Department for Environment Food & Rural Affairs

Review of local approaches to surface water flood risk management

Final report

July 2018

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Review of local approaches to surface water flood risk management

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This is a report of research carried out by CAG Consultants, in conjunction with Rivelin Bridge Ltd, on behalf of the Department for Environment, Food and Rural Affairs

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Executive summary

Purpose of the review

Around 3.8 million homes in England are at risk from surface water flooding[1] and with a growing population, urbanisation and climate change, these risks are increasing. The National Climate Change Risk Assessment carried out in 2016[2] confirmed the potentially severe consequences of surface water flooding with particular risk in large urban areas. Additionally, the Committee on Climate Change's update on Progress in Preparing for Climate Change[3] identified that risks of surface water flooding in towns and cities have not been adequately tackled and should be addressed in 2018.

The National Flood Resilience Review[4] considered how flood risk is assessed, opportunities to reduce the likelihood of flooding and make the country as resilient as possible to flooding. However, this was centred around fluvial and coastal flooding and did not focus on surface water. Additionally, Defra's ongoing development of the 25-year Environment Plan will aim to implement integrated catchment management and natural flood risk management. Commitment has therefore been made to identify the issues relating to surface water with the aim to identify options for strengthening the current framework.

In early 2017 the Inter-Ministerial Group on Flooding agreed to a project which will focus on strengthening the implementation of the current framework.

In July 2017 Minister Coffey (Under Secretary of State for the Department for Environment, Food and Rural Affairs) agreed that the project should have five areas of work:

1. Establish a shared view of surface water flooding outcomes;
2. Better coordinate existing arrangements, clarify responsibilities and improve outcomes;
3. Assess and improve capability and capacity to deliver surface water management;
4. Improve accuracy and sharing of surface water data for better surface water management; and
5. Develop and improve surface water flooding forecasting to improve warning systems.

The aim of this review was to assess how effectively the current arrangements for managing surface water flood risk locally were working in practice. The objectives were to provide independent evidence about local management of surface water flood risk to feed into the cross-Whitehall project, specifically areas one, two and four above.

[1] Environment Agency (2009) *Flooding in England: A National Assessment of Flood Risk.* https://www.gov.uk/government/publications/flooding-in-england-national-assessment-of-flood-risk
[2] Committee on Climate Change (2016) *UK Climate Change Risk Assessment 2017 Synthesis Report*. https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Synthesis-Report-Committee-on-Climate-Change.pdf
[3] Committee on Climate Change (2017) *2017 Report to Parliament – Progress in Preparing for Climate Change*. https://www.theccc.org.uk/publication/2017-report-to-parliament-progress-in-preparing-for-climate-change/
[4] HM Government (2016) *National Flood Resilience Review*. https://www.gov.uk/government/publications/national-flood-resilience-review

Research Questions

The review addressed questions under the following themes:

1. Surface water flood risk management aims and objectives, especially what flood risk scenarios are identified and the aspiration for drainage standards/levels of protection;

2. Working practices relating to surface water flood risk management;

3. Data gathering and sharing across organisations relating to surface water flood risk management; and

4. Effectiveness of local arrangements for managing surface water flood risk.

Methodology

The review involved seven case studies of local authority areas. The local authority areas were selected in order to gain insights from a range of different contexts, with consideration of the following criteria:

- Number of properties at risk from surface water flooding;
- Number of properties at risk from any source of flooding;
- Known significant urban surface water flooding incidents.
- Region;
- Local authority type, i.e. single tier or two-tier; and
- Water and sewerage company (WaSC).

A review of key strategies and documents was undertaken to set the context for the case study and to inform subsequent interviews with key stakeholders. This review was high-level with the aim of understanding the strategic approach to surface water management within the case study area. A set of indicators was developed for each relevant research question, against which the strategies were assessed. Areas for further consideration and follow-up were identified and incorporated into the interviews with key stakeholders.

Interviews were then conducted with representatives from three 'core' stakeholder organisations:

1. The Lead Local Flood Authority (LLFA);

2. The Local Highways Authority; and

3. The WaSC.

Additional interviews were conducted, informed by consultation with the LLFA representative regarding other significant stakeholders in the area. This included:

- The Environment Agency;
- Internal Drainage Boards (IDBs);

- Highways England;
- Local Planning Authorities;
- District Council drainage engineers; and
- Greater London Authority.

A list of the interviews conducted is included in appendix A.

In-depth semi-structured interviews were conducted. In each case, the LLFA interview was conducted in-person during a visit to the case study location. Where possible, other interviews were conducted in-person on the same day. All other interviews were conducted by telephone.

Further evidence was gathered via a workshop at the Environment Agency-led Flood and Coastal Erosion Risk Management (FCERM) Stakeholder Forum in November 2017. Findings from the review were also presented to a joint Defra and Water UK stakeholder workshop in January 2018.

The case study approach has led to caution being applied in the extent to which the findings are considered generalisable. Our focus, reflected in the design of the review and in our reporting on it here, was on:

- Scope, i.e. seeking to identify the variety of issues and experiences in local management of surface water; and
- Depth, i.e. understanding those issues and experiences, rather than making assumptions about the level of their incidence across the country.

However, comment on the generalisability of some findings is made and this has been informed by triangulating the evidence from the case studies with two other sources of evidence in particular:

- Our previous wider and much larger evaluation of local flood risk management[5], which is cross-referenced throughout this report as 'Defra, 2017'; and
- Findings from the national workshop with FCERM stakeholders and from the joint Water UK and Defra stakeholder workshop.

Conclusions

Significant progress and significant local variation

The evidence from this review suggests that there have been significant steps forward in the management of surface water in recent years, underpinned by closer and more effective partnership working between Risk Management Authorities and others. Key drivers/enablers identified included: the increasing need for WaSCs to relieve the pressure from surface water on their networks; an improved evidence base, including improved mapping, a growing number of Surface Water Management Plans (SWMPs) and flood investigations; and increased sharing of data.

[5] Defra (2017) Evaluation of the arrangements for managing local flood risk in England. http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=19219

However, there was significant local variation in the extent to which surface water management was addressed in local strategy and action, the operational arrangements for addressing surface water risks and the extent of partnership and collaboration between agencies.

Significant variation was also identified between different Risk Management Authorities in terms of the drainage standards that they work to. It was suggested that LLFAs, when commenting on planning applications, might expect development which could accommodate a 1-in-100 year event, with an additional percentage allowance for climate change. WaSCs and Local Highways Authorities, on the other hand, when building new assets were said to be adopting lower standards (e.g. 1-in-20 or 1-in-30 year events, and with no allowance for climate change). It was also suggested that when upgrading existing assets there was no requirement on WaSCs and Local Highways Authorities to take account of climate change impacts.

Split roles

In contrast to many flooding incidents (where sources are often integrated) and the drainage network (which is complex and integrated), responsibilities for different sources of flood risk and different parts of the drainage network are split between different agencies. This places a significant burden on the agencies involved and can lead to responsibilities being contested.

Whilst the LLFA might have lead responsibility for ensuring surface water flood risk is managed, many of the 'tools' for taking action to address that risk lie with other agencies: with the EA through providing Flood Defence Grant in Aid (FDGiA); with WaSCs through improvements to their network and through their funding for schemes; with Local Planning Authorities through their setting and discharging of planning conditions; and with Local Highways Authorities through their highways maintenance activities.

This split in roles can result in LLFAs and others expressing concern or frustration about their leadership on surface water management and can make it challenging to join up plans and strategies and coordinate action.

Split incentives

Linked to the issue of split roles, agencies often with the most scope to influence the management of surface water at source (e.g. LLFAs, Local Planning Authorities, Local Highways Authorities) are not necessarily those who are most impacted by it (e.g. WaSCs, because of the increased pressure it can place on their networks) and are therefore not always incentivised to do so. This may be undermining efforts to address sources of surface water risk.

Partnership working

The diffusion of roles and responsibilities for surface water means that effective partnership working is imperative but also challenging, particularly because the agencies involved have different drivers, objectives, resources and funding cycles.

There was evidence of significant improvement in the levels of partnership working on surface water, underpinned by a clearer understanding of roles and responsibilities. WaSCs appear to be increasingly engaged, driven particularly by a business imperative of keeping surface water out of combined sewers in order to avoid costly upgrades to their infrastructure. AMP7 may provide a significant opportunity to further promote partnership working on surface water management by the WaSCs.

Achieving a long-term, strategic approach

Particularly where strong cross-boundary, cross-agency partnership working was established, a long-term strategic approach to managing surface water and other flood risk was apparent in some areas. However, in other cases, there was a more reactive, operational focus, and this was acknowledged by stakeholders. Suggested reasons for this were resource constraints and the need to respond to public or political

pressure rather than being driven by risk. It may also be a function of the fact that many LLFAs sit within the same team or department as the Local Highways Authority, who tended to have a very reactive, operational, 'customer-oriented' focus.

Linkages between surface water management and planning

This review found examples of LLFAs working very effectively with Local Planning Authorities but also evidence of significant weaknesses in the system. The significance of this issue is heightened by the current focus on increasing house-building rates.

Areas of concern identified by stakeholders included:

- Resource constraints leading to varying levels and quality of comment from LLFAs on major planning applications;
- In relation to minor applications, some Local Planning Authorities have expertise to assess them from a drainage perspective, but some do not;
- Practice with regard to monitoring compliance with drainage-related planning conditions, and discharging those conditions, was very variable. Some Local Planning Authorities did not have the resource of expertise to carry out this role. Some LLFAs got involved, others did not;
- Adoption of Sustainable Drainage Schemes (SuDS) was a serious concern for some – it was questioned whether many of the management companies taking on SuDS will be adequately resourced or even in existence in the long term to perform this role.

Resourcing and funding

There was evidence of the operational funding for LLFAs being protected or increased in recent years. However, as we found in the previous wider evaluation, the level of resource allocated to LLFAs varied enormously (Defra, 2017. See section 5.5.2) and stakeholders felt that LLFAs were under-resourced and this was impacting their ability to carry out their responsibilities. The statutory consultee function was seen to have significantly increased the burden on LLFAs and was impacting on their ability to carry out their other roles.

In terms of funding for schemes, there was evidence of LLFAs struggling to move schemes beyond the feasibility stage because of the cost-benefit requirements in FDGiA. There was a feeling that FDGiA is focused on larger scale fluvial and coastal schemes, with the requirements too onerous for the typically smaller surface water schemes. It was also suggested that the process takes insufficient account of the wider benefits often generated by surface water schemes, e.g. to protecting infrastructure. Stakeholders reported that schemes often end up not being progressed as a result, and alternative approaches being adopted, such as property-level protection.

Data and sharing

The 2010 Act was reported to have been a driver for increased sharing of data for the purposes of strategy development, flood investigations, scheme development, funding bids and other uses. Practice varied significantly between case studies however, and some stakeholders expressed the need for greater consistency in approaches to collecting and sharing data, and improved mechanisms for collating data from multiple sources at the local level in order to better understand and respond to risk. Concerns were also expressed about the shortage of data on some aspects of the drainage network, particularly underground assets

Contents

1 Introduction

1.1 Purpose of the review

Background

Around 3.8 million homes in England are at risk from surface water flooding[6] and with a growing population, urbanisation and climate change, these risks are increasing. During the summer 2007 floods, a significant proportion of the damage caused was a result of surface water run-off in urban areas. This highlighted the serious gap in legislation and organisational arrangements for managing flood risk from sources other than rivers and the sea. Since the Pitt Review[7], Integrated Urban Drainage pilot projects and then the subsequent Surface Water Management Plans (SWMPs) were undertaken in pilot areas to identify ways of better managing surface water flooding in the areas at greatest risk.

The Flood and Water Management Act 2010 introduced Lead Local Flood Authorities (LLFAs) to coordinate local responses to all sources of flood risk, as well as the need for Local Flood Risk Management Strategies (LFRMS) for integrated management of local flood risk, including surface water risk. The Act required LLFAs and other Risk Management Authorities to cooperate with each other, exchange information and to act in a manner which is consistent with the National Flood and Coastal Erosion Risk Management Strategy for England. The other Risk Management Authorities are:

- Environment Agency, which directly manages flood risk from main rivers, the sea and reservoirs;
- District councils, which manage flood risk from ordinary watercourses;
- Internal drainage boards, independent public bodies responsible for water level management in low lying areas;
- Highway authorities, which are responsible for providing and managing highway drainage; and
- Water and sewerage companies (WaSCs), which are responsible for managing the risks of flooding from foul or combined sewer systems.

Local planning authorities, although not designated as Risk Management Authorities, also play an important role in the management of surface water because of the potential impacts of new development on surface water flood risks.

The National Climate Change Risk Assessment carried out in 2016[8] confirmed the potentially severe consequences of surface water flooding with particular risk in large urban areas. Additionally, the

[6] Environment Agency (2009) *Flooding in England: A National Assessment of Flood Risk.* https://www.gov.uk/government/publications/flooding-in-england-national-assessment-of-flood-risk

[7] Sir Michael Pitt (2008) *Lessons learned from the 2007 floods*. http://webarchive.nationalarchives.gov.uk/20100702222546/http://archive.cabinetoffice.gov.uk/pittreview/_/media/assets/www.cabinetoffice.gov.uk/flooding_review/flood_report_lowres%20pdf.pdf

[8] Committee on Climate Change (2016) *UK Climate Change Risk Assessment 2017 Synthesis Report*. https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Synthesis-Report-Committee-on-Climate-Change.pdf

Committee on Climate Change's update on Progress in Preparing for Climate Change[9] identified that risks of surface water flooding in towns and cities have still not been tackled and should be addressed in 2018.

The National Flood Resilience Review[10] considered how flood risk is assessed, opportunities to reduce the likelihood of flooding and make the country as resilient as possible to flooding. However, this was centred around fluvial and coastal flooding and did not focus on surface water - an important source of flooding with causes and mitigations different from fluvial and coastal flooding. Additionally, Defra's ongoing development of the 25 year Environment Plan will aim to implement integrated catchment management and natural flood risk management. Commitment has therefore been made to identify the issues relating to surface water with the aim to identify options for strengthening the current framework.

In early 2017 the Inter-Ministerial Group on Flooding agreed to a project which will focus on strengthening the implementation of the current framework.

In July 2017 Minister Coffey (Under Secretary of State for the Department for Environment, Food and Rural Affairs) agreed that the project should have five areas of work:

1. Establish a shared view of surface water flooding outcomes;

2. Better coordinate existing arrangements, clarify responsibilities and improve outcomes;

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4. Improve accuracy and sharing of surface water data for better surface water management; and

5. Develop and improve surface water flooding forecasting to improve warning systems.

Review aim and objectives

The aim of this review was to assess how effectively the current arrangements for managing surface water flood risk locally were working in practice.

The objectives were to provide independent evidence about local management of surface water flood risk to feed into the cross-Whitehall project, specifically areas one, two and four above.

Research Questions

The review addressed questions under the following themes:

1. Surface water flood risk management aims and objectives, especially what flood risk scenarios are identified and the aspiration for drainage standards/levels of protection;

2. Working practices relating to surface water flood risk management;

3. Data gathering and sharing across organisations relating to surface water flood risk management; and

[9] Committee on Climate Change (2017) *2017 Report to Parliament – Progress in Preparing for Climate Change*. https://www.theccc.org.uk/publication/2017-report-to-parliament-progress-in-preparing-for-climate-change/

[10] HM Government (2016) *National Flood Resilience Review*. https://www.gov.uk/government/publications/national-flood-resilience-review

4. Effectiveness of local arrangements for managing surface water flood risk.

1.2 Methodology

Case study selection

The review involved seven case studies of local authority areas. The local authority areas were selected in order to gain insights from a range of different contexts. The following criteria were used on the basis that they were likely to have been drivers for local action to manage surface water:

- Level of surface water risk, using number of properties at risk from surface water flooding;
- Overall level of flood risk, using number of properties at risk from all sources of flooding; and
- Known significant urban surface water flooding incidents.

Case studies were selected with different combinations of the above criteria, as follows:

Table 1: Case study categories

Category	Description	No. of case studies
A	Known significant surface water incident(s), high surface water risk, low overall flood risk	1
B	Known significant surface water incident(s), high surface water risk, high overall flood risk	3
C	No known significant surface water incident(s), high surface water risk, low overall flood risk	1
D	No known significant surface water incident(s), high surface water risk, high overall flood risk	1
E	No known significant surface water incident(s), low surface water risk	1

The following criteria were also applied in the selection process:

- Region – each of the case studies was from a different region of the country;
- Local authority type, i.e. single tier or two-tier (five single tier and two two-tier areas were selected) which also means that we have a range of geographical scales (two-tier areas are typically much larger areas than single-tier); and
- Water and sewerage company (WaSC) – each of the case studies was from a different WaSC area.

Application of the above criteria led to the following case studies being selected

Table 2: Case study areas

Case study category	LA area	Level of SW flood risk	Level of overall flood risk	Known significant urban SW flooding incidents (yes/no)	Region	LA type (single tier/ two tier)	Water company
B	Lancashire	High	High	Yes	North West	Two tier	United Utilities
A	Southwark	High	Low	Yes	London	Single tier	Thames Water
B	Kent	High	High	Yes	South East	Two tier	South East Water
B	Newcastle City Council	High	High	Yes	North East	Single tier	Northumbrian Water
C	Nottingham City	High	Low	No	East Midlands	Single tier	Severn Trent Water
D	Bristol City Council	High	High	No	South West	Single tier	Wessex Water
E	Peterborough City Council	Low	Low	No	East of England	Single tier	Anglian Water

In order to preserve the anonymity of individuals and organisations who participated in the research, no names, organisations or areas are included in the remainder of this report. Stakeholder types (e.g. LLFA, WaSC) are included in places, including in the attribution of quotes, but we have sought to remove all identifiers of individual places, organisations and people. The exception to this is the Greater London Authority (GLA), a representative of which was interviewed as part of the Southwark study. Since the GLA was a unique organisation type in this research and unique to the Southwark case study, some specific references to the GLA have been included. The GLA interviewee was made aware of this situation prior to the interview being conducted.

Fieldwork

Document review

A review of the following key strategies and documents was undertaken to set the context for the case study and to inform the interviews with key stakeholders:

- LFRMS;
- SWMPs;
- Local SuDS guidance/policy;
- WaSC Drainage Strategy;

- Section 19 flood investigation reports for surface water incidents; and
- Flood Risk Management Plans.

In addition, an attempt to identify any additional strategies related to the management of surface water risk by Highways Authorities was undertaken.

The following documents were not included in the review.

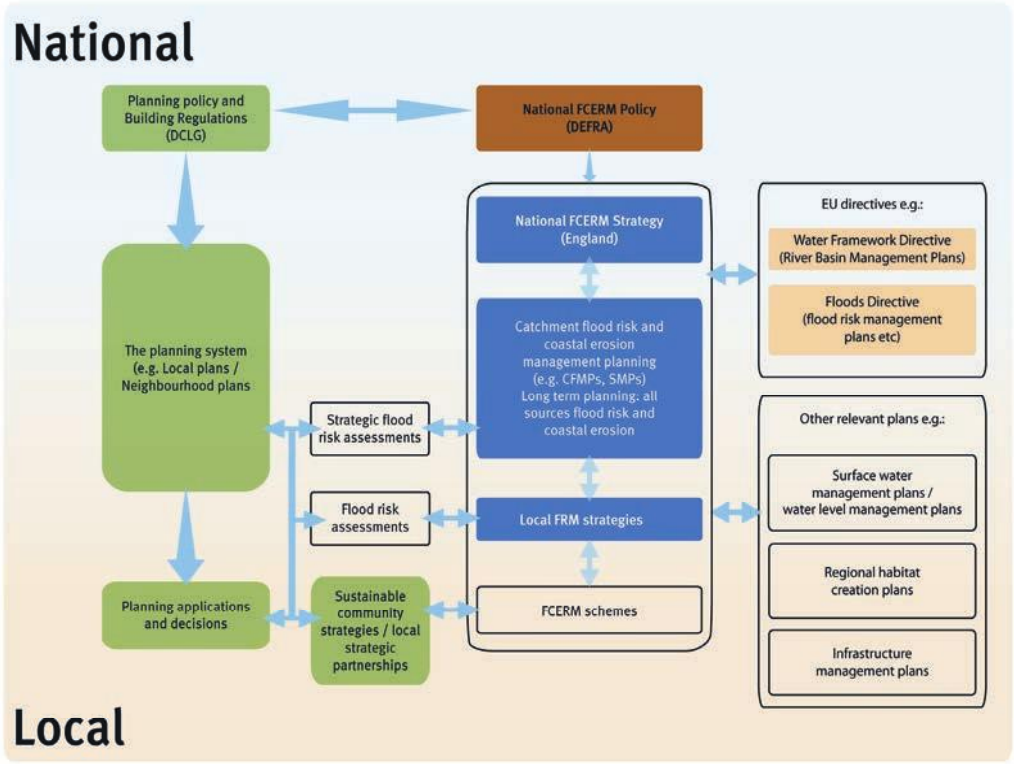
- Preliminary Flood Risk Assessments (PFRA);
- Water Cycle Strategies; and
- Strategic Flood Risk Assessments (SFRA).

Figure 1 below, taken from the national flood and coastal erosion risk management strategy for England, provides a useful overview of the relationship between key strategies and plans.

The review was high-level with the aim of understanding the strategic approach to surface water management within the case study area. A set of indicators was developed for each relevant research question, against which the strategies were assessed. Areas for further consideration and follow up were identified and incorporated into the interviews with key stakeholders.

Documents were only included in the review if they had been published (either draft or final versions) and were publicly available. In one situation, it was identified that a SWMP had been produced but was not publicly available. This was requested during the interview, but the organisation was unwilling to share it for the purposes of the study and it has therefore not been included.

Figure 1: Flood **strategies and plans and their relationship with other planning initiatives**



Case studies

In each case study area, interviews were conducted with representatives from three 'core' stakeholder organisations:

1. The LLFA;
2. The Local Highways Authority; and
3. The WaSC.

In some cases, the LLFA representative and Local Highways Authority representative was the same person, so a single interview was conducted.

Additional interviews were conducted, informed by consultation with the LLFA representative regarding other significant stakeholders in the area. This included:

- The Environment Agency – one interview and one written response to the interview questions;
- Internal Drainage Boards (IDBs) – two interviews;
- Highways England – one interview;
- Local Planning Authorities – six interviews;
- District Council drainage engineers – one interview; and
- Greater London Authority – one interview.

A list of the interviews conducted is included in appendix A.

In-depth semi-structured interviews were conducted, using topic guides which were tailored to the different stakeholder types. In each case, the LLFA interview was conducted in-person during a visit to the case study location. Where possible, other interviews were conducted in-person on the same day. All other interviews were conducted by telephone.

National stakeholder workshop

Further evidence was gathered via a workshop at the Environment Agency-led Flood and Coastal Erosion Risk Management (FCERM) Stakeholder Forum in November 2017. There were approximately 80 participants, including representatives from local authorities, water and sewerage companies, the Environment Agency, Regional Flood and Coastal Committees, Defra, IDBs, Natural England, private sector consultants, utilities, academics, rivers trusts, representatives of the agricultural sector and others.

Participants were introduced to the purpose and nature of the review and gave feedback on three questions:

1. What are the drivers of local differences in approach to surface water flood risk management?
2. What works well in local management of surface water?
3. What works less well in local management of surface water?

The findings from this workshop are reflected in this report.

Analysis and reporting

Initial case study level thematic analysis and coding under each of the research questions was carried out by the researchers who conducted the case studies, using a broad coding frame based on the research questions, i.e. a deductive approach.

Synthesis of the individual case study analyses, as well as further overarching thematic analysis, was then carried out by the report authors, with a particular emphasis on exploring similarities and differences between the case studies. A more inductive approach was adopted at this stage, with the coding and theme development becoming more detailed, directed by the content of the data.

The case study approach has led to caution being applied in the extent to which the findings are considered generalisable. Our focus, reflected in the design of the research and in our reporting on it here, was on:

- Scope, i.e. seeking to identify the variety of issues and experiences in local management of surface water; and
- Depth, i.e. understanding those issues and experiences, rather than making assumptions about the level of their incidence across the country.

However, comment on the generalisability of some findings is made and this has been informed by triangulating the evidence from the case studies with two other sources of evidence in particular:

- Our previous wider and much larger evaluation of local flood risk management[11], which is cross-referenced throughout this report as 'Defra, 2017'; and
- Findings from the national workshop with FCERM stakeholders.

Where we have greater confidence in the generalisability of findings we have sought to highlight this clearly in the report.

1.3 Report structure

The report structure reflects the research themes addressed in the review:

- Section 2 presents our findings on local aims and objectives for surface water flood risk management;
- Section 3 presents our findings on working practices relating to surface water flood risk management;
- Section 4 presents our findings on data gathering and sharing across organisations relating to surface water flood risk management;

[11] Defra (2017) Evaluation of the arrangements for managing local flood risk in England. http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=19219

- Section 5 presents our findings on the effectiveness of local arrangements for managing surface water flood risk; and

- Section 6 sets out our conclusions across each of the research themes.

2 Local aims and objectives for surface water

2.1 Interpretation of surface water: split roles and 'split incentives'

Stakeholders tended to interpret surface water in relation to their own roles and responsibilities. For example, Local Highways Authorities tended to refer to it in terms of rainwater gathering or flowing on road surfaces and Local Planning Authorities tended to refer to in terms of water flowing across or from development sites. Notwithstanding such differences in perspective, there appeared to be a relatively common view that surface water is water on the surface of the ground and that it ceases to be surface water once it has entered a watercourse, drainage system or sewer. This is in line with the definition of surface water in the 2010 Act (Section 6 (5)). It is worth noting, however, that the interviews revealed a degree of uncertainty about the definition of surface water and this may not be helped by differences between the definition in the 2010 Act and the SWMP Guidance[12], with the latter also including flooding from groundwater and sewer flooding resulting from heavy rainfall.

Conversations with stakeholders around such questions of definition highlighted two issues, which impact on many of the other issues identified in this report:

1. Split roles. Whilst it is clearly important and helpful to understand the different sources of flood risk, having different organisations responsible for different sources presents significant challenges for those organisations. The Environment Agency has a statutory responsibility to ensure national coordination of the management of flood risk from all sources, with LLFAs required to play a similar role at the local level. However, the responsibility for taking action to manage risks is dependent on the source of the risk and this separation of roles was highlighted by stakeholders as being in contrast to the nature of flooding itself, which is often caused by multiple sources, and of the drainage network, which is complex and integrated. The integrated nature of flood risks can result, for example, in incidents often being investigated separately by the LLFA, the Environment Agency and the WaSC, prior to decisions being made about responsibilities for taking action to resolve the issues identified. The current arrangements require distinctions to be drawn between flood-related responsibilities, depending on the source and/or piece of the drainage network in question. This places a significant burden on the agencies involved and can lead to responsibilities being contested.

2. Split incentives. Those responsible for dealing with the potential sources of flooding are often different from those responsible for dealing with its consequences. For example, increases in surface water can result from new development (controlled by the Local Planning Authority) or from works to highways (controlled by the Local Highways Authority). Should this surface water drain into a combined sewer, it then becomes the responsibility of the relevant WaSC. Should it drain into a watercourse, managing any resulting increase in flood risk would be the responsibility of the Environment Agency (in the case of main rivers) or the LLFA (in the case of ordinary watercourses). Managing surface water flood risk therefore requires effective communication and cooperation between agencies, which can be hindered by the fact that those agencies with the most scope to manage surface water at source are not necessarily

[12] Defra (2010) Surface Water Management Plan Technical Guidance. See Box 3, p.xiv. https://www.gov.uk/government/publications/surface-water-management-plan-technical-guidance

those who are incentivised to do so. This issue might be characterised in terms of 'split incentives[13]'.

2.2 Local aims and objectives for surface water

Local flood risk management strategies (LFRMS)

In our case studies, the aims and objectives set within LFRMS tended to be risk-based rather than source-specific, i.e. they address risks from all sources rather than referring to specific sources. This is consistent with the National Strategy. Where surface water was mentioned, this tended to be in general terms and alongside other sources, e.g. 'improving the understanding of risks of flooding from surface runoff, groundwater and ordinary watercourses'. Although expressed in general terms, in areas where surface water was the primary source of risk, interviewees understandably saw the aims and objectives as being focused on surface water.

LFRMS were informed by assessments of flood risk. In our case studies, these tended to be based on Environment Agency flood risk data, including for surface water, and were therefore based on current day scenarios. In some cases they were informed by work carried out as part of the preparation of PFRAs and SWMPs. There were examples of assessments which incorporate future risk, particularly as part of SWMPs. These typically assumed a percentage increase in rainfall intensity and flow as a result of climate change. Including assumptions about the impact of future development was less common in our review.

No examples were found of specific aspirations for drainage standards or levels of protection being set for an area within a LFRMS, although stakeholders did refer to differences of approach between different Risk Management Authorities when developing schemes or setting requirements as part of the planning process. This is discussed further in section 3.3.

Some LFRMS did include specific measures for addressing surface water risks but, except where SWMPs had been prepared, these tended to be general, e.g. undertaking studies or assessments, or developing SuDS guidance. This is discussed further in section 2.3 below.

Other local strategies

Specific aims and objectives for managing surface water were set in:

- SWMPs. There were significant variations in terms of:
    - Number - some LLFAs had prepared multiple SWMPs, others none;
    - Scope – linked to the above, some areas had SWMPs for their whole area (including London boroughs, through the Drain London project), whilst others had prepared SWMPs for particular high-risk or important areas;
    - Timing – some LLFAs have had SWMPs in place long enough to have implemented schemes identified within them.

[13] The term 'split incentives' appears most commonly in discussions of the barriers to the deployment of energy efficiency measures in buildings. Split incentives occur when those responsible for paying energy bills (usually the tenant) are not the same entity as those making the capital investment decisions (usually the landlord).

- WaSC Drainage Strategies. Some companies had produced such strategies, whilst others were in the process of doing so. These tended to be focused on areas in which the relevant company had assets (such as Sewage Treatment Works) which were under pressure and would benefit from keeping surface water out of the combined sewer network. The review also highlighted that a considerable amount of unpublished drainage modelling and assessment had been carried by the WaSCs.

In addition to the above, some LLFAs had produced SuDS guidance for developers. Some of these had been published jointly with other LLFAs. We also identified an instance of SuDS guidance being produced by a WaSC. In addition, some Local Planning Authorities had adopted policies and/or guidance relating to surface water, e.g. requirements to incorporate SuDS.

We did not identify examples of Local Highways Authorities producing plans or strategies for the management of surface water, but where Local Highways Authorities had a close relationship with the LLFA, their needs and aspirations in relation to surface water may have fed into LFRMS and/or SWMPs.

2.3 Action planning for surface water

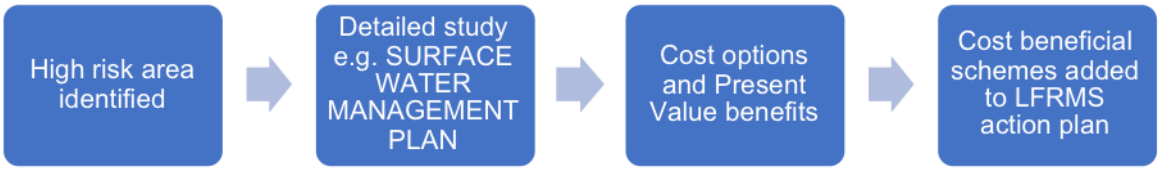
The extent to which local authority areas had costed pathways in place to address surface water risks varied significantly.

The desk review highlighted that the approach in an area is dependent to a significant extent on the journey that each area had been on in terms of their approach to surface water management. A key factor appeared to be whether the LFRMS was preceded by any SWMPs. Where SWMPs informed the LFRMS, the detailed information arising from the SWMPs enabled the inclusion of specific surface water mitigation actions and schemes. Where the LFRMS was not preceded by any SWMPs, LFRMS did not typically include specific surface water actions and schemes due to a potential lack of detailed information.

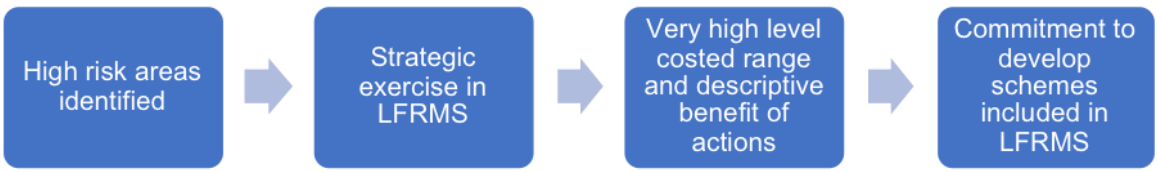
This links to a wider point that, in general, the extent to which an LLFA had developed a costed pathway for addressing surface water risks appeared to be dependent on the extent to which detailed studies had been undertaken. This varied enormously from area to area, with some having prepared multiple SWMPs and some having prepared none. Two examples are illustrated below:

Figure 1: Example pathways to addressing surface water risks

Example 1 – SWMP(s) lead to detailed action planning in LFRMS



Example 2 – Absence of SWMP(s) results in high level actions only in LFRMS



Some LLFAs, particularly those who had recently completed SWMPs, whilst only having high-level action plans in place in their LFRMS, were working towards the development of longer-term, more detailed programmes.

> *"We have commissioned our framework consultants to carry out longer term planning. We recognise [not having a long-term programme] really matters and we know it's a weakness."* (LLFA)

Local Highways Authorities tended to have a more short-term operational focus, with shorter term funding cycles. Whilst there was evidence that some WaSCs had developed or were developing longer term strategies and action plans for surface water drainage, not all had considered how their plans integrate with those of the LLFA and others. The LFRMS did not appear, typically, to function as a means of developing an integrated programme of works at the local level. Where there was evidence of a more integrated approach, strategic partnerships and/or the work of the RFCC, appeared to be more significant mechanisms for achieving this.

Whilst the WaSCs work to five-year funding cycles and have longer-term drainage strategies in place, some WaSC stakeholders emphasised the need for flexibility in their approach, in order to respond to changing needs and priorities.

> "*We don't want to speculatively invest in the network and then find growth doesn't take place as anticipated. We have the supply chain in place to respond to growth and development within 18 months."* (WaSC)

There was evidence that more integrated approaches were being developed, particularly driven by the WaSCs' need to manage surface water flows.

> *"We are currently working on a long-term surface water management programme. This looks out [long term], and says we need to manage surface water differently in the future. It is not good enough to just build bigger pipes and tanks, we need to think differently about how we operate and manage our networks. And how we manage surface flows that get into the network. So hopefully it will be quite different in the future. And we will be working with our partners to deliver it."* (Case Study 1, WaSC)

It was reported that the priorities set within an AMP cycle are significant in terms of determining the extent to which the WaSCs engage in surface water management issues. WaSC stakeholders reported that their surveys of customer priorities were critical in determining their business priorities.

2.4 Enabling factors

Interviewees were asked about factors which have helped in terms of addressing surface water flood risks in local strategies. A number of themes were evident in the responses.

Partnership working

Stakeholders cited increased partnership working, particularly between the LLFA, EA and WaSC, as an enabling factor. This appeared to be mainly in relation to individual schemes rather than in terms of integrated long-term programmes for managing surface water. However, engagement via the RFCCs and/or strategic partnerships did appear to be catalysing a more strategic approach in some areas.

"The RFCC has put together a long-term vision. They have identified five or six areas where we as partnerships need to start looking. It's quite aspirational. This is helping us to look ahead but it's an uphill struggle." (LLFA)

The capacity to engage in partnership working was reported to have increased, with some Risk Management Authorities having posts dedicated to partnership development.

Funding

Whilst the funding situation was seen to be a hindrance by some (see section 2.5 below), it was cited as an enabling factor by other stakeholders. Political leadership was seen to be important in ensuring that sufficient funding was allocated to the LLFA to fulfil their responsibilities.

In relation to funding for schemes, the change to partnership funding from the previous flood funding policy was felt to be an enabling factor for surface water schemes, because the opportunity to bring in funding from other sources meant that some surface water schemes could be justified which would have failed under the preceding regime.

Local levy funding from the RFCC was also an enabling factor for developing schemes, particularly in developing the evidence base to support Flood Defence Grant in Aid (FDGiA) applications.

Evidence base

The local evidence base for developing strategies for the management of surface water was reported to have been significantly enhanced in recent years, particularly in terms of assessing risk and assigning priorities. Contributors to this enhancement include the Environment Agency's Updated Maps for Surface Water, the growing number of SWMPs and the evidence generated by investigations of incidents.

2.5 Barriers

Similarly, interviewees were asked about factors which had hindered the addressing of surface water flood risks in local strategies. The following themes were identified in the responses:

Diffusion of roles and responsibilities

Whilst LLFAs recognised their role in managing surface water, as noted in section 2.1, the impacts of not taking action to address surface water risks are often felt by other Risk Management Authorities. This may be undermining the drivers for LLFAs to develop their programmes for managing surface water. More broadly, the number of organisations with roles and responsibilities relating to surface water, but with different priorities, was seen to make it more challenging to develop a coherent strategy.

"Every time a different body is involved, you have a different set of priorities, a different set of funding principles and different objectives. It makes delivering something where there's more than one of you involved a lot harder, basically." (LLFA)

In response, it was suggested that there needed to be a simplification of roles and responsibilities, or at least a closer alignment of the statutory responsibilities of Risk Management Authorities, in order to facilitate a more coordinated approach to surface water management.

Funding cycles

Linked to the diffusion of roles and responsibilities, opportunities for integrating planning and strategy were being hindered by variations in funding cycles. WaSCs work to a five-year plan and the Environment Agency has a six-year programme. Funding cycles for LLFAs and Local Highways Authorities vary but are typically shorter term, e.g. one to two years.

Short-term horizons

The shorter-term outlook of the LLFAs and the Local Highways Authority was felt to be undermining a strategic approach. Political and public pressures were seen to be a factor behind this.

> *"I think in some respects the customer focus in Highways prevents us taking a strategic approach because we're constantly focused on managing customer enquiries and responding to them and responding to reports of blocked drains, rather than saying, "Can we take an area-wide approach?... The political people who provide us with the money, they don't seem to understand that if there's surface water on the road, you will get more potholes"* (Local Highways Authority)

Some Local Highways Authorities reported having moved to a risk-based approach to network maintenance and gully cleaning, although there was one example of an authority which had since reverted to a cyclical approach because of public pressure.

Resource constraints were a hindrance to LLFAs being able to consider longer term strategies. This is discussed further below.

Funding levels

There were three dimensions to this: operational funding for the LLFA; funding to develop the evidence base; and funding for schemes. In relation to operational funding, some LLFAs suggested that they were under-resourced and this view was echoed by other Risk Management Authorities.

> *"The one aspect that I would say does concern us to a certain extent is the resources that are available for local government funding of surface water flood risk management, because there are obviously pressures on [redacted] Council like all other councils to achieve efficiencies, but they have responsibilities still, key responsibilities, particularly in the area of surface water flood alleviation and mitigation."* (WaSC)

> *"We are always fighting to keep bums on seats and those bums on seats can get very busy on planning, enforcement and investigations etc. We are very much a delivery team, not a sitting back and strategising team…"* (LLFA)

Funding constraints were also a factor in the speed of development of the evidence base for surface water, e.g. through the production of SWMPs.

> *"The production of more accurate SWMPs has been slower and outcomes don't always follow at the pace communities would prefer. Funding constraints do play a role in this."* (EA)

In relation to funding for schemes, there was evidence of LLFAs struggling to move schemes beyond the feasibility stage because of cost-benefit requirements in FDGiA. There was a feeling that FDGiA is focused on larger scale fluvial and coastal schemes, with the requirements too onerous for surface water schemes, which are typically smaller in scale. It was also suggested that the process takes insufficient account of the wider benefits often generated by surface water schemes, e.g. to protecting infrastructure or enhancing biodiversity. Stakeholders reported that schemes often end up not being progressed as a result, with alternative approaches being adopted, such as property-level protection.

"The current funding arrangements… seem to be focused on river and coastal. Where there seems to be big numbers involved. Millions of pounds of big infrastructure projects. Surface water is small and only protects small numbers of properties. That makes it difficult for the LLFA to justify going through the hoops, so technically scoping the work costs more than doing the work. It's not worth doing the level of assessment required (preparing business cases etc)." (WaSC)

"One of the things we identified in [redacted] the first time it flooded was that a trash screen needed replacing. It was a very old arrangement ... It was very difficult for the owner to maintain it in any way when there was any significant flow, so we wanted to replace it with a much more modern one, which we did. We did it very cheaply at about £7,500, and I just put that in as a bid … They wanted a business case for that. It was a trash screen. It was, "Look at the pictures. It was terrible before. Now we've put it in, it looks great. It's much better. Anybody can see that that is an improvement," but they wanted us to put a business case in to claim £7,500. It would have been a waste of time … Collectively, between us, we probably would have spent more money than £7,500 on getting that business case written and getting it reviewed and approved, or at least we would have come very close to that. It's very inefficient." (LLFA)

Funding for highways schemes was also reported to be stretched and tended to be focused on short-term maintenance issues rather than being available to contribute to longer term risk-based activity.

Skills

LLFAs reported difficulties in filling vacancies for flood risk engineers, which undermined their ability to develop schemes and longer-term programmes, as well as impacting on other aspects of their role. It was emphasised that LLFA staff typically need a diverse skill set, incorporating strategy-making, policy understanding, funding and partnership-working, alongside engineering skills. One LLFA reported that a previous reliance on external consultants and on technical advice from the Environment Agency and the WaSC had led to difficulties in maintaining momentum in delivering schemes. They had since focused on developing skills in-house, including utilising Environment Agency foundation degree students.

"We have had some difficulties keeping things moving along and delivering on the ground so we are doing more in-house… We are developing our own skills so that we are less reliant on consultants and on the Agency for external advice" (LLFA)

2.6 Summary

- Responsibilities for different sources of flood risk and different parts of the drainage network are split between different agencies. This places a significant burden on the agencies involved, can lead to responsibilities being contested and makes leadership and coordination challenging.

- Agencies with the most scope to influence the management of surface water at source are not necessarily those who are most impacted by it and are therefore not always incentivised to take action. This may be undermining efforts to address sources of risk.

- The aims and objectives of local flood risk management strategies reviewed in this research tended to be risk-based rather than source-specific and no examples were found of specific aspirations for drainage standards being set within these strategies.

- However, specific aims and objectives for surface water are set within the surface water management plans and WaSC drainage strategies, the coverage of which was found to vary significantly across the case study areas.

- The extent to which local authority areas had costed pathways in place to address surface water risks was found to vary significantly.

- Factors which were found to have helped in terms of addressing surface water flood risks in local strategies included: partnership working; the move to partnership funding for schemes; and the improved evidence base for surface water risks.

- Barriers to addressing surface water flood risks in local strategies included: the diffusion of roles and responsibilities; variations in the funding cycles and planning horizons adopted by Risk Management Authorities; funding constraints; and skills shortages.

3 Working practices

This section sets out the findings from the review in relation to the working practices of the various stakeholders involved in the local management of surface water.

3.1 Operational arrangements

Within LLFAs, surface water was typically addressed as part of wider flood risk management. However, in one of our case studies there was a post which was dedicated to the management of surface water specifically.

As in the previous wider evaluation, the level of resource allocated to fulfilling the LLFA role varied significantly (Defra, 2017. See section 5.5.2). In terms of staffing, it varied in our case studies in this review from 1.25 FTE to 11 FTE.

The previous evaluation found that most LLFAs sit within the same division or directorate as the highways department, with many LLFAs being part of the highways department or wider transport department (Defra, 2017. See section 5.5.2), and this was mirrored in our case studies. The closeness of the relationship between the Local Highways Authority and LLFA functions did vary however, with some sharing staff and/or sitting within the same office and having daily interaction, whilst others had less frequent interaction.

Stakeholders considered close working between the LLFA and the Local Highways Authority to be of considerable importance. As an example of the importance placed on this, one Local Highways Authority had temporarily seconded a member of their team to the LLFA in order to enhance their understanding of the LLFA functions.

It was evident that sharing of knowledge and data enabled synergies to be developed between the activities of the two, e.g. in ensuring that highways maintenance works help to address known flood risks.

> *“Actually having [the LLFA] there, it keeps me focused and therefore my manager focused on the flood-risk management side of things as well. I think that has definitely had a positive impact on us.”* (Highways Authority)

Cooperation between the LLFA and Local Highways Authority was also reported to enable coordination of responses to flooding incidents, with one LLFA reporting that the highways team respond to all highways flooding incidents without involving the LLFA unless the causes were considered to be complex.

> *"Close working with highways is critical in terms of speed. Surface water issues are often related to gullies and other highways infrastructure. Having a close relationship with highways helps us to respond more quickly. We have a good understanding with them that if the flood is on a highway they will go out and respond and will only call us in if the cause is more complex."* (LLFA)

3.2 Changes in structure and resource allocation

Although funding remains a challenge for LLFAs, there was evidence of increased resource being allocated to support their roles and responsibilities. One LLFA reported having to maintain a 50% vacancy rate until April 2016, after which they were granted permission to fill the vacancies.

For some LLFAs, the increased resource was specifically associated with the delivery of schemes for which they have secured external funding, as opposed to it being a long-term resource commitment.

Whilst there were examples of the resourcing of LLFAs being increased, some respondents referred to increased expectations on LLFAs, particularly in terms of their role as statutory consultee on major planning applications, something which had coincided with an increased focus on housebuilding across the country. This had placed a strain on LLFAs.

There was evidence of considerable additional resource and investment being allocated to surface water management by WaSCs in recent years. This was being driven by a need to reduce demands on their networks resulting from surface water entering the combined sewer network.

3.3 Addressing surface water risks in operational decisions

The stakeholder interviews explored the extent to which surface water flood risks were addressed in the operational decisions of the Local Highways Authorities and the WaSCs.

Local Highways Authorities

As referenced in section 3.1, close working between Local Highways Authorities and LLFAs can help to ensure that flood risk management priorities are reflected in highways maintenance activities.

> *"We work closely with highways, informing what they do and vice versa. From not really talking to each other 10 years ago, now they sit on the other side of the corridor and we work closely together".* (LLFA)

Stakeholders suggested that there is a link between Government funding for highways and the management of flood risk, which was a further driver for highways teams to take flood risk management into account.

Some difficulties were articulated in terms of promoting SuDS approaches by highways teams.

> *"We need to demonstrate that it (SuDS) is not much more demanding or expensive. We set up workshops to look at highway projects and make suggestions to the highways team about what they can incorporate. Not just on maintenance - it's more significant that – we are trying to get them to do this for all highway projects."* (LLFA/Local Highways Authority)

WaSCs

WaSCs address surface water flood risk in their operational decisions, e.g. through incorporating flood risk alongside other risks in asset planning systems. One WaSC reported having modelled the flood risks in all of their drainage areas, with the results of this feeding into operational and tactical activities, as well as longer term strategic approaches.

Numerous capital schemes to address surface water (and other) risks, with significant WaSC funding, had been completed or were underway in the case study areas. Because of the potential benefits of these schemes to other Risk Management Authorities, e.g. addressing fluvial risks, many of these were part-funded by FDGiA and LLFA funds. As already noted, the increased pressure on WaSC infrastructure resulting from surface water entering the combined sewer network, and the costs associated with managing that, had led to surface water management becoming a higher priority for the WaSCs. The Water Framework Directive and Habitats Directive were also reported as being drivers for this in more environmentally sensitive areas. More cost-effective solutions to surface water management were increasingly being sought, in conjunction with other agencies. This was seen to represent a significant change in thinking and approach.

> *"I remember 10 years ago being in presentations about tanks the size of football pitches… It was concrete, it was pumps, now it's wildflower meadows"* (WaSC)

It was suggested that statutory requirements placed on Local Highways Authorities and WaSCs do not sufficiently take account of future risk. Specifically, it was reported that they are not required to take climate change impacts into account when carrying out works on their existing networks and when constructing new systems, they are required to design for a 1-in-30 year event. Some LLFAs ask for new development to be designed to much more stretching standards. One reported that they seek design for 1-in-100 year events, with an additional 40% allowance for climate change.

3.4 Addressing surface water risks in planning

Local Planning Authorities, both in terms of their plan-making and their development management functions, play an important role in the management of surface water. In 2015, LLFAs became statutory consultees for all major planning applications, which introduced a direct link between the LLFA and the development management function of the Local Planning Authority. This review found that the practice of Local Planning Authorities in relation to surface water management varied significantly. Some of the different dimensions of this variation are explored below.

Resourcing

There were examples of Local Planning Authorities with drainage expertise within their team, or with ready access to it within the local authority. This is important both in terms of (a) assessing minor applications (those not assessed by the LLFA) from a surface water management perspective, and (b) monitoring and enforcing compliance with surface water-related planning conditions for all schemes. The extent to which this resource is available is unclear, but it is certainly not available to every Local Planning Authority. There may be particularly wide variations in resource in two-tier areas, where there is greater separation between the LLFA (upper-tier) and Local Planning Authorities (lower-tier). The loss of staff with drainage expertise from lower-tier authorities, which was reported in the previous wider evaluation (Defra, 2017. See section 5.5.2), was reported again by stakeholders in this review.

Similarly, there were significant variations in the level of resource available within LLFAs to carry out their statutory consultee role and otherwise engage with the Local Planning Authorities. The level and consistency of input which Local Planning Authorities receive from LLFAs on major planning applications can therefore vary significantly.

Roles

There were significant variations in the understanding and implementation of the LLFA role in the planning system. Whilst LLFAs are a statutory consultee on major planning applications, the setting, monitoring and enforcement of any planning conditions relating to drainage and flood risk management

are the responsibility of the Local Planning Authority. However, some LLFAs were found to be assisting the Local Planning Authority by proactively engaging in monitoring and enforcement activity, in addition to their statutory consultee role. Others were very clear that such activity is beyond their remit and look to the Local Planning Authority to perform this role. Whilst some Local Planning Authorities had taken on this role and had the capability to do so, others had not.

As well as being a statutory consultee, LLFAs can also provide pre-application advice to developers. It was suggested that getting developers to consider surface water issues as early in the design process as possible was critical to outcomes, so this pre-application advice role was seen to be important. However, the extent to which LLFAs were performing this role and its apparent effectiveness varied considerably. Some LLFAs were charging for such advice, and this is sometimes separate to charges made by the Local Planning Authority for wider pre-application advice. This was seen to be a barrier to some developers seeking the advice of the LLFA. Coupled with an apparent unwillingness to implement SuDS and/or a lack of understanding of them on the part of some developers, it was reported that opportunities for implementing SuDS were not being maximised.

Significant concern was also expressed about the adoption and management of SuDS. It was suggested that SuDS schemes are typically being adopted by management companies established for that purpose by developers. Concerns were expressed about:

- Whether the management companies were sufficiently resourced to carry out long-term management and maintenance – it was suggested that some are 'shell' companies; and

- Whether the management companies will continue to exist in the longer-term, who would take on their role if they did not and how this role would be resourced.

"The adoption and future maintenance of SUDs is a big issue. They shouldn't be in private ownership and management. We won't know anything more about them until someone is flooded. We all know it's coming." (LLFA)

"We require management and maintenance conditions. How useful will they be in 15-20 years' time? Will it be possible for a local authority to take action?" (Local Planning Authority)

Policy and guidance

Planning policy and guidance in relation to drainage and surface water management was a further dimension in the local variation. Some Local Planning Authorities had clear requirements within their Local Plans and or within Supplementary Planning Documents. This might include, for example, maintaining current drainage levels on greenfield sites and achieving betterment on previously developed land. Some had Supplementary Planning Documents or guidance documents on SuDS. In London, in addition to the borough-level Local Plans, the London Plan requires the utilisation of SuDS unless there are practical reasons for not doing so, and states that development should aim to achieve greenfield run-off rates and manage surface water run-off in accordance with the drainage hierarchy.

3.5 Roles and responsibilities

Improved understanding of roles and responsibilities among Risk Management Authorities

There was a clear sense from the interview responses that there had been a significant improvement in the level of understanding and acceptance of the different roles and responsibilities of Risk Management Authorities in recent years among those authorities themselves.

> *"I think we understand [roles and responsibilities] a lot better. I think, when the Flood and Water Management Act first came out, a lot of people thought that we were responsible for everything. If they didn't want to do it, they'd just say, "Oh, speak to the lead local flood authority." That happened a lot. We kept on wondering why. I think there was a lot of misinterpretation of the Flood and Water Management Act."* (LLFA)

> *"When the FWMA came in, the districts thought the LLFA would take on everything. That approach is changing now. We have partnerships with officers and a formalised network with managers in the district. That is very helpful and supportive and they understand the rules of engagement."* (LLFA)

> *"There was some teething problems but I think they [the roles and responsibilities] are getting embedded now. We have come a long way."* (Local Highways Authority)

Local Flood Risk Management Strategies were reported to have played some role in that through setting out these different roles and responsibilities. It was suggested that this had helped provide a platform for collaboration.

> *"[The revised LFRMS] quite clearly defines the roles of the different parties, but also the need to ensure that those different risk management authorities liaise to ensure stuff doesn't fall between the cracks, so to speak."* (WaSC)

Partnership working (discussed further in section 3.6) had also clearly played a significant role in cementing an understanding of these roles and responsibilities within the thinking and activities of the different Risk Management Authorities.

> *"The [strategic partnership] is an attempt to make sense of a world with multiple risk management authorities"* (LLFA)

Remaining areas of uncertainty

There was evidence of some remaining uncertainty or confusion about roles and responsibilities. Some of this relates to planning enforcement and pre-application planning advice, as discussed in section 3.4. Other examples cited included:

- Uncertainty within two-tier areas, e.g. Local Planning Authorities not understanding the respective roles of their own drainage engineers in relation to the LLFA or of the limitations of the LLFA's role in terms of advising on rather than discharging planning conditions;

- Taking action to address flood risk – where the causes of incidents are unclear or uncertain, this can lead to uncertainty about who should take forward action to address risks. This links back to the discussion of the integrated nature of the drainage network and of 'split incentives' in section 2.1. A particular issue was the distinction between surface water flooding (the

responsibility of the LLFA) and sewer flooding (the responsibility of the WaSC). Although the responsibilities for them are distinct, surface water can be a contributor to sewer flooding;

- Linked to the previous point, there can be uncertainty about responsibility for particular assets, particularly those which are historic. One example given was of surface water sewers which have river flows going through them; and

- Although their primary role as a Risk Management Authority is in relation to main river and coastal risks, the Environment Agency referred to their national overview role in relation to all sources of flood risk. The boundaries of this role appear somewhat blurred. They respond to and investigate many floods which have a significant surface water element. Their flood forecasting and alerts system is also sometimes used to alert people to surface water risks at the local level.

Understanding among others

It was suggested that the diffusion of roles and responsibilities meant that outside of the Risk Management Authorities some confusion and uncertainty remains. For example, it was suggested that:

- Members of the public were often confused about responsibilities when multiple agencies were involved in responding to incidents; and

- Council members, such as those on planning committees, can be uncertain about the role of different Risk Management Authorities.

3.6 Collaboration and partnership working

Extent

Partnership working across local authority boundaries and between different Risk Management Authorities was evident to one degree or another in each of the case study areas. In all areas, structures were in place to facilitate partnership working but the nature of these partnerships varied in terms of their geographic scope, role and working practices.

Geographic scope. Some partnerships operated at the regional level, involving multiple LLFAs and other partners. Others operated at a smaller, sub-regional level. Others were county-based, involving a single LLFA and multiple district councils, alongside other partners such as the WaSC(s) and the Environment Agency.

Role. The roles of the partnerships encountered through this review varied significantly. Some simply provided a means of sharing information. At the other end of the spectrum, others had a far broader role including, for example, providing a mechanism for the agreement of priorities across multiple LLFAs and a programme for jointly funded work, feeding into the work of the RFCC.

Working practices. Some partnerships were sophisticated multi-level arrangements, with strategic, tactical and operational levels of operation and regular meetings at each of these levels. Others had only one or two of those levels, e.g. a strategic and operational level, and/or met less frequently.

The evidence suggests that there has been significant growth and development in partnership working in recent years. As highlighted in section 3.5, this has been underpinned by a clearer understanding and appreciation of roles and responsibilities.

"There will always be frustrations but they are getting further down the chain, as opposed to any 'in principle' items" (WaSC)

There was much evidence of collaboration in responding to and investigating flooding incidents. Many incidents are investigated by multiple Risk Management Authorities (LLFA, Environment Agency, WaSC), with findings often being shared and discussed in order to agree follow-up action and responsibilities. Although, as already noted, some stakeholders reported challenges in agreeing responsibilities, some suggested that there had been changes in this respect.

"I used to turn up at incident and if it was highway flooding I would be delighted but that mindset has changed now" (WaSC)

The previous wider evaluation highlighted that partnership working tended to focus on LLFAs, WaSCs and the Environment Agency (Defra, 2017. See section 5.1). The case studies generate some evidence of collaboration extending beyond these 'core' partners, e.g. work with organisations such as Parish Councils, Wildlife Trusts and Business Improvement Districts. Some staff resource was specifically being invested in developing partnership working. However, some frustration was expressed about the willingness of others, e.g. other utilities, to engage, whilst others felt LLFAs were missing opportunities by not engaging more widely.

Enabling factors

As noted in the previous section, recent years have seen an improvement in understanding and appreciation of roles and responsibilities. Linked to that, stakeholders also reported that relationships between individuals within Risk Management Authorities had been established. This was a significant enabler of collaborative activity and was highly valued.

"The trust and understanding is there. Communication and relationships is key to what we do and that takes time." (LLFA)

"That level of collaboration from my point of view is great. Dealing with the water company and the agency is an important partnership that I will do my best to protect and I won't point the finger at anybody. Once people get upset, it can take a long time to recover... we can't get mixed up in arguments with each other" (LLFA)

Flooding incidents may be a driver for such relationships developing.

"I think in some respects that's [building of relationships] down to the flooding in [year], that winter. That really forced us to gel together because the press love pitting us against each other. I think there was a realisation that, actually, we're a damn sight better working together and showing a united front rather than slinging mud at each other. There's so much benefit in us working together, helping each other." (Highways Authority)

In the same way that misalignment of the boundaries of Risk Management Authorities can be a barrier to partnership working, where the boundaries of LLFAs, WaSCs and the EA align, this can simplify the development of partnership structures and subsequent collaborative activity.

Recognising multiple benefits and having the mechanisms in place to enable such multiple benefits to be explored was reported to be important in getting flood risk management schemes funded and delivered.

"Working in partnership has been the key. We couldn't have delivered our projects in isolation. They wouldn't stack up for one organisation alone" (WaSC)

Barriers

The number of different agencies with a role in managing surface water, and their differing drivers, objectives and geographical boundaries, was seen to be a barrier by some stakeholders.

> *"It is often difficult to coordinate the management of local flood risk when various Risk Management Authorities are responsible for managing different sources of flooding. Although all the agencies have a duty to cooperate, it is often challenging when realising a partnership approach when the different organisations have different drivers and objectives"* (LLFA)

More specifically, as discussed in section 2.5, the strategy timescales and funding cycles of different Risk Management Authorities do not tend to align. This was cited as a significant barrier to partnership working, e.g. in making funding commitments for schemes to support bids for external funding sources.

In some case studies there was a sense that the Local Highways Authority was an 'operational partner', rather than engaging in more strategic partnership activity. This was seen to be as a result of the nature of their funding and their primary focus on reactive highway maintenance.

> *"I'm going to keep saying it - because all of my capital funding comes from the highway maintenance grant, my focus is keeping the highway safe. I haven't got enough money to do the big asset management, strategic-ey things that we'd like to do. I think that's quite frustrating for [the LLFA representative] because he can see, "Well, if we did that ditching and installed additional drainage to drain that land drain, it'd solve our problems." I'm in the position where I've just got to focus on highway because we've got enough issues within those boundaries."* (Highways Authority)

Varying comments were made about the Environment Agency's engagement in partnership working on surface water issues. Some stakeholders felt that they had become more actively engaged, particularly as a result of the partnership funding model, whilst others suggested that they had withdrawn from such activity. This may be partly a function of the balance between different sources of risk in different areas, e.g. where fluvial or coastal risks interact more with surface water risks, the Environment Agency may be more engaged than in areas where fluvial and coastal risks are limited.

Varying comments were also made about WaSCs. Some were seen to be key drivers and facilitators of strategic partnership activity, whilst others were seen as being more reactive and insular.

The previous wider evaluation noted an issue with regard to disputes about the ownership and status of individual assets, which can undermine partnership (Defra, 2017. See section 5.1.3). Some stakeholders referred to similar issues in this review. One gave examples of: 'orphaned watercourses', i.e. (often culverted) watercourses which were not designated ordinary watercourses or surface water sewers; and reclassification of assets by WaSCs, e.g. de-designating surface water sewers.

Even where the ownership and status of an asset is not in question, the drivers, powers and resources of the agencies responsible for the asset may not always enable appropriate action to be taken. For example, a blockage on an ordinary watercourse may hamper discharges from the WaSC network. Whilst local authorities (lower-tier and unitary authorities) may have the powers to address the issue on the watercourse (through the works powers granted to them under the Flood and Water Management Act), they are often reluctant to do so because of legal risks and resource constraints. This is another example of 'split incentives' in current flood risk management currently – the incentive to act does not lie with the agency with the powers to address the issue. Whilst this issue is not specific to surface water, it can undermine partnership working in relation to all sources of risk.

As discussed in section 3.3, different agencies work to different design standards. It was suggested, for example, that WaSCs typically design for a 1-in-30 year event, whilst LLFAs might look for designs to accommodate a 1-in-100 year event with an additional allowance for climate change. It was suggested that these differences in standards can present a barrier to agreeing levels of risk and to agreeing appropriate solutions in jointly-funded schemes.

Other barriers referred to included:

- Competition for funding, which may make LLFAs cautious about information-sharing; and
- The nature of staffing within some LLFAs – the use of contractors for LLFA posts can mean that they are focused on 'core' activity.

3.7 Leadership on surface water

As in the previous evaluation, there was a general sense among stakeholders in this review that LLFAs provided local leadership on the management of flood risk, including surface water flood risk (Defra, 2017. See section 5.4). This leadership was seen to have a number of different dimensions, including:

- Coordinating a strategic approach to flood risk management (e.g. through convening strategic meetings, chairing partnership groups);
- Bringing partners together, raising awareness and identifying opportunities for collaboration; and
- Leading on partnership funding bids.

However, alternative views on leadership were expressed by LLFAs and others.

There was a certain unwillingness on the part of some LLFAs to characterise their role in terms of leadership. They preferred to emphasise the importance of a partnership approach and/or to see their role more in terms of 'catalysing' than leading.

> *"We see it as partnership rather than leadership. We can't do what we need to do without the water company and the agency."* (LLFA)

This reflects the fact that whilst the LLFA might have lead responsibility for ensuring surface water flood risk is managed, many of the 'tools' for taking action to address that risk lie with other agencies: with the EA through providing FDGiA; with WaSCs through improvements to their network and through their funding for schemes; with Local Planning Authorities through their setting and discharging of planning conditions; and with Local Highways Authorities through their highways maintenance activities. This can result in situations where these other Risk Management Authorities feel like they are having to take the lead.

> *"The role we find ourselves performing is trying to persuade numerous stakeholders to consider better management of surface water".* (WaSC)

The reluctance on the part of some LLFAs to talk in terms of leadership also reflected concerns about resource constraints.

"We will lead where we have a scheme but we don't want to raise expectations too high in terms of what we can do. Expectations are already too high. Being very visibly leading brings a lot of expectations that we can't meet." (LLFA)

3.8 Summary

- Operational arrangements and levels of resourcing varied considerably across the case study areas.

- There was evidence of increased resource being allocated to support the roles and responsibilities of some LLFAs, but this was accompanied by an expansion of their responsibilities.

- There was evidence of considerable additional resource and investment being allocated to surface water management by WaSCs in recent years. This was being driven by a need to reduce demands on their networks resulting from surface water entering the combined sewer network.

- Close working between Local Highways Authorities and LLFAs can help to ensure that flood risk management priorities are reflected in highways maintenance activities, including through the use of SuDS.

- The design standards applied by different agencies varied. Stakeholders reported that the standards within the statutory requirements placed on Local Highways Authorities and WaSCs do not sufficient take account of future risk.

- The practice of Local Planning Authorities in relation to surface water management varied significantly in terms of: the level of drainage expertise available to them in carrying out their roles; the interpretation of their role in relation to that of the LLFA; the policy and guidance on drainage and surface water management at the local level.

- Amongst Risk Management Authorities themselves, there was evidence of improved understanding of the roles and responsibilities of Risk Management Authorities, as well as some remaining uncertainty, particularly where the causes of risk were unclear or complex.

- Some stakeholders suggested that the diffusion of roles and responsibilities for surface water meant that outside of the Risk Management Authorities, considerable confusion and uncertainty remains about these roles and responsibilities.

- Partnership working across local authority boundaries and between different Risk Management Authorities was evident to one degree or another in each of the case study areas. In all areas, structures were in place to facilitate partnership working but the nature of these partnerships varied in terms of their geographic scope, role and working practices.

- There was evidence that the improved understanding of roles and responsibilities had been an enabler of collaborative activity between Risk Management Authorities.

- There was unwillingness on the part of some LLFAs to characterise their role in terms of leadership. This reflects the fact that whilst the LLFA might have lead responsibility for ensuring surface water flood risk is managed, many of the ‘tools’ for taking action to address that risk lie with other agencies.

4 Data gathering and sharing

4.1 Extent of data sharing

The review found that each Risk Management Authority holds different data so many stakeholders need to be involved in sharing data for the management of surface water.

What data is shared?

LFRMS and SWMPs were found to have made use of a variety of datasets. This varied between each strategy but included:

- Historical flooding records (sewer, highway, surface, fluvial) and anecdotal information;
- Environment Agency data; fluvial risk maps, surface water flood maps, receptors dataset, historic flood maps, groundwater flooding database, groundwater hazard maps, Lidar data;
- WaSC: DG5 register for the WaSC's utilities areas, sewer network, asset locations, impermeable area survey (where conducted);
- Fire Service call-out records;
- British Geological Survey groundwater susceptibility map;
- Local Planning Authority - new development data;
- Council drainage plan;
- Local Highways Authority - adopted highways;
- Internal Drainage Board rhines and water courses;
- National Receptor Database; and
- Network Rail or local transport company assets, flood records and inspection records.

It should be noted that none of the case studies we looked at included data from all the above sources.

As part of flood investigation reports, shared data may include mapped sewer networks, mapped river networks, rain gauge data and topographic mapping.

There was evidence of data being shared through the WaSC's sewerage management plan process including passing information to developers through the sewer capacity assessment process. This may include information on risk locations, where the WaSC has schemes, asset data, hydraulic models and root cause analysis.

Data sharing objectives are found in some LFRMSs.

To facilitate data sharing, the Environment Agency maintains a partner data catalogue[14] and holds lists of datasets that are available for each partner type (i.e. Civil Contingencies partners, central government, commercial etc.).

The precise format of datasets shared was not explored as part of this review.

How is data shared?

This review found that there was effective and improving data sharing between Risk Management Authorities. In some partnerships this may involve a data sharing agreement between multiple Risk Management Authorities, whilst in others, data was being shared on an informal and more ad hoc basis. Where the latter was the case, it was reported to be facilitated by strong partnership working. There was evidence of work being done to develop better platforms for sharing data locally, including work to collate multiple datasets within GIS-based systems.

Data sharing by the Environment Agency was reported to have improved. A specific example given was that there used to be a charge for Lidar modeling, but this is now available free of charge as a result of a government open data initiative.

WaSC data is often needed to build up a more accurate picture of risk and potential schemes. In some cases, the WaSC data was freely available via data sharing agreements. Examples of WaSC data shared includes flooding history data at postcode level, hydraulic model information and sewer records. In other cases, accessing WaSC data may require a specific request (with variable turn-around times).

> *"Sometimes it takes a bit longer than we would like, but I guess everyone is requesting information from them [the water company]."* (LLFA/Local Highways Authority)

There were reports of WaSCs becoming better at sharing data on things like their network and capacity issues.

> *"I'm surprised how quickly the mindset has changed in water companies to be open to sharing this information, which was previously seen as a money earner."* (IDB)

LLFAs may work closely and share data with neighbouring LLFAs, for example on their common Critical Drainage Area(s). There was also evidence of LLFAs sharing flood risk data with the Local Planning Authority and of an LLFA and Local Planning Authority working together to develop an integrated water management strategy for a particular area where there were constraints on the WaSC network and a lot of new development planned.

> *"There's a package available where officers can delve into the SFRA (Strategic Flood Risk Assessment) and data layers will have GIS, PDFs of maps, development management recommendations - they are all on there."* (Local Planning Authority)

There were cases of the Local Highways Authority making all their data accessible and contributing to updating LLFA data with, for example gully information, data on highway culverts (over a certain size) and hotspot mapping.

> *"It's all shared ownership. My team own that data [on highways structures] but it's accessible to all parties."* (Local Highways Authority)

[14] http://environment.data.gov.uk/ds/partners/#/partners/login

One area felt to be weak in terms of data sharing relates to instances where surface water flood mapping is updated by LLFAs. The outputs from this are reportedly not always shared with the Environment Agency.

> "*Not all Critical Drainage Areas have been uploaded (to EA) - it takes effort from the LLFA, and they have to go through a review process with the EA and consultants."* (GLA)

4.2 Benefits of data sharing

This review found that shared data had been used to assess risk, more accurately model high-risk areas, identify and develop flood risk management schemes, and support applications for funding for schemes.

For example, a data sharing agreement between an LLFA and WaSC had enabled all sewers to be plotted on an internal GIS. In another case, LLFA records had been overlaid with WaSC and Environment Agency data in order to identify joint problems.

Data from partners had been used in modelling high risk areas and critical drainage areas as part of the SWMP development process. WaSC data in particular was reported to make a big difference to assessing risk as part of such processes.

> *"If it was only based on rainfall events you won't get a full picture of flood risk. For example, in [redacted – an area which is highly built up], the level of risk was a lot higher [once water company data was added in] than we had initially predicted."* (LLFA/Local Highways Authority)

This shared data had been used to model predicted flooding in a particular area and then used to apply for funding from the WaSC.

> *"Data sharing enables people to see where there's overlap on projects and identify synergies and opportunities to piggy back."* (GLA)

Has data sharing led to greater effectiveness and/or accuracy?

Evidence from this review suggests that data sharing can lead to greater effectiveness and/or accuracy in the assessment of local flood risks.

> *"It's essential; without it we can't understand the situation as we only have a small part of the puzzle. You have to get all of the problems together to understand what is going on.* (WaSC)

Data sharing was seen as being critical in developing a complete understanding of flood risk, but also in the development of schemes and in ensuring work is not duplicated.

> *"Data sharing is fundamental to everything. [You have to] build a level of trust and understanding. It's about not doing the same job twice, strategically making sure you are investing in the right way."* (WaSC)

For example, WaSC data can enable the highway authority to quickly identify assets in the area, opportunities, and whether they need to be working with the WaSC on these. Similarly, council data on reported incidents can enable the WaSC to investigate these further.

4.3 Barriers

There were differences in opinion about the existence and extent of barriers to data sharing. Some stakeholders felt that there were no significant barriers. Others identified one or more barrier, which can be categorised as follows.

Legal

One barrier to data sharing was a reluctance or inability by WaSCs to share property-level data (e.g. on historic flooding or DG5 records of sewer flooding) due to concerns over data protection and/or the risk of property blight. It was also recognised that WaSCs are focused on removing properties from the DG5 register and it was suggested that this can result in the registers not always accurately representing those properties which have a current risk.

Our review identified cases where the WaSC would share this information informally (e.g. in conversation but not in writing) or following the establishment of a specific agreement. The latter was described as arduous, lengthy and labour intensive to set up.

> *"They just won't tell us things because they're a private company and they consider it to be commercially sensitive. They just don't want that getting out. That means there are only certain things they can share with us."* (LLFA)

Some frustration was expressed about the legal barriers. It was suggested that despite these barriers, householders would be unlikely to object to their data being shared for flood protection purposes.

> *"I'm sure if the householders knew that the data was being used to protect them from flooding they would want us to crack on."* (WaSC)

Commercial

Some commercial sensitivities were highlighted regarding which assets a WaSC will share data on. For example, they may not wish to share data on their underground sewer network as this data provides them with an income stream (as it can be charged for) and interviewees also suggested that there may be security issues related to the release of this data.

Administrative

The disparate nature of important data was recognised as something of a barrier, with different Risk Management Authorities holding different data and a lack of any generally established mechanism for bringing it all together. The complexity of relationships and associated data sharing varies from place to place, e.g. in two-tier areas data and knowledge will be held by multiple lower-tier authorities, other areas may have multiple IDBs.

Technical

A number of internal technical barriers were identified, such as differences in systems or software between Risk Management Authorities, changes to data systems within a Risk Management Authority, or a reluctance to use file sharing platforms. GIS was only sometimes used by LLFAs due to the associated expense, with some LLFAs holding large amounts of data in hard copy.

> *"So much is shared by email and so the data sharing potential is a bit limited. It comes down to knowing the right person and right team and who to ask for."* (WaSC)

Although the Updated Maps for Surface Water were recognised as being a significant step forward in terms of accuracy, concerns about accuracy were still expressed, with a need for more detailed local modelling identified.

> *"The mapping was meant to take account of drainage but just highlights low spots. We can't remodel it, that's very expensive. It would be great to incorporate local knowledge."* (LLFA)

Knowledge and understanding

Participants at the joint Defra and Water UK workshop suggested that data sharing was being hindered by the levels of knowledge and understanding about what data was available and how to interpret and use that data.

4.4 Enabling factors behind existing data sharing

Our review found that good relationships between Risk Management Authorities was a key factor in aiding data and information sharing, as was a good understanding of what data is held by each organisation.

The Flood and Water Management Act was seen as having been a significant driver of the good data sharing that now exists.

> *"The Flood and Water Management Act… necessitated data sharing. It's a business as usual thing now. That's one of the things that's been a real benefit of surface water management plans, that nobody is protective of their data anymore because we've shared it so many times."* (Local Highways Authority)

Having a data expert in the LLFA team who can establish data sharing protocols between the Risk Management Authorities was reported to be beneficial.

A further enabling factor was having clear and agreed administrative processes for making data requests and sharing data. An example given was of a WaSC having a dedicated email inbox for all data requests, along with a commitment to turn around data requests within five days.

4.5 Additional data

Stakeholders cited a vast array of additional data that would help them to better assess and manage surface water risks. These can be categorised as follows:

Data from national organisations:

The following data was suggested:

- Rainfall data (forecast and measured) from the Met Office would be useful in developing local models for predicting surface water flooding in terms of real time.

- British Geological Survey data on geology and soils would be useful in terms of identifying areas where SuDS is suitable. These data were available to local authorities but at a cost.

- Environment Agency data: better resolution LIDAR was called for as this would increase the ability to update surface water flood maps at the local level. It was suggested that the AIMS system would be more useful if it was shared more easily (it was reported that the Environment Agency will grant access but only when asked).

Local data from Risk Management Authorities

Following a flooding incident, different Risk Management Authorities typically produce their own flood risk assessment and then share the findings of their investigations. However, each organisation may work to its own formats and standards, meaning that there can be inconsistency between the data collected and/or modelling carried out. Stakeholders suggested that it would be beneficial to ensure that data gathered as part of flood investigations is done so in a consistent way and that it is always shared with relevant organisations. In one case study, work was being done to try and achieve this via the strategic partnership which operated across multiple LLFAs.

More information on the local drainage network as well as local knowledge on hotspots would be beneficial**.** This includes data on culverts (location and condition), highway gullies and drains, including maintenance frequency and the location of recurring incidents. Information on connecting pipework for gullies and soakaways would also be useful as would information on the cleaning of screens and areas (from the Environment Agency and WaSC). It was suggested that a highway sewer map would be helpful in looking at flood risk and identifying sites which in are likely to be reaching the peak of their capacity in the medium/near future. The costs of surveying networks were a barrier to gathering such asset data.

A particular issue highlighted was the need for a better understanding of underground assets, including their condition, capacity, depth and incline.

> *"We are very good at mapping the assets above ground. What we are not always clear about is the underground assets."* (Local Highways Authority).

This links to an issue highlighted in the previous wider evaluation regarding the challenges that some LLFAs face in compiling an asset register (Defra, 2017. See section 4.3). The scale of this task is very significant for some LLFAs with complex drainage networks. The previous evaluation found examples of LLFAs committing very significant resource to mapping the location and condition of drainage networks, with underground assets such as culverted watercourses being a particular challenge.

It was suggested that further WaSC data would be useful, including information on their network and where there are capacity issues (though it was recognised that there are security risks associated with this).

In relation to new development, it was suggested that it would be useful if developers were required to provide the council with data on the location and capacity of new drainage.

Local data from organisations other than Risk Management Authorities

It was felt that local data from other organisations would also be beneficial, including:

- Greater detail on historic flood events, e.g. using data from the emergency services.
- Utilities data, including information on electricity, gas and telecommunications networks. Some of this data is available but that it can be difficult to obtain.

4.6 What would aid further data sharing?

There were a number of suggestions for things that would aid data sharing, including:

- Having a national protocol, including minimum standards and common licensing agreements, for sharing data between Risk Management Authorities;
- Promoting greater awareness of the nature of available data from different agencies and how it can be accessed; and
- Having an updatable, online, common platform into which all data is entered from different Risk Management Authorities. Ideally this would include verification of the data incorporated and would allow real-time data sharing. This would enable individual LLFAs to produce detailed risk mapping for their area, bringing together all modelled and other data so that an understanding can be gained of what will happen in a flood event.

There was evidence that particular areas were working to produce their own framework for investigations and reporting to ensure that Risk Management Authorities were collecting compatible data and adopting a common approach to modelling. However, there were reports of such efforts having stalled in some cases.

4.7 Summary

- A wide variety of datasets was being shared between Risk Management Authorities and efforts were being made to increase data sharing.
- Data sharing was found to have been facilitated by strong partnership working.
- Shared data had been used to assess risk, more accurately model high-risk areas, identify and develop flood risk management schemes, and support applications for funding for schemes.
- Evidence from this review suggests that data sharing can lead to greater effectiveness and/or accuracy in the assessment of local flood risks.
- Legal, commercial, administrative and technical barriers hindered data sharing in some areas. In addition, it was suggested that data sharing was being hindered by the levels of knowledge and understanding about what data was available and how to interpret and use that data.

- Stakeholders cited a vast array of additional data that would help them to better assess and manage surface water risks including data from national organisations, local data from Risk Management Authorities and local data from other organisations.

5 Effectiveness of local arrangements

This section sets out the findings from the review in relation to the outputs and outcomes from action to address surface water risks, followed by an exploration of some of the key factors behind the local variation in these outputs and outcomes. This includes a summary of stakeholder perceptions of the level of priority attached to surface water management, followed by a wider overview of the factors impacting on local delivery.

5.1 Outputs and outcomes

Types of actions

LLFAs and their partners were implementing a range of actions to manage surface water risk. These actions can be categorised as:

- Understanding the risks;
- Managing the likelihood; and
- Preventing inappropriate development.

Understanding the risks

Examples from our case studies included:

- Building the evidence base for SWMPs;
- Working in partnership with the community to better understand the risk in the area and to develop options for reducing surface water flood risk. This may involve validating outputs of the SWMP model through engagement with key stakeholders;
- Investigating the resilience of critical infrastructure and services, for example through a detailed review of existing drainage and resilience to surface water flooding at stations, utility services etc., and production of detailed models to form the basis for flood alleviation scheme development; and
- Obtaining additional data on the public surface water sewer network in priority areas to improve partner knowledge and aid scheme design.

Managing the likelihood

Our review identified a wide range of actions being taken to manage the likelihood of surface water flooding through both awareness-raising and the implementation of flood alleviation schemes.

Examples included:

- Setting up campaigns to discourage the paving over of drives and gardens with impermeable surfaces;

- Community engagement projects such as establishing Flood Action Groups and other community activity to manage highway gullies and debris clearance;

- Highways maintenance works to ensure effective surface water management, as well as Local Highways Authorities using their capital budget for works to upgrade the drainage network such as increasing the capacity of pipework, dealing with blockages, culvert replacement, trash screen replacements, culverting and preventing land drainage from entering the highway.

- LLFAs and partners implementing a range of 'quick win' flood alleviation schemes including urban greening, soft landscaping and rainwater harvesting as well as larger scale flood storage;

- Undertaking feasibility studies, investigations and solution design for providing large scale flood storage and/or SUDs; and

- Source control using localised flow diversion, flood storage, urban greening.

  "It is good to see [SuDS] schemes coming forward that provide drainage as well as biodiversity and amenity benefits - rather than just, for example, underground attenuation tanks." (Local Planning Authority)

Preventing inappropriate development

Actions to prevent inappropriate development included:

- Local Planning Authorities ensuring that planning policies require developers to incorporate surface water flood risk considerations, such as SuDS and permeable paving when submitting planning applications;

- LLFAs and Local Planning Authorities engaging with developers regarding surface water management through forums, website, pre-application advice and promotion of any relevant Supplementary Planning Document;

- LLFAs providing comments on major planning applications in their role as statutory consultee;

- Local Planning Authorities monitoring compliance with drainage-related planning conditions. Some LLFAs were also engaging in this process; and

- Working with the Environment Agency to incorporate SWMP outputs in fluvial/pluvial modelling in order to enhance the evidence base for planning policy.

Evidence of outcomes

LLFAs reported that formal monitoring of the impact of schemes was difficult and costly. Formal monitoring of outcomes was rare and LLFAs may simply look for evidence of a lack of repeat incidents.

"We'll just have to wait for it to rain and see if they work." (LLFA)

"When we do have a big event, we need to get up there and check it's working" (LLFA)

Informal monitoring may involve discussions at meetings, feedback from communities and keeping track of the number of complaints or enquiries received. Some stakeholders reported evidence of significant outcomes being achieved.

> *"You look at some of the sites and you look at all the enquiries received and you get to [year], where we implemented a hotspot regime, and you go from an enquiry every three months to two or three enquiries in the last four or five years. You can really see the benefit of it."* (Highways Authority)

Formal monitoring was considered by some stakeholders to be unnecessary because of the extensive preliminary work which precedes a scheme.

> *"The evidence is in the preliminary work. We don't do schemes to see if they work. We do them confident that they will work because we have done the necessary investigation, modelling etc."* (LLFA)

Other stakeholders were keen to carry out more formal monitoring in order to evidence the effectiveness of schemes. One WaSC revealed initial plans to set up formal monitoring, including a series of flow gauges, on a new surface water management scheme.

There was recognition that the benefits of SuDS schemes are multiple and extend beyond reduced flood risk.

> *"In [redacted] scheme), it was a dead space, all grey before hand - we put in planting which increased the biodiversity and amenity value."* (LLFA/Local Highways Authority)

The GLA was running a pilot programme to evaluate the benefit of a number of small SuDS schemes being implemented in one area; this involved conducting hydraulic modelling to evaluate the quantitative impact as well as considering other benefits such as improved water quality and amenity benefits. This was aiming to demonstrate the effectiveness of SUDS with a view to supporting amendments to the FDGiA calculator to make it more amenable to SUDS schemes.

5.2 Priority for surface water within Risk Management Authorities

There were mixed views on the priority being attached to surface water management within Risk Management Authorities, with some feeling that the priority had increased in recent years and others feeling it had remained largely unchanged.

LLFA

Priority within our case study LLFAs was seen as being 'sufficient' or 'high'. This was aided by having good councillor buy-in and the relevant cabinet member meeting regularly with the LLFA lead. Political priority can be heightened by flooding events. However, as in the previous wider evaluation, there were concerns about the impacts of events being relatively short-lived (Defra, 2017, See section 4.1.7).

> *"Political priorities are very fluid. We need incidents on a regular basis."* (LLFA)

There were cases of resources for flood risk management (not surface water specifically) having increased in recent years. In some LLFAs there was a dedicated role or team working on surface water issues and examples of significant funding being allocated to surface water management.

There was a feeling that more powers or statutory duties would be helpful in terms of implementing actions. This relates to the issue of 'split incentives' discussed earlier.

"There's not enough powers and requirements to make us do things." (Case Study 1, LLFA)

LLFA officers can be contractors, rather than staff members. This review suggests that such arrangements can bring a greater degree of uncertainty about the longevity of the role. Levering in external funding can be seen as helpful in terms of securing the position.

"I've been successful in securing major amounts of funding for [surface water flood alleviation] schemes - £5 million for one scheme, none of which came from the council. So I hope my role will be ongoing." (LLFA)

Other Risk Management Authorities commented that the priority given to surface water by LLFAs was highly variable; while some LLFAs are very proactive, others do not have any dedicated internal resource.

"One local authority I know don't have a flood person as such. Their services are contracted to a private company and the person responsible isn't in the borough and only visits the area a few times a month. They are not a high risk area but there are issues in the area that need to be addressed." (WaSC)

WaSC

The level of priority attached to surface water management by WaSCs seems to be driven by two key factors:

- Customer willingness for the company to invest in this area; and
- The extent to which action to address surface water flood risk can create capacity in the combined network, thus reducing the need for costly and disruptive infrastructure upgrades.

In terms of customer willingness to pay there were mixed reports. In some cases, it was said to be low in terms of work to manage external flooding, whilst in others it was reported that customers identify flooding in general as a priority.

"It is a high priority within local catchments, wholeheartedly supported by senior management, it's about having right measures…, cascaded down, because it's important to customers" (WaSC)

Where sewers are combined, the combined sewers are dealing with surface water issues and this seems to increase priority attached to surface water issues as it results in a need to create capacity in the network.

Like LLFAs, WaSCs' priorities are impacted by recent events with the suggestion that insufficient priority had been attached to surface water flood risk in the past, but with recent flood events raising it up the agenda. There was optimism that a more comprehensive approach to surface water flood risk will be supported in the next price review.

As an indication of the level of priority attached to the issue, WaSCs' level of engagement in this area was perceived by some Risk Management Authorities to have increased in recent years.

"[the WaSC] regularly attends the Local Flood Risk partnership meetings and are involved in ongoing partnership working. This is an improvement on the past." (LLFA)

Local Highways Authority

Evidence on the priority attached to surface water within Local Highways Authorities was mixed. There were suggestions that they '*could do better*' (LLFA) and reports of budget cuts for maintenance and drainage.

Whilst stakeholders recognised the importance of highways maintenance work in managing surface water risks, a key issue relating to Local Highways Authorities was their ability and/or willingness to engage in more strategic, risk-based action to manage surface water. This is discussed in section 2.5.

Lower-tier councils

The role of lower-tier councils in managing surface water is particularly significant in terms of their role as the Local Planning Authority. As discussed in section 3.4, the level of priority attached to managing surface water as part of this role varies significantly between councils. Some have Local Plan policy and/or Supplementary Planning Documents or guidance. Some have access to drainage expertise for assessing schemes not assessed by the LLFA. Similarly, some have the capability to monitor and enforce compliance with drainage-related planning conditions.

5.3 Factors which have impacted on the local organisation and delivery of surface water flood risk management

A wide range of factors were cited as having impacted on the organisation and delivery of surface water flood risk management.

Statutory drivers

The Flood and Water Management Act was cited as having had a significant impact on the organisation and delivery of surface water flood risk management. The Act, and subsequent LFRMS, were seen as having been particularly important in clarifying the roles and responsibilities of the different Risk Management Authorities.

However, there was also a view that LLFAs are hampered in their ability to effect change, with insufficient powers and funding. Linked to this there was a view that some LLFAs are focused on keeping costs down with the result that they tend to do only the legal minimum on surface water management.

A key change identified by stakeholders was the introduction of a statutory consultee role for LLFAs on major planning applications. Whilst this role was seen to be important, it can be challenging to resource.

Flooding incidents

As discussed in section 5.2, flooding incidents play a large part in the priority attached to surface water management.

> *"We had started the process of partnership working already and the councils were showing a flickering interest, but after that we got full engagement, including from members."* (WaSC)

Operational working arrangements and partnerships

Whether or not the LLFA is a unitary council impacts on the organisation and delivery of surface water management. In two-tier areas, there is a greater burden on the LLFA in terms of securing effective partnership working and data sharing. The previous wider evaluation also highlighted the issue of the new responsibilities introduced by the 2010 Act being entirely new to county councils, whereas many unitary councils still had significant drainage teams in place when the Act was introduced (Defra, 2017. See section 7.1).

The level of maturity of partnership structures varied significantly across the case studies, as discussed in section 3.6.

A number of factors influence WaSCs' approaches to surface water management. As already discussed, the extent to which surface water impacts on their networks and their customers' priorities were key factors. Some WaSCs have been pursuing partnership approaches to the management of surface water for many years, whilst for others it has been a lower priority. Stakeholders at the joint Defra and Water UK workshop highlighted the potential role of the new drainage and wastewater management plans in making the WaSCs' strategic planning for their drainage role more transparent. This could help to facilitate closer partnership working with the WaSCs.

Data

The Environment Agency's updated flood maps for surface water have had a positive impact in raising the profile of surface water flooding issues and in enhancing the understanding of surface water risks.

5.4 What is working well?

The LLFA role, council commitment and a dedicated officer

The LLFA role was seen to be working well by some stakeholders. Typically, Risk Management Authorities reported that LLFAs were well regarded and seen as being proactive and supportive organisations to work with.

It was suggested that LLFAs needed three things to function effectively; political support, resources and an officer focused on this area.

> *"Ideally, you need three things [to deliver on surface water]; a) a politician who wants to deliver it, b) a senior officer willing to release the funds and c) an officer who can deliver*." (GLA)

There were examples of councils being very committed to their LLFA leadership role, and some LLFAs were developing a track record for successfully leading the delivery of schemes.

> *"Once [the water company] or any other organisation has money to spend, they know they can get us to spend it; we now have a track record for delivering. We don't hang around."* (LLFA/Local Highways Authority)

There were cases of LLFAs having a reasonable budget and resources to enable them to carry out their responsibilities and take forward projects. The importance of having committed staff was also highlighted.

> *"The LLFA has a very proactive and engaging officer."* (WaSC)

As already noted, the establishment of personal relationships at the local level has progressed significantly in recent years and this was seen to be very important by some stakeholders.

> *"Having that direct connection with the LLFA through a specific person is really useful and helpful. If we ever have an issue - e.g. from a planning application perspective – it's much easier to do when there's a direct connection and you can pick up the phone."* (WaSC)

Local partnerships and data sharing

Although variable in nature and scope, local partnerships on surface water flood risk were generally felt to be effective and proactive with good working relationships between the Risk Management Authorities. They were useful in identifying potential opportunities for surface water management schemes, developing more joined-up approaches with multiple benefits and enabling better targeting of resources.

Levels of communication and engagement were reported to be good across many of the Risk Management Authorities in this review and there were examples of effective data sharing between partners.

LLFA links to the Local Highways Authority

There were reports of good integration between the LLFA and the Local Highways Authority, facilitated by the two teams typically being co-located within the same division or directorate, and sometimes with shared staff resource.

LLFA links to and support of the Local Planning Authority

Our review found cases of strong and effective working relationships between LLFAs and the Planning Authority. Specific examples included:

- The LLFA providing proactive support to planners in the Local Planning Authority, including training seminars;
- A dedicated staff member from the LLFA team acting as the surface water consultee on development applications;
- Some LLFAs also had some resource for ensuring that their advice on planning applications was implemented; and
- LLFAs providing pre-application advice to developers.

Some well-resourced Local Planning Authorities felt the planning aspects were working well.

> *"If you are a local authority that gives surface water high priority and you work closely with partners, you can ensure that development doesn't worsen the situation and in limited cases can provide betterment."* (Local Planning Authority)

Supplementary Planning Documents on SuDS

Where SPDs had been developed on sustainable drainage, setting out requirements at the local level, we found optimism that these will result in many more SuDS schemes being implemented, and that this would bring significant benefits in terms of surface water management.

> *"Hopefully over the next decade the benefits of lots of small scale SuDS and green infrastructure improvements which are being implemented now will begin to show."* (Local Planning Authority)

5.5 What is working less well?

Legal, regulatory and policy issues

A range of legal, regulatory and policy issues were cited as having a negative impact, including:

- LLFAs lack a statutory duty to implement surface water management projects and also lack enforcement powers in relation to surface water management;
- There is no mandatory requirement for SuDS;
- Complex ownership of assets, such as culverts, can impede the delivery of schemes;
- Uncertainty around the VAT attached to flood risk management schemes can generate concern. It was reported that, in one scheme, HMRC decided the WaSC was providing a service and should pay VAT (totalling over £1m). HMRC was eventually persuaded that the WaSC were a partner and not a provider and therefore did not need to pay VAT.

  "This is something we need to get reassurance on. It's a massive risk." (WaSC).

- Uncertainty about the impact of Brexit on funding in this area, for example access to low-rate finance through the European Investment Bank.
- Issues relating to the Water Industry Act 1991, which states that agreement to connect a new development to a combined sewer should not be 'reasonably withheld'. This can restrict the WaSC's and/or Local Planning Authority's ability to negotiate the implementation of SuDs. It was also reported that it was becoming a contested issue in terms of what would be considered reasonable; e.g. in the case of a development which would contribute significantly to flood risk from combined sewers, would it be reasonable to withhold agreement?

Limited funding and powers

It was felt that surface water does not get the same attention or resource as fluvial and coastal flood risk and that its diffuse nature makes it difficult to secure funding.

> *"There are more people at risk from surface water than from river and sea, but the level of investment is focused on river and sea. It's a diffuse impact - a few properties here, a few there. It's much more difficult to get numbers to stack up with current funding provision."* (Case Study 1 WaSC)

Linked to this, FDGiA was felt to be unsuited to surface water. As discussed in section 2.5, the process was felt to be onerous with a scoring system that is designed for large scale fluvial/tidal schemes.

> *"It's very difficult to meet the mark for surface water flooding in terms of the required number of properties protected. It's difficult for SuDS schemes to compete against fluvial flood schemes that may involve building a wall and protecting a hundreds of properties."* (LLFA/Local Highways Authority)

To enable surface water schemes to be funded through FDGiA, it was suggested that it would need to be altered to consider the multiple benefits of SuDS including, for example, improvements to biodiversity, water quality, health and amenity value, as well as the protection of properties.

There was also felt to be a shortage of funding and resources for LLFA and Local Highways Authority work, with a lack of ringfencing. Other Risk Management Authorities referred to the impact of austerity, for example in terms of reduced resources for gully cleansing

> *"It keeps coming back to the resource issues; the role is reactive, if [two key officers] are not there, there is no one else to deal with it."* (LLFA)

Lack of awareness and expertise

Lack of awareness and expertise was considered to be hampering efforts to reduce surface water flood risk. There was a view that surface water flooding appeared to be less understood and under-reported relative to river flooding.

> *"When we speak with residents it appears that they are well aware of flooding from watercourses but are less aware of the risks from surface water and are often surprised to learn that they are at risk from flooding when they are miles from a watercourse".* (LLFA)

Linked to this, LLFAs have only been in position for seven years and there was a feeling that expertise was still being developed. Given this, and the skills issues previously discussed, it was suggested that there could be better sharing of resources and good practice. It was also suggested that the Environment Agency could more effectively share their expertise with LLFAs.

> *"Possibly a method of seconding in from the EA would be good - there is a real skills gap." (*GLA)

Monitoring and reporting

The (lack of) reporting of external surface water/sewer flooding was a hindrance in terms of securing funds for surface water schemes.

> *"If it doesn't affect a residential property, it is unlikely we will be aware of it. Records are needed in order to build business case and justify spending/allocation of funds to resolve surface water flooding [at a catchment scale]."* (WaSC)

Monitoring SuDS installations and ensuring that what is proposed and conditioned as part of a planning permission is actually implemented was also a challenge.

> *"Whilst the documentation that's been produced at a planning level has been adequate, that hasn't been installed on the ground and that's then created issues elsewhere."* (borough council)

Planning

Some specific issues related to planning are discussed in section 3.4. More generally, there was a concern that there is an unresolved conflict between the drive to increase housebuilding rates and the need to manage surface water and other flood risks. It was suggested that this needs to be addressed at a Governmental level.

There was also a view that surface water issues are not given sufficient priority at any stage of the planning process.

> *"Drainage is always the last infrastructure to be considered; more could be done to include it in pre-application. Once approved, I'm not sure if any monitoring is done."* (WaSC)

> *"We start quizzing them about surface water towards the end of the process when they have largely planned what they are going to do."* (LLFA)

It was suggested that national planning policy relating to surface water and SuDS is too weak, with the non-statutory technical standards for SuDS too limited in scope. Whilst local policy can help, it was suggested that having national guidance and requirements would be necessary to ensure a strong approach is taken across the board.

An additional issue with planning was the shelf life of some planning applications. In cases of very large schemes, possibly developed in multiple phases over many years, the requirements in relation to flood risk may have been set long before implementation and may therefore be outdated.

> *"That [scheme] is seated planning-wise in a world that is 20 years old. The planning process can get frozen in time."* (LLFA)

In general, practice and policy within Local Planning Authorities was found to be variable. This included:

- Variable expertise; not all LLFAs had the expertise to enforce and discharge conditions properly, partly because of lack of resources but also because a lot of building control is now carried out by private inspectors. On sensitive sites, the LLFA may choose to send out its own building control officer even where a private firm is being used (i.e. without being paid for this).

- Variable resources in terms of providing the monitoring and enforcement role.

- Variable local policy; some LLFAs had an adopted policy which sets specific tests and requirements, while others had no specific policy on surface water.

- Varying levels of understanding and awareness among councillors; some LLFAs have invested in training for members of the planning committee so that they understand roles and responsibilities, how schemes are assessed etc.

WaSC

In some cases, WaSCs felt insufficiently supported by the LLFA and Local Planning Authority, resulting in sub-optimal solutions. An example was provided of SuDS being considered to be impractical for a particular scheme. To avoid discharging into a watercourse, the Local Planning Authority agreed that the surface water could be discharged to a combined sewer which had an outfall to the same watercourse downstream. Instead of entering the watercourse as surface water, the WaSC pointed out that this risked the water entering instead as sewage. This particular WaSC expressed frustration regarding a perceived lack of leadership from the LLFA with regard to surface water management in new development.

Highways

Local Highways Authority budgets were increasing in some cases, but shrinking in others and this was seen to be significant in terms of managing surface water.

> *"We can't just talk about drainage. There's also the maintenance of the roads - water can cause huge damage to roads if you have potholes or the road levels aren't right and the water won't reach the drains. The highways maintenance budget … has been under pressure since 2009. We've been taking more of a risk-based approach but more recently it has been acknowledged that the budget is too tight and more needs to be done."* (Local Highways Authority)

Other organisations

Other key agencies such as Network Rail and London Underground were felt to be behind in terms of prioritising surface water flood risk, with no or minimal involvement in schemes to reduce flood risk on their land/assets. There was a feeling that this was starting to improve in London through the GLA's involvement.

SuDS

Issues relating to SuDS are discussed in section 3.4 but it is worth re-stating here that this was a significant area of concern for some stakeholders in this review.

Standards and metrics

The standards and metrics utilised by different Risk Management Authorities vary. WaSCs have a responsibility to drain their areas and since 2000 have built drainage networks to meet 1:30 years rainfall event. New resilience metrics are also being developed through the 21st Century Drainage programme, which will be used as 'common performance commitments' for WaSCs in their agreements with Ofwat and in Drainage Water Management Plans. The Environment Agency has a strategic overview for flooding from all sources, and publishes surface water maps for 1:30, 1:200 and 1:1000 year events. Local highways authorities build road drainage based on a 1:5 year rainfall event but do not base this on surface water flood risk. Electrical energy suppliers protect substations servicing 10000+ customers to a 1:1000 year rainfall event. There are reasons for these different standards e.g. related to the scale and nature of potential impacts, but the differences were seen to add to the complexity of addressing surface water issues.

A further issue identified by stakeholders at the joint Defra and Water UK workshop was that there are no performance metrics which can measure improvements made in tackling surface water risk. It was also suggested that different methods underpin the standards and metrics so they are often not just different but not directly comparable.

5.6 Summary

- LLFAs and their partners were implementing a range of actions to manage surface water risk. These actions can be categorised as: understanding the risks; managing the likelihood; and preventing inappropriate development.

- LLFAs reported that formal monitoring of the impact of schemes was difficult and costly. Formal monitoring of outcomes was rare.

- There were mixed views on the priority being attached to surface water management within Risk Management Authorities, with some feeling that the priority had increased in recent years and others feeling it had remained largely unchanged.

- The 2010 Act, and subsequent LFRMS, were seen as having been particularly important in clarifying the roles and responsibilities of the different Risk Management Authorities. However, there was also a view that LLFAs were being hampered in their ability to effect change by insufficient powers and funding. The introduction of a statutory consultee role for LLFAs on major planning applications was seen to have been an important development but was reported to be challenging to resource.

- Local variations in operational working arrangements and partnership structures was found to have a significant impact on the delivery of surface water management.

- Typically, Risk Management Authorities reported that LLFAs were well regarded and seen as being proactive and supportive organisations to work with, particularly where they have political support, are well-resourced and have skilled officers.

- Although variable in nature and scope, local partnerships on surface water flood risk were generally felt to be effective and proactive with good working relationships between the Risk Management Authorities.

- The review found cases of strong and effective working relationships between LLFAs and the Planning Authority. However, there was felt to be an unresolved conflict between the drive to increase housebuilding rates and the need to manage surface water and other flood risks. Practice and policy on surface water varies between Local Planning Authorities and there was also a view that surface water issues are not given sufficient priority at any stage of the planning process.

- In some cases, WaSCs felt insufficiently supported by the LLFA and Local Planning Authority, resulting in sub-optimal solutions.

- Local Highways Authority budgets were increasing in some cases but shrinking in others and this was seen to be significant in terms of managing surface water.

- The standards and metrics utilised by different Risk Management Authorities vary. There are reasons for these different standards but the differences were seen to add to the complexity of addressing surface water issues

6 Conclusions

6.1 Significant progress and significant local variation

The evidence from this review suggests that there have been significant steps forward in the management of surface water in recent years, underpinned by closer and more effective partnership working between Risk Management Authorities and others. Key drivers/enablers identified included: the increasing need for WaSCs to relieve the pressure from surface water on their networks; an improved evidence base, including improved mapping, a growing number of SWMPs and flood investigations; and increased sharing of data.

However, there was significant local variation in the extent to which surface water management was addressed in local strategy and action, the operational arrangements for addressing surface water risks and the extent of partnership and collaboration between agencies.

Significant variation was also identified between different Risk Management Authorities in terms of the drainage standards that they work to. It was suggested that LLFAs, when commenting on planning applications, might expect development which could accommodate a 1-in-100 year event, with an additional percentage allowance for climate change. WaSCs and Local Highways Authorities, on the other hand, when building new assets were said to be adopting lower standards (e.g. 1-in-20 or 1-in-30 year events, and with no allowance for climate change). It was also suggested that when upgrading existing assets there was no requirement on WaSCs and Local Highways Authorities to take account of climate change impacts.

6.2 Split roles

In contrast to many flooding incidents (where sources are often integrated) and the drainage network (which is complex and integrated), responsibilities for different sources of flood risk and different parts of the drainage network are split between different agencies. This places a significant burden on the agencies involved and can lead to responsibilities being contested.

Whilst the LLFA might have lead responsibility for ensuring surface water flood risk is managed, many of the ‘tools’ for taking action to address that risk lie with other agencies: with the EA through providing FDGiA; with WaSCs through improvements to their network and through their funding for schemes; with Local Planning Authorities through their setting and discharging of planning conditions; and with Local Highways Authorities through their highways maintenance activities.

This split in roles can result in LLFAs and others expressing concern or frustration about their leadership on surface water management and can make it challenging to join up plans and strategies and coordinate action.

6.3 Split incentives

Linked to the issue of split roles, agencies often with the most scope to influence the management of surface water at source (e.g. LLFAs, Local Planning Authorities, Local Highways Authorities) are not necessarily those who are most impacted by it (e.g. WaSCs, because of the increased pressure it can

place on their networks) and are therefore not always incentivised to do so. This may be undermining efforts to address sources of surface water risk.

6.4 Partnership working

The diffusion of roles and responsibilities for surface water means that effective partnership working is imperative but also challenging, particularly because the agencies involved have different drivers, objectives, resources and funding cycles.

There was evidence from this review of significant improvement in the levels of partnership working on surface water, underpinned by a clearer understanding of roles and responsibilities. WaSCs appear to be increasingly engaged, driven particularly by a business imperative of keeping surface water out of combined sewers in order to avoid costly upgrades to their infrastructure. AMP7 may provide a significant opportunity to further promote partnership working on surface water management by the WaSCs.

6.5 Achieving a long-term, strategic approach

Particularly where strong cross-boundary, cross-agency partnership working was established, a long-term strategic approach to managing surface water and other flood risk was apparent in some areas examined in this review. However, in other cases, there was a more reactive, operational focus, and this was acknowledged by some stakeholders. Suggested reasons for this were resource constraints and the need to respond to public or political pressure rather than being driven by risk. It may also be a function of the fact that many LLFAs sit within the same team or department as the Local Highways Authority, who tended to have a very reactive, operational, 'customer-oriented' focus.

6.6 Linkages between surface water management and planning

This review found examples of LLFAs working very effectively with Local Planning Authorities but also evidence of significant weaknesses in the system. The significance of this issue is heightened by the current focus on increasing house-building rates.

Areas of concern identified by stakeholders in this review included:

- Resource constraints leading to varying levels and quality of comment from LLFAs on major planning applications;
- In relation to minor applications, some Local Planning Authorities have expertise to assess them from a drainage perspective but some do not;
- Practice with regard to monitoring compliance with drainage-related planning conditions, and discharging those conditions, was very variable. Some Local Planning Authorities do not have the resource of expertise to carry out this role. Some LLFAs get involved, others do not;

- Adoption of SuDS was a serious concern for some – it was questioned whether many of the management companies taking on SuDS will be adequately resourced or even in existence in the long term to perform this role.

6.7 Resourcing and funding

There was evidence from this review of the operational funding for LLFAs being protected or increased in recent years. However, as we found in the previous wider evaluation, the level of resource allocated to LLFAs varies enormously (Defra, 2017. See section 5.5.2) and some stakeholders felt that LLFAs were under-resourced and this was impacting their ability to carry out their responsibilities. The statutory consultee function was seen to have significantly increased the burden on LLFAs and was impacting on their ability to carry out their other roles.

In terms of funding for schemes, there was evidence of LLFAs struggling to move schemes beyond the feasibility stage because of the cost-benefit requirements in FDGiA. It was suggested that FDGiA is focused on larger scale fluvial and coastal schemes, with the requirements too onerous for the typically smaller surface water schemes. It was also suggested that the process takes insufficient account of the wider benefits often generated by surface water schemes, e.g. to protecting infrastructure. Stakeholders reported that schemes often end up not being progressed as a result, and alternative approaches being adopted, such as property-level protection.

6.8 Data and sharing

The 2010 Act was reported by stakeholders in this review to have been a driver for increased sharing of data for the purposes of strategy development, flood investigations, scheme development, funding bids and other uses. Practice varied significantly between case studies however, and some stakeholders expressed the need for greater consistency in approaches to collecting and sharing data, and improved mechanisms for collating data from multiple sources at the local level in order to better understand and respond to risk. Concerns were also expressed about the shortage of data on some aspects of the drainage network, particularly underground assets.

Appendix A: Interview details

Case study	Stakeholder type	Interview format
1	LLFA	Face-to-face
	Local Highways Authority	Face-to-face
	WaSC	Telephone
	District Council	Telephone
	District Council	Telephone
2	LLFA/Local Highways Authority	Face-to-face
	WaSC	Telephone
	Internal Drainage Board	Telephone
	Highways England	Telephone
3	LLFA	Face-to-face
	Local Highways Authority	Telephone
	WaSC	Telephone
	District Council	Telephone
4	LLFA	Face-to-face
	Local Highways Authority	Face-to-face
	WaSC	Telephone
	Environment Agency	Telephone
	Internal Drainage Board	Telephone
5	LLFA/Local Highways Authority	Face-to-face
	WaSC	Face-to-face
	Local Planning Authority	Face-to-face
6	LLFA/Local Highways Authority	Face-to-face
	WaSC	Telephone

	Local Planning Authority	Telephone
7	LLFA/Local Highways Authority	Face-to-face
	WaSC	Telephone
	Local Planning Authority	Telephone
	Greater London Authority	Face-to-face