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Assessing the Consideration of Flood Risk by Scottish Local Planning Authorities

Final Report
Prepared for ClimateXChange by LUC
April 2016

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Planning & EIA
Design
Landscape Planning
Landscape Management
Ecology
Mapping & Visualisation

LUC EDINBURGH
28 Stafford Street
Edinburgh
EH3 7BD
T +44 (0)131 202 1616
edinburgh@landuse.co.uk

Offices also in:
London
Bristol
Glasgow



Land Use Consultants Ltd
Registered in England
Registered number: 2549296
Registered Office:
43 Chalton Street
London NW1 1JD
LUC uses 100% recycled paper

Contents

Executive summary	b
1 Introduction	1
2 Policy Context	3
3 Research Method	7
4 Local Development Plans	12
5 Development Management	40
6 Doing things differently: Lessons learned by planning authorities	49
7 Conclusions and recommendations	55
Appendix 1	61
Legislative and policy context	61
Appendix 2	68
Interview Questions	68
Appendix 3	72
Collated recommendations	72
Appendix 4	76
Abbreviations and glossary	76
Acronyms	77
Glossary	78
Tables	
Table 2.1 SPP (2014) Flood Risk Framework	4
Table 3.1 Local authorities with adopted LDPs	7
Table 3.2 Development Management Analysis Questions	11
Table 4.1: Compliance of LDPs with key SPP flooding considerations – comparison matrix	16
Table 0.1: SEPA flood risk criteria	63
Table 0.2 Strategic Government online planning guidance: Flood Risk	64
Table 0.3 SEPA Development Plan Guidance on Flood Risk	65

Figures

Figure 4.1: Stirling's Core Area spatial strategy, and flood risk maps - opportunities for integration? 27

Executive summary

Introduction

ClimateXChange, the Scottish Government's Centre of Expertise on Climate Change, commissioned LUC to undertake research to assess the effectiveness of Scotland's local planning authorities in implementing national planning policy in both planning for flood risk and the effects of climate change, and ensuring new development is avoided in areas at risk of flooding.

Aim, objectives & outcome

The aim of this research project is to assess the implementation of national land-use planning policies on flood risk by Scotland's local planning authorities. As highlighted above, the research focuses on the two stages of land-use policy: development planning and development management.

The objectives of the study are as follows:

- **Development Planning** - Review the 16 adopted Local Development Plans (LDPs) in place by 1st December 2015 and any supplementary guidance to assess how flood risk has been taken into account.
- **Development Management** - Review a sample of planning applications located within areas of flood risk from the 16 authorities to assess the extent to which the issue was considered and influenced decision-making.

The required outcome of the project is a better understanding of the emphasis placed on flood risk management in the production and implementation of Scotland's Local Development Plans, along with key lessons for planning authorities, agencies and stakeholders for future plans and development management casework.

Methods

A systematic review of the 16 adopted Local Development Plans, and a sample of 40 planning applications from these authority areas, was undertaken to understand the extent to which flood risk was considered, and the national and

local policy frameworks applied to decision-making.

Key findings: LDPs

The LDP process works – but could be more efficient

From the 16 LDP processes examined, it is clear that the system as currently defined does work well – with LDP Examinations providing a very valuable back-stop against outstanding issues raised through SEA and representations. Reporters almost invariably follow SEPA's advice on policy issues, although there is some more variance in terms of individual site allocations.

Ensuring that SEPA consultation responses on draft LDPs are given appropriate weight could help to avoid some of this process and administrative burden in development of emerging LDPs.

Assessment of flood risk in LDPs

Strategic Flood Risk Assessment (SFRA) is currently problematic; a little over half of the 16 planning authorities in the study group used the approach, or a suitable equivalent – despite it being requested by SEPA in all but two cases and it being a requirement of SPP.

It is perceived as being a process-driven exercise – rather than a tool that can add value to plan-making. Consequently, there is little evidence for it positively shaping plan outputs in terms of spatial strategies or land allocations. Although good quality guidance is in place, this seems to have comparatively little impact.

The integration with Strategic Environmental Assessment (SEA) was also explored. While most authorities perceived this as a very positive and useful process, SEPA's consultation responses indicated that – at least in the first instance – assessments are not effective in identifying and screening out flood risk. Their responses to over half of the LDPs indicated substantive concerns across a range of issues relating to flooding, including:

- inconsistency of assessment of land allocations within similar areas of flood risk;

- inconsistency in approach to avoidance/mitigation measures;
- not applying mitigation measures in the SEA to the plan;
- lack of evidence of or justification for consideration of flood risk.

Detailed examination of correspondence trails revealed that, even where SEPA repeatedly raise concerns in relation to flooding, authorities often either disregard or otherwise fail to take their views into account. Fortunately, where there were significant issues these were invariably dealt with effectively at Examination.

Availability and use of flood risk spatial data

Authorities are well aware of the flood risk data provided by SEPA, and there is a general recognition that has improved significantly in recent years. However, around a quarter of authorities in the study group did not supplement the SEPA data available at the time with more locally-specific information.

There appears to be a widespread misunderstanding with regard to what the SEPA flood risk maps actually depict, how they are derived and the limitations that should be placed on their usage. This is unhelpful in terms of undermining confidence, and also that the data are being used for inappropriate purposes.

The extent to which climate change was actively considered in assessments of flood risk in development plans was very limited; but interviews indicate that many authorities are now adopting a creative approach to addressing this issue.

Understanding and accounting for the effects of climate change on flood risk

While awareness of climate change in general was very good, understanding of the likely tangible effect on the risks posed by flooding was poor. This was visible across all aspects of LDPs:

- Policies were generally weaker in terms of translating SPP's avoidance principle – which is afforded additional significance in the context of climate change. (6 out of 16 plans had unresolved SEPA objections to flood risk policies dealt with at Examination)
- Spatial strategies showed little evidence of having been influenced by the outcomes of flood risk assessment, with virtually no clear consideration of climate change.

- Land allocations were particularly problematic, with proposals frequently at significant risk of flooding even before the effects of climate change were taken into account. 12 out of 16 plans had allocations with outstanding flood risk objections (usually from SEPA) dealt with at Examination.

Need for stronger alignment with SPP policy principles and risk framework

SPP's policy on flood risk sets a requirement for LDPs to promote:

- A precautionary approach to flood risk from all sources;
- Flood avoidance, by safeguarding storage and conveying capacity;
- Flood reduction through natural and structural management methods; and
- Avoidance of increased surface water flooding through the use of Sustainable Drainage Systems (SuDS).

Unfortunately application of the first three points above was found to currently be suboptimal¹. While it is recognised that identification and protection of areas of significant storage and conveying capacity involves land outside planning control, there is a need for a stronger cross-sectoral approach in identifying important areas and promoting integrated management. This cannot be achieved by planning authorities in isolation, and significant buy-in will be required from Government and the land management sector if meaningful gains are to be made.

Authorities are already tackling the issue in interesting and innovative ways

From the interviews with policy officers, it is clear that there is a widespread recognition that flooding is a weak point in a number of adopted plans. Indeed, a number of authorities are taking the lead in developing approaches to addressing key problems that could be worthy of further study. These include:

- More effective allowances for climate change (e.g. applying an effective 1-in-400 year risk threshold to ensure climate effects are avoided).
- Requiring detailed pre-allocation Flood Risk Assessment from landowners proposing sites in at-risk areas. This can provide greater

¹ SuDS are a legal requirement under the Water Environment and Water Services (Scotland) Act 2003

certainty, ensuring sites are genuinely 'developable' and can effectively contribute to land supply requirements.

Value and importance of local flood risk teams

The availability of locally-specific advice from with the authority was frequently highlighted as a key source of information – a strong positive influence on the content of LDPs.

There is also a perception that the development and adoption of Flood Risk Management Plans will help to embed more effective thinking on flooding across local authorities.

Key findings: Development management

Applying flood risk policies

All 16 LDPs flooding policies were basically sound – but they are only effective when they are applied.

In 15 of 40 cases, there was no evidence that officers had considered local or national flood risk policies as part of their decision-making process – despite all cases being either within (9) or directly adjacent to/in close proximity to areas of significant flood risk (6). This issue affected nine of the 16 local authorities.

This clearly illustrates that flood risk is not always being dealt with effectively; meaning that developments are being permitted and built in areas at potentially significant risk of flooding.

Assessing flood risk

Only nine of the 40 cases were supported by Flood Risk Assessment (FRA) – despite all sites necessitating at least some level of consideration of direct risk and that posed by climate change.

Key recommendations

The following recommendations are not prioritised, but provide a good indication of the breadth and depth of additional thinking required to ensure future LDPs and decisions on development proposals are robust.

Local Development Plans

- Greater emphasis on the value and importance of the application of a precautionary approach to planning for flood risk
- More effective understanding and application of the avoidance principle in policies, overarching spatial strategies and especially assessment of land allocations.
- Need for greater political buy-in and leadership on flooding as a critical local and national issue.

Similarly, SEPA is not being consulted as often as it should be on sites at risk of flooding – despite a clear requirement in The Town and Country Planning (Development Management) (Scotland) Regulations 2013.

This raises significant questions regarding:

- The efficacy of constraints mapping available to validation / case officers;
- Processes for checking application boundaries against constraints;
- Processes triggering consultation with SEPA and internal flood risk teams; and
- Application of relevant local policies requiring FRA for proposed development in flood risk areas.

However, where SEPA is involved at the appropriate time, its advice is highly influential.

Avoidance versus mitigation

In general, planning authorities appear to be taking an approach that allows development in areas of flood risk, and seeking to design out and mitigate potential impacts through the use of conditions. This clearly conflicts with the precautionary and avoidance principles enshrined in SPP's flooding policy.

None of the cases examined contained evidence of specific discharge of conditions – for example, where updated FRA had been requested, this was not available on file.

While this is likely to be an administrative issue, other research projects on planning impact have frequently highlighted a potential implementation gap between the conditions imposed and the environmental benefits delivered by development as-built.

- Research into the costs and benefits of pre-allocation Flood Risk Assessment of proposed land allocations.

Assessing flood risk

- Need for detailed assessment of whether Strategic Flood Risk Assessment (SFRA) as an approach is effective and fit-for-purpose.
- Need for a 'culture change' in attitudes to flood risk in development management – moving from mitigation to avoidance.
- Further research into levels of understanding of cumulative effects of development on flood risk at a catchment scale; and the effects of all sources of flooding.

Consideration of climate change

- Need for guidance for local authorities to assist in understanding climate risks, interpreting available data and translating this into robust, sustainable spatial strategies.

Sources of flood risk

- Assess the need for additional training or guidance on taking surface water flooding into account, and assessing the combined risk from different sources of flooding.

1 Introduction

Background and purpose

- 1.1 Although flooding is a natural part of the hydrological cycle, it represents one of the key threats facing Scotland's natural and built environment, communities and economic activity. Around 4% of residential properties in Scotland (approximately 99,800) are estimated to be exposed to one or more sources of flooding (Scottish Government, 2015)². The planning system has a crucial role to play in ensuring that people, property, infrastructure, and sensitive environmental assets are free from current and future significant flood risk.
- 1.2 ClimateXChange, the Scottish Government's Centre of Expertise on Climate Change, commissioned LUC to undertake research to assess the effectiveness of Scotland's local planning authorities in implementing national planning policy in both planning for flood risk and the effects of climate change, and ensuring new development is avoided in areas at risk of flooding. The project focused on the two stages of land-use policy: development planning and development management.
- 1.3 The project reflects a particular need to document the effectiveness of flooding policies and their influence on decision-making in order to understand the likely levels of exposure of new development to flood risk. The study findings will inform an assessment of how Scotland is preparing for the impacts of climate change and is a requirement under the Climate Change (Scotland) Act 2009. It will also inform the independent assessment of the Scottish Climate Change Adaptation Programme (SCCAP) (due for publication in September 2016) which is being produced by the Adaptation Sub-Committee (ASC) of the UK Committee on Climate Change.

Aim and objectives

- 1.4 The aim of this research project is to assess the implementation of national land-use planning policies on flood risk by Scotland's local planning authorities. As highlighted above, the research focuses on the two stages of land-use policy: development planning and development management.
- 1.5 The objectives of the study are as follows:
 - **Development Planning** - Review the 16 adopted LDPs and any supplementary guidance to assess:
 - How local authorities have assessed current and future flood risk (methods, data sources, use of Strategic Flood Risk Assessments [SFRAs]) in order to inform their LDPs;
 - How flood risk information was used to inform the spatial strategy and site allocations;
 - Whether SEPA's advice was taken into account in the consideration of site allocations and a policy framework for flood risk;
 - How aligned these LDPs are with the policy principles and risk framework within Scottish Planning Policy.
 - **Development Management** - Review a sample of planning applications located within areas of flood risk from the 16 authorities to assess whether:
 - A Flood Risk Assessment (FRA) was provided alongside the planning application;
 - The FRA accounted for all sources of flooding;
 - The FRA accounted for how climate change may affect future flood risk;

² Figures from SEPA FRM Strategy Characterisation Data: 20,600 (0.8%) at high risk [1-in-10 year]; 79,200 (3.2%) at medium risk [1-in-200 year]

- SEPA provided advice on the application and, where this was provided, whether the advice was followed – and if not, what justification was provided for not following SEPA’s advice.
- 1.6 The outcome of the project is a better understanding of the emphasis placed on flood risk management in the production and implementation of Scotland’s Local Development Plans, along with key lessons for planning authorities, agencies and stakeholders for future plans and development management casework.
- 1.7 The remainder of the report is structured as follows:
- Section 2: National Policy context
 - Section 3: Research Methodology
 - Section 4: Development Planning
 - Section 5: Development Management
 - Section 6: Conclusions and Recommendations

Note on presentation of findings

Use of numbers in reporting

- 1.8 In the remainder of the report, wherever possible precise numbers are presented to support findings (e.g. ‘11 out of 16 authorities’; ‘20% of cases’). However, given the qualitative nature of much of the research – particularly with regard to information gleaned from interviews with planning officers – it was sometimes necessary to be more cautious to avoid the presentation of officers’ opinions as fact, or necessarily representative.

Presentation of confidential information

- 1.9 Interview participants were guaranteed anonymity in any and all published work derived from their contributions. Therefore, quotes are not directly attributed to either individuals or to planning authorities (as this would effectively identify the officers involved).
- 1.10 Anonymised interview transcripts and notes have been provided to ClimateXChange.
- 1.11 The project team would like to thank the officers of the 16 authorities involved in the project. Without their contributions, the outputs and outcomes of this research would be much the poorer.

2 Policy Context

Introduction

- 2.1 Scottish Planning Policy (SPP) sets out national planning policies, including those in relation to flooding, for the operation of the planning system and the development and use of land. SPP outlines the high level policy principles that will help to deliver the objectives of the National Planning Framework. The detailed legislative and policy context is provided by **Appendix 1**.
- 2.2 SPP offers broad aspirations and principles rather than detailed guidance on how those principles are to be delivered in practice. Therefore, there is potential for differences in the interpretation of the requirements of SPP by planning authorities, key agencies and Government.

Scottish Planning Policy (2010) and Scottish Planning Policy (2014)

Policy Principles

- 2.3 **Scottish Planning Policy (SPP) (2010)**³ directs planning authorities to take the probability of flooding from all sources – (coastal, fluvial, pluvial, groundwater, sewers and blocked culvers) into account when preparing development plans and determining planning applications. **SPP (2014)**⁴ advises planning authorities to take "a precautionary approach to flood risk from all sources" whilst also taking account of the predicted effects of climate change. Both documents include an effective presumption against development that would have either a significant probability of being affected by flooding, or increasing the probability of flooding elsewhere (SPP2010, para. 197; SPP2014, para. 256).
- 2.4 Both versions of SPP advocate *flood avoidance*, however, while SPP (2014) steers development away from the functional floodplain⁵, SPP (2010) will permit built development on the floodplain provided it does not affect the ability of the floodplain to store and convey water, and where it will not increase the risk of flooding elsewhere. This is a subtle, but important, distinction.
- 2.5 Both iterations of SPP, advocate that the area of impermeable surface should be kept to a minimum in all new developments with SPP (2014) further stating that the planning system should promote the avoidance of increased surface water flooding through requirements for Sustainable Drainage Systems (SuDS).
- 2.6 SPP (2014) promotes *flood reduction* undertaking natural and structural flood management measures where necessary, including flood protection, restoring natural features and characteristics, enhancing flood storage capacity, avoiding the construction of new culverts and opening existing culverts.
- 2.7 SPP states that the planning system should prevent development which would have a significant probability of being affected by flooding or would increase the probability of flooding elsewhere. Both iterations of SPP state that piecemeal reduction of the functional floodplain should be avoided given the cumulative effects of reducing storage capacity.

Development Planning

- 2.8 SPP (2014) states that development plans should use Strategic Flood Risk Assessment (SFRA) to inform choices about the location of development and policies for flood risk management. SFRAs

³ Scottish Government, 2010. *Scottish Planning Policy* [pdf]. Available at: <http://www.gov.scot/Resource/0045/00453827.pdf> <http://www.gov.scot/Resource/0045/00453683.pdf> [Accessed 15 February 2016]

⁴ Scottish Government, 2014. *Scottish Planning Policy* [pdf]. Available at: <http://www.gov.scot/Resource/0045/00453827.pdf> [Accessed 15 February 2016]

⁵ SPP defines the functional floodplain as having a greater than 0.5% (1:200yr) probability of flooding.

should have regard to the flood maps prepared by SEPA, and take into account finalised and approved Flood Risk Management Strategies/Plans, and River Basin Management Plans.

- 2.9 SPP (2014) requires strategic and local development plans to address any significant cross boundary flooding issues by identifying major areas of the floodplain that should be protected from inappropriate development, major flood protection scheme requirements or proposals, and relevant drainage capacity issues. Furthermore, local development plans should protect land with the potential to contribute to managing flood risk through natural flood management, managed coastal realignment, washland or green infrastructure creation, or as part of a scheme to manage flood risk.

Flood Risk Framework

- 2.10 To provide a basis for planning decision making relating to flood risk, SPP (2010) and (2014) prescribes the use of a flood risk framework. The risk framework divides flood risk into three categories of coastal and watercourse flood risk and outlines the appropriate planning approach for each.

Table 2.1 SPP (2014) Flood Risk Framework

Risk Framework	
Little or No Risk	<p>Annual probability of coastal or watercourse flooding is less than 0.1% (1:1,000 years)</p> <ul style="list-style-type: none"> No constraints due to coastal or watercourse flooding
Low to Medium Risk	<p>Annual probability of coastal or watercourse flooding is between 0.1% and 0.5% (1:1,000 to 1:200 years)</p> <ul style="list-style-type: none"> Suitable for most development. A flood risk assessment may be required at the upper end of the probability range (i.e. close to 0.5%) and for essential infrastructure and the most vulnerable uses. Water resistant materials and construction may be required. Generally not suitable for civil infrastructure. Where civil infrastructure must be located in these areas or is being substantially extended, it should be designed to be capable of remaining operational and accessible during extreme flood events.
Medium to High Risk	<p>Annual probability of coastal or watercourse flooding is greater than 0.5% (1:200 years)</p> <p>May be suitable for:</p> <ul style="list-style-type: none"> Residential, institutional, commercial and industrial development within built-up areas provided flood prevention measures to the appropriate standard already exist and are maintained, are under construction, or are a planned measure in a current flood risk management plan; Essential infrastructure within built-up areas, designed and constructed to remain operational during floods and not impede water flow; Some recreational, sport, amenity and nature conservation uses, provided appropriate evacuation procedures are in place; and Job-related accommodation, e.g. for caretakers or operational staff. <p>Generally not suitable for:</p> <ul style="list-style-type: none"> Civil infrastructure and the most vulnerable uses; Additional development in undeveloped and sparsely developed areas, unless a location is essential for operational reasons, e.g. for navigation and water-based recreation, agriculture, transport or utilities infrastructure (which should be designed and constructed to be operational during floods and not impede water flow), and an alternative, lower risk location is not available; and New caravan and camping sites. <p>Where built development is permitted, measures to protect against or manage flood risk will be required and any loss of flood storage capacity mitigated to achieve a neutral or better outcome.</p> <p>Water-resistant materials and construction should be used where appropriate. Elevated buildings on structures such as stilts are unlikely to be acceptable.</p>

- 2.11 The content of SPP's (2010) flood risk framework is, in general, very similar to the current framework outlined in **Table 2.1**.

Development Management

- 2.12 Aside from the flood risk framework criteria outlined above, developers and planning authorities should also take into account the characteristics of the site; the design and use of the proposed development; the size of the area likely to flood; depth/flow rate/path of flood water; risk of wave action for coastal sites; flood protection methods; the effects of climate change (SPP [2014] only) (SEPA advise an increase of 20% of the peak 0.5% Annual Exceedance Probability flow for fluvial, coastal and pluvial flooding); the allowance for freeboard (SEPA recommend a minimum freeboard of 500 to 600mm and, 600-720mm taking climate change into account); surface water run-off (SPP [2014] only); culverted watercourses (SPP [2014] only); cumulative impacts; cross boundary effects; and, effects of flood on access and on proposed open spaces.
- 2.13 Landraising, which involves permanently elevating a site above the functional floodplain, may be considered in exceptional circumstances, where it is shown to have a neutral or better impact on flood risk outside the raised area (SPP [2010] and [2014]).
- 2.14 SPP (2014) states that Flood Risk Assessments (FRAs) will be required for development in the medium to high category of flood risk, and may be required in the low to medium category in certain circumstances. FRAs will be required for applications within areas identified as being of high or medium likelihood of flooding/flood risk in SEPA's flood maps.
- 2.15 SPP (2014) specifies that Drainage Assessments, covering both surface and foul water, will be required for areas where drainage is already constrained, or if there would be off-site effects. Proposed arrangements for SuDS should be adequate for the development and appropriate long-term maintenance arrangements should be put in place.

Interpretation of SPP

- 2.16 Like all planning policies, SPP is subject to interpretation by plan and decision-makers and, ultimately, the Courts. Its provisions with regard to flooding are one of many considerations that need to be balanced to create an ambitious but deliverable LDP vision and spatial strategies, sufficient and sustainable land allocations and robust, enforceable development management policies.
- 2.17 The difficulty of doing this, while reaching the appropriate balance between issues and ensuring compliance with SPP's 300 paragraphs of policy⁶ should not be underestimated. No planning authority would deny that flooding is a key issue, and one that is growing in significance, but inevitably it is afforded different degrees of weight depending on local circumstances, issues and political imperatives.

LDPs

- 2.18 SPP's flooding policy contains no absolutes. It states that LDPs "**should use the...flood risk framework to guide development**" [LUC emphasis].
- 2.19 In strict policy terms, this wording is not binding and does not compel authorities to follow the framework – it leaves space for exceptions. This tacitly acknowledges that it will not always be possible for authorities to make space for the necessary or aspirational patterns of development required to fulfil the needs of their communities, the economy and the local environment without some level of compromise. Here, the role of SEPA as a statutory consultee on development plans and Strategic Environmental Assessment (SEA) is critical in ensuring that flooding has been properly considered and assessed – but ultimately local politicians, through their officers, are responsible for deciding the most appropriate approach to locally significant issues. This democratic accountability is a cornerstone of the Scottish and UK planning systems. While decisions are rightly tested against the national policy framework through the Examination process, Reporters will generally support the principle of subsidiarity⁷ unless clear policy conflicts or errors in process are identified.

⁶ Across 15 policy themes, overarching principal policies and general policy on the purpose of planning and delivery matters

⁷ Taking decisions at the lowest practicable level of government

Development management

- 2.20 SPP states that the planning system “**should** prevent development which would have a significant probability of...flooding or would increase the probability of flooding elsewhere”. As noted above, this language – while reasonably strong – remains equivocal and allows the potential for exceptions.
- 2.21 Planning authorities are required, by Sections 25 and 37 of the Town and Country Planning (Scotland) Act 1997, as amended, to make decisions in accordance with the development plan, unless material considerations indicate otherwise⁸. This means that, where the development plan accords with SPP – as it must, having passed through Examination and Ministerial approval – it should take primacy. The expectation being that the local policy framework will add subtlety and locally-appropriate detail that SPP cannot.
- 2.22 In making determinations on planning applications, officers and Elected Members therefore have an explicit duty enshrined in law to weigh the requirements of policy against wider mitigating factors. On occasion, the economic, social or environmental benefits of a proposal may outweigh the additional risk of flooding, the need for new defences or concurrent increases in downstream risk. This is for the decision-maker to determine and the Courts to decide where errors in law have occurred.

The political dimension

- 2.23 Given the many technical facets of planning, particularly where matters of environmental impact necessitate detailed assessment approaches, it is easy for the inherently political nature of the process, its policies and outcomes to be overlooked.
- 2.24 Elected Members are ultimately responsible for the plans and decisions made by the planning authority and, especially with regard to development proposals, their influence and importance – and the pressures for delivery they face – should not be underestimated.

Limits of planning control

- 2.25 SPP, along with NPF3, sets an ambitious framework for delivering ‘natural flood management’, identifying and safeguarding areas of functional floodplain and ‘safeguarding flood storage and conveying capacity’.
- 2.26 While this is a significant positive step, the majority of activities occurring on functional floodplains – including some development related to land-based industries⁹ – occur outside of planning control. Agriculture and forestry can have major impacts on downstream flooding, for better or worse, with no recourse to the planning system. Local authorities therefore have very little control over the use of large areas of undeveloped catchment, and permitted development rights afforded to land-based industries are extensive and widely exercised.
- 2.27 However, this issue has been acknowledged and solutions trialled by SEPA, in partnership with SNH, through the ‘Ecosystems Approach Demonstration Projects’ arising from *Getting the best from our land: a land use strategy for Scotland* (2011). Bringing together land managers and communities to develop solutions to environmental challenges – most notably flooding – the [Carse of Stirling Ecosystems Approach Demonstration Project](http://www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=2113)¹⁰ is an excellent, and award-winning example of how the land management and planning regimes can work together to deliver locally-developed and legitimised solutions.

⁸ Reiterated in paragraph iii of SPP.

⁹ That benefit from rights conveyed under classes

¹⁰ <http://www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=2113>

3 Research Method

Introduction

3.1 The evidence review approach involved two stages:

- **Development Planning:** Using a desk based approach to identify evidence of the extent to which current and future flood risks are being taken into account in the preparation of Local Development Plans. Interviews with planning policy officers from each local authority were conducted to gain a greater understanding of the challenges faced by planners in implementing national planning policy when preparing Local Development Plans and to gauge where planners think improvements can be made to improve the process in the future.
- **Development Management:** Detailed desk based analysis of 40 planning applications to assess the extent to which local authorities have accounted for current and future flood risks in their decision making and put in place any flood related mitigation measures.

Development Planning Analysis

Local Development Plans

- 3.2 At the time of commissioning, 16 local authorities had adopted Local Development Plans (LDPs) in place. These LDPs were assessed to identify their level of compliance with flood-related national planning policy; the methods, data and advice used to assess flood risk; and, how flood risk information ultimately influenced the spatial strategy and site allocations. The LDPs were assessed against the extant policy framework, which in the majority of cases was National Planning Framework 2 (NPF2) and Scottish Planning Policy (SPP) (2010) (see Table 3.1).
- 3.3 The effectiveness of planning policy in influencing development management was assessed by analysing a sample of planning applications located within areas of flood risk from the 16 local authorities with adopted LDPs. The analysis identifies the extent to which Strategic Flood Risk Assessment (SFRA) and advice from the Scottish Environment Protection Agency (SEPA) have been used to inform decision making.

Table 3.1 Local authorities with adopted LDPs

Local Authority	Date of Adoption	Policy Framework
Aberdeen City	29/02/2012	NPF2 and SPP (2010)
Highland	05/04/2012	NPF2 and SPP (2010)
Aberdeenshire	01/06/2012	NPF2 and SPP (2010)
Comhairle nan Eilean Siar (Western Isles)	09/11/2012	NPF2 and SPP (2010)
Dundee City	05/12/2013	NPF2 and SPP (2010)
Perth and Kinross	03/02/2014	NPF2 and SPP (2010)
Orkney Islands	Apr-14	NPF2 and SPP (2010)
North Ayrshire	20/05/2014	NPF2 and SPP (2010)
Renfrewshire	28/08/2014	NPF2 and SPP (2010)
Inverclyde	29/08/2014	NPF3 and SPP (2014) ¹¹
South Ayrshire	23/09/2014	NPF2 and SPP (2010)

¹¹ Prepared under NPF2 and SPP 2010 but the adopted Local Development Plan refers to NPF3 and SPP 2014.

Local Authority	Date of Adoption	Policy Framework
Stirling	26/09/2014	NPF2 and SPP (2010)
Shetland Islands	26/09/2014	NPF2 and SPP (2010)
Dumfries and Galloway	29/09/2014	NPF2 and SPP (2010)
Argyll and Bute	26/03/2015	NPF3 and SPP (2014)
Cairngorms National Park	27/03/2015	NPF3 and SPP (2014)

LDP Flooding Policies

- 3.4 Firstly, a high level review of the content of Local Development Plan flooding policies was undertaken to determine their level of compliance with the policy principles and risk framework within Scottish Planning Policy (SPP).
- 3.5 The review of flooding policies sought to establish whether each policy:
- Precludes development in areas of any flood risk and where it could increase flooding elsewhere;
 - Considers the potential of flood risk from all sources;
 - Refers to climate change and its impact on flooding;
 - Refers to natural and structural flood management/reduction measures;
 - Requires sustainable management of additional runoff as a consequence of development;
 - Refers to the SPP Flood Risk Framework and the flood maps prepared by SEPA;
 - Refers to SFRAs and site-specific FRAs;
 - Refers to the use of water resistant materials and construction methods;
 - Refers to the Flood Risk Management Strategies and River Basin Management Plans; and,
 - Refers to Supplementary Guidance on flooding.

Local Development Plan

- 3.6 Following the assessment of the flooding policies within each LDP, the project team undertook a systematic review of the 16 adopted LDPs and associated documents.
- 3.7 The methodology for this aspect of the project has evolved considerably over time, in response to challenges posed by the available data and the need to adopt alternative approaches to capture missing, or obscure details. The initial methodology intended to capture the approach to flooding in LDPs using a database.
- 3.8 However, on testing this necessarily rigid and exhaustive recording framework against the available LDP information, it quickly became apparent that a quantitative approach – necessitating direct comparability of data on each LDP – was unlikely to be fit for purpose. Substantial variance in approach between local authorities, SEPA officers and Examination Reporters, as well as the scope and format of available material, meant that there was insufficient commonality to be able to adopt this ‘one-size-fits-all’ solution. Had the project persisted with this approach, the results would also have appeared far more ‘negative’ than is necessarily the case.
- 3.9 The approach was subsequently amended to adopt a more qualitative approach, more suited to the varied nature of issues and approaches to flood risk identified through the review process. Limitations on the approach include the availability of SEPA responses to the MIR and Proposed Plan, which frequently include detailed comments on flood risk of specific sites, in addition to comments made on the Environmental Reports.
- 3.10 The review of Local Development Plans included:
- Development plan documents:

- the Main Issues Report (MIR);
- the Proposed Plan (including modified versions); and,
- the adopted LDP.
- Strategic Environmental Assessment (SEA):
 - Scoping Report;
 - Environmental Report(s);
- SEPA's consultation responses to:
 - the SEA and LDP documents,
 - Strategic Flood Risk Assessments (where prepared), and,
- LDP Examination Reports.

3.11 The first step in the desk based review of LDPs was to review all Scoping Reports and Environmental Reports for references to how flood risk will be assessed and any specific flood related comments/assessment criteria. This also provided details on the sources of information used to inform the environmental baseline. Strategic Flood Risk Assessments were reviewed, where prepared, to assess their influence on land allocations and the LDP's spatial strategy.

3.12 Following this, SEPA's consultation responses to the Scoping Report and Environmental Report were reviewed for their flood related advice and to gauge their level of influence through Strategic Environmental Assessment. The MIR and Proposed Plan were reviewed in addition to SEPA's consultation responses on both documents to assess whether flood risk issues were addressed through the SEA process or whether there were outstanding flood related issues which were brought forward to the examination stage. Examination Reports and Reporter's recommendations were reviewed to gain a greater understanding of the reasons for unresolved objections relating to flood risk and the flood related advice on site allocations and policy wording provided by the Reporter.

Interviews

3.13 Interviews with planning policy officers involved in the production of the relevant LPPs in each of the 16 local authorities were undertaken to gain a greater understanding of the challenges faced by planners in implementing national planning policy when preparing LDPs. The interview process enabled discussion of any key information gaps or issues highlighted by the desk-based review. They also facilitated discussion around where officers believed opportunities had been missed, and where they believed improvements can be made to improve the process in the future, lessons learnt from previous LDPs and differing practice in emerging plans.

3.14 The topics covered in the discussions included:

- Priority given to flood risk in the plan preparation;
- Use of SFRA or an alternative approach to establishing the flooding baseline;
- Data sources used to inform the flooding baseline;
- Challenges encountered in ensuring that flood risk was considered in the plan preparation;
- Integration of SEA process and plan preparation;
- Influence of SEPA's advice;
- Influence of guidance or other advice;
- Reasons for flood related issues not being addressed prior to examination stage; and,
- Lessons learned and recommendations for future LDPs.

3.15 Responses from the interviews were anonymous to encourage planning policy officers to speak more candidly about their experience and the challenges they encountered. **Appendix 2** provides a list of the generic questions asked during the discussions. (More detailed questions, to fill specific knowledge/information gaps, were formulated for individual authorities as required.)

3.16 Detailed appraisal of each LDP is provided separately in Annex 1.

Development Management Case Analysis

Introduction

- 3.17 In order to assess the effectiveness of planning policy in influencing development management decisions, it was necessary to analyse a sample of planning applications located within areas of flood risk from the 16 local authorities with adopted LDPs.

Data provision and selection criteria

- 3.18 Planning application data was provided in ArcGIS shapefile format by 15 of the 16¹² target local authorities from the date their plans were adopted to 1st December 2015. The planning application data was 'cleaned' to consistently show the following fields for each local authority: application reference number, description of the proposal, decision status, application type, and application validation date.
- 3.19 Planning applications were chosen based on the following criteria:
- The planning application was for Full Planning Permission.
Exclusions included:
 - Applications for Planning Permission in Principle: it was judged that detailed Flood Risk Assessment could be held over to subsequent full applications, e.g. as 'matters specified in conditions';
 - Other, less relevant, application types (e.g. Listed Building Consent, advertising consents);
 - Changes of use, where flood risk was unlikely to be a significant consideration.
 - The planning application was within/adjacent/or in close proximity to an area at high or medium risk of fluvial, coastal or surface water flooding as identified by SEPA's flood maps¹³;
 - This was deemed necessary to understand what allowances authorities were making for the likely impacts of climate change, and whether 'trigger' mechanisms are effective.
 - The planning application was determined (approved, refused or appealed) and suitably detailed documentation relevant to the application was available on the local authority's Planning Portal.
- 3.20 A shortlist of 40 determined planning applications submitted in 2015 (from a pool of over 100) was chosen for the analysis to ensure the sample group was of a representative size and within a year when all local authorities had adopted their LDPs. This also ensured consistency in overarching national policy, where SPP may have been a determining factor.

Data processing

- 3.21 There were a number of challenges associated with interpreting the data and choosing valid planning applications for the analysis. Firstly, several local authorities did not provide descriptions of the proposals and one local authority did not provide any application details. To determine valid applications for these local authorities in the case study analysis, reference numbers of applications which intersected with the SEPA flood maps were manually checked in the respective local authorities' online databases. Secondly, upon selecting relevant case studies for two local authorities, documentation relevant to the applications (e.g. Report of Handling, Decision Notice, etc.) was not available on the Planning Portal which resulted in further searches for valid applications for the analysis. Thirdly, no applications in the Cairngorms National Park area met with the above criteria and therefore, the level and extent of how flooding is taken into account in decision making in the National Park is not considered in the analysis.
- 3.22 The review identified planning applications for a range of major and local developments, and from different development types including residential, retail, industrial, and renewable energy. The review also included applications that were refused and appealed in order to understand how frequently flood risk is the determining issue in preventing development.

¹² No data was provided by Aberdeen City Council.

¹³ SEPA has issued different iterations of the flood maps between 2009 and 2015. The analysis focused on the flood maps issued from January 2014 – March 2015, and March 2015 – December 2015.

- 3.23 For each selected planning application we sought to answer the following broad question:
To what extent is flood risk being considered by local authorities in deciding planning applications and imposing conditions on development?
- 3.24 The analysis identified whether Local Development Plan policies on flood risk are being implemented in the determination of planning applications and setting of planning conditions by reviewing the planning officer/committee Report of Handling and Decision Notice (and if appealed, the appeal decision). The analysis recorded the types of flood risk to which any conditions for development relate and the types of mitigation measures required. Flood Risk Assessments, where prepared, were also reviewed to determine whether flooding from all relevant sources was taken into consideration, and what mitigation measures, if any, were proposed. Consultation responses by SEPA and the local authority Flood Prevention Team/Officer were also examined to identify which type of flood risk these related to, if any, and if relevant, the flood risk related reasons for any objection by SEPA and the Flood Prevention Team.
- 3.25 As highlighted above, the analysis of planning applications will depend on the choice of applications using a careful selection criteria of type of risk, spatial variation, scale and type of development. This information was captured in Microsoft Excel which allowed information to be easily coded and be quantitatively and qualitatively assessed.
- 3.26 The following table is a summary of the questions used in the analysis:

Table 3.2 Development Management Analysis Questions

Documentation relating to the planning application	Key questions
Planning application form	Application number Proposal description Decision Development type Any identified flood risk
Flood Risk Assessment	Did the FRA consider flood risk from all relevant sources of flooding? Did the FRA modelling take into account climate change (using UK Climate Projections)? Did the FRA consider whether flood risk will be increased elsewhere? Did the FRA propose measures to mitigate flood risk? What mitigation measures were proposed in the FRA?
Flood Prevention Team/Officer consultation response	What was the Flood Prevention Team's response in relation to flooding? What advice did the Flood Prevention Team provide?
SEPA consultation response	Did SEPA provide advice on the application? What was SEPA's initial response in relation to flooding? What conditions did SEPA specify should be attached to the grant of permission? Was SEPA's initial objection re. flood risk subsequently withdrawn (e.g. due to FRA being provided - refer to any subsequent consultation response, officer's report or decision notice) Was SEPA's advice in relation to flooding followed?
Report of Handling	Are local planning policies re. flooding cited in the reasons for the decision and if so, to which flood risks do they relate?
Decision Notice/ Appeal Notice	If permitted: - which flood risks were considered in the decision/appeal? - which types of flood mitigation measures do conditions require? If refused, to which flood risk does refusal relate?

4 Local Development Plans

Introduction

- 4.1 This section of the report, examines how planning authorities have taken current and future flood risk into account in their LDPs.

NB. This version of the report does not specifically name the local authorities involved in the analysis, except in illustrating examples of good or interesting practice. The intention of the research is to highlight areas for improvement for all relevant stakeholders in an open, positive manner – not to undermine the hard work of local authorities and public bodies.

A full version of this report, along with associated digital data, has been provided to Scottish Government and SEPA and will be circulated to relevant stakeholders on request.

Development planning context

- 4.2 Local authorities have a duty to consider all requirements of SPP. A key challenge when allocating sites for development in LDPs is striking a balance between competing interests such as accommodating housing and economic growth and ensuring the protection of the environment. Flood risk is one of many constraints to development that local authorities must consider. Attempting to balance the demands for development, for example meeting housing targets, with environmental constraints has inevitably led to trade-offs. This drive to meet growth targets, coupled with constrained geography means that there can be pressure for local authorities to consider sites at risk of flooding.
- 4.3 Of the four Strategic Development Plans (SDPs) covering Scotland’s main city-regions, SESPlan (2012) and TayPlan (2012)¹⁴ contain specific policies dealing with water and flooding. At the time of writing, there was incomplete coverage of LDPs within SDP areas. It was therefore determined that an effective evaluation of the impact of SDPs in this regard could not reasonably be conducted.

Recommendation

LDP1 Research into the potential of SDPs as a vehicle for delivering regional-scale leadership in planning for flood risk, particularly with regard to catchment-scale approaches.

Local Development Plan Flooding Policies

- 4.4 The following section outlines the headline findings of a systematic review of flooding policies from the 16 adopted LDPs, concentrating on their compliance with Scottish Planning Policy (the headings below reflect the requirements of the 2014 policy).
- 4.5 The findings are also set out in Table 4.1 below. This matrix affords direct comparison between LDPs – and provides a useful understanding of overall compliance.

¹⁴ SESPlan: The Strategic Development Planning Authority for Edinburgh and South East Scotland comprises the following local authorities: East Lothian; City of Edinburgh; Fife (south); Midlothian; Scottish Borders; and, West Lothian. ; TayPlan: the Strategic Development Planning Authority for Perth and Kinross, Dundee, Angus and north Fife.

Policy framework

Which National Planning Framework and Scottish Planning Policy informed your LDP?

- 4.6 13 (80%) local authorities prepared their Local Development Plans under NPF2 and SPP (2010), although eight (50%) LDPs were adopted subsequent to the publication of NPF3 and SPP (2014) in June 2014. Three local authorities updated their adopted LDP to reflect the change in national policy. It should be noted that this was principally an administrative – rather than a substantive – change, as no concurrent shift in emphasis given to flooding can be observed.

Is there a specific flooding policy within the LDP?

- 4.7 14 (87%) local authorities had a specific flooding policy within their LDP. One LDP presents its key flooding policies in statutory Supplementary Guidance.
- 4.8 One LDP took a different approach and referred to flood risk in relation to sustainable development and climate change - "Avoid places with significant risk of flooding, tidal inundation, coastal erosion or ground instability". Flood risk was also highlighted in relation to other key policy areas, specifically: renewable energy and resource use and consumption. (Separate Supplementary Guidance has been prepared and was out for consultation at the time of writing. It restates the SPP risk framework and highlights that Flood Risk Assessments should accompany planning applications when required by the planning authority and/or SEPA.)

Consideration of flood risk

Does the policy preclude development in areas of any flood risk?

- 4.9 The flooding policies from all local authorities precluded development in areas of **any** flood risk, with two exceptions, which precluded developments in areas at significant risk of flooding.

Does the policy preclude development that could increase flooding elsewhere?

- 4.10 Ten of the 16 local authorities' flooding policies precluded development that has the potential to increase the probability of flooding elsewhere. Recognition of this risk was not included by six local authorities, four of which were among the first authorities to prepare LDPs under the 2008 Regulations¹⁵.

Does the policy consider the potential of flood risk from all sources?

- 4.11 The review indicates that only four (25%) local authorities had specifically mentioned the risk of flooding from all sources (coastal, fluvial, pluvial, groundwater, reservoirs, and drainage systems).
- 4.12 Ten (56%) local authorities made general statements about flood risk but did not explicitly list the different sources of flood risk. For example, one authority's flooding policy primarily focused on the risk of coastal flooding and coastal erosion, while another's concentrated on fluvial, coastal and surface water flood risk – both strongly dependent on their geographical/topographical character. This indicates that authorities are, seemingly rationally, prioritising the main perceived threats to their area¹⁶.

Does the policy include reference to climate change and its impact on flooding?

- 4.13 Recognition of climate change and its impact on flooding was relatively high, with ten local authorities (62%) making specific reference within their flooding policies.
- 4.14 Climate change and its effect on flooding was considered by these local authorities to varying extents, from cursory references, through to providing specific examples of how developments can adapt to climate change (e.g. allowance of freeboard, use of water resistant materials). Although six local authorities did not refer to the impact of climate change on flooding, the majority of their LDPs had overarching climate change policies or Supplementary Guidance on climate change. However, as the report explores below, the extent to which climate change was *meaningfully* taken into account in planning for flood risk varies rather more widely.

¹⁵ The Town and Country Planning (Development Planning) (Scotland) Regulations 2008

¹⁶ Although it should be noted that a significant proportion of the Forth Valley, in the Stirling Council area, is at high risk from coastal flooding – particularly in relation to storm surge events.

Does the policy refer to flood avoidance?

- 4.15 As outlined above, the majority of flooding policies from local authorities precluded development in areas of any flood risk. However, only seven (43%) local authorities specifically referred to precluding development in the functional floodplain to safeguard flood storage and convey capacity.

Does the policy refer to natural and structural flood management/reduction measures?

- 4.16 Only seven local authorities (43%) specifically referred to natural and structural flood management/reduction measures such as flood protection, restoring natural features, etc.

Does the policy require sustainable management of additional runoff as a consequence of development?

- 4.17 Five local authorities referred to sustainable management of additional runoff in their flooding policies, while ten local authorities addressed this issue within a separate policy (usually within a surface water drainage or waste water drainage policy).

Does the policy refer to the SPP Flood Risk Framework?

- 4.18 Over 60% (10) of local authorities advised that the SPP Flood Risk Framework would be used to guide development away from areas of medium to high flood risk. Six local authorities did not refer to the SPP Flood Risk Framework within their flooding policies.

Does the policy refer to the flood maps prepared by SEPA?

- 4.19 The analysis found varying reference to the flood maps prepared by SEPA, with nine local authorities making reference to either the Indicative River and Coastal Flood Map or the more recently published Flood Risk and Hazard maps, while seven local authorities made no reference to SEPA's flood maps in their flooding policies.

Does the policy refer to the Flood Risk Management Strategies and River Basin Management Plans?

- 4.20 The majority (75%) of flooding policies did not refer to Flood Risk Management Strategies and River Basin Management Plans despite both SPP (2010) and SPP (2014) stating that plans should take account of finalised and approved FRMS and RBMPs (a River Basin Management Plan was in place for Scotland for the period 2009-2015 during which all the plans were being prepared).

Does the policy refer to a Strategic Flood Risk Assessment?

- 4.21 Only one local authority referred to its Strategic Flood Risk Assessment in its flooding policy despite six local authorities in total preparing stand-alone SFRA documents in conjunction with their Local Development Plans/Strategic Development Plans.

Does the policy refer to the necessity of site-specific Flood Risk Assessments?

- 4.22 15 of the 16 local authorities' flooding policies referred to the necessity of site-specific Flood Risk Assessments in line with SPP requirements. As previously outlined, one authority does not have a specific flooding policy within their LDP.

Does the policy refer to the necessity of a Drainage Impact Assessment due to flood risk?

- 4.23 Eight (50%) local authorities' flooding policies did not refer to the necessity of Drainage Impact Assessments, nor is it referred to in a different policy within the LDP. Two local authorities referred to DIAs in a separate policy, with six local authorities referring to Drainage Impact Assessments within the flooding policy.

Does the policy refer to the use of water resistant materials and construction methods?

- 4.24 The majority of local authority flooding policies (68%) did not refer to the use of water resistant materials and construction methods with only five local authorities including reference to sustainable materials and construction methods.

Does the policy refer to land-raising?

- 4.25 Four local authorities precluded land-raising on functional floodplains, with 75% of local authorities not referring to land-raising within their flooding policies.

Does the policy refer to Supplementary Guidance on flooding?

- 4.26 11 (68%) local authorities' flooding policies referred to additional Supplementary Guidance on flooding, of which five Supplementary Guidance documents have been prepared to date. Five local authorities did not refer to additional guidance on flooding and development in their LDPs.

Table 4.1: Compliance of LDPs with key SPP flooding considerations – comparison matrix

Local Authority	Policy Framework	Is there a specific flooding policy within the LDP?	Does the policy preclude development in areas of any flood risk?	Does the policy preclude development that could increase flooding elsewhere?	Does the policy consider the potential of flood risk from all sources including coastal, fluvial, pluvial, groundwater, reservoirs and drainage systems (sewers and culverts)?	Does the policy include reference to climate change and its impact on flooding?	Avoidance: Does the policy refer to flood avoidance - by safeguarding flood storage and conveying capacity, and locating development away from functional flood plains?	Reduction: Does the policy refer to natural and structural flood management / reduction measures - flood protection, restoring natural features and characteristics, avoiding the construction of new culverts, etc.	Does the policy require sustainable management of additional run-off as a consequence of development?	Does the policy refer to the SPP Flood Risk Framework?	Does the policy refer to the flood maps prepared by SEPA?	Does the policy refer to a Strategic Flood Risk Assessment?	Does the policy refer to the Flood Risk Management Strategies and Plans and River Basin Management Plans?	Does the policy refer to the necessity of site-specific Flood Risk Assessments?	Does the policy refer to the necessity of a Drainage Impact Assessment due to flood risk?	Does the policy refer to the use of water resistant materials and construction?	Does the policy refer to land raising (permanently elevating a site above the functional flood plain)?	Does the policy refer to Supplementary Guidance on flooding?
1	NPF2 and SPP (2010)	Yes	Yes	No	Policy lists flood risk from all sources	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	No	No
2	NPF2 and SPP (2010)	Yes	Yes	No	General statement on flood risk - Does not specifically list the different sources of flood risk	Yes	No	Yes	No - Addressed in a separate policy	Yes	Yes	No	No	Yes	Yes - Addressed in different policy	No	No	Yes
3	NPF2 and SPP (2010)	Yes - Policy located in SG policies document	Yes	No	General statement on flood risk - Does not specifically list the different sources of flood risk	Yes	Yes	No	No - Addressed in a separate policy	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes
4	NPF2 and SPP (2010)	Yes	Yes	No	Policy lists flood risk from all sources	Yes	No	Yes	No - Addressed in a separate policy	Yes	Yes	No	Yes	Yes	No	No	No	No
5	NPF2 and SPP (2010)	Yes	Yes	Yes	General statement on flood risk - Does not specifically list the different sources of flood risk	No	No	No	No - Addressed in a separate policy	Yes	Yes	No	Yes	Yes	No	Yes	No	Yes - Not prepared yet
6	NPF2 and SPP (2010)	Yes	Yes	Yes	General statement on flood risk - Does not specifically list the different sources of flood risk	Yes	Yes	Yes	No - Addressed in a separate policy	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes
7	NPF2 and SPP (2010)	Yes	Yes	No	General statement on flood risk - Does not specifically list the different sources of flood risk	Yes	No	No	No - Addressed in a separate policy	No	No	Yes	No	Yes	No	No	No	Yes - Not prepared yet

How have local authorities assessed current and future flood risk?

Strategic Flood Risk Assessment

Use of Strategic Flood Risk Assessment

- 4.27 SEPA typically requested the SEA process be informed by a Strategic Flood Risk Assessment (SFRA) at Scoping stage. It was highlighted through the interviews that many authorities believed that SFRA was not always the most appropriate mechanism to identify flood risk, particularly for areas with a more dispersed settlement pattern.
- 4.28 For two of the 16 authorities, SEPA did not request SFRA: while this may not have been appropriate for one of these authorities, being a very large rural authority with highly dispersed population centres, the other is a semi-urban authority with a comparatively large population and significant risk from all sources of flooding. In this instance, SEPA made no mention of flooding issues until their response on the Interim Environmental Report. As noted in Officer's comments at paragraph 4.52 below, potential resource issues at SEPA may partly explain this oversight.
- 4.29 Over half of the 16 planning authorities used a SFRA to inform the SEA process, or adopted an alternative approach to gathering flood information which was recognised by SEPA as representing, or at least fulfilling the requirements of, a SFRA. This highlights the importance of the data gathering process and consideration of flood risk in informing the plan development process, rather than the 'output' of a SFRA.

Effectiveness of SFRA

- 4.30 There is limited information on the quality of the SFRA, or the extent to which they contributed positively to the plan preparation process, over and above other approaches to considering flood risk. Only one specific SEPA comment was identified in relation to the content of a SFRA, which was noted as '*lacking in detail and not updated during the plan preparation process.*'
- 4.31 There appears to have been some lack of appreciation by the planning authorities of the value which a SFRA could bring to the process, as the planning authorities sometimes just used the SEPA flood risk data, without adding other local contextual information. The planning authorities identified that, for areas which had a lot of local data on flood risk, the SFRA approach was too coarse. Conversely, for areas with a paucity of local flood data, the SFRA process did not add sufficient detail to the decision making process.
- 4.32 There was some perception by the planning officers that a SFRA was another reporting requirement, which they did not have time, resources or, on occasion, the technical expertise to prepare, rather than a tool for informing the development plan process. However, the interviews with planning officers identified that there was significant support for the use of SFRA to inform the preparation of emerging LDPs.

Planning officer quotes:

"We undertook a SFRA which we found really useful. It set out flooding issues from an early stage. We looked at all types of flood risk including upstream risk as well as reservoirs and their impact, and how these risks would impact on development downstream...Our GIS team has a huge amount of information on local flooding areas/events which we used in conjunction with SEPA's flood maps."

"The SFRA was informed by SEPA flood maps available at the time. We also used other sources of local information such as tidal gauge readings. National flood risk data is far superior now than it was when we were completing the SFRA."

Recommendation

- LDP2** There may be a need to examine whether SFRA as an approach, and the current guidance, is fit for purpose. This relates particularly to how the guidance deals with assessing flood risk in different contexts (for example dispersed rural settlements vs. higher density urban areas).
- LDP3** There is a need to counter the impression that SFRA is a purely administrative 'box-ticking' task; framing it more effectively as a tool that adds value to plan-making (along with SEA more generally).

Data sources and use of flood risk information

- 4.33 The data source most commonly cited by the planning authorities to inform the flooding baseline was the SEPA flood maps, and for some planning authorities this was the only information source cited within the Environmental Report. It is acknowledged that other information sources may have been used which were not referenced. Beyond the use of SEPA flood maps and flood information, and Biennial Flood Reports, the collection of flood-related data appears to have been largely dependent on the additional information sources for a local area, or the approach taken in that area which appears to vary significantly. Additional information sources included:
- Flood prevention schemes and other studies;
 - British Hydrological Society websites flood events;
 - Information supporting Aberdeen Beach Recharge;
 - Aberdeen City Council's response to the Rural Affairs and Environment Committee of the Scottish Parliament on an inquiry into Flooding and Flood Management which focussed on climate change issues.
 - Office of Science and Technology (2005) Foresight report: Future Flooding Scotland http://www.foresight.gov.uk/Scotland/Final_Scotland.pdf
 - UK Climate Projections (UKCP09), using the medium emissions figure;
 - Potential Vulnerable Area (PVA) to flooding, Estimated Weighted Annual Average damages within PVA, Total Area (Km 2) in PVA, Residential Properties in PVA, Non- Residential Properties in PVA SEPA (2011) Flood Risk Management (Scotland) Act 2009: Flooding in Scotland – A Consultation on Potentially Vulnerable Areas and Local Plan Districts- Appendix 6: Aberdeenshire and Aberdeen City. Edinburgh: SEPA;
 - Dundee Coastal Study and SEA;
 - Dundee Flood Prevention Report (2009) (mapping of known flood risk areas)
 - Information from the Council, Scottish Hydro-electric, British Geological Survey and Scottish Water. The collected data was integrated within a GIS to allow it to be reviewed.
 - A study entitled 'Climate Change: Flooding Occurrences Review';
 - Local Plan District Partnerships;
 - Local advisory groups;
 - Public consultation with local community councils;
 - Historical aerial photographs;
 - Surveys of existing infrastructure for proposed development sites to identify proximity to watercourses and bodies of water;
 - Proudman Oceanographic Laboratory records of tidal levels in Lerwick;

- UK Climate Projections (UKCP09), using the medium emissions figure; and,
- Flood officer input.

4.34 The majority of planning authorities supplemented the SEPA flood map data with local information, however a quarter of the planning authorities appear to have only used the SEPA flood map data, without supplementing this with local information – or more detailed site-specific assessments.

Understanding and application of SEPA flood risk data

- 4.35 A small number of planning authorities did not appear to fully recognise the limitations of the SEPA flood risk maps, and the fact that this is not appropriate for detailed local interpretation without input from other data sources. The issues with data accuracy and how the data was used to inform decisions on site allocations did raise some issues.
- 4.36 There was, however, widespread recognition – and gratitude - that the accuracy of the current generation of SEPA flood maps was greatly improved. Implicit in the first quote below is a level of misunderstanding around how the flood maps are derived, and their applicability to detailed assessments of flood risk. The entire process of modelling flood risk requires a large number of assumptions to be made, and the caveats accompanying the data (including the 'indicative' title) made apparent the limits of their utility.
- 4.37 One planning authority was taking the interpretation of flood risk data much further, and their approach to including the allowance for the effects of climate change, and an allowance for freeboard (as required in SPP) means that the 1-in-200 year flood risk area was not viewed as sufficiently precautionary. They are now looking towards a 1-in-400 or 1-in-500 year flood risk areas as appropriate limits. However, this information is not mapped and there is opposition from local developers and landowners to adopting what is seen as an overly precautionary approach, and the impact on developable areas. [It should be noted that the authority in question has significant areas of flood risk – but also relatively ambitious targets for growth, along with neighbouring authorities.]
- 4.38 The majority of proposed land allocations which were considered at Examination related to sites within or adjoining areas of 1-in-200 year flood risk. This highlights the general lack of adequate consideration of the impacts of climate change on flood risk at the time the current suite of LDPs were produced. It is, however, instructive that many of the officers interviewed acknowledged that flooding had not been given the level of priority it now enjoyed, both within their teams and in the collective consciousness of Elected Members and management.

Planning officer quotes

"We used the Indicative River and Coastal Flood map which was highly questionable. It is based on a number of assumptions by SEPA. However, the new maps are more accessible, accurate and include additional information such as surface water flood extents".

"We didn't have a lot of challenges interpreting and using the flood risk data as the planning team and the flood prevention team worked very closely".

"We verified SEPA's flood maps using advice from our Flood Risk Officer".

"SEPA has made huge strides in improving the flood risk data. When we were preparing the LDP we only had the 1 in 200 year river and coastal flood extents but now there is information on surface water, and 1 in 10 and 1 in 1000 year flood events".

"The main difficulty with SEPA's flood risk data is that it can be inaccurate at a local level. You cannot rely on the SEPA data alone and must use it in combination with other sources like Biennial Flood Reports, local knowledge, etc."

Recommendation

- LDP4** Explore opportunities for a platform for SEPA and planning authorities to share local flood risk information and data so that both parties have access to the same level of detailed information.
- LDP5** Explore the need for guidance on the approach to interpretation and assessment of cumulative impacts of different sources of flooding.
- LDP6** Explore the need for further guidance on planning for the effects of climate change and flood risk areas, the data sources and the parameters which should be used.
- LDP7** Potential need for reiteration of how SPP policy principles and requirements should be reflected in LDPs (particularly precautionary and avoidance principles) – moving beyond textual references to influencing thinking, processes and outcomes.

Flood risk, the SEA process and use of SEPA advice

SEA process and outcomes

Planning authority perspective

- 4.39 The majority of planning authorities felt that the SEA process was well integrated with the plan preparation process and contributed positively to the identification of flood issues at an early stage. One planning authority identified that, although the SEA process was integrated with the plan preparation process, there was a lack of expertise within the teams carrying out the SEA in understanding flood risk.
- 4.40 A planning authority which did not identify the SEA as fully integrated with the plan preparation, explained this through late timing of the SEA:

Planning officer quote

"The SEA process was not as closely integrated with the Plan preparation as it should have been. We prepared the SEA at the end of the Plan stage which meant that we had to revisit work we had previously prepared to provide evidence that sites weren't at risk of flooding. It was a lot of extra pressure on resources."

- 4.41 There may be some opportunities to learn from the 'mainstreaming' of SEA in recent years, in terms of the application of SFRA and understanding of flood risk, to the plan-making process. The perception of SEA as a 'box-ticking' exercise has steadily receded as planning authorities have increasingly undertaking the assessments in-house (rather than contracting out SEA, as was common practice until at least 2010). As understanding of and confidence in the process has increased, its utility as a plan-making tool has also steadily improved.
- 4.42 It should be noted that, for many of the study group authorities, the relevant LDPs were their first attempt at large-scale, complex SEA. Many of the previous generation Local Plans predated the commencement of the 2005 Act¹⁷. The levels of institutional learning required to successfully plan and deliver a fit-for-purpose and useful SEA for a development plan should not be underestimated.

SEPA perspective

- 4.43 While planning authorities were comparatively positive about the SEA process, examination of SEPA's responses throughout the process provided useful context.

¹⁷ Environmental Assessment (Scotland) Act 2005, transposing Directive 2001/42/EC into Scots Law

- 4.44 SEPA raised substantive concerns in their consultation responses over the consideration of flood risk for site allocations through the SEA process for over half of the plans. This included issues such as:
- Inconsistent assessment of flood risk for allocations within areas of similar flood risk;
 - Inconsistent application of flood risk mitigation measures;
 - Not including mitigation from the SEA in the plan;
 - Not adequately identifying some flood related issues;
 - A lack of clarity in SEA objectives for flood risk;
 - Lack of justification of assessments;
 - Lack of evidence for consideration of flood risk.
- 4.45 In several instances SEPA provided their own assessment of flood risk for site allocations in their response to the LDP. In some instances SEPA appeared to hold flooding information on historical flooding of sites, which the planning authority did not appear to be aware of, or had not used.
- 4.46 One local authority opted not to deal with 'Water' as a separate SEA issue¹⁸, instead incorporating this within a general 'natural environment' topic. The authority in question couched their assessment more in terms of a 'Sustainability Appraisal', and tried to produce a focussed and innovative assessment. However, it is clear that flood risk was not given either the level of prominence or integration required to produce either a robust assessment, or information that could usefully be applied in plan-making. The following quotes give an impression of SEPA officers' growing frustration with their [wholly reasonable] recommendations not being taken into account:

SEPA Scoping response quote:

"...how will the methodology take into account a range of water issues such as water quality, flooding, water pollution?..."

SEPA recommends that a Strategic Flood Risk Assessment (SFRA) is carried out to inform the Development Planning Process"

SEPA Environment Report response quote:

No SFRA was undertaken, and consequently flood risk was not given sufficient consideration in relation to proposed land allocations:

"Although the ER states that the appraisal plans have been used to discount housing allocations at risk of flooding there are a number of sites identified in the MIR which are within, partially within, or adjacent to the Indicative 200 year flood envelope, and subsequently may be at medium to high risk of flooding (see our response on the MIR for further details). There are also sites with minor watercourses adjacent to or running through them which may be at medium to high risk of flooding.

We would have expected the ER to have identified sites at risk of flooding, considered alternatives, and detailed mitigation where impacts are considered unavoidable."

- 4.47 While the other authority that adopted a non-standard approach (applying an ecosystems approach-derived framework) was comparatively successful in their innovation, the critical difference was in the level of engagement with and weight given to SEPA's advice. It should, however, be noted that no SFRA was undertaken by this authority either – despite SEPA requests – but that all outstanding flood-related issues were dealt with collaboratively prior to Examination. While conjectural, it is possible that, while SEPA may view flood risk as a 'showstopper' issue (in line with a strict interpretation of the avoidance principle), planning authorities are inevitably

¹⁸ Ordinarily, it would be expected that 'Water' would be scoped in to most SEAs, as the majority of qualifying PPS could result in some level of impact – either positive or negative – on water quality, flood risk or pollution control/management.

concerned with the balance against other issues. There may therefore be a need to understand – and publicise – the weight that Government intends flood risk to have in plan-making.

Policy Framework

- 4.48 SEPA raised issues concerning the wording of the main flooding policy at the Proposed Plan stage in a third of the LDPs. Some of the issues related to minor wording changes, but three of the plan policies were identified as requiring substantive modifications to reflect the avoidance principle. The issues identified in the SEPA responses are identified below [paraphrased]:
- Supporting text for the Flooding and drainage policy did not clearly identify sites and areas constrained by flooding and where further consideration of flood risk required;
 - The need for the policy wording to accord with the avoidance principle;
 - The need for the policy to include reference to the avoidance principle;
 - The main flooding policy is not compliant with the avoidance principle;
 - Amendment required to the text on land use change and vulnerability to flooding;
 - Changes to the wording required to ensure accuracy in the reference to the functional flood plain.
- 4.49 The majority of the planning authorities who still had issues with their main flooding policy at proposed plan stage reported frequent engagement with SEPA throughout the plan preparation process through the interviews. These planning authorities also reported close integration between the SEA and the plan preparation.
- 4.50 There appears to be disparity between the planning authority perspective of the extent to which the SEA process was integrated and effective, and the SEPA consultation response comments which suggest a lack of rigour in the approach to flood risk in the SEA and a lack of true integration between the SEA findings informing the LDP.

Recommendation

- LDP8** Explore how planning authorities can be supported to ensure more effective translation of SEA findings to the LDP preparation process.
- LDP9** Preparation of guidance note on assessing flood risk through SEA, and incorporating SFRA more effectively.
- LDP10** Identify ways to provide additional support to planning authorities that have a lack of flooding expertise. This could include making sure that SEPA staff are aware of which planning authorities need additional support, or targeted training events.

SEPA involvement (to understand how much SEPA involvement is taking place in addition to the statutory consultations)

- 4.51 Three quarters of the plans were informed by SEPA’s own assessment of the flood risk of site allocations, which they provided to the planning authority, most commonly in response to the plan consultation rather than the SEA.
- 4.52 There appears to be a significant geographical disparity in the level of input from SEPA on flooding issues, with those planning authorities in the south and west of Scotland typically receiving a more generic response, and those planning authorities further north benefitting from individual site assessments.

Planning officer quotes

"At the time SEPA were short staffed and we received some basic comments on a spreadsheet

with no additional commentary. We found it difficult to identify the right person in SEPA to speak to...SEPA didn't provide their own assessment of the sites and we would have liked more independent certainty about which sites should be taken forward. We would have appreciated more commentary and advice as to how to address flood risk issues".

"[SEPA's] approach was not to comment on every site (unlike some other key agencies) but to highlight the key risk areas"

- 4.53 Just over half of the planning authorities noted that there had been additional meetings with SEPA, although some of these meetings discussed wider issues in addition to flooding. SEPA's advice was generally noted as being very influential.

Planning officer quotes

"SEPA's advice is very influential. We need their assurance when allocating sites that we are on the right track."

"In general, the information provided by SEPA very useful and their input led to changes in the Plan"

"We had a lot of consultation with SEPA..."

"We had regular meetings in addition to the SFRA training exercise they organised."

"SEPA provided very detailed and specific comments and we had a lot of informal discussions and direct consultation with them about site allocations"

- 4.54 There were examples of where SEPA input was found to be less helpful, including comments based on inaccurate assessment of facts, and a perception that SEPA were sometimes inflexible in their stance on the planning authorities' response to addressing flooding issues.

Planning officer quote

"We took their advice into consideration but there was a degree of inflexibility with the advice they were giving us particularly in relation to the site allocations in [a settlement]."

- 4.55 SEPA generally appears to have put a large amount of time and effort into supporting planning authorities and providing independent assessment and verification of their assessment findings. The interview findings suggest that some planning authorities have a great deal more confidence in their own expertise on flooding issues, whereas others rely more heavily on SEPA input. This is likely to be particularly an issue where there was no flooding officer or flood prevention team within a planning authority at the time of LDP development.

Recommendation

LDP11 Undertake further investigation to understand the geographic association with lower levels of SEPA input to identify if this is an issue with SEPA staffing levels or flooding expertise.

Issues outstanding at Examination

- 4.56 The majority of plans had flooding related policy (6) or site allocation (12) issues outstanding at the Examination stage. The significance of these issues varied, but included some substantial site allocations, and issues with the main flooding policy wording were subject to Examination.
- 4.57 For the planning authorities for which flooding issues were not a significant issue at Examination (or raised at any previous part of the plan making process), two of the planning authorities were areas which had received limited detailed advice from SEPA. Flooding is a significant issue for

these two planning authorities, and therefore the lack of SEPA verification of allocations and policy could have allowed some flooding issues to be overlooked.

Planning officer quotes

"SEPA and the Council's views didn't overlap at the time. It's not Council policy to ask for pre allocation FRAs, we took it to examination and the Reporter agreed that a pre confirmation allocation wasn't appropriate at that time. Views have moved on since then."

"There was a blanket approach taken by SEPA at that time. For brownfield sites in towns, SEPA were making out and out objections to redevelopment. We don't always see eye to eye on certain issues".

"We had a few 'legacy sites', which are sites that have been given planning permission from the previous plan. SEPA objected to several of these sites based on flooding issues. We are obliged to take SEPA's views into account. SEPA wanted these sites out of the spatial strategy which we were unable to do as they had planning permission. SEPA wanted it to be put forward to the Reporter that they weren't happy with these sites being developed because they are at significant flood risk".

"We took their advice into consideration but there was a degree of inflexibility with the advice they were giving us particularly in relation to the site allocations in [settlement] which resulted in sites being brought before the examination board".

"A great deal of learning was being done on both sides getting used to and understanding the SEA / SFRA processes and how to build these in to a suitable LDP."

Reporters' approach to flood risk

- 4.58 In general, LDP Examination Reporters unsurprisingly took a fairly firm line in relation to policy compliance with SPP – particularly with regard to the effective integration of a precautionary approach and the avoidance principle. Similarly, Reporters proved generally willing to accept SEPA's proposed changes with regard to policy issues, and in some instances insisting on even stronger wording.
- 4.59 Similarly, there has been a general acceptance of an approach that includes a comparatively high-level policy within the LDP, and more detailed guidance (and, arguably, occasionally policy) being included in Supplementary Guidance (SG). Convention and practice as applied to other significant policy issues, particularly onshore wind, suggests that, where matters of more-than-local significance are considered, the LDP itself – and not SG – is the appropriate locus for such matters.
- 4.60 While it is not suggested that any of the relevant LDPs should be considered not to be sound due to the adoption of such an approach, it may be worth considering whether in future flood risk should be dealt with entirely within the LDP, and fully integrated with the spatial strategy. This would perhaps enable authorities to take a more strategic and positive approach to the issue, identifying 'functional floodplains' and safeguarding land with significant attenuation capacity as part of a more integrated and sustainable spatial strategy. For example, compare Stirling's adopted spatial strategy for the 'core area' of the plan with the relevant flood map depicted in Figure 4.1 below. The opportunities to deal with flooding, settlement expansion/consolidation and management of the Green Belt are relatively clear. (It should be noted that Stirling's LDP was chosen as an example for convenience, due to a comparatively tightly-bound settlement area, rather than to illustrate any particular issue with the plan.)

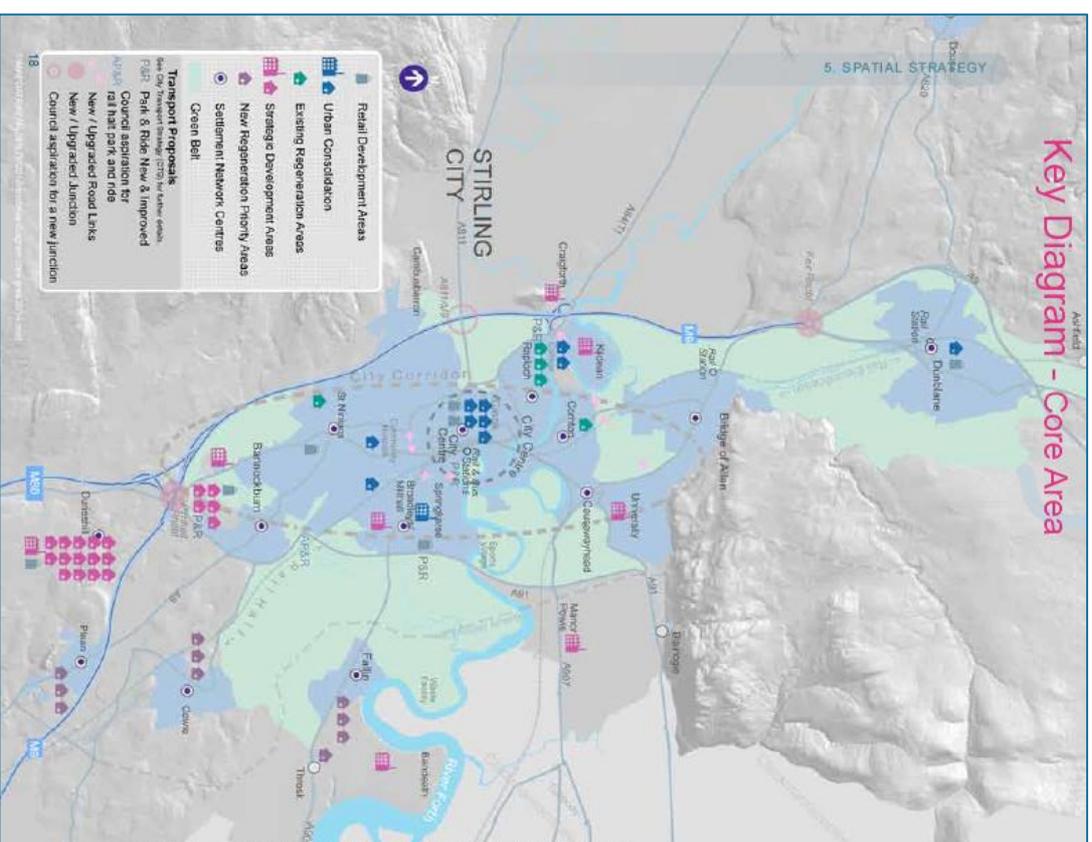
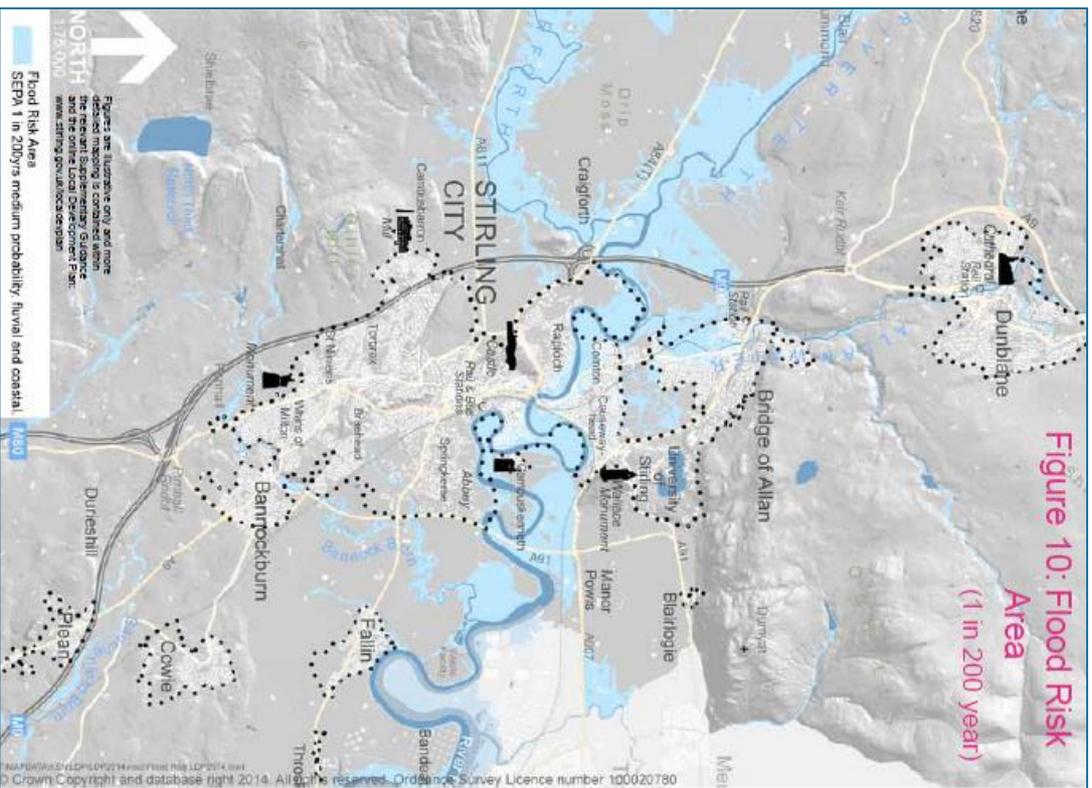


Figure 4.1: Stirling's Core Area spatial strategy, and flood risk maps - opportunities for integration?

Recommendation

- LDP12** Further research should be undertaken on the number of 'legacy sites' – granted planning permission under different policy regimes – that are allocated in adopted Local Development Plans and are subject to significant flood risk

Approaches to using flood risk data to inform the LDP process

- 4.61 The SEA process considers many various constraints to development, in addition to flood risk. The approach to considering the constraints after the initial identification of potential land allocations means that, although flooding constraints are (often) identified early in the process through SEA, the consideration of flood risk is not always built into the first stage of site identification.
- 4.62 As set out under the previous section 'Flood risk, the SEA process and use of SEPA advice' the SEA process is recognised by the planning authorities as important for identifying flood risk and screening out potential allocations with significant negative environmental effects.

Planning officer quotes

"Once the 'call for sites' was completed, we assessed each site using a 'preferred approach'. Each site was assessed against nine SEA objectives, one of which related to flood risk, and those sites which were deemed not to have significant negative effects on the environment were then used to inform the spatial strategy."

"At MIR stage, we undertook a thorough analysis of sites. We worked with SEPA and sites causing significant environmental effects were taken out and sites where the risk of flooding was less, we agreed with SEPA to ask for a FRA."

"Very little priority given in the plan making process itself, because it was such a fundamental part of the SEA process. It was considered that the SEA guided the plan to avoid any development that would increase flood risk."

- 4.63 However site assessment or application of the SEA process is dependent on a number of factors, and is:
- only as good as the flooding information it is based upon (some planning authorities relied primarily on the indicative SEPA flood maps, without additional local information);
 - reliant on the ability of those undertaking the site assessment and/or SEA to correctly synthesise and interpret the flooding information;
 - reliant on the rigour of the assessment framework and/or SEA process.
 - As the SEA process was identified as sometimes lacking consistency, sufficient justification, or full integration with the plan making process, this is a potential concern.
- 4.64 Overreliance on an assessment framework or the SEA process to identify flood risk, when it is not being applied optimally, may result in flooding issues not being identified.

Planning officer quotes

"Flooding was one of many SEA criteria we looked at. The SEA process was very detailed...we had 38 criteria, two of which related to flood risk".

"We overlaid potential development sites with SEPA flood maps to see where there was any overlap. The initial GIS check identified flood risk for some allocations so we sent a GIS shapefile to SEPA. SEPA provided detailed comments and they highlighted particular concerns for some sites. Because we considered flooding at the outset of the process we were able to sieve out a lot of inappropriate sites. These sites become 'non preferred sites'. Flooding is an important factor in

influencing planners' recommendations to designate a preferred site."

- 4.65 Expertise within the planning authority is also important, and although a number of planning authorities referred to the flood related knowledge they had built through the development of the first LDP, a lack of resources and staff changes could impact on the extent and detail to which flood risk is considered in the future.

Planning officer quote

"...since the last LDP we have lost a lot of staff, so due to staffing resources the next LDP and SEA probably won't be done to the same level of detail."

Applying the outputs of assessments

- 4.66 It is clear from the numbers of Proposed LDPs with unresolved SEPA objections considered at Examination, that – while most authorities are undertaking some level of flood risk assessment – the outputs of these processes (and SEA) are not being routinely applied to either the policy [dealt with below] or spatial content of plans.
- 4.67 While it was not possible to identify a single common causal link across authorities, it is readily apparent that the LDP production process is highly fragmented and is often viewed as a series of discrete tasks to be completed on schedule, rather than as a continuum. This appears to occur as a consequence of resource pressure, division of tasks between officers and, on occasion, outsourcing of assessments to consultants.
- 4.68 There may also be an issue with the way in which flood risk data is held and disseminated within authorities. If access or use is restricted to GIS teams, or those undertaking SEA and/or SFRA – without much crossover with officers responsible for developing the spatial strategy – it is perhaps unsurprising that flood risk has comparatively little influence on overarching spatial strategies.
- 4.69 Although specifically mentioned by relatively few officers, there is an underlying suggestion that planners may have some issues in understanding the nature of risk in general, and flood risk in particular. Understanding the nature of probability, risk and uncertainty is critical in ensuring that the effects of flooding – and the potential multiplier effects of climate change – can be properly taken into account.

Planning officer quote

"There is a need to ensure more understanding of what a 1 in 200 [year] flood means."

- 4.70 Across all of the plans, there was very little consideration given to the vulnerability of particular uses to the effects of flooding – missing a key element of the effective functioning of SPP's risk framework. (Similarly, vulnerability of specific uses was only raised in three SEPA consultation responses.)

Recommendation

LDP13 Training events for planning authority staff to build capacity in understanding, interpreting and applying flood data.

LDP14 Adoption of standard nomenclature for expressing flood risk factors. Use of percentages, rather than return periods (e.g. 0.5%, in place of 1-in-200 year event), may be more effective and less abstract.

Alignment of LDPs with the policy principles and risk framework within Scottish Planning Policy

4.71 This section explores how the plan preparation process is aligned with the policy principles and risk framework within Scottish Planning Policy.

Considering all sources of flood risk

- 4.72 SPP requires the consideration of all sources of flood risk. However, there are challenges surrounding the identification of which sources of flooding were taken into account in the plan preparation process. This reflects the lack of clear documentation of what information sources were used in the SEA process for all plans, and the time elapsed since the plans were prepared.
- 4.73 All of the plans reviewed within the study were prepared substantially before the release of the new flood maps by SEPA in January 2014 which included information on surface water flooding for the first time. Just over half of the planning authorities appear to have used additional information sources to inform the baseline on flooding. Due to the lack of widely available information on surface water flooding, this is unlikely to have been fully taken into account in the plan making process. There is likely to be a lack of expertise within planning authorities on interpreting and applying information on surface water flooding, as this was not widely available during the previous plan preparation process.
- 4.74 Analysis of the policies within the adopted plans or supplementary guidance provides some indication of the level of detail and approach to sources of flooding, but does not tell the whole story about how these were taken into account through the plan preparation process. In addition the local characteristics of an area dictate which flooding sources are most relevant.
- 4.75 SEPA comments were not identified from the review of the SEA process as specifically referring to ensuring all sources of flooding were considered through the SEA process. However there were significant levels of input by SEPA to the site assessment process through their responses to the MIR. The extent to which planning authorities were failing to consider risk from all flooding sources would require further analysis of SEPA's assessment findings against the planning authority assessment findings.

Recommendation

LDP15 Assess the need for additional training or guidance on taking surface water flooding into account, and assessing the combined risk from different sources of flooding [links to LDP5]

Taking the impact of climate change on flood risk into account

- 4.76 Reference to the impacts of climate change on flood risk is typically covered in the SEA process and in LDP policy, however only two thirds of flooding policies include reference to climate change, and this is not in any level of detail. Based on the findings that there was heavy reliance on the SEPA flood map data to inform the flood risk assessment, and the reliance on SEPA staff to provide final verification of planning authorities assessment of flood risk, the extent to which any allowance for climate change has been taken into account by planning authorities in the LDPs examined is likely to be low.
- 4.77 There is a lack of clarity in LDPs and SG about how allowance should be made for climate change, with a tendency for high level statements:
- *"Some locations are already at risk of intermittent flooding, and climate change is expected to worsen that situation."*
 - *"The risk of flooding from all sources, including from sea level rise, is likely to increase with projected changes in climate."*

- 4.78 Aberdeenshire SG LSD8: *Flooding and erosion* only refers to the need to include an allowance for climate change in relation to the requirement for 'a hydrological, drainage impact and/or flood risk assessment or geomorphology assessment' for sites **on land at risk of flooding**. The document later states '*Freeboard allowance gives a margin for safety, which takes account of possible waves or turbulence and climate change,*' which contradicts the later advice given in the SEPA (2015) Technical Guidance for Stakeholders (underlined below).
- 4.79 In other planning authorities the onus was being placed on the developer to establish the additional flood risk associated with climate change through undertaking a FRA.

SEPA (2015) Technical Flood Risk Guidance for Stakeholders¹⁹:

SEPA recommends that a climate change allowance of +20% on the estimated 200-year peak flow be made. Alternatively, UK Climate Projections 2009 (UKCP09) provides tools to provide alternate future climate change scenarios.

SEPA considers that such allowances should be over and above any separate allowance for freeboard. [LUC emphasis]

SPP paragraph 254 recognises that a changing climate will increase the flood risk in some parts of Scotland and planning can play an important role in reducing vulnerability of existing and future development to flooding. Although SEPA would always recommend it, SEPA considers that an additional allowance for climate change is for Local Authorities to determine.

- 4.80 Two planning authorities raised issues with how climate change and flood risk are taken into account, but the recognition of climate change issues as a future consideration for the plan making process by *only* these authorities is notable. The quotes below illustrate the comparatively narrow view taken of the effects of climate change. There is a potentially counterproductive acceptance of continuing to build in areas subject to significant flood risk in both statements: rather than 'building resilience into developments' as a first choice, authorities should ideally be seeking the means to avoid risks – in line with SPP.

Planning officer quotes

"There is an uncertainty regarding climate change, and we can only work with the information we have at the time. There is a greater acceptance of the impact of climate change on flooding and we are trying more now to build in resilience into developments".

"The current SPP notes that an allowance must be made for the effects of climate change, including an allowance for freeboard. Therefore sites which may be in a 1-in-200 year flood risk area could still not be safe for development once these 'extra' allowances have been considered."

¹⁹ <http://www.sepa.org.uk/media/162602/ss-nfr-p-002-technical-flood-risk-guidance-for-stakeholders.pdf>

Requiring Flood Risk Assessment

- 4.81 Shetland Water and Drainage Supplementary Guidance specifies the required content of a FRA, but does not refer to how climate change should be included within the FRA, although it notes further guidance is provided in SEPA's Technical Flood Risk Guidance (former document).
- 4.82 In contrast, Perth and Kinross *Developers Guidance Note on Flooding and Drainage* (June 2014) provides detail on how it expects climate change to be taken into account in relation to flooding and drainage. The list of data sources in the Main Issues Report Environmental Report (2010) makes no reference to the inclusion of a 20% allowance for climate change to inform the assessment of sites within the LDP, although the data sources did include consideration of 1-in-1,000 year flood risk.

Perth & Kinross Council – Flood Risk and Flood Risk Assessments (Developers Guidance Note on Flooding and Drainage) (June 2014) includes the following levels of detail on flood risk and climate change:

Supporting text (paragraph 5.3.4)

Assessment of flood risk including consideration of the overland flow route back to the receiving watercourse for up to the 0.5% AP (200-year) plus climate change flood event showing no detriment to land or property as a result of overland flow. The 0.5% AP (200-year) plus climate change flood event must be a minimum of 300mm from the lowest garden ground level and 600mm from property finished floor levels (FFL);

Additional PKC requirements for a FRA are outlined below: (paragraph 6.2)

6.2.2 Climate Change

In accordance with recent DEFRA research, PKC require a climate change (CC) allowance (a 20% increase in the estimated peak flow) to be applied to the 0.5% AP (200-year).

Safe access/egress (paragraph 6.2.6)

Any new development must incorporate safe access/egress for pedestrians and vehicular traffic within the development site. This should take account of flooding from all sources such as the predicted 0.5% AP (200-year) including climate change flood envelope and overland flood routes from within and external to the site.

Hydraulic Design of surface water drainage systems and SuDS (paragraph 7.2.1)

The surface water system should be designed so that should flooding occur during a 0.5% AP (200-year) flood event + 20% Climate Change...

Flood Flow Routes (paragraph 7.3.3.)

Where the design of SuDS shows the system will overtop during a 0.5% AP (200-year) flood event including climate change, the flood flow routes shall be determined.

[LUC emphasis throughout]

Recommendation

LDP16 Further research into how planning authorities are either taking the SEPA recommendation 'that a climate change allowance of +20% on the estimated 200-year peak flow be made', or the methodology they are using to calculate their own allowances for the current generation of LDPs, in order to establish how the impacts of climate change on flood risk are being accounted for.

LDP17 Provision of a 0.5% probability (1-in-200 year) plus [20%] climate change indicative flood extent map to planning authorities. LPAs are unlikely to have in-house capability or data to undertake this analysis in-house.

Avoidance principle and use of the risk framework

- 4.83 The analysis of the SEA process of the plans found that not all SEA objectives were initially worded to embrace the avoidance principle. This was identified as an issue for nearly one third of the plans.

SEPA Scoping Report comments

'In relation to SEA Objective 7 we request that to ensure the proposals are in line with national planning policy "minimise flood risk" is amended to "avoid flood risk".'

'SEA topic "water"...recommend that the SEA objective also includes a commitment to avoiding built development in Greenfield areas already at risk of flooding..'

This remained unchanged in the revised Environmental Report.

'SEA Objective 12 (climate change). As Scottish Planning Policy is to avoid flood risk for all new development (irrespective of type) SEPA requests that the first question be amended to, "Will it ensure that new development is free from flooding?", or similar.'

'We are satisfied with the proposed SEA Objectives. The only revision we request is that as Scottish Planning Policy is for new development to avoid flood risk the related SEA Objective makes avoidance, rather than management, its clear aim.'

'...recommend that the SEA objective refers to the avoidance of flood risk and the safeguard of the functional flood plain...objectives should include a commitment to avoiding built development in Greenfield areas at risk of flooding as well as protect areas already at risk of flooding.'

'... the reference to the use of SUDS to help address flood risk is welcomed. We are concerned however with the reference to allowing development provided suitable mitigation is in place. This does not accord with avoidance, one of the key principles of sustainable flood risk management. It is therefore recommended that this wording is amended to reflect this approach.'

- 4.84 However as previously set out, other issues further contribute to the inconsistent approach to 'avoidance of flood risk' including:

- Differences in interpretation and approach to flood avoidance by SEPA (regulate and avoid) and local authorities (balance competing constraints in order to meet their growth targets);
- The lack of consistent assessment and scoring of site allocations against the SEA criteria for flooding;
- Lack of detailed data on flood risk for particular sites;
- Disparity between planning authority assessment of the flood risk for a particular allocation and SEPA's assessment of flood risk, and
- The number and scale of site allocations with flood risk issues being identified by SEPA at the Proposed Plan stage and subsequently addressed through the Examination process.

- 4.85 Imperfect data and imperfect interpretation of data (at the time of the plan preparation) are likely to contribute to some of these issues, however it does appear that the avoidance principle is not fully embedded in the plan making process. FRA are used to establish greater detail on flood risk for particular sites, and therefore contribute to the information used to inform the risk. The findings from a FRA give clarity on a sites' flood risk, and therefore how it relates to the principle of avoidance and to the risk framework.

Planning officer quotes

"Flooding was given high priority – it was the first constraint that we looked at for each allocation".

"Flood risk was considered as one of the first principles of planning – if a site is likely to flood it is not in the plan."

"Flooding was a key consideration when deciding land allocations."

"Flood risk was one of a number of factors but it certainly wasn't the overriding factor. We did take flood risk seriously and in our policy we tried to ensure that development avoided areas of flooding and the likelihood of increasing flooding elsewhere".

- 4.86 The level of detail on flooding within a LDP and its SG, or between planning authorities varies significantly. Some policies or SG set out the parameters for when a FRA or DIA will be required, and the required content of these. This approach should in effect remove the requirement for reiteration of the requirement for FRA for individual allocations.
- 4.87 The evaluation of the issues identified by SEPA at the proposed plan stage found the most frequent resulting modifications included recognition of the flood risk associated with a site, and the requirement at a FRA may /will be required.
- 4.88 There is a tension within the LDP process around the extent to which the avoidance principle and risk framework can be applied, taking a precautionary approach, based on imperfect data, when the requirement for a FRA is then added to a site which provides an additional level of detail.

Planning officer quote

"We will be preparing a very detailed flood risk and drainage guidance note which will help developers when undertaking FRAs. We will prepare this guidance in conjunction with SEPA".

Recommendation

LDP18 Further guidance / sharing of good practice on the development of a comprehensive local flooding baseline, and methods for applying this consistently and effectively.

Approach to flood reduction

- 4.89 While seven LDPs make some reference to flood reduction, they rarely go beyond suggesting opening up existing culverts or canalised watercourses. None make reference to naturalisation of watercourses, with one exception. Indeed, green infrastructure policies often refer to the role of the natural environment in managing flooding – but these tend to be oblique references rather than specific requirements.

Cairngorms National Park LDP, Para 44: *"Flood risk management measures should target the sources and pathways of flood waters and the impacts of flooding. Where possible, natural features including woodland and trees and characteristics of catchments should be restored to slow, reduce or otherwise manage flood waters."*

Recommendation

LDP19 Local authorities should refer to SEPA's Natural Flood Management map which identifies 'opportunity areas' for runoff reduction, floodplain storage, sediment management, estuarine surge attenuation, and wave energy dissipation.

Surface water flooding, including the requirement for SuDS

- 4.90 The Water Environment and Water Services (Scotland) Act 2003 requires that surface water runoff discharging to the water environment from most new development²⁰ be managed through the use of Sustainable Drainage Systems²¹ (SuDS). SuDS are regulated through the Controlled Activities Regulations (CAR), under General Binding Rules 10 and 11.
- 4.91 The use of SuDS is therefore a legal requirement and partly outside of planning controls (i.e. planning is responsible only for the physical location, disposition, design and wider environmental interactions of the systems – not the requirement for their presence). As such, all but one²² of the LDPs refer to this requirement, but few specify the parameters SuDS are required to meet – beyond reference to CIRIA guidance²³. However, the Dundee LDP provides a good example of an alternative approach, setting out the rainfall parameters that SuDS in the city should be designed to deal with.
- 4.92 In response to questioning on SuDS, a number of planning officers highlighted that, while they had successfully included appropriate policies, these were neither wholly effective nor being applied effectively in development management. It appears likely that there are systemic issues with regard to the appropriate specification and onward monitoring and enforcement of the operation and maintenance of SuDS solutions. Unfortunately, based on this anecdotal evidence, there may have been instances where devices that should have helped to reduce the impact of surface water flooding have exacerbated the issue through technical failure or lack of maintenance. However, it illustrates significant awareness on the part of the relevant authorities to deal creatively and effectively with the issue and put measures in place that seek to prevent the same issue occurring in relation to future

Planning officer quotes

"There is a lack of long term commitment to the maintenance of SUDS which provides an impact on flooding risk deriving from drainage. Clearer guidance is needed to ensure there are sufficient (and perhaps legal) arrangements in place for the perpetual maintenance of SUDS."

"SuDS devices are also an issue with a lot of devices not being sized and maintained correctly. We will be using a new approach where we will ask developers to lodge a financial bond between them and the Council to ensure that if SuDS fail the device will be fixed. In the future Scottish Water are thinking of adopting the maintenance of the larger SudS, which would be ideal, but in the absence of this going forward the Council will ask developers for a bond. Where major flood schemes are undertaken, we will ask developers to make contributions (part fund it), as it will enhance the development potential of their land. We will be targeting developers who would benefit from the flood scheme to contribute to their installation".

Interim conclusions and discussion

Policy

- 4.93 While all LDPs contain some level of policy on flood risk that is broadly compliant with SPP, having passed through Examination to Adoption, the level of synergy with the core policy principles of SPP varies significantly.
- 4.94 The avoidance principle in particular appears to have proved problematic, with authorities mainly recognising the need to avoid areas at elevated risk of flooding – but largely neglecting the wider need to consider safeguarding storage capacity. While it is accepted that replicating SPP policies

²⁰ Single dwellings and discharge direct to coastal waters are exempt

²¹ Also referred to as 'Sustainable Urban Drainage Systems'

²² The authority in question is predominantly rural, but has prepared separate Supplementary Guidance on this, and related, subjects – although this is arguably comparatively poorly 'hooked' in to the main LDP.

²³ The Construction Industry Research and Information Association (CIRIA) produces a manual on the design and specification of SuDS which is regularly updated. http://www.ciria.org/Memberships/The_SuDs_Manual_C753_Chapters.aspx [accessed 01/03/2016]

verbatim is not a requirement, or necessarily desirable, it does appear that some of the key messages of the policy have sometimes been lost in translation. The anecdotal evidence gathered through the interview process clearly illustrates that flooding was not, until very recently, given the level of priority – either by officers or Elected Members – that it perhaps should have enjoyed. Consequently, the precautionary approach embodied by SPP has been somewhat diluted as many LDPs do not provide either the unequivocal steer or detailed advice that developers require to provide an appropriate level of certainty.

- 4.95 Similarly, there appears to be an underlying issue with the understanding of the nature of probability, risk and uncertainty that has potentially undermined the need to plan effectively for climate change (although this was likely exacerbated by the data/modelling issues outlined below).
- 4.96 Robust local policy is, and clearly should remain, a priority for the Scottish Government. However, the backstop provided by both SPP and the interventions of SEPA in the planning process – in addition to the LDP Examination process – provide a corrective influence where authorities have diverged from recommended approaches. What is of greater concern is the widespread disconnect between the key messages of SPP and the spatial strategies and land allocations of LDPs (discussed below).

Assessment of flood risk

- 4.97 Although all LDPs indicated some level of consideration of flood risk in relation to both policy and spatial content, this varied significantly between authorities. From the review and interview processes, it is clear that Strategic Flood Risk Assessment (SFRA), as currently configured and understood, is not perceived as being either a priority or necessarily fit-for-purpose. Planning authorities identified that, for areas which had a lot of local data on flood risk, the SFRA approach was too coarse, while areas with a paucity of local flood data found that the SFRA process did not add sufficient detail to the decision making process. As a technique, it was not widely applied – despite being routinely requested by SEPA in consultation responses – meaning that authorities were all working to substantially different baseline flooding information. The SEPA guidance in place is proportionate, comparatively simple and easy to follow and yet appears to have had very little impact. The perception of SFRA as a ‘box-ticking exercise’ is unhelpful and is a significant barrier to ensuring that authorities are taking a consistent approach to understanding flood risk. Further research is warranted into whether SFRA is suitable for larger, mainly rural authorities – or whether a more focussed approach, concentrating on key settlements may represent a more proportionate approach.
- 4.98 Generally, there was little evidence that any assessment of flood risk was a significant factor in shaping the overall spatial strategy adopted in LDPs, despite this being a key opportunity to set out a robust and resilient vision for development.
- 4.99 In terms of land allocations, SEPA raised significant concerns on all of the Proposed LDPs, variously highlighting inconsistencies in:
- Assessment approach;
 - Scoring of sites in relation to flood risk;
 - Justification for mitigation (rather than avoidance);
 - Assessment of alternatives;
 - Clarity in conclusions; and,
 - The evidence applied to assessment.
- 4.100 In itself, this is not a significant problem, given the safeguards built in to the system to highlight just such issues. What is more of an issue is the frequency with which SEPA’s advice (sometimes reiterated across multiple consultation responses) was not followed or only partially applied. In seven of the 16 cases, significant issues remained unresolved until Examination stage – with Reporters generally following SEPA’s recommendations. While this illustrates that the overall development planning system is working as it should – it also demonstrates the level of inefficiency that inconsistent/inadequate consideration of flood risk introduces to the system and

reinforces the potential value of front-loading the system to deal with flooding issues more fully and earlier in the process.

- 4.101 There is widespread acceptance amongst interviewees that their authorities will – or are already – giving flood risk far higher levels of significance in preparation of emerging LDPs. A key point for the next iteration of LDPs that should ideally render at least some of these issues moot is the requirement for local authorities to produce Local Flood Risk Management Plans²⁴. Due for publication in 2016, these plans should help to drive local authority awareness of and resilience to flooding. Expectations should be realistic though, given that they will be a first attempt at an entirely new type of plan and will inevitably experience teething problems. The increased capacity available in most local authorities necessary to deliver these plans, and fulfil other obligations under the 2009 Act, also means that more specific advice may be available in-house to ensure future LDPs take better account of flood risk from the outset.
- 4.102 It should also be noted that some authorities are already going ‘the extra mile’ in requiring more rigorous approaches to understanding the additional risk posted by the effects of climate change. Developing structures where this best practice can be shared could therefore be an important action.

Integration with SEA

- 4.103 A critical reading of SEPA consultation responses against interviewee opinions suggests that, frequently, officers have different view of how well integrated the SEA process was with that of plan development.
- 4.104 Had the supposed level of integration been enjoyed, it is likely that a more consistent, precautionary approach would have been applied to the consideration of flood risk. Similarly, SEPA identified numerous issues with the way flood risk was considered through the SEA process (whether or not it was related to SFRA), suggesting that authorities were not always considering the issue – or the water environment more generally – in a manner acceptable to SEPA.
- 4.105 It should be noted that, for many authorities, this was the first attempt in undertaking SEA at the development plan scale. Combining policy and spatial assessment is challenging, particularly where large numbers of allocations need to be assessed. There may be a need for more explicit guidance to assist in streamlining the requirements of SFRA with SEA. This could usefully define standard assessment objectives/sub-criteria to ensure consistency, and a standard approach to using and interpreting SEPA GIS data for use in developing spatial strategies and in site assessment. Similarly, greater clarity on the likely effects of climate change – or at least a suitably precautionary approach to accounting for uncertainty – on the available flood extent modelling would be very helpful to authorities.

SEPA advice

- 4.106 The review of LDP documentation reveals a relatively consistent approach from SEPA: highlighting the need for SFRA; raising concerns in relation to flood risk for proposed land allocations; assisting in suggesting mitigation; maintaining objections on problem sites – and frequently being ignored. There was no suggestion in the interview responses that SEPA responses were considered to be systemically inaccurate or otherwise problematic – but there appeared to be a willingness to challenge reasoned responses in a way that is (anecdotally at least) inconsistent with the weight given to the contributions of other key agencies. This is most likely a symptom of the then-prevailing attitude to flood risk as an issue of lower significance that could readily be mitigated. This is reflected in the numbers of proposed allocations taken forward to Examination with unresolved objections, where the only proposed mitigation was a pre-condition for Flood Risk Assessment.
- 4.107 It would be interesting to determine the extent to which all key agency responses were taken into account, and at what stage in the process, to enable comparative analysis of the weight given to key environmental issues. (For example, likely significant effects on sites designated under the EU Habitats and Birds Directives are generally avoided or suitably mitigated through the Habitats

²⁴ Required by Section 34 of the Flood Risk Management (Scotland) Act 2009; complementing the Flood Risk Management Strategies produced at the regional/national level by SEPA, in partnership with relevant stakeholders

Regulations Appraisal process – which, although sometimes problematic, is becoming more effectively mainstreamed in plan-making. SNH advice in this regard is almost never ignored, not least because of the potential for exposure to prosecution – and the rigorous oversight provided by well-resourced NGOs.)

Climate change

- 4.108 Broadly, climate change is acknowledged as an overarching issue by all LDPs – but the extent to which it has meaningfully shaped policy and spatial responses is arguable. Of the ten LDPs that specifically mention climate change in their flooding policy, none can be considered to have developed their spatial strategy with a view towards climate resilience, or adopted an appropriately precautionary approach to land allocations to secure the same. Again, this could be perceived as a ‘mainstreaming’ issue – with climate change effects being acknowledged as a somewhat nebulous threat, rather than a more concrete set of risks that can be understood and managed.
- 4.109 An inherent issue encountered by authorities was the fact that previous iterations of the SEPA flood risk data did not take climate change into account – making this harder to take into account in SFRA. (Equally, there seemed to be little awareness that the 2014/15 fluvial, coastal and surface water data includes an allowance for climate change.) Future assessments will therefore be based on this data and future iterations thereof, meaning that an appropriate allowance for likely climate change effects will be embedded in plans. Similarly, recent SEPA guidance²⁵ (requiring a 20% allowance in addition to the 1-in-200 year peak flow in FRA) reinforces the need to actively plan for the effects of climate change in a measured and precautionary manner – which may help to embed this thinking on the development management side.
- 4.110 While it was doubtless challenging for authorities to consider climate change effectively in the current suite of LDPs due to data issues, the precautionary approach required by SPP appears not be strictly applied, accounting for the large number of sites/issues making it through to Examination. Again, it could be expected that the introduction of Local Flood Risk Management Plans should provide additional robust information, and a higher profile for the issue, on the level and severity of the threat from climate change-driven flood events.

Processes vs. outcomes

- 4.111 Development planning is necessarily a process-heavy activity, given the scale and complexity of the subject and the issues involved. Within the umbrella of the ‘Local Development Plan’, authorities are required to undertake a substantial range of process-driven activities including:
- Strategic Environmental Assessment (SEA);
 - Habitats Regulations Appraisal (HRA);
 - Equalities Impact Assessment (EqIA);
 - Programmes of community and stakeholder consultation;
 - Strategic Flood Risk Assessment (SFRA);
 - Housing Need and Demand Assessment (HNDA – for authorities outside SDP areas); and
 - ‘Call for sites’ – seeking proposals of land for allocation in the LDP.
- 4.112 Inevitably, in all that process it is easy for the desired outcomes to become obscured – particularly where the value of the activity is not necessarily fully understood. Ensuring that, wherever possible, assessment processes are as closely integrated or streamlined to maintain a strong focus on outcomes is advantageous for authorities, key agencies and the public. It is therefore recommended that further research into formally streamlining SFRA as a part of SEA for development plans is undertaken, with an eye to producing guidance for planning authorities. (The rationale for this being that SEA is a requirement of EU law; SFRA has no statutory basis. Therefore ‘piggybacking’ on the assessment process that authorities *have* to undertake would help to embed SFRA, but also reduce the overall process and reporting burden for both local authorities and key agencies.)

²⁵ <http://www.sepa.org.uk/media/162602/ss-nfr-p-002-technical-flood-risk-guidance-for-stakeholders.pdf>

4.113 SFRA and other non-specific assessments of flood risk were generally undertaken in a process-driven way – often losing sight of what the outputs were actually for, and how they would (or could) be applied to shaping policy responses and spatial strategies. Site assessments appear to have been even more of a procedural exercise: the numerous inconsistencies in approach and scoring identified by SEPA being characteristic of an assessment process undertaken in isolation.

5 Development Management

Introduction

- 5.1 Detailed desk based analysis of 40 planning applications either within/adjacent/or in close proximity of areas at high/medium risk of flooding (chosen from a pool of over 100 applications) was undertaken to assess the extent to which local authorities have accounted for current and future flood risks in their decision making and put in place any flood related mitigation measures.
- 5.2 All selected applications were determined in 2015 to ensure that authorities were working to the most recent national policy framework and, in the case of authorities with recently-adopted LDPs, had as much time as possible to allow the new local policy framework to bed in.
- 5.3 The analysis identified whether Local Development Plan policies on flood risk are being implemented in the determination of planning applications and setting of planning conditions by reviewing the planning officer/committee Report of Handling and Decision Notice (and if appealed, the appeal decision). The analysis recorded the types of flood risk to which any conditions for development relate and the types of mitigation measures required. Flood Risk Assessments, where prepared, were also reviewed to determine whether flooding from all relevant sources was taken into consideration, and what mitigation measures, if any, were proposed. Consultation responses by SEPA and the local authority Flood Prevention Team/Officer were also examined to identify which type of flood risk these related to, if any, and if relevant, the flood risk related reasons for any objection by SEPA and the Flood Prevention Team.
- 5.4 The findings of the assessment are outlined in the subsequent paragraphs.

Casework selection criteria

- 5.5 The sampling approach involved selecting 40 planning applications which fulfilled the following criteria:
 - The planning application was for Full Planning Permission.
 - The planning application was within/adjacent/or in close proximity to an area at high or medium risk of fluvial, coastal or surface water flooding as identified by SEPA's flood maps;
 - The planning application was determined (approved, refused or appealed) and suitably detailed documentation relevant to the application was available on the local authority's Planning Portal.
- 5.6 A random sample inherently could not have provided the necessary spread of results without being impractically large and necessitating significant effort and resources in dealing with the 'zero result' cases (i.e. those not fulfilling the necessary criteria).

Development in flood risk areas

- 5.7 62.5% (25) of the applications assessed were within areas of high or medium flood risk as defined by SEPA's flood maps. 20% (8) of applications were adjacent to designated flood risk areas, whilst 17.5% (7) of applications were within close proximity (i.e. 200 meters) of a flood risk area.
- 5.8 Of the 25 applications within areas of identified flood risk (i.e. within the 1-in-200 year flood extent), 23 (92%) were approved and 21 (82.6%) of these applications included flood related conditions. For the two remaining applications within flood areas, one was refused due to insufficient information regarding flooding.

Type of flood risk

- 5.9 29 applications (72.5%) were at risk of one source of flooding, with the remaining 11 proposals (27.5%) subject to more than one flood risk type. Fluvial and surface water flooding accounted for the majority of flood risk types, with nine applications (22.5%) relating to coastal flooding (amongst other sources of flooding).

Decision status and development type

- 5.10 35 applications (87.5%) were 'approved with conditions' which includes one application that was appealed and subsequently approved. Of the 35 applications, two were for major developments (one mixed use and one residential) whilst the majority were for local developments (two retail, two renewable energy, one retail/residential, one industrial development, and 27 residential).
- 5.11 74% (26) of approved applications had flood related conditions attached to the consent, of which the incorporation of SuDS into developments was by far the most cited mitigation measure with 57% (20) of decision notices including this as a condition; followed by a requirement to include raised floor levels (8.5%) (3); and, a requirement to provide further information to the Flood Prevention Team prior to the commencement of development (8.5%) (3).
- 5.12 Five applications (12.5%) were refused, of which three (60%) were not within a recognised flood risk area and were refused on grounds unrelated to flooding. The remaining two applications were refused due to insufficient information regarding flooding and the lack of an FRA to support the application. (Of the five refused applications, all of which were for local developments, four were for residential developments whilst one proposal related to renewable energy.)

Increase flood risk elsewhere

- 5.13 30 applications (75%) considered whether their proposal would increase flood risk elsewhere, all of which were assessed as not likely to affect flood risk elsewhere in the catchment.
- 5.14 Four applications (10%), all of which were local developments for housing, did not consider whether their proposal was likely to increase flooding elsewhere. This is perhaps due to the location of the developments which were in close proximity but not within a recognised flood risk area.
- 5.15 Six proposals (15%) did not state whether increasing flood risk elsewhere was a possibility, of which five applications (12.5%) were in a designated flood risk area and two (5%) were for major developments.

Sustainable Drainage Systems

- 5.16 21 applications (52.5%) explicitly stated that they would manage surface water via Sustainable Drainage Systems (SuDS), 80% (17) of which were for residential developments. Of the 21 applications, 19 (90%) were fulfilling a condition specified in the decision notice by the local authority to incorporate SuDS into the development. Of the remaining two applications, both prepared Flood Risk Assessments which specified SuDS as a mitigation measure.
- 5.17 12 applications (30%) did not state how they proposed to manage surface water. For six applications, four of which were refused consent, the disposal of surface water was not considered in the application, report of handling or the decision notice.
- 5.18 Managing surface water via SuDS was not applicable in one renewable energy development case.

Flood Risk Assessments

- 5.19 22.5% (9) of proposals prepared Flood Risk Assessments in support of their applications²⁶. 77% of applications which were supported by an FRA were within SEPA's flood risk areas, with 22% in areas adjacent to flood risk zones. 88% (8) of FRAs, which were available to view on the Planning Portal, considered flood risk from all relevant sources of flooding and used the SEPA flood maps as a starting point in their analysis.
- 5.20 33% (3) of FRAs considered other hydrology and drainage information whilst 55% (5) focused solely on the information relating to the relevant flood risk.
- 5.21 77% (7) of FRA modelling took into account climate change (using the UK Climate Projections), with one FRA not taking the effects of climate change on flood risk into consideration. Similarly seven FRAs assessed the potential for the development of the site to result in an increase in flooding elsewhere, with one FRA not taking this into consideration.
- 5.22 66% (6) of FRAs proposed measures to mitigate flood risk. The most cited mitigation measures include:
- The incorporation of SuDS into development (66% [4] of FRAs with mitigation measures);
 - Property-level flood protection measures / raised floor levels (66%) (4);
 - Freeboard allowance (50%) (3);
 - Landscaping / access above peak floor level (50%) (3);
 - Flood resilient materials are used (33%) (2);
 - Compensatory flood storage measures (16%) (1); and
 - Other mitigation measures (33%) (2).

Consideration of the future impacts of climate change

- 5.23 Analysis of the information has indicated that climate change in relation to flooding was considered in 20% (8) of applications, of which 75% of these cases had prepared an FRA. In these cases, climate change was addressed in the technical detail of the FRA through the application of sea level risk, peak rainfall, and flow values using the UK Climate Change Projections (UKCP09).
- 5.24 In a number of cases, where FRAs did not accompany the application, the local authority Flood Prevention Team and SEPA have requested additional information to be subsequently produced by the applicant sufficient for the FPT and SEPA to remove their initial objection – 25% of FPTs objections and 25% of SEPAs objections related to either the preparation or amendment of FRAs.

Management of residual risk through effective design

- 5.25 The applications highlighted a range of different applicant/flood risk assessment consultant approaches to the management of residual risk through effective site and/or development design, translation of this information into conditions by SEPA and the final inclusion of these within the decision notice.
- 5.26 This included three (8.5%) applications which required the establishment of a planning condition relating to finished floor levels, one (2.8%) application which was to be relocated outwith the flood zone, three (8.5%) applications required to provide further information on flood resilience measures prior to commencement of development, one application which required landscaping/access to be above peak flood level, and a further two (5%) applications with a

²⁶ One FFRA was prepared and referred to in the Report of Handling however it was unavailable to view on the Planning Portal.

condition relating to the use of flood resilient materials. All of these conditions were either specified by SEPA, the Flood Prevention Team or through the Flood Risk Assessment.

Use of Flood Prevention Team's advice in the final decision making process

- 5.27 Flood Prevention Teams objected to 12.5% (5) of applications due to flood risk and most commonly advised that:
- Further information regarding flood risk was required (80% of applications that FRTs objected to);
 - A FRA should be submitted/amended (60%);
 - Property level flood protection measures / raised floor levels were required (20%);
 - SuDS should be incorporated into the development (40%); and
 - Other measures or responses were needed (10%)
- 5.28 Of the five applications that received objections, only two were within identified flood risk areas, with the remaining three either adjacent to or within close proximity of a flood risk area. All applications, with the exception of one, were for local residential developments.
- 5.29 15% (6) of applications were approved by Flood Prevention Teams provided conditions regarding flood risk were attached to consent. Conditions were attached to consent in all of these cases. The conditions most commonly requested by the Flood Prevention Teams related to incorporating SuDS into the development (50%); providing further information regarding flood risk (33%); and, a freeboard allowance (33%). Other conditions related to:
- Submission/amendment of FRA (16%)
 - Drainage and flood protection works approved under previous applications should be fully completed before work on the site commences (16%);
 - Relocate development outside the flood zone (16%);
 - Property level flood protection measures / raised floor levels should be incorporated into the design (16%)
 - Flood resilient materials should be used (16%)
 - Landscaping/access should be above peak flood level (16%); and
 - Adjacent watercourse should be cleared of any obstructions to ensure the free flow of water (16%).
- 5.30 For one application, the Flood Prevention Team was content with the findings and the mitigation measures proposed in the FRA and did not object. Flood Prevention Teams did not comment on 60% of applications (24). Nevertheless, the decision notice to ten of these applications included flood related conditions attached to consent.
- 5.31 In four cases, the Flood Prevention Teams' advice was referred to in the Report of Handling but was not available to view on the Planning Portal.

Use of SEPA's advice in the final decision making process

- 5.32 SEPA commented on 20% (8) of applications, of which 62.5% (5) of applications were within

Assumptions:

Regulation 25 and Schedule 5 of The Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013, as amended, require that SEPA is consulted on applications for planning permission "where the development is likely to result in a material increase in the number of buildings at risk of being damaged by flooding".

For the purposes of this project, we have assumed that planning authorities **are** fulfilling this statutory requirement for consultation on relevant applications, unless this can be definitively shown to be otherwise.

Likewise, it is assumed that authorities are aware, and are making use of, the following:

SEPA Land Use Planning Guidance Note 8 sets out standing advice for lower-risk types of development, on which SEPA do not wish to be consulted.

SEPA Land Use Planning Guidance Note 9 establishes the protocol for consulting SEPA on a defined range of development types. It also sets out a process for authorities to understand surface water flooding issues, information requirements and when to consult SEPA.

designated flood risk areas and 37.5% (3) of proposals were adjacent to areas of flood risk. It is noteworthy that the project team did not have access to SEPA's database of planning advice in relation to flood risk issues, therefore it was not possible to determine which applications SEPA was consulted on but did not comment, the timeliness of SEPA's advice, or whether the number of applications in flood risk areas which SEPA are considering is increasing or decreasing.

- 5.33 SEPA initially objected to proposals on the grounds of flood risk in four (50%) cases. This initial objection was withdrawn in all cases due to the conditions specified by SEPA being attached to the grant of permission. **No planning applications progressed contrary to SEPA's advice on flood risk.**
- 5.34 In the 50% of cases which SEPA initially raised flood related objections to, the lack of SuDS within the development (50%)(2), the lack of a flood risk assessment (25%)(1), the need for further information relating to flooding (25%)(1), and omission of property level flood protection measures (25%)(1) were the most common reasons for the objection (with one objection relating to two of these issues).
- 5.35 SEPA did not raise an objection in 25% of cases due to an FRA being provided. However, in one case SEPA did provide further advice relating to developing a scheme of maintenance which was attached as a condition of consent.
- 5.36 In one case, SEPA provided advice on the application but did not specify conditions for the grant of permission.
- 5.37 SEPA's response on one application could not be obtained.

Final decision

- 5.38 62.5% (25) of Officer/Committee Reports list the relevant policies that implicitly or explicitly relate to flood risk, with 37.5% (15) of Reports of Handling not referring to flood related policies.
- 5.39 Surface water flooding (50%) was the most common type of flood risk referred to in the Reports of Handling, followed by fluvial flooding (30%), coastal flooding (10%), and drainage systems (2.5%) (sewers and blocked culverts) (some Reports of Handling referred to more than one source of flooding). The source of flooding was not referred to in 20% of reports.
- 5.40 Unsurprisingly, similar to the Report of Handling, surface water flooding was the most common source of flooding referred to in the Decision Notice, followed by fluvial flooding, coastal flooding and drainage systems (sewers and blocked culverts)

- 5.41 The most cited conditions relating to flooding attached to the grant of permission include:
- SuDS should be incorporated into the development (57%) (20);
 - Property level flood protection measures / raised floor levels (8.5%) (3);
 - Further information on flood resilience measures should be provided to FPT before development commences (8.5%) (3);
 - Flood resilient materials are used (5.7%) (2);
 - Freeboard allowance (5.7%) (2);
 - Drainage and flood protection works approved under previous applications are fully completed before work commences on site (5.7%) (2);
 - Development to be relocated outwith flood zone (2.85%) (1);
 - Submission/amendment of FRA (2.85%) (1);
 - Submission of a Drainage Impact Assessment (2.85%) (1);
 - Landscaping/access should be above peak floor level (2.85%) (1);
 - Adjacent watercourse should be cleared of any obstructions (2.85%) (1); and,
 - Other measures (5.7%) (2)
- 5.42 One application was appealed, however, the reasons for appeal did not refer to flood risk.
- 5.43 Of the five refused applications, 40% were refused consent due to insufficient information being provided regarding flooding and an FRA not being undertaken, whilst the remaining 60% were refused on grounds unrelated to flooding.

Interim conclusions and discussion

- 5.44 The main conclusions arising from the analysis are outlined below. Again, it is worth noting that the findings of this section of the report are based on a small sample of planning applications fulfilling the following conditions:
- Relate to applications for Full Planning Permission determined in 2015 (post-adoption of all relevant LDPs);
 - An appropriate sample of outcomes (approved with conditions; refused; appealed);
 - Within, immediately adjacent to or in close proximity to the 1-in-200 year flood zone;
 - Fulfilling an appropriate geographical spread; and
 - Meeting the quota of approved / refused / development type-specific applications.
- 5.45 The analysis would have yielded different results had a random sample of applications been chosen.

Application of relevant local policies

- 5.46 In 15 cases, Officer's Reports and Reports of Handling suggest that local flood risk policies were not explicitly referenced as part of the decision-making process. Of these cases, nine were located wholly within the 1-in-200 year flood zone, one was immediately adjacent and a further five were in close enough proximity for climate change-induced flood risk to be a likely issue. It is surprising that these policies were not referenced at all, much less being actively considered in decision-making. This pattern was replicated across nine of the 16 local authorities with adopted LDPs in place.
- 5.47 On more detailed examination, while some of these cases could reasonably be assumed not to be at significant risk of flooding, based on local topographic conditions and/or the presence of defences, others did appear to be in locations with substantial flood risk. Even in marginal cases, it is still perhaps surprising that authorities are not requesting FRA – despite many local policies

and SPP requiring it – in fulfilment of an appropriately precautionary approach. Equally, where these proposals lie within areas identified as being at significant risk, SEPA should be consulted.

- 5.48 It therefore appears that development management officers may either not be being made aware of the flood risk issue through inaccurate constraints mapping (e.g. missing or out of date flood risk data), or are prioritising local knowledge over the requirements of the policy framework, or are satisfied that the risk of flooding can be suitably mitigated through design/mitigation measures.
- 5.49 From the cases examined, it appears that local flooding policies are potentially not being used as effectively as a tool to guide assessment of planning applications – much less affecting the outcomes of proposals in areas at risk of flooding.

Flood Risk Assessment

Requirement for Flood Risk Assessment

- 5.50 Only nine out of 40 cases were supported by Flood Risk Assessment (FRA), raising some significant questions regarding:
- The efficacy of constraints mapping available to validation / case officers;
 - Processes for checking application boundaries against constraints;
 - Processes triggering consultation with SEPA and internal flood risk teams; and
 - Application of relevant local policies requiring FRA for proposed development in flood risk areas.
- 5.51 Of the 31 applications submitted without FRA, 18 sites lie wholly within the 1-in-200 year flood zone²⁷. The Development Management Regulations²⁸ ('the DMR') require that SEPA be consulted on any such applications (all but one of the proposals being of a type included in SEPA Guidance Note 9). However, only five of these cases showed definitive evidence of SEPA having been consulted – in the form of consultation response letters and/or confirmation of response in Officers' reports. For the remainder, the local Flood Risk team objected to four proposals and, as FRA was supplied for a further three cases, were content with the inclusion of flood-risk-related conditions. SEPA provided advice on one additional case – the remaining five passed through the process with apparently no formal assessment of flood risk.
- 5.52 Somewhat oddly, of these 31 cases: nine *do* include references to the relevant local flood policy; an additional four note surface water issues in the decision notice; and, a further one case notes maintenance requirements for drainage systems (culverts). Similarly, nine of the approved cases include flood-related conditions (eight SuDS; one post-consent information on resilience measures to be provided to the local flood prevention team). Of the remaining six cases, only two could be considered to have been 'missed' in terms of being situated within the 1-in-200 year flood zone and having no formal assessment of site-specific risk. It should, however, be noted that only one of these developments (a dwellinghouse) could be considered to be at specific risk – the other proposed use being of lower sensitivity (a wind turbine).
- 5.53 Ultimately, while the picture provided by the case files is sometimes obscured by partial information, it does appear that planning authorities are taking flood risk into account in their consideration and determination of applications – but that this process is not always as transparent as it perhaps could be. Similarly, authorities may not be taking as precautionary an approach to understanding and managing this risk as SPP required.

Accounting for all relevant sources of flooding

- 5.54 Where FRA has been carried out, it is without exception thorough and covers all relevant sources of flooding. All applications supported by FRA – whether requested by SEPA or local flooding teams or not – were granted planning permission. Of these cases, SEPA initially objected to three cases, but subsequent provision of information addressed all outstanding issues. In this regard, for the sample cases, FRA can be shown to be effective in understanding site-specific flood risk

²⁷ six abut/are directly adjacent; the remaining seven are in close enough proximity to be affected by climate-change-derived increases in flood risk

²⁸ The Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013, as amended

and ensuring that development is suitably de-risked through the use of conditions. It appears that pluvial flood risk is still understood principally as a 'drainage', rather than a flood risk, issue – in that the need for SuDS [in addition to the legal requirement for their use under the 2003 Act] appears to be influencing processes and decision-making – but the links are not necessarily made to wider policy issues. This suggests that the potential for cumulative flood risk (e.g. from pluvial and fluvial sources) may not be considered in a systematic way.

Accounting for the effects of climate change

- 5.55 Climate change was explicitly taken into account in eight of the 40 decisions reviewed. This alone suggests that the issue is not routinely being afforded the consideration necessary to ensure resilience. However, of these eight cases, the six that were subject to FRA did account effectively for the potential influence of climate change.
- 5.56 This is particularly concerning, given the recent patterns of severe weather and increased incidence of flooding across Scotland. Similarly, SPP and the majority of local policy frameworks at refer to climate change – but this compounds the impression that the issue remains more of a nebulous threat than a locally-specific problem that should be understood and taken into account in decision-making.

Recommendation

DM1 Further research into the operational measures put in place to help officers understand threats to development could provide valuable context.

SEPA advice

- 5.57 Of the 25 cases definitively located wholly within the 1-in-200 year flood zone, SEPA provided advice on just eight – submitting holding objections to four (all subsequently withdrawn). Unfortunately, recording of 'no comment' responses from consultees by planning authorities is inconsistent. It cannot therefore be definitively stated that SEPA is not being consulted – or is not responding – but the end result is the same: a substantial number of applications are processed from validation to determination with no reference to the statutory body responsible for flooding, despite legislative requirements for its involvement. (Although, again, it should be noted that decisions and conditions do appear to be taking general cognisance of flooding and surface water management, as only two of the sample cases contained no reference at all to the issue.)
- 5.58 As noted above, where SEPA was involved, its recommendations – in terms of requirement for FRA and/or suggested conditions – were always incorporated in the decision. The issue is not necessarily one of SEPA being simply forgotten, but potentially rather one of the invisibility of officers' decision-making processes in deciding when – and when not – to consult. Strictly, for higher-risk development types, this runs contrary to regulatory requirements, and the precautionary approach necessitated by SPP. As noted above, this reinforces the impression that flood risk is – at least for the purposes of the sample cases – not routinely viewed as a significant constraint necessitating detailed assessment in every case. (This is in direct contrast to, for instance, the way authorities generally deal with casework potentially affecting Natura 2000 sites, with a concurrent need for consultation with SNH and the preparation of Habitats Regulations Appraisal.)
- 5.59 While the DMR requires SEPA to be consulted on proposals at risk of flooding, the lack of an additional, formal designation may be a barrier. However, even authorities that unequivocally have the most up-to-date flood risk GIS data incorporated within their development management systems are not immune.

Recommendation

DM2 Further research into planning authority processes and procedures for recording officers' decision-making on when to consult statutory consultees may be helpful. (Many authorities make use of process checklists – therefore understanding where flood risk figures in the hierarchy of constraints could be instructive.)

DM3 Research into the ways in which SEPA flood data is built into local authority DM systems, and the weight it is accorded, could be helpful.

It should be noted that this project was not intended to explicitly evaluate the effectiveness of SEPA.

Role of local authority FRM teams

- 5.60 Local authority Flood Risk Management teams appear to be playing a key role in helping development management colleagues understand flood risk, as might be expected. However, the evidence on the triggers for consultation, and the frequency with which they are consulted – versus the frequency of a response being provided – is not clear for all authorities.
- 5.61 Nevertheless, they appear to be having a strongly positive influence on planning casework, requiring the provision of FRA in a number of cases, reviewing evidence supplied by developers, supplying advice on appropriate planning conditions and, where necessary, objecting to proposals. Indeed, in some cases (for instance, two of the cases refused on flood risk grounds) they appear to be substituting for SEPA in providing a definitive opinion on information requirements and necessary actions²⁹. While this is encouraged by SEPA Guidance Note 9 in relation to surface water flood risk, there is a potential grey area for other types of flood risk, particularly in relation to higher sensitivity development. Ultimately, planning officers appear to be getting the right advice – but again, transparency and certainty is a potential issue.

Mitigating flood risk to new development

- 5.62 In general, planning authorities appear to be taking an approach that allows development in areas of flood risk, and seeking to design out and mitigate potential impacts through the use of conditions. The requirement for SuDS is by far the most commonly-applied condition – although often this is tangential to the main risk to the development (i.e. SuDS will do little to mitigate likely fluvial flood risk). While it is important to note the general success of the requirements of the 2003 Act in being mainstreamed within the development management process, it does rather suggest that a similar regulatory nudge could be required with regard to flood risk.
- 5.63 In terms of more specific conditions, these relate wholly to site-specific protection and resilience measures – with none of the sample cases including any provision for natural flood management or avoidance of areas at risk. One case did include a condition requiring that the adjacent watercourse – the source of fluvial flood risk – was to be maintained and kept free from obstructions. However, this remains more of an interventionist approach, rather than seeking to work with natural processes as SPP intends.

Discharge of conditions

- 5.64 None of the cases examined contained evidence of specific discharge of conditions – for example, where updated FRA had been requested, this was not available on file. While this is likely to be an administrative issue, other research projects on planning impact have frequently highlighted a potential implementation gap between the conditions imposed and the environmental benefits delivered by development as-built.

²⁹ SEPA was definitively not consulted on either of these example cases, as they are not listed amongst the external consultees in the Report of Handling. (Had SEPA been consulted, but provided no response – or submitted a 'no comment' response – this would have been recorded).

6 Doing things differently: Lessons learned by planning authorities

Introduction

- 6.1 This section of the report pulls together the contributions of planning officers to the interview process that highlighted:
- Where they felt the authority had potentially missed opportunities with regard to flood risk in the preparation of their adopted LDP;
 - What lessons they learned from the LDP process; and,
 - How their practices and processes have already changed – influencing emerging LDPs.
- 6.2 It is important to note the vast majority the officers interviewed were very open and keen to share what they knew and had learned, and for this the project team is particularly grateful.

Policy and spatial strategy

- 6.3 In discussion with planning officers, it quickly became apparent that developing local flood risk policy was not the main source of concern to authorities in terms of plan-making. In essence, this is a relatively simple proposition – translating the requirements of SPP and adding appropriate detail to address key local challenges, and manage development in line with the overarching spatial strategy and wider development goals.
- 6.4 There will always be disagreements between authorities and Reporters with regard to the appropriate level of detail and precise wording of local policies. Allowing an appropriate level of local distinctiveness – albeit within the national framework – is a central part of Scotland’s and the UK’s plan-led system.
- 6.5 Interviewees were clear that, in future iterations of their authority’s LDP, flooding would be afforded a greater level of prominence and SFRA would be more widely adopted: partly as a consequence of the availability of better data, and also through a better understanding of the technique’s potential to add value to the plan.

Planning officer quotes:

“The approach adopted will be more comprehensive. The new LDP includes new flood maps, and more detailed information which will enable this...we will:

- Carry out a SFRA
- Use the 2014 SEPA Flood maps.
- Perhaps look at surface water flooding more, using the SEPA maps and the Surface Water Management studies identified as actions in the Flood Risk Management Strategy for this District if available.
- Consider identifying flood risk areas and protecting major areas of flood plain and storage capacity.

“We are currently undertaking a review of effectiveness of housing allocations. Flood risk can be a major impact on effectiveness...flood risk has to be considered at the start of the LDP process”.

“Regarding flood defences, policy should make provision for the following: If an area, situated behind flood defences, is topographically floodable (should the defences fail) then flood mitigation

/ resilience measures must be built in to developments.”

Planning officer quotes

“In the future we will probably have a checklist for new developments and will provide more detail on flooding in the Supplementary Guidance”.

“We will have a much clearer process for assessing flood risk”.

“We will have a closer dialogue with the flood officers when preparing the LDP”.

“We will prepare Flood Risk Planning Guidance and will provide developers with a template for undertaking FRAs. It would be helpful if SEPA took the lead in developing a standard approach to FRAs”.

Natural flood management

- 6.6 One respondent indicated that their authority was taking a more radical, holistic approach to managing flood risk – through the adoption of natural flood risk management techniques.

Planning officer quote

“We will place more emphasis on natural flood management. For example, where there is scope for land use changes and practices such as peatland restoration projects, reconnecting rivers, and woodland expansion opportunities”.

A second interviewee raised the possibility of implementing a ‘programmed retreat’ from coastal areas in danger of repeated tidal inundation. This would involve the reduction of public investment in areas at risk (primarily anywhere below the 5m contour) and the emptying of ground floors, with any residential properties moving up a floor. He noted that there would be a social aspect related to this as the older areas within coastal settlements tend to those most at risk of flooding, but also those occupied by the less well off.

Land allocations

- 6.7 More effective assessment of flood risk for land allocations appeared to be a major concern for respondents, with some suggesting that previous practice was flawed and had led to inappropriate sites being included in plans – particularly where these related to historical permissions.
- 6.8 Several authorities highlighted that they are actively considering requiring pre-allocation Flood Risk Assessments from landowners proposing sites for inclusion in LDPs. (One authority had attempted this for the adopted LDP – but where relevant sites were subject to outstanding objections taken forward to Examination, this approach was dismissed by the Reporter as disproportionate.)
- 6.9 There is clearly an appetite for greater certainty with regard to the sites coming forward for allocation, and placing the burden for assessment on the owner/developer is consistent with wider planning practice. However, it is likely that some level of resistance will be encountered from landowners and the development community.

Planning officer quotes

“We will highlight flood risk to developers/landowners and make it clear to them that flooding is now a major consideration”.

We will be undertaking a call for sites exercise. We will be asking developers to fill in a form identifying the constraints of the site”.

“Pre-allocation FRAs”.

"We will be insisting on pre-allocation FRAs for sites at risk of flooding".

"...we need to front load the system with pre-allocation FRAs and avoid promoting sites that are at risk of flooding. Planners need to be more proactive than reactive when it comes to flooding".

Recommendation

DTD1 Further research into the practicality and enforceability of pre-allocation Flood Risk Assessments for proposed LDP sites, including draft methods.

Flood risk management strategies and plans

- 6.10 As indicated throughout this report, the availability of FR strategies and plans have the potential to secure far better integration with flooding issues, and better planning outcomes.
- 6.11 Respondents recognised this as a key opportunity to secure better quality information, and their flooding colleagues as a key resource for better plan-making.

Planning officer quotes

"For the next LDP, the Flood Risk Management Strategies and Plans will be used to inform the flooding baseline".

"We will be incorporating the Flood Risk Management Strategy for our area and the emerging Local Flood Risk Management Plan to ensure that our next plan is synchronised with these documents".

"Take account of our Flood Risk Management Strategy, which was published in Dec 2015, and the Flood Risk Management Plan, which is due to be published in June 2016.

Team skills and capacity

Planning officer quotes

"Tackle strategic issues head on, however the general approach would be similar , it was thought to be effective"

"Ensuring the same team is involved will be important as they have grown as team from the first plan and know how to engage with SEPA and other better to ensure a positive outcome."

"I think the importance of a close working relationship with the flood prevention team should be stressed. We will work more closely with our flood prevention colleagues particularly at the early stages in the process to make sure flooding is given due consideration"

"The first LDP was a learning curve. I think it's important in the future that greater emphasis is placed on synchronising the Flood Risk Management Strategies and Plans with LDPs and vice versa"

"There should be closer links with flood officers and planning officers when preparing the LDP."

"Flood risk officers are more qualified to prepare SFRAs than planning policy officers."

- 6.12 A key point drawn out in many discussions was that, as the first attempt at delivering a new type of plan under new regulations, the first iteration of LDPs were inherently challenging – but that the information and resources now available should secure better outcomes.

Recommendation

DTD2 Comparative research examining post-FRM Strategy/Plan LDPs with earlier plans to determine whether flooding is dealt with more effectively

Guidance for developers

- 6.13 There was significant interest in 'front-loading' the system more effectively, through the provision of appropriate, easy to use guidance for developers ensuring that expectations are clear from the outset. Similarly, there was encouraging evidence of authorities seeking to work more closely and effectively with flood management colleagues.
- 6.14 Equally, there was an appetite for more assistance from SEPA in terms of defining a standardised approach to site-specific Flood Risk Assessment for inclusion in supplementary guidance.

Data and guidance

- 6.15 Respondents generally indicated that current SEPA flooding data was of much better quality and utility than previous iterations. However, there remained a level of concern that data products, while fit-for-purpose at the national level, may be less useful at the local authority level. There was some concern around the ability of planners to interpret the data and the need for additional guidance to make this more effective.
- 6.16 While some authorities' criticism of SEPA flood data was clearly couched in historical terms, some respondents appeared to retain a blanket suspicion of the information. There is clearly some work to do in terms of ensuring that all officers understand how the current flood risk data has been derived, what it is for and what its limitations are.
- 6.17 There is a clear tension between some authorities' demands for more detailed data and the supposedly strategic nature of the LDP process as a whole. Balancing this with pre-allocation FRA for at-risk sites may offer a suitable compromise between proportionality at the plan scale, and certainty at the site-specific scale.
- 6.18 Surface water flooding appeared to, generally, be better-understood by respondents than it was when their LDPs were prepared – likely reflecting updated data and guidance. However, some respondents highlighted additional classes of 'technical' flood risk (such as pump failure) that were of specific concern in their areas – but that are not specifically covered or modelled for in national data and guidance. It may therefore be helpful for SEPA to engage with authorities to determine the nature and extent of this issue.

Planning officer suggestions:

- Better Quality Mapping.
- More analysis and understanding of the causes of flooding in the area
- Some flooding is caused by "technical floods" (burst pumps /water mains etc.) but there is no guidance provided as to whether this is classed as flooding.
- There is an absence of regionally specific data, which makes site assessments very difficult.
- Mapping scale.
- Extra data and guidance would be welcomed as the SEAs needed to be contracted out initially. Now there is sufficient skill within the team, but they need to ensure that this is maintained.
- Needs to be more guidance with regards to flood risk in the provision of sites as there is nothing to provide added value currently.

Planning officer quotes:

"The accuracy of SEPAs flood maps has to increase. We can only work with the best available data. The more accurate the data, the better chance planners have of avoiding allocating sites for development where this is potential for flooding".

"There's quite a lot of guidance on flooding and drainage and perhaps it would be useful if this could be combined or summarised/signposted within a PAN on flooding. SPP indicated that there would be an updated PAN on Flooding, but this if this does exist it can't currently be located."

[Scottish Government Flood Risk online planning guidance, replacing PAN69, updated 22/06/15 and available at: <http://www.gov.scot/Resource/0047/00479774.pdf>]

"SEPA's advice notes on flooding and SFRAs are overly complex and too technical. They should be simplified and outline key messages."

"SEPA should issue a standard template for SFRAs and FRAs"

Missed opportunities?

Avoidance principle

- 6.19 For all the very positive progress that authorities are doubtless making in terms of their consideration of flood risk – as evidenced by their contributions above – some fundamental issues remain.
- 6.20 Most apparent is the fact that authorities are not – and arguably cannot – take a wholly avoidance-based approach to flood risk. Inevitably, officers are mainly thinking about how to better understand the risk faced by their areas and how it can be unpacked at a site specific level – rather than turning the issue on its head and trying to plan for growth in areas at low or no risk of flooding. From officers' contributions, it is clear that most authorities will be adopting a far more rigorous approach – but this is predicated on a tacit assumption that they will be allocating land at risk of flooding for development.

Recommendation

DTD3 Research into the availability of land in and around Scotland's main settlements could help to illustrate the scale of the issue – and highlight both where avoidance is unlikely to be a solution, and where upstream catchment management could/should be prioritised.

Development management

- 6.21 The interviews suggested that there was a potential disconnect between policy planners and their development management colleagues in terms of their understanding and appreciation of the risk-based framework and the need to prioritise avoidance. As DM planners are the key link in the chain responsible for interpreting and applying local and national policy, this is potentially concerning and may require further research to understand if this issue is significant and, if so, how it could be addressed.

Recommendation

DTD4 Action research / practitioner-led research into potential differences in understanding and interpretation of SPP policies relating to flooding.

Strategic flood risk management

- 6.22 It is clear that FRM Strategies and Plans are seen as a key resource for local authorities, and rightly so. However, there is still comparatively little evidence of authorities working together to understand flood risk and take a catchment/landscape-scale approach to dealing with the issue.
- 6.23 Follow-up research on the impact of local Flood Risk Management Plans would be very valuable in confirming whether this is indeed the case, and what onward impact these Plans have had on local authority thinking, planning and decision-making.

Recommendation

DTD5 Research into the impact of FRM Plans on planning practice and decision-making.

DTD6 Research into the interfaces between planning, land management and forestry regulatory regimes to identify the policy and operational barriers to and opportunities for flood risk management at the strategic (landscape / catchment) scale.

7 Conclusions and recommendations

Introduction

- 7.1 This final section of the report pulls together the conclusions and recommendations drawn in relation to local development plans and development management practice.

Policy

LDP Conclusions

- 7.2 Generally, there needs to be a step-change in authorities' approach to flood risk, moving from the current mode of ensuring textual compliance with SPP to a more effective means of complying with the spirit of the policy – embodying the avoidance and precautionary principles in particular.
- 7.3 It is recognised that culture change is a slow process and requires extensive investment of time and resources to be effective, but as the main climate change impact likely to affect Scotland's population, flooding needs this level of attention now to secure resilient communities for the future.

Development management conclusions

- 7.4 Local policy frameworks relating to flood risk do not always appear to be given the attention or weight that might be expected, even for proposals at direct risk of flooding. Direct application of SPP is similarly inconsistent.
- 7.5 As noted above, key messages in relation to the need for a precautionary approach to flood risk appear to have gained comparatively little traction in decision-making as yet.

Recommendations

- There is potentially a need for a stronger steer from government on the value and importance of the precautionary principle in planning for flood risk, and the need for authorities to take a proactive approach to understanding risk and avoiding relevant areas.
- Appointing an Elected Member as 'flooding champion', and providing suitable information and training, could help to secure the necessary political buy-in and leadership.
- Further research into how flooding policies and supporting data are built into the operational side of development management planning.

Assessing flood risk

LDP Conclusions

- 7.6 It is clear that SFRA as understood by planning authorities is not working as it should for the current generation of LDPs. It was not perceived as a priority or as a tool that could add value to plan-making, but there is good anecdotal evidence that authorities are more positive and intend to make fuller use of the approach in emerging development plans. However, there is a need to move relatively quickly to capture this opportunity.
- 7.7 Greater integration between SFRA and SEA could be beneficial in reducing the overall burden for assessment – and the administrative burden for SEPA as a statutory consultee. Similarly, good practice guidance (in addition to 'how to' advice), that illustrates the value of a meaningful approach to SEA / SFRA through real-world examples, could be helpful in clearly articulating the

benefits of the approach. This could help to shift the emphasis from a process-driven 'box-ticking' exercise to a more positive outcomes-focussed approach.

Development management conclusions

- 7.8 It appears that formal site-specific FRA is not being requested as frequently as it should, to properly embody a precautionary approach to managing flood risk. A number of cases that could objectively have benefitted from FRA in terms of providing certainty and a coherent audit trail for the planning authority were not supported by this information. While this would not necessarily have changed the planning outcome of these cases, it would have given greater assurance – and formally accounted for the effects of climate change.
- 7.9 However, where FRA was required by authorities (often as a consequence of SEPA or local flooding team interventions), it was generally robust, accounted for relevant risks and the effects of climate change. Clearly, it is a tool that works and should be required wherever there is uncertainty.

Recommendations

- There may be a need to examine if SFRA as an approach, and the guidance on SFRA, is fit for purpose. This relates particularly to how the guidance deals with assessing flood risk in different contexts (for example dispersed rural settlements vs. higher density urban areas)?
- There is also a need to counter the impression that SFRA is a purely administrative 'box-ticking' task; framing it more effectively as a tool that adds value to plan-making (along with SEA more generally).
- Explore opportunities for how examples of best practice in SFRA or the use of flood baseline information be shared between planning authorities, to help understand why there is a disparity in the flooding information gathered by different planning authorities.
- Explore opportunities for a platform for SEPA and planning authorities to share local flood risk information and data so that both parties have access to the same level of detailed information.
- Explore the need for guidance on the approach to interpretation and assessment of cumulative impacts of different sources of flooding.
- Explore the need for further training and guidance on planning for the effects of climate change and flood risk areas, the data sources and the parameters which should be used.
 - Investigate a potential role for the Improvement Service, the Planning Officers' Society, RTPi and TCPA.

Considering climate change

LDP conclusions

- 7.10 Climate change, as it relates to flood risk, cannot be held to be effectively 'mainstreamed' in the current suite of adopted LDPs. While it is frequently referenced in policy, and assessed separately through SEA, it is still treated as a somewhat nebulous and non-specific issue.
- 7.11 It is likely – through Local Flood Risk Management Plans, and the most recent SEPA data that allows for climate change – that this will improve at the operational and assessment level. However, there does need to be an acceptance that the principal influence of climate change on flooding will be increased uncertainty – with a concurrent need to allow greater margins for error in plans and decision-making.
- 7.12 Developers and communities alike require a consistent message from planning authorities on how climate change is understood and how its effects will be managed. To do this effectively, a move away from high-level, positive policy statements towards more outcome-focussed policy and spatial strategy is required.

Development management conclusions

- 7.13 The effects of climate change on flood risk were not directly considered in the majority of the applications assessed (32 out of 40).
- 7.14 This is obviously concerning, given the importance placed on the issue by SPP. As noted above, the persistent impression of climate change as a non-specific threat in local policy frameworks is unhelpful – which makes interpreting and enforcing relevant provisions difficult in a practical setting. It is likely that greater integration between planning and flood risk management within local authorities will have some impact on this, but action is potentially needed now to enhance the level of practical consideration given to climate change in decision-making.

Recommendations

- Further research into the overarching success of understanding and accounting for climate change in Local Development Plans would be a valuable companion to this research.
- Guidance is required to enable authorities to understand and interpret the available climate change projection and flood risk data – to ensure that this can be accurately translated into robust policy and spatial strategy.
- Front-loading consideration of climate change resilience at the pre-allocation stage – for example through site-specific FRA – would help to transfer the burden from authorities to developers that would benefit financially from allocation.
 - It may be advisable for research to test models of delivery, as there is likely to be criticism from the development industry and communities alike (likely unfair burden, vs. 'buying the right results' respectively)
 - Higher-level 'fit-for-purpose' assessments could be trialled at MIR stage, to provide baseline information prior to the process of detailed site assessment / land allocation.
- Research into the robustness and enforceability of all planning policies in relation to climate change. This would help to frame the scale of the task required in terms of moving from 'warm words' to concrete action.
- Given the general paucity of information on how authorities are taking climate change into account, further research into the operational measures put in place to help officers understand threats to development could provide valuable context.

Considering all sources of flood risk

LDP conclusions

- 7.15 Surface water is generally dealt with less effectively than other types of flooding – reflecting the relatively recent provision of surface water flood risk data by SEPA. Few LDPs methodically list all sources of risk, rather they tend to concentrate on the most locally-specific risks. SEPA's extensive input to the plan-making, SEA and SFRA process ensures that key risks are taken into account.
- 7.16 In strict policy terms, it is arguable whether LDP policies need to actually list all sources of risk, given the comprehensive nature of SPP, but should instead focus on highlighting key local issues and providing a catch-all hook for use of 'the best available data' and the need for detailed FRA to provide an appropriate understanding of risk, and opportunities for avoidance/mitigation.
- 7.17 Authorities clearly have concerns with regard to 'non-standard' sources of flood risk, ranging from infrastructure failure through to inappropriate SuDS design and maintenance. A more systematic understanding of the nature and scale of this issue is required before an effective solution can be proposed.

Development management conclusions

- 7.18 Clearly, the inconsistent approach taken to understanding and accounting for flood risk across the sample cases makes generalisation difficult. However, there are good indications that flood risk of any type is frequently not given the level of attention and weight necessary.

- 7.19 Where SEPA and local FRM teams have been involved, greater certainty is provided – along with cases where FRA was required. In all cases where FRA was undertaken, all relevant sources of flood risk were identified and dealt with effectively.
- 7.20 Surface water drainage, and the requirement for SuDS, is rather better accounted for in terms of conditions on planning permission than in active consideration of applications. This implies that these conditions may be applied with comparatively little reference to the wider flood risk context

Recommendations

- Assess the need for additional training or guidance on taking surface water flooding into account, and assessing the combined risk from different sources of flooding

Role and impact of SEPA advice

LDP conclusions

- 7.21 SEPA's dual role as a statutory consultee on the development plan and SEA plays a critical part in ensuring that flood risk is taken into account effectively. The agency functions partly as a critical friend, and partly as a backstop to prevent adverse environmental effects.
- 7.22 SEPA's interventions can be shown to both reduce likely adverse effect and add value, for instance:
- Policy changes for one-third of adopted LDPs;
 - Securing more effective compliance with SPP;
 - Requesting SFRA;
 - Providing methodological critique and assistance for SEA and SFRA;
 - Providing detailed assessment of risk to proposed land allocations;
 - Providing information on mitigation options.
- 7.23 SEPA appears to expend significant energy on contributions to the LDP process – including additional consultation meetings to support planning authorities. SEPA's advice and guidance is highly influential in terms of policy, SEA and SFRA – but there is a significant difference in impact in relation to land allocations. While some authorities accept and implement SEPA's recommendations with regard to flood risk with no issue, a significant proportion did not. In addition to resulting in a substantial administrative burden for the Examination process, this further reinforces the impression that flood avoidance is given more weight at a conceptual level than it is at a practical level.
- 7.24 It is recognised that authorities are often under significant pressure from landowners and other proposing sites for allocation. SPP (para. 123) requires authorities to maintain an effective five-year land supply of housing land, resulting in pressure from the Scottish Government, and not meeting this target is a rich source of grounds for legal challenge to LDPs³⁰.

Development management conclusions

- 7.25 Although the picture relating to precisely when and on what grounds SEPA was consulted on the sample cases is somewhat clouded by vagaries in evidence availability, where it was involved its contributions had a significant impact and were wholly accepted by decision-makers (e.g. need for FRA, appropriate conditions).
- 7.26 It is clear that SEPA may not have been consulted on number of development proposal that, *prima facie*, should be referred to them under Schedule 5 of the DMR and associated SEPA guidance. Some clarity in terms of officers' decision making in this regard would be a helpful addition to any case file – and would help to provide a robust audit trail for the authority in the event that decisions are challenged through legal review. It should be noted that the planning

³⁰ At the time of writing, the adopted Stirling LDP was subject to legal challenge by a landowner as a consequence of not allocating a particular site for housing development

outcomes of the cases are unlikely to have resulted in large-scale exposure of additional development to flood risk, but in many instances the provision of FRA or a more robust approach would have provided additional certainty. Additional SEPA involvement may also have assisted in securing more effective consideration of the effects of climate change – most likely through the provision of FRA.

Recommendations

- Further research into planning authority processes and procedures for recording officers' decision-making on when to consult statutory consultees may be helpful. Many authorities make use of process checklists – therefore understanding where flood risk figures in the hierarchy of constraints could be instructive.
- Similarly, research into the ways in which SEPA flood data is built into local authority DM systems, and the weight it is accorded, could be helpful.
- More extensive research into the approaches taken to understanding and mitigating flood risk across the whole of Scotland would be beneficial.

Resources and technical capacity

- 7.27 It is clear that local Flood Risk teams are a valued and indispensable resource for both development planning and development management. Their advice can be shown to have a high, positive impact on development proposals – and will likely play a stronger role in influencing emerging LDPs through FRM planning.
- 7.28 Understanding the distribution and prioritisation of this resource in Scotland's local authorities would be advantageous.

Outstanding issues

Methodological limitations

- 7.29 As this research was limited to the 16 authorities with adopted LDPs, half of Scotland's planning authorities remain unaccounted for. The vast majority of Scotland's population and development pressure is located within those authority areas and, as such, substantial questions remain. Extending this research to give full coverage of Scotland's LDPs, once adopted, would potentially yield more balanced conclusions.
- 7.30 Similarly, the opportunities to avoid and manage flood risk are substantially different in dense urban areas, therefore some of the conclusions of this report may not be applicable to urban authorities (Dundee and Aberdeen, although urban, are small by comparison and have large rural hinterlands – rather than the extensive suburban area of Glasgow in particular.)
- 7.31 A small-scale sampled approach to casework analysis can only ever provide a snapshot of current practice. Although this process provides valuable insights, they should be seen as helping to define the research questions for a larger study rather than providing a definitive view on the issue.

Natural flood and catchment management

- 7.32 The fact that the majority of the land resource and activities affecting the flood management potential of undeveloped catchment lies outside planning control needs greater acknowledgement. For all that planning authorities could designate areas of 'functional floodplain' to be safeguarded from development in their LDPs, the activities and indeed some development that could occur there is not within their control.
- 7.33 A key recommendation of this report is therefore to undertake parallel research into the potential barriers and opportunities of taking a more integrated approach to catchment management, through greater alignment of land management and planning structures and policies.

Need for balance in plan and decision-making

- 7.34 The fact that planning authorities are required to balance an extensive suite of often competing objectives is a central consideration. While it is easy for research on a single issue to appear overly critical, it is necessary to view any conclusions on effectiveness in the wider context of the role and purpose of planning – and the local circumstances that affect plan and decision-making.
- 7.35 This research did not – and could not – take the full planning balance of development management casework into consideration, given its terms of reference.

Evidence of improvement

- 7.36 It is important to note that many of the recommendations arising from this project were suggested directly by local authority officers. Indeed, from the interview process it became readily apparent that many authorities had already changed their approach to flooding and, in some cases, were developing and applying innovative methods to tackling the issue.
- 7.37 It would therefore be valuable for further research to take a 'snapshot' of the methods and approaches being employed by *all* planning authorities in developing their LDPs and/or reviewing the adopted documents.

Appendix 1

Legislative and policy context

Flood Risk Management (Scotland) Act 2009

The Flood Risk Management (Scotland) Act 2009 (FRMA) implements the European Directive on the Assessment and Management of Flood Risks 2007³¹. It requires a framework to be established for the assessment and mapping of flood risks and to plan for their management. This legislation shifted the emphasis towards managing the likelihood and impact of flooding – rather than the reactive approach of the past that concentrated principally on defending property.

The FRMA places duties on the Scottish Environment Protection Agency (SEPA) and responsible authorities, such as local authorities, including a duty to exercise their functions to reduce overall flood risk. SEPA's first responsibility under the FRMA was the publication of the **National Flood Risk Assessment** (NFRA) in December 2011. The NFRA estimated that:

- fluvial flooding accounts for 45% of all flood impacts in Scotland;
- surface water flooding accounts for 38% of all flood impacts in Scotland; and,
- coastal flooding accounts for 17% of all flood impacts in Scotland.

It also identified that approximately 125,000 properties are at risk of flooding from any source, representing one in 22 residential properties and one in 13 businesses. The NFRA identified 243 'Potentially Vulnerable Areas' (PVAs), where flooding is likely to have the greatest impact. For the purposes of the flood risk framework, Scotland has been split into 14 Local Plan Districts with each district covering a number of local authorities, with one authority designated as the lead.

The framework will be made up of two sets of complementary plans. In December 2015, SEPA produced **Flood Risk Management Strategies** for each Local Plan District (which together comprise the Flood Risk Management Plan for Scotland). Each strategy will be implemented through **Local Flood Risk Management Plans** (LFRMPs) produced by the lead local authority for their area. The publication date for the LFRMPs is June 2016. Local authorities are therefore currently in the process of developing their LFRMPs – which should influence future LDPs, but are unlikely to have had a significant impact on those already adopted which form the basis of this study.

SEPA's Flood Hazard and Flood Risk Maps

A key milestone of the FRMA was the production of flood hazard and flood risk maps for Scotland³². In 2009, SEPA produced the Indicative River and Coastal Flood Map (IRCFM) which provided data on the extent of fluvial and coastal flooding throughout Scotland based on 1-in-200 year flood events. There are, however, certain limitations with this dataset:

- Whilst they provide a high quality and scientifically robust *indication of areas* which may flood, this is for a presentation scale no greater than 1:25,000;
- The maps have been developed to give an indication of whether a general area, not individual properties, may be affected by flooding;
- The maps only show flooding from the specified sources. The fluvial maps do not show runoff from fields or explicitly take into account any flood prevention schemes in place;
- The maps only show the likely extent of 1-in-200 year flood events;
- The maps do not take predicted climate change into account; and,
- The fluvial map does not show flooding from very small watercourses i.e. where the area draining to the river is less than 3km².

In January 2014, SEPA published updated flood risk and hazard maps for coastal, river and surface water flooding (which were subsequently updated in March 2015 and December 2015), superseding the Indicative River and Coastal Flood Map. The flood hazard maps show information such as the modelled extent of flooding, depth and velocity of floodwaters. The flood risk maps provide detail on the impacts on people, the economy and valued environmental assets. Natural

³¹ Directive 2007/60/EC The Assessment and Management of Flood Risks

³² SEPA provided local authorities with a Planning Sub-folder which contains the mapped information on flood risk and hazard.

flood management (NFM) maps identify areas where there are opportunities for runoff reduction; floodplain storage; sediment management; estuarine surge attenuation; and wave energy dissipation.

These maps provide the most comprehensive national source of data on flood hazard/risk and include information on the different likelihoods of flooding (see **Table 0.1**). Two climate change scenarios are represented within the fluvial flood maps and are based on 30-year and 200-year return periods, taking existing flood defences into account³³. For coastal flooding, UKCP09 projections of sea level rise were used to account for sea level rise to 2080 (High emissions, 95% confidence to 2080). For surface water, a 20% uplift in national rainfall was applied.

Table 0.1: SEPA flood risk criteria

Likelihood of flooding	Return period	Probability of occurrence in any given year
High	1-in-10 year event	10%
Medium	1-in-200 year event	0.5%
Low	1-in-1000 year event	0.1%

Similar to the Indicative River and Coastal Flood Map, these maps have been prepared using a nationally-applied methodology and are based on a two-dimensional flood modelling method applied across Scotland to all catchments greater than 3km². SEPA (2014)³⁴ states that the maps are of a "strategic nature to support flood risk management planning at a community level. It is not appropriate for property level assessment. This is due to the application of a nationally consistent methodology being applied to provide Scotland wide mapping and with this approach there are assumptions and inherent uncertainty".

River Basin Management Planning

River Basin Management Planning (RBMP), one of the core requirements of the EU Water Framework Directive³⁵, takes a source-to-sea approach to integrating land and water management to improve the quality of Scotland's waters. Although RBMP is concerned with water quality rather than flooding, there are linkages between the processes. For example, ecological restoration can help restore more natural run-off patterns to slow the passage of flood waters. River Basin Management Plans³⁶ for the Scotland River Basin and the Solway-Tweed River Basin (covering the south of Scotland) were prepared for the period 2009-2015, coinciding with the period the 16 LDPs were being prepared, and may have influenced how flooding was considered during their plan preparation.

National Planning Framework

National Planning Framework 2 (NPF2)³⁷ recognises that the projected increase in flood risk as a consequence of climate change has implications for the siting of new development, the protection of existing development, coastal defence and the safeguarding of cultural heritage. It supports the use of SEPA flood maps to inform decisions on the location of development and the provision of mitigation and attenuation measures where vulnerable sites have been selected for development.

³³ Estimates are based on an assessment of Scotland's coasts and river catchments to the effects of climate change (CEH, 2011), in turn based on the conservative 2080s 'high emission scenario' from UKCP09.

³⁴ SEPA, 2014. *River flooding summary: Methodology and mapping* [pdf]. Available at: https://www.sepa.org.uk/media/163406/river_flooding_summary.pdf [Accessed 12 February 2016]

³⁵ EU Water Framework Directive 2000, transposed into Scots law by the Water Environment and Water Services (Scotland) Act 2003

³⁶ Scottish Government, 2009. *The river basin management plan for the Scotland river basin district 2009-2015* [online]. Available at: <https://www.sepa.org.uk/environment/water/river-basin-management-planning/publications/> [Accessed 15 February 2016]

³⁷ Scottish Government, 2009. *National Planning Framework for Scotland 2* [pdf]. Available at: <http://www.gov.scot/resource/doc/278232/0083591.pdf> [Accessed 15 February 2016]

It recognises that sustainable catchment management measures, such as increasing the capacity of wetlands, meanders and floodplain woodlands, have an important part to play in providing long-term solutions to problems of flooding. It states that the FRMA modernises the framework for sustainable flood management and directs local authorities and SEPA to work together to produce flood management plans.

In relation to flooding, **National Planning Framework 3** (NPF3)³⁸ is less detailed than its predecessor. Nevertheless, NPF3 supports a catchment-scale approach to sustainable flood risk management. Its spatial strategy aims to build resilience of our towns and cities and, with the Scottish Government’s Land Use Strategy, encourage sustainable management in rural areas, highlighting the role that planning can play in reducing vulnerability of existing and future development to flooding.

Planning Guidance

Scottish Government online planning guidance: Flood Risk

The Scottish Government published a **Planning Guidance on Flood Risk**³⁹ for local authorities (most recently updated in June 2105) to take into account in the development planning and development management processes. The document reiterates SPP requirements of planning authorities to ensure future development is not located in areas with a significant risk of flooding, including functional flood plains. It outlines the following points which should be considered in the preparation of strategic and local development plans and which should be taken into account as part of the development management process.

Table 0.2 Strategic Government online planning guidance: Flood Risk

Development planning	Development management
Understand and identify flood risk from all sources at the earliest opportunity	Establish whether the development site is susceptible to flooding, from all sources , and whether development of the site would lead to an increase in flood risk elsewhere
Strategic Flood Risk Assessment should be carried out to inform preparation of the development plan	Consider proposals within the context of the Flood Risk Framework , location and site specific circumstances, the characteristics and nature of any flood risk and the type and design of development proposed
Develop policies setting out the planning authority’s approach to flood risk based on the principle of flood avoidance in accordance with the Flood Risk Framework set out in the SPP	Applications that may lead to an increase in flood risk on or off site should be supported, as appropriate, by a Flood Risk Assessment in accordance with SEPA’s Technical flood risk guidance for stakeholders
Indicate the functional flood plain and any other relevant flooding constraints on the proposals map/spatial framework	Where development is allowed in a flood risk area measures to protect against or manage flood risk and loss of storage capacity should be agreed
Where relevant to the development strategy, flood protection and reduction measures and opportunities, including natural flood management and coastal realignment, should be indicated in the development plan and protected and promoted as appropriate	For redevelopment and change of use proposals in areas at flood risk, consider options to reduce flood risk vulnerability through e.g. design, type and use of development or number of buildings.
Natural and man-made features which help reduce the impact of flooding or flood risk should be identified and appropriately protected from development	Consider the impacts of climate change during the lifetime of the development and whether the development needs to be designed to be adaptable to climate change, e.g. to

³⁸ Scottish Government, 2014. *Scotland’s Third National Planning Framework* [pdf]. Available at: <http://www.gov.scot/Resource/0045/00453683.pdf> [Accessed 15 February 2016]

³⁹ Scottish Government, 2015. *Flood Risk* [pdf]. Available at: <http://www.gov.scot/Resource/0047/00479774.pdf> [Accessed 25 February 2016]

Development planning	Development management
	potentially rising levels of flood waters
Ensure any assessment of the effectiveness of sites, especially housing sites, takes flood risk into account . Sites that have previously been allocated for development may need to be reassessed where flood risk has not previously been a consideration or where new information on flood risk has become available since allocation	
Take forward opportunities to deliver multiple benefits through flood risk management approaches . There may be scope to complement other relevant policy areas in the development plan and to contribute to wider placemaking.	
Set criteria against which the need for FRA will be assessed	
Consider the inclusion of policy highlighting opportunities to reduce flood risk through redevelopment (including change of use) in flood risk areas.	
Promote flood resilience through the design and construction of buildings, as appropriate	
SEPA's flood maps, SFRA and flood risk management plans (i.e. Flood Risk Management Strategies and Local Flood Risk Management Plans) should be used to inform all of the above	

Land Use Planning System: SEPA Development Plan Guidance on Flood Risk

SEPA⁴⁰ (2015) outlines the requirements and recommendations for Local Development Plans relating to flood risk:

Table 0.3 SEPA Development Plan Guidance on Flood Risk

Requirements	Recommendations
Policy coverage and allocations support the delivery of relevant objectives and actions within Flood Risk Management Strategies and Local Flood Risk Management Plans that affect the plan area [once published].	The role of sustainable flood risk management should be recognised in the context of sustainable placemaking and blue/green infrastructure. This includes the policy framework for sustainable placemaking and blue/ green infrastructure and the identification of existing and creation of new blue/green infrastructure in the spatial strategy.
Allocation sites accord with the principles of sustainable flood risk management by avoiding development in areas at flood risk, unless they accord with risk framework in paragraph 263 of SPP.	To ensure that proposed land uses are acceptable for the location and degree of flood risk, SEPA's Land Use Vulnerability guidance should be used to inform the spatial strategy, site allocations, and policy framework. A commitment should be made for development to accord with the guidance.
Site requirements are attached to allocations where a potential flood risk has been identified (from any source) to ensure that a site specific Flood Risk Assessment (FRA) is undertaken in advance of the development. This should be used to inform the siting, layout, design and capacity of development on the site in a way that avoids an increase in flood risk on and off site and ensures that there is safe dry pedestrian access and egress at times of flood.	To limit the impact of potential flood risk any development permitted in medium to high risk areas (that accords with the exceptions in the risk framework) or is located in adjacent low to medium risk areas should be built to a water resilient design .
Policy coverage to ensure that: <ul style="list-style-type: none"> • a precautionary approach is taken to flood risk from all sources taking account of the predicted impacts of climate change; 	

⁴⁰ SEPA, 2015. *Land Use Planning System: SEPA Development Plan Guidance on Flood Risk* [pdf]. Available at: <http://www.sepa.org.uk/media/143247/lups-dp-gu2a-development-plan-guidance-on-flood-risk.pdf> [Accessed 15 February 2016]

Requirements	Recommendations
<ul style="list-style-type: none"> • development is avoided in locations at medium to high flood risk (unless it accords with the risk framework in paragraph 263 of SPP) or where it would lead to an increase in the probability of flooding elsewhere; • a Flood Risk Assessment (FRA) is required for all developments at risk of flooding from any source in medium to high risk areas and developments in low to medium risk areas identified in the risk framework (i.e. developments located in an area at the upper end of the probability scale, essential infrastructure and the most vulnerable land uses). The flood risk assessment should be undertaken in accordance with SEPA technical guidance. 	

Strategic Flood Risk Assessment: SEPA technical guidance to support development planning

The production of a SFRA within a local authority’s Local Development Plan is a key mechanism for influencing planning policies and approaches to flood risk. SEPA (2015)⁴¹ states that a *“Strategic Flood Risk Assessment is designed for the purposes of informing the development planning process, primarily, to avoid increasing overall flood risk by avoiding areas of flood hazard. It constitutes a strategic overview of flood risk to the development plan area and should involve the collection, analysis, and presentation of all existing, available and readily derivable information on flood risk from all sources”*. The strategic nature of these studies can help prioritise and signpost where specific Flood Risk Assessments (FRAs) may need to be carried out.

One of the key roles of a SFRA is to provide baseline information regarding flood risk for inclusion in the Strategic Environmental Assessment (SEA) of LDPs. It should be used to apply the risk based approach to the identification of land for development and for the development of policies for flood risk management, including surface water management. As a consequence, a SFRA should be produced at the early stage of the LDP development process to ensure that flood risk issues are considered in the formulation of the spatial strategy, the identification of development allocations and refinement of land use policies. In addition, embedding SFRA as part of the development plan process would also contribute to satisfying the requirements placed on local authorities under section one of the FRMA.

The level of detail and information requirements of a SFRA should be proportionate to the issues a development plan is dealing with and the flood risk issues in the area. The SFRA should include information on potential flood hazard and risk from all potential sources; information on potential flood hazard and risk due to climate change; information on existing flood protection schemes; identification of the functional floodplain, drainage issues, and sites constrained by flood risk; and information on growth pressures in the area.

The Planning Guidance document advises local authorities on the sources of information which should be taken into consideration when preparing a SFRA. SFRA should take account of all sources of flooding (as identified in SPP [2014]) and use the updated flood risk maps and Potential Vulnerable Areas (PVAs) published by SEPA to identify areas with a high/medium/low probability of flooding. Other valuable sources of information include previous Flood Risk Assessments (FRAs); historical records including local authority biennial flood prevention reports (although no longer required under the FRMA); the United Kingdom Climate Change Projections (UKCP09); and, consultation with Flood Liaison and Advice Groups (FLAGs) and local authorities’ flood risk management officers.

Technical Flood Risk Guidance for Stakeholders

SEPA’s Technical Flood Risk Guidance for Stakeholders⁴² provides guidance to applicants on preparing a Flood Risk Assessment (FRA). A FRA is required to support an application where it

⁴¹ SEPA, 2015. *Strategic Flood Risk Assessment: SEPA technical guidance to support development planning* [pdf]. Available at: <https://www.sepa.org.uk/media/143351/lups-gu23-strategic-flood-risk-assessment-sepa-technical-guidance-to-support-development-planning.pdf> [Accessed 15 February 2016]

⁴² SEPA, 2015. *Technical Flood Risk Guidance for Stakeholders* [pdf]. Available at: <http://www.sepa.org.uk/media/162602/ss-nfr-p-002-technical-flood-risk-guidance-for-stakeholders.pdf> [Accessed 15 February 2016]

appears that a site, or parts of the site, may be at 'medium to high risk' of flooding (i.e. located on or immediately adjacent to the functional floodplain).

A key requirement for a FRA is that it must consider all sources of flooding and demonstrate how flood mitigation methods will be managed. The FRA will be required to certify that any flood risk associated with the development can be managed now and in the future, taking into account climate change, and should illustrate how the development will not increase the risk of flooding elsewhere. The scale, nature and location of the proposed development will inform the scope of the FRA required.

Appendix 2

Interview Questions

Interview Questions

Question	Response
Name and position of Planning Policy Officer	
Date of interview	
Local Authority	
<p>Overview:</p> <p>LUC has been commissioned by ClimateXChange to examine how Scotland’s local authorities are planning for current and future flood risk through their Local Development Plans, and how these risks are taken into account in decision-making. The assessment is required by the Climate Change (Scotland) Act 2009.</p> <p>The purpose of this interview is to collect information from local authorities about the approach taken to integrate national flood risk policy into the LPD development process. In particular, to draw out where the approach used by your planning authority has worked well and where recommendations can be made to help planning authorities improve the process in the future.</p> <p>The responses you provide will be anonymous.</p>	
<p>Notes from SEA/LDP analysis:</p>	

Use of baseline flood data sources and information (to find out if there are any issues with the understanding, availability and use of flood data)

- What are the main flood risk issues and what is their complexity in the Cairngorms area? (*gain an overview from their perspective*)
- What priority was given to flood risk in the plan preparation process? Was flood risk a key area of challenge for the settlement strategy?
- Did you use a Strategic Flood Risk Assessment or an alternative approach to establishing the flooding baseline for the planning authority? What was the reasoning for this? How useful was it to the plan making process?
- What data sources did you use to inform your flooding baseline (SEPA flood maps, information from Flood Liaison and Advice Group etc.)?
- Did you consult with neighbouring authorities with regard to flooding? What were the issues?
- What were the challenges associated with the interpretation and use of flood risk data? How did you overcome these? Did you have data on all sources of flooding (surface water, groundwater, climate change etc.)?

SEA process (to understand if the SEA process is effective in relation to considering flood risk)

- How closely was the SEA process integrated with Plan preparation?
- Was the SEA carried out in-house, within planning or another team? Or contracted out?

- To what extent did the SEA assessment of flood risk influence the plan preparation?

SEPA involvement (to understand how much SEPA involvement is taking place in addition to the statutory consultations)

- Did SEPA provide detailed comments on flood risk through their formal responses to the MIR and Proposed LDP? (e.g. did they provide their own assessment of the flood risk of allocations?)
- What additional support and information did SEPA provide through the plan preparation process? (e.g. Did they hold additional meetings with the planning authority? Did you work with SEPA to agree site specific mitigation measures or the wording of flooding policy?)
- How did you use the information SEPA provided? How influential was this information?

Examination (to understand why in some cases, allocations with significant flood risk are appearing in the proposed Plan without suitable mitigation)

- *(if relevant to the planning authority)* SEPA had a number of issues and objections which reached LDP examination *(if this is the case)*. What were the reasons for these flood related concerns not being addressed earlier in the plan preparation process?

Overview (some of these may not need to be asked if it has become apparent through the previous discussion)

- What were the main challenges to ensuring flood risk was considered through the LDP?
- What was most influential in enabling the consideration of flood risk:
 - Integrated approach to consideration of flood risk by the planning authority throughout the plan preparation process?
 - SEA process?
 - SEPA responses to the MIR and LDP?
 - Informal consultation and involvement with SEPA?
- Looking to your new LDP, what will you be doing differently in your approach to considering flood risk, and why?
- Is there any additional advice, guidance or data which would help you when undertaking this process in the future?
- Do you have any additional comments on the approach to and process of incorporating current and future flood risk into planning policy?

Appendix 3

Collated recommendations

Code	Recommendation
Local Development Plans	
LDP1	Research into the potential of SDPs as a vehicle for delivering regional-scale leadership in planning for flood risk, particularly with regard to catchment-scale approaches.
LDP2	There may be a need to examine whether SFRA as an approach, and the current guidance, is fit for purpose. This relates particularly to how the guidance deals with assessing flood risk in different contexts (for example dispersed rural settlements vs. higher density urban areas).
LDP3	There is a need to counter the impression that SFRA is a purely administrative 'box-ticking' task; framing it more effectively as a tool that adds value to plan-making (along with SEA more generally).
LDP4	Explore opportunities for a platform for SEPA and planning authorities to share local flood risk information and data so that both parties have access to the same level of detailed information.
LDP5	Explore the need for guidance on the approach to interpretation and assessment of cumulative impacts of different sources of flooding.
LDP6	Explore the need for further guidance on planning for the effects of climate change and flood risk areas, the data sources and the parameters which should be used.
LDP7	Potential need for reiteration of how SPP policy principles and requirements should be reflected in LDPs (particularly precautionary and avoidance principles) – moving beyond textual references to influencing thinking, processes and outcomes.
LDP8	Explore how planning authorities can be supported to ensure more effective translation of SEA findings to the LDP preparation process.
LDP9	Preparation of guidance note on assessing flood risk through SEA, and incorporating SFRA more effectively.
LDP10	Identify ways to provide additional support to planning authorities that have a lack of flooding expertise. This could include making sure that SEPA staff are aware of which planning authorities need additional support, or targeted training events.
LDP11	Undertake further investigation to understand the geographic association with lower levels of SEPA input to identify if this is an issue with SEPA staffing levels or flooding expertise.
LDP12	Further research should be undertaken on the number of 'legacy sites' – granted planning permission under different policy regimes – that are allocated in adopted Local Development Plans and are subject to significant flood risk
LDP13	Training events for planning authority staff to build capacity in understanding, interpreting and applying flood data.

Code	Recommendation
LDP14	Adoption of standard nomenclature for expressing flood risk factors. Use of percentages, rather than return periods (e.g. 0.5%, in place of 1-in-200 year event), may be more effective and less abstract.
LDP15	Assess the need for additional training or guidance on taking surface water flooding into account, and assessing the combined risk from different sources of flooding [links to LDP5]
LDP16	Further research into how planning authorities are either taking the SEPA recommendation 'that a climate change allowance of +20% on the estimated 200-year peak flow be made', or the methodology they are using to calculate their own allowances for the current generation of LDPs, in order to establish how the impacts of climate change on flood risk are being accounted for.
LDP17	Provision of a 0.5% probability (1-in-200 year) plus [20%] climate change indicative flood extent map to planning authorities. LPAs are unlikely to have in-house capability or data to undertake this analysis in-house.
LDP18	Further guidance / sharing of good practice on the development of a comprehensive local flooding baseline, and methods for applying this consistently and effectively.
LDP19	Local authorities should refer to SEPA's Natural Flood Management map which identifies 'opportunity areas' for runoff reduction, floodplain storage, sediment management, estuarine surge attenuation, and wave energy dissipation.

Code	Recommendation
Development Management	
DM1	Further research into the operational measures put in place to help officers understand threats to development could provide valuable context.
DM2	Further research into planning authority processes and procedures for recording officers' decision-making on when to consult statutory consultees may be helpful. (Many authorities make use of process checklists – therefore understanding where flood risk figures in the hierarchy of constraints could be instructive.)
DM3	Research into the ways in which SEPA flood data is built into local authority DM systems, and the weight it is accorded, could be helpful.

Code	Recommendation
Doing things differently	
DTD1	Further research into the practicality and enforceability of pre-allocation Flood Risk Assessments for proposed LDP sites, including draft methods.
DTD2	Comparative research examining post-FRM Strategy/Plan LDPs with earlier plans to determine whether flooding is dealt with more effectively
DTD3	Research into the availability of land in and around Scotland's main settlements could help to illustrate the scale of the issue – and highlight both where avoidance is unlikely to be a solution, and where upstream catchment management could/should be prioritised.
DTD4	Action research / practitioner-led research into potential differences in understanding and interpretation of SPP policies relating to flooding.
DTD5	Research into the impact of FRM Plans on planning practice and decision-making.
DTD6	Research into the interfaces between planning, land management and forestry regulatory regimes to identify the policy and operational barriers to and opportunities for flood risk management at the strategic (landscape / catchment) scale.

Appendix 4

Abbreviations and glossary

Acronyms

Acronym	Full Name
FRA	Flood Risk Assessment
FRMS	Flood Risk Management Strategy
LDP	Local Development Plan
NFRA	National Flood Risk Assessment
NPF	National Planning Framework
SEPA	Scottish Environment Protection Agency
SFRA	Strategic Flood Risk Assessment
SPP	Scottish Planning Policy
SuDS	Sustainable Drainage System
WFD	Water Framework Directive

Glossary

Term	Definition
Civil infrastructure	Hospitals, fire stations, emergency depots, schools, care homes, ground-based electrical and telecommunications equipment.
Climate change adaptation	The adjustment in economic, social or natural systems in response to actual or expected climatic change, to limit harmful consequences and exploit beneficial opportunities.
Climate change mitigation	Reducing the amount of greenhouse gases in the atmosphere and reducing activities which emit greenhouse gases to help slow down or make less severe the impacts of future climate change.
Coastal flooding	Caused by a combination of high tides and storm surge and/or high wave conditions linked to low pressure weather systems.
Cumulative impact	Impact in combination with other development. That includes existing developments of the kind proposed, those which have permission, and valid applications which have not been determined. The weight attached to undetermined applications should reflect their position in the application process.
Drainage Assessment	A report prepared by the developer demonstrating the drainage issues relevant to a proposal and the suitable means of providing drainage.
Ecosystems services	The benefits people obtain from ecosystems; these include provisioning services such as food, water, timber and fibre; regulating services that affect climate, floods, disease, waste and water quality; cultural services with recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis and nutrient cycling.
Essential infrastructure	Defined in SEPA guidance on vulnerability as 'essential transport infrastructure and essential utility infrastructure which may have to be located in a flood risk area for operational reasons. This includes electricity generating stations, power stations and grid and primary sub stations, water treatments works and sewage treatment works and wind turbines'.
Flood	The temporary covering by water, from any source, of land not normally covered by water, but not including the overflow of a sewage system.
Floodplain	The generally flat areas adjacent to a watercourse or the sea where water flows in time of flood or would flow but for the presence of flood prevention measures. The limits of a floodplain are defined by the peak water level of an appropriate return period event. See also 'Functional floodplain'.
Flood risk	The combination of the probability of a flood and the potential adverse consequences associated with a flood, for human health, the environment, cultural heritage and economic activity.
Flood Risk Assessment (FRA)	An FRA is required to support a planning application when it appears that the site, or parts of the site, may be at 'medium to high risk' of flooding (i.e. located on or immediately adjacent to the functional floodplain).
Freeboard allowance	A height added to the predicted level of a flood to take account of the height of waves or turbulence and uncertainty in estimating the probability of the flooding.
Functional floodplain	For planning purposes the functional floodplain will generally have a greater than 0.5% (1:200) probability of flooding in any year. See also 'Washland'.
Green infrastructure	Includes the 'green' and 'blue' (water environment) features of the natural and built environments that can provide benefits without being connected. Green features include parks, woodlands, trees, play spaces, allotments, community growing spaces, outdoor sports facilities, churchyards and cemeteries, swales, hedges, verges and gardens. Blue features include rivers, lochs, wetlands, canals, other water courses, ponds, coastal and marine areas including beaches, porous paving and sustainable urban drainage systems.
Green networks	Connected areas of green infrastructure and open space that together form an

Term	Definition
	integrated and multi-functional network.
Groundwater flooding	Occurs when water levels below ground (i.e. in soils, sands and gravels or rock formations) rise above surface levels.
Most vulnerable uses	Basement dwellings, isolated dwellings in sparsely populated areas, dwelling houses behind informal embankments, residential institutions such as residential care homes/prisons, nurseries, children's homes and educational establishments, caravans, mobile homes and park homes intended for permanent residential use, sites used for holiday or short-let caravans and camping, installations requiring hazardous substance consent.
Potentially Vulnerable Areas	Areas identified using the National Flood Risk Assessment, where the scale of potential impact is sufficient to justify further assessment and appraisal.
River (fluvial) flooding	Occurs when the water draining from the surrounding land exceeds the capacity of the watercourse.
Sewer flooding	Occurs when combined sewers are overwhelmed by heavy rainfall. Sewer flooding is often closely linked to surface water flooding, and may contain untreated foul water.
Strategic Flood Risk Assessment (SFRA)	A SFRA provides an overview of flood risk in the area proposed for development. An assessment involves the collection, analysis and presentation of all existing available and readily derivable information on flood risk from all sources. SFRA applies a risk-based approach to identifying land for development and can help inform development plan flood risk policy and supplementary guidance.
Surface water (pluvial) flooding	Flooding as a result of rainfall runoff flowing or ponding over the ground before it enters a natural (e.g. watercourse) or artificial (e.g. sewer) drainage system or when it cannot enter a drainage system (e.g. because the system is already full to capacity or the drainage inlets have a limited capacity).
Sustainable Drainage Systems (SuDS)	SuDS are a sequence of water management practices and facilities designed to drain surface water in a manner that will provide a more sustainable approach than what has been the conventional practice of routing run-off through a pipe to a watercourse. Examples of SuDS include permeable surfaces, wetlands and ponds, and filter strips/trenches.
Watercourse	All means of conveying water except a water main or sewer.
Washland	An alternative term for the functional floodplain which carries the connotation that it floods very frequently.



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