

# UK and Ireland natural flood management practitioner workshop





**Published by CREW** – Scotland’s Centre of Expertise for Waters. CREW connects research and policy, delivering objective and robust research and expert opinion to support the development and implementation of water policy in Scotland. CREW is a partnership between the James Hutton Institute and all Scottish Higher Education Institutes supported by MASTS. The Centre is funded by the Scottish Government.

This document was produced by:

Kirsty L. Holstead and Mark Wilkinson,

James Hutton Institute,

Craigiebuckler,

Aberdeen

AB15 8QH.

**Please reference this report as follows:** Holstead, K.L and Wilkinson, M, (2013), UK and Ireland natural flood management practitioners workshop, CD2012/23. Available at [www.crew.ac.uk/publications](http://www.crew.ac.uk/publications)

**Dissemination status:** Unrestricted

All rights reserved. No part of this publication may be reproduced, modified or stored in a retrieval system without the prior written permission of CREW management. While every effort is made to ensure that the information given here is accurate, no legal responsibility is accepted for any errors, omissions or misleading statements. All statements, views and opinions expressed in this paper are attributable to the author(s) who contribute to the activities of CREW and do not necessarily represent those of the host institutions or funders.

Cover photograph courtesy of: Mark Wilkinson (Belford catchment, Northumberland offline storage pond in action during a flood)





## Contents

<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
<b>1. INTRODUCTION .....</b>	<b>2</b>
<b>2. WORKSHOP FINDINGS .....</b>	<b>3</b>
2.1 <i>Reflections on NFM .....</i>	<i>3</i>
2.1.1 <i>What works?.....</i>	<i>3</i>
2.1.2 <i>What does not work?.....</i>	<i>4</i>
2.2 <i>Land owner/manager engagement .....</i>	<i>5</i>
2.3 <i>Top 10 most important tips for NFM implementation .....</i>	<i>6</i>
<b>3. CONCLUSIONS .....</b>	<b>7</b>
<b>4. APPENDICES .....</b>	<b>8</b>
<i>Appendix I: List of Participants .....</i>	<i>8</i>
<i>Appendix II: Presentation Summaries .....</i>	<i>9</i>
<i>Appendix III: Agenda .....</i>	<i>11</i>

# Executive Summary

## Background to research

There are numerous Natural Flood Management (NFM) and multifunctional catchment projects occurring around the UK and Ireland. All of these projects have differences, however, they are all aiming for a common goal: to reduce flood risk and accrue other multiple benefits. A UK and Ireland practitioners workshop was held on 19<sup>th</sup> February 2013 in Edinburgh to a) share knowledge and experience of the practical aspects of implementing NFM, b) connect researchers and practitioners and enable the better sharing of evidence, c) avoid duplication of effort in developing NFM, d) learn about private, public and other sources of funding for NFM implementation and e) identify NFM sticking points and suggest solutions. A total of 33 delegates from 26 institutions/groups were invited and attended the workshop. All had a strong background in the practical implementation of NFM. The workshop responded to a key need to share information between NFM projects and to understand whether there are lessons that can be learnt, particularly in practical implementation, from those with extensive experience in the field.

## Key findings and recommendations

### What works?

Workshop delegates referred to nearly all the NFM measures available. However, participants agreed that some measures only work in the right place (or work best in the right places). This exercise also highlighted the use of different terminology for the same measure. For example, field bunds are very similar to earth bunds and flood storage ponds.

### What does not work?

Participants noted a number of aspects of NFM which they considered to not work including: NFM measures in high energy river systems, NFM in SSSI/SAC, top-down approach to land owner, complete land use change, insufficient maintenance, possible flood peak synchronisation from sub-catchments, funding streams not working together, potential conflict with the Reservoir Act (e.g. some problem encountered in Pickering, England which increased construction costs), top down policy and small scale measures in large river systems.

### Top 10 most important tips for NFM:

1. Good community engagement strategy (within this, the integration of local knowledge)
2. Joined up funding mechanisms for NFM (it also helps if practitioners help land owners find funding and do paper work)
3. Demonstration features (show how NFM works in practise)
4. Share experience between practitioners to understand what is happening in other projects and what is not
5. Have the right messenger (catchment 'champion')
6. Get to know and understand the catchment and how it works (i.e. where the water comes from)
7. Over design NFM features (put lots of small NFM features in as some will get washed away)
8. Have a long-term vision (including for maintenance)
9. Local flexibility (designing NFM requires consideration of local circumstances)
10. There is a need for monitoring and access to data

## 1. INTRODUCTION

On the 19<sup>th</sup> of February, 2013 a practitioners' NFM workshop was held in Edinburgh. The main objective of the workshop was to exchange knowledge about practical aspects of NFM implementation. By gathering NFM practitioners together and people researching the impacts of NFM, key sticking points and suggested solutions could be shared to avoid duplicated resources. A total of 33 participants attended from a range of organisations including the James Hutton Institute, Scottish Government, several universities, SEPA, OPW, consultancies and rivers trusts (see participant list in Appendix I). This report captures and highlights the opinions and discussions of the delegate who attended this meeting.

The morning session consisted of presentations from NFM practitioners and researchers involved in a number of projects including: the Eddleston Water project (Chris Spray, Andrew Black and Tom Ball, University of Dundee), Holnicote Multi-Objective Flood Management (Steve Rose, JBA), ALFA project and ERT work (Lucy Butler, Eden Rivers Trust), Tweed Forum NFM projects (Luke Comins and Tracy Hall, Tweed Forum), Slowing the Flow in Pickering (Nick Odoni, Bristol University and Tom Nisbet, Forest Research) and case studies of catchment systems management from Northern England (Paul Quinn, Newcastle University). All presentations looked at land manager engagement, findings, what worked, what did not work, knowledge gaps and the future of the project. All presentations are available at <http://www.crew.ac.uk/call-down/national-nfm-workshop> (See Appendix II for a summary of presentations).

The afternoon session was focused around developing a practical, shared understanding of NFM from different national contexts (see agenda Appendix III). The findings from this session are highlighted below.



**Photo 1: Break out group in the afternoon session.**

## 2. WORKSHOP FINDINGS

### 2.1 Reflections on NFM

In order to exchange knowledge, the delegates discussed their practical experiences and research knowledge in NFM projects. The objective of the activity was to promote discussion on which aspects ‘worked’, and which did not. Firstly presentations were given which were then preceded by questions. The questions directed toward the morning speakers were broken up into four categories including issues sounding stakeholder engagement, the practicalities of implementing NFM, the science behind NFM and any other general issue. Some sample questions which were then discussed in plenary included; modelling output - what level of predictability do we require for NFM? What issues are there with regard to the risks associated with NFM in the long term? Soil aeration as an NFM feature – what’s in it for the farmer and how much does it cost?

#### 2.1.1 What works?

The second part of the workshop was to try to focus discussion on understanding specific experiences from the NFM practitioners to understand what has worked and not worked in their NFM projects. A general agreement found that NFM can be successful as a way to reduce local flood risk and realise multiple benefits when the right feature is in the right place at the right time, even though we do not yet possess all of the evidence. Because each catchment is different, there can be no ‘one-size-fits-all approach’ to implementation. However, it was possible to draw out some key attributes which have previously worked for the participants (see Table 1).

**Table 1: NFM: What works?**

<b>Aspect or NFM Feature</b>	<b>Why it works</b>
<b>Woody debris dams</b>	Provides multiple benefits, are discreet, accessible for maintenance and offer good potential for stakeholder uptake (i.e. less productive land for farmers)
<b>Tree planting</b>	Offer increased infiltration storage, are particularly good for upland, lowlands and flood plain areas. It was thought that there is a positive public perception of this NFM feature, however, not all landowners are willing to plant large areas of productive land without payments. Those who are planting trees must also consider the impact of grazers (deer/rabbits)
<b>Field bunds</b>	Seen as a good way of using low value land or using buffer strips/riparian zones, offer multiple benefits, low cost, generally have good uptake by stakeholders, can be small scale, offer minimal loss of productivity
<b>Buffer strips</b>	Offer multiple benefits and in particular can reduce diffuse source pollution through capturing fine and coarse sediments
<b>Moorland/wetland management</b>	Offer additional off-line storage, multiple benefits, increasing water storage and reduced loss of carbon
<b>SuDS (Rural)</b>	Effectively store water and offer multiple benefits
<b>Ponds</b>	Act to slow the flow, work at peak flow, avoid costly licences as feature does not work in the river system
<b>Hill slope tree planning/hedges</b>	Mimic nature, have infiltration benefits and interrupt flow paths
<b>Peatland restoration</b>	Increases surface roughness, raises local water table potential, offers carbon storage and drought resilience potential
<b>Soil management</b>	Increases soil potential to store water and offers drought benefits

Table 1 is a summary of the group findings; it is not an exhaustive list of all NFM measures that are identified in SEPA's section 20 of the Flood Risk Management (Scotland) Act 2009. What Table 1 does show is that different people have different terminology for measures which effectively are the same measure. For example, field bunds and ponds are very similar in their description and could fit under a general heading category. They are created from earth bunds, stone walls, hedgerows and wood barriers placed perpendicular to overland flow pathway or in corner of fields with the primary aim to disconnect overland flow pathways and collect surface runoff generated (as a result of saturated soils or drain surcharging). These measures drain away slowly via a pipe or leaky barrier allowing for future storage from multi-day storm events. They work with the same general philosophy, to disconnect, slow, store and filter surface runoff.

### **2.1.2 What does not work?**

In this discussion participants acknowledged that the same NFM features do not work everywhere and therefore a blanket approach is not appropriate. Rather, each feature must be engineered to respond to a specific issue. A number of other aspects, listed in the Table 2 were seen to represent issues in NFM implementation:

**Table 2: NFM: What does not work?**

<b>Aspect or NFM feature</b>	<b>Why it does not work</b>
<b>NFM measures in high energy river systems</b>	Lack of resistance and resilience of features owing to river system energy can lead to failure and possibly exacerbate problems.
<b>NFM in SSSI/SAC</b>	Regulatory framework restricts success of measures or slows down implementation.
<b>Top-down approach to land owner</b>	Difficulty of getting uptake on ground and local knowledge in NFM implementation if top down approach is applied. Always engage with all stakeholders.
<b>Complete land use change</b>	This is usually not a possibility and has been met by strong resistance by land owners and farmers. Farmers focus is mainly to produce food.
<b>Insufficient maintenance</b>	When an NFM feature is not maintained it causes uncontrolled change. It is important that NFM features are not remote so that they can be reached for maintenance.
<b>Synchronised sub-catchments</b>	There was scepticism about increasing emphasis on synchronisation of sub-catchments. Participants thought that it is useful at the theoretical level but not at a practical one in NFM implementation due to the complexity involved.
<b>Funding streams not working together</b>	There is currently little available funding for NFM implementation. Where funding is available it is sometimes conflicting with other funding streams.
<b>Same measures do not work everywhere</b>	A one size fits all approach for NFM is not possible. What works in one area of the catchment may not work in another.
<b>Reservoir Act</b>	Offline storage ponds which hold over 10,000m <sup>3</sup> of runoff can face long delays (upper limit for the Reservoirs Act) which can increase project costs. This has been seen in the Pickering catchment, England – legislation driving more engineered, larger and expensive schemes. This may not be the case in Scotland or other areas where these features may be classed as low risk and will therefore require minimal supervision under the Reservoirs Act. Always work closely with SEPA or EA development control team with large features.
<b>Top down policy</b>	NFM policy should not be dictated by government; rather it should be made bearing in mind the perceptions and knowledge of stakeholders including community groups, scientists and practitioners.
<b>Small scale measures in large river systems</b>	Small features in large scale river may suffer damage owing to the river energy at larger scales. They can be washed away and therefore require more engineering if placed in large rivers which could be expensive.

## **2.2 Land owner/manager engagement**

A number of relevant points came out of the discussions on land manager engagement, which was seen to be best practice.

Land manager engagement was seen as vital to ensuring the success of NFM at the farm level. NFM should be seen as a bottom-up process (rather than top-down) that is shaped by the land owner/manager and integrates their local knowledge. In this process, the delegates highlighted the value of a mediator or a champion who is knowledgeable both on NFM and local land management practises and therefore “talks the language”. Messages should be simple; “the simpler the message the better” as one participant noted. It was thought that an initial pilot feature(s) and demonstration(s) will help sell NFM to the local community and land managers. This demonstrates how the feature(s) work in the landscape and becomes an initial focal point.



In general the engagement process was considered to be lengthy, but necessary and rewarding. Practitioners discussed the value of respecting individual farmers' needs and concerns and that NFM project practitioners must work on developing a long term relationship with the farmer. There may be a need to provide a lot of information on what NFM actually is, what it would mean for a land owner and what role it would play in the farm business. Several practitioners believed that some land managers do not fully understand what NFM is, rather, they presume it is linked to flooding extensive parcels of land.

Some participants mentioned that they did not think that it was appropriate for an immediate discussion of financial compensation as soon as they met the landowner. Instead time should be taken to discuss plans, understand what the land owner wants from the process, their concerns, and the benefits that NFM may provide them and the community. From past experience, participants shared that when NFM practitioners knew about funding streams and could offer to do the paper work involved with accessing funding, farmers and land owners were more inclined to consider NFM as an alternative land use.

There was interest in the approach implemented by the West Country Rivers Trust where farmers bid for funding to have NFM features on their land.

### 2.3 Top 10 most important tips for NFM implementation

Participants within small groups (see photo II) were asked to come up with a short list of 10 points which they considered to be most important for implementing NFM. The most commonly cited points are listed below (in no particular order).

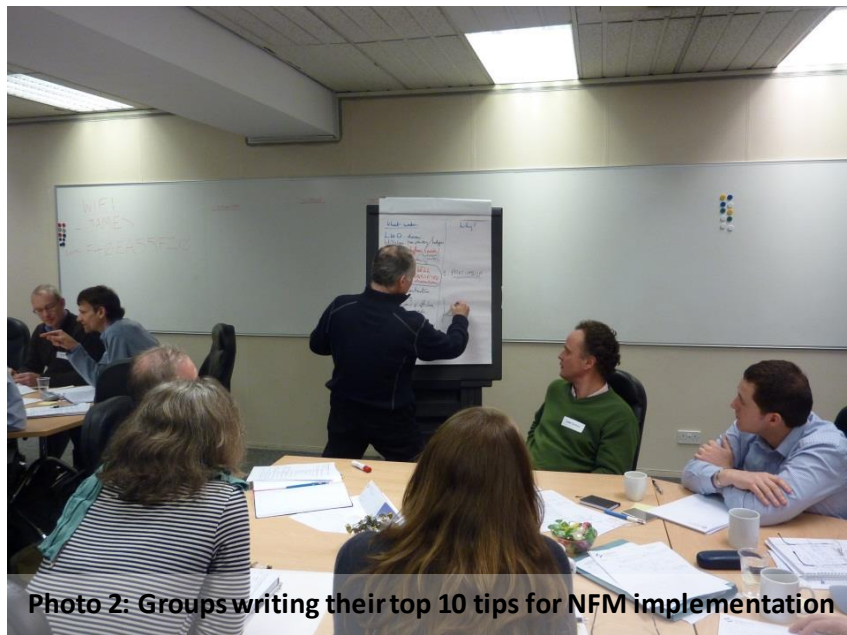
1. Good community engagement strategy (and integration of local knowledge).

2. Funding for NFM (there must be joined up funding mechanisms for NFM funding and it also helps if practitioners help land owners find funding and do paper work).

3. NFM demonstration features at full scale.

4. Share experience between practitioners to understand what is happening in other projects; good and bad experiences helps refine design criteria.

5. Have the right messenger (catchment 'champion' e.g. intermediaries such as the Tweed Forum, Rivers Trusts).



**Photo 2: Groups writing their top 10 tips for NFM implementation**

6. Get to know and understand the catchment and how it works. Which flow pathways cause flooding and how can they be targeted?
7. Many features may be needed in the design (put lots of small NFM features into the local landscape). Make sure they all contribute to flood reduction and do not panic if some features get damaged.
8. Have a long-term vision (including for maintenance).
9. Local flexibility (designing NFM requires consideration of local circumstances).
10. There is a need for monitoring and access to data. Put in place some rain gauges and water level recorders and make the data available to the stakeholders. Show that features will fill and empty in big events.

### **3. CONCLUSIONS**

This workshop was the first practical knowledge exchange NFM workshop to share experiences from all around the UK (to the knowledge of the researchers). It provided an excellent opportunity for practitioners to share views and exchange knowledge on the implementation of NFM. Many of the participants noted that they had met new people and also found out about new projects, datasets and models they were not aware of. This sharing of practical and scientific knowledge is vital, for example, for understanding the catchment scale effects of NFM on flood peaks. It was suggested that this type of event should occur more regularly. The participants noted that the development of an NFM network, where this type of event could occur more often, would be very useful and reduce resource duplication. There would be great benefit in the creation of a UK and Ireland (potentially international at a later date) NFM network to share practical experiences behind installing and maintaining NFM measures and to share evidence between sites was recommended. Participants agreed that this could either be by a newsletter, website blog, or annual meetings.

Participants had a number of questions, most were addressed at the workshop but there were some which were only lightly touched upon that pose possible areas for future research in the area of NFM research. For example:

- Would it be possible to get consent for a package of measures rather than an individual site?
- Is baseline data possible for NFM?
- What about un-gauged catchments, can we still implement NFM and target measures?
- Can catchment scale modelling show cause and effect?
- How many NFM interventions make an impact?

The creation of an NFM network will help to answer some of these long term questions by sharing experiences, data and knowledge. There is a need to continue monitoring in our established mitigated catchments to provide long term datasets and share and compare results between these catchments through comparative studies. New NFM measures are continuing to be installed as the NFM evidence base continues to be developed. Where possible, sharing experiences and collecting qualitative data (quantitative if feasible) from these new catchments will continue to help to answer these long term questions and strengthen the overall evidence base.

## 4. APPENDICES

### Appendix I: List of Participants

Name	Organisation
Mark Wilkinson (organiser)	James Hutton Institute
Kirsty Holstead (organiser)	James Hutton Institute
Luke Comins (presenter)	Tweed Forum
Peter Worrall	Penny Anderson
Nick Odoni (presenter)	Bristol University
David Hetherington	ARUP
Lindsay Beevers	Heriot Watt
Mark Adamson	OPW Ireland
Steve Rose (presenter)	JBA
Peter Kerr	Northumberland Rivers Trust
Linda Mathieson	Dee Catchment Partnership/Aberdeenshire council
Hugh Chalmers	Tweed Forum
Garry Pender	Heriot Watt/FRMRC
Roy Richardson	SEPA
Tom Nisbet (presenter)	Forest Research
Lucy Butler (presenter)	Eden Rivers Trust
Miles Marshall	CEH
Andrew Black (presenter)	Dundee University
Charlie Perfect	Stirling University
Heather Forbes	SEPA
Paul Quinn (presenter)	Newcastle University
Graham Holyoak	Tyne Rivers Trust
Tom Ball	Dundee University
Richard Bryan	Aberdeenshire council
Sarah Hutchinson	SNH
Ruth Ashton-Ward	Defra
Chris Spray (presenter)	Dundee University
Paul Atkinson	Tyne Rivers Trust
Wendy Kenyon	James Hutton Institute/CREW
Steve Addy	James Hutton Institute
Tracey Hall	Tweed Forum
Neil Nutt	Halcrow
Debi Garft	Scottish Government

## Appendix II: Presentation Summaries

Chris Spray (University of Dundee) – *Natural Flood Management – the context and challenges*

- Chris pointed out six key challenges; these are 1) the legal and policy context, 2) the science and policy needs, 3) the bio-physical science evidence base, 4) from theory to practice, 5) the resource needs and 6) the partnership needs.

Andrew Black and Tom Ball (University of Dundee) – Eddleston Water Project: introduction to research aims and monitoring.

- Aim: to assess the effectiveness of the proposed measures for restoration and NFM.
- Summary of the Eddleston Water monitoring network; 13 gauging stations, 4 rainfall sites and a weather station. Extensive borehole network.
- Modelling work completed to show synchronization of flood peaks. Measures soon to be installed.

Steve Rose (JBA) – The Holnicote multi-objective flood demonstration project

- Key findings to date include: Modelling can assist in opportunity mapping, impact assessment and development of intervention design.
- Demonstration events to show and discuss interventions do work.
- Early dialogue with stakeholders on land management or catchment interventions to collect local knowledge, identify issues and constraints. Also dialogue with relevant regulatory, planning and consenting authorities on proposed interventions is essential.

Luke Comins (Tweed Forum) – Experiences of NFM on the Tweed

- Manage expectations – explain the expected effects of works and also the intended scope and limitations.
- Be brave enough to accept when things do not go to plan and use it as a positive learning experience.
- Work closely in partnership with the landowners and integrate their knowledge.
- Importance of scale; sometimes the small things are the effective options. At other times, size does matter.
- Balance interests; look for multiple benefit projects that offer benefits for land management, farm business, environment, biodiversity, public access as well as flood management.

Lucy Butler (Eden Rivers Trust) – ALFA: Adaptive Land use for Flood Alleviation

- To protect people in North West Europe against the effects of flooding due to climate change by creating new capacity for water storage in catchments.
- Research has looked at land use management changes in the Eden catchment, Cumbria. Lots of engagement with farmers.
- Soil aeration: Soil aerator loaned out to farmers. Plot scale results show that in moderate compacted soils there was a delay in runoff peaks and soil could hold 100% more water before surface runoff begins.

Tom Nisbet (Forest Research) and Nick Odoni (Bristol University) – Slowing the flow at Pickering: Project overview.

- Siting the right measure in the right place: use of opportunity mapping and modeling to target best locations and reduce flood risk.
- Flood storage bunds: major issues with legislation driving more engineering, larger and expensive schemes.
- Installed 175 large woody debris dams and 130 heather bale dams in wooded and open channels. Observations look promising.
- Woodland creation can help but struggling to plant a sufficient area; resistance to landscape change.

Paul Quinn (Newcastle University) – A case study of catchment systems management from Northern England: using Runoff Attenuation Features (RAFs)

- Target where and when to modify flow pathways on farms; peaky high energy flows.
- It is not about storage size, it is about flow attenuation and buffering; proof they work locally.
- RAFs are acceptable to the farming community, cheap and multifunctional.
- Network of RAFs can modify the catchment system function. Modeling results show a network of 35 RAFs can reduce a large flood peak by ~30%. However, ongoing management is an issue.

## Appendix III: Agenda

Natural Flood Management workshop– 19<sup>th</sup> February 2013, 9:30-16:30

EDINBURGH TRAINING AND CONFERENCE VENUE, 16 St. Mary's Street, Edinburgh EH1 1SU Scotland

Time	Agenda item	Activity
9.30	<i>Introduction and Welcome</i>	<b>Aims: introduction to the day and a run through of how it will work</b>
9:45	<i>NFM: experiences around the UK</i>	<p><b>Aims: knowledge exchange- to share information between the English and Scottish NFM projects</b></p> <p>6 presenters present information about their NFM projects including:</p> <ol style="list-style-type: none"> <li>1) Andrew Black/Chris Spray – University of Dundee Eddleston NFM project</li> <li>2) Steve Rose– JBA Consulting Holnicote Multi-Objective Flood Management</li> <li>3) Lucy Butler – Eden Rivers Trust (ERT) ALFA project and ERT work</li> <li>4) Luke Comins – Tweed Forum Tweed Forum NFM projects</li> <li>5) Tom Nisbet – Forest Research Slowing the flow in Pickering</li> <li>6) Paul Quinn – Newcastle University Case studies of catchment systems management from Northern England</li> </ol> <p>Audience will be asked to write down questions for the presenters. The questions will be addressed after a short break.</p>
11.15	<i>Teas and coffees</i>	Short break
11.30-12:15	<i>Question time</i>	<p><b>Aims: to answer questions arising from the presentations</b></p> <p>Presenters answer questions from audience</p>
12:15-1.00	<i>Lunch</i>	Networking lunch
1:00-2:30	<i>Key issues in delivering NFM</i>	<p><b>Aim: problem solving - to work as groups to work out key problems in NFM and exchange knowledge</b></p> <p>Small groups will work to address challenges in NFM and feed back to plenary</p>
2.30-2.45	<i>Tea break</i>	Short break
2.45 -3.45	<i>Finance and land manager engagement</i>	<p><b>Aim: to work as groups to think about land manager engagement and funding</b></p> <p>Participants are invited to consider a scenario related to engagement and future funding</p>
3.45-4.15	<i>The future of NFM</i>	<p><b>Aim: to work as groups to consider the future of NFM and research gaps</b></p> <p>Participants to identify research gaps and how NFM can progress in the future</p>
16:15 - 16.30	<i>Thanks and close</i>	<p><b>Aim: thanks for participating and answer any last questions.</b></p> <p>Wrap up and close</p>

**CREW Facilitation Team**

**James Hutton Institute**

**Craigiebuckler**

**Aberdeen AB15 8QH**

**Scotland UK**

**Tel: +44 (0) 844 928 5428**

**Email: [enquiries@crew.ac.uk](mailto:enquiries@crew.ac.uk)**

**[www.crew.ac.uk](http://www.crew.ac.uk)**

