower part of the catchment has been identified as a priority area for economic regeneration, with plans for major developments along the Lee valley in particular (e.g. the 2012 Olympics and Cross Transit Rail Link at Stratford). The spatial plans for London and the East of England target a number of areas for major housing development. In particular the Strategy area overlaps in part with two Office of the Deputy Prime Minister Growth Areas, i.e. the London-Stansted-Cambridge Corridor and the Thames Gateway.

In terms of long-term strategic planning for flood risk management, over a 100 year horizon, the trend of development and ever increasing population (10% in London by 2016) will continue.

7. Links With Other Studies and Schemes

The Strategy was developed in parallel with studies to address the severe flooding in 2000 on Cobbin's Brook, Salmons Brook and Nazeing Brooks. Currently, the Cobbin's and Salmons flood storage areas are at detailed design stage. However, the Nazeing Brook scheme is not being promoted, as no viable scheme was identified following feasibility study.

Other relevant studies considered during Strategy development were:

- Review of FRC Structures Study, ongoing.
- FRC Integrity Enhancement Study, May 2004.
- Strategic Flood Risk Assessment – Lower Lee Valley Masterplan Area, October 2004.
- Upper Lee Flood Defence Strategy Study, January 2002 (Halcrow).
- River Stort Flood Risk Management Strategy – Inception Study, August 2002 (Atkins).
- River Ash Flood Risk Management Strategy – Inception Study, July 2005 (Atkins).
- River Ash Flood Risk Management Strategy – Mini Gateway Report, Dec 2005 (Atkins).
- River Rib Flood Risk Management Strategy – scheduled to commence in 2006.
- Upper Lee Level of Service Study, May 2002.

8. Option Selection & Appraisal

8.1 General Approach

An integrated package of non-structural and structural measures is required to manage flood risk in the long term. A long-list of flood risk management options was identified, then a short-list of options selected. This short-list was evaluated to form the preferred strategy.

The approach to options appraisal involved detailed evaluation against economic, technical and environmental criteria necessary to develop, cost and prioritise the options. Specifically the options appraisal included:

- Modelling investigations to identify flood risk and evaluate each option.
- Technical scoping to outline the details of options.
- Strategic Environmental Assessment (SEA) to establish whether there could be significant environmental benefits or environmental impacts of selected options.

8.2 SEA & Consultation

The environmental appraisal has followed the SEA regulations. A broadscale approach was taken whereby features of strategic (regional or greater) interest were identified using mapping software and through consultation, and each option was assessed in terms of the potential contribution to, or impact on, these features and the agreed environmental objectives.

In addition, opportunities for environmental improvement were identified and investigated in the SEA for the flood risk management options. These included:

- Urban green space (aiming to identify opportunities for their improvement or linkage along river corridors).
- Major development proposals and opportunity areas identified in spatial plans (which could present opportunities for significant environmental improvements in river corridors).

Using this approach, all the technically and economically viable Strategy options were appraised. The assessment for the whole Strategy area is shown in Table 3. This is further detailed in the Environmental Report, which also includes more detailed environmental appraisal outcomes for the 14 separate tributaries and sections of the River Lee within the study area, including an assessment of the level of significance of the impacts (major, moderate or minor).

Table 3: Summary of Predicted Environmental Impacts for the Lower Lee Catchment over the 100-Year Lifetime of the Strategy

Theme	Strategic Environmental Objectives	Indicators	Do-nothing	Do Minimum	Non-Structural	Storage	Hard Defences	Improved Operation of Flood Relief Channel
To protect and, where possible, enhance biodiversity	Avoid damage to designated wildlife sites including those of international, national, regional and local importance and protect or enhance the favourable condition status of habitats or species listed within them.	Extent and type of change in condition of designated site.	Increased floodplain connectivity & total wet habitat area	Unlikely to have significant effect	Increased floodplain connectivity	Increased total wet habitat area	Potentially adverse if adjacent to site	Potential adverse effect on SPA where water levels affected
	Protect and where possible enhance species and habitats listed in relevant Biodiversity Action Plans (national, local, Environment Agency) in line with targets for areas encompassed by the Lower Lee Catchment	Lower Lee assists and supports the achievement of Biodiversity Action Plan objectives and targets	+/- Increased floodplain connectivity but potential to damage existing sites	Unlikely to have significant effect	Unlikely to have significant effect	Increased total wet habitat area (if not located on existing ecological site) Damage to existing river & riparian habitats / ecology	+/- Adverse effects on riparian corridor but opportunity to set existing defences back	Adverse effects on riparian corridor
	Protect and where possible improve the status of fisheries	Status of the fisheries (e.g. diversity and biomass)	+/- Increased floodplain connectivity but potential damage as channel fails	Unlikely to have significant effect	Unlikely to have significant effect	+/- Beneficial or adverse – site specific	+/- Adverse effects on riparian corridor but opportunity to set existing defences back	Adverse effects on riparian corridor
To avoid effects on human health and population	Reduce the impacts on humans (the local population) from the effects of flooding related in particular to storm events and channel under capacity	Number of injuries due to flooding. Number of properties impacted by flooding.	Decreased flood protection	Progressive decrease in flood protection	Increased flood protection	Increased flood protection	Increased flood protection	Increased flood protection
	Protect and enhance recreational and amenity facilities.	Total extent of riparian corridor accessible to the public. Total number/extent (and condition) of riparian recreational assets (cycleways, footpaths, angling sites) and visits (educational, public) to riparian green space.	Loss of safe access	Progressive loss of safe access	More sustainable use of floodplain	Create new resource (unless located on existing resource)	Improved access	Loss of safe & reliable access to facilities
To protect and improve inland waters	Maintain and improve surface water quality where feasible	Changes in GQA classifications (chemical and biological) (with dissolved oxygen as a key indicator) or River Ecosystem grade	Improved if greenfield location	Improved if greenfield location	Decreased pressure on floodplain	Improved through better flood protection	+/- Improved flood protection but decreased connectivity	+/- Beneficial or adverse – site specific
			Decline if urban location	Decline if urban location				
	Ensure that groundwater resources are protected.	Water quality and productivity of the Main Aquifer.	Improved if greenfield location	Improved if greenfield location	Unlikely to have significant effect	Improved through better flood protection	+/- Improved flood protection but decreased recharge	Unlikely to have significant effect
			Decline if urban location	Decline if urban location				

Table 3: Summary of Predicted Environmental Impacts for the Lower Lee Catchment over the 100-Year Lifetime of the Strategy

	Reduce the amount of waste and opportunities for waste disposal associated with the river (e.g. fly-tipping)	Quantity of waste removed by Operations.	Removal of failed defences	Continuing removal of debris	Greater respect for river corridor	Generates construction waste	Generates construction waste	Unlikely to have significant effect
	Restore riparian corridors, floodplains, including connectivity and natural processes.	Determination of the risk of failing to meet the prescribed morphological quality objectives for the river in accordance with the Water Framework Directive. Area/length recovered or restored through flood management works including river restoration.	Natural processes become dominant	Natural processes largely suppressed	Work with natural processes	+/- Increased total wet habitat area but artificial control of processes	Natural processes suppressed	Natural processes largely suppressed (but system is artificial)
To mitigate impacts from climate change	Reduce vulnerability of the human population & property to changes in flooding patterns/risks resulting from climate change	Level of service offered by flood defences, taking account of future predictions of rainfall event probabilities	Decreased flood protection	Progressive decrease in flood protection	Some increased flood protection	Increased flood protection	Increased flood protection but may not be sustainable	Increased flood protection but may not be sustainable
To protect and enhance features of cultural heritage	Prevent damage to statutory archaeological / heritage sites (Scheduled Monuments, Registered Historic Parks and Gardens, Listed structures) and non-statutory sites	Number and type of sites at risk of flooding or experience flood damage	Increased risk of flood damage	Progressive increased risk of flood damage	Some protection against flooding	+/- Protection against flooding (but risk of construction damage or from flood storage)	+/- Protection against flooding (but risk of construction damage)	Protection against flooding - but few sites along FRC so unlikely to have significant effect
To protect and enhance landscape character/visual amenity	Protect, enhance and encourage enjoyment of the landscape	Changes in Landscape Character (Assessments), changes in character of watercourses / riparian corridors	Flooding could improve greenfield spaces (but derelict defences)	Unlikely to have significant effect	Protects floodplain against development in rural areas	New artificial landscape feature in rural areas	New intrusive structures in rural areas	Likely to lead to decrease in visual amenity
			Flooding adverse in brownfield spaces	Unlikely to have significant effect	Improved floodplains in urban areas	+/- Beneficial or adverse in urban areas – site specific	+/- Opportunity to set back or otherwise improve existing defences, but new intrusive structures if none existing	

Prediction of Impacts

	Negative
	Negligible, or both positive & negative possible (+/-)
	Positive

8.3 Long-List of Options

The following long-list of options was drawn up by the project team through technical and environmental analysis and through consultation:

- Do Nothing as ‘walk-away’ option under which all operation and maintenance activities would cease, or Do Minimum as a continuation of operation and maintenance activities.
- Non-structural measures include: improved operation and maintenance of existing flood defences; influencing development control to take full account of flooding and making space for water; flood warning and flood forecasting; flood flow monitoring; and land management changes (to reduce storm runoff).
- Structural options - to maintain and enhance the level of service provided by the FRC on the Lower Lee main stem, and to reduce flooding on the Lower Lee tributaries - include:
 - Improving the FRC without major works including alternative control;
 - Upstream storage and flood defence works on the Lower Lee tributaries;
 - Upstream storage in the Upper Lee;
 - Increasing capacity of the FRC to convey high flood flows;
 - Dualling the FRC by constructing a second flood relief channel;
 - Diverting flood flows away from the FRC to the River Lee and Lee Navigation.

The Do Nothing scenario was used as the baseline economic reference case, whilst the current (2006) environmental baseline was used to assess the environmental consequences of each of the options.

Those options which were not considered viable on technical, economic or environmental grounds were discarded. This led to a short-list of options.

8.4 Short-list of Options

The preferred Strategy for flood risk management combines the short-listed non-structural options (listed below), and structural options (located in Figure 3 and summarised in Table 4).

- Promote partnerships with stakeholders (local authorities and other organisations).
- Influence land use and development through the planning process.
- Flood warning improvements that continue and strengthen existing initiatives.
- Raising awareness of flood risk through public education and communication.
- Promote land management changes.

Each of the short-listed structural options were considered in more detail, by undertaking an Environmental Impact Analysis (EIA) screening exercise to determine the probable level of environmental risk and were subjected to further detailed economic assessments.

The Lower Lee Strategy Plan sets out a package of structural and non-structural measures that, collectively, will enable the aims and objectives of future flood risk management to be achieved in the short, medium and long term (Table 5).

Table 4: Short-Listed Structural Options		Main Benefit Areas
Option A: Do-Nothing		
Cease all O&M	<ul style="list-style-type: none"> Non-operation, with deteriorating assets 	All areas
Option B: Do-Minimum		
Continued Operation & Maintenance	<ul style="list-style-type: none"> Maintain assets, including essential replacement Short term maintenance priorities identified 	All areas
Option C: Lower Lee Tributaries		
Target Priority Tributaries	<ul style="list-style-type: none"> Salmons/Cobbin's/Nazing storage – as designed Cobbin's additional storage option (Parklands) Ching Brook Flood storage Pymmes Brook Flood storage 	Grange Park, Nazeing Waltham Abbey Chingford Edmonton
Option D: Lower/Upper Lee Main Stem (Non-FRC)		
Strategic Storage	<ul style="list-style-type: none"> Upper Lee on-line storages - 6 potential sites Upper Lee off-line storages - 2 potential sites 	As above, and Upper Lee (Hertford)
Options E: Lower/Upper Lee Main Stem (Non-FRC)		
Local Protection	Includes bank raising and set-back defences: <ul style="list-style-type: none"> Protect Enfield Island Protect at Ching confluence Protect at Dagenham Brook Protect Hertford (Upper Lee) 	Enfield Island Chingford Walthamstow Hertford

9. Further Development of the Strategy

• Consultation

An important part of the strategy development process is to consult with key stakeholders, including the local community. This consultation document summarises our progress so far, and provides some information on the types of flood management options we are considering. Further detail about the strategy process and development of our options can be found in the Lower Lee Strategy Environmental Report. Feedback from this round of consultation will be considered in producing the final Strategy.

The strategy recommends the setting-up of a Flood Risk Management Steering Group, led by the Environment Agency, to manage and promote the delivery of the Strategy, working with stakeholders.

• Environmental Enhancement Opportunities

In 2006 the Environment Agency completed a *River Restoration Strategy for North London*. This promotes the removal of culverts and hard engineered channels, the re-creation of natural river features and the management and restoration of wetland areas.

The *River Restoration Strategy* identifies areas on the River Lee where potential environmental enhancements could take place. The Lower Lee Flood Risk Management Strategy recommends that areas identified for enhancement are taken into consideration when developing the structural options on the Ching Brook. It also recommends that opportunities for environmental enhancements are considered alongside maintenance and replacement of structures along the Flood Relief Channel and ongoing maintenance elsewhere in the Lee catchment.

The Lower Lee Flood Risk Management Strategy also recommends that the type of river restoration and enhancement measures that will be carried as part of the Olympic development are also considered for implementation at upstream locations in the urban Lower lee valley.

- **Strategy Implementation**

Implementation of the Strategy will initially require more detailed studies to develop and appraise the feasibility of the preferred solution, and the improved standard of protection it can provide. Further liaison with other studies is also essential.

- **Strategy Review**

We aim to implement the Strategy from 2007, which will then govern our approach to flood risk management for the next 5 years and in the longer term. Formal review of this Strategy is scheduled in 2011.

10. **Links with the Thames Catchment Flood Management Plan (CFMP)**

The Environment Agency is producing long term flood risk management policies for river catchments in England and Wales. The policies relevant to the River Lee catchment are contained within the Thames Catchment Flood Management Plan (CFMP).

The CFMP's vision for flood risk in the Lower Lee catchment in 50 years is for:

- Flood risk to be generally reduced.
- A more integrated urban drainage system, recognising the many sources of flood risk.
- Flood resilience incorporated into new developments and individual buildings.

CFMP policy for the Lower Lee: *Reduce the risk now and in the longer term. Take further action to reduce flood risk.*

A combination of the preferred flood risk management options identified by the Strategy, could reduce flood risk to an additional 500 properties in the Lower Lee.

CFMP policy for the Upper Lee and tributaries: Take action to increase the frequency of flooding to deliver benefits locally and elsewhere.

The Lower Lee Strategy identifies flood storage on the Ching, Cobbin's and Salmons as a possible measure for reducing flood risk locally and further downstream.

The Lower Lee Strategy recommends a number of non-structural options to be investigated alongside the flood storage and local protection schemes.

Table 5: The Draft Strategy Plan

Short Term Measures (0-5 years)	
Measure	Details
Maintain existing standard of protection (Do Minimum)	<ul style="list-style-type: none"> - Maintenance of 5 priority structures - Maintenance of mechanical and electrical control systems - Replacement of Newmans and Fishers Green Sluices - Moselle and Pymmes Brooks culvert refurbishment - Continuation of current level of maintenance and vegetation clearance
Local flood protection	<ul style="list-style-type: none"> - Undertake a feasibility study for local protection in Chingford
Flood storage	<ul style="list-style-type: none"> - Cobbin's and Salmons Brooks flood storage areas (already in progress) - Undertake a feasibility study for a flood storage areas on the Ching Brook
Non Structural measures	<ul style="list-style-type: none"> - Improve flow monitoring in the Lee catchment - Increase the number of at risk properties offered a flood warning service - Raise the awareness of flood risk and promote self help measures - Influence regional, sub-regional and local spatial planning early on in the process
Other Studies	<ul style="list-style-type: none"> - The strategy has identified that management of flood risk in Hertford is particularly complex and recommends a further study to look at this area in detail - The strategy recommends the Area Operations team investigate whether changes to their existing operating procedures would have a positive effect on flood risk - The strategy recommends that a study be undertaken to identify environmental improvement opportunities on the Lee Flood Relief Channel linked to future operational maintenance, renewal and replacement of the channel. - The strategy recommends that the North London River Restoration Strategy is developed further to identify opportunities for environmental improvement related to future flood risk management works. This would also provide opportunity to establish partnerships with planning authorities and major developments, and to extend the Olympics Masterplan concept upstream in terms of river corridor restoration / enhancement measures
Medium Term Measures (6-25 years)	
Maintain existing standard of protection (Do Minimum)	<ul style="list-style-type: none"> - Replacement of sheet piling on the flood relief channel
Local flood protection	<ul style="list-style-type: none"> - Chingford local protection construction scheme
Flood storage	<ul style="list-style-type: none"> - Ching Brook flood storage area construction scheme
Non structural measures	<ul style="list-style-type: none"> - Improve guidance on sustainable urban drainage systems based on proven schemes - Continuation of short term non structural measures
Long Term Measures (26-100 years)	
Maintain existing standard of protection (Do Minimum)	<ul style="list-style-type: none"> - Replacement of structure on the flood relief channel - Overhaul of flood relief channel lining
Non structural measures	<ul style="list-style-type: none"> - Monitor output on rural landuse management research to identify effect on reducing flood risk - Promote <i>Environmental Stewardship</i> schemes which have the potential to decrease flood risk by decreasing volume of soil and water entering rivers from surrounding rural land - Continuation of short and medium term non structural measures

Figures

Figure 1: Strategy Area Boundaries

Figure 2: Main Flood Risk Areas

Figure 3: Location of Short-Listed Options

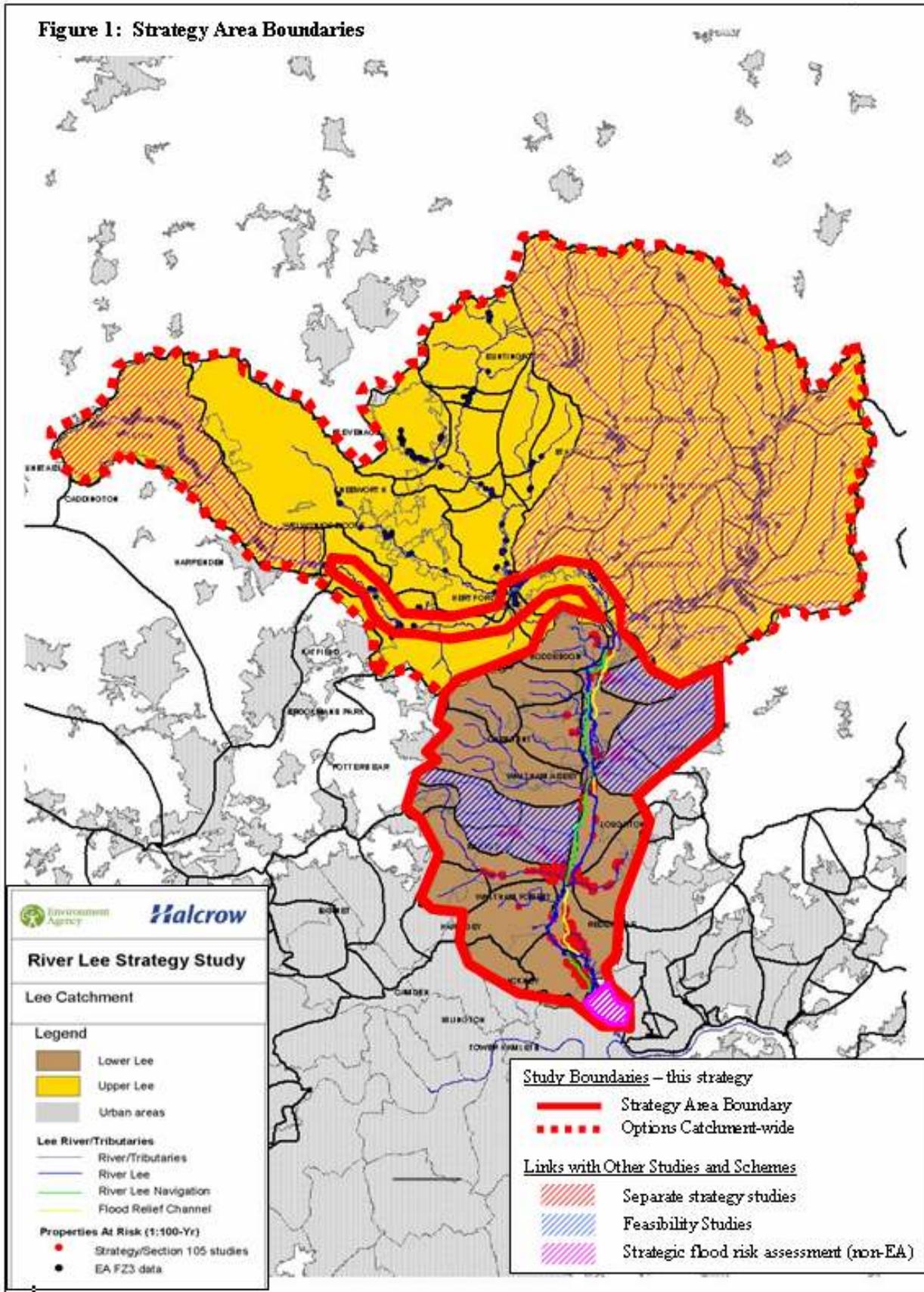


Figure 2: Main Flood Risk Areas

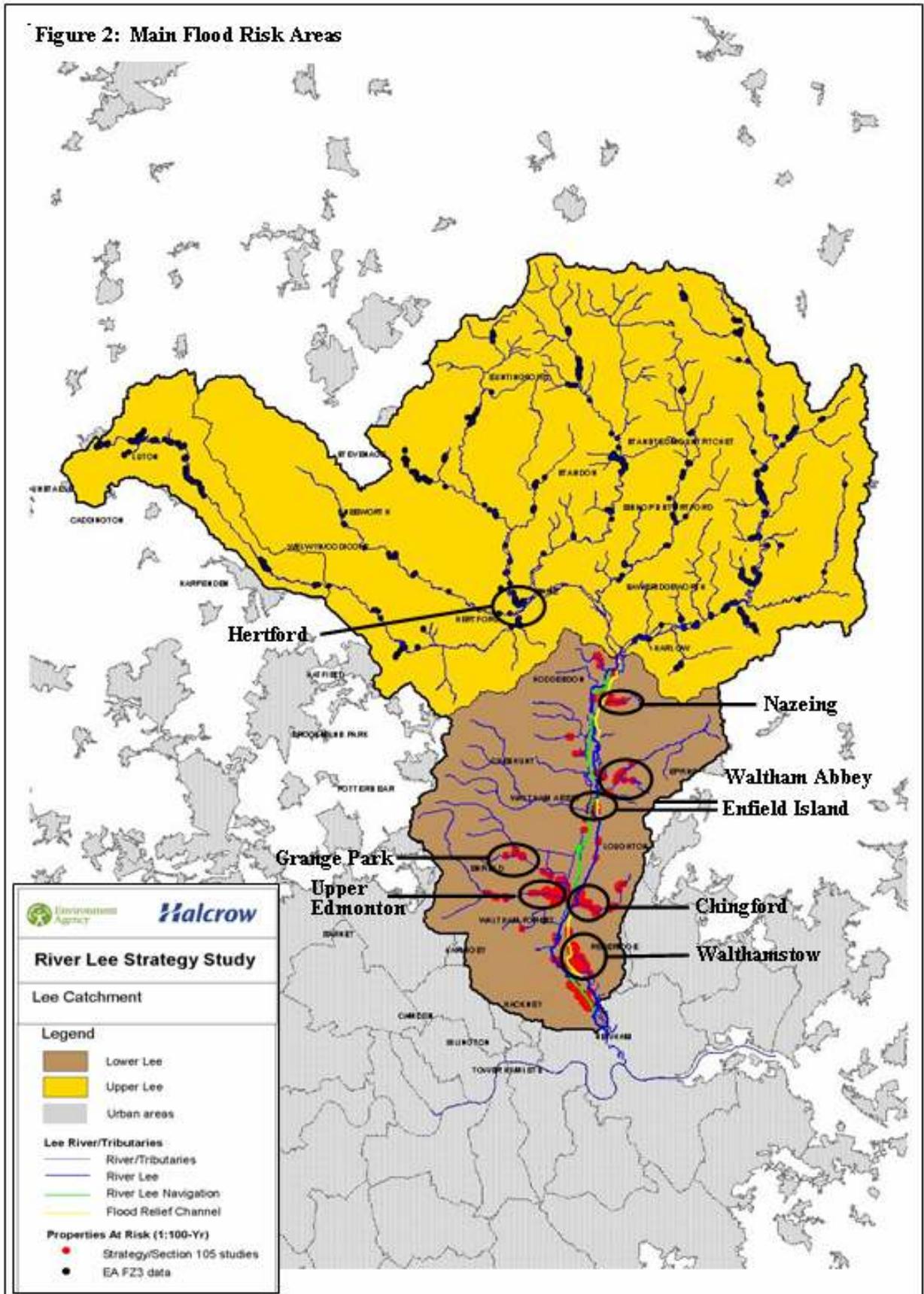


Figure 3: Location of Short-Listed Intervention Options

