Submissions to the initial call for evidence

Ref	Organisation
Sub-001	British Property Federation
Sub-002	Environmental Change Institute, University of Oxford
Sub-003	National Centre for Atmospheric Science
Sub-004	City of London Corporation
Sub-005	Cross River Partnership
Sub-006	Centre for Climate Change, Economics and Policy
Sub-007	Environment Agency
Sub-008	Kent County Council
Sub-009	Marks and Spencer plc
Sub-010	Team London Bridge
Sub-011	Technology Strategy Board

Response to the London Assembly's call for views on severe weather and climate change

Monday 14th July 2014

The British Property Federation is a membership organisation devoted to representing the interests of all those involved in real estate ownership and investment. We aim to create the conditions in which the real estate industry can grow and thrive, for the benefit of our members and of the economy as a whole. Our members can help the government deliver many of its policies, particularly those involving urban regeneration, sustainable communities, social inclusion, tax-efficient property investment, savings and pensions reform, carbon reduction and environmental improvement.

With 800,000 buildings in London being at risk of surface water flooding from excessive rainfall[1] and 99.9% of UK businesses classified as Small and Medium-Sized Enterprises (SMEs) by the department for Business Innovation and Skills[2], the London Assembly and the Government should support these businesses if it wishes economic growth to be maintained in the longer term.

The BPF believes that a key issue facing SMEs is their exclusion from the Government's proposed Flood Re scheme. SMEs are more vulnerable than big businesses and their existence could be threatened if they are unable to afford their flood insurance premiums. BIBA has provided evidence that SMEs are finding it increasingly difficult to obtain flood cover in high risk areas. This could have negative impacts on the UK economy as a whole but at a local level, on those communities who may lose access to local retailers and service providers.

Additional challenges will be faced by leaseholders who are also excluded from the Flood Re scheme. Buildings cover on leasehold flats is only ever arranged on a block basis, as required by leases, to ensure the whole building is covered. Whilst larger owners and managing agents of blocks will be able to buy cover at a competitive rate and dilute risk, smaller blocks owned and run by leaseholders will not have the same bargaining power and therefore may encounter affordability issues particularly if they are in flood prone areas.

The ABI believes that leasehold blocks will be able to diversify risk internally, because the top floors will not be flooded. However, diversification in small blocks will be limited and ground floor flooding will affect the whole block in terms of access, knocking out power and other common services. Buildings insurance is therefore as important as contents insurance and again, is a critical requirement of mortgage lenders for any mortgage.

DEFRA and the ABI have stated that the number of properties, particularly in the leasehold sector, who will not be able to access Flood Re and who are in flood risk areas is minimal. We do not believe this is the case. Data produced by the Leasehold Knowledge Partnership estimates that, at the very least, 840,000 leasehold properties are at risk of flooding and 70,000 leasehold properties are deemed at high

[1] Climate UK, *A Summary of Climate Change Risks for London* (Jan, 2012)
[2] Department for Business, Innovation and Skills, *Business Population Estimates for the UK and Regions 2013* (Oct, 2013)

risk of flooding[3]. For a large number of these, it will be impossible for leaseholders to obtain reasonable priced insurance through the free market resulting in potentially sky-high premiums.

Indeed according to figures originating from the original Flood Re discussions, those households affected could face hikes of over £1,000 per annum per unit in their costs of insurance. We have examples of leasehold properties which have seen their premiums rise by 300-400%+ after flood events. One such example saw each individual leaseholder's contribution rise from about £400 per annum to £2,000 per annum.

The residents, businesses and infrastructure of London are at risk of not being economically resilient in the face of severe flooding in the future due to their exclusion from the Flood Re scheme; being unable to afford skyrocketing flood insurance premiums. If the London Assembly wishes to protect residents and businesses in London from the risk of flooding, then serious attention needs to be paid to the Flood Re scheme and those currently excluded from it.

[3] The Leaseholde Knowledge Partnership, http://www.leaseholdknowledge.com/leaseholder-kingston-gets-6000-insurance-premium-10000-excess-flooded (Feb, 2014)

A risk based approach to adaptation monitoring and evaluation to support London's response to climate change and improved adaptation decision making

Ashley Kingsborough and Professor Jim Hall – Environmental Change Institute, University of Oxford

A disconnect exists between climate change risk and vulnerability assessment, adaptation monitoring and evaluation (M&E) and adaptation decision making in cities worldwide, including London. In this briefing we present a risk based framework developed by Kingsborough et al. (in press) that links adaptation M&E, risk assessment and adaptation decision-making. We show how the framework has the potential to improve adaptation in London by better integrating M&E with risk assessment and decision making processes, using the Thames Estuary 2100 project as an example. We then outline recommendations related to adaptation M&E that the mayoral bodies may consider to ensure London can effectively adapt to climate change.

Adaptation monitoring and evaluation

M&E is a well-established practice utilised in a wide range of sectors and contexts that can inform the development of adaptation M&E systems and approaches. There is a critical role for adaptation M&E to play in informing the development of adaptation policy and practice, the identification of priorities, and ensuring the financial and technical resources committed to adaptation are used effectively and efficiently. In London there is significant potential for adaptation M&E to evaluate the effectiveness of adaptation mechanisms; communicate with the public about adaptation; learn about and improve the process of adaptation; identify adaptation priorities; justify adaptation expenditure; understand how climate risk is changing; and inform decision making processes.

Indicators can play an important role in informing adaptation M&E by providing evidence that a certain condition exists or certain results have or have not been achieved. Adaptation typically requires a broader set of indicators than less complex interventions. A portfolio of indicators can be used to provide evidence that a certain condition exists or certain results have or have not been achieved (Pringle, 2011). In the UK, the Committee on Climate Change's Adaption Sub-Committee (ASC) monitors changes in climate risks at the national level using indicators for exposure and vulnerability to climate risk, adaptation action and realised climate impacts. It evaluates preparedness through an analysis of ongoing decision making processes (ASC, 2012). The presentation of the trends identified in a range of indicators has been recognised internationally as a 'very useful way to summarise the results of the assessment' (Hammill et al., 2013). In New York City indicators to monitor the resilience of infrastructure and the built environment have been developed (NYC, 2013). Both these examples highlight the potential contribution adaptation M&E could make in London.

Adaptation M&E in London

To date, there is no published adaptation M&E framework in London. Without appropriate M&E, it is difficult to assess the effectiveness of the London Climate Change Adaptation Strategy or measure how London's climate risk profile is changing through time. The majority of monitoring relevant to adaptation has been carried out by stakeholders responsible for the management of specific risks, such as private a sector water company monitoring of water supply and demand within their water supply districts. Whilst this reflects the existing institutional responsibilities, this means that at a city scale some critical risks, such as the risks associated with heat waves and surface water, are less effectively monitored and managed.

The London State of the Environment Report (2013) details the monitoring of a number of environmental variables since 2000. It does not identify any explicit climate change adaptation indicators, but does include indicators that could contribute to the monitoring of climate risk and adaptation, such as flood risk, water supply and green space. The difficulty in monitoring climate change adaptation is cited as the reason for not including explicit adaptation indicators, which is consistent with international experience (Rosenzweig et al., 2010, Hammill et al., 2013, Hunt and Watkiss, 2010, Kingsborough et al., in press). Cities such as London, however, need to continue innovating and advancing climate change adaptation and through experimentation overcome such challenges.

Linking adaptation monitoring and evaluation, risk assessment and decision making

Traditional decision-making tools were not developed to manage the high degrees of uncertainty associated with long-term climate projections and existing planning frameworks and approaches need to be modified to account for the increased levels of uncertainty (Hallegatte, 2009). Adaptation planning approaches that

embrace flexibility and can incorporate uncertainty into the decision making process will be the most effective in managing future risks in complex systems. 'Adaptation pathways' approaches seek to maximise flexibility and minimise sensitivity to climate change scenarios by delaying decisions until critical thresholds are achieved (Reeder and Ranger, 2011, Haasnoot et al., 2012). Such approaches are increasingly relevant to adaptation planning in London. They are utilised in the Thames Estuary (as discussed below) and being developed in response to heatwaves, droughts and surface water flooding. Critical components of assumption based planning are the identification of adaptation thresholds or levels or tolerable risk and the incorporation of ongoing monitoring to inform the prioritisation of future actions. The emphasis upon reacting flexibly to change as it materialises reduces the reliance on assumptions about future scenarios but increases the importance of effective M&E.

The lack of M&E used in decision making is not limited to adaptation, but the challenge is compounded by long timeframes, inherent uncertainty and difficulties with attribution. A *risk based adaptation monitoring, evaluation and decision making framework*, shown in Figure 1, could contribute to overcoming a number of existing adaptation challenges. The proposed framework explicitly links adaptation M&E, and climate risk and vulnerability assessment to adaptation decision making. The iterative framework's components and linkages are described in (Kingsborough et al., in press).

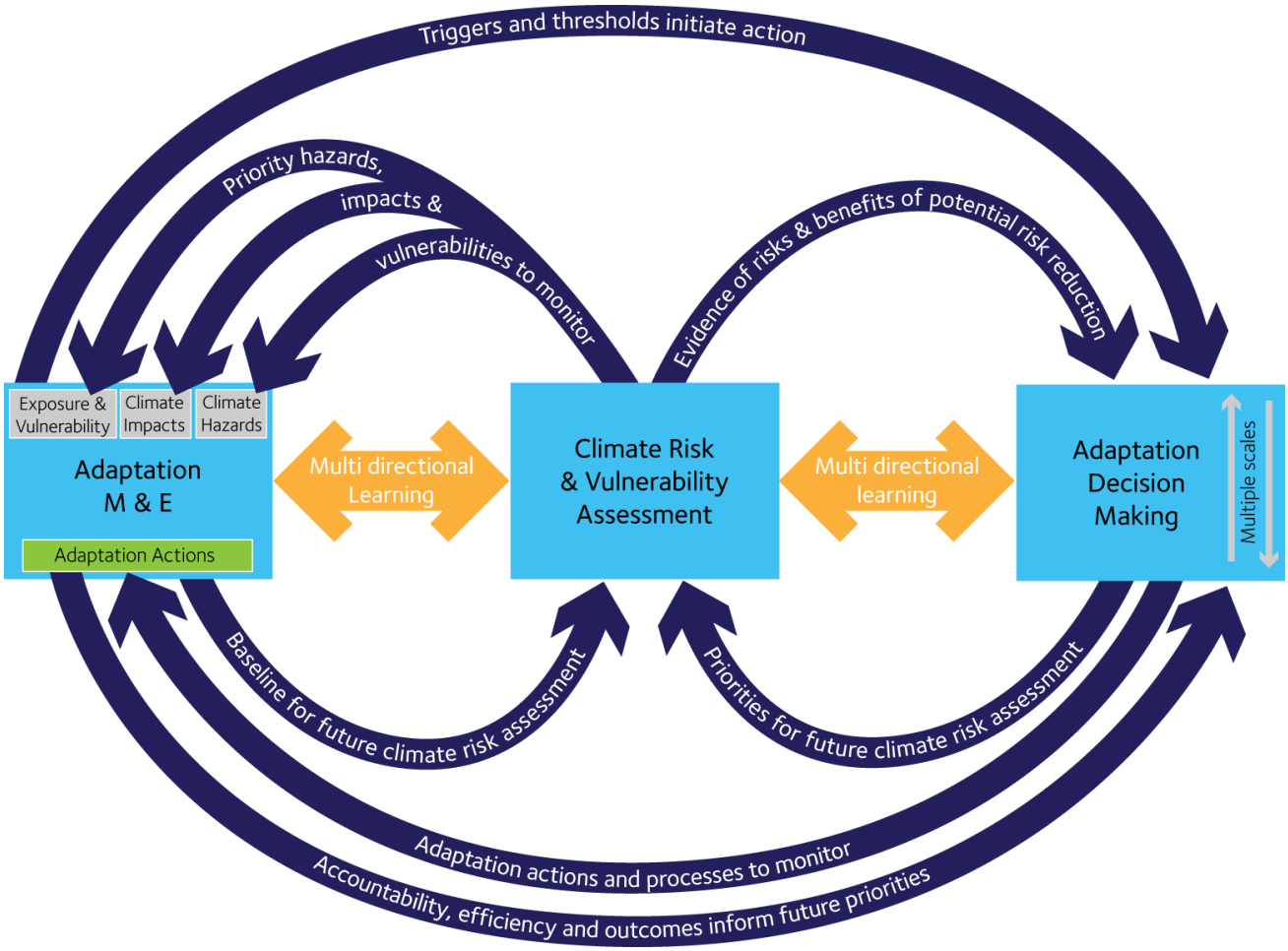

Figure 1 Framework for risk based adaptation monitoring, evaluation and decision-making (Kingsborough et al., in press)

The specific design and implementation of any *risk based adaptation monitoring, evaluation and decision making framework* will depend on the adaptation context. The next section shows how the framework could be implemented in the context of the Thames Estuary 2100 (TE2100) plan.

Risk based adaptation monitoring, evaluation and decision making for the Thames Estuary

The TE2100 Plan is the plan for long-term tidal flood risk management for London and the Thames Estuary; it includes specific flood risk management actions and pathways (EA, 2012). The Environment Agency and Greater London Authority have increasingly recognised the importance of risk assessment, the development

of adaptation pathways and M&E as critical components in adaptation planning, and TE2100 is an example of how they have begun to be integrated. Figure 2 demonstrates how these elements fit into our framework, and highlights the explicit linkages and components that will be critical in ensuring learning is captured and M&E contributes to future iterations of adaptation decision making.

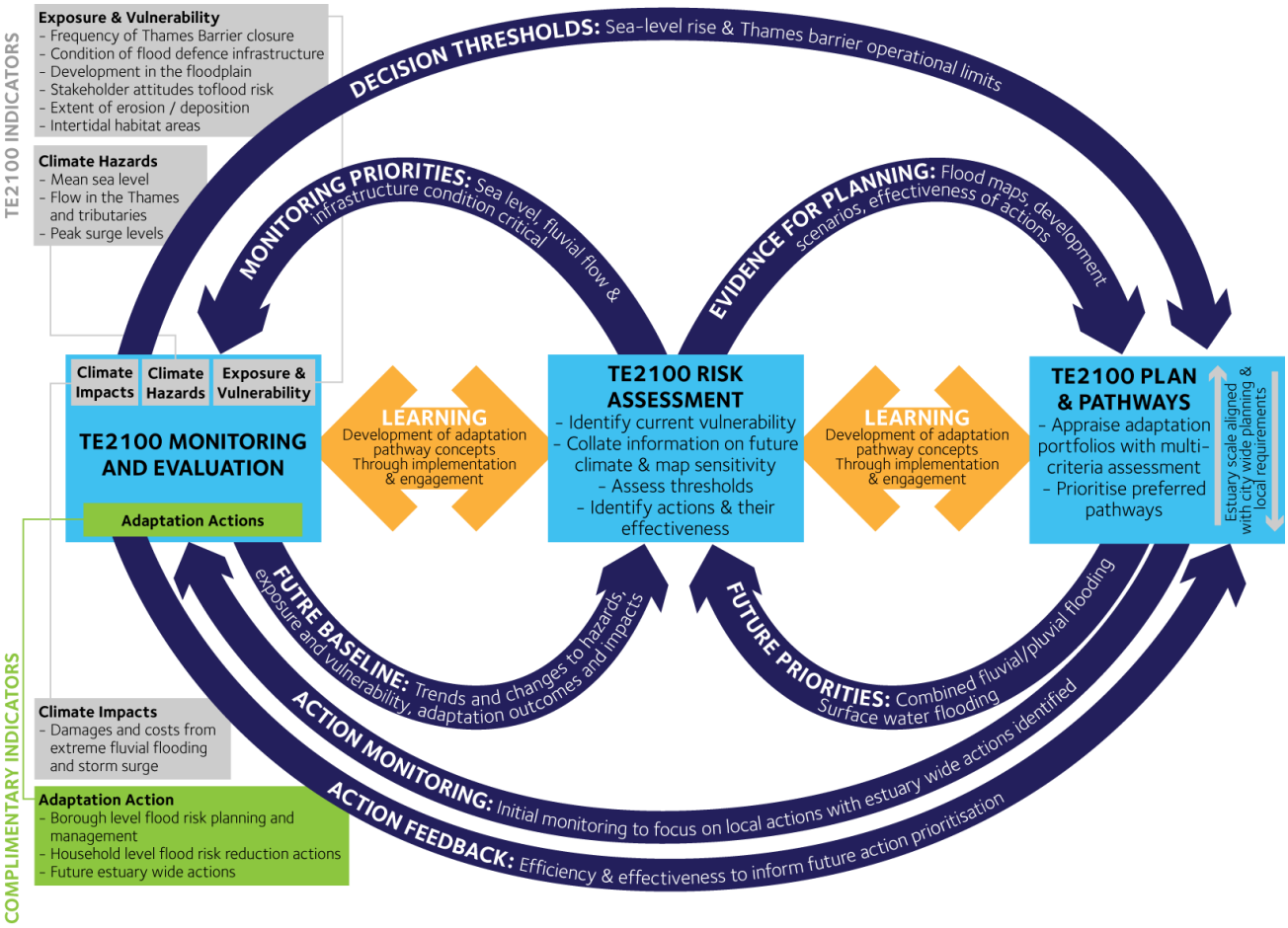

Figure 2 Framework for risk based adaptation M&E and decision making applied to TE2100 (Kingsborough et al., in press)

Monitoring of climate indicators for climate hazards, exposure and vulnerability is proposed in TE2100, and intended to track when decision thresholds are being approached. We propose M&E should be expanded to the monitoring and reporting of adaptation actions (e.g. tracking the number of properties with property level flood defences) and climate impacts (e.g. costs and damages from extreme fluvial flooding and storm surge events). Potential indicators for adaptation action and climate impact are included in Figure 2. As many elements of the proposed adaptation framework were utilised in TE2100 it serves as a useful example of how the components and linkages may be implemented. It is observed, however, that there is further potential to strengthen the role of adaptation M&E in the Thames Estuary.

Recommendations

Given the challenges faced in adapting to climate change, approaches that embrace flexibility and can incorporate uncertainty into the decision making process are required. The emphasis on reacting flexibly to change as it occurs reduces the reliance on assumptions about future scenarios, but increases the need for enhanced understanding of existing levels of risk and vulnerability. In addition, the limited financial resources available for adaptation make utilising available resources as efficiently and effectively as possible critical.

There has been limited adaptation M&E related to London-wide surface water flooding, heat risk and water scarcity. The proposed framework could be used as a structure for risk based adaptation monitoring, evaluation and decision making that addresses priority climate threats. The framework could be used to highlight the components and linkages that are well established and those that require strengthening.

Enhanced institutional linkages will be necessary to strengthen the linkages between risk assessment, monitoring and decision making. The flexible nature of the framework means, however, information can be incorporated as it becomes available. This allows new data collected from long term monitoring of climate risks and impacts and exposure and vulnerability to improve baseline data for future risk assessments, and show the tangible benefits of adaptation in terms of reduced climate risk and increased resilience.

The design of London's M&E approach will require extensive consultation and sharing of information between stakeholders including the Greater London Authority (GLA) and its functional bodies, Environment Agency, Met Office, London's boroughs and the City of London, water and drainage utilities, the London Climate Change Partnership (LCCP) and London Resilience. Figure 3 outlines a structure for the development of indicators for adaptation M&E in London. Such a structure is consistent with the *risk based adaptation monitoring, evaluation and decision making framework* and if populated effectively will inform a number of critical yet poorly understood adaptation processes such as the identification of tolerable levels of climate risk and the identification of when decision relevant adaptation thresholds are being approached.

Adaptation M&E should build on existing monitoring activities and capitalise on increasingly accessible spatially disaggregated data, some of which now exists in the London data-store but many are dispersed. There is a critical role for the GLA and LCCP to play in structuring and coordinating adaptation M&E. The provision of adaptation information and coordination between stakeholders are public goods that private sector organisations are not well placed to carry out. This is a critical role that the mayoral bodies are able play and it will help to facilitate future adaptation investment and support London's adaptation economy.

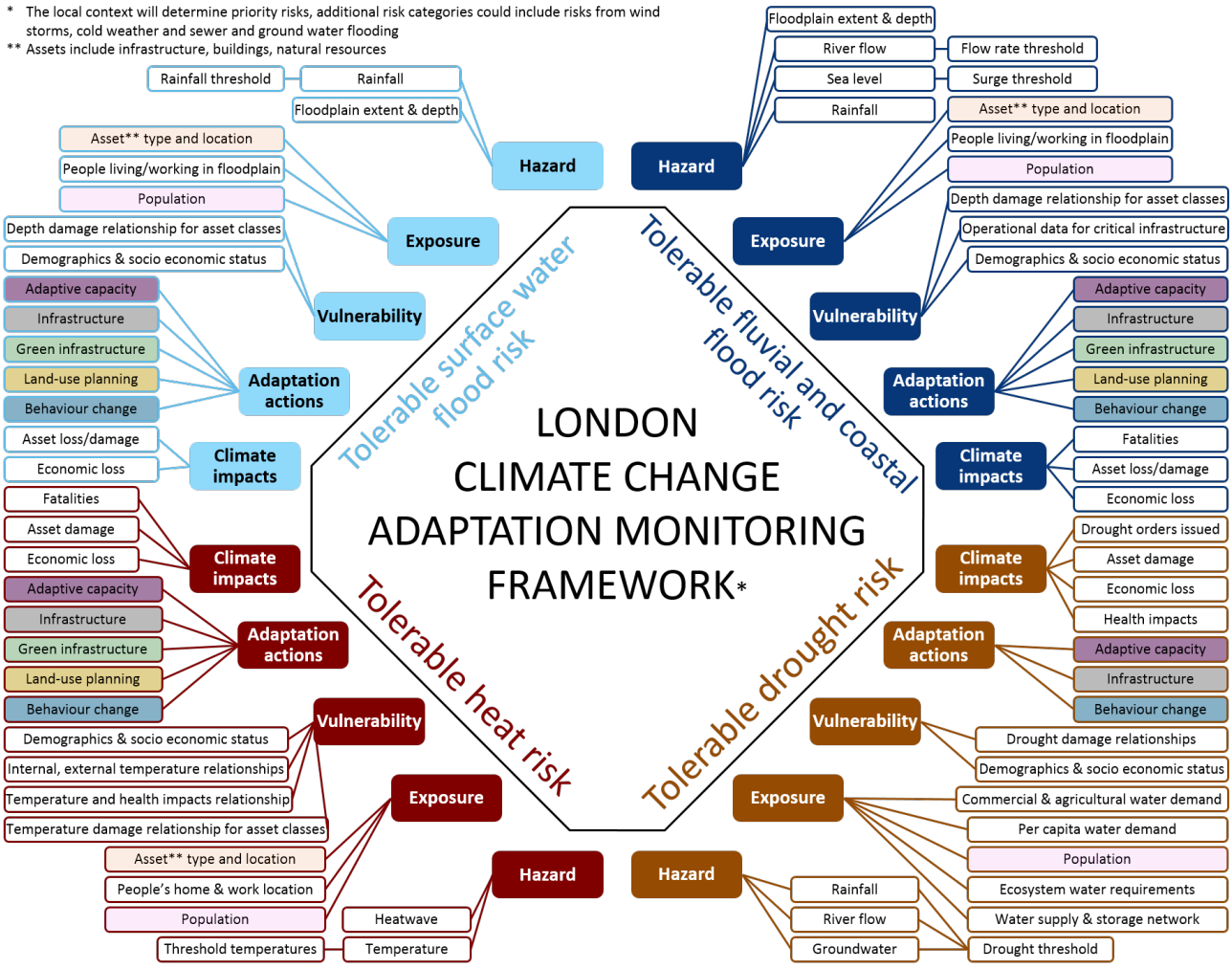

Figure 3 Monitoring and evaluation, indicator framework for urban climate resilience in London.

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London's response to severe weather and climate – Contribution from the National Centre for Atmospheric Science climate division.

In a changing climate, Londoners are likely to be affected by increased frequency of severe weather events, including windstorms, intense precipitation and heat waves. In addition, changes in the regional circulation may increase the frequency of air quality events.

This summary of recent findings on the changing risks of heat waves and air quality events contributes to the following two questions, posed in the Greater London Authority's 11th July call for evidence on the impact of climate change on Londoners:

1. What do climate change projections tell us about the likely increase or decrease in different weather risks in coming decades?

2. Has the consensus about likely changes in the risks of severe weather changed in recent years?

Heat wave risk

Heat waves significantly affect UK mortality and morbidity (Johnson et al. 2005). This impact is amplified in London by the urban heat island effect, which results in higher temperatures relative to surrounding rural regions. London's dense population renders the city vulnerable to the increased mortality and morbidity associated with high temperatures (Hajat et al. 2014).

Daily maximum temperature (i.e. the highest temperature reached during the day) is a good indicator of heat stress. Under a medium emissions scenario, daily maximum temperature in the southeast of England is projected to warm by 1.2 – 7.3 deg C by the 2050s, relative to the 1961-1990 baseline (UKCP09). The UKCP09 plot reproduced below shows the probability of the change in daily maximum temperature in SE England being less than a given value. According to this, under a medium emissions scenario, there is ~50% chance that the daily maximum temperature in SE England will warm by 3^0C by 2050, with ~25% probability of warming exceeding 4^0C. For context, the 2003 summer was of the order of 4^0C warmer than usual in London.

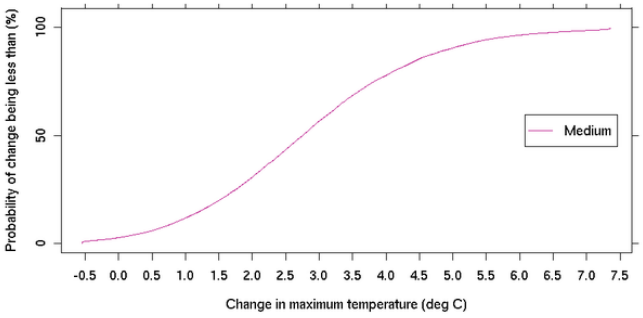

Figure 1: Probability of the change in a given maximum temperature for a medium emissions scenario for SE England (UKCP 09).

Such warming would be reflected in a significant increase in the frequency of high impact heat waves, like the one that occurred in 2003 (Beniston 2004). The likelihood of hot summers will, however, vary from decade to decade, in the future – as it does now. The variability of the climate on time scales from years

to decades is illustrated by Figure 2, which shows a time series of Central England Temperature (Parker et al. 1992).

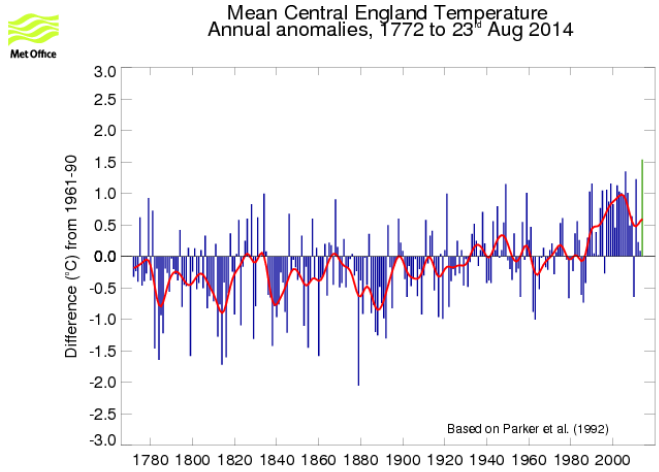

Figure 2: Annual mean Central England Temperature relative to the 1961-1990 annual mean. The red line is a 10-year running mean. Figure reproduced from http://www.metoffice.gov.uk/hadobs/hadcet/

A recent study has used an integrated assessment approach to investigate the impact of very hot summers on Londoners (Jenkins et al. 2014). The climate projections referred to in the study were based on the UKCP09 dataset. These data were adjusted to account for variability in the weather on fine spatial scales, and the temperature inside buildings. The climate projections were then combined with models of morbidity and mortality for a range of adaptation scenarios. The study found, that under a high emissions scenario, by 2050, there could be an average 842 extra heat related deaths in London. It was further found that adaptive measures, which reduce the temperature/mortality response curve by 1-2 ^{0}C, would reduce this figure by 32-69%.

Air quality events

Londoners are exposed to more air pollution at present than any other community in the UK (http://www.londonair.org.uk/LondonAir/guide/WorstPlace.aspx). Whilst the cause of air pollution can be thought of as being an emission based problem, regional scale meteorology plays a big roll in regulating the strength of air pollution episodes and changes in regional scale meteorology in the future will impact air quality. The most important meteorological phenomenon controlling air quality is atmospheric blocking or stagnation events. A recent study has quantified the global response of atmospheric stagnation events to climate change, concluding that by the end of the century there will be increases in the number of days that stagnation events occur in many parts of the globe (Horton et al. 2014). A key conclusion of this being that emission based control strategies for air quality will need to take into account changes in the frequency of stagnation events to deliver the improvements they are intended for. However,

that study (based on global climate model data) was unable to provide evidence for robust increases in stagnation events affecting London and the UK.

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LONDON ASSEMBLY ENVIRONMENT AND ECONOMY COMMITTEES' INQUIRY INTO FACING THE CHALLENGE OF SEVERE WEATHER AND CLIMATE CHANGE

Memorandum from the City of London Corporation
Submitted by the Office of the City Remembrancer

Introduction

1. The City Corporation adopted its climate change adaptation strategy in 2007. Many climate change strategies tend to focus on mitigation rather than adaptation. Though it is specific to the City of London, the issues raised within the City's Strategy are common to most areas. *"Rising to the Challenge"*, published first in 2007 and updated in 2010[1] with the UK Climate Projections (UKCP 09) scenarios[2], examines how the City's services and infrastructure will need to adapt in order to mitigate the predicted impacts of climate change. The strategy uses a standard risk assessment approach to categorise and assess climate impacts on the City's services and infrastructure. It prompted a fundamental assessment of flood risk to the City in addition to practical adaptation and resilience responses.

2. The Strategy was commissioned by the City Corporation in consultation with a wide range of partners. Workshops were held with individuals working in a range of bodies for which the City Corporation is responsible and with City stakeholders, including Thames Water, the Environment Agency, the Association of British Insurers (ABI), Transport for London, the Government Office for London and London Metropolitan University. In addition, City businesses including RBS, KPMG, Charles Russell Associates and Clifford Chance attended, and neighbouring boroughs of Tower Hamlets, Westminster, Hackney and Islington, as well as the Greater London Authority, were represented.

3. The resulting document is intended to be a comprehensive piece of work which clearly outlines the major risks[3] from climate change to the City along with recommendations on remedial action. The strategy aims to 'climate-proof' the City of London by undertaking a number of actions: initiating research and monitoring to help develop appropriate policy and actions on climate adaptation; climate proofing policies, practices, assets and infrastructure; and working in partnership with utilities and service providers, other public sector bodies, residents and businesses in achieving this.

4. The City Corporation's approach to adaptation has sought to ensure that, wherever possible, adaptation measures are incorporated into planning policy and guidance. The intention is for an incremental approach to ensure that the City adapts gradually to climate change impacts.

[1] Available here - http://www.cityoflondon.gov.uk/services/environment-and-planning/sustainability/climate-change/Pages/Climate-Change-Adaptation.aspx
[2] The UKCP09 scenarios predict an increase in extreme weather events to 2100 and provide more accurate forecasting (on 1km2 grids) compared to the predecessor UKCP02.
[3] The main climate risks are summarised at Appendix 1 of the Strategy.

5. The issues and actions identified within the strategy have prompted the City Corporation to work more closely with service delivery organisations, such as those in the voluntary sector, that might not previously have been approached on this issue. In depth conversations have also been initiated with bodies such as OFWAT and OFGEM to examine the resilience of energy and water supplies to the Square Mile. Adaptation is on the agenda for the City Environmental Forum, a forum facilitated by the Corporation for facilities and environmental managers throughout the City.

Awareness of the risks

6. Awareness amongst many businesses (particularly SMEs) about how climate change may impact upon them is relatively low. The impacts of extreme weather events can however be devastating on small businesses. There could be a role for the local authorities to assist small businesses to develop recovery and continuity plans[4]. The London Climate Change Partnership has done a great deal to spread awareness of climate change impacts and best practice in adaptation among infrastructure and service providers in London including local authorities and businesses. The Mayor, GLA, TfL, the London Enterprise Panel and other Mayoral bodies are able to communicate the issues, signpost advice and support the further development of guidance and case studies by bodies such as the London Climate Change Partnership

7. Raising awareness of this issue amongst businesses is important. The City of London has a good track record of engaging with businesses to enhance their resilience. Adaptation has become a part of this. However there are some issues where a national strategy is required – for example, responding to a failure of a staple crop harvest which could lead to substantial global commodity price rises.

September 2014

[4] The City of London has developed a series of case studies of best practice on flood protection for businesses- see https://www.cityoflondon.gov.uk/services/environment-and-planning/sustainability/climate-change/Documents/surface-water-flooding-case-study-report.pdf

Sub-005

CROSS RIVER PARTNERSHIP

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Richard Berry
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28th August 2014

Dear Richard,

Environment Committee & Economy Committee - Facing the challenge of severe weather and climate change

Cross River Partnership is pleased to be invited to contribute to the London Assembly's enquiry into severe weather and climate change.

Cross River Partnership coordinates the Greening the BIDs Steering Group on behalf of the GLA. Now in its fourth year, the Steering Group has brought together over 20 Business Improvement Districts to improve London's green cover – this work contributes to Area 12 of the All London Green Grid (central sub-region). In this time £360k of public sector support from Natural England, the Mayor and the Drain London Fund has levered £440k of private sector investment to increase London's bio-diversity and enhance its environmental resilience.

The financial support provided by public sector partners, has enabled CRP to work with its BID partners to deliver 15 Green Infrastructure Audits and catalyse the installation of 17 green infrastructure assets in central London, including bird boxes, planters, green walls, hanging gardens, green roofs and rain gardens. Each project is majority match funded by the private sector. A further 5 installations are due for completion in 2014, including a green roof on the southern terrace of level 5 at Tate Modern and a Rain Garden at St Mary's hospital in Paddington.

GI installations deliver multi-functional benefits including, habitat to sustain bio-diversity, mitigation of localised surface water flooding, tempering the urban heat island effect and providing air pollution capture, as well making places more attractive in which to work, visit, shop and dwell. To date installations have provided 60 additional trees planted, 2463m2 of green coverage and attenuated 3500m3 of surface water through Sustainable Urban Drainage. Interventions are small scale, but strategically targeted as part of an incremental, cumulative approach.

The GLA collaborates with CRP to identify and match fund BIDs to undertake green infrastructure Audits. The Fitzrovia Partnership is the most recent BID to receive support. They are augmenting this with private sector match funding and surveying their members for ideas, exemplifying the business engagement that GI audits enable. Victoria Business Improvement District, working with Arup, and supported by Natural England, the GLA and CRP, brought best practice in undertaking GI audits together in 2013 providing a step-by-step approach to classifying existing assets and identifying opportunities for future installations. The guide has been extremely well received. In a little over 9 months the publication has been downloaded 137 times with 200 hard copies distributed. The GTB Steering Group seeks to ensure that audits are converted into installations. Interest amongst emergent and new BIDs in undertaking GI audits remains strong.

The GTB Steering Group BID members have also contributed significantly to creating greater awareness about the multi-functional benefits of green infrastructure. BID 'greening' project managers regularly host walkabouts, speak at events, convene workshops and produce 'how to' guides and other outputs. During this year's 'Green Sky Thinking' week' (28th April – 2nd May) three of the GTB Steering Group members hosted GI promotional workshops and talks. CRP is currently collating all of this 'additional' activity delivered by BID partners to assist the GLA in considering funding that will support future installations – this can be made available to the Committee upon completion in mid September.

Natural England, the GLA and BID partners are also committed to supporting CRP in producing a compendium of case studies and promotional video. These outputs will highlight the challenges project managers have faced, the lessons learned and the successes achieved – both will be available in the autumn. The compendium and the video will be used to service a series of awareness raising events targeted at local authority officers, elected members, academics, developers, land owners and others. The Mayor's focus on green infrastructure as a key asset for the city in his recently published consultation on London Infrastructure Investment to 2050 is very welcome. However, the benefits of GI are still not well understood by key decision makers and stakeholder groups. We aim to address this gap through the compendium and video.

Outside of the funding provided by Natural England, the GLA and the Drain London Fund, BID partners have delivered many of their own installations, demonstrating a growing business commitment to urban realm improvement that is sustainable and that contributes positively to London's environmental resilience – the Diamond Jubilee Garden adjacent to the Queen's Gallery realised through a partnership

between Victoria BID and Buckingham Palace is a prime example. The designer, Nigel Dunnett, noted that:

> *The combination of no irrigation, reduced energy requirements, high wildlife and biodiversity value, and its role in urban water management means that [the garden] is a very sustainable garden, and one that is 'future-proofed' in terms of our changing and unpredictable climate. It is a model of how we can adapt our urban areas, and our gardens and parks, to face the challenges of the future.*

CRP is currently seeking to capture information on the non-publicly funded installations delivered within the central London sub-region by GTB BID partners. This will augment the information identified above and feed into the GLA's consideration of future funding opportunities. This information may also be made available to the Committee when completed.

Elsewhere, the 'Missing Link' competition run by the Royal Institute of British Architects and Vauxhall ONE has realised a vision for Vauxhall that will link three of the area's existing parks to the South Bank and its rail arches to the river through a 'Promenade of Curiosities'. The promenade will capitalise on the area's history as well as to its current industries and attractions. One of the key features of the design will be rain gardens along the promenade separating the new cycle and pedestrian pathways. These will reduce surface water run-off and will be planted to reflect the changing seasons – with flowers in spring and summer and a focus on foliage and architectural forms in autumn and winter. The project is being supported financially by TfL and Vauxhall businesses.

The Mayor has pledged nearly £1bn investment in cycling in London over the next 10 years. This is extremely welcome and will contribute to sustaining and encouraging modal shift with positive benefits for London's congestion, air quality and the health of Londoners. To date, however, there is neither a plan nor a budget to ensure that the extension of the cycle super-highway network, roll out of the central grid, and delivery of Quietways and mini Holland's is achieved in a way that integrates green infrastructure – the GTB Steering Group considers this a missed opportunity; one that will likely be addressed retrospectively in an *ad hoc* fashion in the years ahead at greater cost. The Mayor's investment in cycling provides an ideal opportunity to integrate sustainable urban drainage and GI that contributes to surface water management and air quality improvement in a seamless way. We encourage the Mayor and TfL to actively consider how to exploit this opportunity now.

The LIFE+ programme funded through the European Union provides €3.4bn for the next funding period, 2014 – 2020. The programme focuses on the environment and climate change, including environmental and resource efficiency and nature and biodiversity; and climate change mitigation and adaptation. Thematic priorities include water, floods and drought; waste legislation; resource efficiency; air quality; and green infrastructure. The deadline for submitting project proposals in round one is 16th October 2014.

Preparation of bids to the LIFE+ programme are detailed and lengthy often proving too resource intensive for smaller partnerships, charities and other bodies. The programme provides an excellent opportunity, however, to support a number of both the Mayor's and the Committee's environmental and climate change adaptation priorities. The GTB Steering Group invites the Mayor in his role as strategic lead for the capital to consider how the GLA working with Defra, the Environment Agency, TfL, borough, BID and other partners like CRP can develop project proposals that will secure funding from LIFE+ that will enable London to deliver against its environmental priorities – greening London's cycle grid would be one area in which a proposal should be developed and submitted.

This year the GTB Steering Group has widened its agenda beyond its traditional focus to coordinate and stimulate interest in other related areas. Many of the Steering Group members submitted expressions of interest to TfL's Road's Task Force Future Streets Incubator Fund. Team London Bridge BID were one of these. Their initial proposal for the trialling of a series of 'mobile parklets' along the south bank, developed in partnership with King's College, London Wildlife Trust, Treebox and CJS Plants, was welcomed by TfL. The 'parklets' will both provide and test the efficacy of GI as an air pollutant capture device and manage water whilst improving the look and feel of the south bank area. Initial feedback from BID partners on the selection of round one projects is that the sift criteria did not appear to have been applied universally, that feedback on proposals was too generic, and that only 'eye-catching' projects seem to be being supported. Partners appreciate this is a new fund and as such will take time to bed in, however.

The enthusiasm that exists within the business community, amply demonstrated by the work of the members of the GTB network, to contribute to improving London's environmental resilience should be recognised and supported by continued financial backing from the Mayor, whether through the Drain London Fund or other funding streams. The GTB Steering Group is consistently very well attended, including by valuable collaborators like Arup and King's College, and acts as a valuable forum for promoting and maintaining action around the sustainability agenda amongst the business community in London. A view endorsed by the Public Realm and Development Director at Vauxhall ONE BID, who described the GTB Steering Group as 'one of the best little groups working in this area [environmental sustainability] in London'. Members of the group are grateful for the support received and very much hope that their own considerable efforts will continue to be valued and supported by the Mayor.

Owain Jones

Place Making Project Manager
Cross River Partnership: 'Delivering Regeneration Together'

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Richard Berry and Ian Williamson
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London Assembly,
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12 September 2014

Dear Mr. Berry and Mr. Williamson

Thank you for inviting us to respond to your inquiry on 'Facing the challenge of severe weather and climate change'. We welcome the joined efforts of both the Environment and the Economy Committees to investigate this important area. As a research institute based in London we have a natural interest in considering how our analysis can support adaptation efforts locally. Climate risk and adaptation form important strands of our research programme, with a wide range of projects and collaboration ongoing, spanning several geographical areas and sectors.

Of particular relevance for the Committees' inquiry is our work under the European Union (EU) funded FP7 research project 'Enhancing risk management partnerships for catastrophic natural disasters in Europe' (ENHANCE). The institute is leading a case study that assesses multi-sector partnerships for adaptation in London. This work is in collaboration with Professor Jim Hall at Oxford University and combines qualitative as well as quantitative assessments. As part of the ENHANCE case study we are currently conducting a survey of members of the London Climate Change Partnership to inquire about adaptation action in London. This covers several of the questions raised in your inquiry and we enclose the survey outline for your information.

Other reasearch conducted by the Institute, such as on climate and the insurance industry, or adaptation of multi national companies, also provides insights of use to your inquiry. Section 1 below summarises the results published so far, with an indication on how this may support the Committees' inquiry and Grater London Authority's adaptation work. Section 2 describes ongoing, as yet unpublished, work by the Insitute and gives details of when results will be available. We would welcome the opportunity to discuss these findings with the Committees at the appropriate time.

Section 1: Research findings relevant to the consultation questions

Question 5: Is London ready to adjust its adaptations to cope with future weather changes?

Flood risk is a major concern for London. Currently, flood insurance is playing an important role in minimising the finacial disruption faced to properties in the event of s flood. However, climate change is likely to pose a threat to affordabilty and availabiity of flood insurance. Our analysis of the Government's proposed Flood Re insurance scheme finds that it provides very little incentives for the uptake of risk reduction measures to support flood defences, for example household level flood protection and improved spatial

planning and zoning (Surminski and Eldridge, 2014). We are now exploring how this could affect London's resilience to a major flood today and in the future (see section 2).

Question 7. How can London map its dependence on global supply chains that are at risk from climate change effects and severe weather overseas?
Question 8. What advice and information is available to London businesses about how they should respond to climate change and severe weather events? To what extent do firms use these services?
Question 9. To what extent businesses in London have adaptation or continuity plans in place?

It is increasingly clear that mounting cross-cutting climate risks cannot be addressed successfully at any single institutional or spatial scale, or by any one sector. Furthermore, the supporting risk management efforts that will influence risk levels are often determined at a local level and involve a much broader range of stakeholders than just the insurance industry and government.

London hosts some of the largest businesses in the world. How these companies are dealing with climate risk and opportunities is likely to have implications beyond their direct operations and supply chains, but their role and impact in promoting adaptation locally is poorly understood. We are investigating this for multi-national companies (MNC's). In our investigation of the drivers of MNC-led adaptation we can see that MNCs are taking steps to adapt their operations to climate change under the headers of risk management, reducing impact, increasing sustainability, and environmental and social governance (ESG). Our work has resulted in an extensive database of case studies and references to MNC adaptation activities. A first working paper is expected by the end of 2014. As part of this process we are also contributing to the upcoming Second UCCRN Assessment Report on Climate Change and Cities, ARC3-2, where we co-author the chapter on private sector adaptation and cities.

A detailed investigation of companies domiciled or operating in London is currently not planned, but we would expect our methodology to be applicable to a city scale and would be happy to discuss this further with the Committees.

A specific focus area of our work is the insurance sector, which is of particular relevance to London due to its role as a global hub for insurance and investment. Exploring the potential impact of climate change on this sector we found that indirect regulatory risks and opportunities appear to outweigh the direct risks and opportunities arising from the impacts of climate change (Ranger and Surminski, 2013). How the industry responds to climate change is likely to influence not just the resilience of the sector, but wider society. However, we find that both globally and in the UK there is very little evidence of insurance incentivising risk reduction and adaptation (Surminski and Oramas-Dorta, 2014; Surminski and Eldridge 2014). Potential ways for addressing this are currently being considered in our ENHANCE project. This work is feeding directly into the European Union green paper on 'Disaster Insurance' as well as the UK Flood Re negotiations, which may have implications for companies in the London market.

Section 2: Current research relevant to the consultation question

The following section summarises forthcoming work that is directly relevent to the Committees' inquiry. We would be happy to dicuss this work further with the Committees at the appropriate time.

2.1 Case study of the London Climate Change Partnership

We are now considering the scope for new partnerships to enhance climate resilience in London. Our starting point is the London Climate Change Partnership (LCCP), which we use as a lens for understanding the effectiveness of public-private partnerships to address climate risks, specifically flood risk, in London. One important aspect is the analysis of relationships between partners in existing partnerships aimed at adaptation and resilience. We are looking for indicators for successful partnerships and governance arrangements in improving resilience. We are particularly interested in LCCP's role in other flood risk reduction projects, such as Drain London. For data collection we are currently surveying LCCP members through an online survey (see Appendix for survey questions). The questions are closely linked to those outlined in this inquiry: we ask LCCP members to indicate their understanding of climate risks, sources of information, actions being undertaken as well as some specific questions on current flood risk management in London. The survey will close in mid- September and we are likely to complement this exercise by follow-up interviews. First results are expected to be presented to the LCCP at their next meeting in October. We would be very happy to share and discuss our findings with the Committees.

2.2 Flood insurance and London

Under the ENHANCE programme the Institute working with the University of Oxford to explore how proposed changes to the provision of flood insruance in the UK could influence London's resilience to major flooding today and in the future. For this an Agent Based Model (ABM) is being developed and implemented to explore the relative merits of individual and community risk reduction measures; the optimal levels of risk and risk reduction from different stakeholder perspectives; the interactions of stakeholders; the roles of different multi-sector partners and economic instruments in delivering risk reduction (including their advantages and disadvantages), and the role of asymmetries in information and uncertainty on stakeholder decision making, with a focus on London. Initial results are expected early 2015.

2.3 Flood risk investment

We are planning a comparative analysis of existing approaches to flood investment in other countries and reflection on current practices in the UK, with a particular view on the role of the private sector. This work is expected to be conducted in the autumn 2014.

2.4 UK Climate Change Risk Assessment (UK CCRA)

Several of the questions raised in the consultation are currently being investigated as part of the next UK Climate Change Risk Assessment (CCRA), albeit at a national rather than city level. This applies particularly well to Qs. 7-10 on the economic impact of climate change on London. The Institute is taking the lead for the business and industry chapter of the upcoming UK CCRA. The work is still at the scoping phase and, as part of this scoping, we would welcome the opportunity to discuss the evidence received by the Committee for this inquiry on the economic impacts of climate change on London.

While the Institute has a good relationship with the Greater London Authoritiy's adaptation team and is also involved in the work of the LCCP, we support further efforts to utilise research such as ours in the delivery of London's adaptation strategy. We hope that this inquiry will help to facilitate such a knowledge exchange and we would welcome a face-to-face meeting over the next couple of months to discuss how the Institute's research can be helpful to your committees.

Yours sincerely,

Dr Swenja Surminski
Senior Research Fellow

Further reading

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Surminski, S., (forthcoming). The role of insurance in reducing direct risk – the case of flood insurance. *International Review of Environmental and Resource Economics*.

Surminski, S., and Crick, F., 2013. *Response to European Commission's green paper on the insurance of natural and man-made disasters.* Policy paper. London: Grantham Research Institute on Climate Change & Environment and Centre for Climate Change Economics and Policy.

Surminski, S., Crick, F., Eldridge, J. and Ward, R., 2013. *Securing the future availability and affordability of home insurance in areas of flood risk.* Policy paper. London: Grantham Research Institute on Climate Change & Environment and Centre for Climate Change Economics and Policy.

Surminski, S. and Eldridge, J., Forthcoming. *Flood insurance in England - an assessment of the current and newly proposed insurance scheme in the context of rising flood risk.* Working paper. London: Centre for Climate Change Economics and Policy.

Surminski, S. and Oramas-Dorta, D., Forthcoming. Flood insurance schemes and climate adaptation in developing countries. *International Journal of Disaster Risk Reduction*.

Appendix

London Climate Change Partnership online survey
(Conducted by Dr Swenja Surminski and Dr Hayley Leck at the London School of Economics and Political Science. Survey will close mid-September, results will be presented to LCCP in October.)

Survey questions with particular relevance to this consultation:

LCCP and your organization

1. How long has your organisation been a member of LCCP? Please tick one:

- Less than 6 months
- 6-12 months
- 1-3 years
- 3-6years
- 6-10 years

2. Why did you/your organization join the LCCP? Tick all that apply:

- Interest in supporting London climate adaptation and resilience
- Information and knowledge sharing on climate adaptation and resilience
- Carry out research and develop solutions for climate adaptation and resilience
- To influence climate change and other policy in London
- Other, please specify:

3. What do you consider as the LCCP's main functions? Tick all those that apply:

- Lobbying for climate change adaptation
- Research on climate change
- Information dissemination on climate risks and climate change for London
- Supporting wider UK adaptation to climate change
- Brings together a knowledge network on climate change for London
- Establishing best practice on climate change adaptation in London
- Other (please specify):

4. Please rate the awareness of the LCCP and its work within your own organization – from 1 (no awareness at all) – to 5 (strong awareness across the organisation)

5. Do you think that the LCCP has had an impact on adaptation in London?

6. If you answered 'No' to (5.), please skip to question 7. If you answered 'Yes', please tick all those that apply:

- Collecting and sharing high quality information about expected climate change, its impacts on London and examples of suitable actions to adopt

- Raising awareness of the impacts of climate change with organisations and people,
- Driving forward climate adaptation and resilience in London.
- Informing climate change policy
- Monitoring how prepared London is for climate change
- Other, please specify:

7. Please rate the effectiveness of the LCCP in bringing together public and private sector actors from 1 (not very effective) to 5 (very effective) – in terms of the following aspects of adaptation:

- Awareness raising of the need for climate change adaptation (?)
- Proposing solutions for London climate change adaptation
- Funding for climate change adaptation
- Implementation climate change adaptation initiatives/projects

8. What should be the key focus areas/priorities of LCCP for the future? (I.e. longer term plans – list up to three)

<u>Your organization and climate risks in London</u>

9. Which climate risk(s) do you think your organisation is concerned about in London?

10. Does your organisation keep track of climate risk levels in London?

11. If you answered 'No' to (10) please skip to question 12. If you answered yes please indicate how by ticking all those that apply:

- Conducting your own research
- Official Government sources (UKCCRA, EA's flood risk data etc.)
- Collaboration with peers
- Seeking advice from independent sources
- Other (please state)

12. In your view, is your organization currently engaged in efforts to increase climate resilience in London?

13. If you answered 'No' to (12.) please skip to question 14. If you answered yes please indicate how by ticking all those that apply:

- Taking measures to increase operational resilience of your own organization
- Working with stakeholders (including clients, general public) on climate change adaptation
- Engaging with policy makers on climate change adaptation
- Developing new products or climate change adaptation solutions
- Other (please specify)

14. Do you think your organization faces any barriers to supporting and delivering climate adaptation initiatives?

15. If you answered 'No' to (14.) please skip to question 16. If you answered 'Yes' , please tick all those that apply:

- Funding
- Knowledge
- Institutional inertia
- Regulation
- Other (please specify)

Flood risk in London

16. In your view, who is driving current flood risk management efforts in London?:
- The private sector
- Both, in collaboration
- Neither of these
- Not sure

17. Do you think efforts to manage flood risk in London are:

- Adequate in response to current risks (Yes/No)
- Incorporating climate considerations (yes/No)
- Sufficiently funded (Yes/No)
- Involving most relevant stakeholders (Yes/No)

18. If you have answered no to any of the above, please outline briefly why:

19. Can you provide an example of public-private sector collaboration that led to the implementation of flood risk management measures in London (within LCCP or beyond)?

20. Where do you see scope for further London-focused public-private collaboration to increase flood resilience in the capital? (rank in order of importance – from 1 to 7)

- Flood insurance
- Flood defence spending
- Retrofitting existing building stock
- Flood resilience of new build
- Planning regulation
- Flood risk modelling
- Flood risk awareness raising

21. Are you aware of any public-private collaborations on or joint projects on flooding elsewhere that could be of interest for London? Please explain:

LCCP and flood risk

22. Do you think LCCP should engage in the flood insurance debate? Please explain the reason(s) behind your answer:

23. Do you think LCCP should do more to engage with property developers on the issue of flood risk?

24. Could you envisage LCCP playing a role in testing new funding options for flood risk management in London?

London Assembly's call for views and information: London's response to severe weather and climate change

Here is the Environment Agency's response to this call for views and information.

Climate change and severe weather:
1. What do climate change projections tell us about the likely increase or decrease in different weather risks in coming decades (by 2050 to 2100 depending on available data)?

It has been projected that average summer temperatures could increase in the South East of England by 3.9ºC by the 2080s. This scenario is based on a 'medium carbon emissions' pathway, which according to the Climate Change Adaptation Sub Committee[1] is currently a likely scenario.

In a large metropolis like London, the city generates its own micro-climate, known as the Urban Heat Island effect. The higher temperatures of this microclimate are caused by the surfaces of the densely built urban environment (road surfaces, pavements, walls, roofs) absorbing heat and then radiating this heat. During the 2003 summer heatwave, differences of up to 10°C between central London and rural temperatures were measured. London's urban heat island effect will exacerbate the impacts of projected increased summer temperatures.

At the same time, a 22% decrease in average summer rainfall in the South East is projected, which could increase the risk of water shortage. London is prepared to deal with water shortages in the current climate but there is a need for a better understanding of future impacts relating to different climate change scenarios.

Despite the innovation in climate change modelling in the last few years, there are still uncertainties when it comes to water resources. For example, current modelling does not accurately represent blocking high pressure weather systems, which generate drought and drive frequencies.

A Met Office study suggested that in a worst case carbon emissions scenario, we might have ten times as many significant droughts by 2100, with droughts like the one the UK experienced in1976, occurring on average every ten years.

A case study by the Climate Change Adaptation Sub Committee in July 2011 pointed out that in a high emissions future scenario, even with substantial development of new water resource infrastructure, water availability could be under severe pressure by the 2080s. (can supply graphic)

Climate change will also bring wetter winters and more frequent heavy rainfall . London is already prone to flooding from all sources. We recently provided evidence to the London Assembly, to support the production of the Environment Committee's report *Flood Risks in London* (April 2014), so we will not duplicate the content in this response. Surface water flooding and sewer flooding events caused by heavy rainstorms are likely to increase if action is not taken to make London more resilient to these events.

[1] Committee on Climate Change is an independent statutory body that provides evidence-based advice to the UK Government and Parliament. The Adaptation Sub-Committee sets the direction for adaptation matters including independent advice on preparing for climate change..

2. *Has the consensus about likely changes in the risks of severe weather changed in recent years (compared to the evidence base used to draw up the Climate Change Adaptation Strategy)?*

Since the Adaptation Strategy was published in 2011, the Intergovernmental Panel on Climate Change (IPCC) has published its 5th Assessment report (2013). This considered new scientific evidence based on many independent scientific analyses from observations of the climate system, historical climate archives, theoretical studies of climate processes and simulations using climate models. The conclusion was that there is a 95% probability that human action is the dominant cause of climate change. This represents an increase in certainty from 90% in the previous report. In 2012 the IPCC also published a Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX). The report determined that a changing climate leads to changes in the frequency, intensity, spatial extent, duration, and timing of extreme weather and climate events, and can result in unprecedented extreme weather.

Together, the findings of these reports reinforce the position, set out in the Climate Change Adaptation Strategy, that London will face an increase in severe weather events, and it will need to adapt to these new risks.

3. *What are the risks of severe weather? For different hazards, how many people are at risk, of what effects, at what risk level? For example, the Environment Committee has recently investigated risks of flooding from storms at various likelihoods – are there similar figures for other weather risks such as heatwaves, droughts, snow or cold snaps?*

Regarding the increased likelihood of heatwaves, research indicates that the 2003 extremely hot summer cost the economy £500 million, plus loss of human life. In London there were an estimated 600 excess fatalities related to the heat wave. The London School of Hygiene and Tropical Medicine studies have shown that we see excess mortality in London when the temperature rises above 24.7C – way below the 32C threshold for heatwave[2].

Projected increases in summer temperatures will be a contributing factor to more air pollution episodes in London. Poor air quality is a serious health risk for the elderly and asthma sufferers. For example, in the 2003 hot summer it was estimated that air pollution alone was responsible for between 423 and 769 excess deaths in England and Wales during the first two weeks of August and these deaths were associated with the elevated ambient ozone and PM_{10} concentrations.[3]

The London Climate Change Partnership has done some work on identifying overheating thresholds in London. See Appendix 1. (Overheating Thresholds report, London Climate Change Partnership 2012)

Future hotter, drier summers and projected population growth in London will put increasing pressure upon already limited water resources, potentially leading to more frequent drought management measures and negative impacts on the quality of London's rivers canals and wetland habitats.

Extreme weather would exacerbate an already water stressed London. London and the South East region is the driest area in the UK. Water demand in the capital is disproportionately high compared to other parts of the country. Londoners now consume an average of around 165 litres per person per day, compared to the national average of less than 150 litres per person per day. This is due to smaller households (flats) and low uptake of water metering.

Severe weather of climate change is expected to affect water availability by reducing river flows, reducing groundwater replenishment ('recharge'), increasing evaporation, and increasing demand for

[2] http://blogs.lshtm.ac.uk/news/2013/07/18/premature-deaths-from-heatwave-in-england/
[3] http://www.sciencedirect.com/science/article/pii/S1352231003010203

water from Londoners as a result of population growth. While water companies are better prepared for droughts since the 1976 drought, our infrastructure would struggle to be resilient to the more extreme conditions that we might see under a changing climate, such as several consecutive very dry years.

Water supply shortage or interruption in supply would have a significant impact on Londoners, This could include disruption to health and social care systems and adverse impacts on critical infrastructure, putting vulnerable people at greater risk. The Adaptation Sub Committee's 2012 report *Climate Change – Is the UK preparing for flooding and water scarcity?* refers to a projected high level deficit of -1040 Mega litres/ day in the Thames river basin for the 2020s (in a medium greenhouse gas scenario).

It is not just extreme weather that will affect water supply availability. Population growth will also be an important factor. The latest predicted population figures indicate that London will be the first European city to reach a population of over 10 million by 2036. The Mayoral ambition to build 42,000 new homes every year as a minimum (currently around 25,000) will add to the water demand in Greater London.

Poor quality water also needs more intensive treatment to make it fit for public consumption, raising costs to water company customers and increasing energy use and carbon emissions.

There has been some analysis of other extreme weather events, but not any London focused analysis that we are aware of. Snow and icy conditions which defined the 2011 winter cost the economy an estimated £600 million per day (Federation of Small Businesses). 5 people in the UK died (17 in total across western Europe) following the St Jude storm event in October 2013. Willis Re estimated total UK insured losses at between 100 million and 150 million Euros in the aftermath of this storm. The Association of British Insurers and the Met Office have done some work on financial risks of climate change.[4] Key findings for UK windstorms included;

- Annual event - Insured wind losses could rise by 25% to £827 million (valid for slight southward shift in storm track)
- 1-in-100-year event - Insured wind losses could rise by 14% to £7.3 billion
- 1-in-200-year event - Insured wind losses could rise by 12% to £9.7 billion (valid for a slightly southward shift in storm track)

The Environment Agency takes a strategic overview of all sources of flooding and we work with Lead Local Flood Authorities in London to support plans to manage local flood risk. We are an active partner of the Drain London partnership. We will not repeat here the information we provided to the London Assembly's Environment Committee in April for their Flood Risks investigation and report.

Significant impacts of climate change on biodiversity in England have already been observed (DEFRA 2008) [5], and the potential changes to London's habitats and biodiversity as a result of climate change have also been well documented (LCCP 2009) [6]. Whatever action is taken now to reduce levels of greenhouse gas emissions, further impacts are inevitable because climate change will continue due to inertia in the climate system. Climate change, therefore, poses serious threats to biodiversity this century.

Adaptations:
4. How is London adapting to lessen or cope with the effects of severe weather and climate change? Are London's adaptations focussed on the greatest threats?

[4] http://www.metoffice.gov.uk/services/finance/abi-report
[5] England Biodiversity Strategy Climate Change Adaptation Principles (DEFRA 2008) http://www.lbp.org.uk/downloads/Publications/Climate%20Change/Adapting%20to%20Climate%20Change%20-%20Creating%20Natural%20Resilience%20Technical%20Report
[6] Adapting to Climate Change Creating Natural Resilience (London Climate Change Partnership 2009)

Flood risk is one effect of severe weather and climate change that London is addressing. The bullet points below outline some of London's adaptation measures to address increased risk of flooding:

- The Thames Estuary 2100 (TE2100) Plan is recognised as an example of a long term tidal flood risk management plan that takes account of climate change. This plan identifies adaptation options for different future climate change and sea level rise scenarios to the end of the century.This adaptability will ensure that the right actions are taken at the right time.

- Adapting to climate change is a process and can be built into our normal planning and risk management procedures, whether in business, government or services. For example, we provide information to local planning authorities to support planning decisions based on the Government's most up to date climate change projections. This will ensure that new development will be out of high risk flood zones or designed and built to be resistant and resilient to future flooding.

- Drain London are looking at developing a London wide adaptation pathway to cope with increases in the magnitude of rainfall events.

- River catchment management plans are in place for managing the risk of river flooding. These also take into account projected climate change and impacts on water levels.

London needs to integrate adaptation into its plans for new and retro-fitted developments. For example, the Mayor's RENEW programme is beginning to tackle this and provides holistic advice that will include adaptation as well as carbon saving advice. This is a very positive development. The house building programmes anticipated for London to address housing shortage, provides an opportunity to locate and design new developments that are 'climate ready'. The Mayor's Sustainable Design and Construction Supplementary Planning Guidance (2014) provides guidance to local authorities to support adaptation measures in new development.

There are also positive references in the draft Mayor's London infrastructure investment plan (2014) to the need for London's infrastructure being resilient to climate change. A welcome chapter on green infrastructure recognises the multi benefits of this resource, including climate change adaptation. This reflects London Plan policy and All London Green Grid guidance. The Mayor's urban greening and tree planting programmes supporting local projects, provide multiple benefits for climate adaptation. For example, cooling through natural vegetation, rainwater management in the landscape and local improvements to air quality.

The London Climate Change Partnership (of which we are a partner) is a key mechanism for supporting adaptation in London. It is a cross-sectoral partnership which enables collaborative analysis and action on the issues of climate change.

5. Is London ready to adjust its adaptations to cope with future weather changes?

Flood risk: The TE2100 plan is designed to be adaptable and includes a monitoring programme to ensure that decisions to manage Thames Estuary tidal flood risk take account of future weather changes and changes to projected climate trends. This is a national infrastructure project.

Water resources and infrastructure:
It is difficult to financially plan for climate ready infrastructure for water (for example, building reservoirs) due to current short-term planning/ funding cycles of the water industry. At the moment water resources are planned on a 25 year cycle and do not take a longer term view that would require the need to consider impacts of a changing climate. Taking a longer term adaptation pathways approach would mean we would have to significantly change current funding arrangements set by Ofwat. However, the pathways approach is recommended in the draft London Infrastructure investment plan.

6. What could be the costs and benefits of different adaptation approaches?

As already stated one example of an adaptation approach is the TE2100 plan. The benefits of this plan are significant and include the continuing protection of 1.25 million people and £200 billion worth of property from increasing tidal flood risk, through to the end of the century and beyond. The Plan sets out actions, at a cost of up to £9 billion pounds, by the end of the century.

The London Climate Change Partnership has provided costed guidance and advice as well as case studies to encourage investment in adaptation (see their publications on LCCP website http://climatelondon.org.uk/resources/publications/)

Economic impact:
7. How can London map its dependence on global supply chains that are at risk from climate change effects and severe weather overseas?

Environment Agency's 'Climate Ready Support Service' has developed a five-step framework to help businesses understand and manage the risks that severe weather and our changing climate present to increasingly complex supply chains of UK commerce. The guidance has been tested as part of ASDA's Sustain & Save Exchange (SSE) programme.[7]

8. What advice and information is available to London businesses about how they should respond to climate change and severe weather events? To what extent do firms use these services?

London Climate Change Partnership has a number of London businesses and business organisations in its membership, including London First. LCCP partnered with the City of London Corporation and Price Waterhouse Cooper, to hold a business resilience event in May 2014.This event was devised to test and refine support tools for businesses and identify opportunities for providing better support for Small and Medium-sized Enterprises.

Climate UK provides a Business Resilience Health Check, in Partnership with Business in the Community and the Environment Agency. This provides holistic advise to businesses regarding their resilience, including but not limited to, severe weather:[8]

9. To what extent do businesses in London have adaptation or continuity plans in place?

We do not have information on this. It is a potential area of work that we could look at with the London Climate Change Partnership.

10. Are there specific challenges for Small and Medium-Sized Enterprises (SMEs)? How can these be addressed?

We do not have information on this. It is a potential area of work that we could work with the London Climate Change Partnership.

[7] To download the guidance go to http://www.acclimatise.uk.com/resources?resource=202

[8] Find out more about the checklist at http://www.businessresiliencehealthcheck.co.uk/

Mayor's role:
11. What specific steps can the Mayor and GLA take to ensure London and its economy is prepared for and can adapt to the impacts of severe weather and climate change?

Projected population growth for London will place an additional strain on London's resources and infrastructure. The Mayor and the GLA will need to ensure that all new development is sustainable and that it is planned to be able to adapt to a changing climate. For example, Opportunity Areas apply London Plan policy and demonstrate sustainable design and build.

The Mayor and the GLA should continue with initiatives such as Greening the BIDs, RE:NEW and Drain London.

Surface flood risk management is the responsibility of the Lead Local Flood Authority (each London Borough). However we also recommend a London wide strategic approach that will support local delivery bodies and identify priority locations for investment for rainwater management. Retrofitting programmes into existing places will be as important as opportunities to install sustainable drainage into new development. The emerging London Sustainable Drainage Action Plan is a mechanism for applying a strategic approach.

Jenny Scholfield
London team
Environment Agency

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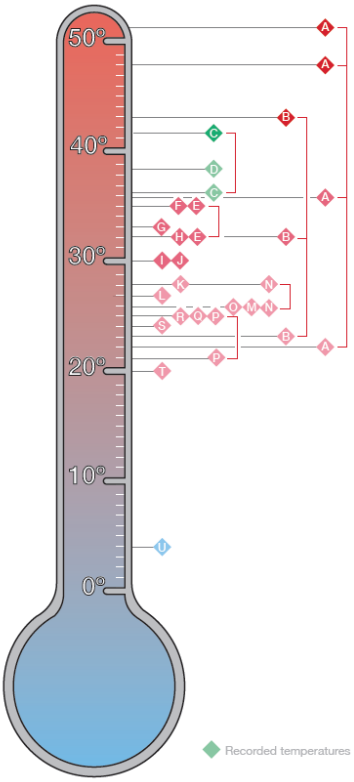
Appendix 1

Selected temperature thresholds relevant to London's urban systems.
Extract from Overheating Thresholds Report (LCCP 2012)



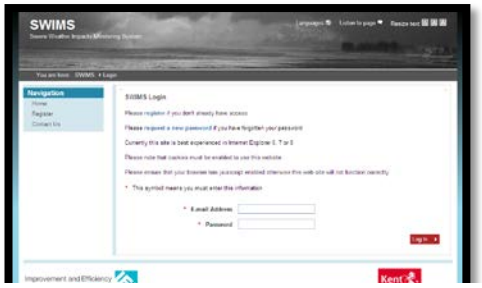
Temp.	
A	**36°C** External air temperature which results in rail track temperatures of **48°C-52°C**. Extreme precautions, such as temporary speed restrictions, taken by Network Rail at this air temperature to avoid buckling of non-pre-stressed rails and overheating of power sources. **22°C** Network Rail begin to implement staged preventative measures at this air temperature.
B	**43°C** Maximum internal air temperature advised for server rooms. **32°C** Maximum internal air temperature advised for computer rooms. **23°C** Maximum internal air temperature advised for IT equipment rooms.
C	**41.5°C** and **36.2°C** Air temperatures recorded on the tube and on platforms respectively during the 2003 heatwave in London.
D	**38.5°C** Highest daytime temperature recorded in the UK (at Gravesend, Kent).
E	**32°C** and **35°C** Internal air temperature thresholds to which Crossrail rolling stock and stations respectively are designed not to exceed.
F	**35°C** Heat stress risk for healthy adults begins at this internal air temperature combined with a relative humidity level of 50%.
G	**33°C** Softening of tarmac, asphalt and bitumen road surfaces generally begins to occur but is also dependant on direct solar exposure.
H	**32°C** The highest estimate for summer mean daily maximum temperatures by the 2080s.
I	**30°C** Vulnerability of commercial buildings to power outages increases when external air temperatures exceed this.
J	**30°C** Overhead power lines begin to experience a reduced rating factor above this air temperature.
K	**28.1°C** The highest estimate for summer mean daily maximum temperatures by the 2050s.
L	**27°C** Threshold temperature specified for overheating in well insulated housing.
M	**26.2°C** The central estimate for summer mean daily maximum temperatures by the 2080s.

Temp.	
N	**28°C** Current CIBSE temperature threshold for living areas. If 1% of annual occupied hours exceed this temperature, internal spaces in a building have technically overheated. **26°C** Current CIBSE temperature threshold for bedrooms
O	**26°C** Threshold for air temperatures of internal cool areas required to be provided by hospitals.
P	**25°C** Suggested 'hot' temperature threshold for bedrooms. **21°C** Suggested 'warm' temperature threshold for bedrooms.
Q	**24.8°C** The central estimate for summer mean daily maximum temperatures by the 2050s.
R	**24.7°C** over 2 days leads to greater incidences of morbidity, mortality and hospital admissions in London.
S	**24°C** London Underground implement overheating plans including public health communications and measures to prevent non-pre-stressed railtracks from buckling.
T	**20°C** Legionella bacteria begin to develop in potable water supplies (both stored and piped) if water temperature exceeds this.
U	**4°C** to **60°C** Bacterial growth on food encouraged between these temperature. Likelihood of food borne diseases increase by 4.5% for every 1oC increase in air temperature.

The Severe Weather Impacts Monitoring System (SWIMS)

Kent County Council and partners are committed to ensuring the county is prepared for the impacts of climate change, in particular severe weather events. An important part of this work is to further understand how we are impacted by, and how we respond to, severe weather events currently. This will enable us to learn from our experiences and continue to deliver effective services for the county, both now and into the future. We have therefore developed in partnership the web-based Severe Weather Impacts Monitoring System (SWIMS). This is the first system of its kind in the UK and as such has gained significant national interest.

SWIMS is a decision-support tool and ongoing central data collection point for public sector services to log on and record the impacts of severe weather events and the resulting financial cost. Services can also capture additional data including the impact on the Kent community (e.g. flooded homes), reputational impacts (e.g. compliments/complaints received) and how they responded to these events. Further information is available on our website www.kent.gov.uk/swims.

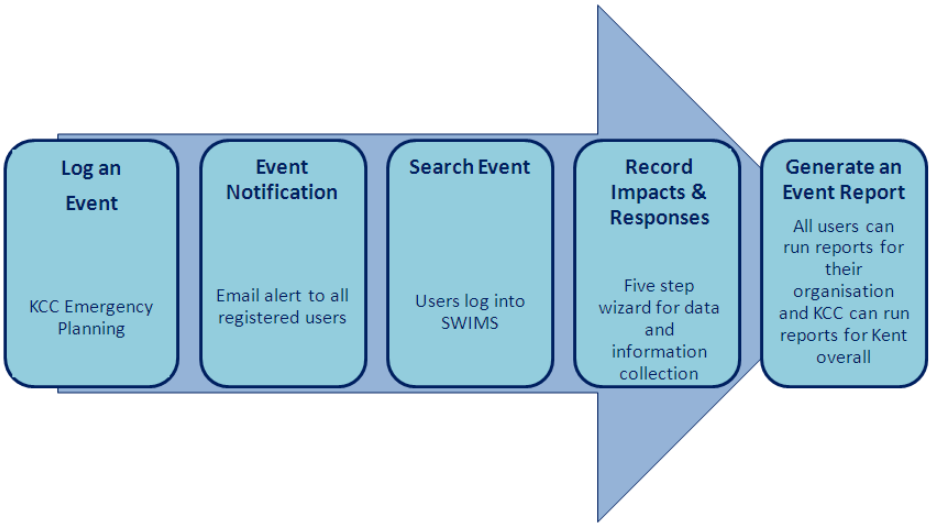


Screenshot of SWIMS login page

Over 90 users, representing services and organisations have signed up to SWIMS with over 35 severe weather events have been logged on the system in the period of Jan 2012 – 2014.

Impacts include road, rail and port closures, fatalities, numerous flood events and structural damage, with services disrupted after the event through additional staff resources.

SWIMS builds up a picture of key vulnerabilities to severe weather and can provide the evidence base for business case development for climate change adaptation and resilience.



National roll out of SWIMS

In 2012, Defra released the national Climate Change Risk Assessment (CCRA), which identified the priority risks and sectors for the UK. Using this evidence base, the National Adaptation Plan (NAP), was published in 2013.

The roll out of SWIMS is a key action for the local government stream of 'Climate Ready', the front face of the National Adaptation Programme. Through Climate Ready, SWIMS was made available to other public sector partnerships from Spring 2013.

Kent County Council provides input into the National Adaptation Programme through the Local Adaptation Advisory Panel (LAAP), a partnership of local authorities leading on climate change adaptation, the Environment Agency, Defra, LGA, DCLG with other Central Government departments attending when required. SWIMS provides key learning for this group and Lord de Mauley (Parliamentary Under-Secretary for Resource Management, the Local Environment and Environmental Science) has directly referenced SWIMS in letters to Chief Executives across the UK.

Further information

- Kent County Council's website on SWIMS
- The Kent Adaptation Action Plan
- The Kent Environment Strategy
- The UK Climate Change Risk Assessment

Facing the challenge of severe weather and climate change

Responses from Marks and Spencer plc are based on a 3-part, UK-wide, retail property study undertaken to better understand

i) the business case for adapting to climate change,
ii) a strategy for implementing adaptation measures and
iii) the climate change impacts on the construction supply chain.

Climate change and severe weather:

1. What do climate change projections tell us about the likely increase or decrease in different weather risks in coming decades (by 2050 to 2100 depending on available data)?

Average annual UK temperatures are 1°C higher than they were in the 1970's and a trend towards drier summers and more frequent heat waves, wetter winters with heavier rainfall events and rising sea levels is predicted. The impacts of global warming will be experienced on a regional and local level in diverse ways. By the end of the century we can expect the average yearly temperature of the UK to be between 1°C and 4.5°C hotter than today, depending on the levels of future greenhouse gas emissions. The following general trends in climate are expected:

- increased climatic variability

- rising temperatures

- increasing risk of heat waves

- warmer, drier summers

- milder, wetter winters

- changing patterns of rainfall with more intense rainfall events

- increasing risk of drought and floods

- sea-level rise and coastal erosion

- increased frequency and severity of sea storm surges

- possible increase storm intensity and frequency, including lightning.

M&S's study looked up to 2050 in terms of climate change projections.

2. Has the consensus about likely changes in the risks of severe weather changed in recent years (compared to the evidence base used to draw up the Climate Change Adaptation Strategy)?

From M&S's perspective the prognosis remains the same in terms of mid to long-term climate risk. However, in light of the very recent flood experience the perceived risk of water management has certainly risen up the agenda with business continuity teams now aggressively working to better manage this going forward.

3. What are the risks of severe weather? For different hazards, how many people are at risk, of what effects, at what risk level? For example, the Environment Committee has recently investigated risks of flooding from storms at various likelihoods – are there similar figures for other weather risks such as heatwaves, droughts, snow or cold snaps?

M&S has looked into severe weather risks, specifically from a retail perspective and with a focus on flood, drought and heat. We have looked at the risk profiles of various scenarios such as staff and customer

health and comfort, food hygiene and failure of heating and cooling equipment and proposed remedial actions which have been plotted on a risk matrix.

Adaptations:

4. How is London adapting to lessen or cope with the effects of severe weather and climate change? Are London's adaptations focussed on the greatest threats?

5. Is London ready to adjust its adaptations to cope with future weather changes?

6. What could be the costs and benefits of different adaptation approaches?

M&S is unable to comment specifically on how London as a region is managing climate risk, but as part of M&S's climate change adaptation study we undertook a more detailed analysis of our flagship store, Marble Arch, in terms of risk and coping strategies. The biggest risk to the store as we head towards 2050 is energy / heat management.

Economic impact:

7. How can London map its dependence on global supply chains that are at risk from climate change effects and severe weather overseas?

By firstly understanding what are London's biggest dependencies and which of those are imported or exported. Then understanding the climate impacts from those imported or exported regions. M&S has conducted a similar exercise specifically in relation to the impact of climate change on construction materials.

8. What advice and information is available to London businesses about how they should respond to climate change and severe weather events? To what extent do firms use these services?

M&S has used tools from Climate Ready, UKCIP and the Environment Agency.

9. To what extent businesses in London have adaptation or continuity plans in place?

As part of M&S's sustainability strategy, Plan A, we have two Plan A commitments related to managing climate risk:-

1) By 2015, we will review possible adaptations to climate change at our top 50 UK stores. We will then develop a plan in collaboration with our landlords to agree which adaptations will be implemented by 2020.
2) From 2015 all store development investment in excess of £10m will be assessed against future building climate change risk mitigation by the Property Board.

M&S currently has an adaptation strategy and is now working to integrate specific actions into existing processes ranging from planned, preventative maintenance regimes, retrofit specifications of M&E equipment, up-skilling of relevant staff and tabling climate change risks at relevant high-level property decision making meetings.

Our business continuity team have been and continue to pro-actively address flood risk and adverse weather risk and are currently engaged with the EA to support their flood awareness campaign which launches in November '14.

10. Are there specific challenges for Small and Medium-Sized Enterprises (SMEs)? How can these be addressed?

Top of the list of challenges for SME's are likely to be the lack of resources to be proactive rather than reactive which makes SME's more vulnerable to climate change risk than larger organisations.

Mayor's role:

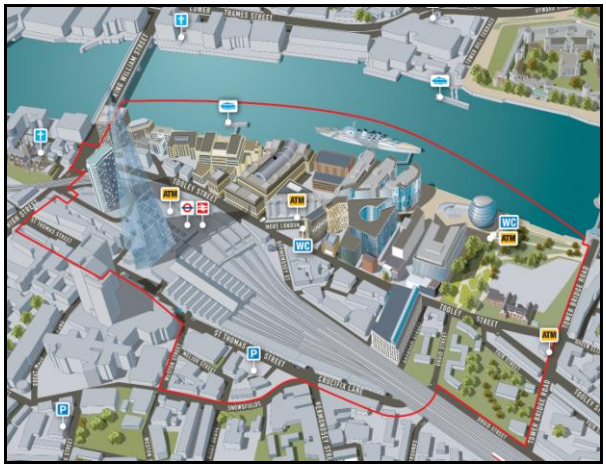
11. What specific steps can the Mayor, GLA, TfL, London Enterprise Panel and other Mayoral bodies take to ensure London and its economy is prepared for and can adapt to the impacts of severe weather and climate change?

Work together. There's little point in an M&S store being a lonely island of climate resilience. The Mayor is in a unique position to facilitate collaborative working and bring others on board to help create climate resilient cities. Understand the greatest risks and opportunities and agree ways of mitigating or capitalising them. These should be continually reviewed in light of new data, evidence and experience. Learn lessons from other large cities in different climates.

Team London Bridge

Business Improvement District Company

Response to the London Assembly Environment Committee investigation: Facing the challenge of severe weather and climate change



September 3rd 2014
Shane Clarke
Deputy Executive Director
Team London Bridge

This report constitutes the formal response of the Team London Bridge (Business Improvement District) to the London Assembly investigation 'Facing the challenge of severe weather and climate change..

Team London Bridge

Team London Bridge Business Improvement District (BID) represents over 300 businesses in the London Bridge area stretching south of the Thames River from London Bridge to Tower Bridge. These businesses range from large blue-chip organisations such as Ernst & Young, PWC and Norton Rose through a diverse community of small and medium sized enterprises. The executive team reports to the BID Board made up of business representatives. Our comments are within the context of the work we carry out as a BID, ensuring agreed business objectives for the BID area are met and the business investment (£850,000+ capital per annum) through the BID levy is well spent.

In November 2010 Team London Bridge secured a extended term of five years from 2011 – 2016 following a successful business ballot. 78% support by number and 88% support by rateable value. As part of our renewal campaign the following strategic objectives were agreed for the area:

- a first class transport interchange
- a world class pedestrian-focused public realm
- restoration of the historic railway arches
- an increased and varied retail offer

Quite obviously facing the challenge of severe weather and climate change within London requires a strategic approach from the government, GLA and public bodies at legislative, infrastructural, fiscal and monetary levels. All such responses play out at the local level and it is at this neighbourhood level that BIDs have a great deal of knowledge and expertise. The comments that follow therefore concentrate on the 'public-realm' and how the London Assembly and GLA can work with local communities and within local areas to help contribute to adapting to and mitigating climate change challenges in London.

Each of the following recommendations are evidenced in more detail in the main body of the report.

Recommendations

Recommendation 1: The London Assembly should recognise the value of Green Infrastructure audits and action plans as galvanising support locally for GI projects and aiding their financing and delivery.

Recommendation 2: The London Assembly should recognise that small public realm projects are readily embraced by local communities because they tackle climate change & improve the quality of life locally.

Recommendation 3: The London Assembly should recognise the opportunity presented by partnering with the London BID community so as to both help tackle climate change and improve local areas.

Recommendation 4: The London Assembly should recognise the importance of the Cross River Partnership Greening the BIDs partnership as a forum for spreading best practice and helping finance and deliver innovative climate change adaption projects.

Recommendation 5: The London Assembly should work with the GLA and Cross River Partnership to develop a Drain London 3 funding programme.

Recommendation 6: The London Assembly should work with the GLA to investigate to opportunities afforded by the EU LIFE programme to invest in a greener future for London.

Recommendation 7: The London Assembly should work with TFL to ensure that their Roads Task Force focused investment strategy contributes significantly to helping tackle climate change challenges.

Recommendation 8: The London Assembly work with Team London Bridge, TFL & local partners to realise the sustainable & place oriented objectives outlined in the 'London Bridge Future Streets' report.

Recommendation 9: The London Assembly and the GLA should work with Team London Bridge to deliver a London Bridge Plan that helps future proof the area against climate change challenges.

Green Infrastructure (GI) audits

The Mayor has stated in the London Plan his ambition to increase green cover in central London by 5% by 2030 and 10% by 2050. This is in keeping with the All London Green Grid and Mayor's green infrastructure strategy.

In 2012 Team London Bridge worked with the Ecology Consultancy and Green Rood Consultancy to publish the London Bridge Green Infrastructure Audit. The report was part funded and coordinated by the Greening the BIDs partnership of Cross River Partnership and the GLA Urban Greening & Biodiversity team. The report presents a clear picture of existing green cover and identifies specific sites and interventions that can help increase both the quantity and quality of GI within the wider neighbourhood which would deliver multiple benefits, including flood alleviation, climate adaptation, public realm improvements, visual enhancement, biodiversity, food production and community cohesion.

Key opportunities indentified in London Bridge audit include:

- The potential to green 3.7ha of flat roof space which is 7% of the BID's total land area.
- 49 sites were identified as being able to accommodate a rain garden.
- Over 33 sites were identified as being able to accommodate green wall treatments.

Team London Bridge developed the rather technical finding within the report into a '12 Point GI Plan' for London Bridge. The objective of this document is threefold. Firstly, to present GI in layman's language to local businesses, developers, landlords, planners, residents and decision makers. Secondly, to generate debate locally such that GI becomes part of the regeneration remit and conversation. Thirdly, to translate the report findings into actual projects on the ground. This approach has been very successful to date both helping finance and deliver GI projects and in terms of getting decision makers to realise the popularity, feasibility and efficacy of GI projects.

Recommendation 1: The London Assembly should recognise the value of Green Infrastructure audits and action plans as galvanising support locally for GI projects and aiding their financing and delivery**.**

Public realm projects

'A world class pedestrian focused public realm' continues to be a core objective for the business community in London Bridge. To this end TLB commits circa 50% of our annual funds to public realm projects. Highlights include:

- planting approximately 80 mature trees
- Melior Street community garden
- Gibbon's Rent secret garden
- Estates in Bloom programme to green two large housing estates
- placing circa 80 hanging basket and 80 planters
- a world first vertical rain garden on Tooley Street
- 75 bird, bat and bug hotels across the area
- Dinner from Our Back Garden
- Greenwood Theatre pocket park

These projects are examples of how low key, relatively low cost, neighbourly and micro GI projects can help transform local areas. These projects have been embraced by local businesses and residents because they make London Bridge a more convivial, safer, more bio-diverse and distinctive neigbourhood. They all also contribute to adapting to and mitigating climate change in a way that improves people's quality of life in the locale in which they live and work.

This aspect of the climate change debate is often missing. The consequence of this is that people and businesses perceive climate change solutions as outside of their understanding and their ability to make significant positive interventions. It also sidelines that fact that GI interventions improve both the quality of the environment and the quality of life locally and are therefore both easily understood and embraced locally.

The Landscape Institute's' 2013 research report Public Health & Landscape positively correlates investment in landscape and GI with improved with health and well being and therefore as being key in tackling climate change in the years ahead.

Recommendation 2: The London Assembly should recognise that small public realm projects are readily embraced by local communities because they tackle climate change & improve the quality of life locally.

London's Business Improvements Districts

There are currently thirty seven Business Improvement District (BID) companies in London. The Mayor of London has publically stated his support for BIDs and his wish to see 50 across greater London by 2016.

The focus on a world class, green and friendly public realm is shared across the London BID community. Variations on the green projects delivered by Team London Bridge are being taken forward and financed by London BIDs on an ongoing and increasingly confident and ambitious basis. Stand out projects include the Better Bankside Urban Forest framework, the Vauxhall One Missing Link strategy and the Rubens Hotel green wall project in the Victoria BID area.

The cumulative impact of these green BID investments and their often ground breaking nature are making real the Major's greening ambitions for central London These projects are also beginning to positively change the look and feel of central London.

Locally, we are particularly excited about our TFL Innovation Fund bid, in partnership with King's College London and Vauxhall One BID for a series of 'Fresh Air Squares' across London Bridge. These are modular parklets that combine place making, pocket parks, air quality monitoring and mitigation and sustainable urban drainage features in one package. Moving forward we would welcome the opportunity to work with London BIDs through the Greening the BIDS forum to spread our prototype 'parklets' across central London. Such funding streams perfectly compliment the entrepreneurial and innovative thinking within the BID community and are very much welcomed.

Recommendation 3: The London Assembly should recognise the opportunity presented by partnering with the London BID community so as to both help tackle climate change and improve local areas.

Greening the BIDs

The Greening the BIDs partnership and forum brings together Cross River Partnership (CRP) and the GLA Urban Greening & Biodiversity team with the majority of the BIDs in central London. It was this partnership that coordinated and funded the aforementioned GI projects. The partnership also coordinated Drain London funding projects which helps to predict and manage surface water flood risk in London. In London Bridge this funding allowed for the delivery of a world first vertical rain garden (with Tree Box, the Ecology Consultancy and the Green Roof Consultancy) two rain garden planters on a hard landscaped housing estates and a more tradition rain garden within that estate.

We would like to reiterate Team London Bridge's commitment to working with CRP, the GLA and our BID colleagues across London though the Greening the BIDs partnership. BIDs are exceptionally well placed to trial GI and climate change projects and the partnership offers an excellent vehicle to take such projects forward, to fund these projects, to share best practice and celebrate that best practice.

The LIFE programme is the EU's funding instrument for the environment and climate action. The general objective of LIFE is to contribute to the implementation, updating and development of EU environmental and climate policy and legislation by co-financing projects with European added value. While the administrative requirements of this programme are too onerous for BIDs or CRP this is most certainly a funding programme that the London Assembly and GLA should give serious consideration to bidding for. Thereafter the Greening the BIDs partnership would be well placed to help deliver climate change projects on the ground in London.

Recommendation 4: The London Assembly should recognise the importance of the Cross River Partnership Greening the BIDs partnership as a forum for spreading best practice and helping finance and deliver innovative climate change adaption projects.

Recommendation 5: The London Assembly should work with the GLA and Cross River Partnership to develop a Drain London 3 funding programme.

Recommendation 6: The London Assembly should work with the GLA to investigate to opportunities afforded by the EU LIFE programme to invest in a greener future for London.

TFL Roads Task Force Report

The Transport for London Roads Task Force (RTF) report in July 2013 noted "at least £30bn [investment programme in London's streets and roads] is needed over the next 20 years" to bring the capital's road network into the 21st century. This level of investment represents an amazing opportunity for Transport for London to help contribute to London facing the challenges of severe weather and climate change.

In December 2013 Team London Bridge submitted our 'London Bridge Future Streets' response to the RTF and TFL. We wholeheartedly welcomed the report's focus on the need to make London streets more place and people focused. Unfortunately the RTF made little other than a cursory note of the challenges facing the city due to climate change. Given the levels of investment under consideration this is a real missed opportunity and should be revisited by TFL, the GLA and the London Assembly.

In London Bridge we are particularly concerned about a sustainable future for Tooley Street, St. Thomas Street, Borough High Street and Tower Bridge Road all of which are TFL red routes. Our London Bridge Future Streets report has been formally supported by the majority of the landlord, business and resident groups in the area. The report cogently argues that without significant investment and imagination St. Thomas Street, Tooley Street, Borough High Street, Tower Bridge Road and Bermondsey Street will not realise their potential as exemplars of network management and sustainable urban design. Further to this all local stakeholders agree that given the completion of the London Bridge Station in 2018 there is an urgent need for TFL to work with the noted partners to investigate delivery of our shared objectives.

Recommendation 7: The London Assembly should work with TFL to ensure that their Roads Task Force focused investment strategy contributes significantly to helping tackle climate change challenges.

Recommendation 8: The London Assembly work with Team London Bridge, TFL & local partners to realise the sustainable & place oriented objectives outlined in the 'London Bridge Future Streets' report.

Planning

Much of this response has focused on place specific public realm investment opportunities that would make a positive impact on climate change at the local level. At the strategic level the London Assembly need to realise the potential and challenges of taking forward climate change solutions through the planning system.

Team London Bridge are currently working with Southwark Council to help write a London Bridge Plan with the aim that this becomes part of the New Southwark Plan due for publication in 2016. Team London Bridge has brought together a genuine partnership of public, private, business, developer and resident communities to inform this plan. We would welcome input from the London Assembly and the GLA into this plan process so as to ensure that climate change challenges are acknowledged, evidenced and built into the final plan report.

Recommendation 9: The London Assembly and the GLA should work with Team London Bridge to deliver a London Bridge Plan that helps future proof the area against climate change challenges.

Research material

Document	Author	Date published
London Bridge GI Audit & Report	Team London Bridge	April 2012
Better Bankside GI Audit & Report	Better Bankside	April 2012
Green Infrastructure	Landscape Institute	March 2013
Public Health and Landscape	Landscape Institute	November 2013
Roads Task Force report	Transport for London	July 2013
London Bridge Future Streets	Team London Bridge	December 2013
Fresh Air Squares – TFL Incubator Fund Application	Team London Bridge	July 2014
Green Infrastructure reports	Natural England	Ongoing
www.inlondonbridge.co.uk	Team London Bridge	July – December 2014

Team London Bridge contact details

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TeamLondonBridge
improving our district

Submission from the Technology Strategy Board

General response:
The Technology Strategy Board funded 50 project teams to develop adaptation strategies for their new build / significant refurbishment projects – Design for Future Climate (D4FC). The Technology Strategy Board provided £100k per team to work on projects across the UK in 2010 to 2014. The teams were to consider

- what is the risk exposure to future climate,
- how would they adapt the building now & in the future,
- when is the optimum time to implement the adaptation.

The teams considered the response to issues such as *comfort* (keeping warm / keeping cool) *construction* (stability & weathering) *water management* (drought & flooding). The output of each project was a detailed report for each project which are freely available along with case study material.

12 of the 50 projects are based in London which include a range of iconic buildings and developments such as – Great Ormond Street Hospital, London Bridge Station, University of Greenwich & 100 City Road (White Collar Factory).

We have previously published the following:

- a framework guide for developing an adaptation strategy written by Bill Gething in October 2010, which was used by each of the project teams;
- a book on design guidance based on the first 26 projects which completed and published by RIBA, written by Bill Gething in March 2013.
- We are currently finalising a report for publication in November 2014 which examines the business case for adaptation and resilience in the built environment based on the findings from our D4FC programme. This is being written by Matt Thompson and authored by Dr Ian Cooper and Bill Gething.

I have copied in Bill, Ian and Matt, who along with myself are open to assist in establishing evidence and policy direction for this crucial matter. Please feel free to come back to us if we can be of further assistance.

The following is a light response to the very complex questions you have posed in your call for evidence. We can provide more detailed responses if and when required – we look forward to hearing from you and wish you good luck in progressing this important piece of work.

Climate change and severe weather:
1. What do climate change projections tell us about the likely increase or decrease in different weather risks in coming decades (by 2050 to 2100 depending on available data)? Our project teams generally used weather files generated from CIBSE ProCLIPS or Exeter Universities Prometheus. These data files are very complex and can contain vast numbers of data files and simulation runs. This can be difficult for building designers and managers to understand and use. The files are based on regional data observations which does not provide a very granular data set to work from. This should be the subject of further research to develop more robust data sets which can be readily used in today's digital design systems. In general we can expect to see warmer

wetter winters and hotter drier summers, rising sea levels, with more intense weather events, higher wind speeds and greater levels of UV radiation.

2. Has the consensus about likely changes in the risks of severe weather changed in recent years (compared to the evidence base used to draw up the Climate Change Adaptation Strategy)? In our opinion based on the evidence we have the "destination" has not changed and is not likely to change. Our built environment has been designed and delivered to meet a performance standard based on historic and inaccurate data. It does not have sufficient service performance to meet than extensive current climate conditions. The variable is not whether the climate is changing as we cannot meet current service expectations. The question is how often will we tolerate a loss of service and how much will we pay to restore service. This will get worse with time as the climate changes. The question is what is the rate of change.

3. What are the risks of severe weather? For different hazards, how many people are at risk, of what effects, at what risk level? For example, the Environment Committee has recently investigated risks of flooding from storms at various likelihoods – are there similar figures for other weather risks such as heatwaves, droughts, snow or cold snaps? There has been several limited investigations in to overheating (including by DCLG and the EA). The Water Companies have data and assessments on droughts.

Adaptations:

4. How is London adapting to lessen or cope with the effects of severe weather and climate change? Are London's adaptations focussed on the greatest threats? The London Climate Change Impact Partnership are best placed to comment on this. To us there are pockets of activity but this is not extensive or very visible outside of the climate change community.

5. Is London ready to adjust its adaptations to cope with future weather changes? Unlikely – as a species we respond to driven change – so in the built environment we will respond to taxation, regulation, investor demands and finally market demands – all of which are typically driven following a succession of "events".

6. What could be the costs and benefits of different adaptation approaches? We do have a range of costed approaches as case studies. These are predominantly on a building by building basis although some such as Acton Gardens are on a neighbourhood scale. Some approaches are applicable at a building scale (such as external shading) and others are optimised at a neighbourhood or larger scale (such as water supply).

Economic impact:

7. How can London map its dependence on global supply chains that are at risk from climate change effects and severe weather overseas? Consultancies like PWC or companies like M&S have looked at sectors and specific responses. We are not able to comment.

8. What advice and information is available to London businesses about how they should respond to climate change and severe weather events? The Environment Agency under Climate Ready have produced such guidance. To what extent do firms use these services?

9. To what extent businesses in London have adaptation or continuity plans in place?

10. Are there specific challenges for Small and Medium-Sized Enterprises (SMEs)? How can these be addressed?

Mayor's role:

11. What specific steps can the Mayor, GLA, TfL, London Enterprise Panel and other Mayoral bodies take to ensure London and its economy is prepared for and can adapt to the impacts of severe weather and climate change? Support a co-ordinated response and maintain funding for groups like LCCIP to enable them to continue to develop strategies and response plans and deliver quality guidance to businesses and communities to prepare and improve resilience. Develop and disseminate best practice and drive up build quality and resilience through local plans and regulation as we have for climate change mitigation. Our key messages include:

The **market** for design services to adapt buildings remains **very limited**
This is NOT an excuse for design professionals to do nothing.
Clients risk procuring *stranded assets*
Government must signal this is a ***critical issue***
At present, the industry has no adaptation plan to tackle climate change
Industry urgently needs educating in climate change adaptation
Need a programme of monitoring & evaluating climate adapted buildings

Kind regards
on behalf of the **Technology Strategy Board**

Mark Wray
Lead Technologist
Low Impact Building Innovation Platform
Sustainability