Collaborative Flood Risk Management in Scotland.

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Abstract

A true collaborative approach has been developed in Scotland between the Scottish Environment Protection Agency (SEPA), Scottish Water and the 32 Local Authorities. This has resulted in the successful delivery of the first national Flood Risk Management Strategy at the end of 2015 and the subsequent Local Flood Risk Management Plans in June 2016, borne out of the requirements of the Flood Risk Management (Scotland) Act 2009. A further benefit of the collaborative approach has been the significant development of data sharing between the public bodies which has allowed such an ambitious strategy to be implemented.

This paper will outline how Scotland is now divided up into Local Plan Districts (LPD's), each led by a Lead Local Authority. LPDs are based on river catchment areas as opposed to Local Authority Council boundaries, resulting in collaborative working between Local Authorities, SEPA, Scottish Water and other Responsible Authorities. The paper will summarise the process SEPA, Scottish Water and Local Authorities have been through to date and the actions they have committed to over the first six-year cycle.

It will draw on examples of collaboration such as Local Authorities and Scottish Water developing integrated models of sewer and river systems, and agreements that are being drawn up regarding the adoption of sustainable drainage.

The paper will conclude with lessons learnt from the collaboration process and identify the challenges Scottish Water and the Local Authorities still face.

Introduction

Scotland, England and Wales have developed legislation and strategies to meet the needs of the same EU Floods Directive, (Directive 2007/60/EC). There are, however, notable differences in the approaches between the devolved nations. This paper will outline the approach taken in Scotland to deliver the Floods Directive. Particular focus will be on the collaborative approach which the authors believe are more robust than that undertaken in England.

Scotland's governance and organisational responsibilities are different to that of England, which in many ways has facilitated the ability to collaborate; for example there is one publicly owned water utility company. However, the responsibility for flood protection lies within the Responsible Authorities as described within the Flood Risk Management (Scotland) Act 2009 rather than a national organisation such as the Environment Agency. Responsible Authorities include Scottish Water all 32 Local Authorities, the Forestry Commission and National Parks. This provides simplicity in that Local Authorities are responsible for both major and minor watercourses within a catchment, however the varying priorities, resources and strategies of the Local Authorities results in variation in approach geographically. This potential disjoint has been addressed by the formation of various cross party groups and the next section explains how these groups operate collaboratively.

Cross Party Groups

Society of Chief Officers in Scotland (SCOTS) is a strategic body comprising of transportation professionals from all the 32 councils and the seven regional transport partnerships. The society's work involves improving performance and innovation in the design, delivery, and maintenance of transportation systems. Within the committee structure there are specialist sub groups, one of which is the Flood Risk Management Group.

The society actively influences important aspects of transportation at the highest levels in Scottish Government by responding to consultations from Government, providing advice on legislation as it is developed or implemented, advising the representative voice of the Scottish local government the Convention of Scottish Local Authorities (CoSLA), local authorities and stakeholders. It is also develops research and best practice through publishing guidelines such as the SuDS for Roads or through training courses for staff across Scotland.

An example of collaborative working between various agencies as well as sub groups within the SCOTS umbrella is working with Scottish Water on drafting the Memorandum of Understanding (MoU) for Section 7 of the Sewerage (Scotland) Act 1968. This MoU is a collaborative approach to the adoption/vesting of SuDS schemes for development to encourage the best use of integrated drainage. This will be explained in more detail later in the paper.

Fourteen **Local Plan Districts** (LPD) have been identified based on an amalgamation of certain Scottish river catchments, and have provided a vital function in co-ordinating the production of FRM Strategies and Local FRM Plans, which are explained in detail in the next section. The LPD groups meet regularly and each group is led by a Lead Local Authority. The groups are made up from representatives from the Responsible Authorities. As LPDs cross organisational boundaries, a single authority may be a member of more than one LPD. This catchment wide management approach allows for consideration of actions throughout the catchments and decisions to be made in full collaboration with all the parties involved. This achieves best practice independent of the organisational and more importantly, financial boundaries.

The Lead Local Authorities from each LPD also meet regularly, at the Lead Local Authority Forum (LLAF), to discuss the approaches and challenges they face and to learn from each other. This provides opportunity to discuss issues within each LPD and promote common solution areas across the country.

The LLAF has been set up to provide the opportunity for discussion on processes and challenges faced by all Lead Authorities, allow for consistent approaches to be developed, communicated and adopted, and for lessons learned to be shared for the benefit of all parties. It has provided an effective forum for understanding and promoting best practice and a level of consistency across the 14 LPDs.

This overview is of the current cross party groups, and the author recognises that there have been predecessors which paved the way for the achievements outlined in the next section.

Legislation and Strategies

The Flood Risk Management (Scotland) Act 2009 was given Royal Assent on 16th June 2009 and ratified in 2011, while the requirements of some of sections of the Act have yet to begin. The Act identified various changes in responsibilities and included various requirements which are not going to be outlined in this paper. Instead, this section will focus on the process to date of delivery of flood risk management in Scotland in line with the Act.

The initial activity was to carry out national mapping of fluvial, surface water and coastal flood hazard and risk at the time the Act came into force. Prior to the Act, much of England had already been mapped by the EA, but prior to the current flood maps (published in 2014); Scotland did not have an equivalent depth of indicative mapping. The first flood maps in Scotland were the Institute of Hydrology 130 maps, developed in the 1990s (providing one flood source, depths and extents for catchments greater than 10km^2), followed by the Indicative River and Coast Flood Map in the 2000s (providing two flood sources, three return periods, extents only, for catchments greater than 3km^2). Following this mapping, properties at risk of pluvial flooding in the 200 and 1000-year probability outlines were identified, forming the surface water contribution to the National Flood Risk Assessment. From this the scale of Flood Risk across Scotland could be appreciated and this set a baseline of understanding to build on as the development of the Strategies and Plan began in earnest.

A second stage of pluvial mapping was carried out by the National Pluvial Flood Maps in 2011 which utilised NEXTMAP DTM data which had national coverage. A second wave of regionally pluvial mapping was carried out in key urban areas utilising the more accurate LIDAR data available across these urbanised extents.

Alongside the development of the Flood Risk Management Strategies (FRMS) and Local Flood Risk Management Plans (LFRMP) which are discussed in the following sections, further development of the flood maps has been carried out. SEPA have mapped reservoir inundation and Scottish Water, through their Section 16 work, have assessed the risk of sewer flooding utilising existing and new hydraulic models.

Flood Risk Management Strategies

The mapping was followed by an appraisal process from the maps which included an economic assessment of the potential damages across Scotland and identified Potentially Vulnerable Areas (PVA's), which were the catchments with the greatest potential flood damages in the appraisal process. The damages identified in

these PVAs were used to create a national list of Objectives and Prioritisation. This national scale prioritisation provided a factually based justification for further investigation, based on a national priority which aided in the financial provision to the Responsible Authorities. This ensured a fair approach to further development of actions at a national level. It also ensured that further investigation was based on the prioritised list. The proactive collaborative approach to flood risk, including preparation of studies and the development and delivery of schemes, are being progressed in a way that does not look solely at past events. The future likelihood of potential flood risk is used in a planned and proactive approach rather than reactive approach after an event.

Through collaboration across the LPD's, actions were identified to address flood risk in the PVAs and this has formed the basis for the Flood Risk Management Strategies.

Local Flood Risk Management Plans

The LFRMPs were developed, based on the Strategies, identifying timescales within the six-year cycle. The actions would be delivered and an estimated funding required based on the strategic Benefit Cost Analysis carried out by SEPA as part of the Strategies development. The first six-year cycle of the plans comes with a promised annual budget for Local Authorities of £42million from the Scottish Government to invest in actions over the first six years, with a further investment guaranteed from Scottish Government for a further 4 years in the second cycle. A total of £420million averaged over 10 years. This has allowed for the first time a freedom for the Local Authorities to develop programmes to deliver individual actions over more than one year knowing the funding is available over the first six-year cycle. The allocation of funding has been developed through a formula agreed between all parties and CoSLA to ensure a fair and equitable spread of funds for delivery of the first cycle, based on properties at risk within each Council boundary, as well as other factors including existing defences currently in place, and proposed schemes to be concluded within the first six-year cycle. This amounts to approximately 20% of the £42m set aside by Scottish Government to help the Responsible Authorities to procure studies. On receipt of the formal order from Scottish Ministers, the Responsible Authority delivering the scheme can then progress the construction and make an application to Scottish Government for Capital funding up to 80% of the agreed capital costs. This is taken from the £420 million 10-year budget. However, to do so, these schemes must be within the Strategies and Plans. Therefore, any studies within the first cycle will require to be progressed to schemes and incorporated within the second cycle of Strategies and Plans.

Integrated Catchment Studies

The Flood Risk Management (Scotland) Act 2009 identified Scottish Water as a responsible body for flooding associated with their drainage duties as set out under the Sewerage Scotland Act 1968. This places a number of duties upon them under various sections of the Act. One duty is to identify flood risk from their assets under Section 16 of the Act, as well as a general requirement to share information. Scottish Water had many hydraulic models developed over the years, and S16 assessments were carried out covering 67% of the country to provide information as part of planning for the first cycle. A programme of new model builds and model upgrades is set out within the first FRM cycle to continue to build on the initial assessments and provide further coverage of the country, where there is a risk of pluvial flooding.

Scottish Water undertakes a Sewer Flooding Programme to address hydraulic incapacity to meet the levels of service to our customers set out within the Sewerage Scotland Act 1968. This equates to an Industry standard to meet the 1:30 year storm event. However, Scottish Water continues to work with other Responsible Authorities in a collaborative approach to plan and develop the most sustainable integrated solutions to manage and reduce flood risk. This includes carrying out joint studies to provide a fuller understanding of the sources, interactions, and mechanisms of flooding in the urban areas.

Through this collaboration the Integrated Catchment Study Programme was developed. Initially 5 high priority areas were taken forward Edinburgh, Falkirk, Meadowhead (Ayrshire), Tayside and Aberdeen. These five sites were chosen as they had the highest risk of pluvial flooding across the country. Through a collaborative process, requiring both legal and procurement input, the projects were contracted by Scottish Water and co-funded by the 14 Local Authority partners through a formulaic approach. This took account of survey/modelling works required solely for the Local Authority, a share of the administrative role, and full involvement in the development, management, and delivery of the relevant ICS. Integrated models of the foul, combined, surface water and open and culverted river systems throughout the extended urban extent were built, verified, and assessed to identify the sources, interactions, and mechanisms of flooding up to a 200-year

return period. A high-level sensitivity analysis for the river, coastal and sewer systems was undertaken to identify the number of properties and associated cost damage within the catchments, as well as an analysis of the sensitivity of the catchments to climate change. This process was the development of a single model that could be used to meet Scottish Water's requirements for future investment as part of our sewer flooding programme. The same tool was also used to gain the catchment understanding the Local Authorities required to meet their duties under the FRM Act. As well as providing opportunities for delivery of joint projects to reduce flood risk from more than one source or mechanism.

This process demonstrates that different public bodies with different requirements and funding cycles can work collaboratively, to deliver a combined approach to Flood Risk Management, deliver a fully functioning model which can be used by both parties to assess future development and flood risk associated to that development, and ensure cost savings to the public purse, by the reduction in scale of work processes required in delivering the ICS.

This process also provided the benefit that both the Local Authorities and Scottish Water gained an understanding of each other's expectations, governance, and pressures to be able to develop approaches and methodologies that would serve the purpose to all. Often with these things the devil is in the detail. For example, it was not appreciated that the normal approaches taken by both parties were so different until the methodology for assessing Flood Risk Management needs was developed. Examples in gaining an understanding of each partners' procedures and requirements included:

- financial cycles to fund the work;
- committee approval requirements of Local Authorities;
- procurement regulations;
- legal agreements regarding "sensitive" data and the use by each party of the others data, and IPR of the model;
- Management of consultants and contractors.

Section 7 Agreements

This section outlines the challenge of the adoption/vesting of Sustainable Drainage Systems (SuDS) and how collaboration in Scotland has gone a long way to address this barrier.

Scottish Water has a duty to effectively drain in-curtilage foul and surface water to industry standards, and to manage and maintain sewerage networks. The Roads Authority (Local Authority) has duties to deal with roads and associated assets related surface water. This leads to issues with regards to maintenance of assets within the highway where both in curtilage drainage (SW) and roads drainage (LA) water combines in the same surface water pipe. Further complications are added when the Local Authority as "the flooding authority" under the FRM Act require one level of probability design built into a new drainage system (usually 1:200 +cc) and Scottish Water require a different level of probability as set out within their design guidance (Sewers for Scotland Version 3). In addition, all drainage should now comply with The Water Environment (Controlled Activities) (Scotland) Regulations 2011 and Ciria Guidance c753 The SuDS Manual. Through a lengthy and sometimes challenging process of collaborative working involving SCOTS, Scottish Water, Local Authorities and Scottish Government a "Memorandum of Understanding" has been developed, agreed and endorsed. This is driven by Section 7 of the Sewerage (Scotland) Act 1968 which states:

"Subject to the provisions of this section, Roads Authority and Scottish Water may agree, on such terms and conditions as may be specified in the agreement, as to the provision, management, maintenance or use of their sewers SUD systems or drains for the conveyance of water from the surface of a road or surface water from premises."

This MoU is currently being circulated around all 32 Local Authorities for them to decide on whether they want to operate under this agree MoU. Initially this will be used to deliver a robust management and maintenance policy for new developments; with the next stage being the examination of "legacy" systems which are currently neither managed nor maintained by either public body. The third edition of Sewers for Scotland (equivalent to Sewers for Adoption in England) included specific design guidance for SuDS features and if the system was built to this standard it was possible for Scottish Water to vest the SuDS system. However, as previously explained, Scottish Water will only vest systems that stored and conveyed water up to their requirements set out in SfS3. In reality the developments required SuDS features that addressed runoff up to

the 200-year event plus climate change, so even with this big step forward future maintenance liability remained a challenge as Scottish Water design guidance requires a lower return period.

The MoU developed in collaboration with all parties involved in the delivery of SuDS provides an agreed approach to future management and maintenance. In its simplest form, it can be summarised as the Local Authorities will adopt the above ground features and Scottish Water will vest below ground features. The MoU will cover the whole Local Authority boundaries with individual appendices detailing who manages what areas of the network appended to each document. This matches the maintenance skills of each organisation. Local Authorities can incorporate the grass cutting maintenance of detention basin within their parks and recreation departments and Scottish Water can vest below ground pipe and chamber inspections within their asset management departments. While there may be some time before the new system is up and running in earnest, a way forward has been paved and the potential for addressing this issue can be seen, which is exciting. It provides an "in perpetuity" management of the system ensuring no private factors are involved in future maintenance and the possibility of "double funding" by the homeowners.

Arrangements south of the border appear to be at an impasse where people do not see such an agreement being made. SuDS are not being built into new developments because of the future maintenance concerns. With the increasing urbanisation and development pressures, increased flooding from climate change and deterioration of assets, it is a lost opportunity to build in attenuation, storage and treatment well understood by industry to be best practice, simply because of this organisational impasse.

The Remaining Challenges

There are various challenges that remain throughout the organisations involved that need to continue to be addressed during the delivery of the LFRMPs. Local Authorities' resources are being stretched more and more with budget cuts combined with increased responsibilities and requirements in these plans. Even though the Scottish Government have identified funding there are requirements to spend it on capital schemes, with mixed interpretation of how the 20% slice can be spent. The Scottish Government is unable to stipulate that the funding has to be ring fenced for flooding with some authorities having to lobby internally for the funding to be provided solely for Flood Risk Management and not be siphoned off to deliver other department's requirements within the Local Authority.

The challenges that exist are:

- Reduction in staff within the Responsible Authorities to deliver the action "in house"
- Lack of expertise within the Responsible Authorities staffing;
- Finite external resource regarding the number of private consultancies capable of delivering the actions required;
- Procurement challenges to comply with all legislation and regulations
- 6-year cycles are actually nearer three as any studies developed into schemes require to be incorporated into the cycle 2 Strategy to be eligible for future Scottish Government funding

Who knows what challenges BREXIT, a change in government, or an independent Scotland will bring in addition to the above.

Conclusions

The success to date has been through the genuine appetite across all these parties to manage flood risk and reduce where possible. Within all the organisations there are individuals with a true grasp of the problems, both technically and organisationally and in some situations they have been prepared to go out on a limb and challenge boundaries to achieve the best for the public, commit their own time to knowledge sharing and development of best practice and give their all the achieving this collaboration and they should be commended.