London Assembly Environment Committee

Managing Flood Risk in Case of Severe Rainfall Report

Combined Evidence Received

Investigation: "For a Rainy Day", July 2011

Contents

FR01 Thames Rivers Restoration Trust

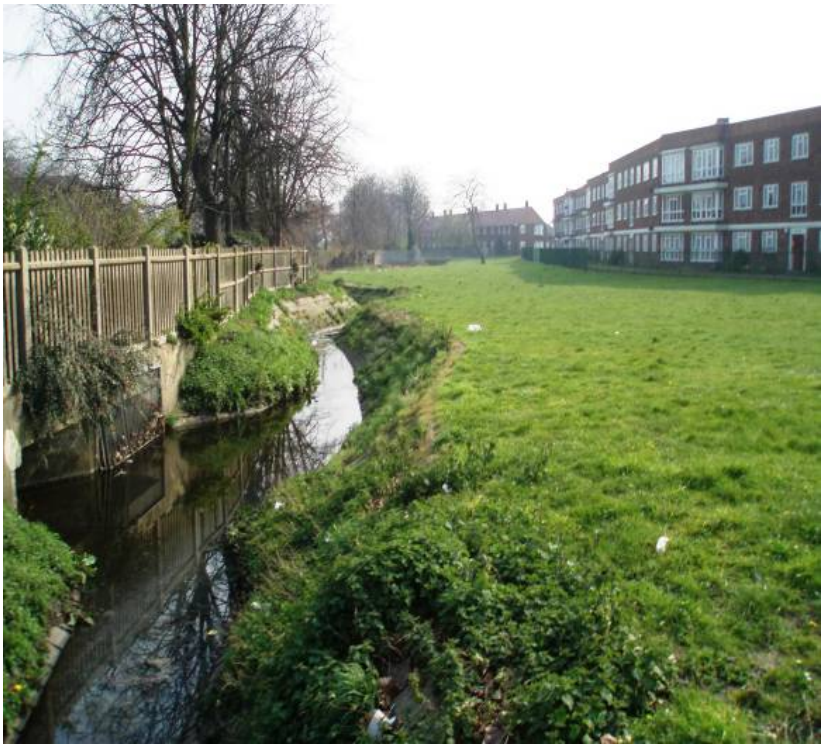
Thames Rivers Restoration Trust

Registered Charity number 295138

LONDON ASSEMBLY, ENVIRONMENT COMMITTEE
INVESTIGATION INTO – 'RAIN AND FLOOD RISK MANAGEMENT IN LONDON'

SUBMISSION BY TRRT

30 July 2010



Mayesbrook Park, Barking, east London
site of the UK's first climate change public park

The Mayesbrook Park adaptation to climate change project is grateful for the financial and other support provided by RSA.

1. The role of Thames Rivers Restoration Trust (TRRT)

1.1 The Thames Rivers Restoration Trust (TRRT) is an independent charity dedicated to improving the river and its tributaries to benefit people and nature. We cover the whole of the freshwater area of the Thames river basin; including the main river and its tributaries totalling 600 km.

1.2 As recently as the 1950s the Thames was so polluted that it was classed as 'biologically dead'. Pollution from industry and other sources has been hugely cleaned up over the past sixty years. But many parts of the Thames and its tributary rivers still suffer from problems such as:

- pollution from agriculture, sewer overflows and roads run-off
- physical alteration in structure, such as concrete flood defences
- Low flows, due to water abstraction for homes and businesses
- Loss of wildlife

1.3 Healthy rivers are needed to provide essential functions such as water supply, flood water transfer, biodiversity protection and recreation. TRRT helps to restore these functions through:

1. *Philanthropy* – raising funds for river improvement projects
2. *Policy work* - lobbying national government to improve legislation and funding for river restoration
3. *Planning* – influencing processes such as the EA's Thames River Basin Management Plan under the Water Framework Directive
4. *Practical projects* - to demonstrate how to improve rivers for people and nature, more cost effectively and adapting to climate change
5. *Promotion* – including education and awareness raising of the public, through our website, newsletters, events and activities
6. *People* - involving them in solutions through supporting the trust or in consultations over plans and projects

1.4 Where possible, our activities are carried out in partnership with public and private stakeholders. We have been a leading partner in producing the London Rivers Action Plan (LRAP), the first UK plan for restoring the rivers across a whole city. The LRAP will help public and voluntary bodies to restore 15km of rivers by 2015, which is part of the Mayors Plan for London.

2. Flooding in London

2.1 The London Assembly has identified that London is vulnerable to surface water flooding. Heavy rainfall can swiftly overwhelm the drainage network, leading to flooding of low-lying areas (in 2007 more than 1,000 homes were flooded in London despite the capital having only a third of the rainfall that affected Hull). Climate change is projected to increase the frequency and intensity of heavy rainfall events, whilst London's growth will mean that more people and assets will be at risk. A one in 200 year rainstorm today would flood up to 680,000 properties in London.

2.2 No agency has overall responsibility for flood risk, so this Environment Committee investigation will review how 'all the relevant bodies – Environment Agency, local authorities and the GLA - are working together'. We suggest that the Committee also looks at the role that NGOs, private companies and other stakeholders can play.

2.3 The proposal for this LA investigation identifies that governance of flood risk management is complex. At the national level, the responsible body is the Environment Agency, which is accountable to DEFRA. The Environment Agency has a strategic overview, and specific responsibilities relating to main rivers and sea defence, and flood risk maps and flood warnings. However, the EA does not have all of the funds required to provide complete flood risk protection to all properties and persons in the London area. The Environment Agency estimates that adapting to

climate change by using traditional 'hard engineering' approaches (e.g. by upsizing sewers and increasing storage) would cost £15 billion nationally[1].

2.4 In addition, many of the existing hard flood defences owned or managed by the EA and local authorities are old and coming to the end of their useful life. There are big questions around whether society can afford to replace these hard defences. TRRT has been encouraging the EA and other stakeholders to investigate more natural flood management systems, as an aspect of sustainable drainage, which could also bring multiple benefits to society. This is further discussed in section 3 below on 'Mayesbrook – the UK's first climate change public park'. The role and responsibility of the EA are further discussed in section 2.3 below.

2.5 At the local level, local authorities lead, taking responsibility for surface water, groundwater and watercourses other than main rivers. They have roles in maintaining and improving flood defences and encouraging sustainable drainage. However, some LA's in flood prone areas have struggled to afford their role and the current economic climate will make their task harder. To help with this problem, the type of natural flood management systems that TRRT has been promoting are designed to provide better value for money and lower overall costs than traditional hard defences. They are also the type of schemes that will attract joint funding from other stakeholders, due to the wider benefits that they provide such as river restoration, biodiversity enhancement, angling and recreation.

2.6 At the London level, the GLA has its role as a local authority with London-wide responsibility. Several GLA statutory strategies relate to flooding, including the London Plan, the Climate Change Adaptation Strategy and the Water Strategy. The Mayesbrook Project is designed to show how to link up these strategies on the ground.

3. The EU Water Framework Directive

3.1 The EU Water Framework Directive (WFD) of 2000 requires the Environment Agency to produce a Management Plan for restoring all rivers to new higher quality standards of 'Good ecological status' (GES) or 'Good ecological potential' (GEP) by 2015. An ancillary purpose, identified in Article 1, is to contribute to mitigating the impacts of floods and droughts.

3.2 In addition, The WFD will require a new regime for flood risk management and land-drainage schemes, to ensure that they are compatible with the new higher environmental standards of GES or GEP. The WFD therefore requires the integration of flood risk management with other aspects of river basin planning. This will provide all stakeholders with the opportunity to improve flood risk management and provide other societal benefits through the implementation of more natural flood management systems. This view is supported in the DEFRA strategy document for water management, *Directing the Flow*:

"*For the future we need to put more weight on ensuring that the combined benefits to flood management and other water policies are maximised… This requires integration of Catchment Flood Management Plans, and other water plans under the umbrella of river basin management plans that are a requirement of the Water Framework Directive."* Paragraph 4.6.1

[1] Environment Agency. 2007. *The potential costs of climate change adaptation for the water industry.* At www.environment-agency.gov.uk/static/documents/research/icf2007_cc_report_1920959.pdf

4. The EA's Thames River Basin Management Plan

4.1 In December 2009, the Environment Agency produced the Thames River Basin Management Plan (RBMP) for the period 2009 to 2015 entitled 'Water for life and livelihoods'. That plan includes among the key issues for improving the Thames and its tributaries 'the physical modification of water bodies', which includes modifications for flood risk management. The means through which this should be done is:

'Catchment Flood Management Plans (prepared by the Environment Agency) …….set out long term policies for flood risk management. The delivery of the policies from these long term plans will help to achieve the objectives of this [Thames RBMP] and subsequent River Basin Management Plans.' Main document, page 30.

4.2 But there is no guidance as yet for EA staff, local authorities or other stakeholders on how to implement flood risk reduction or other river improvement projects on the ground in such as way as to be compatible with the requirements of the WFD. This is particularly important as DEFRA and the EA have said that central government and the EA alone cannot deliver the WFD. They need the involvement of stakeholders to help plan, fund and implement WFD actions on the ground. But stakeholders cannot do this unless they have good examples to learn from. For this reason, we have formed a partnership with other organisations (including the GLA) to demonstrate at Mayesbrook Park just how natural flood management and other benefits for society can be delivered on the ground, in such a way as to meet the requirements of the WFD.

5. Mayesbrook – the UK's first climate change public park

5.1 Mayesbrook Park is a forty five hectare public park in the London Borough of Barking and Dagenham, in the East of London. It is in a priority area for the Thames River Basin Plan as it has an over-engineered structure, poor water quality and is low in biodiversity, including poor fish populations. The park was designed in a classical style in the 1930s but never completed. It has been maintained as a typical public park with large areas of mown grass, football pitches and a sports stadium in need of refurbishment. It is an underused asset in an area of high social deprivation and low biodiversity.

5.2 Climate change is considered to be the greatest environmental threat to society by many scientists and governments. For Londoner's it brings the threat of dangerous rises in temperature, more intense air and water pollution, increased droughts and floods, loss of wildlife and increased pests and diseases. There is an urgent need to demonstrate how society can adapt to climate change, especially in urban areas. The adaptation of Mayesbrook Park will do this in a way that is practical, cost effective and attractive.

5.3 TRRT has formed a partnership with the London Borough of Barking and Dagenham, GLA, Design for London, Environment Agency, Natural England, and London Wildlife Trust; along with sponsors RSA[2], to transform Mayesbrook into the UK's first climate change public park. The Masterplan for this transformation was launched on 6 July 2010 at an event in the park.

5.4 The Mayesbrook Park project will:

- Show how partnership working can improve the planning, funding and implementation of environmental improvement projects
- Be a demonstration project for the Thames RBMP and for natural flood management in the urban environment
- Contribute to the East London Green Grid, London Biodiversity Action Plan and London Climate Change Adaptation Strategy
- Be a flagship project for the London Rivers Action Plan.
- Provide 21st century outdoor recreation in an area of social deprivation.
- Attract a range of public and private sponsors

[2] **About RSA**

With a 300 year heritage, RSA is one of the world's leading multinational quoted insurance groups. It has the capability to write business in over 130 countries and major operations in the UK, Scandinavia, Canada, Ireland, Asia and the Middle East, Latin America and Central and Eastern Europe. Focusing on general insurance, it has around 23,000 employees and, in 2009, its net written premiums were £6.7bn.

5.5 The project works will include restoration of up to one kilometre of river through the park, which will be London's largest river restoration project. Also the creation of a new one hectare floodplain to store the increased flood water expected in the area in future as a result of climate change. These works will be done in such a way as to meet the requirements of the WFD.

5.6 Other works to adapt the park to the impacts of climate change will include the planting of five hectares of native trees for shade to reduce the urban heat island effect, as well as providing a more attractive landscape and more habitats for biodiversity. Two polluted lakes will be restored to good water quality to help with atmospheric cooling and biodiversity enhancement. One lake will have boating restored and the other will have angling restored. A new visitor centre will include an exhibition about climate change and what individuals can do to adapt to it. New entrances and signage around the park will explain how the different works demonstrate adaptation to climate change.

5.7 The local community has been involved in developing the Masterplan for the restoration. Three local primary schools have also been involved. The whole project will provide large educational opportunities for adults and school students.

5.8 The project is managed by a steering group chaired by the London Borough of Barking and Dagenham, who own the site. The river restoration and floodplain creation phases of the project are due to start work on the ground in January 2011 and be completed by the autumn of 2012. The other phases of the work will be completed up to 2014 and beyond in the case of the visitor centre.

5.9 The estimated costing for the whole project is £3.6m. The project partners have identified sources of funding for most of the works, including some £450,000 for the first phase of river restoration and floodplain creation works. The project is demonstrating that large-scale improvements can be achieved through partnership projects which pool the resources of many stakeholders to achieve multiple benefits. The project is benefiting from a grant of £400,000 from the Mayor's 'Help a London Park' initiative, which has attracted £300,000 match funding from the RSA and other amounts from the other partners. This joined up approach enables each organisation to fulfil objectives that it could not afford alone. This approach will be increasingly necessary in today's reduced public sector funding situation.

5.10 TRRT understands that physical modification and hard flood defences are required in many places to protect people and property. However, we believe that there is large potential for more natural flood management approaches in urban areas, such as through creating 'Sustainable Urban Drainage Systems' (SUDS) or by creating or restoring floodplains in green spaces – which the Mayesbrook Park project will demonstrate. This approach will be further detailed in the RSA and WWF report on 'Water management in a changing climate – mainstreaming sustainable drainage systems in our towns and cities', to be published later in 2010.

6 Committee meeting with stakeholders

6.1 TRRT would be pleased to attend the Committee meeting with stakeholders on 8 September and answer any questions about the Mayesbrook Park project and the natural flood management approach.

7 Site visit by the Committee

7.1 TRRT, on behalf of the Mayesbrook Project Steering Group partners and donors would be glad to organise a site visit for the Committee to Mayesbrook Park.

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ANNUAL ACHIEVEMENTS REPORT
JULY 2010

CLIMATE CHANGE PARK LAUNCHED

The UK's first climate change public park was launched in Mayesbrook Park, Barking, London, on 6 July. The £2.7 million project is a partnership between TRRT, London Borough of Barking and Dagenham, Environment Agency, GLA, Natural England, Design for London and the London Wildlife Trust; with a £300,000 donation from RSA, the global insurance company and £400,000 from the Mayor of London's 'Help a London Park' scheme.

The Mayes Brook (photo TRRT)

The project includes the restoration of up to one kilometre of the Mayes Brook through the park. This will be London's largest river restoration project and a flagship project for the London Rivers Action Plan. The work includes the creation of a new natural channel and a one hectare floodplain for natural flood management. This will safely store the additional flood water expected in the area in future as a result of climate change. A boardwalk will allow visitors to see and enjoy the wetland wildlife.

The Mayes Brook is a tributary of the River Roding, which enters the Thames at Barking Creek. The brook has been straightened and deepened over the years for flood management. It has poor water quality from the many drains connected to it. As a result, there is little wildlife left in the brook. A high fence prevents the public from accessing the waterside. It is a classic example of what is wrong with urban rivers across the country. The Mayesbrook Park Project will demonstrate how to improve our urban rivers through cost-effective partnerships that bring multiple benefits to people and wildlife.

The launch event (photo RSA)

All aspects of the restoration project will demonstrate adaptation to climate change. Two lakes will be restored to help cool the area and provide boating and fishing. Five hectares of woodland will be planted to provide shade and habitats for wildlife. New visitor facilities will include a café, toilets and ranger service. A climate change garden will show drought resistant plants. The local community and primary schools have helped to design the Masterplan for the park.
The launch included a speech by Geoff Bateman, Head of River Basin Planning at the Environment Agency, who welcomed the project as a model of partnership working between government agencies, local authorities, private sponsors and NGOs. Geoff looks forward to the project demonstrating how to deliver the objectives of the EU Water Framework Directive on the ground. He is also looking at the natural flood management and climate change adaptation aspects of the project, for lessons of use across England.

There was also a speech by Tim Mitchell, Group Underwriting and Claims Director at RSA. Tim described how RSA are using the project to help promote managing flooding more naturally through new floodplains and other 'Sustainable Urban Drainage' (SUDS) type systems. At the launch, RSA distributed leaflets announcing the publication in the autumn of their report 'Water management in a changing climate' in partnership with WWF.

With the restoration model (left to right) – Councillor Bert Collins, Paul Hogan (LBBD), David Theakston (LBBD),
Robert Oates (TRRT), Geoff Bateman (EA), Tim Mitchell (RSA)
Tim also spoke about how RSA had been inspired by the whole Mayesbrook Project. Many company staff are devoting voluntary work days to help with practical tasks in the park. These range from helping to clean up the lakes, plant trees, paint fences, install benches and put up bird nesting boxes.

RSA volunteers with new bench and happy local residents (Photo TRRT)

The launch event included a tour of the site for the first phase of river restoration and the creation of the new floodplain. The walk was led by TRRT, London Borough of Barking and Dagenham and Quartet Design. Around fifty guests took advantage of the warm, sunny day to see where the river work is planned to start in February 2011, aiming for completion in autumn 2012. Then further phases of the park improvements will continue to 2014.

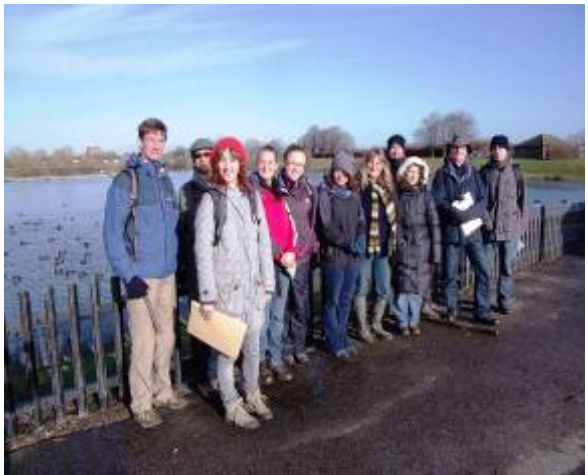
Local children at the launch (Photo RSA)

TOMORROW'S RIVER MANAGERS

In the autumn of 2009, TRRT was invited by Birkbeck College, University of London to design and teach the first ever module in 'River basin planning and management', for their MSc course in Environmental Management. The students on this course are aiming to be future managers of our environment, with many especially interested in helping to protect rivers.

The TRRT course included the theory and science of river basin planning, with examples from the UK and around the world. The river basin management component focused on the implementation of the EU Water Framework Directive. The course covered how the Directive was being implemented through River Basin Management Plans, prepared by the Environment Agency with the input of stakeholders such as river trusts.

Following the indoor classes, the students were taken by TRRT on a field trip in January to Mayesbrook Park in Barking, London, to see some of the barriers and opportunities to restoring one of our most damaged urban rivers. We plan to continue our association with Birkbeck College and help to prepare even more river managers for their future careers.



Birkbeck College students at Mayesbrook Park (Photo TRRT)

REDUCING POLLUTION

For the third year, TRRT has supported a Farming and Wildlife Advisory Group (FWAG) project to reduce diffuse pollution from agriculture into the River Kennet. The project helps land managers to reduce the run-off of sediment, fertilisers and pesticides into the river. Over 100 farmers and land managers have received advice.

Farm advice session (Photo TRRT)

RIVERS TRUSTS CONFERENCE

The Autumn Seminar of the Association of Rivers Trusts (ART) was held in Thames region for the first time in September 2009. TRRT was a host organisation for the event, which was sponsored by the EA. About 100 delegates heard a range of presentations about river trusts work across the UK. Huw Irranca-Davies, MP, former Minister for the Natural Environment, made a keynote speech.

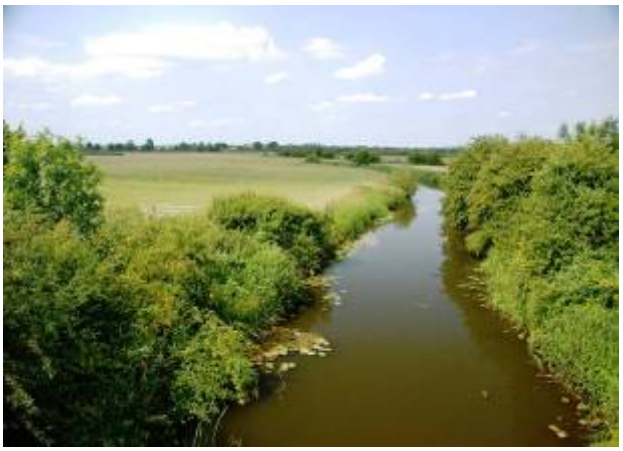
Huw Irranca-Davies MP

BETTER RIVER PLANS

In December 2009, the Environment Agency (EA)

published the first Thames River Basin Management Plan (RBMP).

The RBMP contains actions for improving the Thames and all of its tributary rivers.
To help implement the RBMP at local level, TRRT has been lobbying the EA to produce Catchment Plans for each of the Thames' tributaries. We were delighted when in July the EA agreed to produce Catchment Plans, in partnership with TRRT and other stakeholders. These Catchment Plans will initially be produced for high priority rivers, such as the River Ray in Oxfordshire where we have a project with the EA and other partners.



The River Ray (Photo TRRT)

INTERNATIONAL RIVERPRIZE

The International Riverprize is awarded each year to the river which has been most improved in the world. In partnership with TRRT, the EA entered an application on behalf of the Thames, which has now been selected as one of four finalists. The winner will be announced in October at the International Riversymposium in Australia.

TRRT has also been invited to give a presentation about the London Rivers Action Plan at the International Riversymposium. This will help to carry the rivers trusts message to a wider audience.

WHO WE ARE

TRRT is an *independent charity* dedicated to improving the River Thames and its tributaries for people and nature. Many parts of the Thames river system still suffer from pollution, physical alteration and loss of wildlife. We form *partnerships* with government agencies, local authorities, businesses and others to lever change. We set up practical *projects* to improve rivers for all to enjoy. Those projects also *demonstrate* how to manage rivers better and more cost effectively.

HOW YOU CAN HELP

- **Register as a supporter** – it's free, just enter your details on our website. With more supporters we have more chance of

gaining grants from organisations such as the National Lottery.

- **Make a donation** – even a small amount will help.
- **Join your local river trust** – see www.associationofriverstrusts.org.uk for the nearest one to you.
- **Corporate sponsors** – if you are interested in discussing how we can help achieve your objectives for the environment, local community or Corporate Social Responsibility, please contact the Director.
- **Spread the word** – please forward this newsletter to your friends and contacts

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London Assembly Enquiry: Managing risks of river and surface water flooding in London

MEMORANDUM BY THE ASSOCIATION OF BRITISH INSURERS

The ABI is the voice of the UK's insurance, investment and long-term savings industry. It has over 300 members, which together account for around 90% of premiums in the UK domestic market. The UK insurance industry is the third largest in the world and the largest in Europe. Employing more than 300,000 people in the UK alone, it is an important contributor to the UK economy and manages investments of £1.5 trillion, over 20% of the UK's total net worth.

Introduction

1. The UK enjoys a relatively benign climate. Nevertheless, London has been identified as one of the most at risk mega cities globally in view of the high asset accumulation and level of economic activity combined with low-medium level natural hazards.[1] This assessment took account of the existing resilience of building codes, flood and coastal defences, emergency planning systems etc as well as the total assets at risk. Not only could climate change affect the severity and frequency of extreme weather, it could also render ineffective these measures designed to reduce today's vulnerability. Recent studies conducted by the ABI and other stakeholders and the new UK Climate Impact Program 09 projections all show that climate change is likely to increase the risk of flooding across the UK. The 2007 floods demonstrated the crippling impact extreme weather events can have on the economy. They are costly not only to insurers – the total bill to insurers for the 2007 floods amounted to approximately £3bn – but also to public services and small businesses. This is especially the case for London and the Thames Estuary, with the extremely high concentration of people and assets.

2. The last decade has seen an increasing concern that the UK is poorly prepared to deal with flooding. This concern has intensified with the demand for increased development arising from the Government's housing targets, a realisation that urban areas are becoming more intensively developed (so called "urban creep") and the predicted impacts from climate change. Socio-economic changes could combine with climate effects so that actual claims rise even more sharply. For example, the significant rise in financial and insured damages arising from weather events since the 1950s is driven in large part by increasing numbers and values of assets in flood-prone areas.[2] Insurers need a clear commitment from Government that the expected future levels of flood protection will not be less than today's. This applies to all sources of flooding.

3. If the risks of more frequent and more severe weather hazards are not addressed, insurance costs will rise and some insurance products may not be sustainable in the future. This would mean, in the worst case, consumers may be left without protection. The wider costs to our economies and societies are even larger.

1 Megacities – Megarisks. Munich Reinsurance, 2005.
2 ABI: Coastal flood risk report, November 2006

Responses to questions asked by the Committee

Q. How is the ABI working, itself and with other organisations, to manage river and surface water flood risk?

4. The ABI wants to ensure that flood risk is managed effectively and that as many people can continue to obtain competitively priced insurance to protect themselves from the financial cost of flooding. Under a 2008 flood agreement with the Government – the Statement of Principles - insurers committed to continuing to provide flood insurance to the vast majority of customers until 2013. In return, the Government gave an overarching commitment to ensure that flood risk is appropriately tackled. Over the next three years the insurance industry will continue to work with the Government to put in place long-term solutions that will enable flood insurance to be as widely available as possible through effective long-term management of flood risk, backed by adequate funding.

5. The ABI is also working with the Government to encourage homeowners and businesses to take flood resilient and resistance measures and to promote financial inclusion. The ABI continues working closely with Government to promote the benefits of insurance among low-income households.

6. Experience from the 2007 floods shows that property owners tend to be reluctant to complete resilient and resistant repairs as they fear this will lead to a devaluation of their property or that the features of such modifications will be unsightly. Homeowners also have to pay any additional costs. To inform our work on how to promote property-level flood protection and flood resilience, the ABI produced research into the cost of resilient repair resulting in a guidance document published in co-operation with the Environment Agency, the National Flood Forum and the Chartered Institute of Loss Adjusters.[3] This guide is intended to encourage customers who have been the victims of flooding to discuss their options with their insurer and loss adjuster. This work is being followed up by another ABI research study that looks at how insurers are promoting resilient repair and how take-up amongst customers could be increased.

7. The most efficient way to avoid creating new flood risk is to stop building in high flood risk areas. If development is needed in high flood risk areas, higher minimum standards should be applied to any buildings constructed. These should include design features to protect against flooding and minimise damage should a flood occur. Applying the routine national standards is not sufficient in high-risk areas. In 2006, the ABI welcomed the introduction of the new Policy Planning Statement 25 (PPS25) that was intended to strengthen and clarify policy on developments and flood risk. While it appears to be working in most areas, further work is needed to spread best practice amongst all local planning authorities. This highlights the importance of developers and planners complying with the ABI's guidance on insurance for new developments, published in January 2009.[4]

3 See ABI "A guide to resistant and resilient repair after a flood" - "http://www.abi.org.uk/Publications/ABI_Publications_A_guide_to_resistant_and_resilient_repair_after_a_flood_670.aspx

4 ABI: Climate Adaptation – Guidance on Insurance Issues for New Developments, 2009, http://www.abi.org.uk/Publications/Climate_Adaptation_-_Guidance_on_insurance_issues_for_new_developments1.aspx

Q. How does the ABI view work by public agencies such as the GLA, the Environment Agency and London boroughs?

8. We welcome the TE2100 plan as it provides a useful approach to long-term flood risk management. It is therefore encouraging to see that the Mayor of London has begun to recognise the significance of adaptation. The ABI welcomes the decision to prepare a Climate Change Adaptation Strategy for London as an important step in dealing with climate change.

Q. How does the ABI view developments in these issues since the Government's response to the Pitt review and the Flood and Water Management Act 2010?

9. The Flood and Water Management Act is a vital step towards implementing the recommendations of the Pitt Review to protect homeowners and businesses in England from flooding. The ABI worked with politicians to ensure that it passed through Parliament as quickly as possible so people could benefit from a more effective framework to cope with the rising flood risk.

10. The Act forms part of the ABI's flood agreement with the Government of July 2008 which commits insurers to ensure that flood insurance remains as widely available as possible until 2013. The Act puts in place a clear framework identifying accountabilities for managing flood risk. The ABI welcomes the requirement for risk management strategies to include consideration of climate change impacts. Recent projections such as UKCIP09 show that climate change is likely to increase flood risk across the UK – this places increased importance on incorporating climate science into risk management. We are particularly pleased that the Environment Agency (EA) will have a clear national overview role and that Local Authorities will have clear responsibility for identifying and tackling surface water flooding. But certain gaps remain:

- **Targets:**

11. We believe that, as in the Climate Change Act, there is a need for legally binding targets for reducing the number of properties and businesses at risk of flooding, and a requirement for the Environment Agency (EA) to report against these. At the very least, we would like a statement from the Government of their vision for managing flood risk in the future, particularly on what they regard as acceptable levels of homes and businesses at flood risk and how delivery of flood protection measures can be monitored.

- **Independent public scrutiny:**

12. We need to empower local communities to hold their Local Authority to account and ensure they are delivering on their local flood risk management plans. Otherwise, the local community may only be aware their local authority is not managing flood risk effectively when they are flooded –this is too late. We recommend an independent body has responsibility for auditing Local Authorities' performance against flood risk management plans and making this information publicly available. The Environment Agency is best placed to do this.

• **Identifying and helping people at high flood risk:**

13. The EA and Local Authorities should be required to liaise with all homes and businesses that they do not expect to be able to protect to below significant flood risk levels to ensure that all homes and businesses are aware of the significant flood risk they face and the options available to them. Local Authorities should be empowered to provide and

coordinate free property-level flood risk surveys, and provide support for homeowners and businesses willing to modify their property to make them more resistant and/or resilient to flooding.

• **Funding:**

14. Many of the proposed measures in the Act will require additional funding in particular at local level. Policy makers need to ensure that, despite the difficult current climate, sufficient funding sources are available to finance these new powers and responsibilities as part of a long-term funding strategy. We welcome the Environment Agency's work on a long-term investment strategy. Now the Government needs to respond by setting out its long term strategy as soon as possible.

Q. What risk mapping is being undertaken?

15. We need to create an open culture of sharing information between all those involved in increasing risk awareness. Comprehensive, clear and accessible flood risk information is a prerequisite for effective management of flood risks. We all need to improve our understanding of flood risk through assessing both the probability and consequences of flooding from all sources, including surface water. The ABI continues to work with the Environment Agency to ensure that more detailed flood risk information is made publicly available and updated annually.

16. The provision of free flood risk surveys to owners of high risk properties would also increase understanding and acknowledgement of risks. It is vital that improved information on flood risk is available to insurers. This will allow them to continue to provide insurance to as many customers as possible on terms that reflect the risk of flooding as accurately as possible. But insurers also need to share their knowledge and expertise. We are committed to providing industry data that will help to improve the understanding and modelling of risks. In November 2009 the ABI published the results of a major research project conducted by the catastrophe modelling firm AIR and the Met Office, examining the financial implications of climate change using climate models and insurance catastrophe risk models. The research team has used ground-breaking modelling techniques, combining the latest climate models with insurance risk models for the first time.

17. Latest research on rainfall trends for London shows a need for public and private stakeholders to engage to ensure appropriate information is collected to allow further analysis. Through our membership of the London Climate Change Partnership we have been involved in discussions with the Met Office, Lloyds of London and the GLA about the availability of meteorological data for London. One conclusion of this work is that London would benefit from a more joined-up system to monitor and analyse weather data.[5]

[5] Lloyds' of London: East London Extreme Rainfall - Importance of granular data, London 2010. http://www.lloyds.com/~/media/Lloyds/Reports/Emerging%20Risk%20Reports/East%20London%20Extreme%20Rainfall_Final.pdf

Q. To what extent are surface water and river flooding risks likely to be mitigated in London in the next few years?

18. In London it is encouraging to see that there is a good understanding of the need for action to manage all sources of flooding, as outlined by the Mayor's Adaptation Strategy. It is now very important to link the good work that has been produced through the TE2100 project and the Drain London initiative to implement one holistic flood risk management response for London.

19. For river flooding, the TE2100 plan outlines the need to take action going forward. One key element of flood risk management efforts is the effective use of the planning system. Future developments in flood risk areas could increase the risk of flooding unless built in a resilient way. Spatial planning is an important element of flood risk management. Without the proper implementation of the planning rules we will not be able to keep flood risk levels under control. While the planning system has been strengthened we are concerned that local planners need to be better trained and resourced in order to fulfil their important flood risk management role. This is especially important in a dedicated growth area such as the Thames Gateway. The TE2100 Plan should put greater emphasis on the importance of local authorities' planning practices. The TE2100 Plan therefore needs to fully capture the risk of surface water flooding.

20. The current arrangement for surface water management in London and elsewhere in the UK is complex with many bodies involved. In reality the hydrology of the surface water system operates as a whole so any boundaries are artificial but the current arrangement seems over-complicated and places barriers in the way of overall management.

21. As well as a large number of bodies involved in surface water management the present system leads to a multiplicity of design standards, objectives and record keeping. These are often geared to the particular requirements of the body responsible and are therefore incompatible. Many of these different systems interact on the ground, however, whether by design (combined sewer overflows for instance) or through accident (river overflows into sewers). The splitting of responsibilities makes practical management of the interacting systems very problematic. The Flood and Water Management Act provides the opportunity to resolve the institutional confusion at a local level.

22. The Drain London initiative is a useful start, but implementation of risk management measures should not be deferred, as action is needed now. Insurers are very concerned about the current lack of preparedness of London for severe rainfall events, as experienced in the UK in 2007.

Q. What challenges remain in the management of risk from river flooding and surface water flooding in London?

23. A key challenge for London is the effective co-ordination of flood risk management across Boroughs and between stakeholders. The floods in summer 2007 demonstrated the need for flood risk management to be properly coordinated, especially in the context of surface water flooding. The ABI conducted a major research project looking at the need to

improve surface water management in order to reduce flood damage in urban areas [6]. This research draws evidence from recent projects which have aimed to manage surface water in urban areas, supplemented by two projects, in Peterborough and Bristol, where surface water management plans were developed through stakeholder groups including the key institutions involved. The research has highlighted a range of institutional and process issues that need to be addressed in order to better manage the increasing risk of urban surface water flooding in the UK, such as a clear recognition of Local Authorities' obligation to manage surface water, the need to share data amongst stakeholders to undertake surface water management and a clarification of the responsibilities of riparian owners.

24. Flood risk management requires funding. In the current economic climate it is important that any proposed measures are sufficiently funded, today and in the future. We welcome the Government's announcement to conduct a public debate about future public investment in flood risk management, and we will play our part in this discussion.

Association of British Insurers
August 2010

[6] **ABI: Urban surface water management planning - Implementation issues, 2009 - http://www.abi.org.uk/Publications/Urban_Surface_Water_Management_Planning_-_Implementation_issues1.aspx**

FR03 Thames Water

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Environment Committee
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31 August 2010

Dear Mr Williamson

Managing risks of river and surface water flooding in London

Thank you for your letter of 23 July outlining the London Assembly Environment Committee's inquiry into the management of river and surface water flood risks in London.

I appreciate your invitation to submit evidence and am pleased to be able to submit the following points in response to the Committee's questions.

Q: How is Thames Water working, itself and with public agencies, to manage river and surface water flood risk?

- The shared responsibilities for addressing flood risk make it key that the different bodies and agencies involved work closely together.

- With respect to surface water flood risk, we are a strategic partner in the Drain London project (covered in the next question), and are supporting all 33 London boroughs in the production and delivery of their Surface Water Management Plans.

- We also engage directly with individual boroughs and the Environment Agency to understand flood risks from surface water drainage infrastructure and watercourses, and work closely with them to resolve problems and issues such as ownership and responsibility.

- We have participated in two Defra Integrated Urban Drainage pilot schemes (Hogsmill and Wealdstone Brook) and a 1st edition Surface Water Management Plan trial (Richmond and Kingston upon Thames).

- We comment on all Local Development Frameworks and significant planning applications to highlight the potential impact of development on the public sewer network and help local authorities take decisions that take this into account.
- With regard to river flood risk, our work and responsibilities are limited to improving the resilience of our own operational sites during flood events. We have a programme of work to protect our most vulnerable sites over the next five years, which we have shared with the Environment Agency.

Q: What is being done under the Drain London project?

- Drain London is an important forum that has played a key role in promoting a partnership approach and developing a London-wide strategy for managing surface water flood risk.

- The Drain London project will deliver the following outputs:

    - A strategic assessment of surface water flood risks across the capital.
    - Establish partnership groups of local authorities who share common flood risks and features such as river corridors, so that they can collaborate on joint solutions and share best practice.
    - Produce a Surface Water Management Plan (SWMP) for each borough.
    - Provide data for a Preliminary Flood Risk Assessment (PFRA) for each borough, to help them comply with the Flood Risk Regulations 2009.
    - Create an on-line portal for sharing data on flood risks and infrastructure, among the boroughs.
    - Carry out detailed investigations into a number of critical drainage areas, to identify solutions to well understood flood risks.
    - Create Community Flood Action Plans for areas vulnerable to flooding for which no short-term solution is identified.
    - Create a Green Roof Fund to promote and encourage the installation of green roofs on the Capitals buildings.

- We are a strategic partner in the Drain London Forum and have supported the project from its inception.

- We are represented on the project board and we provide support in the form of resource time, data and expertise.

- On an ongoing basis we assist in project oversight, the drafting of policies and communications and we attend meetings of the project board, the full forum and local meetings with the individual boroughs.

Q: What risk mapping is being undertaken?

- The Drain London project is carrying out high-level mapping of surface water flood risks across the capital, prior to more detailed mapping of high-risk areas.

- We carry out hydraulic modeling of public sewers to identify sewers at risk of flooding. These models can be made available to the Drain London project, if required by the detailed investigations of high-risk areas.

- For example, we are carrying out extensive investigations into the Counters Creek catchment in the London Borough of Hammersmith and Fulham. We are conducting a strategic study into the sewer flooding of that area and, through the Drain London Forum, we will work with Hammersmith and Fulham, as well as neighbouring boroughs, to investigate options to address the surface water component of the problem.

Q: To what extent are surface water and river flooding risks likely to be mitigated in London in the next few years?

- Our twenty-five year strategy 'Taking Care of Water', which we published in December 2007, sets an objective of resolving virtually all high-risk properties experiencing internal sewer flooding over the following 25 years.

- Surface water drainage in central London relies heavily on combined sewers, which carry both rain water and waste water. Conventional solutions to mitigate pluvial risk have historically involved building larger sewers, providing storage tanks and protecting properties at very high risk using, for example, one-way valves to prevent backflow. It is likely that similar solutions will continue to be delivered over the next few years to address localized problems.

- To achieve our 25-year objective, more sustainable solutions at a wider catchment level are required in order to fully mitigate surface water flood risks. These could include incorporating source control (reducing impermeable areas and surface water run-off) and managing peak flows in the network (for example, using Real Time Control - this is where automatic gates and other mechanical equipment can be used to manage flows as they are happening, making best use of all available capacity).

- All boroughs can make a contribution to reducing the risk through effective land use control via the planning process.

- We are unable to comment on the extent to which river flooding risk is likely to be mitigated in London in the next few years, with the exception that our most vulnerable operational sites will be more resilient to flooding as a result of the investment highlighted in our response to the first question.

- In addition to our work to tackle surface water flooding, we have a major programme of investment to reduce the risk of flooding from the foul sewer network. This programme will benefit almost 2,500 properties during the five-year period from 2005 to 2010.

Q: What challenges remain in the management of risk from river flooding and surface water flooding in London?

- Urban Creep – ie the growth in impermeable area due to paving over of gardens and open spaces, expansion of the highways network and car parks, infill development and the extension of existing properties. This increases the volume of run-off discharging to the sewers during a storm, but because the growth in the drained area is not accompanied by significant growth in properties, it is particularly challenging to demonstrate to Ofwat the need to increase capacity to meet this demand.

- The degree of dependence on public sewers for surface water drainage. The public sewers in London were provided primarily for sanitation, and constructed to handle only a limited amount of surface water from roofs, yards and minor roads. They are now in effect also being used for the drainage of land, major trunk roads and rail infrastructure. A key challenge for us is to demonstrate to our economic regulator, Ofwat, the need to upgrade the infrastructure to cope with the runoff from such an expanse of impermeable area during extreme weather events.

- Transport infrastructure drainage. Highways agencies and rail track operators discharge large volumes of surface water into sewers and watercourses, at no cost to themselves and with few restrictions. This contributes significantly to flood risk but the agencies have no incentives to manage their run-off responsibly.

- The Floods and Water Management Act 2010. The Act modifies the rights of 3rd parties to connect to the public sewers, to encourage the construction of sustainable urban drainage systems (SUDS). However, we are concerned at how these rights might be exercised in practice. Without adequate regulation and policing, they could result in the connection of further land and highway drainage to the public sewers, through SUDS which are poorly designed and/or maintained, thus increasing flood risk. The Act does not address the issue of highway and rail drainage and only applies to new drainage schemes, with no mechanisms to correct existing surface water issues.

- Funding. The Act creates new roles and responsibilities for the Environment Agency and local authorities, however no new funding mechanisms are created. The Drain London project will identify flood risks and solutions, but without a significant funding stream, solutions requiring major new infrastructure cannot be delivered.

I trust you find this information helpful. Please do not hesitate to contact me if you would like to have any further details in advance of the Committee's meeting on the 8 September.

Yours sincerely

External Affairs and Sustainability Director

FR04 City of London Corporation

2nd September 2010

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Dear Mr Williamson,

LONDON ASSEMBLY ENVIRONMENT COMMITTEE INVESTIGATION INTO RAIN AND RIVER FLOOD RISK MANAGEMENT IN LONDON

The City of London Corporation welcomes this timely investigation into the current and future state of flood risk management. A high level of defence from floods is vital to the City, not only for the safety of the residents, workers and visitors in the Square Mile but also in safeguarding the City's reputation as a secure financial centre in which to conduct business. The City Corporation is not in a position to respond fully to the questions posed in the announcement of the inquiry but the Committee may wish to be aware of the work the City has undertaken in relation to flood risk. The City Corporation published a dedicated Climate Change Adaptation Strategy in 2007, which took account of the potential risk of flooding arising from climate change. Later in that year the City Corporation commissioned a detailed Strategic Flood Risk Assessment (SFRA) for the City, and, as background for the inquiry, the Committee may be interested in some of its main findings.

The SFRA analysed all forms of flood risk to the City and was commissioned to ensure that flood risk was considered as part of the spatial planning process. The study concluded that the City is at low risk of flooding compared with many other parts of London. There was a low risk of flooding from sewers, and where flooding may occur, the consequences are likely to be minimal enough not to warrant restriction on development. However to avoid overloading of the combined sewer/rainwater drainage network buildings should be designed to reduce rainwater run off through the use of features such as green roofs and soft landscaping. Groundwater flooding was also found to be a relatively low risk due to the ongoing abstraction scheme operated across London by GARDIT[1]. The primary source of flood risk was seen to be tidal flooding from the River Thames. However, the assessment identified the Thames Barrier and riverside defences as giving a high standard of protection and stated that it would continue to provide protection for London up to 1 in 1000 year flood event (that is the event which has a 1 in 1000 year annual probability). Although, it was noted in the report that the combined residual risk of breaching or overtopping of the defences must still be considered when planning a development due to the serious potential consequences.
In recent years reports from both the London Climate Change Partnership and London Underground have shown the vulnerability of the transport network to flooding and have highlighted the negative economic consequences which follow a breakdown in such vital infrastructure. In order to maintain the City's reputation as a financial centre it is imperative that infrastructure is not put at risk by inadequate flood defence or poor flood risk management. To this end, the City Corporation has implemented a number of actions in recent years to assist in the management of flood risk, as part of the Corporation's Climate Change Adaptation Strategies. These include:

- Assigning responsibility for co-ordination and liaison on flood risk management to a named officer.
- Application of Planning Policy Statement 25 on Flood Risk in conjunction with the Environment Agency, during the planning process.
- A more detailed map of surface water flood risk, which differentiates risk within postcodes, (being prepared this year as part of the Drain London Project).
- The development of a methodology for assessing risk from surface flooding, as part of the Drain London project. This aims to address flash flood risk by mapping flash flood hotspots and developing surface water management plans.
- Policies on flood risk, sustainable development and climate change within the draft Local Development Framework Core Strategy. This in turn promotes the use of Sustainable Drainage Systems (SuDs), such as green roofs, in developments and street enhancements. Subject to an external consultation, this will be implemented in 2011.
- Where feasible, subjecting planning permissions to a 'green roof condition', which aids rainwater absorption through vegetation planted.

Recent legislation, namely the Flood and Water Management Act 2010 and the recommendations following the Pitt Report, has placed a series of new regulatory obligations on the City Corporation as a Lead Local Flood Authority (LLFA). The new responsibilities have significant resource implications in terms of technical expertise, funding for specialist studies and the setting up and management of flood asset registers and "approving body" arrangements. Given the already tight constraints on public funding, it is not clear whether additional funding will be provided to meet these new responsibilities or whether authorities will be expected to meet costs through already stretched existing resources.

The significance of maintaining flood defences is clearly of growing importance and a number of challenges regarding the management of flood risk will continue to face London in the years to come. The City Corporation, therefore, supports the adoption and implementation

[1] GARDIT (General Aquifer Research, Development and Investigation Team), the umbrella organisation comprising Thames Water, London Underground, the Environment Agency and others, **formed in 1992.**

of the Thames Estuary 2100 Plan. The TE2100 Plan includes a range of short, medium and long term actions which must be implemented as a whole to provide the necessary future protection from tidal flooding. The City Corporation takes the view that making such an investing in the project now will safeguard the long term future and security of the capital.
If you have any further queries in connection with the City's interests in this topic or require copies of the reports referred to in this letter, please do not hesitate to contact my office who
have been responsible for the preparation of this submission.

Remembrancer
Parliamentary Agent to the City of London

FR05 GLA Climate Change Adaptation Team

Assembly Scrutiny Flood Risk in London

Wednesday 8th September

Response from GLA Climate Change Adaptation Team

Introduction

The GLA welcome the Assembly's investigation of this issue, it comes at a time when flood risk has risen up the public and political agenda, largely due to severe flooding in several parts of the country in 2007, Cockermouth in 2009 and the devastating flooding that currently affects Pakistan.

The Mayor has long recognised the potential risk of flooding in London and the fact that climate change predictions all tend to lead to increases in that risk whether it is through increasing sea levels, increasing river flows or increasing storm intensity. He has recognised the need to take action to offset and manage these increased risks, particularly for London's benefit towards the end of the century, when the increased risks could be severe.

In support of this the Mayor has worked with the Environment Agency over many years on the Thames Estuary 2100 project and Catchment Flood Management Plans. In the London Plan, the Mayor has set a positive planning framework to consider flood risk, including a sustainable drainage hierarchy which was an innovative step forward.

In October 2009 the Mayor published the Regional Flood Risk Appraisal, as required under PPS25. One of the key outputs from this was the recognition that London is at significant but un-quantified risk of surface water flooding. This conclusion lead to the formation of the Drain London project and the subsequent award of funding from Defra. The progress of Drain London is detailed below in answer to the relevant question.

Knowledge on flood risk is still building, as is our understanding of how climate change will affect it. This is clearly an area where some uncertainty exists – this uncertainty is magnified given that we are dealing with weather patterns.

Given the uncertainty it is important that action taken today do not close off potential options in the future.

It is worth remembering that the GLA Acts contain no specific duties or responsibilities for the mayor in relation to flood risk management. The mayor has however undertaken a number of activities in order to ensure that this issue is managed consistently and sustainably across the various organisations with flood risk responsibilities across London.

Q1 What are the implications for flood risk management in London of the Government's response to the Pitt review and the Flood and Water Management Act 2010 (F&WMA)?

One of the key themes from the Pitt Review was the recognition that there was a disjointed approach to flood risk. Flooding from different sources came under different authorities' responsibilities. Such an approach lead to difficulties in a large event where flooding from surface water, rivers and sewers all happened at the same or similar times. Of course those affected by the flooding care little whether the water has come from a river, a small stream or simply ponded on the ground.

In order to address this, the F&WMA gives the Environment Agency an overall co-ordination role for flood risk and identifies Lead Local Flood Authorities (LLFA) to produce a local flood management strategy. In London each borough is a LLFA. The responsibilities of LLFAs are set out in the Act with further requirements from the EU Floods Directive (via the Flood Risk Regulations 2009) and further definition in Guidance from the Environment Agency (http://publications.environment-agency.gov.uk/pdf/GEHO0410BSLS-E-E.pdf). These responsibilities are set out below along with a note that identifies the extent to which Drain London will assist in the delivery of particular requirements, there is further detail on the Drain London project in answer to Q3 below:

	Task	Due date	Note
1	Establish a flood risk partnership	Nov 2010	Drain London has established 8 sub regional groups of boroughs covering London
2	Collate and review flood risk data	Nov 2010	Drain London Tier 1 will complete this task in September 2010
3	Analyse national data sets and prepare supplementary local data	Nov 2010	Drain London Tier 2 will undertake this during Autumn 2010
4	Produce a Preliminary Flood Risk Assessment	To EA by June 2011	Drain London Tier 2 will undertake this by Feb 2011
5	Identify Flood Risk Areas	To EA by 22 June 2013	Drain London Tier 2 will undertake this by Feb 2011
6	Produce a Flood Hazard Map(s)	To EA by 22 June 2013	Drain London Tier 2 will undertake this by Feb 2011
7	Publish a Flood Risk Management Plan	To EA by 22 June 2015	LLFAs will have to undertake this by taking forward the work of Drain London
8	Investigate floods events	On going	Drain London will produce a common standard for gathering and recording flood events
9	Maintain a register of flood risk structures	On going	Environment Agency will produce an initial register, Drain London will refine this and LLFA will need to maintain on an ongoing basis
10	Be a Sustainable Drainage Approval Body (SAB)	On going	Drain London will not address this but the Forum will be useful to share ideas on how to implement this

Q2 How is the GLA working, itself and with partners such as the Environment Agency, boroughs and other responsible bodies, to manage river and surface water flood risk?

The GLA has a long history of working with the Environment Agency to better understand flood risk. The GLA has been an important stakeholder in the Thames Estuary 2100 project over the past 8 years and has worked with the Environment Agency in the preparation of Catchment Flood Management Plans and the Thames River Basin Management Plan. In relation to planning, the GLA has worked closely with the Environment Agency on the London Plan and in relation to the assessment of flood risk in relation to some strategic planning application referrals to the Mayor. The Environment Agency was very supportive when

the GLA undertook the London Regional Flood Risk Appraisal and indeed seconded a member of their staff to assist GLA officers.

More recently, the GLA has won funding from Defra to implement Surface Water Management Plans for each London borough via the Drain London project. As is stated below Drain London is actively assisting boroughs to understand and develop their role as Lead Local Flood Authorities. A considerable benefit of this work is that the GLA is building up a wide network of contacts at borough level and within TfL, London Underground, Thames Water and other agencies with a responsibility for flood risk. This is assisting with the sharing of knowledge and awareness of flood risk issues.

Q3 What is being done under the Drain London project?

The table that forms part of the response to Q1 has set out the main deliverables of Drain London.

The Drain London Project is broken down into three phases or Tiers, further details of these are set out in the two attached Drain London Newsletters which are also available on the GLA website. In summary, Tier 1 is almost complete, it sets the common working framework and has gathered the existing data ready for Tier 2.

Tier 2 represents the bulk of the project; that is the production of Surface Water Management Plans (SWMPs) for each London borough. We are currently out to tender for this work and anticipate awarding contracts later in September. These SWMPs will be undertaken during September 2010 to February 2011 and once completed will give a much improved understanding of surface water risks across London. The SWMPs will then influence the next version of the London Regional Flood Risk Appraisal and future iterations of borough's Strategic Flood Risk Assessments.

The last phase of the Drain London project, Tier 3, will be to implement some demonstration projects across London to mitigate the risks involved. It is anticipated that these projects may include, green roofs, Community Flood Plans, other flood mitigation measures and more detailed investigations of high priority risk areas.

Drain London will also enable London Boroughs to meet their requirements to produce Preliminary Flood Risk Assessments, Flood Risk Maps and Flood Hazard Maps, as set out in the Flood and Water management Act 2010.

In addition the Drain London Forum is catalysing boroughs to work together to understand risks and share good practice and ideas about managing flood risk.

Different boroughs are at different stages in their consideration of Surface Water Flood Risk. Most boroughs have not undertaken any comprehensive work although some have had work undertaken for particular areas. Four boroughs are worthy of note. Sutton and Croydon have both commissioned SWMPs and in Sutton's case the Plan is almost complete. Richmond and Kingston were both pilot boroughs for Defra's SWMP guidance and therefore have had the majority of work completed. Drain London will not lose or duplicate the work of these boroughs and has grouped the 4 boroughs together in order that work can progress on these at a more rapid rate. The consultants that have worked on the four boroughs are in the tendering process for Tier 2 work.

Q4 What risk mapping is being undertaken?

As set out in previous questions Drain London will produce Surface Water Management Plans across London. These plans will show the extent of surface water flood risk under a range of storm events. The maps will be used to determine the nature and extent of the built environment and infrastructure that could be affected by flooding.

Drain London will also deliver the Flood Risk and Flood Hazard Maps required under the Flood and Water Management Act 2010. In line with the Act, these maps will bring together largely existing information

about other forms of flood risk. Some of this is currently available in borough Strategic Flood Risk Assessments and on the Environment Agency's website.

Q5 To what extent are surface water and river flooding risks likely to be mitigated in London in the next few years?

A key part of mitigating any risk is first to understand it. The work that the Drain London project is undertaking will be crucial here. The SWMPs will be a first for London, indeed there are very few in existence across the country, and the Flood Risk and Hazard Maps will bring together information that is currently held in a variety of formats.

Understanding flood is particularly a challenge when the risk is from a relatively long return period – eg 1 in 100 years, a tendency is that it is often viewed as "not likely to happen to me". With a changing climate, such return periods may be reduced. The move toward annualised probabilities eg a 1 in 100 year return period is a 1% chance per year may assist with this understanding.

In terms of physical measures to mitigate flood risk there are no specific plans at present from the GLA and this reflects the organisation's strategic rather than delivery focused role. The Environment Agency will no doubt inform the Committee of any planned schemes it is working on.

Once the Drain London investigations have been completed, there may be a need to work with relevant partners to implement specific measures where there are high or unacceptable risks.

Furthermore, the continued implementation of the London Plan Sustainable Drainage Hierarchy (Draft Replacement London Plan policy 5.13), will, over the long term, reduce the amount of rainwater flowing to surface water sewers, tributary watercourses and main rivers. Anecdotally, there are many development proposals that are referred to the Mayor where reductions of over 50% of peak rainfall run-off are achieved through SUDs, green space coverage and reduced impermeable area. The next challenge will be to roll this success out to the many much smaller scale developments across London and take even more surface water out of the drainage system – at least for an initial period during a large storm.

Q6 What challenges remain in the management of risk from river flooding and surface water flooding in London?

Significant challenges remain. As stated above the output from Drain London may indicate some high priority areas where surface water flood risk should be addressed.

There is an ongoing need to continue to monitor sea level rise and the condition and adequacy of tidal flood defences. The Environment Agency is currently managing this well but the Government's response to the TE2100 project will be important.

There is also a need to maintain vigilance in relation to fluvial flood risk. Increased river flows of up to 40% by the end of the century could significantly increase flood risk along many urban tributaries. Larger rivers such as the Thames and the Lee may also present a major risk. The river Lee is a particular concern as there has historically been extensive flooding through the Lee Valley. Whilst this has been mitigated by extensive flood defence measures, there has been an increase in the amount of development within the Valley, including the Olympics, Tottenham Hale, Enfield Island and other proposed developments in the Upper Lee Valley which are increasing the flood sensitive receptors, should a flood occur. It is notable that there has been considerable urban development in the upstream catchment of the Lee over the past 50 years. There may well be a need to work with the Environment Agency and local government outside the London boundary to address risks from the larger rivers.

As mentioned in answer to Q5, there is a need to roll out more sustainable drainage solutions to smaller scale developments. There is certainly considerable scope for retro-fitting more sustainable drainage solutions to many buildings across London, in particular in less densely built up areas where open space and garden areas provide opportunities to divert surface water away from drains and sewers.

FR06 Submisssion From the Environment Agency

Key messages on managing flood risk in London

Managing risk

- London is very susceptible to rapid river (non-tidal) and surface water flooding following storms. This risk will increase as a result of climate change.

- There are many technical and economic constraints to further reducing the likelihood of flooding from rivers and surface water sources; a sole reliance on flood defence is no longer sustainable.

- Effective flood risk management will require better use of both likelihood and consequence management measures. This will also help to manage flood risk from more than one source; a common feature of flooding in London.

Working together to deliver solutions

- We need to increase efforts to reduce the consequences of flooding on the understanding that the likelihood will increase. This approach to managing risk is more complicated, and to achieve it, we need many organisations to work together in partnership.

- Many of the more sustainable solutions to managing flood risk are reliant upon land-use changes with a significant scope and scale, for instance, redevelopment of floodplains. Whilst important to deliver this where possible, the opportunities can be limited in London. It is therefore beneficial to have flood risk policies in local plans that drive development to be more resilient to flooding.

- There are some important synergies and opportunities between the policies and vision for London set out by the Mayor and the future management of flood risk. For example, the promotion of blue and green corridors, so that Londoners have access to open recreational space, and their use for flood storage.

- A framework of partnerships for managing local flood risk has been agreed, but is not yet up and running. Getting this framework working, with the Chairs of the Local Flood Risk Partnerships sitting on the Flood Defence Committee, is seen as particularly important.

- Opportunities to secure contributions (sharing the costs with those who will benefit the most) will allow us to reduce flood risk quicker and in more locations than we could otherwise afford. There is also greater scope to deliver a more tailored solution to local needs. These beneficiaries can include private, public or voluntary organisations or communities.

Preamble: Overview of flood risk in London

There are over 500,000 properties at risk from flooding in London from rivers and the sea. Over 80% of these have a low likelihood of flooding as a result of the high standard of protection offered by the Thames Barrier and other associated tidal defences. However, the consequences are very high. The Annual Average Damages equate to over £700 million. There is a medium to high probability of fluvial flooding on the Thames tributaries, with moderate to high consequences. See Figure 1 showing the floodplain in London.

There is also a high risk of localised surface water flooding and it is estimated a further 400,000 properties in London are in areas susceptible to this type of flooding[3].

What are the implications for flood risk management in London of the Government's response to the Pitt review and the Flood and Water Management Act 2010?

Defra has published factsheets setting out the implications of the Flood and Water Management Act 2010 for different organisations. These factsheets are included with this response. Some of the main points are set out below.

For local authorities

- The Act requires lead local flood authorities to take on responsibility for leading the co-ordination of local flood risk management in their areas. Lead local flood authorities are unitary authorities or county councils.

- The Pitt review recommended that lead authorities form local partnerships bringing together key partners. The Act enables these partnerships to be formed without being prescriptive about how they should operate. In the next session the proposed framework of local flood risk partnerships is described.

- The Act requires load local flood authorities to develop, maintain, monitor and apply a strategy for local flood risk management in their area. The strategy may set out how the National Strategy (to be developed by the Environment Agency and approved by the Minister) should interact with the local strategy.

- The Act will require that the local strategy is consistent with the National strategy.

- The Act will require lead local flood authorities to investigate flooding incidents in their area and maintain a register of structures which could have an impact on flooding.

- The Act provides the lead local flood authority with powers to do works to manage flood risk from surface water run-off and groundwater.

- The Act provides lead local flood authorities, district councils and the Environment Agency with powers to designate structures and features that affect flooding or coastal erosion. Once a feature is designated, the owners must seek consent from the authority to alter, remove or replace it.

- The Act establishes a SuDS (Sustainable Drainage System) Approving Body at county or unitary level.

For the Regional Committees

The Flood and Water Mangement Act provides for the replacement of the existing Flood Defence Committees (FDCs) by Flood and Coastal Committees (FCCs). In doing so it will reconcile the legal position with current practice and extend the remit of the committees to include coastal erosion as well as flooding.

The Act allows for transitional arrangements and the new committees will continue much of the work of the FDCs. They will play an important role in guiding the Environment Agency's flood and coastal erosion risk management activities in their region. It is intended that they will also have a wider role in assisting the scrutiny of local authority risk assessments, maps and plans required by the Floods Directive.

- The Environment Agency will establish the FCCs

[3] Figures obtained from the DEFRA evidence base as part of the consultation on' Distributing Funding to Lead Local Flood Authorities for Local Flood Risk Management'

- FCCs consent regional programme
- FCCs consent on levy and the spend of revenue
- Oversight of delivery of Flood Risk Regulations 2009
- FCCs aim to be in place by April 2011

Following the recent elections, London Councils Transport and Environment Committee (TEC) have taken the opportunity to align the membership of the EA Thames Flood Defence Committee with the local flood risk partnerships. The advantages of aligning membership of the FDC with the partnership groups are that members have sight and understanding of both the strategic and local flood risk. The seven local partnerships for London are made up of groups of local authorities based on river catchments and flood risk characteristics. Further details are provided in the section '*Local Flood Risk Partnerships'.*

For the Environment Agency

The Floods and Water Management Act 2010 does not significantly change the responsibilities for the Environment Agency. The Act does give the following new flood and coastal risk management (FCRM) functions and responsibilities to the Environment Agency as well as amending and updating existing legislation:

- develop a national flood and coastal erosion risk management strategy for England which would apply to other operating authorities.
- report periodically to Ministers on the state of flood and coastal erosion risk management in England and Wales;
- power to designate third party assets that have a flood and coastal risk management function.

How are the GLA, the Environment Agency, boroughs and other responsible bodies working, individually and together, to manage river and surface water flood risk?

Introduction

Defra has national policy responsibility for flood and coastal erosion risk management and provides funding through grant in aid to the Environment Agency (EA) which also administers grant for capital projects to Local Authorities and Internal Drainage Boards (collectively known as operating authorities). Defra does not build or manage flood defences nor direct the authorities on which specific projects to undertake.

The EA was established by the Environment Act 1995 and is a Non-Departmental Public Body of Defra. It is the principal flood risk management operating authority in England and Wales.

The EA is empowered under the Water Resources Act 1991 to manage flood risk arising from designated "main" rivers and the sea. The EA is also responsible for flood forecasting and flood warning dissemination, and for exercising a general supervision over matters relating to flood defence.

Land use and emergency planning

The GLA has worked closely with the Environment Agency to establish flood risk related policies within the London Plan. These policies build upon the Planning Policy Statement 25 that seeks to avoid inappropriate development in the floodplain and ensure that where development is unavoidable it is suitably safe and resilient. Most of the floodplains in London have been developed in the past so there is an increasing emphasis on adapting the character of buildings in the floodplain through redevelopment. Boroughs also consult and take advice from the EA on flood risk related policies within their Local Development Frameworks.

Since October 2006, the EA in England has been a statutory consultee for all planning applications (other than minor development) in areas where there is a risk of flooding, and Local Planning Authorities (LPAs) must now consult the EA before making any significant decisions on new development in flood

risk areas. The Flooding 'Call In' Direction[4] became effective in January 2007. Under the Direction, if the EA objects to an application for 'major' development in the highest risk areas (Flood Zone 3 'high probability' and Flood Zone 2 'medium probability') all parties (the LPA, the EA and the applicant) are required to negotiate the application. If the EA is unable to withdraw its objection and the LPA remains minded to approve the application, the LPA is required to notify the Secretary of State about the proposal. The Secretary of State may 'call in' the application for determination - usually after a public inquiry.

High Level Target 5 (HLT5)[5] report monitors how well LPAs in England have taken into account the expert advice on flood risk provided by the Environment Agency. It covers development plans adopted by LPAs, which set out their long term planning policies, planning applications and appeals. Where the EA objected on flood risk grounds and where LPAs have advised us of the final outcome, 96% of all decisions in England were in line with our advice. Figures from the latest report indicate that Councils are taking on board our advice on flood risk more consistently than in previous years.

The Flooding Call-in Direction has been a success, as it requires continued discussion between the parties to try to resolve outstanding problems.

PPS25[6] aims to ensure new development proposals take account of the safety to people over the full lifetime of the development, allowing for climate change. Local and Emergency Resilience Forums (LRFs) ensure that risks from flooding are fully considered, including the resilience of emergency infrastructure that will need to operate during floods (Fire and Rescue, Police and Ambulance services).

LRFs are made up of representatives from local public services, including the emergency services, Local Authorities, NHS, Environment Agency, Maritime & Coastguard Agency and other partners. These agencies are known as Category 1 Responders, as defined by the Civil Contingencies Act 2004.

LRFs plan and prepare for localised major emergencies. They work to identify potential risks and produce emergency plans to either prevent or mitigate the impact of any incident on communities.

Local Flood Risk Partnerships

Under the Floods and Water Management Act 2010 it is recommended that lead local flood authorities establish partnerships to help manage local flood risk. London Councils, working with the Environment Agency, have established a framework for this to happen in London. This framework was endorsed by the London Councils TEC and Environment Agency RFDC. The framework involves grouping boroughs into one of seven partnerships. As part of the Drain London project, officers from some of these boroughs are starting to meet so that the Surface Water Management Plans can be developed. The formal partnerships have not yet met.

The Floods and Water Management Act 2010 updates flood risk management legislation, transposes new EU regulations, and places recommendations from Sir Michael Pitt's Review on a legislative footing. In particular, it clarifies responsibilities for local authorities who have responsibility for the management response to local flood risk. Specifically under the Bill, London's authorities will have a leadership role for local flood risk management (surface water flooding, groundwater and ordinary watercourses). The EA will have a strategic overview role and will continue to manage flooding from main rivers and coasts.

In December 2008 and April 2009, the Secretary of State wrote to all Local Authorities recommending that partnerships are established to start to manage local flood risk ahead of the Bill being finalised.

[4] Link to Call in Direction
http://www.communities.gov.uk/publications/planningandbuilding/circularconsultationdirect
[5] Link to High Level Target 5
http://www.environment-agency.gov.uk/research/planning/33704.aspx
[6] Link to PPS25
http://www.communities.gov.uk/publications/planningandbuilding/pps25floodrisk

London Councils worked with the EA to develop a proposal for setting up partnerships in London. The proposals were accepted by the London Councils Transport and Environment Committee in October 2009 and by the Thames Regional Flood Defence Committee in November 2009.

The proposals recognised that setting up 33 separate partnerships for each borough would be inefficient and would make it difficult for partners such as the Environment Agency and the water companies to adequately engage or provide input. On the other hand, one partnership for the whole of London may be strategic but unable to address local flood risk issues adequately.

The proposal accepted by London Councils involved grouping boroughs together geographically to form partnerships and may prove to be a better balance between the strategic and local needs. The principles used to form the groups were:

- There should be a small enough number of partnerships in London so that we can have an efficient and meaningful engagement with our partners and be sufficiently strategic.
- There should not be too few partnerships otherwise they will not be locally specific or accountable.
- The groups and/or membership should be linked into the Thames RFDC.
- Take account of water catchment boundaries.

Based on these principles the following groups are proposed:

Group	**Boroughs**	**Rationale and characteristics**
West	Hillingdon, Hounslow, Ealing, Brent, Harrow, Barnet	Virtually all of the Brent, Crane and Pinn catchments are contained within these boroughs
South West	Richmond upon Thames, Kingston upon Thames, Sutton, Merton, Wandsworth, Croydon	All of the Hogsmill, Beverley Brook, Wandle and Graveney catchments are contained within these boroughs
South East	Bromley, Lewisham, Greenwich, Bexley	Virtually all of the Ravensbourne catchment is within these boroughs
North East	Havering, Barking and Dagenham, Redbridge	These boroughs comprise the parts of the Roding, Beam and Ingrebourne catchments that flow through London
Central North	Hammersmith and Fulham, Kensington and Chelsea, City of Westminster, City, Camden, Islington	Most of the risks within these boroughs are from surface water flooding (or from Thames tidal flooding managed by the Environment Agency).
Central South	Lambeth, Southwark	Most of the risks within these boroughs are from surface water flooding (or from Thames tidal flooding managed by the Environment Agency).
North	Hackney, Tower Hamlets, Haringey, Enfield, Waltham Forest, Newham	The River Lee and its tributaries are largely within these boroughs

What is being done under the Drain London Project?

Drain London is a Defra funded project, led by the GLA to assess the level of flood risk from surface water sources and identify the range of actions needed to manage this risk.

Drain London will deliver the following:

1. A spatial, London-wide assessment of current and future surface water flood risk, covering flood sources, pathways and receptors.
2. A London-wide, digital mapping of critical drainage pathways, including major infrastructure.

3. A strategy for managing surface water going forward, that promotes sustainable land use, defines approaches for managing runoff and is reflected in other spatial plans, such as the London Plan, Opportunity Area Planning Frameworks and Local Development Frameworks.
4. A tool for planners and developers to support the delivery of the strategy. The tool must identify surface water flood risk in each area, along with localised approaches to maintain or improve the level of flood risk.
5. A Green Roof Fund to subsidise green roofs and walls
6. Community Flood Action Plans
7. Critical Drainage Area Action Plans for areas at most serious risk of flooding.

Two newsletters have been produced from the project and these are enclosed. The first provides an overview of the project (what will be delivered, why the work is important and the partners involved) and the second explains more about how the project will be delivered.

What risk mapping is being undertaken?

Over the past 10 years, a vast amount of flood risk mapping has already been undertaken and regularly improved and updated. Our National Flood Zone maps (which are available on the EA website) show the extent of flooding from the rivers (fluvial) and the sea (tidal) for an event up to the magnitude of 1 in 1000 years (0.1% Annual Exceedance Probability). Our National Flood Risk Assessment (NaFRA) model, divides this floodplain up into three likelihood categories of flooding (significant, moderate and low) taking into account the presence and condition of flood defences. Historic flood event outlines and a Surface Water Vulnerability map are also available from the EA.

Strategic Flood Risk Assessments (SFRAs) produced by Local Authorities inform the planning process of present and future flood risks from all sources. They contain a more detailed level of mapping. The content varies depending on the level of assessment required, but the mapping may include flood depth and hazard information or take into account the potential effects of climate change. It may also show areas at risk of flooding from other sources, such as surface water, depending on the availability of local information. The mapping of surface water risk in London is being improved through the Drain London project.

The UK Flood Risk Regulations[7] (which came into force in December 2009), transpose the European Commission Floods Directive into domestic law[8]. One of the key requirements is for Lead Local Flood Authorities to produce Preliminary Flood Risk Assessments (PFRAs) by June 2011. The PFRA involves an assessment of local flood risk, the preparation of a Preliminary Assessment Report and the identification of Flood Risk Areas (where the risk of flooding is significant). It is a screening exercise that is based on existing information. Please refer to the enclosed document 'Preliminary flood risk assessments "Living Draft" Guidance for Lead Local Flood Authorities', May 2010 (Environment Agency) for further detail.

Number of properties at risk of flooding from the rivers and the sea in each London Borough per likelihood category[9] using NaFRA08:

Local Authority	Significant	Moderate	Low	TOTAL
Barking and Dagenham	2,185	987	7,097	10,269
Barnet	1,322	591	1,159	3,072
Bexley	480	67	12,220	12,767
Brent	422	1,151	895	2,468
Bromley	1,217	1,143	6,665	9,025
Camden	0	0	0	0
City of London	20	0	757	777

[7] Flood Risk Regulations (2009) http://www.opsi.gov.uk/si/si2009/uksi_20093042_en_1
[8] The European Directive on the Assessment and Management of Flood Risks (2007/60/EC). http://ec.europa.eu/environment/water/flood_risk/index.htm
[9] Low = 0.5% (1 in 200) chance of flooding each year or less
Moderate = 1.3% (1 in 75) chance or less but greater than 0.5% (1 in 200) chance in any year
Significant = greater than 1.3% (1 in 75) chance in any year

City of Westminster	44	0	26,968	27,012
Croydon	1,240	631	2,983	4,854
Ealing	249	145	2,345	2,739
Enfield	1,541	5,248	3,632	10,421
Greenwich	643	344	25,313	26,300
Hackney	49	41	3,375	3,465
Hammersmith and Fulham	106	3	59,676	59,785
Haringey	112	1,669	3,254	5,035
Harrow	492	1,127	1,245	2,864
Havering	2,441	1,131	3,343	6,915
Hillingdon	1,170	2,671	3,668	7,509
Hounslow	681	333	16,277	17,291
Islington	0	0	0	0
Kensington and Chelsea	49	0	5,076	5,125
Kingston upon Thames	2,655	3,173	2,065	7,893
Lambeth	327	248	21,834	22,409
Lewisham	1,626	1,774	17,481	20,881
Merton	4,931	2,457	3,719	11,107
Newham	1,719	697	38,910	41,326
Redbridge	2,494	1,360	1,381	5,235
Richmond upon Thames	5,290	3,422	15,779	24,491
Southwark	46	0	84,655	84,701
Sutton	919	457	2,578	3,954
Tower Hamlets	87	0	32,706	32,793
Waltham Forest	3,066	2,152	292	5,510
Wandsworth	1,975	1,369	32,951	36,295
TOTAL	39,598	34,391	440,299	514,288

To what extent are surface water and river flooding risks likely to be mitigated in London in the next few years?

And,

What challenges remain in the management of risk from river flooding and surface water flooding in London?

Our understanding and management of river flooding is currently far more developed than our understanding of surface water flooding. However, the outputs from Drain London and then the Preliminary Flood Risk Assessments will quantify the scale of the surface water risk to London. There are unlikely to be quick fixes to most of the issues that are identified.

For river flooding, previous investment in improvements and alterations have provided a basic standard of protection from flooding by improving the conveyance of water. However, it is difficult to justify major improvements to the existing system and often there are technical constraints e.g. space. For most watercourses in London, the focus is on maintaining the benefits of these systems (where this makes sense) and seeking improvements through the changes associated with redevelopment.

There is a tendency for flood risk to be assessed and mitigated on a site by site basis thus inhibiting the potential for larger integrated solutions with the potential to have greater impact, and involvement by the local community and key stakeholders.

The long term challenge is to change the emphasis of how flood risk is managed. We need to understand all sources of risk with far greater emphasis on considering how the things (people, property,

infrastructure) at risk can be altered and adapted. This will reduce our reliance on costly structures and also increase our resilience when traditional defences are overtopped or breached.

Many of these aspirations link closely with other aims for London including those for adapting to climate change and improving quality of life. Improved use of open space, multi-functional space and integrating water within the built environment all have the potential to deliver numerous benefits including better management of flood risk.

For further detail, please refer to the Thames Catchment Flood Management Plan (CFMP) Summary document enclosed.

Two Appendices were attached to the Environment Agency Evidence Submission: both contain images. Please find these included on the following pages.

Winner: waterways

London Borough Lewisham - Cornmill Gardens

SUBMITTED BY:

Martin Hodge, Project Manager

Cost: £1,797,718

Landscape Architecture:	Building Design Partnership
Main Contractor:	Skanska McNicholas
Paving, seating and cedec gravel:	CED
Benches, bins, bollards and cycle stands:	Benkert Street Furniture
Flag paving and step units:	Marshalls
Children's play:	Kompan
Seating pod:	Woodhouse UK Plc
Lighting columns and river railings:	The Stainless Steel Works
Luminaires and light fittings:	iGuzzini illuminazione UK

London's waterways are generally either avoided or hidden underground in concrete vaults, which means many people don't even realise how close they are to natural running water.

The London Borough of Lewisham, amongst others, has blamed this on concerns over health and safety and a lack of funding to maintain and integrate the neglected waterways with the wider environment.

However, after winning this year's Waterways category, the Council has proved that there is hope for inner-city rivers and canals which can be re-introduced to the urban environment in a safe and ecological manner.

As part of a renaissance makeover for Lewisham in south east London, Cornmill Gardens provided a vital public space for residents and commuters in and out of the town centre. Sited next to a tube, rail and bus interchange, the Gardens offer a quiet respite from the frantic traffic nearby.

In addition to a new park, children's play area and public piazza, plans were drafted in 2005 to reopen the River Ravensbourne which had laid hidden under concrete tunnels and was devoid of ecological life.

In order to bring the River back into public view the walls and base were removed to widen its demise with a clay liner. The western bank now features a disabled access path that leads towards timber decking and steps down towards the rivers edge.

People can also dip their toes in the water, which been improved by the introduction of native plants and wildlife, at the eastern edge of the river. This side of the Ravensbourne has been lined with steeped banks for plant biodiversity and engineered to prevent storm flooding to this and other areas.

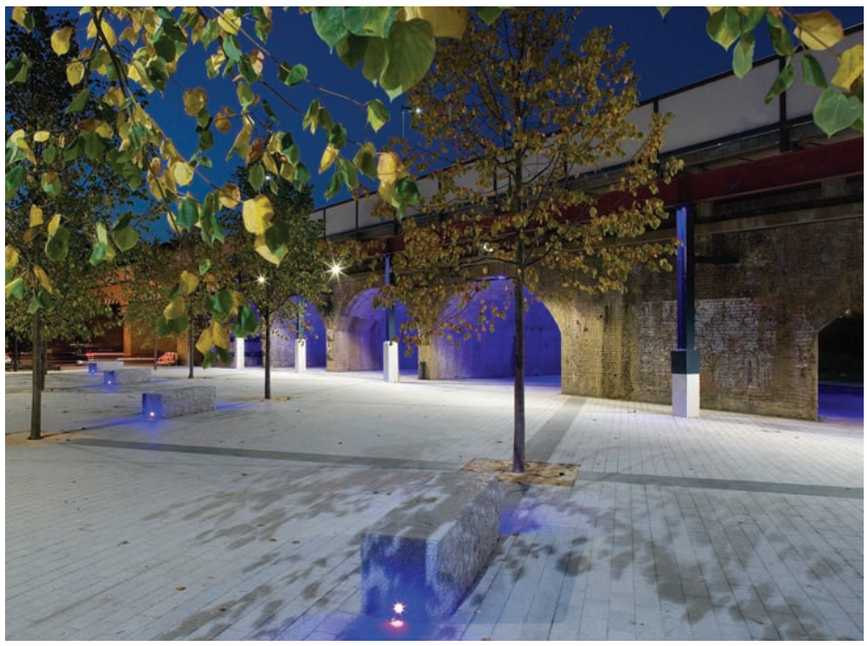
At night the pathways along the river, park and play area are lit up, leading back towards the train station and rail bridge. This public piazza has been designed to host community events, performances and market, should the need arise.

As Cornmill Gardens is regarded by the Council as the main park for future commercial and residential projects, the value of such an adaptable public realm is almost immeasurable, as the judges agreed.

The renewed river provides a greener, calmer touch to an otherwise hectic urban environment. It has also attracted a number of different wildlife species, many of whom have not been seen in the area before, or by the local children.

The Gardens are popular with local residents and nearby office workers, who are attracted by the vibrancy of the plantings and tranquil spots near the waterside.

After showcasing its capabilities, the Council and its partners are now able to raise revenue for further stages of regeneration within the Town Centre, and expand the public facilities within the new scheme.



River Quaggy at Sutcliffe Park

Techniques: Re-meandering, backwater creation, de-culverting

Project location: Eltham, South East London
River: Quaggy
London Borough: Greenwich
Project end date: 2003
Length: Approx 500m
Upstream grid reference: TQ411748
Partners: Environment Agency, Quaggy Waterways Action Group, Breheny Engineering, Greenwich Council

Boardwalks close to the river and informal wetland area link people to nature

Site background

For years the River Quaggy at Sutcliffe Park was lost underground in a culvert. Local residents only became aware that a river was there when their homes flooded more frequently as development increased. Rather than further deepening and widening the hidden channel, a decision was made to combine flood risk management with a strategy for river restoration that would benefit the local community.

Objective

- To provide additional flood storage area in the form of ponds and lakes, whilst creating an attractive open space for the public.

Open water providing space to manage flood risk and provide access to nature

Design

A new 'low-flow' meandering channel was cut through the park, following its original alignment. The previous culvert was retained, enabling it to take excess water in times of extreme flood events. Flow is now regulated between the two watercourses by a sluice. To provide further flood water storage, the park itself was lowered and re-shaped to create a floodplain capable of storing a maximum of 85,000 cubic metres of flood water. A network of boardwalks, pathways and viewing points were designed to encourage access to the river and ponds, all of which were an integral part of the scheme for community and wildlife enhancements.

Subsequent Performance – RRC's views

The combination of the new smaller open river together with the old culverts is a good demonstration of how to regulate flow for a range of environmental and flood conditions that should both help reduce future flood risk and low flow scenarios associated with climate change impacts. In addition people have been reconnected to waterscapes and locally completed surveys have indicated that visits to the park have increased by 73%. The open watercourse and wetland pond areas have sustained a range of native plant species since project completion which, together with the natural gravels found at the site, provide a range of habitats necessary for wildlife diversity.

the **River Restoration Centre Case Study Series**
This site was last visited by RRC staff on 11th March 2008

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