



Update to the River Roding Flood Risk Management Strategy (2012)

Managing flood risk in the Roding catchment over the next 100 years

June 2015

We are the Environment Agency. We protect and improve the environment and make it a better place for people and wildlife.

We operate at the place where environmental change has its greatest impact on people's lives. We reduce the risks to people and properties from flooding; make sure there is enough water for people and wildlife; protect and improve air, land and water quality and apply the environmental standards within which industry can operate.

Acting to reduce climate change and helping people and wildlife adapt to its consequences are at the heart of all that we do.

We cannot do this alone. We work closely with a wide range of partners including government, business, local authorities, other agencies, civil society groups and the communities we serve.

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Environment Agency
Horizon house, Deanery Road,
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Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

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Foreword

We have adopted a strategy for managing flood risk in the River Roding catchment. The strategy looks ahead for the next 100 years and makes recommendations to manage the flood risk in the catchment. This document summarises our recommended approach and progress we have made to the strategy since it was adopted in 2012. It also explains roles and responsibilities in flood risk management and the different funding sources available.

There are currently a number of small flood defences, such as embankments, which protect lower reaches of the River Roding particularly in Woodford. However, these do not provide the standard of protection we would wish to achieve for the catchment. Currently, there are around 1,580 properties in the Roding catchment at risk from flooding in a flood event with a 1% (1 in 100) chance of occurring each year or greater. The majority of these properties are located in the middle and lower parts of the catchment, in Woodford, South Redbridge (Roding Lane), Ilford and Loughton.

Through this strategy we have identified ways to alleviate flood risk to nearly 900 properties. We have included climate change predictions in our assessment of our proposals, meaning these properties will remain protected even with 20% increase in river levels as a result of climate change. However, even once these recommendations are in place, almost 700 properties will remain at risk from a flood event with a 1% (1 in 100) chance of occurring each year. Flooding is a natural process and we cannot protect every property at risk of flooding, as there may not be a feasible solution for practical or financial reasons. This is why it is vital that future development in the floodplain is restricted.

In preparing this strategy, we have:

- proposed changes to our current maintenance regime, to prioritise areas where flood risk is greatest and to cease maintenance work where the effect is minimal
- recommended structural works in Woodford, where a significant number of properties are at risk, to reduce risk of flooding from the River Roding and from surface water
- identified a location in the upper catchment where we could construct a flood storage area to reduce flood risk to properties throughout the catchment
- ensured that any properties who could be at a higher risk of flooding as a result of implementing these proposals are offered alternative protection from flooding

Although the River Roding Flood Risk Management Strategy sets out our recommendations for the catchment, it does not guarantee funding for the works. This document explains how we will need to work with others to secure funding and to carry out our proposals to reduce flood risk in the catchment.

This document provides a detailed non technical summary of the River Roding Flood Risk Management Strategy appraisal report plus updates and progress made since 2012. If you would like a copy of the full 2012 report please contact RodingStrategy@environment-agency.gov.uk.

Caroline Douglass

Area Manager, Hertfordshire and North London

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Summary of the strategy

Introduction

Following major flooding of the Roding Catchment in 2000, we have reviewed how we manage flood risk from rivers and surface water in the Roding Catchment. The River Roding Flood Risk Management (FRM) Strategy identifies our recommendations for managing the risk now and over future decades. This strategy covers the River Roding from its source at Molehill Green in Essex to the tidal limit at the A118 at Wanstead and includes the major tributaries of the Cripsey Brook and Loughton Brook. This document summarises our recommended approach for managing flood risk in the catchment.

We developed the strategy over a number of years and carried out extensive consultation with other risk management authorities, organisations and the public. We incorporated the responses to these consultations in our final strategy which we adopted in 2012.

There are around 1,580 properties in the Roding Catchment that are at risk from flooding in a flood event with a 1% (1 in 100) chance of occurring each year or greater. The majority of these properties are located in the middle and lower parts of the catchment, in Woodford, South Redbridge (Roding Lane), Ilford and Loughton. These areas are highly urbanised, meaning there is less floodplain available for flood storage. In these urban areas, water reaches the river shortly after it has fallen as rain, causing the river to rise quickly and flood the surrounding areas. This was demonstrated in 2000 when, following heavy rainfall, flooding from the river and from surface water caused damage to over 400 properties in Woodford.

The two main sources of flooding we are seeking to address in this strategy are river flooding throughout the catchment, and surface water flooding in the Woodford area specifically.

The preferred options identified in this document include:

- making changes to our river management and maintenance activities;
- improving surface water management as well as flood risk from the River Roding in Woodford;
- reducing the flood risk by creating a large flood storage area near Shonks Mill, Essex.

Through this strategy we have identified ways to reduce flood risk to nearly 900 properties throughout the catchment, whilst making annual savings, on average, of £200,000 of public money.

We cannot, however, completely remove the flood risk or protect every property. Even if these recommendations are carried out, a small number of properties will remain at risk. We are also proposing to work with a small number of property owners that would be at increased risk of flooding, to discuss options for property-level protection.

We will seek to work with councils and other organisations to implement the strategy, including Thames Water and Transport for London. We will also continue to engage with the local community and other stakeholders throughout the implementation of the strategy.

Progress since 2012

Since adopting the strategy in 2012, we have made progress on all recommendations in the strategy. We have successfully reduced flood risk to 400 properties in Woodford, however we have achieved this through repair and improvement of existing structures without the need for extensive flood alleviation works. This has not only reduced the cost to the tax payer but has also allowed the flood risk to be reduced to more properties sooner than originally planned.

We are also in the process of writing to all properties in the flood zones of the River Roding to alert them to the proposed changes to our maintenance regime. We will then announce the start of the notice period which we will give before implementing these changes.

Finally, we have begun a more detailed appraisal into the proposals for the flood storage area near Shonks Mill.

The River Roding and the Thames catchment

The recommendations made in this strategy align with the policies outlined by the River Thames Catchment flood management plan (CFMP) www.gov.uk/government/publications/thames-catchment-flood-management-plan. The Thames CFMP considers all types of flood risk in the Thames catchment, including rivers, surface water and groundwater, and sets out policies which will lead to sustainable, long-term flood risk management. The CFMP policies for the River Roding include:

- increasing the frequency of controlled flooding in the upper catchment through flood storage;
- reducing flood risk downstream;
- continuing with actions to manage flood risk at the current level elsewhere.

Responsibilities and partnership funding for flood risk management

Risk management authorities

Responsibility for flood risk management rests with a number of authorities, including the Environment Agency, councils, sewerage companies and highways authorities. County or unitary councils (known as lead local flood authorities) take the lead on local flooding issues, including surface water, groundwater and flooding from smaller rivers, known as ordinary watercourses. The Environment Agency is responsible for managing flood risk from main rivers and the sea.

The Thames Regional Flood and Coastal Committee (RFCC) brings together members appointed by lead local flood authorities and independent members with relevant local experience, including farmers and landowners. The RFCC approves our regional investment programmes, raises and allocates local funding (local levy) and enables the sharing of good practice between partners.

A national strategy for flood risk management requires the responsible authorities to co-operate with each other and to work consistently to achieve targeted benefits. Lead local flood authorities are responsible for developing local flood risk management plans for their area in line with the national strategy for England. You can find out more here: www.gov.uk/flood-risk-management-plans-what-they-are-and-whos-responsible-for-them

Riparian owners

Anyone who owns or occupies the land adjacent to a river, through which a river runs, or above a river which is in culvert (pipe), is the riparian owner. The riparian owner has rights and responsibilities for the section of a river which passes through their land and any structures within it. They should ensure that water can pass downstream freely without obstruction, including ensuring the bed and banks of the watercourse are reasonably maintained and any debris removed. You can find out more about riparian ownership here:

www.gov.uk/government/publications/riverside-ownership-rights-and-responsibilities.

Funding for flood risk management

In May 2011 the Department for Environment, Food and Rural Affairs announced a new approach to funding flood risk management, called 'Flood & Coastal Resilience Partnership Funding'. This new approach is more flexible than the previous funding scheme. Under the old approach, a scheme could only go ahead if it achieved a high cost benefit ratio and therefore receive 100% funding from central government. Under the new partnership approach the amount of government funding (flood defence grant in aid - FDGiA) available to each project will depend on the flood risk and environmental benefits delivered by the project. Some will be 100% funded, where others will receive a proportion of the funding required, with the remaining being made up from local government and beneficiaries. This means that more schemes will be able to proceed with contributions where they may not previously have received funding.

For any of the flood alleviation works in this strategy to proceed, we will need to secure funding under the partnership funding approach. Dependent on the level of funding from FDGiA, we will look to make up the difference with contributions from appropriate partners including local levy from the Thames RFCC, as well as from private, public and voluntary organisations, local councils and communities who will benefit. The London Borough of Redbridge has already contributed towards projects in their borough.

For the proposed changes to our maintenance regime, contributions will not be required, as these will be funded via our annual maintenance budget which we must spend in priority areas where the work will have the greatest benefit to people and property.

Catchment overview

The Roding Catchment

The River Roding rises at Molehill Green situated to the east of Stansted Airport and to the west of Great Dunmow. It runs for approximately 45km through the Essex districts of Epping and Uttlesford before reaching the London Boroughs of Redbridge, Newham and Barking, and discharging into the Thames at Barking Creek. This strategy covers the River Roding from its source to the tidal limit at the A118, just west of Ilford town centre and its major tributaries of the Cripsey Brook and Loughton Brook. The River Roding downstream of Ilford is covered by the Barking and Dagenham Embayment Flood Risk Management Strategy and also by the Thames Estuary 2100 Plan.

There is a variety of land use in the River Roding Catchment. The upper Roding (north of the M25) is predominantly rural and a large amount of the land use is arable farming, with only a few isolated settlements. The main urban areas are Fyfield, Thornwood, North Weald Bassett and Chipping Ongar. In the middle Roding, downstream of the M25, the land adjacent to the Roding is also agricultural land. The lower Roding Catchment is comprised of densely populated urban centres supporting a significant manufacturing and industrial base. In this section the river passes through the urban areas of Abridge, Loughton, Chigwell, Woodford, Wanstead and Ilford.

History of flooding and current risk

We have records of flooding on the River Roding since 1926, the largest recorded event being in 1947. This flood was estimated to have a 1% (1 in 100) chance of occurring each year. There was also flooding in 2000 and 2007.

In 2000, the Roding Catchment experienced river flooding estimated to have a 1.4% (1 in 71) chance of occurring each year, affecting over 300 properties in Woodford as well as some properties in other parts of the catchment.

The Roding Catchment is underlain by impermeable London Clay for most of its length, therefore any rainfall tends to flow over the surface rather than soak into the ground. As a result the river is prone to flooding after large storms or prolonged heavy rainfall.

The upper Roding Catchment (see figure 1) is very rural and the natural floodplain retains flood water well following heavy rainfall. However, in the middle and lower parts of the catchment where large parts of the natural floodplain have been developed, there is little open space remaining for storage of flood water. In the urban areas, water flows very quickly into the river (either as surface run off or through man-made drains) causing the river to rise rapidly and flood surrounding areas.

In 2012, around 1,500 properties were at risk from flooding in the Roding catchment. The majority of these properties were located in the middle and lower parts of the catchment. The areas at highest risk of river flooding are Woodford, South Redbridge (Roding Lane), Ilford and Loughton. These areas are covered by our flood warning system for river flooding, provided by Flood Warnings Direct. The progress we have made with the strategy since 2012 has now reduced the risk to 400 of these properties in the Woodford area.

You can view the areas at risk of flooding on our website at <http://apps.environment-agency.gov.uk/wiyby/default.aspx>. We will update this flood map to reflect the reduced flood risk in Woodford later this year.

There are currently no formal flood defences on the River Roding north of the M25, but there are some natural raised embankments through Woodford that act as defences, and Ray Park in Woodford provides flood storage. There is also some flood alleviation and storage on the Cripsey and Loughton Brooks. Downstream of the tidal limit of the Roding, at the A118, the Barking and Thames Barriers prevent the progression of tidal flood water upstream.

In Woodford, a drainage network provides some protection from surface water flooding and discharges into the river. Development within the floodplain of the lower Roding has also reduced the overall capacity of the surface water drainage system.

Map of the River Roding and its catchment area

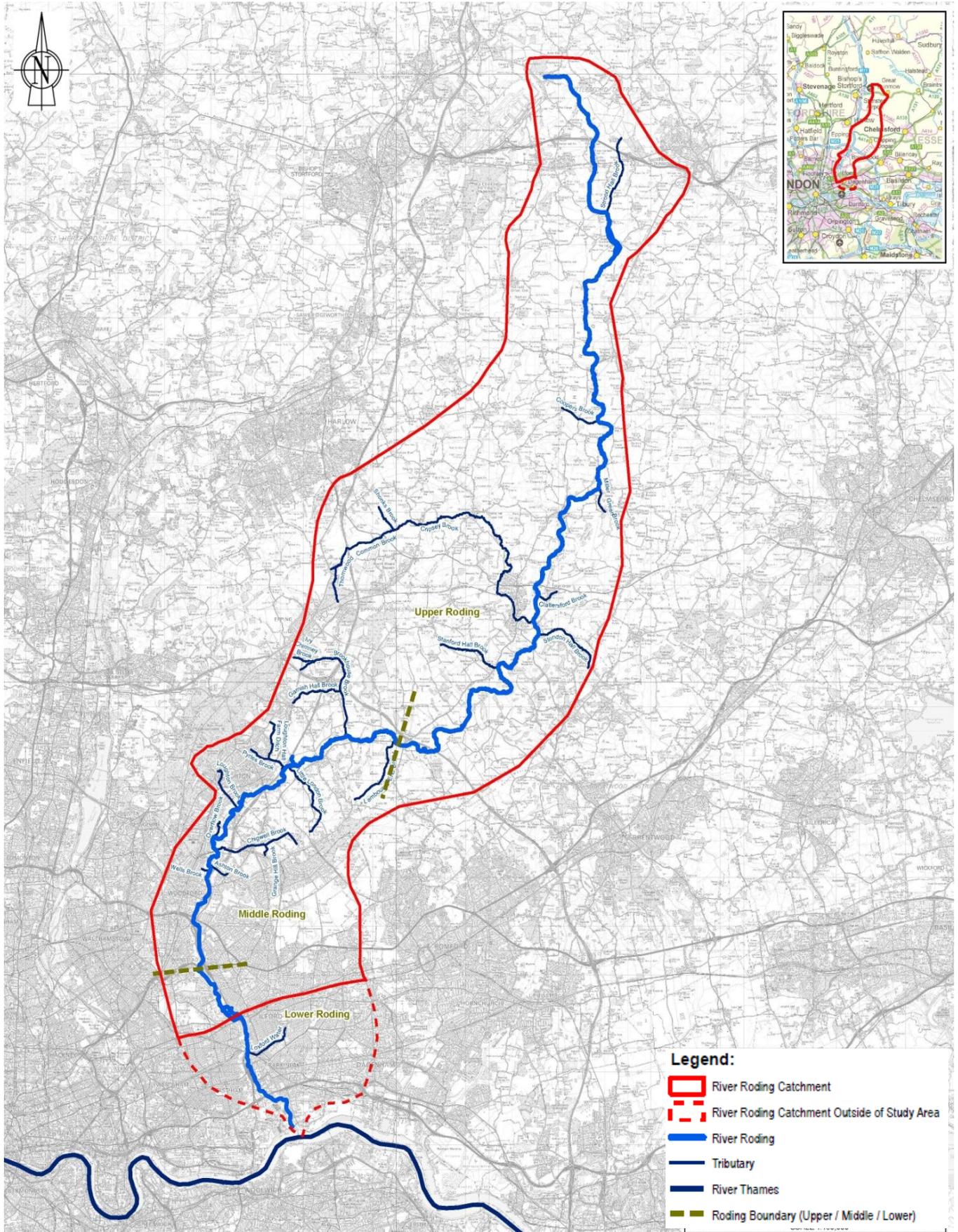


Figure 1: map of the River Roding Catchment

Current approach to flood risk management

Although maintenance of a river is the responsibility of the riparian owner, we do carry out some maintenance work on the River Roding, using our permissive powers for flood risk benefits. We plan our maintenance work in line with government policy to make sure we provide the greatest benefits to people and property at risk of flooding.

As part of our current funding allocation for maintenance work we have carried out regular maintenance on the lower River Roding, including bank repairs, vegetation and debris clearance, and de-siltation in Woodford. Upstream, in the upper and middle parts of the catchment, we carry out maintenance on a reactive basis, clearing fallen trees and similar hazards only when they create an immediate flood risk. This allows the river to act naturally and restricts flood flows downstream by temporarily storing flood water on the open floodplain.

Where we have the funding available, we may also carry out ad-hoc maintenance on stretches of the river most at risk of flooding.

Environmental considerations

The key conservation areas relevant to the strategy are the Roding Meadows Site of Special Scientific Interest (SSSI), Roding Valley Meadows Local Nature Reserve, the Roding Valley Park (located in Redbridge) and the Roding itself (designated as a Site of Nature Conservation Importance from Chigwell to the River Thames). There are some key biodiversity action plan habitats in close proximity to the river. Large areas of agricultural land in the upper catchment are under Environmental Stewardship Agreements and under the old Countryside Stewardship Agreements.

The Water Framework Directive (WFD), implemented in England and Wales by the Water Environment (England and Wales) Regulations, aims to ensure that all water bodies achieve good ecological status or good ecological potential. River basin management plans (RBMPs) have been produced to define the current status against the defined criteria and set out the proposed measures to be carried out to achieve good status. Any new activities within the water environment need to take into account the WFD to reduce any potential negative impact on the water status and to seek out opportunities to enhance it. The River Roding is in the Thames RBMP and has a target date of 2027 by which to meet a good status. You can find out more about the Thames RBMP here <https://www.gov.uk/government/publications/thames-river-basin-management-plan>.

How we developed our proposals

The main objectives of developing the strategy were to work with our partners to:

- develop and implement sustainable short and long-term flood risk management options,
- review the existing maintenance programme,
- meet the goals of the local flood risk and environmental strategies, including the Thames Flood Risk Management Plan and River Basin Management Plan.

Options

We initially developed a long list of flood risk management options through consultation. We assessed all options in this list to reject those that were not technically feasible, environmentally acceptable or cost effective. We were then left with a short list of options for further consideration.

The options considered were:

1. **Do nothing (cease maintenance);**

Assumes all maintenance and repairs to channel and assets are ceased and the channel is allowed to return to its natural state. For this option we will make all riparian owners aware of the change and their responsibilities to maintain the passage of water through their land.

2. **Do minimum (maintain channel only);**

Comprises grass cutting, weed and debris clearance, and silt removal where appropriate, in the river channel. Assets would not be maintained, so would deteriorate and likely fail, but would be kept safe for users and the public.

3. **Maintain (maintain channel and assets);**

Continue a channel maintenance programme (including the maintenance detailed above) and repair and replace assets when required. We would also continue to inspect and maintain assets as needed, to ensure assets continue to provide the existing standard of protection.

4. **Reduce surface water flood risk**

An option considered for Woodford, comprising of a flood storage area and pumping stations to protect properties behind the existing embankments at Woodford, to a standard of 1.3% (1 in 75) chance of flooding each year, from both fluvial and surface water flooding (investigations started 2012).

5. **Flood storage on the upper catchment**

A flood storage reservoir to be constructed in the upper catchment to protect properties downstream from events with up to a 0.5% (1 in 200) chance of occurring each year. This is an additional option to numbers 1 to 4, to prevent flood risk increasing to properties due to climate change. We have identified Shonks Mill Bridge, north of the M25 near Navestock, Essex, as the best location for the flood storage option, as it provides appropriate space for holding flood water upstream of the major conurbations in the catchment.

6. **Resistance and resilience measures**

This option will target the individual properties that will remain at risk of flooding once other recommendations are implemented. Property owners may be responsible for maintaining equipment or structures once implemented.

In looking at these options we have used the Department for Environment, Food and Rural Affairs (Defra) 2006 and 2011 climate change guidance and considered the effects of an increase of 20% in river flows as a result of climate change. This increases the number of properties at risk from river flooding, if we were to do nothing to reduce flood risk in the catchment. Future increases in rainfall as a result of climate change will also increase the risk of surface water flooding. This is an important consideration for the option selection.

For each option, in addition to impact on flood risk, we carried out environmental assessments, including the Water Framework Directive, to consider impacts and opportunities for enhancement. We evaluated the economic costs, benefits and damages avoided for each option, and considered the social and community impacts.

The differences between the upper and lower parts of the catchment mean that a range of management approaches are required in different areas. The impacts of each approach on the upstream and downstream stretch of the river also need to be considered. We therefore carried out detailed modelling of the catchment in order to make our assessments.

Consultation

In 2011, we held a public consultation on our proposed options, via mail drop, public drop-in sessions, online advertising and meetings with stakeholders. We received a range of responses to our consultation which we considered in developing the final recommendations in the strategy. This also gave us the opportunity to provide more detail to those stakeholders who wanted it and to clear up any misconceptions about the proposals.

As a result of the consultation we carried out property-level threshold surveys in several areas of the catchment to assess the flood risk to the individual properties. This survey helped us to better understand the number of properties which would be at an increased flood risk. We found that there were fewer properties at increased risk than we initially thought.

The recommended strategy

The preferred strategy sets out the flood risk management needs of the catchment with a focus on those areas with properties at risk. The recommendations made fall into three categories:

- making changes to our river management and maintenance activities;
- improving surface water management at Woodford;
- reducing the flood risk of the catchment and protecting against climate change related increase in river flows, by creating a large flood storage area near Shonks Mill.

By implementing these recommendations we will reduce the flood risk from the River Roding to almost nearly 900 properties within the catchment. However, up to 15 properties in the upper Roding could be at increased risk from flooding as a result, and other will remain at a high risk. We will therefore work with the property owners to identify their risk and the individual measures they can take to protect their property.

As well as a reduction in flood risk, we will also see additional environmental and economic benefits. Our strategy aims to achieve the natural restoration of the functional floodplain where possible, which will enhance biodiversity. This 'do nothing' approach will help to improve the quality of the river environment and help us to achieve targets under the Water Framework Directive.

We will ensure that the proposed alleviation works consider environmental impacts and make allowances where possible to ensure the environmental impact is low, such as incorporating fish passage into the flood storage embankment and creating habitat.

By reducing flood flows downstream, this will have a benefit on the Roding Valley Meadows SSSI.

We will also consider recreational needs and visual impact and how these can be maintained throughout the works.

We are proposing to change our river management and maintenance activities in areas where there is insufficient economic justification to continue existing maintenance activities, in other words, the cost of carrying out maintenance is greater than the benefits it provides. By doing this we have the potential to save up to £200,000 of public money, which is currently spent on annual maintenance costs, and avoid significant replacement and remediation costs. It should be recognised that levels of maintenance in the low risk areas of the upper Roding have been reducing over the last 10 years as a result of funding reductions.

Key infrastructure will also be better protected from flooding, including electricity substations, a sewage treatment works, and parts of the North Circular and other A roads. This will prevent additional economic costs to the economy during flood events through damage to or loss of use of this infrastructure.

Recommended options by cell

In developing our proposals we split the catchment into 18 flood cells, dependent on their characteristics. We considered each option against each cell, and carried out a cost-benefit analysis to determine the preferred option. We also considered the interactions between cells and the effects that the overall option for flood storage upstream would have on them. Once we had assessed all of these factors, we were able to come up with a recommended option for each cell.

The following section summarises our specific proposals for each flood cell, running from the north to the south of the catchment.

Map of the River Roding Flood Risk Management Strategy cells

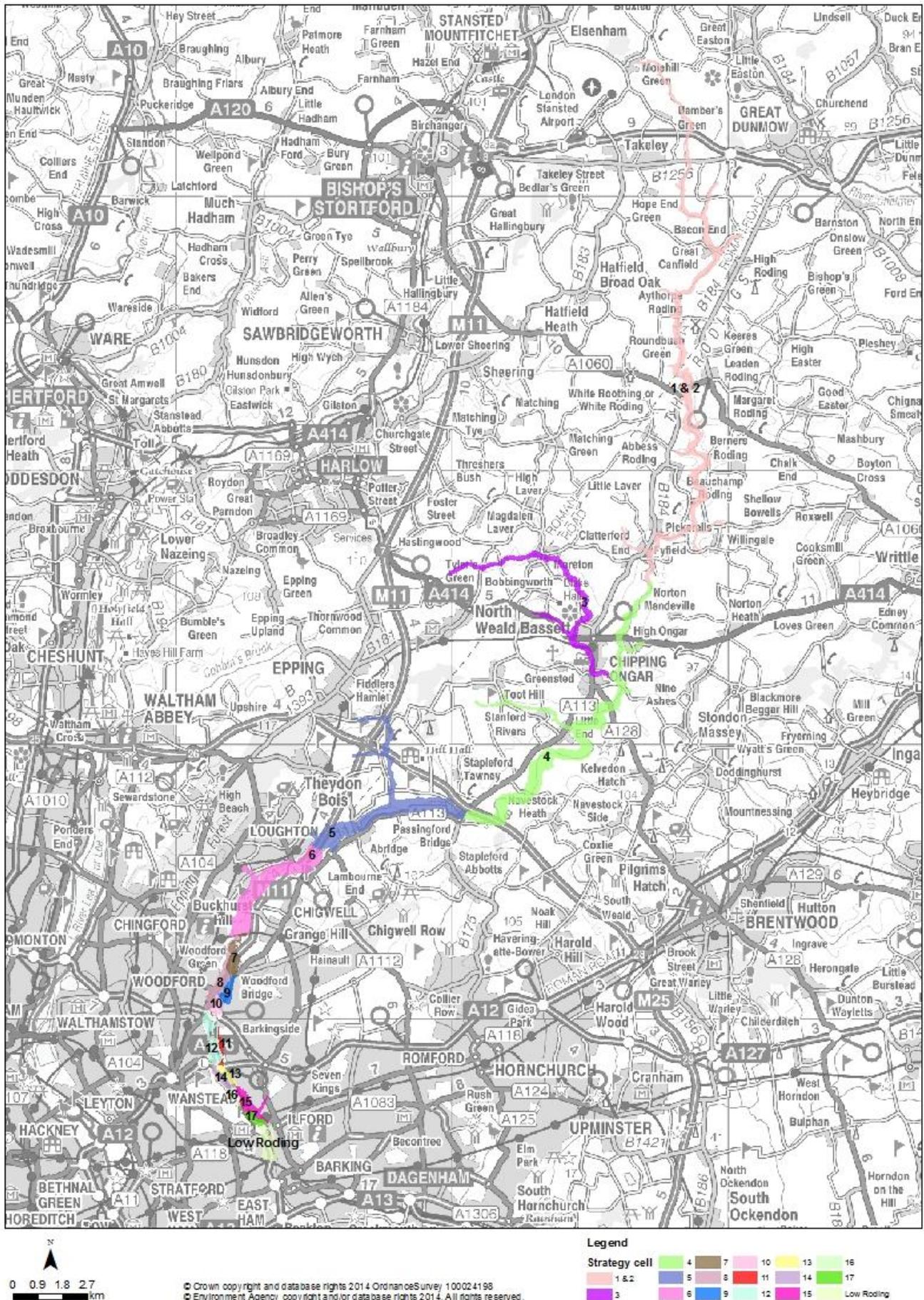
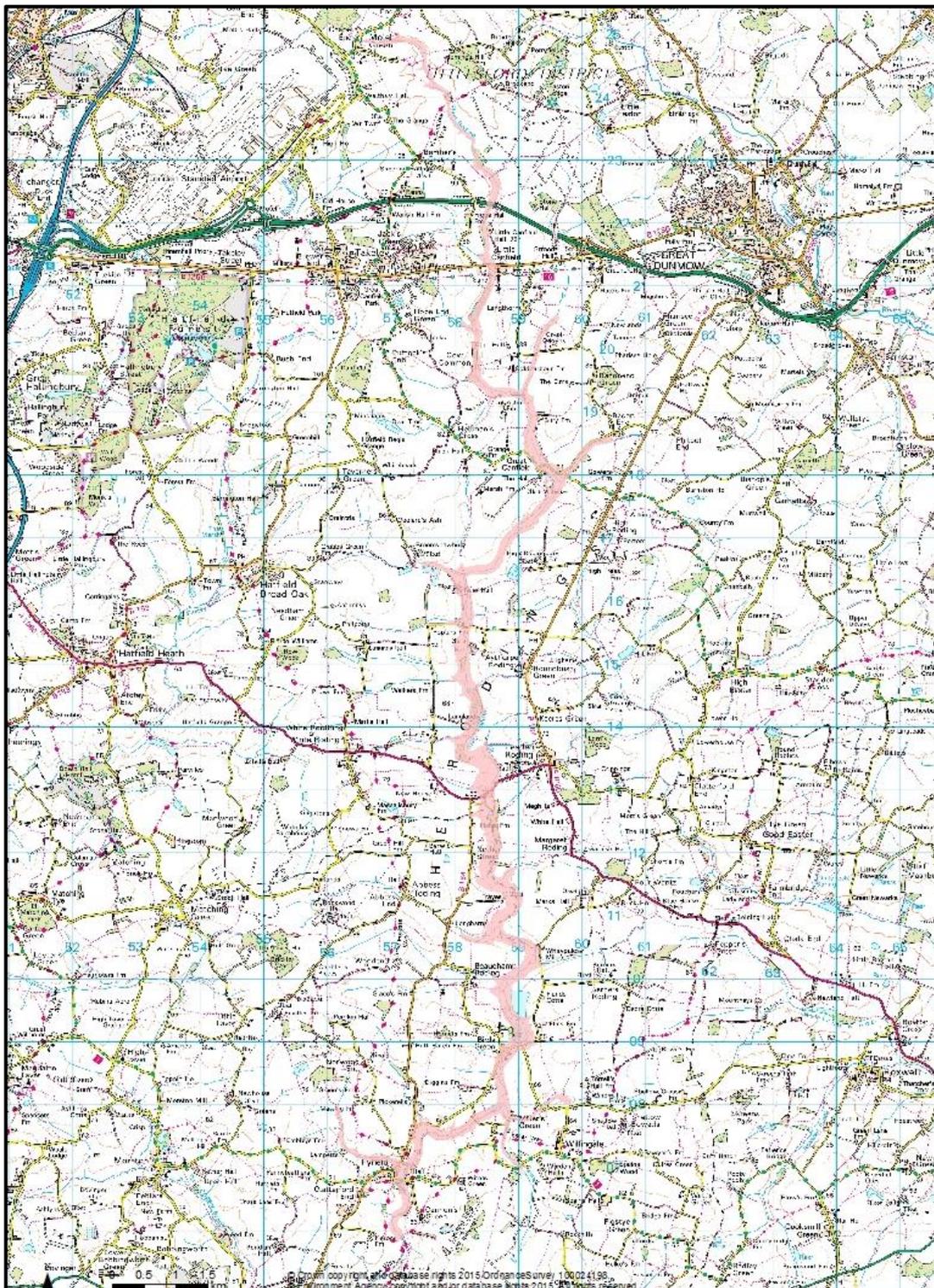


Figure 2: map of the River Roding Flood Risk Management Strategy cells

Cells 1 and 2: Molehill Green to Fyfield

The recommendation made in the strategy for these cells is to cease maintenance.

These cells cover the uppermost parts of the catchment from Molehill Green to Fyfield. This area is rural with very few people and properties at risk, including under climate change predictions. Our options assessment showed that there is insufficient economic justification to continue existing maintenance activities in these areas.



Cell 3: Cripsey Brook from North Weald Bassett to Chipping Ongar

The recommendation made in the strategy for this cell is to maintain the existing channel and assets.

This cell covers the Cripsey Brook from North Weald Bassett to Chipping Ongar. It is a rural area and includes part of the Epping Forest SSSI. Our options assessment showed that the preferred option would be to continue maintenance of the existing channel and assets, maintaining the 2% (1 in 50) chance of flooding in any year standard of protection.

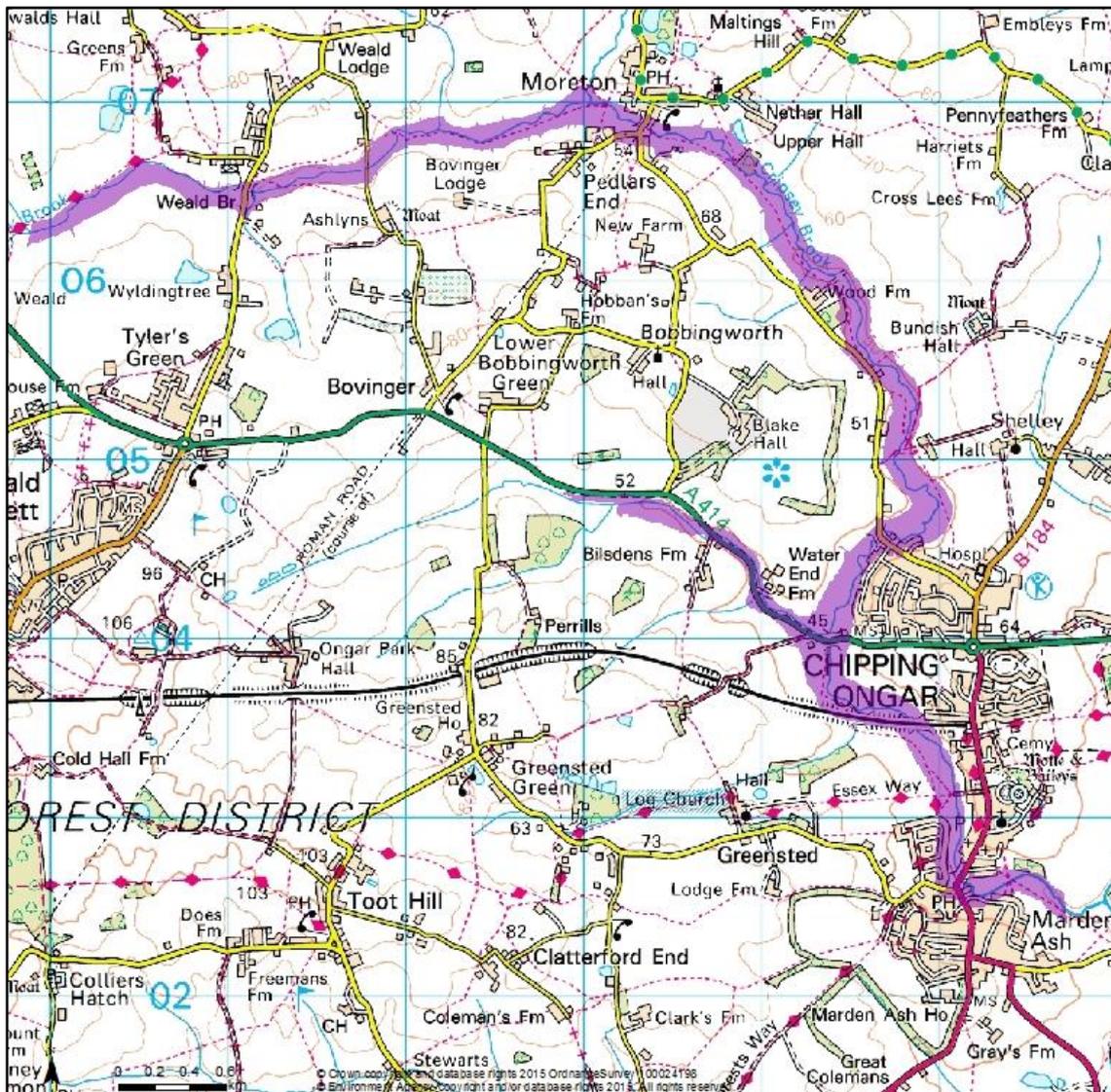
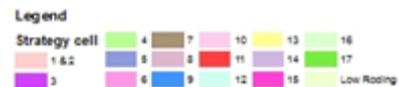


Figure 4: cell 3



Cell 6: Debden to Chigwell, including the Loughton Brook

The recommendation made in the strategy for this cell is to cease maintenance along the River Roding but to continue to maintain the channel and assets along the Loughton Brook.

This cell covers the Roding from Debden in Loughton to Chigwell, a mostly rural stretch, and the Loughton Brook which runs through urban Loughton.

Our options assessment showed that there is insufficient economic justification to continue existing maintenance activities along the Roding in this area. Under the cease maintenance option, the siltation and vegetation growth that would result upstream will help to reduce flood flows downstream. For Loughton Brook our options assessment showed that there is economic justification to continue maintenance of the channel and, considering the impact of climate change, to continue maintenance of assets as well.

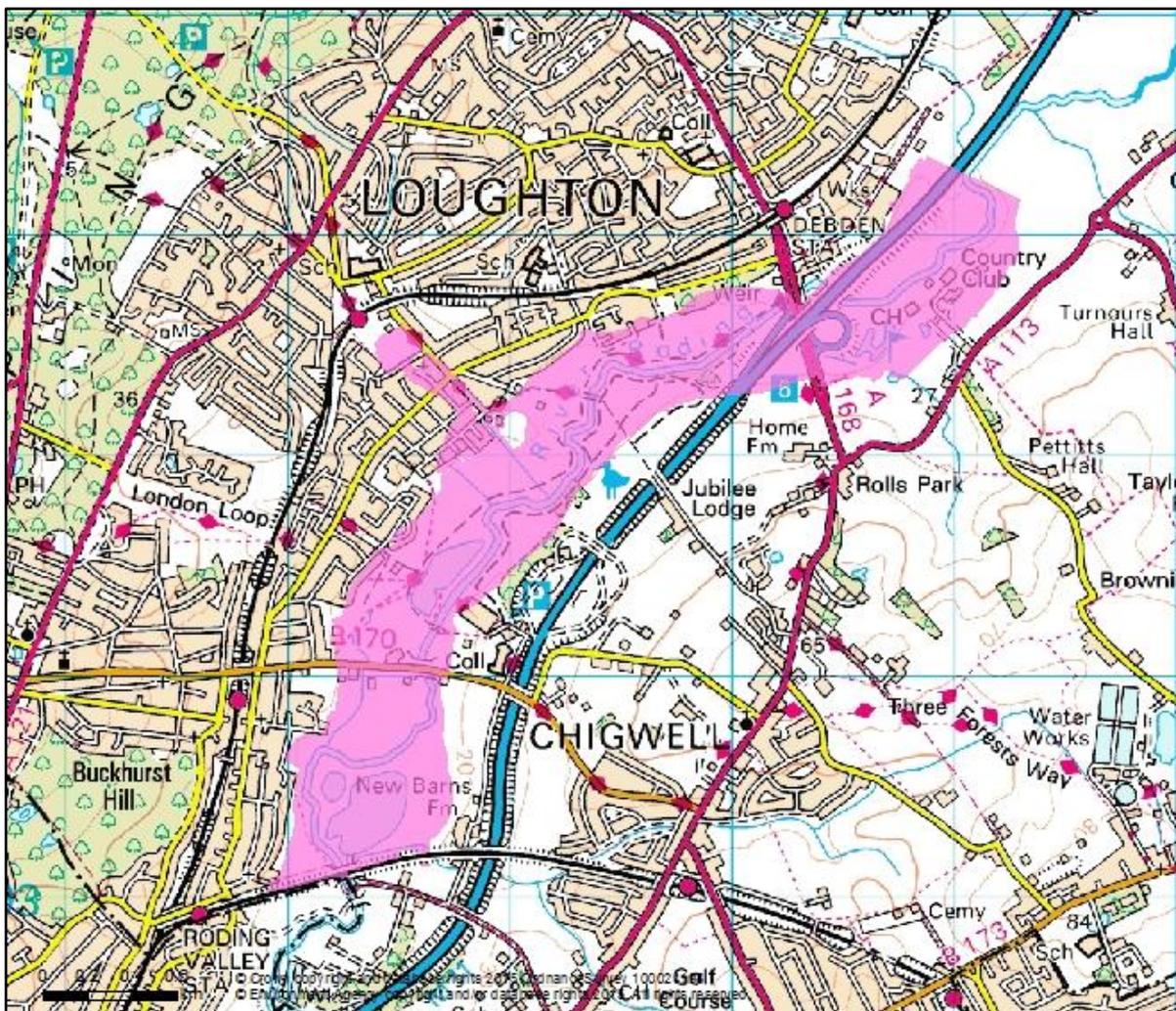


Figure 6: cell 6



Cells 7-10: covering Woodford from Chigwell to the junction of the M11 and A406

Cell 7

The recommendation made in the strategy for this cell is to maintain the channel only.

Although our options assessment showed that there is no economic justification to continue existing maintenance activities in this area, the preferred option for cell 8 is to maintain the channel and assets, which would be ineffective without maintaining the channel in cell 7 as well.

Our assessment showed that the defence structures in this cell offer no additional benefits compared to just maintaining the channel.

Cell 8

The recommendation made in the strategy for this cell is to maintain the channel and assets and to provide measures to reduce flood risk from the River Roding and surface water in Woodford.

Our options assessment showed that there is economic justification to continue existing maintenance activities in this area. There are existing embankments in Ray Park which provide some flood protection in this area. We will work with the London Borough of Redbridge to continue to maintain these. This option will continue to provide the existing standard of protection for the assets in these areas over the 100 year strategy period. The benefits provided here can also cover the costs for maintaining the channel in cell 7.

The assessment also showed a benefit to providing flood alleviation measures at Woodford to a standard of protection of 1.33% (1 in 75) chance of flooding per year. Proposals include a new flood storage area to provide storage for surface water flooding until the flood water levels in the River Roding have subsided and two pumping stations to supplement the flood storage area. We started work with London Borough of Redbridge to investigate these proposals in 2010.

Cells 9 and 10

The recommendation made in the strategy for these cells is to maintain the channel only in this partly urban area. Our options assessment showed that there is economic justification to continue maintenance of the channel, in particular to reduce flood risk to the M11.

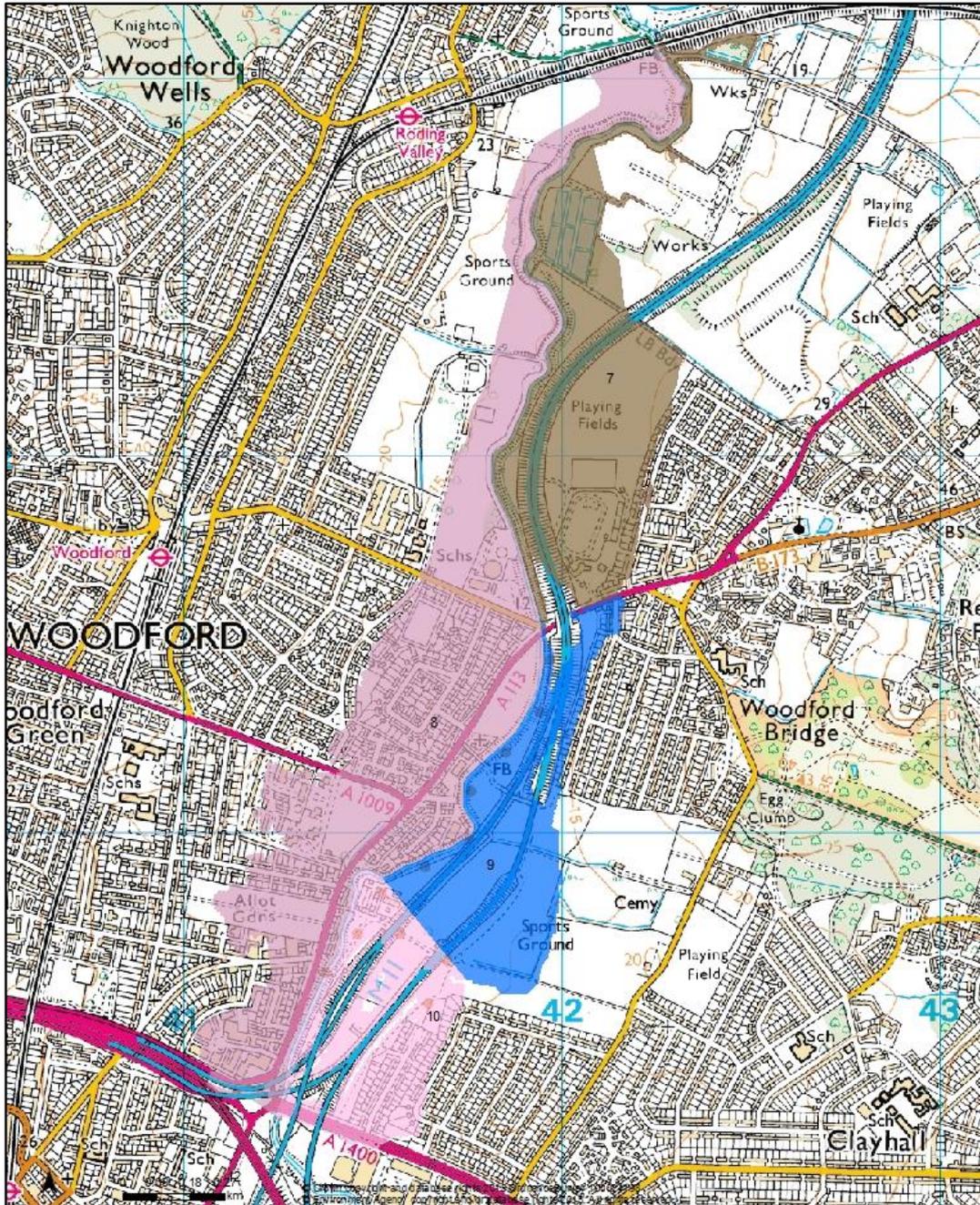
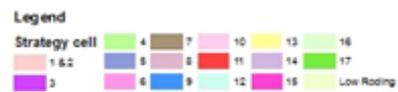


Figure 7: cells 7 to 10



Cells 11 and 12

The recommendation made in the strategy for this cell is to maintain the channel only.

These cells cover the River Roding from the junction of M11 and A406 to the northern boundary of Wanstead Park. Our options assessment showed that there is economic justification to continue maintenance of the channel but not the assets.

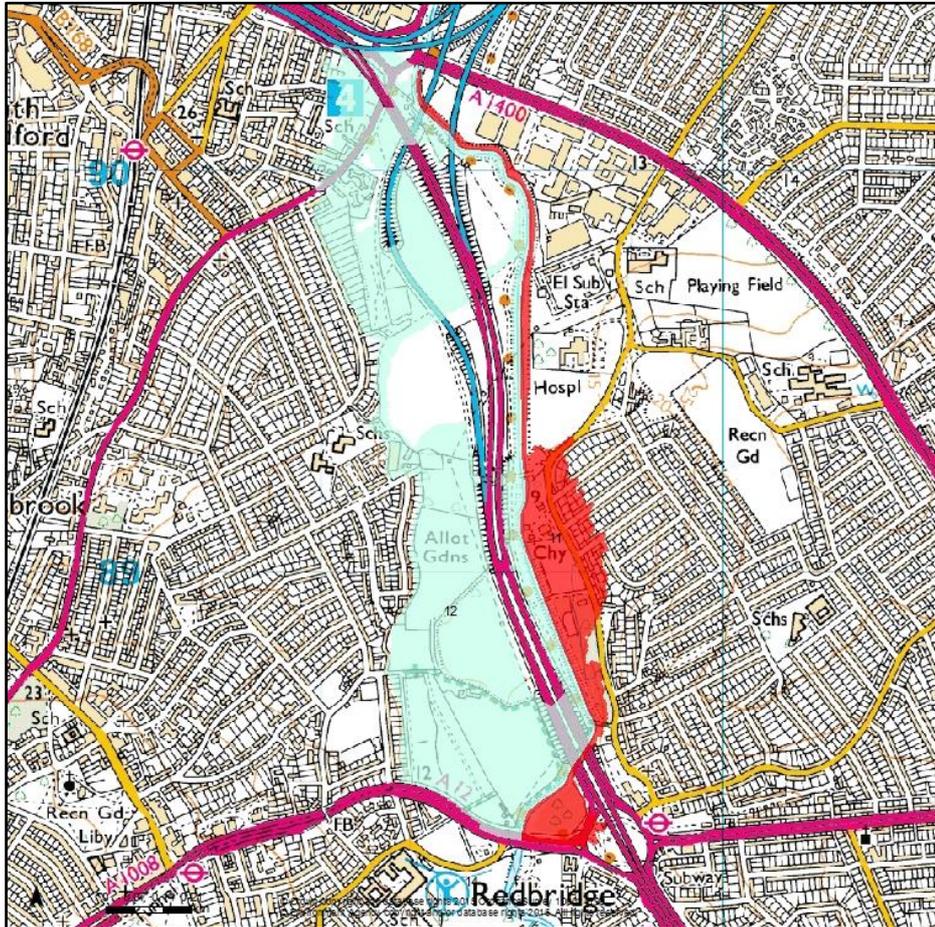
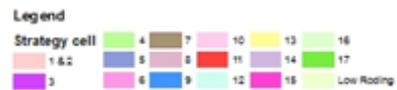


Figure 8: cells 11 and 12



Cells 13-17: covering Wanstead Park

Cells 13 and 14

The recommendation made in the strategy for these cells is to cease maintenance.

This is a mainly urban area. These areas contain no property or infrastructure. Cell 13 consists of rough scrub and a field, and cell 14 consists of Wanstead Park. Therefore we have not economically assessed these cells and will cease maintenance.

Cell 15:

The recommendation made in the strategy for this cell is to cease maintenance.

This is a rural area. Our options assessment showed that there is no economic justification to continue existing maintenance activities in this area.

Cells 16 and 17

The recommendation made in the strategy for these cells is to cease maintenance.

These areas contain no property or infrastructure, and the land comprises Ilford Golf Club. The loss of business to the golf club does not make maintenance economically justified and we will be ceasing maintenance.

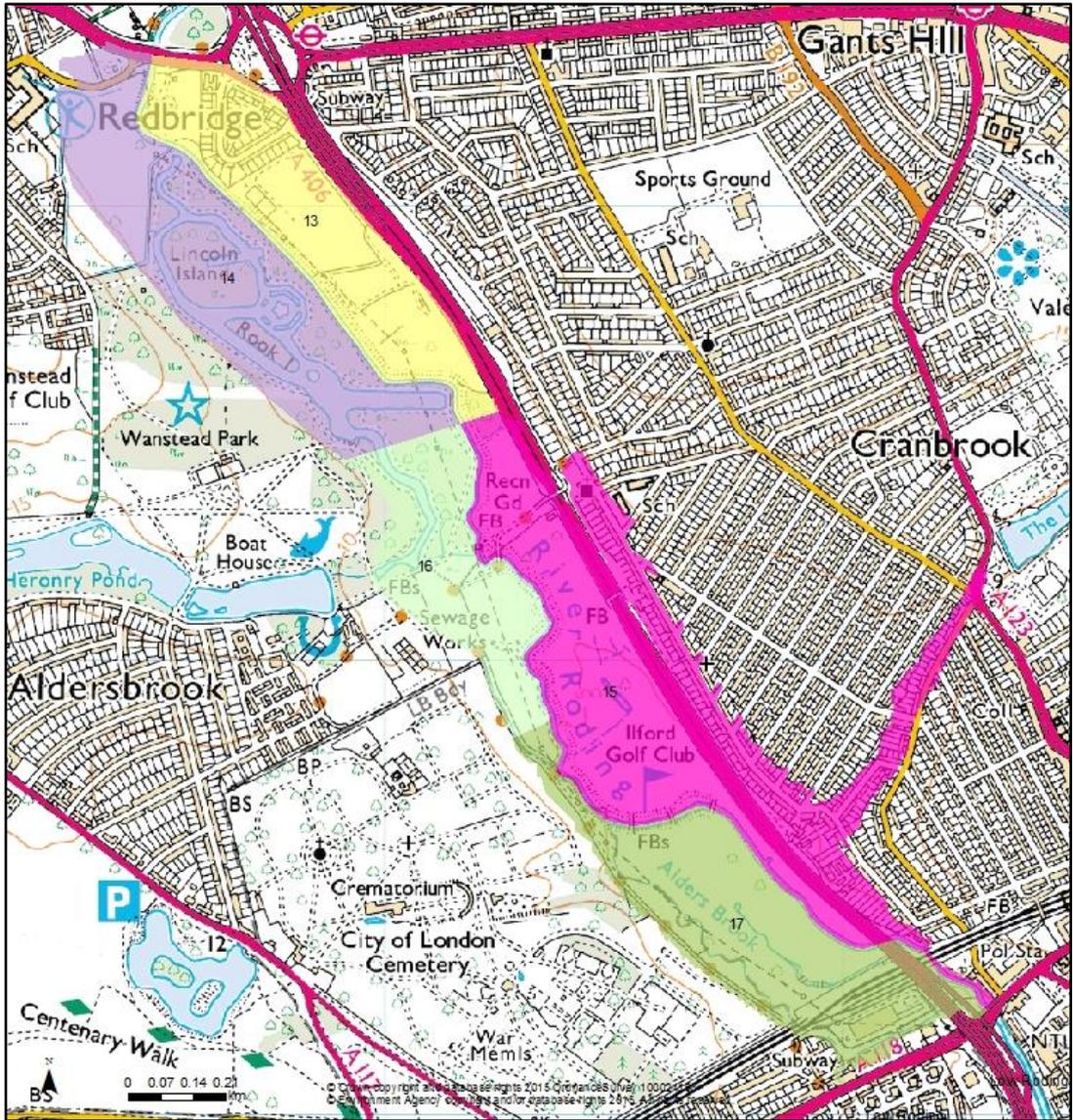


Figure 9: cells 13 to 17

Shonks Mill Flood Storage Area

Although the options identified above will mostly maintain the standard of protection currently offered to properties in the Roding Catchment, the ideal standard of protection would be higher, particularly for the urban areas of Redbridge. Climate change is projected to lead to increases in rainfall that may increase the risk of fluvial and surface water flooding. A climate change related increase to flows would result in a reduced standard of protection throughout the catchment. For example, in Woodford, defences that currently provide protection against a flood with a 1.33% (1 in 75 year) chance of occurring each year or greater would, with climate change increased river flows, only provide protection in a flood event with a 2% (1 in 50 year) chance of occurring each year or greater. Similar effects would be felt in other cells. We therefore investigated the viability of an upstream storage option.

The proposed flood storage area at Shonks Mill, near Navestock, Essex, will mitigate the effects of climate change related increases in river levels and reduce the current overall flood risk downstream.

Flood storage helps to reduce the risk of flooding by collecting water and releasing it gradually when a storm has passed. We assessed a number of different sized storage areas, to determine which was the most viable, and have recommended a storage area large enough to hold water in flood events between a 2% (1 in 50) and 0.5% (1 in 200) chance of occurring per year. This will provide an increased standard of protection to almost 900 properties downstream, mainly in the areas of Woodford and Ilford and Loughton.

We have identified an area north of the M25 at Shonks Mill Road where a flood storage area could be constructed. It would consist of an earth embankment approximately 700m long with a maximum height of 3.75m above ground level, constructed across the floodplain adjacent to Shonks Mill Road. This will include a flow control structure to control the flows allowed to pass downstream.

Other recommendations

Developments in the Roding Catchment also have potential to impact flood risk, either through location in the floodplain or from increased run-off. The strategy also recommends that development in the floodplain is continued to be restricted, and that flood resistance and resilience measures are incorporated through the planning system. We will work with local councils to promote this through our role as statutory consultee on planning applications and local plans.

Implementing our proposals

Since adopting the strategy, we have made progress on all of the recommendations made in 2012.

Woodford surface water management

Following our earlier work with London Borough of Redbridge since 2010, we continued to work together to investigate the feasibility of the scheme in Woodford.

In order to have a more in depth look at these recommendations, we used the latest software to develop detailed flood modelling of the River Roding and local drainage network in Woodford. The modelling revealed a more simple solution to reduce the flood risk in Woodford.

In times of high water levels, the greatest risk of flooding in Woodford was from the River Roding. In particular, water from the river would overtop the banks into Ray Park.

An embankment around the edge of Ray Park acted as a wall to enclose the flood waters in the park.

However, the modelling showed one section of the bank was lower than the rest. This opened a route for flood flows from the river into the residential area to the south of the park. If we increased the height of this section, the embankment would act as a defence and contain flood waters in the park. We completed this work between September and November 2014.

This embankment, in combination with further embankment repairs and new flap valves installed by London Borough of Redbridge and Thames Water, now protects almost 400 properties in Woodford from flood events up to a 1.3% (1 in 75) chance of occurring each year. We will update our flood maps to reflect this later this year.

As these works have provided the intended level of protection from flooding, we will not need to proceed with the recommendations made for Woodford in the strategy.

The strategy also identified that as well as flooding from the River Roding, Woodford also suffers from surface water flooding. We are therefore now working with London Borough of Redbridge to investigate this surface water flood risk. We expect to be able to share the final report of our completed investigations in summer 2015.

Changes to our maintenance regime

Between Autumn 2014 and Spring 2015 we are writing to all riparian owners and occupiers to inform them of the proposed changes to our maintenance regime.

Before making changes to our maintenance programme we will give a notice period, which will be a minimum of 12 months. This will allow those affected to make necessary preparations or arrangements for adapting to the change.

We will communicate with all riparian owners of the river and any assets, and work with them to ensure they are fully aware of what work we have done in the past, what we will be doing, and to make sure they are aware of their responsibilities as riparian owners. We will also raise awareness with the public in general about the changes we are making. During this notice period we will offer advice and guidance to riparian owners, or other stakeholders who are not riparian owners but who wish to take on the responsibility of maintenance.

At the end of the notice period we will no longer maintain any structures in the areas where we are ceasing maintenance or only continuing with channel maintenance. We will also stop maintenance of the channel where the recommended option is 'do nothing'.

We will continue to provide a reactive service to clear any blockages or other incidents which are reported to us via our incident hotline on 0800 807060 that we feel could cause an immediate flood risk to properties.

Shonks Mill Flood Storage Area

We have begun investigations into the feasibility of the scheme, during which we will liaise with land owners and interested parties. If the scheme proves viable and is fully funded, we will develop detailed designs and carry out further consultation before the final design is approved. We expect to complete construction over a period of 32 months following this process.

Once construction is complete we will implement operating and maintenance regimes to ensure that the scheme continues to function at the required level.

Resistance and resilience measures

We have contacted all those properties which appear to be at a higher flood risk following implementation of the strategy to offer advice and support around individual property protection measures.

What happens next?

The actions recommended in this strategy aim to improve flood risk management in the Roding Catchment over the next 100 years. Completion of individual measures will depend on a number of factors, including funding, contributions, planning permission and public support.

Each measure and scheme will need to be investigated fully to ensure it delivers the strategy's recommendations in the most economically, technically and environmentally viable way. Most new schemes are also likely to require planning permission and other consents. We will continue to work closely with the communities affected by our proposals, as well as their councils, and other bodies to be able to deliver schemes that will provide long-term benefits of reduced flood risk and a better water environment.

We will continue to review the strategy periodically to ensure that it considers changes in the catchments, climate change, policy, and other factors. Some of the recommendations may change if new material comes to light. We will ensure any changes are communicated to stakeholders.

If you would like to find out more, visit our website at

www.gov.uk/government/publications/river-roding-flood-risk-management-scheme

Alternatively you can contact us at HNLenquiries@environment-agency.gov.uk

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