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CIWEM Rivers and Coastal Group Annual Conference
Managing our changing flood and coastal risk
Emerging good practices

January 27th, SOAS London

This conference aims to share the emerging good practices both at the strategic scale and at the sharp end of delivery in tackling existing challenges head on. It will also provide an opportunity to take stock of where we are and assess how we need to progress to achieve our goal of using flood and coastal management as a vehicle to mitigate and adapt to sustainable futures given the expected pressures.

Sponsors

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If you would like to sponsor this event please contact Lauren lauren@ciwem.org or Justin justin@ciwem.org at CIWEM or on 0207 831 3110

Please circulate to colleagues who may be interested

A conference organised by CMS – Communications and Management for Sustainability in partnership with CIWEM Rivers and Coastal Group

A welcome to this CIWEM Rivers and Coastal Group Winter meeting

We hope you will enjoy participating in this event which includes excellent speakers on a range of very contemporary issues.

If you are not currently a member of CIWEM then we would like to encourage you to join and also to encourage existing and new members to become a member of the Rivers and Coastal Group (RCG).

To enable you to join CIWEM initially we would like to offer you **free** Environmental Partner membership to the end of 2010. All you need to do is complete your details on the 'Environmental Partner' form, available today from the CIWEM stand, and hand it to the representatives on the stand or any RCG committee member and we will do the rest. We will all be wearing RCG Badges so you can recognize us.

Since 1949, CIWEM's Rivers & Coastal Group has worked to become the lead professional body in water, flood and erosion risk management, providing a forum for CIWEM members to develop their careers and to influence governments, NGOs and the wider community in the sustainable management of water.

Members are supported in their continuing professional development through events and competitions that provide valuable platforms to share and develop technical knowledge. Networking opportunities and career development are also strong features of the wide variety of events organised by the Group, including those aimed at younger members progressing through the chartership process.

The Group takes every opportunity to influence forthcoming political and strategic initiatives. This involves responding to consultations and holding events around critical initiatives such as PPS25, Making Space for Water, the Pitt Review and the Floods & Water Bill. Success is highlighted by the Government now actively seeking the opinions of members.

These are many reasons to join us but don't just take our word for it. We recently asked Dr Jean Venables, Immediate Past-President of Institution of Civil Engineers, for her views and she told us that "CIWEM's Rivers & Coastal Group has been extremely helpful in sharing best practice and spreading knowledge, increasing understanding and practice of sustainability in river and coastal work, and in promoting improved environmental performance."

So in summary, joining CIWEM could not be easier and for 1 year it is free for new members attending this event. There is no additional cost to become a member of the RCG.

If you would like to become involved, please come and talk to us today or visit www.ciwem.org/groups/rivers.

Regards

Terry Fuller
Chair, CIWEM Rivers and Coastal Group

Welcome to the conference

This information gives the answers to some of the most frequently raised questions that arise at the conferences we organise.

Conference Outputs

- **The Power Point presentations** and delegate notes will be available shortly after the event on the CMS www.coastms.co.uk and CIWEM www.ciwem.org websites. We will notify you by email when these have been placed on the sites.
- The data from the questions posed and a short report will also be made available.

Questions – Bookings – Receipts – In house information If you have any questions during the event about bookings, finances, or logistics please see **Christina Beech** at the registration desk; she will be pleased to help.

Timing We will try to ensure that the conference runs on time to allow the allocated time for speakers and as importantly for discussion. A bell will be rung 5 minutes before the start of sessions.

Refreshment Breaks In running events in London over the last 15 years we have used two main refreshment breaks during the day that enable us to split the sessions and breaks more evenly. A sandwich buffet is available in the first break and sweet course during the second.

Food There is always ample food at the events and you can come back for more. Once you have collected your food **could you move away** from the serving table. Catering staff are on hand if you need anything, including extra drinks.

Delegate list A list of the delegates to 18 January is at the end of the delegate notes.

Evaluation form There is a questionnaire and evaluation form in your delegate pack; your views will help us improve future events. Please leave these at the registration desk along with your badge when you leave.

NB Valuables **If you have anything you value keep it with you i.e. do not leave laptops unattended.**

Before you leave Check you haven't left anything in the conference hall.

Please also take any **leaflets or reports**.

Background to the Conference

Sea level rise and land tilt is increasing the threats on our coast and tidally influenced communities, increasing precipitation, storminess and extreme river flows will increase our chance and frequency of extreme flood levels and flows. All these are happening against the background of an increasing population and the development of housing and industry to support this. Lest we forget, we are an Island, so there is nowhere to run.

Practitioners in the field of flood and coastal management are presently doing a lot of head scratching to address the challenges this brings to deliver sustainable communities into the future, where people, the economy and the environment all thrive.

This conference aims to share the emerging good practices both at the strategic scale and at the sharp end of delivery in tackling existing challenges head on. It will also provide an opportunity to take stock of where we are and assess how we need to progress to achieve our goal of using flood and coastal management as a vehicle to mitigate and adapt to sustainable futures given the expected pressures.

Objectives

The objectives of the conference are to:

- Share the emerging good examples of how practitioners are tackling the challenges sustainable flooding and coastal erosion within ever increasing pressures and threats
- Identify what future challenges remain
- Identify how flood and coastal management needs to adapt to sustain our communities and environment into the future

Who should attend?

- Flood and coastal management practitioners
- Flood and coastal management policy and strategy developers
- Planners and developers working in areas of flood or coastal risk
- Environmental professionals who deal with the interface between land and water
- Surface water drainage professionals
- Asset and investment managers for flood and coastal infrastructures and systems
- Research organisations and academia at the leading edge of flood and coastal science

Programme

09.00	Registration and refreshments	
9.45 – 11.40	Session 1 – Charting the future path	Chair: Fola Ogunyoye <i>Royal Haskoning</i>
09.45	Welcome to the Conference on behalf of CIWEM	
09.50-10.15	Keynote speaker – Challenges to R&C industry	Jean Venables Association of Drainage Authorities
10.15-10.35	How is government dealing with the challenge – FCERM update on their policy F&W Bill etc	Linda Aucott Defra
10.35-10.55	Developing integrated strategies for FCERM data, modelling and mapping to take us forward	Kate Marks Environment Agency
10.55-11.15	November 2009 Flood event in NW England – how did we fare?	Ian Payne Strategic Manager, Allerdale Borough Council
11.15 – 11.35	Summer 2007 floods – how far have we come?	Steve Jordan Wychavon District Council
11.35-12.20	First course refreshments	
12.20 - 14.00	Session 2 – Learning from emerging good practices.	Chair: Bryan Curtis Worthing Borough Council
12.20-12.40	Medmerry – Achieving win-win for communities and habitats through working with natural processes	Joe Pearce Environment Agency
12.40-13.00	Real examples of retrofitting sustainable water management systems	John Blanksby Pennine Water Group
13.00-13.20	Building resilience into our coastal heritage	Hamish Hall Royal Haskoning
13.20 – 13.40	Weston – Using Flood and coastal risk information within development planning	Rachel Lewis North Somerset Council
13.40- 14.00	Delivering a multi-objective Strategy for the Humber Estuary through multiple funding sources	John Pygott Environment Agency
14.00 - 14.40	Second course refreshments	
14.40 – 16.00	Session 3 – Tackling the future challenges	Chair Terry Fuller <i>Jacobs</i>
14.40 -14.55	How do we create sustainable communities into the future	Peter Bide Communities and Local Government
14.55 – 15.05	Q&A	
15.05 – 15.20	How do we work with natural processes under an increasing environmental risk? -	Duncan Huggett Environment Agency
15.20 – 15.30	Q&A	
15.30– 15.45	How will strategy and scheme appraisals have to change? What tough choices would we have to make?	David Cotterell Environment Agency
15.45 – 15.55	Q&A	
15.55 – 16.00	Chairman’s concluding comments	
16.00	Close	and refreshments

Challenges to the Rivers and Coastal Industry

Dr Jean Venables OBE FREng FICE

Chief Executive, Association of Drainage Authorities, 12 Cranes Drive, Surbiton, KT5 8AL
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(and Immediate Past President, Institution of Civil Engineers)

This address will consider the current challenges to all involved in the rivers and coastal industries. One of these challenges is an overwhelming need for disparate organisations to work effectively together in partnership, for example to implement new legislation. Water needs to be managed on a catchment basis for all purposes- water supply, disposal, irrigation, land drainage, surface water, SuDs, the environment and recreation involving so many different kinds of organisations: the public and private bodies; national, regional, county and local government; statutory bodies and NGOs.

Many of these organisations have different boundaries, funding mechanisms, skill sets and organisational priorities and yet need to work effectively together to deliver change. This change is needed to meet:

- rising public expectation
- rising sea levels
- increasing water use
- increasing legislation
- increased storminess
- increasing need for food security
- together with reducing the carbon footprint

Delivering solutions is going to require individuals to increasingly exercise professional judgment: itself a challenge in today's risk averse climate.

This Conference is focusing on the changing flood and coastal risk which is only a part of the whole catchment process – we need to find new and effective ways to join up the activities of all those dealing with water in a catchment.

How Government is dealing with the challenge – FCERM policy update and Flood and Water Bill progress.

Linda Aucott

Surface water drainage programme manager, Defra Flood Management, Ergon House, Horseferry Rd, London, SW1P 2AL

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Since 1998 a series of serious floods have concentrated thinking on developing new approaches for dealing with flooding across England. The Governments Making Space for water strategy began to set a new direction for managing all types of flood risk. The events of 2007 consolidated the need for urgent action and recommendations in Sir Michael Pitts review lead to the current proposals in the Floods and Water Bill which was laid before Parliament in November 2009. Current policy development is working concurrently across a number of areas including:

- Progressing the Floods and Water Bill through both houses of in order to get essential early legislation in place to set the framework for change.
- Implementing Pitt recommendations where possible in advance of legislation and facilitating early action and developing new approaches, including
 - improving the national capacity for forecasting and disseminating extreme weather
 - the development of a first generation of surface water flood susceptibility maps,
 - local authorities trialing new guidance for surface water management plans,
 - assessing the skills and capacity requirements of local authorities and others identified with new roles in the future.
 - Developing and testing approaches to resilience and adaptation.
- Looking forward at further new legislative requirements and opportunities to consolidate floods and water legislation together with the new Floods Regulations 2009 for the long term.
- Looking at a short to medium term implementation programme for new legislation and policy from mid 2010 including the development of regulations, guidance and funding streams to enable organizations involved to bring these into their business plans and everyday work.
- Supporting the development of research frameworks that will inform the new areas of policy development and work on the ground where better understanding is urgently required.

Developing integrated strategies for FCERM data, modelling and mapping to take us forward

Dr Kate Marks

Head of Mapping and Modelling, Flood and Coastal Risk Management,
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The recent floods in Cumbria have once again demonstrated the importance of having the right risk information when planning for, and responding to, a flood. Good quality risk information, using appropriate data, modelling and mapping, continues to be the foundation of our assessment of risk for flood and coastal erosion management (FCRM), underpinning both our, our partners' and communities decisions on the future.

The next five years will see changes in the current approach to data, modelling and mapping by all involved in FCRM, driven by recent floods, changing expectations, the Flood and Water Management Bill, and the Flood Risk Regulations (2009). The Environment Agency has recently published its five year Corporate Strategy and supporting FCRM Strategy, with a key aim that "we, our professional partners, and the public, will have a greater understanding of flood and coastal erosion risk."

We are currently finalising the FCRM Risk Information Strategies covering Data, Modelling and Mapping. These will support the delivery of both the strategies and the forthcoming legislative requirements. An extensive consultation took place in 2009 and will inform the final documents and delivery plans.

The Cumbria Floods 2009

Ian Payne

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Between Wednesday 18th November and Friday 20th November up to 372mm of rain fell over Cumbria. In the 24 hours ending 00:45 on Friday 20th 314mm of rain fell in Seathwaite. This is a record daily rainfall for the UK.

The presentation will give an overview of the resultant flood event in the Derwent and Cocker river catchments, its impact on infrastructure and communities and the challenges facing recovery in both urban centres and rural communities.

From Flooding to Partnerships

Steve Jorden

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Website: <http://www.wychavon.gov.uk>

Wychavon has experienced flooding before and for the last ten years has had its own Capital Flood Alleviation programme delivering vital improvement works to our most vulnerable villages. Badly hit in Easter 1998, the floods of July 2007 surpassed all previous experiences and set new challenges for responding to flooding incidents.

In meeting these challenges our primary focus was to collect accurate data, essential in identifying problems and potential solutions.

Wychavon District Council quickly realised that such was the nature and extent of flooding that no single agency had overall responsibility and that to make a real difference a partnership approach was needed. Representatives from the Environmental Agency, County Council Highways and Severn Trent Water were brought together to agree the methodology and commit to action.

Using local District Councillors and sending questionnaires to affected householders, good data was collected on the nature, extent and source of the flooding. Many sent in photographs and video clips to highlight what happened.

OS maps were used to capture such information as numbers of properties flooded, to what depth and where the water came from i.e. main river, watercourse, road, adjacent land etc. From this information Flood Data Sheets were produced. These Flood Data Sheets identified what the issues were which agency would be best placed to deal with those issues and helped determine priorities.

Flood Data Sheets and accompanying maps were produced for each of our 93 Parishes and sent to the relevant Parish Council for validation, many included public meetings to share knowledge/experiences.

These Flood Data Sheets formed what became early versions of Surface Water Management Plans which identify the works needed to reduce flood risk from all sources. To support these plans Parish Councils have been encouraged to appoint Flood Wardens and Parish Lengthsman whose role is to monitor vulnerable watercourses, road gulley's and village natural drainage systems, reporting to an engineering team any blockages or problems.

In addition Wychavon has used EU money to establish a Parish Grant Scheme whereby Parish Councils can bid for pump priming money to undertake improvement works in their own area. This money has also been used to support a number of bids for main river Capital Works through the Regional Flood Defence Committee.

Work is currently underway to develop Multi Agency Flood Plans which are designed to inform an emergency response during flooding incidents. These plans identify vulnerable households,

local infrastructure that may be critical, key transport routes and establish mechanisms for early warning.

Shortly after the 2007 floods a Worcestershire Land Drainage Group was established and tasked with identifying and coordinating land drainage issues including developing a consistent approach to land drainage enforcement.

Membership of the group includes all those agencies with responsibility for or an interest in flood risk management, including Internal Drainage Boards, NFU and key local land owners.

With the introduction of the Draft Flood and Water Management Bill the final piece of the jigsaw has now been put in place by creating a countywide Strategic Coordinating Group responsible for managing flood risk within Worcestershire. This strategic group has political representation via local members as well as representation from all District Councils, including planning, the County Council, Environment Agency and Severn Trent Water.

Their current focus is on using GIS to capture flood risk data and plot against critical infrastructure, main transport routes and assets. This will then be used to develop a flood risk management strategy for the county.

Medmerry – Achieving win-win for communities and habitats through working with natural processes

Joe Pearce

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Website: <http://www.environment-agency.gov.uk/medmerry>

Medmerry lies on the western side of the coastal peninsula south of Chichester in West Sussex. The existing 4km shingle embankment defence requires constant maintenance each winter, but is still overtopped or breached regularly flooding neighbouring farmland and holiday parks. Maintaining effective defences becomes increasingly difficult as sea levels rise. If the defences fail, the only road into Selsey would flood isolating the town's 10,000 inhabitants. The Environment Agency has worked together with Arun and Chichester District Councils to investigate options for managing coastal flood and erosion risks in the recently completed Pagham to East Head Coastal Defence Strategy.

Medmerry is at the eastern edge of the Solent, an area important for wildlife and natural habitats. Over 45,000 properties are at risk of tidal flooding in the Solent and Isle of Wight. In protecting these properties from flood risk by 'holding the line' we allow coastal squeeze which will damage the internationally important habitats. In order to undertake schemes in the Solent we must therefore compensate for this habitat loss. Current estimates are that 600ha of intertidal habitat will be required to compensate for losses over the next 100 years.

Managed realignment is the preferred option for managing coastal flood risk at Medmerry. New embankments will be built up to 2km inland from the current coastline and a tidal inlet formed. The realignment has a number of advantages. It will provide:

- improved protection against coastal flooding for land, properties and infrastructure throughout the next 100 years;
- new intertidal habitat that can provide compensation for other schemes and contribute towards habitat creation targets; and
- opportunities to work with together with existing interests. The scheme can incorporate working together with private coastal defences which have been proposed for the coastline neighbouring the realignment area. Part of the area is already owned by RSPB who are involved in helping shape the scheme bringing experience of managing sites elsewhere for people and for wildlife.

The realignment is a major change for the area. Effective engagement has been essential in explaining the proposals among local communities and has enabled them to explore the possible opportunities the scheme can offer.

Real examples of retrofitting sustainable water management systems

John Blanksby

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Content

Retrofitting of surface water management measures is normally required as an adoptive response to current shortcomings or future need. Measures taken may form part of a redevelopment opportunity within an urban area or alternatively be introduced within the existing landscape. Issues relating to cost and, maintenance and operation are just as important as for measures introduced into green field sites.

The presentation explores some of the main causes of surface water flooding within urban areas to help identify the types of measures that may be appropriate. It also considers how use of public realm land can facilitate the retrofitting of surface water management measures.

The presentation uses examples of retrofitting within the UK and from overseas to show how opportunities can be exploited to help manage flood risk and also contribute to pollution abatement.

The examples include measures taken to reduce the impact of:

- runoff from urban green space resulting from long duration moderate to heavy rainfall,
- runoff from impermeable areas as a result of short duration intense rainfall and
- measures taken to improve the management of the connectivity between the surface and sub surface drainage assets

Building Resilience into our Coastal Heritage

Hamish Hall

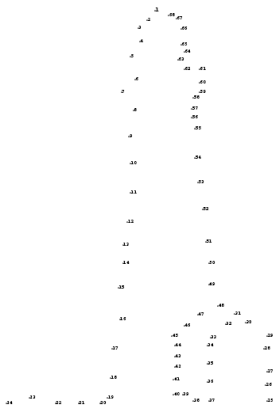
Coastal & Rivers Development Director, Royal Haskoning, Stratus House, Emperor Way, Exeter, EX1 3QS

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It is generally accepted that our coast is under increasing pressure from both erosion and flooding. The ongoing Shoreline Management Plan reviews have highlighted people's understandable desire to protect our shoreline from these hazards.

People's views, however, of our coast's heritage, amenity, economic and environmental worth will vary from person to person, which means deciding on the future management of our coasts is very often complicated. With scarce funding we are faced with greater challenges to manage or protect our coast.

The presentation shows a number of current dilemmas and potential solutions aimed at protecting or managing our heritage. These are presented in the context of what is being protected, whether it should it be protected and sustainability. Consideration is given to future pressures on funding and to changing people's views on the management of their coast.



During a spare moment today, feel free to complete the dots, colour in and suggest what you would do with this listed structure, on an eroding and highly mobile shingle ridge which is only a few years, possibly months away from falling into the sea.

Submit your answers to the Royal Haskoning stand and we will compile a list of answers. Awards for the sensible, innovative and silly to be judged by Trinity House

Weston – Using Flood and coastal risk information within development planning

Rachel Lewis

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Weston-super-Mare is located on low lying land adjacent to the Severn Estuary coast. The town is at risk of flooding from both the sea and also from the rhynes and other surface water courses draining the town and its hinterland. There are significant areas within the town boundaries that are within flood zones 2 and 3 of the EA's Flood Map.

Weston-super-Mare is identified in the Regional Spatial Strategy (RSS) as one of the 'Strategically Significant Cities and Towns' within the South West meaning that it will play a critical role in delivering development and in particular employment led regeneration in the period to 2026. The draft RSS allocates 12,000 new homes and provision for 10,000 new jobs including 34ha of employment land. Implementing this scale of development will be a challenge for the town.

The Council has commissioned flood risk assessments to identify in detail, the areas at risk and the mitigation measures that would need to be put in place to both protect existing property and to enable future development.

Over £30m is currently being invested in upgrading the sea defences to the required 1:200 year standard. a residual risk map to be agreed with the EA will enable the vast majority of the zone 3 areas to be treated as zone 2 in future. The completed SFRA and more detailed substudies will be used to guide the implementation of new housing and employment areas.

Delivering a multi-objective strategy for the Humber Estuary through multiple funding sources

John Pygott

Project Manager, National Capital Programme Management Service, Environment Agency,
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Since the mid 1990s the Environment Agency has been working to produce a flood risk management strategy for the Humber Estuary where more than 400000 people live and work below the highest tide levels. Improvement works arising from the strategy have included a combination of both traditional flood risk management capital schemes and a series of managed realignments. The realignment schemes are primarily designed to provide new intertidal habitat to replace losses occurring as a result of sea level rise. However the Agency has worked closely with a range of partners to develop these habitat replacement schemes to deliver multiple objectives including access and recreation, agricultural diversification and rural business development, education and green tourism. Developing projects with a wide range of objectives has enabled partners to access a wider range of funding opportunities than would normally be available to individual organisations and has resulted in some exciting and innovative schemes.

How do we create sustainable communities into the future

Peter Bide

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Managing flood risk isn't just about defences. By looking at the bigger picture there are opportunities to reduce flood risk across whole communities and achieve multiple benefits.

Planning Policy Statement (PPS) 25, Development and flood risk promotes strategic consideration of flood risk at all stages of the planning process, to locate development away from flood risk whenever possible. PPS25 says that planners should use opportunities offered by new development to reduce the causes and impacts of flooding by improving the management of flood water to reduce risk to communities.

Positive strategic planning can achieve multiple benefits: reducing flood risk; enhancing the public realm; and encouraging biodiversity.

Creating sustainable drainage systems (SUDS) such as swales and retention ponds manages water at source to lower flood risk downstream whilst also providing pleasant open space to enhance the amenity of an area and encouraging biodiversity.

Open spaces, the connections between them and layout of roads and paths that are designed to transmit floodwater safely as part of a Surface Water Management Plan can play a major part in reducing flood risk.

We can make space for floodwater by using land for flood storage in the floodplain. This open space can be used for recreation when not holding floodwater and can support a variety of different habitats for wildlife.

Working with natural processes under increasing environmental risk

Duncan Huggett & Wendy Brooks

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It is now widely accepted that flood risk cannot simply be managed by building ever bigger and taller 'hard' flood defences. More sustainable 'softer' approaches must be considered. This is reflected in Government's strategy for flood and coastal risk management – Making Space for Water – which says that the concept of sustainable development must be firmly rooted in all flood risk management and coastal erosion decisions and operations. This will manifest itself on the ground in the form of more flood and coastal erosion solutions working with natural processes. More space will be made for water in the environment through, for example, appropriate use of realignment to widen river corridors and areas of inter-tidal habitat, and of multi-functional wetlands that provide wildlife and recreational resource and reduce coastal squeeze on habitats like saltmarsh¹.

The Pitt Report: Learning Lessons from the 2007 floods was published in June 2008. It recommended that Defra, the Environment Agency and Natural England should work with partners to establish a programme through Catchment Flood Management Plans and Shoreline Management Plans to achieve greater working with natural processes². Pitt recognised that working more with natural processes does not mean more traditional, hard defences will not be needed, but that more sustainable approaches should work alongside them. The approach should complement and extend the life of traditional defences³. Working more with natural processes should also realise a wide range of other benefits, from creating new habitats and enhancing biodiversity to providing large expanses of green space for recreation and amenity.

In response to Pitt's recommendation, the Environment Agency established a 'Working with Natural Processes' working group which included representatives from Natural England, the Countryside Council for Wales, environmental NGOs and landowner representatives. One of the first tasks was to define what we mean by 'working with natural processes':

Working with natural processes means taking action to manage flood and coastal erosion risk by protecting, restoring and emulating the natural regulating function of catchments, rivers, floodplains and coasts.

Pitt recognised that natural processes operate across a continuum of flood risk management measures from mitigated engineering to full naturalisation with flood-risk management benefits.

¹ See vision in Making space for water - Taking forward a new Government strategy for flood and coastal erosion risk management in England - First Government response to the autumn 2004 Making space for water consultation exercise. Defra, March 2005

² Recommendation 27 of the Pitt Review: Lessons learned from the 2007 floods (June 2008)

³ See paragraph 7.101 of the Pitt Review: Lessons learned from the 2007 floods (June 2008)

Table 1 demonstrates the range of options and how they relate to natural processes and floodplain connectivity.

Hard engineering	Mitigated hard engineering	Soft engineering/ restoration	Natural Flood-risk Management	
Example interventions				
Flood walls, pump drainage, dry washlands	Green roofs, permeable paving,	Wet washlands, balancing ponds, regulated tidal exchange, swales	Managed re- alignment, upland grip blocking, re- meandering	Natural floodplain/coastal zone (minimal intervention)
Example outcomes				
<i>Floodplain disconnected from channel/sea, except in exceptional circumstances</i>	<i>Floodplain connected with channel/sea with high degree of control</i>	<i>Floodplain connected with channel/sea with high degree of freedom</i>		

Table 1: A conceptual model of “working with natural processes

The Flood and water Management Bill currently before Parliament formalises the working with natural processes approach by referring to it as an example of something that might be done in the course of flood or coastal erosion risk management (cf maintaining or restoring natural processes⁴). This reflects obligations arising from the EU Floods Directive to take account of flood plains as natural retention area, the need for flood risk management plans to address non-structural initiatives and the promotion of sustainable land use practices⁵.

Of course, this is all well and good as a philosophical debate, but what does it mean in practice for FCRM? The working group commissioned work to identify what FCRM working with natural processes means (see table 2) and to provide real examples of this in practice. The example of Sinderland Brook is given. More examples will be explored at the meeting.

⁴ Clause 3(3)(b) of Flood and Water Management Bill, second reading version

⁵ See Articles 4(2)(b), 7(2) & 7(3) of Directive 2007/60/EC of 23 October 2007 on the assessment and management of flood risks

Table 2: Techniques for working with natural processes to manage flood and erosion risk illustrated in the guidance manual		
Technique name	Catchment location	Technique description
Land and soil management activities to retain / delay surface flows	Upper / middle	Field scale activities include; reducing stocking densities, moving gates and water troughs, planting cover crops, contour ploughing, maintaining soil quality.
Moorland grip blocking to slow run-off rate	Upper	Blocking previously dug drainage ditches ("grips") to allow peat bogs to re-wet.
Creation or re-instatement of a ditch network to promote infiltration (swales, interception ditches, etc)	Middle / lower / urban	Maintained road and track-side ditches to intercept overland flow and detain field and road drainage.
Floodplain reconnection	Middle / lower	Removed or lowered river embankments or new spillways to reconnect river channel to floodplain.
Selective bed raising / riffle creation	Middle	Technique used to repair damage from over dredging. Mimics a natural process to the extent that it aligns with the river's natural sedimentation cycle.
Washlands	Middle / lower	An area of floodplain that is allowed to flood or deliberately flooded for flood management purposes. (cf. Flood storage areas and wetlands).
Wetlands	Middle / lower	Permanently wet areas where water levels are managed to allow some additional flood storage and high flow detention.
On-line flood storage areas	Middle / lower	Engineered flood storage typically involving use of a flood storage embankment and flow control structure to detain out of channel flows and control downstream flow volumes.
Off-line flood storage areas	Middle / lower	Pond, backwater or off-line bypass channel providing a below surface level flood storage connected to the river by a low bund or overflow pipe allowing the storage to fill during times of high flow and empty through evaporation or seepage or designed drainage back to the main river. Design can allow for a minimum retained water level within the storage area.
Two-stage channels (river narrowing)	Lower	Techniques to build additional high flow capacity into a river channel by creating a low flow (narrow) channel and a wider (upper) channel.
Re-meandering straightened rivers	Middle / lower	Reintroduction of river meanders to delay downstream time to peak.

Coastal managed realignment	Coastal	The deliberate breaching or removal of existing seawalls, embankments or dykes in order to allow the waters of adjacent coasts or estuaries to inundate the land behind.
Regulated tidal exchange	Coastal	Regulated tidal exchange (RTE) is the management of existing coastal defences to permit the inflow and outflow of a controlled volume of tidal waters behind a maintained defence. It can be used to raise the elevation of terrestrial habitats as a precursor to managed realignment.
Coastal erosion to promote sediment supply	Coastal	Permitting – or indeed encouraging – coastal erosion in some areas in order to supplement sediment supply for the benefit of coastal frontages elsewhere.
Removal of coastal structures impeding long shore drift	Coastal	Man-made features such as groynes, bastions, outflow pipes, river training walls, quays and harbour walls may act as impediments to longshore sediment drift and promote sediment starvation downdrift in dynamic coastal areas dominated by coastal sediment movement. Their removal or modification may allow natural longshore sediment movement to reassert itself.
Manage natural coastal defence features	coastal	Natural features such as saltmarsh, sand dunes, shingle ridges and foreshores dissipate wave energy and act to restrict tidal incursion. Activities to promote these functions include saltmarsh regeneration, beach recharge, and dune and shingle ridge naturalisation.
Permeable surfacing	Urban	Increased areas of impermeable surfacing affect both the volume and rate of (urban) surface water run-off. Permeable paving reduces run-off rates and increases infiltration. See also green roofs / green walls.
Green roofs / green walls	Urban	Provision of vegetated surface covering (roofs, walls) on impermeable building surfaces in order to intercept rainfall and reduce or slow surface water run-off.
Surface water attenuation ponds	Urban	Manufactured water storage areas designed to detain surface water run-off from roads, housing estates etc. Design may involve a retained water level and will include some control on discharge to an adjacent watercourse.
Woody debris dams on streams and tributaries	Upper / middle	Naturally occurring or induced in-channel dams of woody debris and vegetation.
Field drain blocking, ditch blocking	Middle / lower	Deliberate blocking or impeding the flow of water along field drains and field ditches to raise water levels and increase field storage / detention potential.
Land use changes – arable reversion	Upper / middle / lower	Reversion of arable fields (or part fields (buffer strips)) to pasture to improve soil infiltration rates and reduce surface run-off.

Flood woodland, forestation	plain re-	Upper / middle / lower	Creating or re-instating floodplain woodland to intercept out of channel flows and encourage infiltration.
(Cessation of) in-channel vegetation management		Middle / lower	Alteration of channel vegetation maintenance regime to selectively promote in-channel vegetation growth.
Removal of in-channel constrictions		Urban	Deliberate removal of artificial constrictions to flow and natural hydromorphology. Could include de-culverting, removal of redundant bridge supports or service pipework.

Case study: Sinderland Brook, Altrincham, Cheshire

Techniques demonstrated

- Floodplain reconnection
- Re-meandering
- Riffle creation (secondary benefit)

The problem

Sinderland Brook near Broadheath, Altrincham, was channelised in the late 1960s by the local water authority. This resulted in increased flood risk during heavy rainfall events due to the brook’s rapid response to upstream runoff from Altrincham. In the late 1990s a proposal was put forward by the landowner, National Trust, to create a flagship sustainable residential development, which integrates with the surrounding environment. This included the proposal to restore the brook and its floodplain to reduce the risk of flooding to a nearby housing estate and a newly proposed housing development by Redrow Homes and Bryant Homes.

Objective

One of the main objectives of the restoration work was to transform the existing channelised watercourse to a diverse meandering river and extend its floodplain and thus reduce flood risk to a nearby housing estate and a newly proposed housing development.

Project description

The project restored approximately 1.8km of the Sinderland Brook corridor from a heavily canalised and toe-boarded watercourse into a diverse, natural and complex river system. This involved re-meandering the brook and the creation of a new wide floodplain which provides significant flood protection benefits. The newly constructed brook is between 30-50% narrower than the old channelised brook, and this encourages more frequent inundation of the new floodplain, offering flood risk benefits to downstream areas. No bank protection work was undertaken along the length of the restored reach, allowing the river to freely adjust its planform and thus be sustainable in the long-term. Intervention will only occur if erosion threatens the limits of the extended floodplain or serious instability is identified.

Project success and lessons

The construction of the new floodplain has provided an increase in floodplain storage area that will cause a reduction in the flood pulse delivered to the downstream brook. A hydrological monitoring programme is currently being undertaken by Haycock Associates. The project has reduced the flood risk to a neighbouring housing development from a 1 in 35 year flood risk to 1

in 75 years, contributing to Defra's *Making Space for Water* programme. The flood alleviation work will also provide a high level of protection for the new housing development.



*Sinderland Brook during works
(photo courtesy of Environment Agency)*



Sinderland Brook after the flood alleviation works, showing the meandering channel re-connected to its floodplain

Other benefits

The restoration of Sinderland Brook has created an attractive and enhanced environment with diverse native habitats for wildlife. The restoration work has also provided significant aesthetic and recreational benefits for the local public, and the next phase of the development will involve the creation of footpaths and community woodland.

Additional information

- Project Location: Altrincham, Cheshire
- Water Body: Sinderland Brook
- Grid Reference: SJ 760 903
- Associated Partners: National Trust (lead partner), Haycock Associates (river restoration design and advisors to the National Trust), Bryant Homes, Redrow Homes
- Cost: £3.9 million
- Further information:
 - The River Restoration Centre: <http://www.therrc.co.uk/newsletters/issue20.pdf>
 - Haycock Associates: (<http://www.haycock-associates.co.uk/home.html>)
 - The Waterways Trust: <http://www.thewaterwaystrust.org.uk/newsfile/index.shtml?item=20080319.113914>

How will strategy and scheme appraisals have to change to embrace future challenges

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We must ensure we get the most out of our investments to manage flood and coastal erosion risk. This not only means being efficient in our decision-making and investments but achieving better social and environmental outcomes as part of sustainable development.

We must better understand local needs and cover a broader range of issues, guided by national drivers. This includes identifying and working with others and where possible integrating our investments and solutions with those of others to deliver greater efficiencies and wider benefits for communities. We need to manage uncertainties and future changes like climate change present challenges to effective decision-making today and the management of our activities going forward.

The future will require innovative, adaptive and integrated risk management solutions that meet social environmental and economic objectives together; this is set out clearly in the Defra Policy Statement on Appraisal (June 2009). Our strategy and scheme appraisals are a primary vehicle for how these solutions will be identified and justified. The Environment Agency is publishing the new FCERM Appraisal Guidance (FCERM-AG), replacing the current Defra Project Appraisal Guidance (PAG), that will support practitioners, through the appraisal process, to achieve Defra's new policy.

In the future, appraisals will not just set out the flooding or erosion problems in a location but more often express these within a wider context of possible problems, opportunities and needs of a community. The new Guidance uses best practice to promote better and more timely engagement with communities and other stakeholders to improve awareness, understanding and ownership and to enable more informed objectives to be identified to steer the appraisal process. These are essential to the appraisal if it is to identify more innovative solutions and across a wider portfolio of measures to manage risks (both probability and consequences). In addition we need to identify solutions that achieve better outcomes perhaps by working with natural processes, enhancing the environment or integrating possible solutions with the proposals of others to support economic growth. More tools are provided in the Guidance to support the impact assessment exercise so that more intangible impacts such as upon the landscape, community cohesion, health and the natural environment can be more readily included in the appraisal. It should show who benefits most from investments, using Appraisal Summary Tables to disaggregate impacts and beneficiaries, and thereby help practitioners to secure more partnerships and alternative sources of funding through which we can deliver more from our limited resources and in a fair and transparent manner.

Building upon the hierarchy of appraisal established under the Defra PAG, some schemes will be expected to minimise the appraisal effort required to make informed investment decisions delivering particularly smaller more simple projects quicker and for less. The FCERM-AG provides the information and arrangements for identifying when these cost effective opportunities may apply.

Development of the FCERM_AG has drawn upon the success of the Defra PAG, research and development for new appraisal techniques, best practices from past appraisals and feedback from individuals and organisations across our sector. Its use will enable us to more consistently deliver a higher standard of appraisal and ensure that the decisions we make are in line with policy are better suited to the challenges of the future.

The new FCERM Appraisal Guidance will be available for download from the Environment Agency website in January 2010. Operating Authorities, organisations and individual across the flood and coastal erosion risk management sector will be notified of its launch and arrangements for its introduction. It is being launched as a 'living draft' and feedback is invited on its use until July 31st 2010 after which time the final document will be published.