

Getting the most for nature based flood and coastal risk reduction from ELMs – How might it work? Some thoughts & ideas (Not policy)

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Management (Nature based solutions)
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Topics to cover.

- Links to FCRM policy (National Strategy & Policy Statement)
- Evidence base for effective NbS?
- Types of Actions to implement in ELM?
- How to determine spatial priorities?
- Measuring effectiveness and payments
- What advice & guidance might be needed for FCRM?
- Blended funding. How will ELM work with FGIA & Local levy?
- Lessons from existing projects?

Future Farming and Countryside Policy

- Opportunity to address multiple environmental impacts and perverse outcomes of CAP.
- Transition away from BPS to payment for public goods
- New regulatory culture
- Payment for provision of public goods:
- Potentially £2.4bn p.a. available
- New policy statements Jan 2020

National FCERM Strategy

- Mainstreaming Nature Based Solutions (NFM)
- Landowners and farmers working with RMAs to reduce risk
- Future adaptation for low lying farmlands
- Development and implementation of ELMs to reduce flood risk
- Net Biodiversity Gain
- Nature Recovery & RBMP

Evidence for reducing “risk” using NbS

“Slow the Flow”:

Low magnitude / high frequency events

Muddy and surface flow flood events

Smaller operational catchments (< 100km²)

High Synergy with WQ, groundwater recharge, Nature Recovery

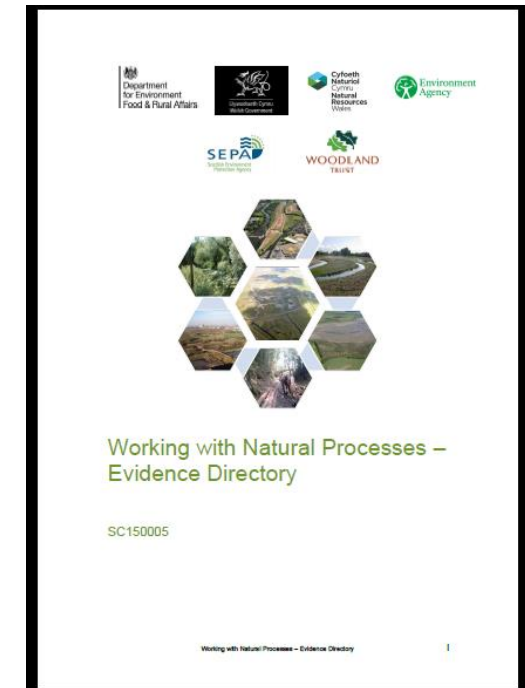
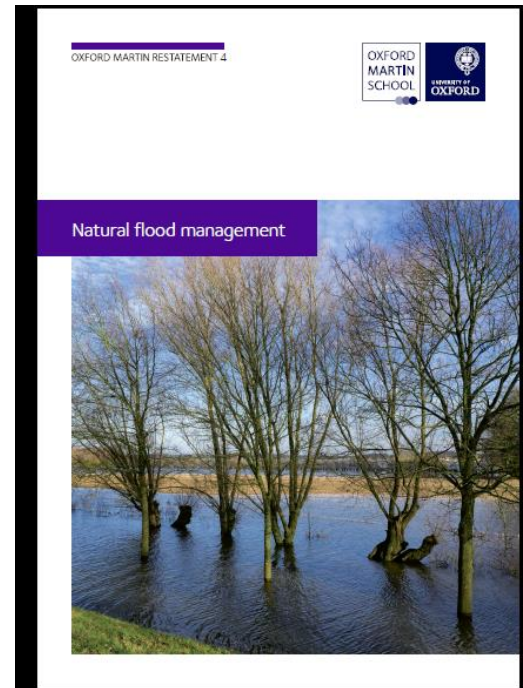
“Floodplain Restoration & Storage”:

Higher magnitude events

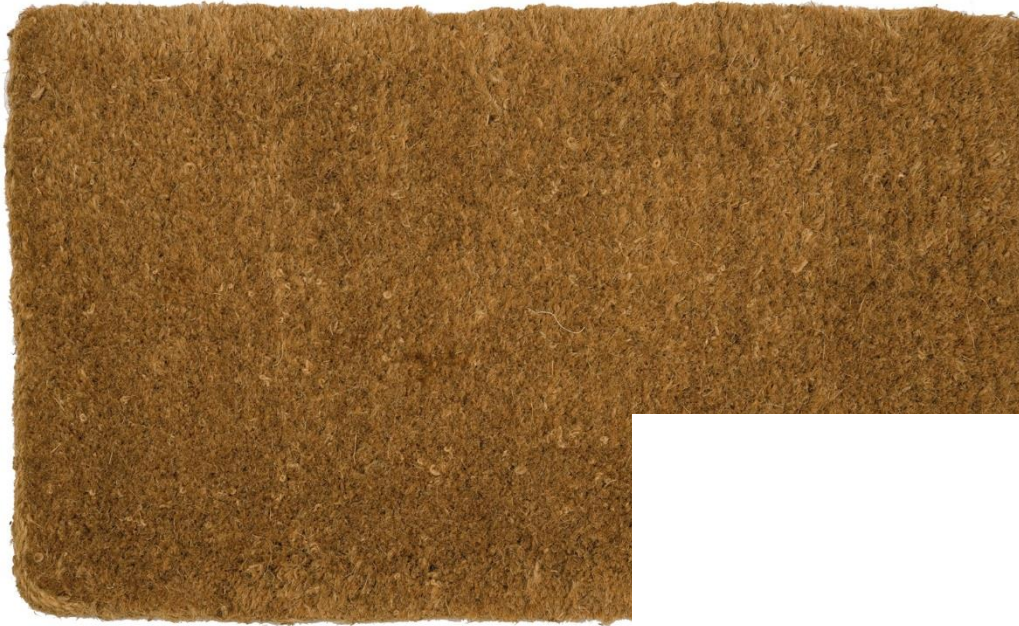
Larger catchments & populations

Coastal Erosion & flooding - Yes

Water Level management - Yes



How does NFM influence hydrology and flows?



(A) Landscape scale land use change to create or restore habitats to increase roughness, infiltration and evapotranspiration
BUT do not require engineering
e.g. Tree planting, rewilding & peatland restoration projects





(B) Changes to farming practice and land management e.g. soil/livestock/crop & land management to increase infiltration and reduce erosion.



REGENERATIVE AGRICULTURE SHIFTS THE PARADIGM

Compete with Nature

Disturb Soil

Monoculture

Reductionist



Partner with Nature



Protect Soil



Diversity

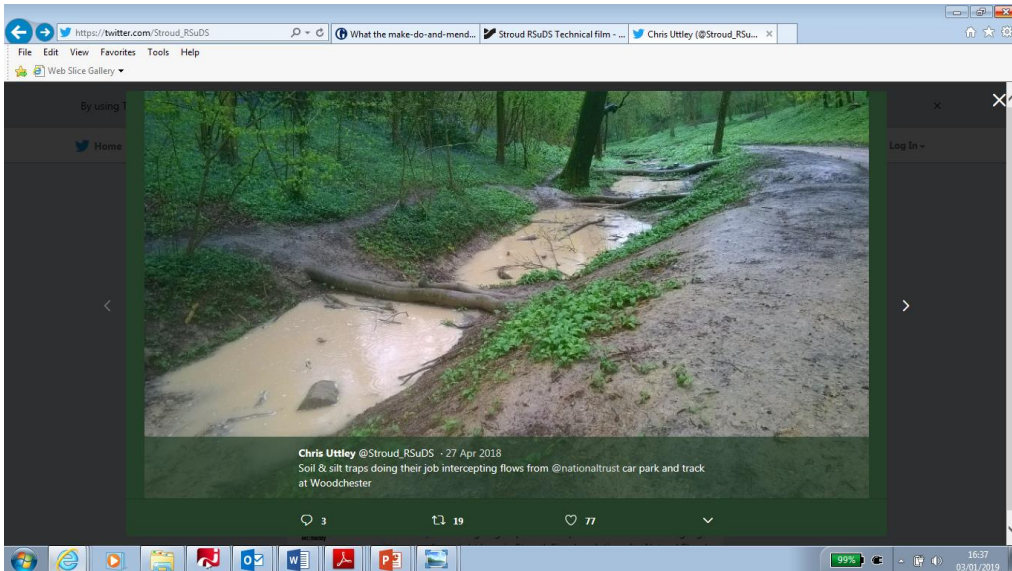


Holistic

Graphic produced by General Mills, 2018.
Photo: Regenerative Farmer Group/Princeton University, Lake Umbagog



C) Minor capital NFM works to produce small changes in topography or landscape that can be effective at changing hydrology and slowing flows when applied across large areas of land. e.g. leaky barriers, dry ponds or bunds ,swales. silt traps etc.



3D buffers and flood management

- Working with natural processes such as swales and magic margins
- Slows the flow of run-off
- Riparian trees will increase hydraulic roughness & increase infiltration
- In future can be material for leaky structures

One case study showed a 30m wooded buffer with woody debris structures reduced peak flows by 10%





Using Wood and LWS/LWD.

- The main purpose of LWS is to increase hydraulic roughness, add channel diversity, divert flows out of channel and slow the flow by small areas of attenuation. It is not to maximise storage.
- The principle should be to establish a variety performing different roles, so more smaller/lower/broader features rather than few & high.
- Permeability is key to stability! The more permeable a structure, the less hydraulic pressure will be exerted on the upstream face during high flows. We also want scour in some places.
- Go big or go home. Larger, longer and more complex elements of wood are safer & less mobile in flood flows. Use large timbers, relative to the width of the channel (approx. 2.5 times channel width)
- (The influence of geomorphology on large wood dynamics in a low gradient headwater stream Dixon. S & Sear. D 2014)



(D) Large scale land use change NFM (Capital Projects) requiring significant engineering – e.g. saltmarsh, managed re-alignment, floodplain restoration and re-connection. Create larger scale storage or reduce erosion





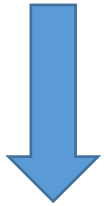
Floodplains Forever - Reconnect the Floodplain!



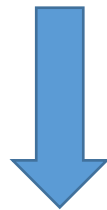
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(C) Minor capital NFM works to produce small changes in topography or landscape that can be effective at changing hydrology and slowing flows when applied across large areas of land. e.g. leaky barriers, dry ponds or bunds ,swales. silt traps



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3 Tier & FCERM



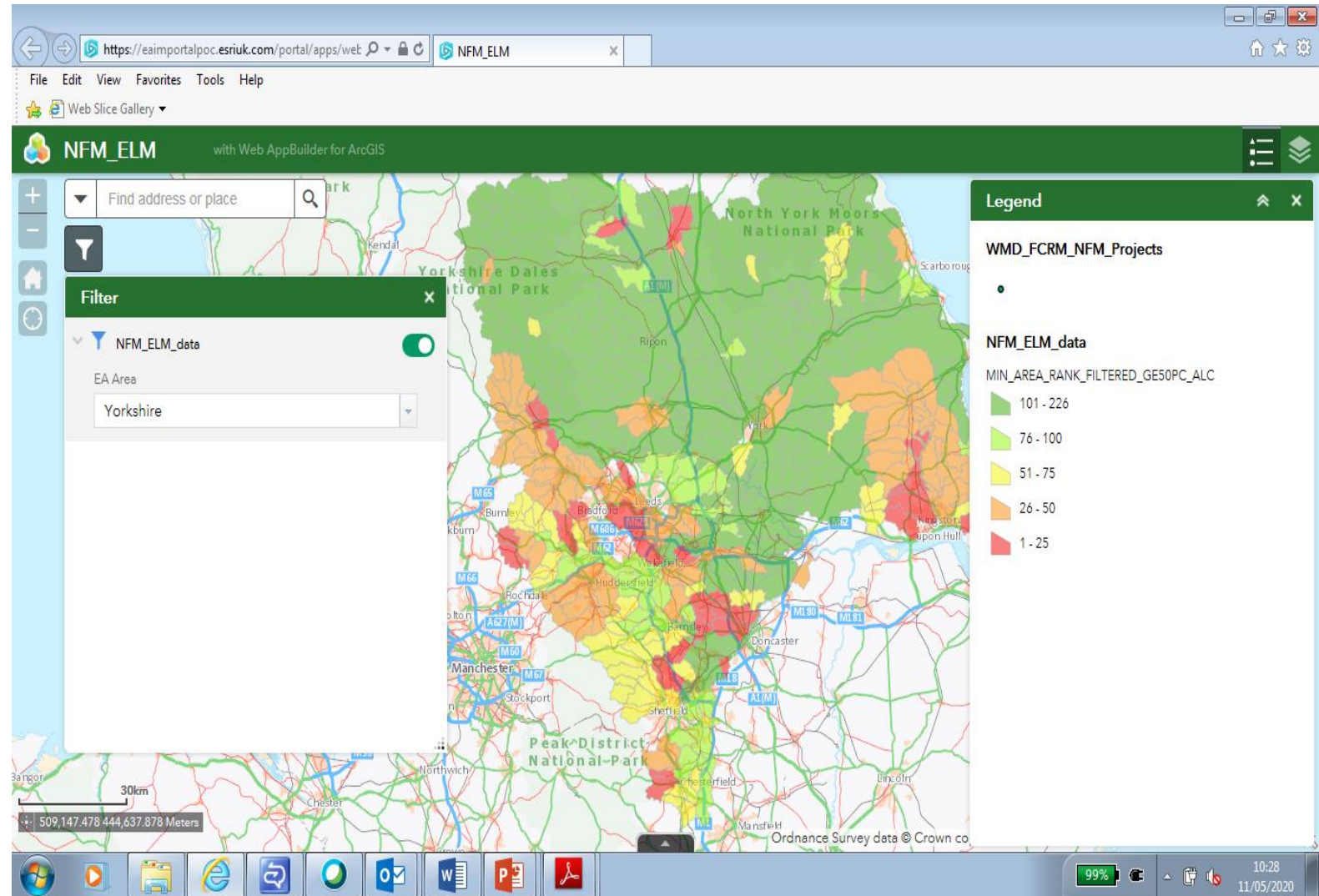
Basic
resource
protection.
Soils
Tier 1

Landscape
Scale Land
Use choices
Tier 3

Land Management
Practices, land use
& NFM
Tier 2

NOT Opportunity.

1. Slow the Flow : Greatest public benefit = large populations @ High risk IN small rural catchments.
2. Flood plain storage: Large areas of floodplain mid/lower catchment available for ADDITIONAL or NEW storage
3. Coastal re-alignment & habitat creation or extension. SMP policy?
4. Water Level Management



Advice & guidance. Who can build NFM?



Contractors: Skills resource
and valuable advocates



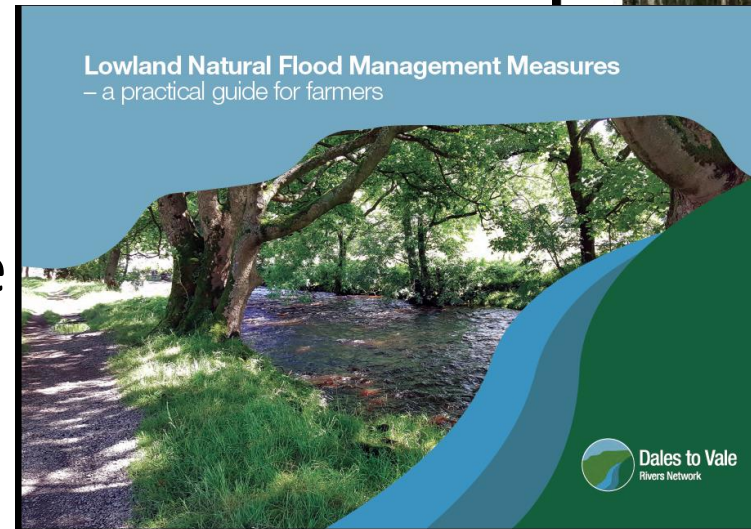
Farmers and woodland owners:
Crucial partners



Mobilising expertise for ELM Guidance Drafting

Guidance:

1. Technical Guidance for ELM FCERM Actions needed for the pilot & full scheme
2. Maximising FCERM outcome from other Actions (Soils, Nature, wetlands)
3. Linking with existing work (e.g. CIRIA SuDs Manual).



Assessing the Risk

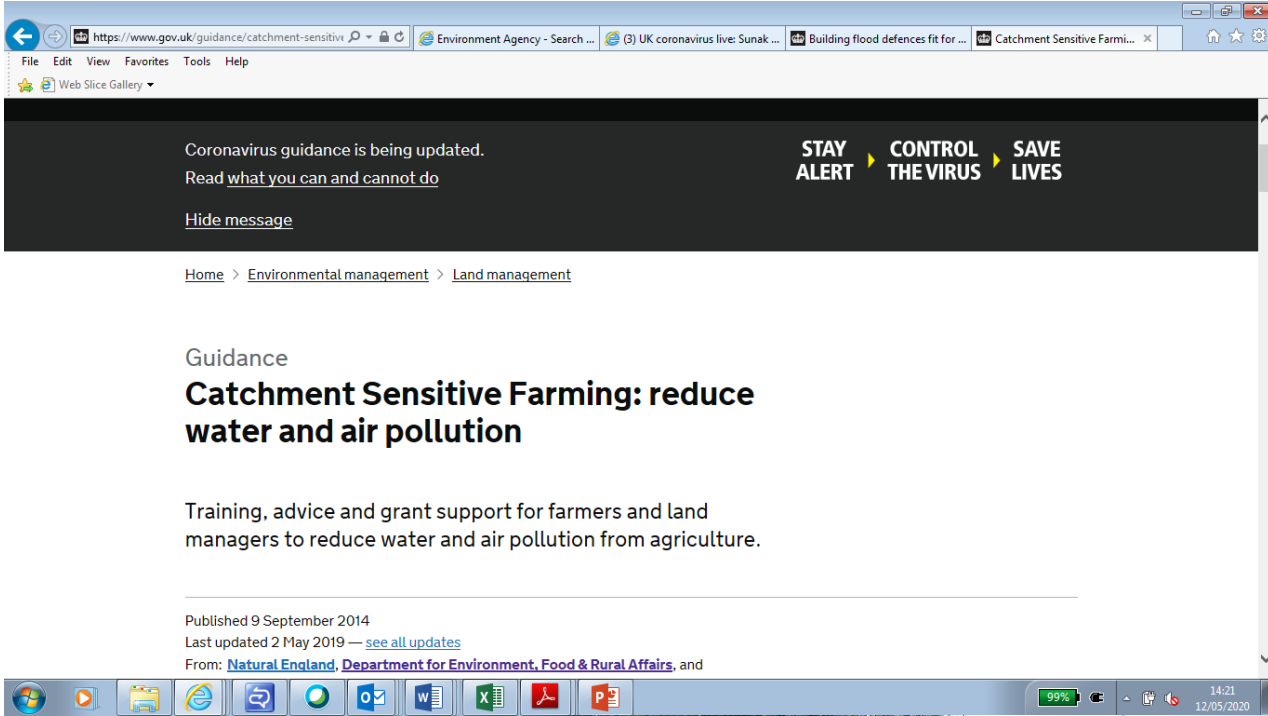


The SuDS Manual




Mobilising FCERM Advice in ELM Pilot?


1. Training the advisors
2. Technical Advice “What & Where”, Not here but there!
3. Specialist bespoke advice for complex agreements & construction.



The screenshot shows a web browser window with the URL <https://www.gov.uk/guidance/catchment-sensitive-farming>. The page features a dark header with the text "Coronavirus guidance is being updated. Read what you can and cannot do" and a "Hide message" link. To the right of the header are three buttons: "STAY ALERT", "CONTROL THE VIRUS", and "SAVE LIVES". Below the header, the breadcrumb trail reads "Home > Environmental management > Land management". The main heading is "Guidance Catchment Sensitive Farming: reduce water and air pollution". The subheading is "Training, advice and grant support for farmers and land managers to reduce water and air pollution from agriculture." The publication information states "Published 9 September 2014" and "Last updated 2 May 2019 — see all updates". The source is listed as "From: Natural England, Department for Environment, Food & Rural Affairs, and". The Windows taskbar at the bottom shows various application icons and the system clock indicating 14:21 on 12/05/2020.



An aerial photograph of a coastal construction site. A yellow excavator with "OVENDEN" written on its side is in the foreground. A red truck is parked on a dirt path leading towards the water. The site is surrounded by water and some vegetation. The date "9th September 2013" is overlaid at the bottom of the image.



A photograph of a person wearing a white hard hat and a high-visibility orange and grey safety vest. They are standing on a dirt path and using a surveying instrument (a total station or similar) mounted on a tripod. A yellow surveying pole is visible in the background. The setting appears to be a rural or semi-rural area with trees and a brick wall in the background.

NFM “Type”	ELMs/CS/CSF	FDGiA	Local levy
D: Large scale engineered land use change e.g. coastal realignment, flood storage	Construction & Capital – No, likely to be too expensive in most cases except smaller sites. Maintenance & Land management – Yes, long term/ permanent payments for managing the new use needed. Significant Land take.	<p style="text-align: center;">Yes</p> Significant funding where clear flood risk benefits shown and schemes meet funding rules. Often long term management funding not available	<p style="text-align: center;">Yes</p> Can be a significant contributor (RMAs, partners), but clear flood risk benefits must be shown
C: Minor capital NFM works and changes in topography e.g. Leaky woody structures, earth bunds	Construction & Capital – Yes, as part of capital grants for one off works Cheap and simple to construct Maintenance and land management – Yes, maintenance often straightforward & land take minor	<p style="text-align: center;">Potentially</p> Can be difficult to demonstrate economic flood risk benefits for a small number of small interventions. Long term management & maintenance difficult to fund.	<p style="text-align: center;">Potentially</p> Significant funding where there are clear local benefits. Long term management & maintenance difficult to fund.
B: Changes to farming practice & land management e.g. livestock, crop husbandry, soil management	Construction & Capital - Yes Core funding for this type of work for longer term. Capital includes fences, gates, tracks etc. Maintenance and land management- Yes, shorter /medium term agreements needed for changing management to improve infiltration/reduce erosion	<p style="text-align: center;">No</p> Very difficult to justify as benefits hard to demonstrate and likely to be realised over long period of time	<p style="text-align: center;">Potentially but difficult</p> Local benefits can be justified sometimes, but difficult over longer term
A: Landscape scale land use change to restore or create nature. (No engineering needed)	Construction and Capital – Yes Significant funding for this activity over long term e.g tree planting, peatland restoration Maintenance and land management- Yes, needs long term agreements.	<p style="text-align: center;">Potentially but very difficult</p> There will need to be clear demonstration of flood risk benefits. Benefits likely to be released over long term so hard to justify	<p style="text-align: center;">Yes</p> contributions local benefits can be justified

Recording interventions, measuring effectiveness & payments

1. Link payments to contribution to reductions in Flood Risk?
2. Link payments to income foregone + capital + X
3. Link payments to “proxy” measurements of attenuation, roughness & infiltration/evapotranspiration
4. Number of additional Outcomes contributed to? Nature, Carbon, WQ?
5. Length of time – Permanent or very long lasting

Data required	Unit	Comment
Area of roughness created (Ha)	(Ha)	<ul style="list-style-type: none"> - Estimated area of rougher vegetation or - Area of catchment draining to single in-river feature or - Area of catchment draining to lowest in a series of in-river features divided by the number of features or - Area of land draining to a river improvement scheme.
Volume of attenuation/storage created (m3)	(m3)	<ul style="list-style-type: none"> - Estimated/measured for the feature from DTM or local survey or - Measured for a similar feature e.g. leaky barrier in a cascade or - Estimated from LiDAR for a river improvement scheme
Area of increased permeability or increased interception (Ha)	(Ha)	<ul style="list-style-type: none"> - Area over which soil structure has been improved to increase permeability or - Area over which interception of rainfall has been increased by tree planting or - Area draining to rural or urban SuDs - Area of increased inundation for a river improvement scheme
Change to runoff pathway	(Y/N)	<ul style="list-style-type: none"> - Yes, runoff flow-path which causes flooding has been altered - Coastal schemes where risk of inundation has been reduced.
Reduced risk of erosion	(Y/N)	<ul style="list-style-type: none"> - Coastal schemes mainly but available to all.

Table 6: Asset level data on hydrological change

Risks and Challenges:

Risks:

Unknown longevity and sustainability of funding
ELM & FGIA – Potential competition or Trade offs
Climate impacts to agricultural land and productivity.
Landowner /reluctance to contribute to NFM/FCERM projects before ELM starts

Challenges:

Spatial Priorities. Local, Regional, National
ELM Pilot & Resilience Pilots
Resourcing input from LLFAs

What about the people having NFM “Done” to them

NFM needs strong and sustained partnerships.



**Local Residents, Businesses,
Councils and Councillors, NGOs:
Key driving forces and decision makers.**

What does community involvement look like?



- Flood groups in initial project development.
- Flood groups on interview panel for choosing project Officer.
- Regular evening meetings with Flood groups.
- Engagement with Parish Councils before works Commence.
- Flood groups engage landowners in project, visit work sites and volunteer in work parties.

Adam Horovitz

Poetry from a Year on Four British Farms

Adam Horovitz was the Poet-in-Residence at the

Reference

Or, perhaps, go into the towns and cities
laden with produce and stories,
your tongues ripe with carefully
disguised science, the bare
bone facts dressed in the muscle
of myth and memory.
Too much fact runs off busy people
like water from compacted soil.
Learn how to open them
to the seeds of ideas.
Water them with stories.
Watch them grow.



Don't over-complicate NFM

Need to balance modelling with experience



Use and respect local knowledge and experience and make your work accessible.

Key elements of the NFM Story

- NFM is a catchment wide approach. It is the cumulative benefit of multiple interventions that will deliver effective and safe outcomes. You cannot solve “flooding” with action on a single farm.
- NFM is not a “project”. it is a form of land and watercourse management over the longer term.

Most effective NFM Structure ever built!



Lessons Learned from Slow the Flow type NFM Project Delivery – How to transfer into ELM?

1. Compromise – with partners and landowners. Design measures that fit with their farming practice and business.
2. Design and build measures that require no/little maintenance or ongoing management
3. Keep it local – Build capacity in farmers, land owners & local contractors.
4. Remember it's a cumulative effect of lots of interventions!
5. Start as upstream as possible (on land) & concentrate in channel work on Ordinary Water Courses.
5. Focus on low risk, certain wins to gain confidence.
6. Don't try and do everything at once!