FLOODING ISSUES ADVISORY COMMITTEE
FINAL REPORT FROM THE AVOIDANCE SUB-COMMITTEE

Purpose

1. This paper presents the outcomes from the Flooding Issues Advisory Committee (FIAC) Avoidance Sub-Committee. It also makes a number of recommendations, which it believes FIAC should make in its final report to the Executive.

Background

2. The Avoidance Sub-Committee was set up to consider a number of specific issues and in particular has addressed the following matters:

- Planning;
- Building Standards;
- Water Environment and Water Services (Scotland) Act 2003;
- River Basin Management Planning;
- Sustainable Flood Management – Pilot and Consultation;
- Sustainable (Urban) Drainage Systems (SuDS);
- Land Use Issues;
- Cross-Cutting Issues.

3. The Sub-Committee met 6 times and Jim Conlin of Scottish Water chaired the meetings. Full Membership details are attached at Annex A.

Workplan

4. The Sub-Committee was set up so that FIAC might offer advice to the Scottish Executive on taking forward the *Avoidance* element of the National Flooding Framework Action Plan.

Planning

Position statement and responsibilities

5. The Sub-Committee was charged with ensuring that planning issues were appropriately represented in the wider work of FIAC. Significant issues were raised under this remit and the need to discuss a wider national **'Water Vision'** together with the current changes about to be introduced courtesy of the new Planning etc (Scotland) Bill were considered in some detail.

6. In addition, the recently published Second Generation 'Indicative River and Coastal Flood Map (Scotland)' gives further impetus to ensure that there is full integration between River Basin Management Planning, Planning for Sustainable Flood Management and Land Use Planning at a strategic national level.

7. The Planning etc (Scotland) Bill replaces the existing legislative framework and, although these matters will be covered by new development planning regulations, the sub-committee consider that it is critical that these regulations must be given appropriate

instruction and guidance to ensure integration of flooding issues into any Strategic Development Plan. The scale of this problem and the current lack of uniform and integrated action in Scotland must be recognised and addressed and, although all parties must continue to play their individual part, a commitment to strategic integrated planning and joint working must be guaranteed. (See Annex B for full statement.)

8. The statutory responsibility for flooding is currently widespread and the sub committee identified the following plans and reports which the **Strategic Development** plan must cross reference with:

- River Basin Management Plans;
- Water Resource Plans;
- Strategic Flood Management Plans;
- FLAGS
- Local Authority Investment Planning
- Scottish Water Investment Plans;
- Biodiversity Plans;
- Forestry Plans
- Others as appropriate.

Outputs

9. Details are included in Annex B below.

Building standards

Position statement and responsibilities

10. The Sub-Committee treated building standards as a cross cutting issue and therefore it has been considered by the other Sub-Committee.

Water Environment and Water Services (Scotland) Act 2003

Position statement and responsibilities

11. The Water Environment and Water Services (Scotland) Act 2003 ("The 2003 Act") transposes the EC Water Framework Directive (2000/60/EC) (WFD) into Scots law. The Directive aims to mitigate against the effects of flooding and preserve and improve the ecological status of the water environment including rivers, lochs, coastal waters, transitional waters and groundwater and requires a co-ordinated approach to the management of the water environment.

12. The 2003 Act provides for new controls, which will be implemented by the Water Environment (Controlled Activities) (Scotland) Regulations 2005 (CAR). Since these activities include impoundments and engineering works for flood defence, authorisation under the CAR regime will be required for flood management schemes.

13. Under section 2 of the 2003 Act Scottish Ministers, SEPA and the responsible authorities have a duty to promote sustainable flood management, and act in the way best calculated to contribute to the achievement of sustainable development. The 2003 Act

requires the designation of responsible authorities. An order defining the responsible authorities came into force on 1 April 2006.

Outputs

14. The Chair responded to the Designation of Responsible Authorities consultation paper on behalf of the Sub-Committee in December 2005. He welcomed the statement in the consultation that FIAC will assist in taking forward the duty for sustainable flood management. However he pointed out the paper did not set out how the promotion of sustainable flood management would be delivered and expressed the view that guidance is required and the Avoidance Sub-Committee would wish to contribute to this.

River Basin Management Planning

Position statement and responsibilities

15. The 2003 Act sets up strong links between the role of flood management in protecting people and property, and river basin planning and environmental protection by introducing measures such as River Basin Management Plans. The Sub-Committee was charged with considering how catchment flood management planning can be linked with the River Basin Management Planning process.

Outputs

16. A Working Group met to take forward this work for the Sub-Committee and produced a discussion paper, which sets out a draft framework for decision-making on how to carry out Catchment Strategy Planning for Sustainable Flood Management. The paper (attached at Annex E below) brings together the key issues to be considered; suggests, at high level, some choices that need to be made for policy; suggests possible options, constraints and criteria for those choices; and asks for agreement on next steps to take things forward.

17. This paper is a starting point to help the Executive decide how best to ensure that sustainable flood management is implemented and properly integrated with the WFD work. The Sub-Committee recognises that the Executive has an opportunity to start from scratch here and get the best model for Scotland. However it suggests that 2007 is a critical point for ensuring that this work is taking forward with other interacting policies. The Sub-Committee suggests that catchment flood management can either be taken forward in parallel with the WFD work or fully integrated as a subset of WFD. It then offers options for an organisational structure for taking responsibility for this work at a strategic level.

18. Roy Richardson has also provided a detailed paper to show how SEPA intends to promote sustainable flood management through its responsibilities for river basin management planning. The paper identifies a series of actions designed to enable SEPA and other authorities within the river basin management planning process to deliver their responsibilities for sustainable flood management. (Paper attached at Annex D.)

Sustainable flood management – pilot and consultation

Position statement and responsibilities

19. Under section 2 of the 2003 Act Scottish Ministers, SEPA and the responsible authorities have a duty to carry out their functions in compliance with the requirements of the EC Water Framework Directive. They also have a duty, so far as is consistent with relevant enactments or the designated functions in question, and having regard to social and economic impacts:

"to promote sustainable flood management, and act in the way best calculated to contribute to the achievement of sustainable development."

20. In practice it means that local authorities are required to promote sustainable flood management when carrying out flood prevention functions under the 1961 Act. However "sustainable flood management" is not defined in the 2003 Act. The new legislation sets up strong links between the role of flood management in protecting people and property, and river basin planning and environmental protection by introducing measures such as River Basin Management Plans.

21. FIAC has continued the work from the National Technical Advisory Group on Flooding Issues (NTAG) on defining sustainable flood management. On the basis of a recommendation from FIAC a pilot study was carried out to test the draft definition, principles and objectives and the proposals for measuring sustainable flood management contained in the NTAG paper *What is sustainable flood management?*. This included interactive workshops. The proposals were generally well received and revised in light of feedback received at the workshops.

Outputs

22. A public consultation based on the revised FIAC paper *What is sustainable flood management? (available on the FIAC website at:* http://www.scotland.gov.uk/Resource/Doc/1223/0028633.pdf) will be released in 2007. The consultation exercise has been delayed to allow time to carry out a Strategic Environmental Assessment of the proposals. The Avoidance Sub-Committee has been instrumental in ensuring that the consultation paper is as clear and concise as possible. It has advised on the content of the paper and the questions posed. It has also provided advice on good practice examples included in the paper. A partial Regulatory Impact Assessment has also been completed to assess the cost and benefits of proposals for defining sustainable flood management.

Sustainable (urban) drainage systems (SuDS)

Position statement and responsibilities

23. Part 2 of the 2003 Act amends the Sewerage (Scotland) Act to designate Scottish Water responsible for all future public SUDS. This new duty was not brought in immediately. Instead it will only come into force when secondary legislation detailing the construction standards and vesting conditions has been enacted. To support these regulatory

changes Scottish Water is currently amending their Technical Manual 'Sewers for Scotland' to include a chapter on SUDS.

24. Scottish Water is currently assisting the Executive in drafting a consultation on the SUDS approach in Scotland. One of the aims of the consultation is to set out the roles and responsibilities of all parties involved in development and reaffirm that it is not the sole responsibility of Scottish Water.

25. The consultation will explore options to future proof our urban drainage not creating surface water runoff in the first instance. Identifying policy and fiscal measures, which encourage permeable areas and the treatment of runoff at source, will be one of the key strands to achieving Sustainable Flood Management. Successful case studies like Glasgow Strategic Drainage Plan highlight the importance of integrated drainage and surface water management plans and this area will be reviewed within the document, alongside green corridors through our cities. The Avoidance Sub-Committee support and welcome this approach and wish to see all urban areas in Scotland develop surface water management plans in the future.

Outputs

26. A revised version of Scottish Water's technical manual 'Sewers for Scotland 2' will be publicly consulted on alongside the Executive's consultation on SUDS. The public consultation should take place in spring 2007.

27. We would encourage all stakeholders with an interest in the new SUDS approach in Scotland to take part in this consultation and provide feedback and comments.

28. The output from FIAC will bring integrated systems and surface water management plans to the forefront of the consultation on SUDS and ensure that the importance of joint working on Strategic Flood Management is reflected in the technical guidance.

Land-use issues

Position statement and responsibilities

29. Increasingly flood risk managers are shifting attention and resources from dealing with the effects of floods towards slowing down the rate of flow further up the catchments. The role and function of natural drainage processes and rural land use in managing river flood risk to communities and properties, often much further downstream, has come under increasing scrutiny. FIAC recognises that land use management techniques, including forestry, can play an important role in delivering the Executive's policy on sustainable flood management. The Avoidance Sub-Committee was asked to explore and inform FIAC on the potential roles of rural land use in sustainable flood management in Scotland. The Sub-Committee recognises the important role of forestry techniques in taking forward this element of sustainable flood management.

Outputs

30. The Sub-Committee produced paper FIAC2005(6), which considers the role of possible land and channel management measures. (Copy attached at Annex E below.) Firstly,

changes in rural land use and of river processes, which could help to reduce the size of a flood peak by influencing the rate of passage of the flood downstream. Secondly, by action which could be taken to maximise natural floodplain retention or to enhance it artificially. It considers these measures in terms of longer term (2010-2020) and short – medium term measures (2005-2010).

31. The Sub-Committee suggests that there remains an artificial divide between statutory provisions for protecting non-agricultural land from flood damage and private responsibilities for protecting agricultural land. Whilst there are some funds and measures available that could improve sustainable flood management in rural Scotland, it is not easy to coordinate these at a catchment scale, or to combine them with downstream 'harder defences'.

32. In summary, the Sub-Committee concludes that land use management techniques, including forestry, should be considered as part of wider portfolio of responses for managing flood risk.

Cross-cutting issues

Position statement and responsibilities

33. Each Sub-Committee was asked to consider a range of cross-cutting issues when taking forward its specific workplan. These included:

- Climate change
- DEFRA *Making Space for Water* initiative and Foresight report
- Recommendations made in the CoSLA report on flooding and research findings.

The Avoidance Sub-committee has taken full account of these issues in discussions. The following extract from the Foresight reports highlights the close inter-relationships developed between integrated drainage and surface water management and sustainable flood management.

> "As well as facing flooding from rivers and the sea, our towns and cites can be flooded by local intense storms which can overwhelm drains and sewers. Analysis suggests that current methods of flood management would be stretched to maintain risks at current levels, even with substantial increases in investment.
>
> The foresight report has highlighted that a minimum of 10 to 15 years' warning is required to prevent significant flood damage and allow efficient upgrades in the sewer network and other urban drainage systems to be undertaken.
>
> It will be important to manage the layout and functioning of our cities so they can adapt to future changes in rainfall patterns. Approaches such as the creation of new green corridors and the maintenance of existing undeveloped spaces (including brownfield) would provide safety valves for the storage and passage of flood waters when the drainage network becomes overloaded. This has the added benefit for increasing amenity and biodiversity.
>
> The risk of flooding in towns and cities, as well as possibly being the greatest challenge in the future, is also the area of greatest uncertainty. If we want to plan

ahead effectively for our cities, we need to develop much better modelling capabilities to predict flooding and manage flood routes in intra-urban areas"

Presentations

34. The Sub-Committee heard a number of presentations from guest speakers. These included Alistair Smith from Aberdeenshire Council; Luke Comins from The Tweed Forum; Catherine Preston from SEPA and Cascade consulting Ltd. These presentations have all added to the Sub-Committees understanding of practical sustainable flood management. The Sub-Committee would like to extend their thanks to these guest speakers.

Recommendations and next steps

35. The Avoidance Sub-Committee recommends that:

1. the timelines and key decisions of integrating polices set out in the Catchment Strategy Planning paper (Annex C) are drawn out and there is a forum for key stakeholders to continue their work in this area.
2. an expert review of the responses to the sustainable flood management consultation paper and how the final proposals might be taken forward is carried out. Members have agreed to act as a review group.
3. following publication of the responses from the sustainable flood management consultation paper the Executive should issue guidance on how to implement the proposals. This guidance should be strategic and acceptable to a wide range of stakeholders.
4. further detailed work to link catchment strategic planning and the River Basin Management Planning process should be carried out and the outcomes addressed in a public consultation on new flooding legislation.
5. the Executive must maintain a position to keep up to date, learn from, act on and support exemplar projects and good practice in the UK, Europe and beyond, which are examining land management techniques, and their possible role in sustainable flood management.
6. reducing the risk of flood damage should be an objective of rural policy in Scotland and the Executive should seek to promote rural land use solutions as part of its strategy for flood risk management.
7. all stakeholders with an interest in the new SUDS approach in Scotland to take part in this consultation and provide feedback and comments.

Conclusions

36. Members ask that FIAC:

- notes the outcomes from the Avoidance Sub-Committee and
- agrees to the recommendations and next steps at paragraph 35 above.

FIAC Avoidance Sub-Committee
June 2007

Annex A

FLOODING ISSUES ADVISORY COMMITTEE
FINAL REPORT FROM THE AVOIDANCE SUB-COMMITTEE

Membership

1. **Jim Conlin, Scottish Water – Chair**
2. Carolyn Girvan, Scottish Executive, Climate Change and Air Division
3. Andrew Smith, Homes for Scotland
4. Arthur Philip, Norwich Union
5. David Rae, Forestry Commission Scotland
6. Prof Charles Ainger, MWH UK Ltd
7. Mike Donaghy, Scottish Environment LINK
8. Dr Roy Richardson, SEPA
9. Roy Mclachlan, Scottish Executive, Agricultural staff.
10. Iain Mathieson, NFU Scotland
11. John Smith, Royal Town Planning Institute in Scotland
12. Stephen Tingle, Renfrewshire Council
13. Prof. Alan Werritty, University of Dundee
14. Jonathan Chapman, Environment Agency
15. Morag Garden, Scottish Water
16. Prof. Phil Boon, Scottish Natural Heritage

FIAC Secretariat
June 2007

Annex B

FLOODING ISSUES ADVISORY COMMITTEE
FINAL REPORT FROM THE FIAC AVOIDANCE SUB-COMMITTEE

Planning

1. The new Planning etc (Scotland) Bill requires Scottish Ministers to prepare a spatial plan known as the National Planning Framework. This framework must contain a strategy for Scotland's Spatial Development. It is considered likely that a national statement in relation to flooding and priorities for sustainable flood management could be contained within the National Planning Framework.

2. In addition, this new Act completely repeals and replaces the existing Legislative Framework for the preparation of development plans. In its place comes a requirement for Planning Authorities to exercise the development plan function with the objective of contributing to sustainable development. Ministers are to designate Planning Authorities by an order and it is a requirement for such Authorities to prepare a Strategic Development Plan. The Strategic Development Plan has to include a position statement, a spatial strategy, analysis of relationship to the adjoining areas and other matters to be prescribed. The position statement is to cover physical characteristics, principle land uses, demographics and infrastructure.

3. Although these matters will be covered by new development planning regulations we consider that it is critical that these regulations must give appropriate instruction and guidance to ensure integration of flooding issues into this Position Statement.

4. The Development Plan regulation requires the strategic development plan authority to consult "the key agencies" and adjoining Planning Authorities, and it is the duty of the key agency to co-operate. This process is one which gives significant weight to the requirement for flooding issues to be fully assessed and integrated into the new style development planning process for the strategic development plan areas of the Country.

5. The Avoidance Sub-Committee was particularly concerned that the issues identified and solutions promoted should respect the current advice given in SPP7 and PAN69. It was considered imperative, however, that recommendations should be relevant to the planning regime and where possible they should enhance the processes being promoted under the Water Environment and Water Services (Scotland) Act 2003, River Basin Management, the CAR Regulations and Sustainable Flooding Management.

6. It was determined that the appropriate way to deal with this matter was by giving a simple position statement identifying these processes together with relevant responsibilities and from that to make recommendations as to how the processes can be improved to ensure integration to deliver improved measures to accommodate planning and flooding issues.

Outcomes

7. The scale of the problem and the current lack of uniform and integrated action in Scotland is one that must be recognised and addressed. In particular, based on the context established by the second generation flood mapping exercise, it is evident that there are large sections of the existing urban areas of Scotland that are at potential risk from flooding and, as

such, all relevant future policies require to ensure that the strategic planning process recognises such issues and presents opportunities to address these impacts.

8. At present, several Local Authorities in Scotland are actively pursuing proactive measures to integrate planning and flooding in a statutory and advisory sense. However, it is imperative that all authorities provide equally sound sustainable advice for the satisfactory treatment of planning and flooding issues in their given Local Authority area. The new Planning Bill will introduce further refinements to the planning system but in relation to planning and flooding the opportunity for integrated spatial planning must make full use of the new Strategic Development Plans and the full use of cross issue benefits.

9. Strategic and integrated planning is fundamental for the effective use of collective resources and collective strategies. Individual local planning policies at Council level, have their place, but sustainable development benefit will only be derived when strategies of all relevant parties are integrated.

10. The spatial location of development is of fundamental importance to the sustainable development of a given area, but there is a need to ensure an integrated approach for the accommodation of such development. It is also critical to assess not just the impact on flood risk that that development may cause, but the potential solution(s) that the proposed development can potentially bring.

11. Future flood risk management strategy relies on a number of relevant bodies working in close collaboration. At present there are indications of joint workings but the scale of the issue is such that a certainty of delivery must be guaranteed.

12. In general terms, all parties must continue to play their individual part but with a commitment to strategic integrated planning and the following general suggestions are made:

- Scottish Water prepare a long term 25 year **Wastewater Plan** in conjunction with SEPA and in parallel with a Water Resources Plan for a similar period;

- The Wastewater Plan would address water quality issues and a full appraisal of sewerage, SUDS potential and combined sewer overflow reduction would be carried out;
- A wider and retrofit adoption of SUDS which have a dual benefit of improving water quality and also flood risk management,

- Strategic Development Plans are given a specific requirement to address Flooding Issues, and to appraise how sustainable development can accommodate and address such matters.

13. SEPA has prime responsibility for the Water Framework Directive, which in turn will impact on the implementation of River Basin Management Plans and the establishment of good ecological status. At present, work on this direction could potentially be supported by policies for appropriate agricultural practices and there is a need to ensure that agricultural best practice should be promoted and if necessary enforced.

14. It is considered that the present approach is largely reactionary and undertaken on a separate and 'unjoined-up' basis and there should be a culture change to provide a much more integrated approach in all of these matters.

15. In promoting sustainable development within the strategic flood management arena, efforts should be focused on a positive cooperative approach and on looking for multi-benefit opportunities. River Basin Management Plans linked to Strategic Development Plans linked to Strategic Flood Management Plans must be important tools in this process.

16. Above all the integrating process of Strategic Environmental Assessment is seen as one of the most important coordinating tools whereby all strategies and plans being prepared for all subjects in this Water Vision arena can be potentially integrated through the SEA process.

17. The existing framework for SEA through the Scottish Executive, ensures that the statutory bodies SEPA, SNH and Historic Scotland have a full consultative role to play. If this process were widened to include the Local Authorities and Scottish Water, this would help to ensure the wider sustainable development requirements were being addressed. All parties require to adopt a philosophy of cooperation and maximisation of multi-benefit opportunities linked to the integration of private sector development initiative. This should produce delivery of much more cost effective and efficient flood management strategies and solutions.

18. The importance of the knowledge base(s) supporting the promotion of the Development Plan, and its subsidiary plans/development guidance, including Community Plans, has already been demonstrated, in Glasgow's GSDP and Renfrewshire's Urban Water Project. The new Planning Bill will now be implemented across a new raft of secondary WFD, and forthcoming FD legislation. The knowledge base(s) to provide technical support to Planners in respect of these duties, on the infrastructure, flood risk, pollution risk and environment, is already required for the new Development Plan, its subsidiary plans, associated development guidance, and associated asset management plans of roads, watercourses and sewers. It is clear that in this new planning context, the implications of non statutory water sources, on flooding, pollution and the environment, on areas designated for development, require a supportive knowledge base, to assist across all the components of the Development Plan, to link it with the physical asset implementation matters also dealt with by the Local Authority.

Annex C

FLOODING ISSUES ADVISORY COMMITTEE(AVOIDANCE SUB-COMMITTEE)

Catchment Strategy Planning for Sustainable Flood Management

Charles Ainger and Alan Werritty 20/2/07

1. Background and Purpose

This working paper has been drafted as a result of discussion of two papers presented at the 2 March 2006 FIAC Avoidance Sub-Group meeting

Catchment Flood Management Plans; an EA summary – ***describing the EA's approach to CFMPs for flood management. This is a formal framework, separate from the WFD's RBMPs, executed by the EA, which [unlike SEPA in Scotland] has formal responsibility for all flood risk management in England and Wales. The discussion also noted that getting such planning right needed time for a learning process [eg. lessons from Shoreline Management Plans].***

Update on the Executive's involvement in River Basin Management Plans – ***recording the latest SE thinking. This emphasised the WESW 2003 integration of WFD and Sustainable Flood Management intent.***

Plus reference to

Sustainable Flood Management and Land Use - paper FIAC2006(5); feedback from FIAC meeting on 23 February 2006 – ***emphasised the relevance, opportunities and risks in integrating rural land use planning, and the Rural Development Plan (RDP) 2007-2013, with WFD and catchment flood management***.

Further discussion took place at the 23 November 2006 FIAC Avoidance Sub-Group meeting.

The paper presented by SEPA at the 8 February 2007 FIAC Avoidance Sub-Group meeting (summarised below) has also been noted.

Sustainable Flood Management and River Basin Management Plans – *describing how the '4As' (Awareness, Avoidance, Alleviation and Assistance) can be used to summarise how SEPA can promote SFM within RBMPs. Specifically, the Area Advisory Groups will have regard to SFM in the assessment and prioritisation of measures targeted at 'at risk' water bodies (Avoidance) and the assessment of mitigation for existing flood prevention schemes (Alleviation). In the first RBMP cycle SEPA will work with other authorities and stakeholders towards the goal of closer integration of RBMPs and catchment-based SFM. CAR will assist SEPA in ensuring new flood prevention schemes are consistent with SFM (Alleviation) and assessing other engineering activities which affect flood risk (Avoidance).*

Collectively these papers highlighted Scotland's intent on WFD and SFM integration, in spite of having diverse responsibility structures [SEPA and LAs, etc]; and the strong interaction with rural and urban planning.

The key issues in developing Catchment Strategy Planning (CSP) are:

Setting the context for CSP

1. Crucial over-riding issue: top down or bottom up approach in delivering CSP?
2. Need to operate within a strategic Water Vision
3. EU Floods Directive and EU WFD
4. Water Environment Water Services (Scotland) Act 2003, section 16

Nature of principles underlying CSP

5. SFM duty and adhering to SFM principles
6. WFD duty and adhering to WFD principles
7. Linkages between SEPA, FIAC and SFM and respective responsibilities
8. Joint working and funding of responsible bodies
9. Collaborative working

Implementation of CSP

10. SEPA (Roles of AAGs and stakeholders in RBMP, first and second RBMP cycles, CAR)
11. Local authorities (local development plans, sustainable development, Community Planning Partnerships, Strategic Environmental Assessment)
12. Scottish Water (flexible funding for holistic planning, Sustainable Urban Drainage Systems (SUDS), 3rd generation urban flood maps)
13. Multiple use pollution/flood control (eg compensatory storage may become SUDS later)
14. Asset management of roads, sewers and other utilities
15. Unlocking potential economic development areas isolated by surrounding flood risk
16. Exploiting agri-environmental programmes to deliver SFM in rural areas
17. Relationship between FLAGs and AAGs

Delivery of CSP

18. Timetabling
19. Promoting existing Best Practice
20. Enforcement
21. Development of appropriate knowledge and skills bases (capacity building)
22. Public participation and information mechanisms (required by Floods Directive)

The purpose of this paper to:

- Bring together the key issues to be considered
- Suggest, at high level, some choices that need to be made for policy, possible options, and constraints and criteria for those choices.
- Suggest possible next steps to take things forward.

2. Drivers for catchment wide, strategic flood management planning

The drivers now are:

- **Common sense:** consideration of the geography and science of the causes and influences on flooding risk and consequences immediately shows potential benefit from taking a catchment wide and strategic approach.
- **Sustainable Flood Management (SFM):** the SE draft policy on SFM states that its intent is to: “Ensure that links are made between flood management, Development Plans (urban

and rural), River Basin Management Plans and Coastal Zone Management Plans, Strategic Environmental Assessments, Scottish Biodiversity Strategy and plans to conserve the natural heritage." (Extract from the purpose of SFM, paper FIAC2006(6) Annex A para 14).

Further, the SFM Principle 1 (Strategic Approach) states:

"**1 – Strategic Approach:** SFM should reflect a strategic approach both nationally (across Scotland) and locally (within River Basin Management Plans) (1), with phasing where appropriate (2). It should take account of the 2003 Act principles of co-ordinated management to achieve relevant objectives for all water bodies (3), and the planning policy contained in SPP7 (4). It should use strategic environmental assessment and sustainability appraisal as they are introduced into Scottish methodology (5)"

The WFD and WEWS 2003

The general purpose of the Water Environment and Water Services (Scotland) Act 2003 are:

a) preventing further deterioration of, and protecting and enhancing, the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on those aquatic ecosystems,
(b) promoting sustainable water use based on the long-term protection of available water resources,
(c) aiming at enhancing protection and improvement of the aquatic environment through, amongst other things, specific measures for the progressive reduction of discharges, emissions and losses of priority substances and the cessation or phasing out of discharges, emissions and losses of the priority hazardous substances,
(d) ensuring the progressive reduction of pollution of groundwater and preventing further pollution of it, and
(e) contributing to mitigating the effects of floods and droughts,

The draft EU Floods Directive: was adopted in plenary in June 2006. It requires Member States to, on a 'River Basin District level':

1. undertake flood risk assessment;
2. use this to designate river basins;
3. prepare flood risk maps;
4. prepare flood risk management plans [by 22/12/2015 latest] and then implement them;
5. co-ordinate plans for trans-national waters across national boundaries. All these must be available for public access.

The European Commission proposes that implementation of WFD and the Floods Directive be co-ordinated:

- "the *administrative units* shall be the same for the two Directives, ie the Floods Directive shall be implemented on the level of the *river basin districts* (which includes not just river basins and sub-basins but also associated coastal areas) identified in the WFD Article 3 and the *competent authority* for the WFD shall also be responsible for the flood risk management actions.

- the principles for *coordination within the river basins*, in particularly as river basins are shared between Member States, or with third Countries, are the same in the two Directives.

- the *implementation cycles and reporting mechanisms* shall be synchronised as regards the timetables, and it is envisaged that the Member States can chose to include the flood risk management plans in the river basin management plans required under the WFD.

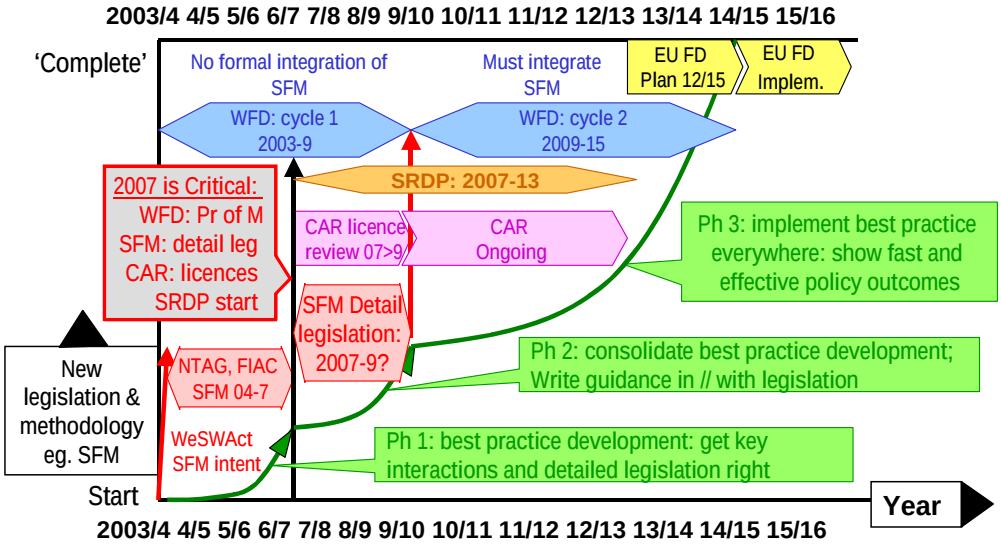
- the *public participation and information mechanisms* of the WFD shall furthermore be used, and as the key tools of the Floods Directive – the preliminary flood risk assessment, the flood risk maps and the flood risk management plans – shall be made available to the public, there can be further synergies made with the electronic reporting mechanisms, being developed under the WFD, including for public information".

Definition: we suggest that Catchment Strategy Planning is characterised by:

- a catchment-wide (or equivalent coastal zone) coverage
- a long-term view, including 'Foresight' type prediction and uncertainty management
- optimal combination of all types of 'measures', including all options from 'prevention' to 'end of pipe treatment' (in WFD terminology); ie. the SE's 'Four As' for flooding: Awareness, Avoidance, Alleviation, Assistance.
- integration with other relevant plans and policies.

Timescales: the practical opportunities and choices to be made are partly dependent on understanding the actual timescales, over which the interacting policies take place – from 2006 to 2015, at least. They need to include CAR, Guidance, SFM legislation, WFD cycles, EU Floods Directive, Strategic Rural Development Plans, Local Authority local plans and structure plans, Scottish Water investment plans and utility investment plans. Potential links between CSP and other plans are itemised in **Appendix A**. In terms of timetable important that implementation begins as soon as possible based on evaluated risk and available opportunity.

Proposed that in first cycle of WFD/Floods Directive link between catchment strategy planning and river basin management planning be explored by pilot projects tested on selected catchments. In second cycle of WFD/Floods Directive nationwide implementation.



FIAC Draft 1: Charles Ainger, 9/8/06

Stakeholders: there are many stakeholders; the key ones, for this discussion, are:

Level 1:

- **Scottish Executive** – at policy level: SE controls, sets policy for, partly funds, and directs all the key players at level 2. Therefore the SE has the power to set this up in the way that best satisfies its objectives. SEERAD (esp Air, Climate and Engineering Unit) key government department.

Level 2: (leading roles in SFM)

- **SEPA:** with two roles*: (1) responsible for the water quality aspects of WFD; (2) with several duties involved in flood management
- **LAs**: with (at least) two roles*: (1) with powers to implement flood alleviation works; (2) responsible for urban planning and control of land use
- **SE**: various departments responsible* for rural planning and control of land use and agriculture
- **Scottish Water**: with two roles*: (1) responsible for combined sewers and sewer flooding alleviation; (2) responsible for pollution interactions with rivers and coasts
- **Forestry Commission Scotland**: responsible for management of the national forest estate, and regulating and grant aiding forestry
- **Water Industry Commission:** responsible for regulating Scottish Water's investment plans

*These roles can of course be changed by legislation.

Level 3: Others which have been identified within FIAC discussions. List illustrative and not exhaustive:

- **National:** ABI (Scotland), NFUS, Scottish Rural Property and Business Association, RTPI, SNIFFER, Environment LINK, university researchers
- **Local**: Network Rail, British Waterways, District Fishery Boards, local communities, developers, National Park planners, utilities, River Trusts, Scottish Enterprise

3. Tasks involved in catchment strategic planning for flood management

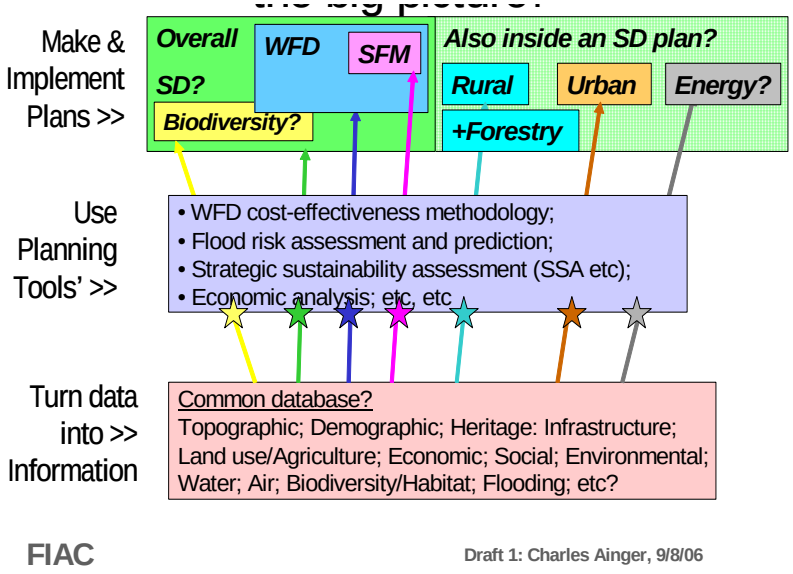
The first task involves defining catchments (or 'basins') and their sub-divisions. Then for each one, the main tasks involved are:

Information	Planning	Implementation
▪ Collection ▪ Analysis ▪ Outline design (incl modelling and predicted risk reduction)	▪ Strategies ▪ Options ▪ Choice criteria	▪ Management ▪ Monitoring ▪ Control
▪ Information management ▪ QA and Updating ▪ Providing access ▪ Stakeholder liaison	▪ Stakeholder involvement ▪ Strategies and Options evaluation ▪ Decision-making	▪ Execution ▪ Operation and maintenance ▪ Stakeholder liaison
Notes		
Two types of information: ▪ generic catchment data – geographic, environmental, social, economic ▪ flooding-specific data	Integrating with other planning: ▪ urban ▪ rural (incl National Parks) ▪ WFD ▪ Other policies – SD, BioD, Scottish Forestry Strategy.	Involves adherence to SFM principles (incl Alleviation, Avoidance, Awareness and Assistance)

These tasks cover and coincide with the requirements of the draft EU Floods Directive. The table also highlights need for single source, readily updated GIS to underpin implementation.

Implementation will require co-operation across a range of organisations with WFD linked with urban and rural planning and delivered at the local level to allow for contrasting priorities across river basins.

The key challenge for the SE and all stakeholders, then, is *how to set up to get these tasks carried out in the most 'effective' – in its widest sense – way*? Key issues and questions around this will **influence** and **constrain** what options are worth considering, and how they are compared. Some of these issues and questions are explored in **Appendix B**.



Another question is whether there are other 'successful' models of basin-wide flood risk management that we could learn from. Some illustrative examples are provided in **Appendix D.**

4. Consideration of options for linking WFD, flooding management and urban and rural planning

There are two choices to be made, which are interlinked:

- **The framework:** whether to make catchment strategy planning for flood management (1) a separate framework, to run alongside the WFD RBMPs (as in England), or (2) integrated as a sub-plan under WFD RBMPs.
- **The structure:** what organisational structure, resources and funding to use, to carry out the chosen framework.

The draft EU Floods Directive does *not* pre-determine either of the choices above. It uses specific language – 'prepare flood risk management plans' etc – but it states that: "Member States may integrate the flood risk management plans into the RBMPs" (Section 3, para 2, lines 9, 10, of document SEC(2006)66).

The options available for each of these choices are as follows (Table 1); and the issues and questions raised in 3 above are all relevant, in comparing them.

Initial observations on the options itemised in the table are listed in **Appendix C**

Table 1:

The framework		
F1	A separate framework for flooding management, in parallel with WFD plans [RBMPs]	As in England. Would require legislation. NB: an outline of this was included in the first draft of Chapter 3 of the 'Guidance' document.
F2	Executing flooding management plans as a sub-set of the WFD RBMPs	Any examples from elsewhere? ***Might not require legislation?*** NB: several aspects of this are covered in informal guidance in the final draft of Chapter 3 of the 'Guidance' document.
The structure		
S1 a	A single organisation, for each catchment, charged with the duty to carry out the activity – **convert SEPA to this role**	As the EA, in England. ***Would require legislation.***
S1 b	A single organisation, for each catchment, charged with the duty to carry out the activity – **convert LAs to this role**	Any examples from elsewhere? Would require legislation. Could be evolved from trials with S2a?
S1 c	A single organisation in each catchment – **set up a new one**, to cover *all* drainage and flooding responsibilities	Any examples from elsewhere? ***Would require legislation.***
S2 a	A 'virtual' organisation in each catchment, requiring collaboration between several stakeholders to cover flooding responsibilities	***As at present – no legal change?*** ***Eg: Parrett Catchment Partnership, England (see Appendix D); some best practice emerging in Scottish LAs***
S2 b	A virtual organisation, with one 'lead' party charged with a *duty* to organise it and do it.	***Any examples from elsewhere?*** ***Would require legislation.*** Could be evolved from trials with S2a?

5. Criteria for choice between options

The key criteria for deciding between options could include:

Effectiveness *in operation*:

- Minimum interfaces across boundaries?
- Most closely matching existing accepted (and public-trusted?) roles?
- Best justified by other(s) similar experience or models?
- Most likely to fit the emerging SE policies and government structures trends?

- Least costly?

Best matching relevant SFM Principles:

[The other SFM Principles are 'neutral' on these choices.]

2 – Responsibilities: All stakeholders (1) should be actively engaged in and share responsibility for achieving SFM….

5 - Multiple Benefits: SFM should seek opportunities for multiple benefits….

6 – Openness: The whole process of developing a scheme should be transparent (1)...

7 – Democracy: SFM should promote effective community engagement (1). Decisions should be taken at the local level, as far as possible…

8 – Simplicity: Implementation of sustainable flood management should be understandable (1), aim for ease of delivery (2), and promote continual learning (3) and sharing of knowledge (4).

Easiest change:

- Most closely matching existing roles, skills and resources?
- Quickest to change to?
- Easiest to experiment with, to build up best practice?
- Most acceptable, politically?

Additional choice criteria

- Clarity
- Reduction of duplication
- Affordability

No wish to prioritise the above, but favoured structure (from table) should comply with long-term SFM principles and be the easiest to implement.

6. Interim comments and 'next step' recommendations

There is attraction in testing out the 'minimal change' option of combining F2 and S2a. It is the only option combination that can be tried out immediately, without legislative change, in parallel with SEPA's implementation of the WFD first cycle. Lessons could be learnt, in time to change the framework, legislation and structure, to fit the final choice, in time to fit with both the WFD 2nd cycle, and the timing of the EU Directive.

(a) SE should identify best practice stakeholders in 3 [?] selected catchments, and set up trials of the F2 + S2a options, with strategy funding conditional upon working in an agreed way, to both develop best practice, and to feed back answers to specific questions about other options, for long term decision-making.

This paper aims to start creating a 'playing field', on which the choices to be made can be set out, and all stakeholders can contribute to the choices considered, and the decisions made. The SE, as the sole 'Level 1' stakeholder, is of course in the driving seat, and is the final decision-maker. To help them manage the process, the propositions made above need to be questioned, refined and strengthened.

More detailed work is needed (but not to get buried in detail!), by those with the right knowledge, on clarifying the interactions and implications of the various options considered, so that assessment of the options, and the resulting decisions, are informed by appropriate knowledge.

(b) Noting these issues, and the Scottish Executive's goals in terms of SFM, FIAC should comment on the propositions in this paper, and advise on how to take this paper forwards.

Appendix A: Illustrations of links between CSP and other plans which relate to the water environment

CAR to be used in guidance on implementing SFM, but not primarily designed for this purpose and to be seen as a transitional mechanism at best.

Flooding will probably be included within National Planning Framework

Inclusion of Scottish Water's asset planning constrained by current funding model (crucial role of Water Industry Commission)

Building in redundancy (cf 30% contingency advised in guidance for cost-benefit analysis)

Single source information systems based on GIS

Need for integration of various planning 'layers' and risk analysis, possibly under unifying 'water vision' (added to issues above). But then who owns the vision and how is it to be implemented?

Ownership by all stakeholders, facilitated by LAs, but with 'soft leadership' by responsible bodies [NB this points to S1b or S2b in terms of structure].

Some practical opportunities of linking catchment strategy planning with river basin management planning already under way (eg Tweed Forum's work).

The delivery of SUDS in Scotland

Part 2 of the WEWS Act amends the Sewerage (Scotland) Act to designate Scottish Water responsible for all future public SUDS. This new duty was not brought in immediately instead it will only come into force when secondary legislation detailing the construction standards and vesting conditions has been enacted. To support these regulatory changes Scottish Water is currently amending their Technical Manual 'Sewers for Scotland' to include a chapter on SUDS.

Scottish Water is currently assisting the Executive in drafting a consultation on the SUDS approach in Scotland. One of the aims of the consultation is to set out the roles and responsibilities of all parties involved in development and reaffirm that it is not the sole responsibility of Scottish Water.

The consultation will explore options to future proof our urban drainage by allowing Scotland to work towards not creating surface water runoff in the first instance. Identifying policy and fiscal measures, which encourages permeable areas and the treatment of runoff at source, will be one of the key strands to achieving Sustainable Flood Management. Successful case studies like Glasgow Strategic Drainage Plan highlight the importance of integrated drainage and surface water management plans and this area will be reviewed within the document, alongside green corridors through our cities.

Appendix B Key issues and questions which will *influence* and *constrain* the options for delivering CSP

Some of these are:

- Optimising the use of all '4 As' in *implementation* (rather than just Alleviation) already requires collaboration between several different stakeholders, who really could not be combined into one new statutory organisation, because flooding is only part of their responsibility. (eg: the discussion at the 15/6 FIAC on SEPA's awareness campaign)

- Similarly, any new single organisation solution for flood management will still have to integrate with urban and rural planning roles (with stakeholders adopting a multiplicity of roles) – which again could not be combined into one new statutory organisation, because flooding is only one aspect of planning under the new National Planning Framework

- So – how could the tasks be split between different organisations? How many different ways? Is there some minimum combination of key tasks, which must be within one organisation, to ensure consistency, focus and continuity? (eg. maybe, the 3 information management tasks, all the planning tasks, and all the implementation management tasks?)

- Which current responsibilities, available skills, and resources best fit each task?

- What existing or planned roles are there for handing all the *generic* information about a geographical area? How do these this interact with or constrain options for the *flooding specific* information? Should the latter be treated as just a sub-set of the former?

- How do the current responsibilities overlap, miss-match or fit together geographically: AAGs, FLAGs, LAs, etc? (SEPA and Scottish Water cover all Scotland, so OK?)

- How far are the currently available databases and GIS systems used by above organisations held in common? Could the emergence of shared/common databases and GIS systems help breakdown 'silo' mentality is some responsible bodies? Does GIS potentially move knowledge and decision-making closer to the end user?

- What is the balance of 'duties' [must do this], 'powers' [may do this], and 'contributions' [must contribute to this] needed? The draft EU Floods Directive implies that by the implementation date, some organisation(s) must have a *duty* for the key actions it lists?

- Could we trust a 'virtual' organisation of individual organisations collaborating, to deal effectively with flooding? (Eg. Parrett Catchment Partnership, in England; other partial examples in Scotland?). Could a *duty* be allocated to such an organisation, and how would it have to be incentivised and/or regulated, to be effective?

- Is there a need for an all-encompassing 'water vision' which provides a top-down framework which links CSP with WFD and water resources planning and is consistent

with LA development planning? Water vision to be agreed by all stakeholders in accordance with SFM principles, but implementation to be undertaken at different levels (cf Development Plan implementation following public consultation)?

- Local Authorities currently bring forward flood alleviation schemes and propose and implement local plans and structural plans. But planning of forest and agricultural land not included as a LA responsibility – this impedes holistic catchment scale planning.

- How does SFM fit with other regional priorities – economic development, rural diversification, forest expansion?

- To produce and carry out CSP will involve new stakeholders (such as farmers and foresters) with little prior knowledge of flood risk management. This will require change in current targeting of resources to the forestry and agricultural sectors.

- Present funding streams (mainly to LAs) do not support a catchment strategy approach to delivering SFM.

- A "water vision" would allow the balance of responsibilities, lead body and funding to be evaluated by the SE.

- What is the optimal level and mechanism for funding? Current funding model to individual bodies with **partial powers** for flood alleviation. In future funding to an **integrated** catchment body? Local funding (to expanded FLAGS) democratic control versus national funding (to a national body or NAG) more central direction?

- Regulatory controls on Scottish Water could constrain ability to work flexibly and co-operate with other stakeholders. Hence inclusion of WIC as a level 2 stakeholder.

- Capacity to deliver SFM within LAs and private sector. Need for new CPD programmes and MSc courses in universities to train staff in the principles and delivery of SFM.

Interactive workshops (and widespread consultation) may be the best way to answer these questions.

Appendix C Initial observations on possible options for CSP

- In England, the flooding framework is *separate* from WFD, even though the single responsible organisation is *the same* – the EA. In contrast, the 'minimal change' option for Scotland would be *exactly the opposite*, combining F2 and S2: an *integrated* framework, to be carried out by *separate* but collaborating organisations.

- These two extremes may be seen as reflecting very different paradigms [world-views]. The first is a top-down, 'machine' model, driven by *legislation*; the second is a bottom-up, 'complex system' model, which would have to be *incentivised* – mainly by conditionality of funding? Which paradigm, or what combination, best matches the SE's government philosophy? Which will most likely encourage the innovation needed for effectiveness?

- For S2a or S2b, the most obvious candidates for informal or formal leadership are the LAs. Choice of S1a or S1c would dis-empower the LAs.

- Therefore, the structural choice must reflect SE's wider intent on empowering, or reducing, the roles of LAs. This will need to consistently reflect other policy choices, particularly on handling other new sustainable development issues.

- Considering timescales, and SEPA's challenges with implementing WFD, option S1a would not be able to be up and running for several years. Options S1b, 1c and 2b would also be delayed by the need for legislation. The only way to make early progress, within the first WFD cycle, is to 'experiment' with F2 and S2a.

- Integration of implementation of WFD and Floods Directive explicitly favoured by European Commission with administrative arrangements left open. Does the SE currently favour embedding implementation of the Floods Directive within the provisions of the WEWS Act?

- If action in first cycle of WFD, what arrangements are made should not depend on implementation of the Floods Directive for which guidance may take many years.

- In relation to S2a, legislation should be in terms of 'duties' and not just 'powers'. Unclear at present whether new legislation needed or not.

- At present Scottish Water has no mandatory responsibility in terms of river basin management planning.

- Given that Area Advisory Groups (AAGs) and a National Advisory Group (NAG) being set up by SEPA to implement WFD, potential to expand role of Flood Liaison Advice Groups (FLAGs) at local level and create a national FLAG. These parallel structures for implementing WFD and the Floods Directive could then deliver river basin management planning according to SFM principles. Is a national FLAG a way of monitoring implementation of water vision?

- Virtual organisations (along the lines of S2a and S2b) have been effective in delivering LA Structure Plans.

- ‘Lead party’ wrong terminology? Facilitator/chair more appropriate? If so, points to S2a as optimal way forward.

Appendix D Models of basin-wide flood risk management in England and other parts of the world

Tom Ball (UKRC Academic Fellow in Sustainable Flood Management, School of Social Sciences – Geography, Dundee University)

The Scottish Executive is compiling examples of "SFM best practice" already emerging in Scotland and these will form part of the forthcoming Consultation on SFM. These will be added to this Appendix in due course.

1 INTRODUCTION

Countries surveyed have been England, New Zealand, Australia, Canada, Netherlands, USA (California).

For each country, a summary has been developed of the approaches in a case study catchment, loosely arranged under the following criteria.:

- Physical type and flooding history of catchment or part of catchment in which integrated management / SFM has been attempted (e.g. mountain torrent, middle catchment, low lying, coastal)
- Social characteristics
- Programme structure
- Programme aims
- Measures taken
- Measures planned
- Measures attempted or planned that would come under Scottish SFM principles, objectives and indicators as presently defined by FIAC
- Key data and/ or approaches that have emerged
- Any other ways in which the outcomes are particularly relevant to Scotland, general lessons, cautionary notes.

2.1 ENGLAND

An example of catchment management with high relevance to SFM delivery is the *Parrett Catchment Project*, (PCP). The *Parrett* forms a case study for a DEFRA study into ecosystem services (although not one of the pilots for Catchment Flood Management Plans, it will also eventually have a CFMP).

Parrett Catchment Somerset
Characteristics are: 1690 km^2 generally low lying/ coastal on the levels, middle catchment on the moors, predominantly agricultural (30% grazed, 70% cereal), with much reclaimed wetland, main rivers Parrett, Isle,Tone,Yeo and Cary. The social backdrop is: several population centres with flooding history, and many smaller settlements in which there is a history of conflict over land drainage and flood management.

The partnership was formed in 2000 between Somerset County Council and 30 stakeholder organisations. The timescale is a 50 year vision and Strategy, with measures implemented

through a series of 10 year Action Plans 'to achieve integrated, sustainable land use planning and resource management'.[1]
Stakeholders are the local authority and thirty other organisations, mainly community and NGOs. There is also community participation with Levels and Moors partnership (a Parish Council group).[2]

The aims are 12-fold:

1. Changes to agricultural land management
2. Creating temporary flood storage areas on farmland
3. Controlling runoff from development
4. Creating new wetland habitats
5. Dredging and maintaining river channels
6. Raising riverbanks
7. Upgrading pumping stations
8. Spreading floodwater across the moors
9. Building a tidal sluice or barrier
10. Upgrading channels to enhance gravity drainage
11. Restricting new development on the floodplain
12. Woodland development

Of these, many would come under SFM principles and objectives. Noteworthy is the attempt to link urban and rural drainage together in the programme (note aims 1-4 inclusive). Approaches 8, 11 and 12 adhere to the multiple benefit principles. The reported outcome is- '*considerable progress in resolving soil management and water storage issues to benefit local communities'.*

Most progress is claimed so far for aims 1 and 3. For aim 1, the first Action Plan is claimed to be successfully integrating water quality and water flows, farming practices and enhancing biodiversity '*perhaps more fully than in any other English river catchment*'[1]. Planned measures are more specifically ecological, with a WFD focus *Biodiversity issues connected with water level management are the next priority.*[3]

For aim 3, the 'Big sponge' public awareness project is an example of public outreach, aimed at encouraging local SFM. It encourages local retention schemes mainly in urban areas. A further aim is managed public access. Both comply well with openess/democratic SFM principles. A key approach to implementing all measures is the stakeholder involvement aspect of the programme, whose expressed aim is *'creating a socially-negotiated framework'* to make decisions in the catchment. This aspect might score well under SFM objective 2.

[1] See Forum for the Future sustainablility appraisal case study for the PCP. http://www.forumforthefuture.org.uk/docs/publications/271/parrett4.pdf

[2] See EU-Life environment project website http://www.floodplains.org.uk/pdf/area_case_studies/SomersetLevelsCaseStudy.pdf

[3] See Catchment futures ecosystem services study: http://www.catchmentfutures.org.uk/cfutures.htm

Key outcome: using the community as the initial focus to be integrated with later concentration on the biodiversity and WFD objectives.

Cautions: There are few data in the surveys consulted to evaluate overall progress to SFM 'Objective 1' (overall need for resilience)? It is noted that the *biggest barrier to increasing the project's impact on local sustainability remains the lack of resources to carry out of major flood defence works that will contribute to and help restore natural catchment function'*. The reason for this is said to be that the catchment is not meeting cost-benefit criteria under existing FPS funding cost-benefit models. Therefore it might be questioned how much long term resilience to extreme events is really being created. Also, are there catchments of a similar type in Scotland? If so, this would certainly influence scoring of catchment storage and associated multiple benefits.

2.2 NEW ZEALAND

About 100 New Zealand cities and towns, along with some of the most productive farmland, are located on floodplains (New Zealand Ministry for the Environment, 2007)[4]. For many years there has been a national focus on integrated catchment management for water quality, with a more recent change to integrated flood management.

Waitotara Catchment
SW part of N Island. Catchment characteristics: 15 major storms and/or floods in the last 15 years. Affected by major floods 2004, which inundated 14,480 km^2 in this and nearby catchments, left 2 dead and 2000 displaced[5], so significant that the option of re-locating the whole town of Waitotara was considered! Landsliding a problem in steep upper catchment. Social backdrop: Mostly rural catchment, several small settlements badly affected by floods in the past (Waitotara itself)

Plan: four-fold objectives, no timescale specified:

1. Maintain and upgrade flood warning systems
2. Target farm properties to implement management practices that encourage both water attenuation and erosion control
3. Building and development control
4. River control programme - which envisages a sharing of responsibilities. Taranaki Regional Council and District Council will each contribute equal funds over 10 years 'landowners adjacent to rivers and streams in the catchment will contribute works and *services in kind'*. [6]

Measures planned include upgrades of storm drains in urban areas.

[4] See ministry review at http://www.mfe.govt.nz/issues/land/natural-hazard-mgmt/flood-risk-review.html

[5] Map of the flood inundation is at http://www.dartmouth.edu/~floods/2004024.html

[6] See Taranaki regional council: http://www.trc.govt.nz/council/recount/recount54.pdf

Programme in relation to SFM principles: Of note here is the functional and financial link between landowner action and the actions by the local and regional authorities, and the sharing of responsibilities (and finance). Many would come under SFM principles (particularly the emphasis on land restoration and natural riverbank management).

Cautions: There is notably less emphasis to grassroots participation than in the integrated catchment approaches (such as Taieri), possibly because of the highly problematic catchment, and the recent timing of the floods lends itself more to a top-down approach at present. However there is a clear awareness in NZ government bodies of the need to link flood management approaches with the exemplary integrated catchment management programmes elsewhere in the country (such as Taieri), where there are useful pointers for stakeholder engagement and progress to fair outcomes.[7]

2.3 AUSTRALIA

Flood management in Australia as a matter of law, devolved to federal level. States and Territories have their own planning policies and guidelines, but as long ago as 2000, 'Total Catchment Management' (TCM), incorporating flooding, was chosen as the federal approach, leading to the regional flood mitigation programme *'aimed at assisting State and local agencies to address priority flood-mitigation needs in rural and regional Australia on an ecologically sustainable basis'*.[8],[9]. Prior to this policy change, most flood prevention measures were funded and managed on a local level (Whitehouse, 2000).

Three key outcomes were envisaged by the federal government from its TCM policy:

1. Promote community safety and protect community infrastructure through the provision of flood mitigation works and measures

2. Achieve complementary environmental enhancement of the floodplain

3. Implement flood mitigation projects in accordance with the principles of total or integrated catchment management and ecologically sustainable development and in accordance with established best practice.

Thus, there has been a national drive toward SFM principles. Many catchment based organisations have grown up regional level, in which community involvement is encouraged. Thus '*it is considered that floodplain management in Australia, is close to world best practice'*[10] . That in NSW is considered particularly good, partly because it has been around a long time and had time to 'bed down'.

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[7] See New Zealand centre for advanced engineering
http://www.caenz.com/info/2005Conf/pres/Martin.pdf

[8] See Parliament of Australia http://www.aph.gov.au/house/committee/environ/cminq/sub93e2.pdf *RFMP aims to reduce the current flood damage bill and limit the increase in future damage whilst continuing to manage and, where possible,enhance the social, economic and environmental impacts associated with the human occupation of the floodplain.*

[9] Floodplain Management in Australia: Best Practice Principles and Guidelines (2000) By Australian Agricultural Council Standing Committee on Agriculture and Resource Management

[10] http://www.unescap.org/esd/water/disaster/2001/australia.doc

Upper Parramatta River Catchment, NSW
NSW. Characteristics are: upper-mid catchment. Mainly urbanised, located in the Sydney metropolitan area and has a population of > 230,000. Covers 110 km^2, including suburbs of Blacktown, Holroyd and Parramatta. Flood risk was recognised in the 1970s (combined fluvial and drainage), but little was done until the 1980s, when a series of major floods occurred with many properties inundated repeatedly.

A trust was set up by the New South Wales Government in 1989, which had the following aims:

1. All properties to be protected and kept protected from mainstream and trunk drainage flooding
2. Water quality objectives that meet aquatic ecosystem protection and recreational use criteria desired by the community
3. Application of water sensitive urban design in all new developments and re-developments; progressive retrofit of water sensitive urban design features to existing buildings.
4. A healthy network of vegetated corridors,
5. An informed catchment community supportive of Trust-initiated activities
6. More efficient and effective management of the catchment's natural resources and hazards through co-ordination by all stakeholders and consistent planning instruments and policies based on a catchment Regional Environment Plan.[11]

A major part of the work has been stormwater runoff management and establishment of green corridors along the rivers. There are very interesting funding arrangements. The trust uses the Sydney Water Service to charge for its work on a rating basis. Community participation is encouraged throughout (many examples over the years of community outreach and attempts to get social feedback, public consultations).

Outcomes have been positive: Many examples, e.g. high success at getting population involved with reducing urban runoff, such as purchasing rainwater tanks for home. Positive feedback on the green corridor initiatives.

Programme in relations to SFM principles: Many areas would score highly on SFM principles, particularly the link between water quality and flood management objectives,

Cautions: Objective 4 (affordability) might be questionable under SFM, particularly in relation to the rating charge, which seems to be local financing of water programmes that would probably not be possible under current Scottish Water/ WIC arrangements. However, it could, conversely be argued that the strong management control that the structure gives to the Water Service is a good thing for forcing an agenda on SFM through to operation.

[11] information here is mainly gleaned from annual reports of the PCT: see for example http://www.uprct.nsw.gov.au/about_us/publications/annual_report_02_03/uprct_annual_report_2003.pdf

Mission statement of the PCP: *To improve the social, economic and environmental wellbeing of the catchment community by providing protection from flooding and trunk drainage surcharge, and enhancing streams and stream banks, through the developments of high technical standards, community support and co-ordination with other agencies.*

2.4 CANADA

Thames Catchment, Ontario.
Upper: 3432 km2, 432,000 people total. Very large catchment, divided for management into upper and lower, but functionally all mid-catchment.

There is a long history of high-impact floods, on the Thames, particularly in 1937 and '47 and most recently in '77, '86, and 2000.[12] They generally occur in spring when ground is saturated and snow melt, sometimes with ice jam incidents, but can occur other times of year. Main population centres are London, Stratford and St Marys, and in all three storm drain overload has been a problem. The 1940s floods led to the establishment of two Conservation Authorities with a specific mandate for flood prevention. The Lower Thames conservation authority notes: *'As upstream agricultural landuse has gradually changed from general farming to a more cash crop intensive system, the speed of runoff water and the frequency of all degrees of flooding has increased. However, due to the topography of the lower Thames valley, the flooding is relatively shallow and of a low velocity'*

The two conservation authorities implement a variety of programmes spanning water quality, retention, emergency management and planning.

Examples of measures implemented are, in summary:

1. Very strict planning and permit regime. See 'City of London Thames corridor plan' as an example. Plan emphasises the *'multi-functional role of the river valley system in the City and determine how to use the corridor's resources in a way that protects and maintains the value of the feature over the long term.'* [13]
2. Clean water projects in conjunction with local landowners.
3. Forestry projects and public access promotion to the corridor
4. Some flood control measures such as new sluices and selected defences.
5. Urban water management projects including green corridors and SUDS

Both authorities have had success in all these criteria. For 30 years, local communities planning powers have been such that development is prohibited within 1:200 flood risk areas (assessed by detailed mapping) unless there are exceptional circumstances (Brick and Goldt 2001). People living there can either stay or sell property to the community, who pay a fair market price and the property is then left vacant or demolished. The priority is purchasing land of open space/ conservation value, under which heading the riverside land generally qualifies.

Community engagement in areas other than planning has been a part of both authorities' actions for a long time and can be seen from even a quick glance at the websites, where

[12] See on this link pictures of July 2000 floods – on the UTRCA website.
[13] Brick, J., and Goldt, R., 2001 "*City of London Flood Plain Management***".** Upper Thames River Conservation Authority, London, Ontario, Canada.

landowner interaction and planning are placed alongside news about community events [14] [expand]

Programme in relation to SFM principles Many of the measures would therefore score well under the proposed SFM principles.

Key outcome: Shows potential for use of community trusts with strong financial and planning powers.

Caution: Both trusts have had many years to get established and form the necessary stakeholder links.

2.5 NETHERLANDS

While the Dutch situation is quite different to Scotland, in terms of hydrology:

In a hydrologically complicated area such as the current Netherlands, the concept of a watershed is in its usual sense not quite appropriate for describing the hydrology in this country, since in most of the Netherlands surpluses of water have to be artificially removed. [15]

…it has been included because there is much value in analysing the stakeholder integration aspects of flood management in large catchments, particularly as they show many of the complex issues that must be worked through between landowners and water users.

Like UK, there has been a recent strong focus in government on integrated water management, although the national government has refrained from implementing new overarching laws. Administratively, each dyke-protected area is a separate unit for flood management under the Water Embankment Act.

The Dutch law of water management…lacks a general umbrella act. In recent years, it was frequently discussed whether such an act would be necessary to achieve truly integrated water management. However, the government has been decided to refrain from legislative activities for the time being. It is preferred to get first more practical experience with the concept of integrated water management.

Part of that experience is illustrated well by the Lower Meuse Catchment upstream from Maastricht and the *Maaswerken* project

Lower Meuse Catchment
Characteristics: A large lowland transboundary catchment, includes much of Belgium and NE France. Three separate channels, Grensmaas, Maasroute (the navigation channel) and Zandmaass. Flood risk high along all three. Much flooding in past 15 years. Around Christmas 1993, long lasting floods in the Maas valley led 8,000 people being evacuated and

[14] Upper Thames Conservation Authority http://www.thamesriver.on.ca/;

[15] Floods, flood management and climate change in the Netherlands
Oolsthorn, AA, Tol, RSG (2001)

a total financial damage of € 115 million. In the beginning of 1995, floods caused financial damage of about € 90 million (Van Leusssen et al., 2000). The floods provided an opportunity for reviving existing plans for environmentally sound gravel extraction, but with benefits for flood security through the ponds that would be created.

The Maaswerken project thus evolved, which has the objective of simultaneously furthering the interests of flood safety, navigability, gravel extraction and nature conservation.
The detailed objectives were

1. Open planning - the involvement of stakeholders in both formulation of the problems and their solutions
2. Sustainable gravel extraction - Green for Gravel (*Groen voor Grind*). Plan combines gravel extraction and pond restoration wildlife.
3. Use the natural retention areas created to reduce flood risk to below 1 in 250 years return period

The programme is based on five general principles

1. The focus should be on integrated and multidisciplinary with focus on sustainable development
2. People should be made aware of the residual flood risk
3. Land use activities should be seen from a water perspective
4. Water should be stored for a longer time in the watershed and released more slowly.
5. Space should be created for the river and its tributaries.

The programme structure is complex, involving ministries, local authorities, water agencies and nature conservation groups. It has been commented (Van Leussen et al. 2000) that the different groups see the objectives differently. For example, the flood relief values of the gravel extraction ponds are compromised by wetland establishment. Also, extraction of additional gravel to create the ponds is an unpopular measure socially, although very popular with the industry.

Programme in relations to SFM principles: While many of the governance aspects would score well under SFM principles, the practical measures, overall, probably would not (question equitability of outcomes). Although there has been attention on phasing, trying to get the flood reduction measures through as early as possible, the pond creation is ultimately under the control of the industry, so there is a lesson here for delivery of SFM by landowners.

Outcomes and caution: mixed and many cautionary notes are sounded. Integrated planning has not been able to take account of the different interests and sensitivities of the many stakeholders. It has been noted that *consensual decision making, both in its advantages, such as inclusiveness, and disadvantages, such as sluggish decision-making.*

2.6 USA (CALIFORNIA)

In the USA there is federal involvement for flood prevention via US ACE but responsibility for initiating flood prevention lies with municipal governments.

The Napa valley: is mid-low catchment with tidal in lower reaches. There has been serious flooding recorded 21 times since 1862. Major floods occurred in 1986 (around $100m damage and 3 lives lost), 1997 and most recently 2005, when many houses were flooded and evacuations necessary.[16] Overall $600m in damage has occurred over 4 decades.

The Napa Valley Flood Reduction Programme
$300m was allocated for flood prevention in the 1990s, funded partly by US ACE and partly by ½ cent local sales tax. The programme is a complex combination of re-modelled defences and flood plain storage, which was credited with substantially reducing the flood damage in the 2005 event, when *terraced banks and revitalized wetlands let the river expand outward without overflowing its banks.*[17]

Programme structure
The programme decision making is centred around a community coalition that includes local engineers, architects, river experts, business and agricultural leaders, environmentalists, government officials, residents and community organizations. *They hammered out a plan to restore the Napa River to a more natural state, re-establish the wetlands safety valve and make the river more accessible to the public.* [18]

The project had complex requirements and some need for re-location. Measures taken so far have required the removal of 33 buildings, 53 mobile homes, three public streets, an animal shelter and a small part of Napa Valley College. Five bridges needed replacing. The project was not complete when the 2005 event hit and is still only around 40% complete. Future measures planned include new set-back embankments and restoration of wetlands.

Key Outcomes and lessons: An enormous project virtually double the grant aid budget in Scotland, but the important points are, partly what was done in an engineering sense: *reconnect the river to its historic flood plain, maintain its normal slope and width while allowing the river to meander as much as possible and retain natural channel features like mud flats, shallows and sandbars*[18], and partly the governance approach. The whole programme was put to a local vote and many of the key decisions consulted on. However, also cautionary notes: there have been major problems in phasing the capital expenditure, particularly in getting the funding allocation from the USA ACR, that has held the project up (projected completion date is now 2011).

Programme in relations to SFM principles: There is evidence that measures that would score highly on SFM have had a positive effect. Notably, it is the hard defences that have been slow to implement and the soft structures that seem to have mitigated the damage in '05. Some interesting points are the use of local finance, which in addition to the consultation encourages community to feel part of the scheme decision-making process.

Caution: The budget is far in excess of that currently available across the whole of Scotland.

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[16] Report from the Napa Valley register at
http://www.napavalleyregister.com/articles/2005/12/31/news/local/doc43b7347fbd757312594498.txt

[17] See the umbrella website for stakeholders in the Napa Valley
http://www.napawatersheds.org/news.php?display=1&oid=13227

Annex D

FLOODING ISSUES ADVISORY COMMITTEE
FINAL REPORT FROM THE AVOIDANCE SUB-COMMITTEE

Sustainable Flood Management and River Basin Management Plans

Roy Richardson, 12th January 2007

Background

This paper outlines how SEPA intends to promote sustainable flood management (SFM) through its responsibilities for river basin management planning (RBMP). The paper identifies a series of actions design to enable SEPA and other authorities within the RBMP process to deliver their responsibilities for sustainable flood management.

Under section 2 of the Water Environment and Water Services (Scotland) Act 2003, Scottish Ministers, SEPA and the "responsible authorities" have a duty, so far as is consistent with relevant enactments or the designated functions in question, and having regard to social and economic impacts:

> "to promote sustainable flood management, and act in the way best calculated to contribute to the achievement of sustainable development."

However "sustainable flood management" is not defined in the Act. To ensure that this provision in the 2003 Act is implemented effectively and consistently, the Scottish Executive have taken the view that it is essential that a pragmatic, measurable, universally accepted and clearly understood definition is developed. The Flood Issues Advisory Committee (FIAC) has proposed the following definition of sustainable flood management:

> "Sustainable flood management provides the maximum possible social and economic resilience against flooding, by protecting and working with the environment, in a way which is fair and affordable both now and in the future."

Further objectives, principles and measurable indicators of SFM are set out in 'What is Sustainable Flood Management?' FIAC paper; FIAC2006(6).

The principles for SFM include a strategic approach both nationally (across Scotland) and locally (within River Basin Management Plans).

SFM and RBMPs

The emphasis on resilience provides a useful framework for considering how RBMPs can be used to promote SFM. Resilience means ability to recover quickly and easily from flooding, and the Scottish Executive is using this emphasis on resilience to deliver the '4As' of flood management, namely; awareness, avoidance, alleviation and assistance. The same 4As can be used to summarise how various SEPA functions can promote sustainable flood management within RBMPs. This paper discusses various SEPA functions and duties, and how they link to SFM. This will form the basis for how SEPA intend to promote sustainable flood management within RBMPs.

RBMP Objective setting and programme of measures

RBMPs provide an opportunity to deliver multiple benefits for environmental quality and flood management. River Basin planning will be an open and participative process. One of the key mechanisms for participation of stakeholders is the formation of area advisory groups (AAGs) to inform the planning process at a sub-basin level. In total, 10 AAGs have been formed across Scotland to help deliver River Basin Management Plans. The AAGs include authorities and other parties with a role to play in promoting sustainable flood management.

Action 1 (Avoidance): Benefits to sustainable flood management will be considered in the assessment and prioritisation of measures targeted at at-risk water bodies within the RBMP process. At-risk is defined according to ecological risk, not flood risk, therefore any measures defined are primarily designed to tackle ecological quality issues. However, there will measures with ecological benefit that also serve a flood management function. For example, where the restoration of floodplains has both an ecological and flood management benefit it can be given additional weight in the planning process.

Action 2 (Alleviation): The RBMP process will be used to assess required mitigation for ***existing*** flood prevention schemes, where the schemes contribute to the ecological quality of an affected water body being at risk. This will result in an improved balance between the environmental impact and the economic and social benefit of such schemes, thus ensuring they are more sustainable. A project has been initiated under the UK Technical Advisory Group to define mitigation measures for flood prevention schemes (further details are available at www.wfduk.org). The mechanism for defining and delivering such measures within RBMPs is yet to be agreed.

In future RBMP cycles, it is likely the requirements of the proposed EU Floods Directive will strongly influence how sustainable flood management is promoted and integrated within the work of the WFD.

Action 3 (Alleviation, Assistance, Avoidance & Awareness): SEPA will work closely with other authorities and stakeholders within the first cycle towards the goal of closer integration of river basin plans with catchment based sustainable flood management. This will include developing links between AAGs and associated flood liaison advisory groups (FLAGs).

Controlled Activities Regulations (CAR)

The Water Environment (Controlled Activities) (Scotland) Regulations 2005 form part of the RBMP process. They require people undertaking river management works to obtain an authorisation from SEPA. The authorisations will require work to be planned and carried out in a sustainable manner.

Action 4 (Alleviation): CAR will be used by SEPA to ensure new flood prevention schemes brought forward by local authorities are sustainable, i.e. they are designed and assessed following the principles and objectives of SFM as defined by FIAC. This will ensure the schemes work with the environment as far as possible, and that the economic and social benefit of such schemes fully justify any environmental impacts, and impacts are mitigated as far as it is practical and reasonable to do so.

Action 5 (Avoidance): CAR will also be used to assess how new engineering activities on rivers affect flood risk. Authorisation will be refused where impacts on flood risk are considerable unacceptable.

Other SEPA functions and Duties

There are several other areas of work SEPA are involved that help to promote and deliver sustainable flood management. These include SEPA's role in producing indicative flood maps, the operation of flood warning schemes, the raising of flood awareness through various publicity campaigns, responding to development control consultations and inputting to the development planning process. There are already strong internal links between the RBMP process and these functions.

Through its planning advisory role SEPA provides a specialist input into land use decisions that impact on River Basin Management Planning. Flood management schemes that arise through the planning process will often have implications for the River Basin Management Plan in terms of affecting the status of the water body. SEPA can provide advice as to the how any such effects can be mitigated or avoided.

Action 6 (Avoidance): SEPA will work with Local Planning Authorities to ensure that the planning system promotes sustainable flood management through development management and a policy framework and land allocations which support the aspirations of the RBMPs.

Action 7 (Alleviation, Assistance, Avoidance & Awareness): During the first RBMP cycle, SEPA will ensure all of its functions work closely together to produce an integrated approach to promoting sustainable flood management. This will help to maximise SEPA's effectiveness in this area. To help deliver this action, SEPA will produce a strategy document describing how the organisation will promote sustainable flood management across its various functions and duties.

Annex E

FLOODING ISSUES ADVISORY COMMITTEE
FINAL REPORT FROM THE AVOIDANCE SUB-COMMITTEE

SUSTAINABLE FLOOD MANAGEMENT& RURAL LAND USE

Purpose

1. This paper is intended to inform and stimulate discussion by exploring the potential roles of rural land use in sustainable flood management (SFM) in Scotland. Although it concentrates on river flooding, some of the issues considered are also relevant to debates about the role of 'managed retreat' in coastal flood defence and the management of coastal erosion.

Introduction

2. Across the world, published predictions of climate change, and the uncertainties associated with its effects (some possibly appearing already) have increased interest in flood management. Attention and resources are shifting from dealing with the effects of floods towards managing their causes. The role and function of natural drainage processes and rural land use in managing river flood risk to communities and properties, often much further downstream, has come under increasing scrutiny. Several projects in the UK, and beyond, are examining these processes, and their possible role in flood management.

3. This approach to flood management relies on two basic arguments. First, in catchments where flood flows are initiated in rural areas, particularly in the headwaters, a number (probably a relatively large number) of changes in rural land use and/or of river processes could help to reduce the size of a flood peak by influencing the rate of passage of the flood downstream. Second, action could be taken to maximise natural floodplain retention or to enhance it artificially. This would allow for elements of storage to occur during a flood event and subsequent slow return of flood waters to the channel from the floodplain as the river drops. These arguments stem from the principle that flood management responses and techniques are best applied where catchment flooding processes are well understood.

4. Possible land and channel management measures include:

(a) reduction of grazing pressure to allow for an increase in general ground 'roughness' and to re-establish native tree cover in headwaters – both in flatter terrain and gullies, to intercept precipitation and slow down rapid runoff from compacted soils/low vegetation which generates flood flows;
(b) reversing upland drainage (by blocking surface drains & ditches) in improved pasture and forest plantations, again to use the natural capacity of the ground to slow the downstream release of flood waters;
(c) connecting field drains to wetlands rather than directly to watercourses, to slow the rate of run off into the river.
(d) controlling surface soil erosion and soil compaction through targeted cultivation and re-vegetation practices, to reduce overland flow and sediment loadings;
(e) managing woody debris dams in gullies above floodplains, to impede sediment and debris movement which might otherwise choke lower-gradient channels downstream;

(f) re-establishing meanders or creating 'two-stage channels' to maximise the volume of in-channel storage during flood events, reduce channel slopes and increase friction.
(g) restoring and protecting watercourses that have been deepened and straightened, to slow the flow down the channel and increase the buffering of flows provided by vegetation;
(h) maximising/re-establishing the natural storage and attenuation capacity of floodplains, through removing, lowering or 'setting back' flood banks;
(i) increasing 'floodplain roughness' (for example, by re-establishing floodplain tree cover) to slow the downstream movement of water; and
(j) enhancing floodplain storage beyond natural capacity (e.g. excavate retention basins, install control structures or diversion channels), or set-back floodbanks, if necessary with control structures).

It is also worth adding a general point regarding other benefits associated with land use changes and sustainable flood management. The biodiversity value of sites is likely to increase. Wetlands offer high amenity value and can have a positive effect on water quality and carbon sequestration. Flows are not only attenuated in high water conditions. In low water periods, water is still released from wetlands for a longer duration than if they had been drained or reduced.

5. Doubts surround the effect some of these measures may have in controlling more extreme flood events. They could be promoted in higher return period events as methods of mitigating design uncertainty and ecological impacts. Freeboard is currently used by engineers to mitigate uncertainty. These measures could also contribute to managing uncertainty. However, there is more agreement on their potential role in managing small- to medium-sized events with shorter return periods. Flood management benefits include: a longer, flatter flood hydrograph for a given sized flood (and hence more time for flood warnings and emergency procedures); less associated damage, through greater flood resilience and 'living with the flood'; and lower flood management infrastructure and maintenance costs. In addition, there are much wider, additional benefits for biodiversity, landscape and amenity value. Such measures, in their close attention to the detail of land cover, land management, and channel management, should, through creating greater structural and biological diversity in river ecosystems, also help to 'defend' the water environment from diffuse pollution.

6. In England, the Government's strategy for managing the risks of flooding and coastal erosion, Making Space for Water, supports such measures as part of the "wider portfolio of responses" for managing flood risk. Through further R&D, pilot projects in a number of catchments, and Common Agricultural Policy reform, the Government in England is seeking to promote rural land use solutions as part of its strategy for flood risk management.

7. This paper argues the case for a similar formal position in Scotland, initially through stimulating wider debate via FIAC. The paper summarises the current position, proposes a long-term vision, identifies some key challenges, and highlights a range of short/medium-term opportunities for progress. For the purposes of this paper, short-medium term opportunities are considered to be within the period 2005-2010, with the medium/longer-term spanning 2010-2030.

Current position

8. Rural land use can be severely disrupted by flooding (both through inundation and subsequent damage), as well as offering a range of potential measures for managing flood risk. However, at present, flood management legislation in Scotland makes little provision for the management of flooding of agricultural land. Here, responsibilities tend to rest with the owner of the land. Earlier legislation from the 1930s-1950s created land drainage schemes which protected drained farmland from flooding; statutory maintenance of these schemes ceased in the 1990s. In addition, as late as the 1980s, agricultural grant was available for maintaining flood banks and river channels for flood prevention purposes.

9. The Flood Prevention (Scotland) Act 1961 makes it clear that Local Authority powers and responsibilities are specifically restricted to assessing and managing the risk of flooding of non-agricultural land. Access to funds for SFM via the '61 Act is unclear yet there is a clear duty for SFM in the WEWS Act. This position requires to be clarified, since it could release substantial funds quickly for SFM.. However, some flood prevention schemes considered or promoted recently have included flood storage or attenuation on agricultural land. Local authorities report difficulties (they are eligible but grants are not normally provided when there is a statutory requirement) in accessing existing rural land use budgets (e.g. Scottish Forestry Grant Scheme (SFGS); Rural Stewardship Scheme (RSS)) for statutory flood management purposes. However, informal and exploratory approaches to managing agricultural and forested land for flood attenuation (i.e. not involving statutory schemes) can be found in areas such as Clackmannanshire and Aberdeenshire.

10. Agricultural payments available through the EU Common Agricultural Policy are increasingly moving away from simply subsidising food production towards supporting a broader range of social, economic and environmental benefits. Recent payment schemes for farmers and crofters offer a range of prescriptions which could help to reduce the risk of flooding, or of flood damage. Current payments/measures which could contribute to SFM are available as follows:

- Set-aside near watercourses (land taken out of cultivation);
- Numerous management options and capital payments under the Rural Stewardship Scheme (e.g. ponds, riparian woodlands, wetlands, floodplains, moorlands, wet pasture);
- Tier 1 Single Farm Payment for, inter alia, minimising soil erosion;
- Several options in the 2005 Land Management Contracts (LMC) Tier 2 'Menu Scheme', e.g
- Buffer areas (Option 6);
- Management of ditches (Option 7);
- Management of moorland grazing (Option 8);
- Management of rush pasture (Option 9);
- Retention of winter stubbles (Option 11); and
- Farm woodland management (option 17).

11. By 2007, it is intended that in Scotland these are delivered through LMCs via 3 'tiers' of payment. First, through 'Tier 1', the Single Farm Payment will use 'cross-compliance' to make existing subsidy payments conditional on achieving basic standards of animal welfare, food safety and environmental quality – the latter including measures relevant to the

behaviour of flood waters in soils. Second, 'Tier 2' offers payments on a non-competitive basis to all farmers and crofters in Scotland for a range of measures, some of which could contribute to SFM. Finally, 'Tier 3' measures (yet to be made available) will target specific areas of Scotland where rural land management could bring specific benefits. Some elements of the LMC scheme's basic standards (e.g. the UK Forestry Standard; Standard of Good Farming Practice; General Agricultural and Environmental Conditions) could also help in managing flood risk.

12. However, flood management benefits are not generally promoted as an aim of many options which, if correctly targeted and incentivised, could deliver greater benefit for SFM. To do would require a new approach, where there was a stronger focus on the design and implementation of particular land use options for SFM, with a focus on assessing merits and securing implementation at the essential catchment scale. This implies a clearer understanding of catchment flood processes, a better guarantee of SFM options being taken up, and the need for options which involve payments which are attractive in the long-term. New arrangements and relationships are required to secure the long-term/permanent commitment required to safeguard communities and properties downstream from flood damage. All of these are significant challenges.

13. The Scottish Forestry Strategy, first published in 2000 and with the second edition out for consultation, includes objectives to increase the amount of floodplain and riparian woodland, through the SFGS. As well as helping with SFM, this would increase 'woodland connectivity' through river corridors linking existing woodland fragments. However, evidence gathered during the strategy review suggests that there has been little interest in these objectives – a disappointing observation, given the potential SFM benefits. The current strategy review provides an opportunity to examine the reasons for this lack of interest, to address that where possible through amending the SFGS, and to introduce support for some of the other measures proposed above at para. 4. Whilst of less obvious relevance, moorland management (especially in sporting estates supporting deerstalking and grouse-shooting) may also need attention where vegetation management could deliver SFM benefits.

14. In summary, there remains an artificial divide between statutory provisions for protecting non-agricultural land from flood damage and private/proprietorial responsibilities for protecting agricultural land. Whilst there are some funds and measures available which could improve SFM in rural Scotland, it is not easy to coordinate these at a catchment scale, or to combine them with downstream 'harder defences'. More frequent flood flows are predicted, but not enough is known about which catchments could best benefit from rural measures as part of a wider SFM package.

Long-term vision (2010-2020) – and associated challenges

15. This vision, expressed in the 'future present' tense, sets out what is considered to be necessary (and achievable) outcomes for governing sustainable flood management in rural Scotland during the period 2010-2020.

(a) A Scottish strategy for sustainable flood management, which highlights the role of rural land use in delivering a reduction in flood risk to communities and properties downstream. This could be achieved through the identification of objectives, targets, milestones, responsibilities, delivery mechanisms and funding sources;

(b) Local Flood Management Plans developed by broader-based Flood Liaison and Advisory Groups, operating under new flood management legislation, linked to river basin management plans/Area Advisory Groups (AAGs) established via the WEWS Act.
(c) These plans are supported by an improved, shared and published understanding of how floods typically arise in different parts of Scotland, the communities and assets vulnerable to flood damage, the measures proposed to minimise such damage, and the locations in each catchment where such measures will be carried out;
(d) Local Flood Management Plans are linked strongly to (and informed by) key rural land use and water use policies, with objectives, procedures and funding streams much better aligned with those for agriculture, forestry, sporting estates, natural heritage, fisheries, other water uses (through WFD river basin planning) and more 'urban' land uses (through town and country planning). Better coordination of delivery of public funds for flood management.
(e) Measures are available, or in place, to maximise the contribution which rural Scotland can make to SFM, to complement – but perhaps in some cases, avoid – the need for 'harder' engineering solutions. Rural land managers receive long-term 'SFM premium' payments where they manage land/channels in accordance with wider CFMP measures, to deliver a flood management service with wider catchment benefits.
(f) Flood management in rural Scotland delivers multiple benefits, helping to deliver a range of objectives in Scotland's Sustainable Development Strategy, including: a reduction in damage and disruption created by flooding; better understanding & awareness of flooding; lower flood defence capital costs; lower maintenance & repair costs for defences after low-medium return–period events; and benefits for biodiversity, landscape & amenity, fisheries, and control of diffuse-source pollution.

16. However, if this vision is to be achieved, the approaches advocated above will need to overcome a number of challenges:

(a) Significant culture changes, of various types, but mainly professional and social – challenging 200 years of land use policy and practice, 50-75 years of civil engineering flood defence practice, and public perceptions of what flood management is.
(b) Mathematical uncertainties for the SFM benefits which might arise for small-medium flood events: how much effect, and where is effort best targeted (upper catchment, floodplain, channel management);
(c) Gaps in the expertise needed to assess land use options, conduct a 'flood risk management audit' and advise on options, design and delivery: hitherto not a service easily provided by (e.g.) FWAG, SAC, FC, SNH or SEPA;
(d) No obvious current route for systematic, proactive, pursuit of some of the channel management options (e.g. re-meandering, debris dams);
(e) Difficulties in accessing rural land use budgets for SFM purposes at an organised catchment scale, or for the length of time required to deliver some of the longer-term SFM benefits;
(f) Longer time periods needed to mature some land management options before they deliver their full SFM potential – thus the likely need for a combined approach with (temporary?) hard defences downstream, and for larger floods;
(g) Potential conflicts with other land management objectives (agriculture, grouse & deer, biodiversity, landscape) if greater tree cover is proposed for higher-grade agricultural land, sporting estates, or protected areas;
(h) Liability issues if landowners' actions create/exacerbate flood risk or other risks elsewhere: damage to rural infrastructure (tracks, footpaths); more woody debris blocking

bridges/culverts, triggering channel change, hence the need for expert advice issued within the context of a wider strategy;

Short-medium term opportunities (2005-2010)

17. Whilst the precise facts and figures are open to debate, there is a growing body of support for the view that catchment processes (land cover, land management, channel management) in rural Scotland can contribute to flood risk, but could also help in managing the risk of flood damage. However, previous rural land use and river channel management decisions have rarely been taken with a view to managing flooding throughout a catchment. This, with the heavy statutory focus on preventing flooding of non-agricultural land, has resulted in a 'policy drift', with uncertain consequences for SFM.

18. The principal issue for FIAC to consider is whether or not reducing the risk of flood damage should be an objective of rural policy in Scotland. The authors of this paper contend that this should be the case and the FIAC Avoidance Sub-Committee is invited to endorse this view.

19. If such an objective is to be delivered, clear actions can be identified in the short-medium term which will help to deliver the vision proposed above. These actions are summarised below.

(a) Issue high-level Scottish Executive policy statements on the role of rural landowners & managers (agriculture, forestry, sporting estates) in helping to deliver SFM.
(b) Issue WEWS Act SFM guidance, and detailed procedural guidance for LAs, pushing existing legislation as far as it can to highlight opportunities for rural measures. Broader membership & remit for FLAGs, linked to the work of SEPA AAGs, to explore the possibility of publishing catchment-based assessments of flood risk and the possible SFM solutions least likely to damage the water environment under the Controlled Activities Regulations.
(c) A Scottish Rural Development Plan with an SFM objective, with stronger incentives, via SFGS and for collaborative LMC applications, and a broader range of measures/prescriptions, to deliver SFM. Payments available for collaborative catchment flood risk assessments, to identify areas most likely to deliver SFM benefit. Public service aspects of providing land for SFM measures acknowledged through payments.
(d) R&D and a network of pilot projects to improve the knowledge/evidence base – e.g. build on the recent JBA report on natural floodplain capacity in extreme flood events, with R&D for less extreme events. Build on work by WWF in Clackmannanshire and the LA in Aberdeenshire. Improve the understanding of key processes and rural catchment locations which generate flooding, locations most frequently flooded, feasibility & potential contribution of various measures, including human, geographical and hydrological practicalities. This offers a real opportunity to link into the research and funding agenda of SNIFFER and other bodies. A major unknown is the economics of sustainable flood management. Although, experience has revealed this as likely to be a fraction of traditional schemes and requiring virtually no maintenance. This clearly another opportunity for study.
(e) Improve understanding and involvement of views of those in rural communities who own, manage or access rural land affected by flooding, or with a potential role in managing flooding.
(f) Promote debate within & between professional communities (land managers, water managers, engineers, planners, utilities, environmental interests) and with local communities.

(g) Build professional capacity towards establishing new advisory and operational expertise. Explore the funding of a post-graduate course in Sustainable Flood Management.
(h) Trial catchment-wide flood risk assessments to identify these areas where rural measures are best applied, i.e. areas of catchments which contribute to flooding or are flooded. Work towards maps showing catchments in Scotland at particular risk of flood damage; locations where payments are available for the application of appropriate measures; locations of properties and infrastructure at risk.
(i) Work towards establishing new institutional arrangements, funding packages and statutory functions – new flood management legislation in the 2007-2011 Scottish Parliament.
(j) Argue for land use & channel management solutions to be included in the UK negotiating position regarding proposed EU Floods Directive

Conclusion

20. This discussion paper has reviewed the current position, proposed a long-term vision, identified challenges, and suggested short-medium term actions for discussion. During this interim period, a flexible combination of 'bottom-up' and 'top-down' actions, and new policy, funding and R&D frameworks, would allow and encourage various approaches to evolve, to test out the issues, rather than trying to force them in areas of current technical uncertainty.

21. FIAC views land use measures as part of a wide portfolio of responses to flood risk management. Calls for flood defences will not abate whilst this debate plays out. As it does, heavy reliance is likely to be placed on 'CAR', Ministerial guidance, and the evolving RBMP/AAG process, by promoters of schemes to identify options which help to minimise the risk of environmental damage arising from new flood management schemes.

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June 2006