

NATIONAL TECHNICAL ADVISORY GROUP ON FLOODING ISSUES
SUSTAINABLE FLOOD MANAGEMENT SUB-GROUP – REPORT FOR 23
SEPTEMBER 2004 NTAG MEETING

Purpose

1. The purpose of this paper is to provide the National Technical Advisory Group on Flooding Issues (NTAG) with a fourth and final progress report from the Sustainable Flood Management Sub-Group.

Background

2. The Sub-Group met on 20 February, 22 April, 27 July and finally on the 26 August 2004. The current membership is detailed in Annex A, with Alan Burdekin usually chairing meetings but in his absence Philip Wright chaired the final meeting.

3. This Sub-Group is tasked with supporting the Scottish Executive to define “sustainable flood management” within the meaning of the Water Environment and Water Services (Scotland) Act 2003 (“the 2003 Act”) and produce a set of accompanying objectives and principles.

Feedback from last meeting on 26 August 2004

4. Charles Ainger presented the latest version of the definition. Importantly the term ‘resilience’ has been added to the definition and this has been explained in terms of the 4 ‘As’. Members made a couple of minor amendments before agreeing that it could be taken to NTAG as final.

5. The Sub-Group has taken a new approach to the ‘objectives’, dropping the primary/secondary division in favour of one overall objective and 4 balanced objectives under the headings *social, economic, environmental* and *future generations*. Some of the original principles have been amalgamated and three new principles have been introduced, giving 12 in total. Each principle has been prefixed with a key word for clarity.

6. David Cowan, from the Executive’s Sustainable Development Directorate, attended the meeting and confirmed that the work on sustainable flood management was consistent with the Executive’s sustainability framework.

7. The revised definition, objectives and principles is attached at Annex B.

8. Members agreed that it was important to have measurable indicators for the objectives, agreeing that they must be robust and easy to follow. Members discussed how to combine and introduce a weighting system for the indicators. They recognised that stakeholders might not have the appropriate information to accurately measure all these indicators but that at this level it was important to introduce the ideal situation as something to aim for.

Recommendations from that meeting to take to NTAG on 23 September 2004

9. The Sub-Group recommends that NTAG agrees:

- the definition of sustainable flood management as detailed below:

*“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.”;*

(* **‘resilience’** means: *‘able to recover quickly and easily’*. The Executive uses it to deliver the ‘four As’: **Awareness + Avoidance + Alleviation + Assistance.**)

- that there should be one overall objective and a further 4 equal objectives as detailed in paragraph 7 of Annex B;
- that there should be 12 principles as detailed in paragraph 8 of Annex B, and
- that NTAG Members offer corporate feedback (to Secretariat and Charles Ainger/Adrian Johnson) on the detailed meaning of the draft objectives (paragraph 13 of Annex D to this paper) by 31 October and a further draft is produced.

Review of Sustainable Flood Management Sub-Group output.

Outputs

10. The Sub-Group produced a first draft of the definition, objectives and principles and these were presented to a wide range of stakeholders at a seminar on sustainable flood management, hosted by Scottish Natural Heritage (SNH) in June. This work was generally well received and feedback from the event has helped shape the drafts in Annex B presented to NTAG today.

11. Taking account of that feedback, the Sub-Group has agreed a concise definition of sustainable flood management, which it believes is easy to understand and would meet the needs of all responsible authorities under the 2003 Act. It has also drafted high level objectives and principles.

12. Work has also begun on how we should go about measuring the objectives and principles and a draft of measurable indicators is ready to be presented to NTAG for discussion (see Annexes C and D).

13. The Executive commissioned Ioulia Timochkina from the University of Cambridge, to undertake a research project to apply a systems dynamics to sustainable flood management and Members took part in the project. Ioulia presented her findings to NTAG at its meeting in August and identified 4 main areas for improvement.

Next Steps

14. The Sub-Group recommends that the next steps on sustainable flood management should be that:

- A further draft of the indicators is produced for comment by Members.
- detailed comments on the definition, objectives principles and indicators are sought from stakeholders not (or under) represented at the SNH seminar or NTAG;
- A paper is prepared by the Executive for public consultation;
- Members consider how this work might be piloted, and
- Members to consider how to take forward the findings from the systems dynamics research.

Conclusions

15. Members are invited to:

- **Discuss and agree the recommendations made at paragraph 9;**
- **note the outputs in paragraphs 10 to 13;**
- **agree the next steps in paragraph 14, and**
- **consider whether the Sub-Group should resume, and in what form, if NTAG continues beyond 2004.**

**NTAG Secretariat
September 2004**

ANNEX A

THE NATIONAL TECHNICAL ADVISORY GROUP ON FLOODING ISSUES

MEMBERSHIP OF THE SUSTAINABLE FLOOD MANAGEMENT SUB-GROUP

Chair

Alan Burdekin, Scottish Executive (Air, Climate and Engineering Division)

Philip Wright, Scottish Executive (Air, Climate and Engineering Division) – Temporary Chair for 26 August 2004 meeting

Members

Charles Ainger, CIWEM

Mike Donaghy, Scottish Environment LINK (Andrea Johnstonova (RSPB) substituted for the 26 August 2004 meeting)

John Greaves, COSLA

June Graham, SEPA

David Howell, Scottish Natural Heritage

Jonathan Chapman, Environment Agency

Alan Werritty, University of Dundee (Department of Geography)

David Wilson, Scottish Water

Secretariat

Debi Garft, Scottish Executive (Air, Climate and Engineering Division)

Chris Birt, Scottish Executive (Air, Climate and Engineering Division)

Observers/special invites

Peter Bolton, Consultant

Adrian Johnson, MWH

David Cowan, Scottish Executive

**NTAG Secretariat
September 2004**

**NATIONAL TECHNICAL ADVISORY GROUP ON FLOODING ISSUES
WHAT IS SUSTAINABLE FLOOD MANAGEMENT?
[Revised draft for NTAG meeting 23.9.04]**

Revision Process

1. The revision process started from the ‘Draft Definition’ paper, which NTAG put up to SNH for 17th June presentation. It takes account of the SNH 17.6.04 feedback (paper NTAG2004(29), including Appendices B, C and D), further feedback from NTAG on 5 August 2004 and the SFM Sub-Group on 26 August 2004. The sequence was:
Add three Principles to cover the ‘extra’ issues at the end of Appendix B;
Deal with all specific comments as listed in Appendix C;
Review Appendix B general ideas, and Appendix D comments and summary, against that intermediate revision – add, combine or amend as appropriate;
Review comments after NTAG 5/8/04 – particularly on the objectives, and on the wording of principles – and add, combine or amend as appropriate; and
Make final amendments following comments received during SFM Sub-Group meeting 26/8/04.
2. Three texts have been produced as a result.
 - This first one includes a ‘clean’ revised text for Sections 5 to 10 of the original Draft Definitions paper (see 4 to 8 below), together with a summary of the main revisions made (next).
 - The second one is an ‘Audit Trail’ revision of the original Draft Definition document, in ‘tracker’ mode, with retained original text in black, and changes in red. It includes detailed audit trail notes for feedback from NTAG2004(29) – particularly Appendix C – from NTAG 5/8/04 and from SFM Sub-Group 26/8/04. (Not included with this paper.)
 - A third one is the original NTAG2004(29) paper, marked up with Audit Trail comments on Appendices B and D. (Not included with this paper.)

Summary of revisions

3. The revision below includes these changes, all following from the suggestions put to NTAG on 5th August 2004. [*** identify the key points**]
 - The **Definition** wording has been amended according to feedback*; and the introductory paragraph (original section 7, para 1) has been omitted, since it overlaps*. An explanation of ‘resilience’ is added, referring to the ‘Four As’.*
 - The **objectives** have been simplified*. The NTAG debate about what is ‘primary’ or ‘secondary’, and the need for a sustainable balance, has been resolved by giving an ‘overall’ purpose*, as well as the four sustainability objectives, all of which have been stated in ‘positive’ terms*.
 - Three extra **principles** have been added, as numbers 1 to 3, covering the type of ‘flooding’*, strategy – including ICM and SPP7*, and responsibilities*. The wording attempts to capture the flavour of comments made at NTAG.
 - Original **principles** (a), (d) and (i) have been combined into number 4 – all are about the decision-making process*; (h) has been omitted, as not being a ‘principle’*

- Others have revised wording reflecting feedback*, and revised numbering. There are 12 in all; all now have a ‘keyword’ at the start of each*.

Proposed revised text

“Sustainable flood management” – draft definition

4. The Sub-Group first considered definitions already in the public domain, such as:
 - Bruntland report definition of ‘sustainable development’
 - WWF definition of ‘sustainable flood management’ launch in April
 - DEFRA (from guidance on flood prevention schemes) definition of a ‘sustainable scheme’
 - The RSPB definition of ‘sustainable flood management’ launched at its seminar in March.
5. The Sub-Group proposes this **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.”*

* **‘resilience’** means: *‘able to recover quickly and easily’*. The Scottish Executive uses it to deliver the ‘four As’: **Awareness + Avoidance + Alleviation + Assistance**

“Sustainable flood management” – draft objectives

6. As a first step to developing sustainable flood management the Sub-Group proposes **objectives**, which will:
 - act as a long-term *vision* and also encourage interactive learning and education on flood risk management;
 - provide *test criteria* for current or future policies and legislative changes with *principles* for practical guidance;
 - develop *measurement indicators* to assess progress enabling the impacts of options to be evaluated more effectively at national and local scales;
 - provide an *‘audit trail’* for detailed decision-making to consistently justify and communicate decisions;
 - improve the quality of decision-making by ensuring that all stakeholders are involved in the process; and
 - ensure that links are made between flood management, Development Plans (urban and rural), River Basin Management Plans and Coastal Zone Management Plans, and plans to conserve the natural heritage.
7. Within the SE’s overall sustainable development objectives, stakeholders should meet the following **objectives**, in delivering sustainable flood management:
 - **Overall** – meet needs for resilience against flooding.

To meet this overall objective, the following needs must be balanced:

- **Social** – enhance community benefit, with fair outcomes for everyone;
- **Environmental** – protect and work with the environment, with respect for all species, habitats and landscapes;
- **Economic** – deliver resilience at affordable cost (construction, maintenance, running and renewal); with fair economic outcomes and the protection of local jobs and wealth;
- **Future generations** – allow for future uncertainty (the ‘precautionary principle’), with a fair balance between meeting present needs and those of future generations.

“Sustainable flood management” – draft principles

8. The Sub-Group also proposes these **principles**, setting out **how** the objectives might be delivered:
 1. [Scope] This framework of definition, objectives and principles for sustainable flood management (SFM), and the measurement indicators attached, apply equally to all types of flooding: surface, sewer, river, estuarine and coastal.
 2. [Policy] SFM should reflect a strategic approach both nationally and locally, with phasing if appropriate. It should incorporate the WFD principles of integrated management for all water bodies, and planned ‘control at source’ (ie. prevention of risk) through the use of SPP7 planning controls.
 3. [Responsibilities] All stakeholders share responsibility for achieving SFM. They are expected to collaborate constructively to meet SFM objectives, with the lead taken by the appropriate party(ies) according to their statutory, legal, common law or commercial role(s).
 4. [Decision-making] Sustainability issues should be considered from the earliest stages of investigating options. A whole-life (construction, maintenance, running and renewal) view of the costs and benefits is essential, each option requiring an assessment of sustainability. Decision-making tools will include, but not be limited to, Cost Benefit Analysis and should make the ‘values’ applied explicit.
 5. [Uncertainty] A long-term view of sustainability means taking account of future uncertainties, including climate and societal change. It also requires explicit consideration of the implications of flood events that exceed design limits.
 6. [Resources] Resources should be used sustainably.
 7. [Options] All possible options for flood management should be considered including, through to full evaluation, at least one option that represents a ‘most sustainable benchmark’, addressing all four ‘A’s: Awareness, Avoidance, Alleviation and Assistance, even if regulatory or legal barriers appear to block implementation.
 8. [Environment] Biodiversity and landscapes should be protected and enhanced (wherever possible) and negative impacts avoided.

9. [Multiple Benefits] SFM should seek opportunities for multiple benefits wherever possible, and seek other relevant funding sources.
10. [Openness] The whole SFM process should be transparent; and there should be a common, shared source of information, which all stakeholders can access and learn from.
11. [Democracy] Implementation of SFM should maximise community engagement. Decisions should be taken at the local level, as far as possible, and reflect local community 'Agenda 21' or similar sustainability objectives.
12. [Simplicity] Implementation of SFM should be understandable, and should aim for ease of delivery, with self-correcting and learning behaviour, and sharing of knowledge.

Next Steps

9. You are invited to consider, discuss and confirm or amend the above revised definition, objectives and principles.

NTAG Sustainable Flood Management Sub-Group

September 2004

ANNEX C

**NATIONAL TECHNICAL ADVISORY GROUP ON FLOODING ISSUES
MEASURING THE PERFORMANCE OF SFM [Revised Draft, for NTAG 23.9.04]**

Background and purpose

1. The revised SFM Definition, Objectives and Principles paper deliberately used straightforward language and the minimum number of words, as a general introduction for all readers. This companion paper adds **clarifying detail**, and proposes ways to **measure the performance** of SFM, by:
 - Describing in specific detail what we **mean** by each Objective and Principle – to clarify **what facts we need to know** about any SFM proposals, to effectively assess progress against objectives or compliance with principles [**validity**]
 - Suggesting **indicators** by which those specific requirements can be **measured**, effectively, and to ensure consistency with other SE indicators [**measurement**]
2. We separate these two stages, because we recognise that indicators may be difficult to set immediately, and we think it important not to allow that difficulty to stop us reaching agreement on what facts we need to know. If measurement is a problem for a valid indicator, it may be useful to look for an interim ‘proxy’ indicator.

Measuring SFM Performance

3. Indicators are required both for assessing *progress* against the defined **Objectives** (i.e. **what** results SFM is actually achieving) but also to assess *adherence* to the **Principles** (i.e. **how** we expect to achieve the results). Therefore the **Objectives** indicators and the **Principles** indicators are of fundamentally different types, and must be considered separately. *They cannot be combined in one number.*
4. The **Objectives** will be applied at two levels; to monitor and measure **progress** on SFM **at national level**, and to drive **decision-making** between alternative proposals or options considered. Compliance with the **Principles** will be important as a secondary factor in the decision-making process, since proposals that are prepared in accordance with the principles are most likely to deliver successful SFM performance.
5. The expected need to ‘ration’ and therefore prioritise investment funding could provide a powerful driver for the presentation of compliant proposals, and the selection of optimum options, by Local Authorities, and other ‘responsible authorities’ on the basis of sustainability. The outcome of funding applications could be determined by competitive rules set by the SE and based on this set of indicators. National figures for the indicators could also be published as benchmarks.
6. So, the framework of indicators, and how they are measured and used in option selection or proposal prioritisation, will motivate stakeholders. Therefore before finalising indicators we should consider what behaviour that way of measuring is likely to motivate.

Using indicators in decision-making and prioritisation

7. Indicators will be in a variety of measurement units (£, hectares, kilowatt-hours, tonnes of CO₂, fractions of 1, etc.). The monitoring of national progress in SFM does not require an aggregate indicator measure to be determined; but decision-making between alternative proposals depends on considering the indicators *together*. Techniques such as Cost Benefit Analysis, including shadow pricing, can be used to determine a single measure for appraisal, but other methods may also be used. For example, ‘ecological footprinting’ can be used for combining environmental indicators, and turning indicators into fractions allows them to be multiplied together, so a good result (>1) improves the scheme result, and a bad one (<1) makes it worse. It is always valuable to use more than one way to support decision-making.
8. In assessing proposals, each indicator may have two roles. It may have a ‘threshold’ value which acts as a ‘veto’, if the threshold is not met; and it may be used to compare options within proposals, or to prioritise between proposals.

Comparison with other indicators and best practice

9. In developing these indicators, we have fitted them as far as possible with the latest version of the SE sustainability indicators for Scotland. These have implications for measurement of the Environmental and, to some extent, Economic objectives, and Principle 6 on Resources. We have also:
 - compared these proposals with developing UK best practice, particularly the established guidance and the still-developing draft proposals from Defra and the EA (Defra’s Prioritisation System for Grant Allocation, the EA’s Strategy for Flood Risk Management (May 2003), the Defra/EA Flood and Coastal Defence R&D Programme, and “Making Space for Water” – the consultation for a new UK Government strategy); and
 - compared them with leading international examples, including ‘best practice’ by Regional and Territorial Councils in New Zealand, the National Flood Insurance Program and more recent Flood Mitigation Assistance Program applied in the USA; and the strategy of ‘Making Space for Rivers’ developed in Holland.
10. There is significant similarity between our SE proposals and these other examples, particularly in the trend to use the concepts of social and environmental resilience, and economic risk, within the context of flood events that may exceed design limits.

Proposed detailed descriptions and indicators; and next steps

11. With this in mind, draft detailed descriptions and suggestions for indicators for the Objectives and Principles are listed in tables below (in Annex D). We have made comments against them, to suggest discussion on critical issues.
12. **NTAG is asked to:**
 - **Discuss and agree or modify the comments on indicators in sections 1 - 10 today.**
 - **Examine the tables; and feed back agreement or suggested modifications for the detailed meanings of the objectives by 31st October 2004.**

- **Discuss and agree further work needed on defining measurement indicators, particularly any ‘expert’ comments from NTAG members.**

**NTAG Sustainable Flood Management Sub-Group,
September 2004**

13. Objectives

There are five objectives. The last four include more than one element each, and they have been separated into those elements for this table. Key comments and points for discussion are *in italics*.

Objective 1	Overall: Meet needs for resilience against flooding
Detailed Meaning	Reduce the total sum of flooding impacts over time, to an agreed level. Specifically: (i) Personal social impact (death and injury, evacuation, shock, and distress); (ii) Potential damage to property; (iii) Personal (travel) interruptions; and (iv) Lost production and sales.
Measurement Indicator(s)	Net sum of: (i) People at risk x personal social impact/person + (ii) Property at risk x damage potential/property + (iii) People at risk x lost travel time/person + (iv) Jobs at risk x lost time/job + lost sales <ul style="list-style-type: none"> • <i>Personal social impact is the subject of research (e.g. by the New Economics Foundation) and is under consideration by the SE for inclusion in C:B ratio calculations*.</i> • <i>Impact costs for death and injury are used in HA roads assessments</i> • <i>Measurement of the latter three aspects is standard practice and they are already embedded in Defra's current project appraisal techniques.</i> • <i>Aggregate measure requires analysis of the distribution of reduced impacts (benefits) accrued in the future.</i>
National Scale Measure	<i>Total unmet need quoted as number of properties, and % of population, remaining at risk at target level.</i>

* as advised by Jenna Coull, Economic Analyst, Scottish Executive (02/09/04).

Objective 2(a)	Social: Enhance community benefit with fair outcomes for everyone
Detailed Meaning	(i) Benefits from physical improvements to the urban and rural environment, (ii) The increase in community responsibility and self-help generated (<i>e.g. the 'Boscastle effect' but pre-flooding</i>).
Measurement Indicator(s)	(i) Shadow price valuation of benefits from specific improvements in amenities and aesthetic appearance (open spaces, views of river, wetlands, landscape, etc). <i>Willingness-to-pay approaches may enable benefits to be valued</i> (ii) Statement of achievement of 'Awareness' and 'Assistance'.

	<i>The challenge is establish an indicator that can effectively capture the diversity of ‘social capital’ in perceived benefits and individual responses.</i>
National Scale Measure	Aggregate of benefits across all proposals.

Objective 2(b)	Social: Enhance community benefit with fair outcomes for everyone
Detailed Meaning	This requires that: i) All those at risk have appropriate access to the benefits of SFM (reduced impacts); and ii) Payment (whether by Local Authority tax, direct flood-proofing, insurance, etc.) by those at risk should be in proportion to the level of benefits they receive.
Measurement Indicator(s)	(i) Clear statement of who has access to which benefits (ii) A broad comparison of the distribution of benefits gained against the distribution of payments made and/or grants received. <i>It is unlikely that a judgement will be made on (ii) since the usual funding route is through general taxation.</i>
National Scale Measure	National level aggregation of the distribution of benefits gained against payments made, judged as in (ii) above, and weighted by population in each proposal.
Objective 3(a)	Environment - protect and work with the environment with respect for all species, habitats and landscapes
Detailed Meaning	The individual elements are to: (i) Protect the water environment (quality and quantity); and (ii) Minimise emissions of greenhouse gases
Measurement Proposal(s) <i>[It may be possible to combine the individual measures (at local level) into an ‘Environmental footprint’]</i>	(i) Water: <ul style="list-style-type: none"> • Maintain or improve SE 9 Water Quality: km of river identified as “poor” or “seriously polluted” • More directly-measurable indicators that take account of water quantity (and act as a proxy for water quality)* <i>It is likely that SE 9 will be superseded by requirements of the Water Environment and Water Services Act. This may allow water quality to be measured under Objective 3(b) as part of a biodiversity indicator.</i> (ii) GHG emissions: <ul style="list-style-type: none"> • SE 1 Sustainable Prosperity: CO₂ emissions/GDP • SE 7 Climate Change: million tonnes GHG emissions weighted by Global Warming Potential (GWP) <i>It is considered that materials use, waste production, and energy use could be encompassed within an overall measure of GHG emissions.</i>
National Scale Measure	Either aggregate the two individual indicators, or the individual ‘Environmental Footprints’, into a single national measure expressed per person or property.

*These might include:

- Minimise artificially increased (mean) river flows;
- Proportion of river flow (or catchment rainfall) stored in impoundments with flow regulation functions (positive or negative depending on means of flow regulation e.g. SUDS positive, large impoundment could be negative)

(Feedback from June Graham, SEPA, 10/9/04)

Objective 3(b)	Environment – protect and work with the environment with respect for all species, habitats and landscapes
Detailed Meaning	This includes: (i) Delivering Biodiversity Plan targets, (ii) Protecting and/or improving water courses, ecological habitats and landscapes (geomorphology)
Measurement Indicator(s)	Consider: (i) <i>Either</i> statement of specific areas (SSSIs, ‘corridors’, wetlands, landscape features, etc.) affected in terms of hectares (as per Defra’s existing appraisal guidance) or by percentage of total catchment area*. (ii) <i>Or</i> areas affected by percentage of targets (<i>e.g.</i> SE 10 Biodiversity “%s of Biodiversity Action Plan species and habitats which are identified as stable or increasing”) <i>It may be possible to combine the individual measures (at local level) into an ‘Environmental footprint’</i>
National Scale Measure	Cumulative national results of all implemented proposals in both categories

* There are number of measures that could be considered including:

- Percentage of catchment wetlands reclaimed/created (positive)
- Percentage of catchment with provision of meanders, length of meanders (positive)

(Feedback from June Graham, SEPA, 10/9/04)

Objective 4(a)	Economic - deliver resilience at affordable cost (construction, maintenance, running and renewal), with fair economic outcomes, and the protection of local jobs and wealth
Detailed Meaning	Deliver SFM for lowest whole life cost of alleviation (capital costs, operation & maintenance, replacement, individual response funding and compensation), plus awareness, avoidance, and assistance costs.
Measurement Indicator(s)	£ (Whole Life Cost) Whole life costing is included in C:B ratio calculations*
National Scale Measure	Cumulative national costs and number of properties affected for all implemented proposals

* comment received from Jenna Coull, Economic Analyst, Scottish Executive (02/09/04).

Objective 4(b)	Economic - deliver resilience at affordable cost (construction, maintenance, running and renewal), with fair economic outcomes , and the protection of local jobs and wealth
Expanded Meaning	<i>Nature causes flooding; human infrastructure and intervention causes its negative impacts*</i> This requires: (i) A statement of the main causes of the flood impacts, which are to be reduced; (ii) A statement of who pays the costs; and (iii) A comparison and judgement on 'fairness'
Measurement Indicator(s)	(iii) A comparison of facts will provide an objective judgement of 'fair', 'partly fair', or 'unfair'.
National Scale Measure	Cumulative 'people affected' weighted average of 'fair', 'partly fair', or 'unfair'.

* It is difficult to identify 'flood causers'. Comment received from Jenna Coull, Economic Analyst, Scottish Executive (02/09/04).

Objective 4(c)	Economic - deliver resilience at affordable cost (construction, maintenance, running and renewal), with fair economic outcomes, and the protection of local jobs and wealth
Detailed Meaning	This includes: (i) the impact on jobs protected, and (ii) wealth generated for local community.
Measurement Indicators(s)	(i) No. of local jobs protected (ii) £ (and percentage of proposal costs) spent in the local community <i>Measurement will need to take account of any changes in labour market activity that do not add to the total number of local jobs*</i>
National Scale Measure	Cumulative national results of jobs protected, and total £ spent in communities.

* comment received from Jenna Coull, Economic Analyst, Scottish Executive (02/09/04).

Objective 5(a)	Future - Allow for future uncertainty (the 'precautionary principle') with a fair balance between meeting present needs and those of future generations
Detailed Meaning	This needs to take account of: (i) Allowance for increased rainfall (as a result of climate change) (ii) Allowance for increased or decreased catchment response (i.e. change in the run-off coefficient) (iii) 'Headroom' potential, as the net result of both
Measurement Indicator(s)	(i) Rainfall increases (% of current) (ii) Change in average runoff coefficient (% of current)* (iii) Net headroom as percentage of design total

National Scale Measure	Cumulative Net ‘headroom’ potential as percentage of ‘design’, weighted by catchment area
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*This takes account of “Percentage of catchment converted to impervious surface” suggested by June Graham, SEPA, 10/09/04.

Objective 5(b)	Future – Allow for future uncertainty (the ‘precautionary principle’) with a fair balance between meeting present needs and those of future generations
Detailed Meaning	This must take account of: (i) Flood plain capacity for flood response - in terms of storage capacity and channel capacity (ii) Future affordability of continuing resilience (iii) Fail safe provision for design flood exceedence
Measurement Indicator(s)	(i) Flood plain storage (m ³ and %age of ‘natural’ floodplain retained), and floodplain channel capacity (m ³ /s and %age of ‘natural’ channel retained)* (ii) Discount rate used (%) (iii) Statement of the expectation, and estimate of the relative level of risk during exceedence – catastrophic, severe, minor.
National Scale Measure	(i) Catchment area weighted national average of flood plain capacities retained (ii) Cost-weighted average discount rate use (iii) Aggregated sum of exceedence risks as in (iii) above, weighted by population served by each proposal

This takes account of “Proportion of flood flows managed by setting back of embankments” suggested by June Graham, SEPA, 10/9/04.

14. Principles

Where the words of the principle include more than one element, they have been separately numbered and referred to, under ‘Detailed Meaning’, for each Principle.

Principle	1. Scope
Detailed Meaning	This framework of definition, objectives and principles for SFM, and the measurement indicators attached, apply equally to all types of flooding: surface, sewer, river, estuarine and coastal.
Measurement Indicator(s)	Value of schemes of each type - measure: by £ of ‘need met’. <i>Possible proxies: households or people (no), or area of schemes (ha).</i>
National Scale Measure	% of value completed of each type vs. need for each type

An approach is demonstrated for Principles 2 and 3, which it is suggested can be applied to all the others.

Principle	2. Policy
Detailed Meaning	All schemes for SFM should reflect a strategic approach (1), with phasing if appropriate (2). They should incorporate the WFD principles of integrated catchment management (3), and planned ‘control at source’ (ie. prevention of risk, through use of SPP7 planning controls) (4).
Measurement Indicator(s)	<ul style="list-style-type: none"> • Ask ‘Have the 1, 2, 3, 4 elements been followed?’ - measure: score ‘yes’=3, ‘partly’=2, ‘no’=1, for each. Record score for each as a fraction of maximum 3/3 = 1. <i>Could combine the scores for the four elements into an overall score out of 12, as a fraction of 1</i> • For (3): has an ICM been prepared? – measure: area covered by ICM (ha) <p><i>For (4), on use of SPP7: could require a statement of effectiveness in preventing risk.</i></p> <ul style="list-style-type: none"> • Provide a summary of how each element was followed – to learn from.
National Scale Measure	<ul style="list-style-type: none"> • Cumulative fraction of 1, for each of 1 to 4, for all schemes completed. • For (3): % of catchments (by ha) for which ICMs have been prepared • Collection of summary information

Principle	3. Responsibilities
Detailed Meaning	All stakeholders (1) share responsibility for achieving SFM, whether they are ‘responsible authorities’ or not, and whatever their statutory, legal, common law or commercial roles. They are expected to collaborate constructively (2) to deliver schemes to meet SFM objectives, with the lead taken by the appropriate party(ies) (3) according to their role(s)
Measurement Indicator(s)	<ul style="list-style-type: none"> • For (1): have all stakeholders been identified? • For (2): is there evidence of constructive collaboration? • For (3): have appropriate lead(s) been taken? • Provide a summary of how each element was followed – to learn from. <p>Measure for each: score ‘yes’=3, ‘partly’=2, ‘no’=1. Record score for each as a fraction of maximum 3/3 = 1.</p>
National Scale Measure	<ul style="list-style-type: none"> • Cumulative fraction of 1, for each of 1 to 3, for all schemes completed. • Collection of summary information

Principle	4. Decision-making
Detailed Meaning	Sustainability issues should be considered from the earliest stages of investigating options through all stages of the scheme appraisal process (1). A whole-life (construction, maintenance, running and renewal) view of the costs and benefits is essential (2). Each option considered will require its own assessment of the sustainability of the solution (3); decision-making tools will include Cost Benefit Analysis but will not be limited to this (4), and should make the ‘values’ applied explicit (5).
Measurement Indicator(s); and National Scale Measure	Follow the same approach as in Principles 2 and 3 above, scoring 1, 2 or 3 out of 3 for each element identified in the overall Principle; and recording how each element was followed – to learn from.

Principle	5. Uncertainty
Detailed Meaning	A long-term view of sustainability means taking account of future uncertainties, including climate change (1), urban development (2), land use (3), technology development (4) and affordability (5), in considering future generations’ opportunities. . It also requires explicit consideration of ‘design exceedence’ events (6).
Measurement Indicator(s); and National Scale Measure	<ul style="list-style-type: none"> • Follow the same approach as in Principles 2 and 3 above, scoring 1, 2 or 3 out of 3 for each element identified in the overall Principle; and recording how each element was followed – to learn from. • Record the allowances for uncertainty made.

Principle	6. Resources
Detailed Meaning	Resources should be used efficiently (1) and sustainable construction methods should be promoted (2)

<p>Measurement Indicator(s); and National Scale Measure</p>	<ul style="list-style-type: none"> • Follow the same approach as in Principles 2 and 3 above, scoring 1, 2 or 3 out of 3 for each element identified in the overall Principle; and recording how each element was followed – to learn from. • Record the practices and methods used, and savings made. <p><i>Various SE SD indicators are relevant – particularly SD 14 – in measuring resource efficiency</i></p> <ul style="list-style-type: none"> • <i>SD 14 Travel: Distance: Total vehicle kilometres</i> • <i>SD 15 Travel: Industry: Freight intensity (relationship between tonne kilometres moved and GDP)</i> • <i>SD 16 Travel: Mode: Percentage of journeys to work not using car.</i> <p><i>There are many existing schemes for measuring resource efficiency and sustainable construction – suggest SE collaborate with the industry to agree on national approaches, and expect flood management schemes’ design and construction to follow this.</i></p>
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Principle	7. Options
<p>Detailed Meaning</p>	<p>Flood management options must include, through to full evaluation, at least one option that represents a ‘most sustainable benchmark’(1), addressing all four ‘A’s: Awareness (2), Avoidance (3), Alleviation (4) and Assistance (5), even if there may be seen to be regulatory or legal barriers to its implementation. Elements may include ‘do-nothing’, ‘property abandonment/flood-proofing’, and urban and rural land-use adaptation.</p>
<p>Measurement Indicator(s); and National Scale Measure</p>	<p>Follow the same approach as in Principles 2 and 3 above, scoring 1, 2 or 3 out of 3 for each element identified in the overall Principle; and recording how each element was followed – to learn from.</p> <p><i>Can a comparative measure be constructed, for each scheme, catchment, and nationally, for the ratio in which these ‘4 As’ have dealt with flood risk?</i></p>

Principle	8. Environment
<p>Detailed Meaning</p>	<p>Bio-diversity (1), habitats (2) and landscapes (3) should be enhanced and conserved (wherever possible) and negative impacts avoided.</p>

Measurement Indicator(s); and National Scale Measure	<ul style="list-style-type: none"> Follow the same approach as in Principles 2 and 3 above, scoring 1, 2 or 3 out of 3 for each element identified in the overall Principle; and recording how each element was followed – to learn from. Record the specific areas and actions involved. <p><i>More detailed measurements could be made here, or could be made under the Objectives for 'Environment' - See SEPA comments there.</i></p>
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Principle	9. Multi-functionality
Detailed Meaning	Sustainable flood management should seek opportunities for multi-functional benefits (1) (economic, rural, landscape or amenity enhancement) wherever possible, and seek other relevant funding sources (2).
Measurement Indicator(s); and National Scale Measure	<ul style="list-style-type: none"> Follow the same approach as in Principles 2 and 3 above, scoring 1, 2 or 3 out of 3 for each element identified in the overall Principle; and recording how each element was followed – to learn from. Record the specific multi-functional benefits (£, descriptions) and additional finds (£) and sources involved. <p><i>SE SD 2 indicator – unemployment is marginally influenced by this principle.</i></p>

Principle	10. Openness
Detailed Meaning	The whole process of developing a scheme should be transparent (1); and there should be a common, shared source of information (2), which all stakeholders can access and learn from (3).
Measurement Indicator(s); and National Scale Measure	Follow the same approach as in Principles 2 and 3 above, scoring 1, 2 or 3 out of 3 for each element identified in the overall Principle; and recording how each element was followed – to learn from

Principle	11. Democracy
Detailed Meaning	Systems should be developed to maximise community engagement (1), and the subsidiarity of decision-making (2).

Measurement Indicator(s); and National Scale Measure	<p>Follow the same approach as in Principles 2 and 3 above, scoring 1, 2 or 3 out of 3 for each element identified in the overall Principle; and recording how each element was followed – to learn from.</p> <p><i>For (1), particularly important to describe the forms of consultation and stakeholder dialogue used.</i></p>
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Principle	12. Simplicity
Detailed Meaning	<p>Systems should not be overly bureaucratic (1), and should aim for ease of delivery (2), with self-correcting (3) and learning behaviour (4), and sharing of knowledge (5).</p>
Measurement Indicator(s); and National Scale Measure	<p>Follow the same approach as in Principles 2 and 3 above, scoring 1, 2 or 3 out of 3 for each element identified in the overall Principle; and recording how each element was followed – to learn from.</p> <p><i>Worth reviewing the results of the systems dynamics report to learn from, here.</i></p>

**NTAG Sustainable Flood Management Sub-Group,
September 2004**