

FLOOD RISKS IN LONDON

Summary of findings

April 2014

About this summary

This is a summary of the findings of the Environment Committee's investigation into flood risk. In January 2014, the Committee discussed the risks facing London, and their mitigation, with the following expert guests:

- **Alex Nickson** - Greater London Authority
- **Hamish Cameron** - Greater London Authority
- **Howard Davidson** - Environment Agency
- **Kevin Reid** - Greater London Authority
- **Nishma Malde** - London Councils
- **Paul Cobbing** - National Flood Forum



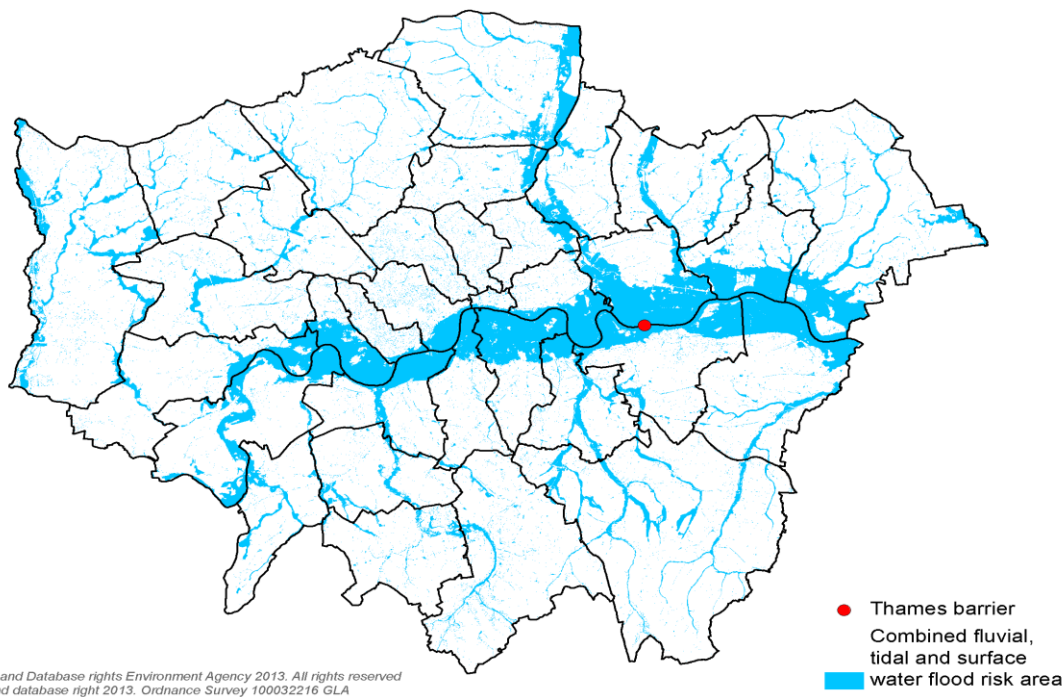
The Environment Committee examines all aspects of the capital's environment by reviewing the Mayor's strategies on air quality, water, waste, climate change and energy. It considers what additional measures could be taken to help improve Londoner's quality of life.

The Committee Members are:

- Murad Qureshi (Chair)
- Stephen Knight (Deputy Chair)
- Andrew Dismore
- James Cleverly
- Jenny Jones
- Kit Malthouse
- Navin Shah

Overview

There are three main flood risks facing London: tidal surges, river water, and surface water. Most parts of London are at risk of one or more of these flooding categories. The largest concentrations of risk are around rivers, especially the River Thames.



The Mayor, central and local government, the Environment Agency, and other partners seek to reduce the risks of, and increase resilience against, flooding. Following the floods of winter 2013/14, there is an opportunity to think nationally, regionally and locally about how best to respond to, and reduce, flood risk; and how to prepare for the flooding that will inevitably happen despite precautions.

TIDAL

A tidal surge happens if the natural tidal cycle combines with the weather to drive an exceptional volume of water up the Thames Estuary. The Thames Barrier and other defences protect large parts of London, but thousands of properties remain at high or medium risk.

Slides 4 and 5

RIVER

Heavy or prolonged rain locally or upstream can cause rivers to flood. Tens of thousands of properties are at high or medium risk of river flooding. This is not just from the Thames, but also many smaller rivers that flow into it.

Slides 6, 7 and 8

SURFACE WATER

Heavy local rainfall can cause flash flooding. This is because paved and built urban surfaces prevent rainwater soaking into the ground, instead causing it to reach drains rapidly and to overload them. At least a hundred thousand properties are at high or medium risk.

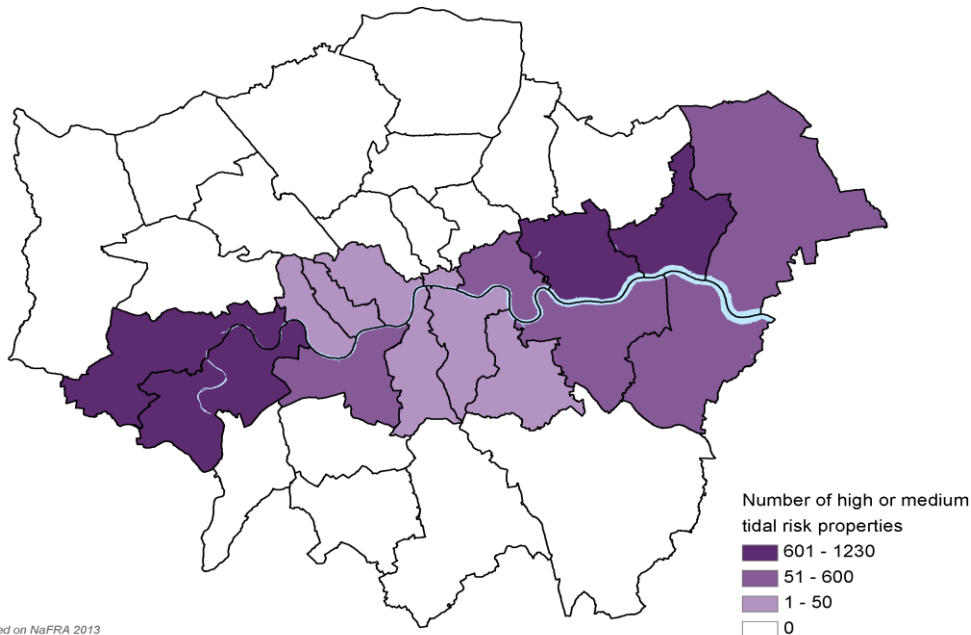
Slides 9 and 10

Tidal flooding

The Thames is tidal as far west as Richmond. Large parts of the capital are built on the tidal floodplain, which could, if not defended, flood in the event of an exceptional tidal surge. In 1953, 307 people died when a tidal surge flooded the east of England, including parts of London.

As a result of defences, most of the tidal floodplain is at low risk; but there are high or medium risks near the Thames.

Risk	Annual risk	London properties
High	At least 1 in 30	3,000
Medium	1 in 100 to 1 in 30	3,300
Low	1 in 1000 to 1 in 100	398,000
Very Low	Zero to 1 in 1000	About 3 million



Without the Thames Barrier, an extreme tidal surge in the Thames Estuary today could affect:¹

 **1.25**

million people



16 hospitals

£200 billion

worth of
property,
including



500,000 homes

Tidal flooding



“In early December 2013 we had probably one of the highest tides and tidal surges in 60 years on the east coast, which, had it not been for the Thames Barrier and the investment put in over the years, would have severely affected London...”²

Since 1982, the Thames Barrier, and associated defences, have protected London from tidal surges. The Mayor, and some Assembly Members, have called for the operation of the Barrier to be reviewed in the light of the record number of closures required in the winter of 2013/14.

The Thames Barrier normally allows the tide, river flow and shipping to pass, but can be raised to keep out a tidal surge. The Committee heard that the Barrier will need to cope with rising sea levels, caused by a combination of factors, including:

- the very gradual lowering of the ground in southern England due to long-term geological shifts,
- the transfer of water to the sea from melting glaciers and ice caps, and
- the expansion of existing sea water as it warms.

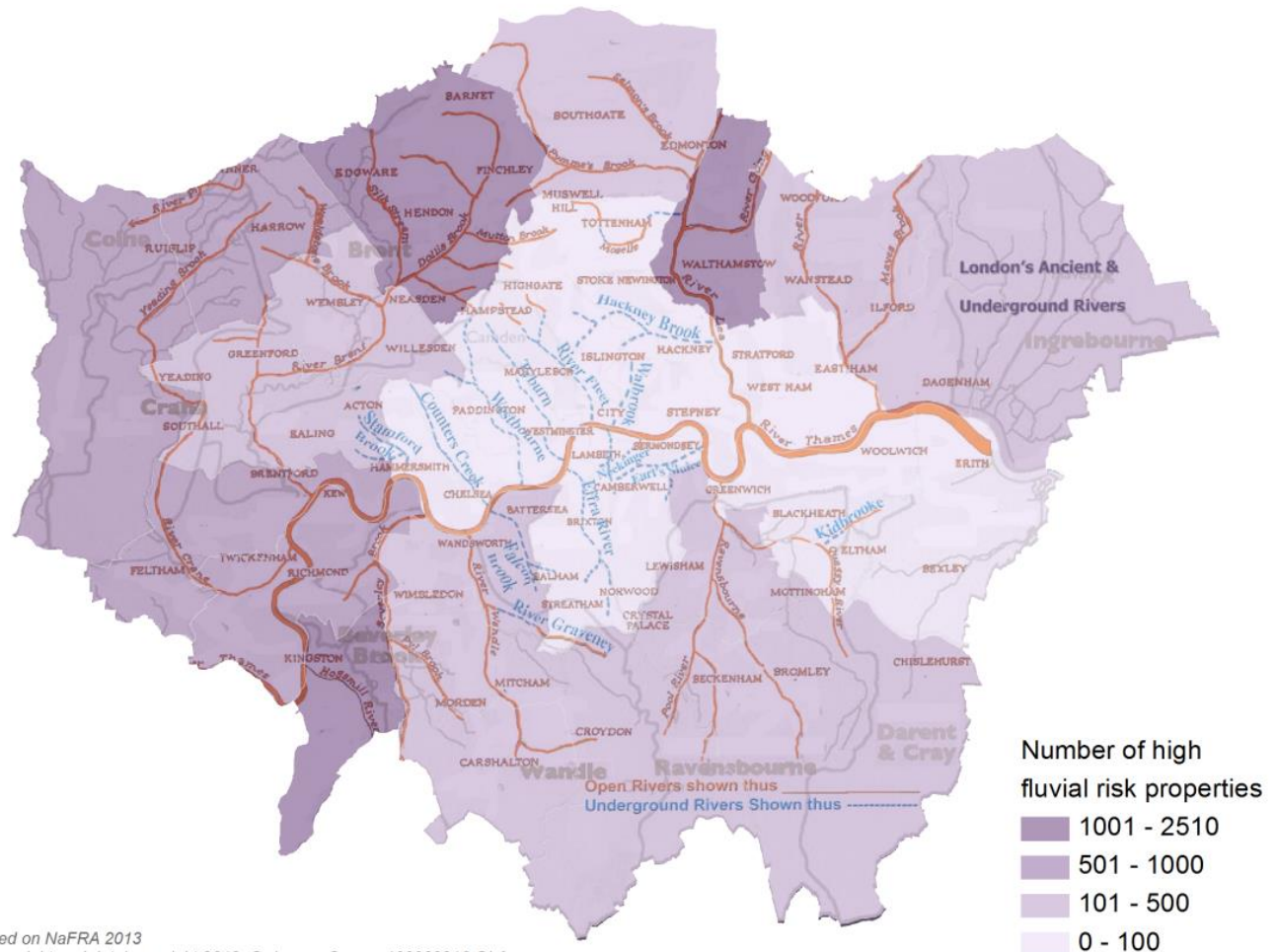
The estimated likely rise is up to 90cm in the remainder of this century, with a “worst-case” estimate of 2.7m.

The Thames Estuary 2100 (TE2100) plan sets out how London’s tidal defences would need upgrading over the remainder of the century, including ultimately the upgrading or replacement of the Thames Barrier. The anticipated date for renewing the Barrier is 2070, based on the estimate of up to 90cm sea level rise. To cope with the worst case scenario of a 2.7m rise, the TE2100 programme would need to be adapted, by accelerating the timetable and identifying sufficient funding.³

River flooding

The highest risk of river flooding is in outer and west London, and comes from tributaries of the Thames or the non-tidal Thames. This distribution is very different to that of tidal flood risk.

The Thames, and its main London tributaries, are highlighted in orange on the map. There are also hidden tributaries of the Thames, now in underground tunnels, indicated in blue.⁴ Flood risk is generally low from these rivers; but the River Effra is believed to have contributed to the localised flooding in Herne Hill, south east London, in August 2013. As underground rivers in inner London often carry sewage overflow, such flooding can have serious consequences.



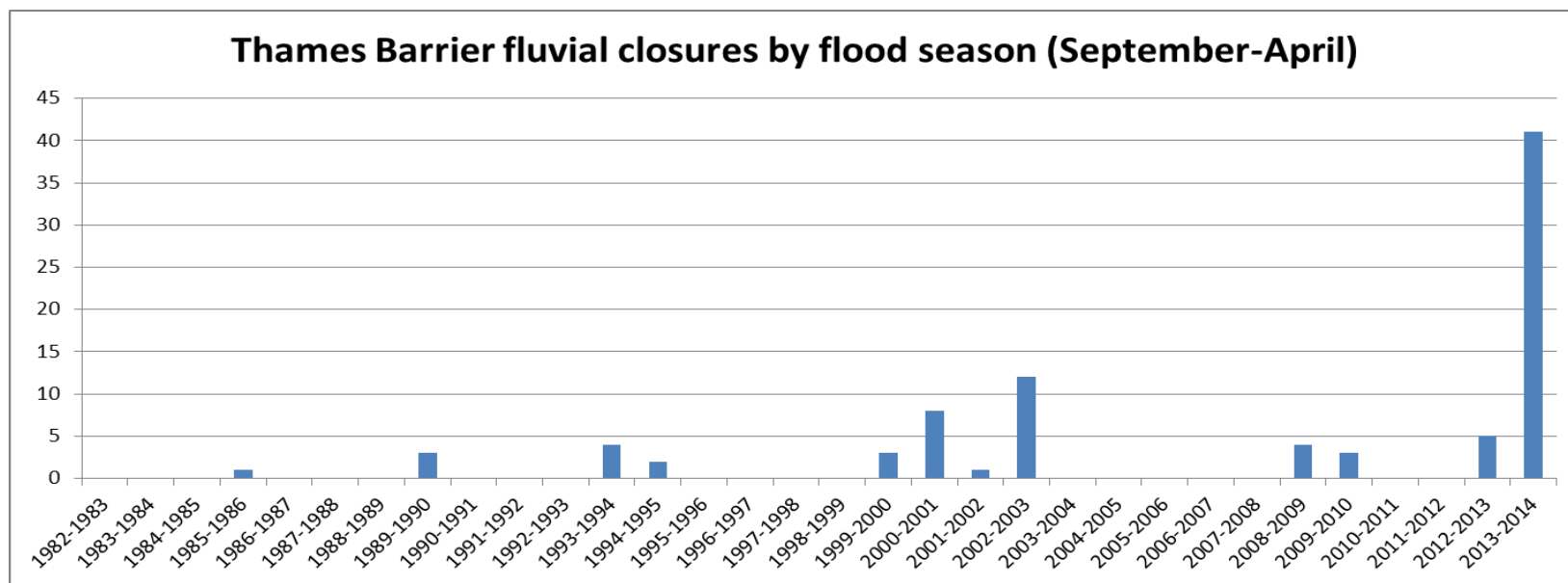
River flooding

The Committee heard that there are 24,000 properties in London at significant risk of river flooding. The Environment Agency estimates that plans currently under development could protect in the region of 10,000 of these properties.

*"I could see the Government putting in £50 million, but it would need £50 million of other contributions to make the work happen...One of the challenges in responding to floods is actually putting the funding packages together to enable these schemes to go ahead."*⁵

The Committee also heard that the risk of river flooding may be increasing. The expected effects of climate change in southern England could include drier summers and wetter winters. More heavy rain in the Thames region could lead to more river flooding in London.

Alongside permanent local measures to reduce flood risk, the Thames Barrier has been used to keep out the tide and allow the tidal river channel to hold flood waters more safely. This was done a record number of times in the prolonged flooding during the winter of 2013/14, as shown on the graph below.⁶



River flooding

Our expert guests told us that restoring rivers has many benefits, including the reduction of flood risk. In February 2014, the London Assembly unanimously called on the Mayor to identify funding for further river restoration projects.

As depicted below⁷ many of London's rivers are now in artificial channels. These often have low value as wildlife habitats, leisure or access to nature. They can also increase flood risk, both alongside their banks (a narrow channel, or one with weirs, can only take limited flood flow), and downstream (a smooth, straight channel sends flood waters rapidly to lower-lying areas).



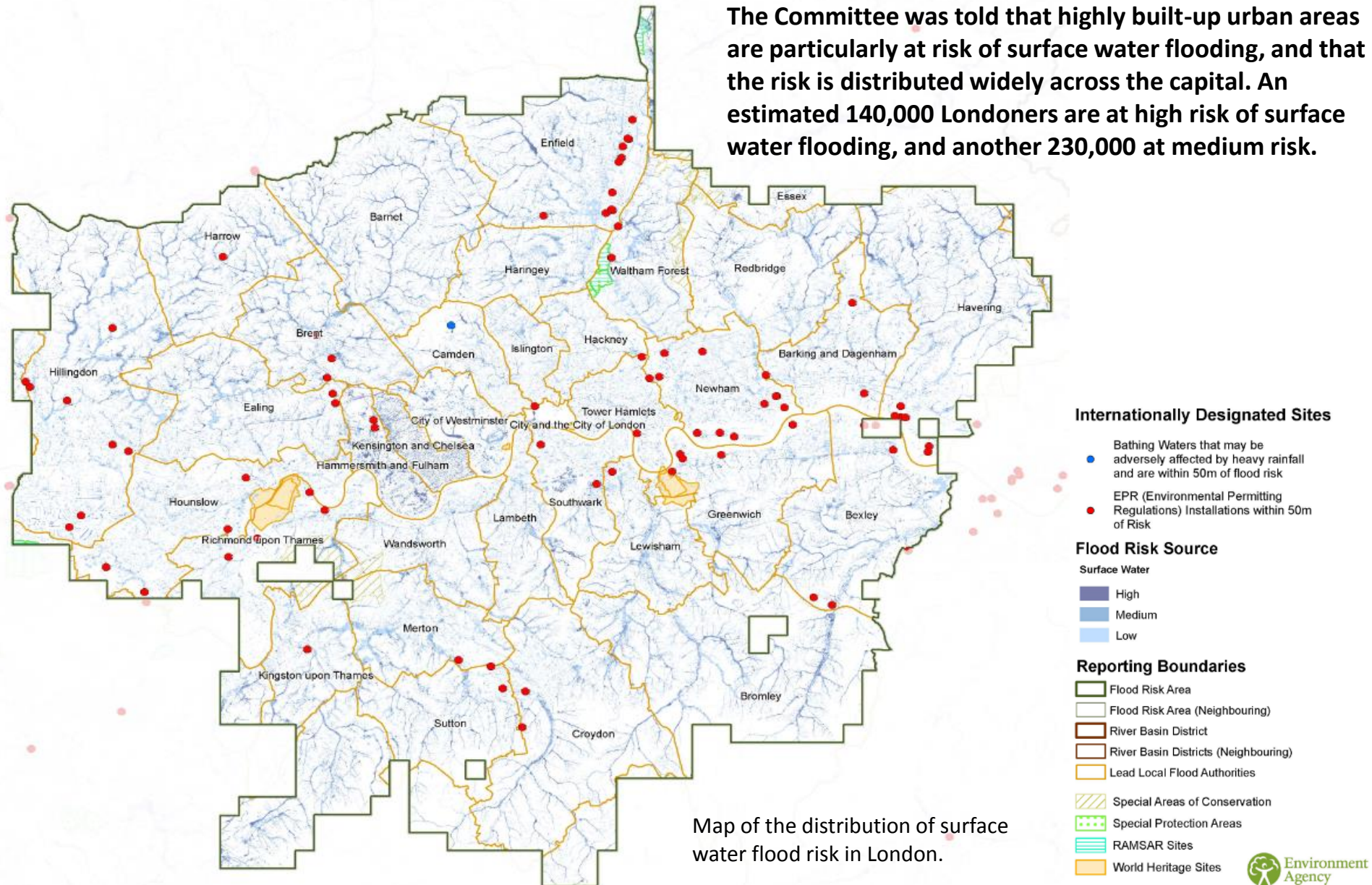
River restoration, illustrated below right, can greatly improve habitat for plants and wildlife, and allow people to access the river and its nature. Restoration can also create space for flood waters to be held safely higher in the river catchment and soak back into the ground, thereby reducing flood risk for built-up areas. This could be part of wider flood alleviation schemes, especially those that use green spaces to create low-lying areas that can safely flood at times of high water flow. Thereby, protecting homes, roads, businesses and other places where flooding would be a problem.

The London Rivers Action Plan, supported by the Mayor, aims to restore 15km of rivers by 2015: 14km have been restored to date, and there are many more potential projects for the future.



Surface water flooding

The Committee was told that highly built-up urban areas are particularly at risk of surface water flooding, and that the risk is distributed widely across the capital. An estimated 140,000 Londoners are at high risk of surface water flooding, and another 230,000 at medium risk.



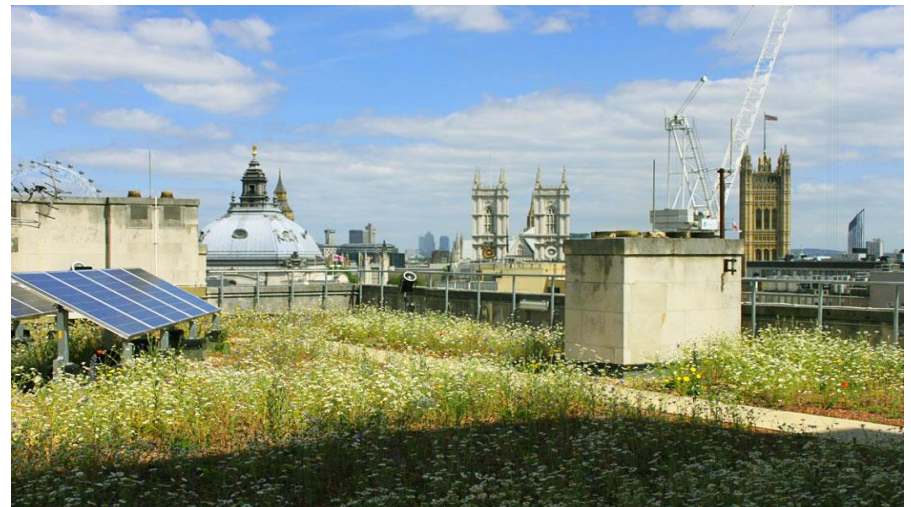
Surface water flooding

Rain water cannot soak into most built surfaces, and heavy rain in urban areas runs off rapidly into drains and local low ground. But drains can only cope with a certain level of water flow. When this is exceeded, the water flows across the land surface, creating temporary streams or ponds. At lower points along the drain, water will come back up out of grilles and access holes, potentially bringing with it sewage or other hazards. Sewage flooding is particularly a problem in some parts of London where Victorian drainage systems handle both rain water and waste.



The Committee heard that sustainable drainage reduces the flood risk from heavy rain: it allows water to stay on-site, rather than running off quickly into drains or areas vulnerable to flooding.

Sustainable drainage can include green roofs,⁸ water storage tanks, paving that lets through water, and drains that lead to unpaved areas where water can soak away. Features like ponds and green areas can often enhance the appearance, livability and environmental value of the site.



The public drainage network can also be improved to reduce overflows. For example, flow management to spread water through the network, and flood-water holding tanks, such as those currently under construction to tackle recurrent flooding at Maida Vale.⁹

London responds

Despite best efforts, some flooding will be inevitable, and London's agencies are planning how they can best mitigate its effects.

The Committee was told that local authorities and emergency services are developing plans to:

- look after people affected by flooding,
- continue to provide services, and
- recover and clean up after the flood.

Flood warning and public preparedness is important for resilience. We heard that the Environment Agency offers warning alerts, but many Londoners in at-risk areas are not signed up.

The Committee was reassured that a tidal surge overcoming the Thames Barrier is classed as a low-likelihood event, and did not require specific mitigation. The Thames Estuary 2100 plan¹⁰ sets out how London's tidal defences will need upgrading over the remainder of the century.

Authorities practice flood response exercises and scenarios. There will be a formal process for learning lessons from events in the winter of 2013/14.



Conclusions

- The risk of tidal flooding in London is minimised, and river flooding reduced, by the Thames Barrier. The operation of the Barrier and expectations for future upgrades should be reviewed in light of the record number of closures required in the winter of 2013/14.
- Many London properties remain at risk of river and surface water flooding. Some are to be covered by flood defence plans, including river restoration, but these plans require funding. The Mayor should lobby government to secure London's fair share of national resources for flood defences.
- Sustainable drainage can reduce flood risk, and is part of the London Plan's policies for developments. Local authorities should fully implement the sustainable drainage policies of the London Plan.
- Many properties will remain at risk, and should be made more flood-resistant. Londoners need to know the risks and to be prepared, for example, through signing up for warning alerts.

References

Cover image courtesy of the Environment Agency. This shows the area that might be affected by a 1-in-1000 year tidal surge event, if none of the Thames defences or barriers were in place. It does not reflect the area that would have been affected by any recent tidal surge, including that of December 2013.

¹ *Thames Estuary – tidal flood risk today*; Environment Agency. Figures relate to the Thames Estuary area, including parts of Kent and Essex, as well as parts of Greater London.

² Quote from Howard Davidson, South East Regional Director of the Environment Agency, during the Environment Committee meeting of 30 January 2014.

³ Sea level rise estimates and TE2100 information from the Environment Agency.

⁴ Rivers overlay graphic courtesy of Sandra Crisp, based on a map in *The Lost Rivers of London* by Nicholas Barton.

⁵ Quote from Howard Davidson, South East Regional Director of the Environment Agency, during the Environment Committee meeting of 30 January 2014.

⁶ Based on Environment Agency data. The data is by flood season, to illustrate the winter of 2013/14; there have been some fluvial closures outside the flood season, for example in summer 2007.

⁷ Photographs courtesy of the Environment Agency; they depict Chinbrook Meadows on the River Quaggy, in south east London.

⁸ Photograph courtesy of pitchcare.com; <http://www.pitchcare.com/magazine/green-roof-congress-boosts-biodiversity.html>;

⁹ Photograph courtesy of susdrain.

¹⁰ TE2100 graphic courtesy of the Environment Agency.

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