Strategic Approach to NBS for Irish flood relief schemes

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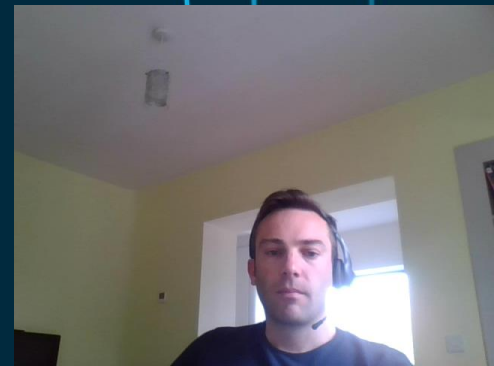
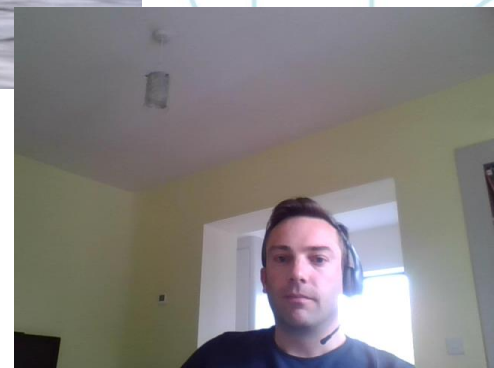


What's the objective?

- Nature Based Solution to *what?*
- The objective needs to be clear.

- I'm going focus on flood risk objectives.

- But we also want to take opportunities to address climate and biodiversity emergencies.



Scale of NBS

- International scale
  - Climate mitigation is a nature based solution to prevent future increase in flood hazard.

Flood schemes fit in here

- **Catchment scale**
  - An approach to reduce runoff or manage sediment regime to protect downstream areas at risk.
  - An expensive and uncertain approach to reducing flood levels or time to peak

At present are we mostly looking at reach and local scale NBS for flood risk management

- **Reach scale**
  - Measures local to a flood defence structure to reduce its scale, size, height
  - Includes maintenance regime
  - Less expensive and we have more confidence in the effect.

- **Local scale**
  - The nice to do additions to an engineering option. Like bat boxes, maintenance plan, wildflower meadow, tree planting. Can have significant local benefits.

- Individual
  - Nice things people like to do (e.g. green roof on new houses, wildflower strips in gardens, community activities)

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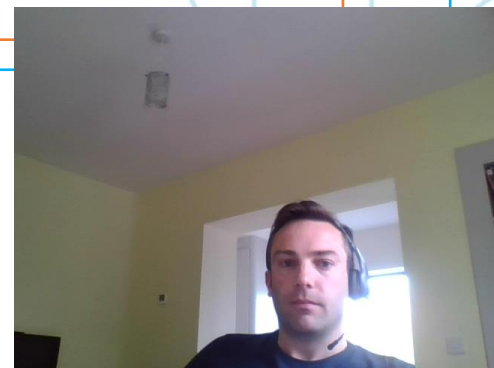


Conceptual review of the problem

- What is the root cause for the flood problem?
- Tailor the solution to the type of problem

development on natural floodplain - poor planning policy

a consequence of historic intervention.

e.g. changes in sediment regime, conveyance or gradual evolution over time, Arterial Drainage & Drainage Districts

change of upstream land management

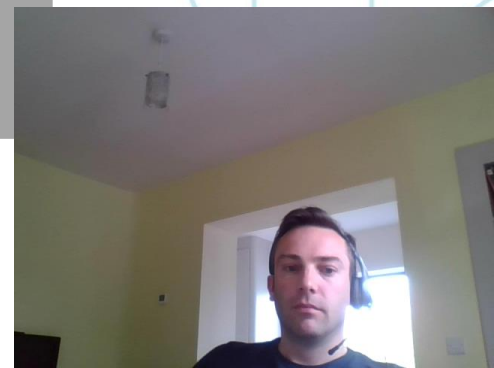
climate change

historic intervention that enabled floodplain development now at risk

e.g. mills and industry now converted to riverside housing

perception of flood impacts and acceptable risk

critical infrastructure which has no alternative location and so exposed to flooding



Example flood risk nature based solutions

To reduce runoff and manage sediment sources from entering rivers

Upland and gully afforestation

Floodplain and riparian woodland

Runoff management

Leaky Barriers (source: Roger Uttley)

Upland / peatland restoration (source: Coillte)

To attenuate flow, reduce velocity and manage sediment within the riparian zone

Floodplain reconnection

Riparian corridor restoration

Barrier removal

De-culverting

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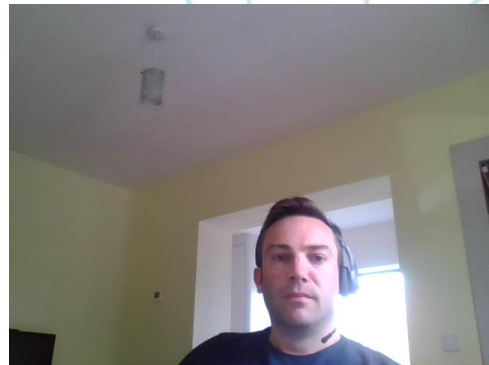


Example flood risk nature based solutions

To attenuate runoff and manage sediment in the urban environment

Swales

Setback vegetated outfalls

Green detention areas

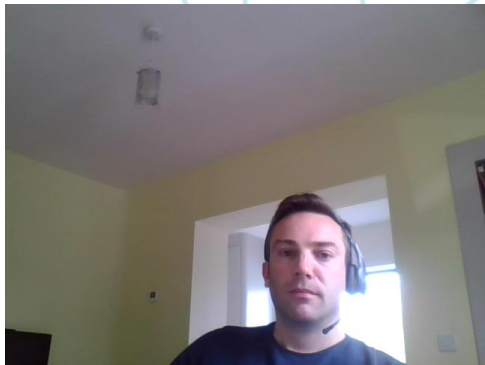
Rain gardens (source: Urban Design London)

To reduce flow velocity and manage sediment within urban river corridors

On-line storage

Wetland creation

Buffer strips in parks



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A process for flood schemes

Evidence

- Evidence base.
- EU, UK and Irish demonstration sites

Opportunity mapping

- Identify locations suitable for the different NBS measures
- Either, using readily available datasets
- Or, more efficiently through data mining of surface water flood maps

Benefits

- The effect of NBS measures on flood risk indicators
- Either, sensitivity testing of traditional river flood model inflow hydrographs
- Or, explicit modelling NBS measures in fully integrated catchment models.

Seek to capture benefits across the catchment, not just the flood risk area.

Engage and Appraise

- Cannot work without proper stakeholder engagement.
- Needs input from different disciplines.
- Trade off between measures located at risk areas, or away from risk areas.

Will Public Spending Code allow spend not directly related to flood benefits?

Deliver and Evolve

- Need to monitor and adapt
- Build the evidence base

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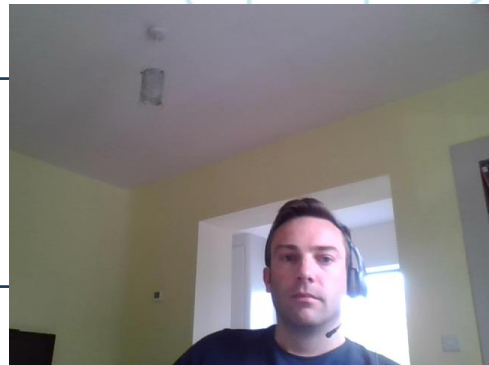
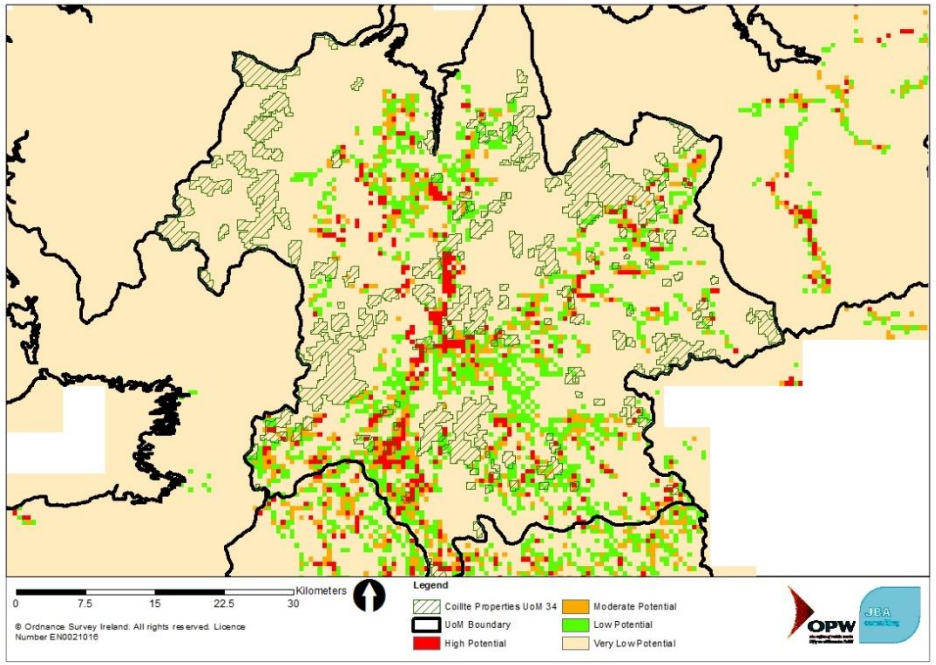


Two possible start points for Flood Schemes

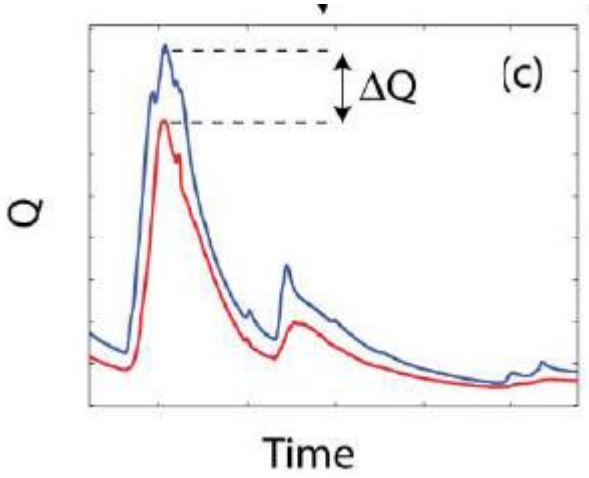
- NBS opportunity mapping

  Showing locations possibly suitable for floodplain reconnection (in this example)



- Flood model sensitivity tests

  Showing the scale of benefit of a measure.



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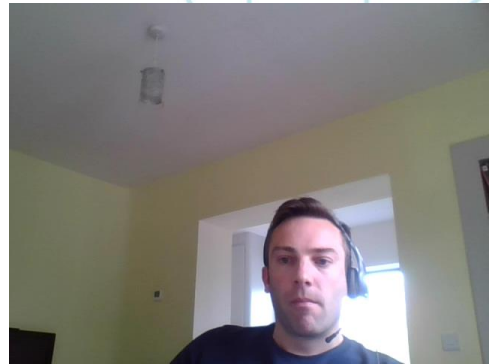
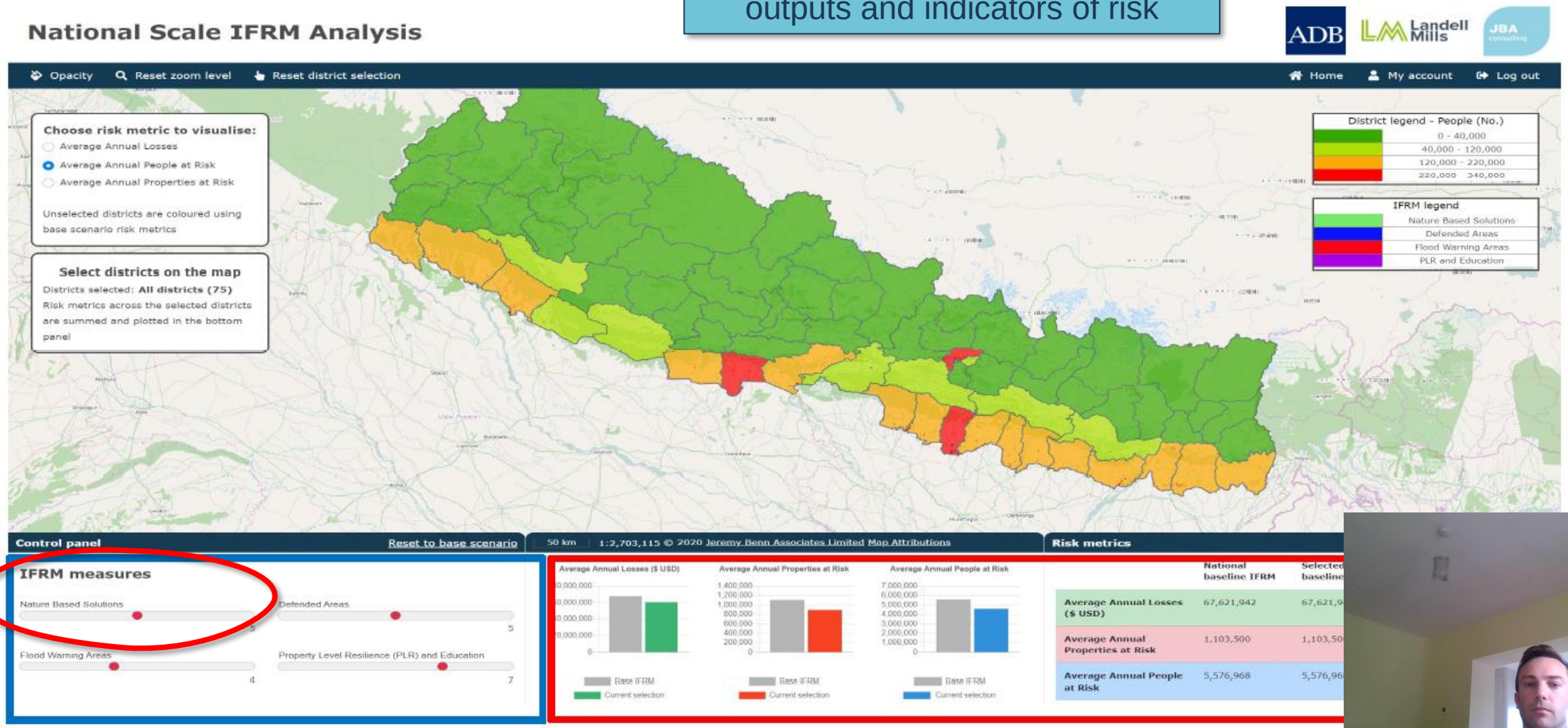


Or an integrated approach

Dashboard with model scenario outputs and indicators of risk



If NBS are not the single solution to managing flood risk

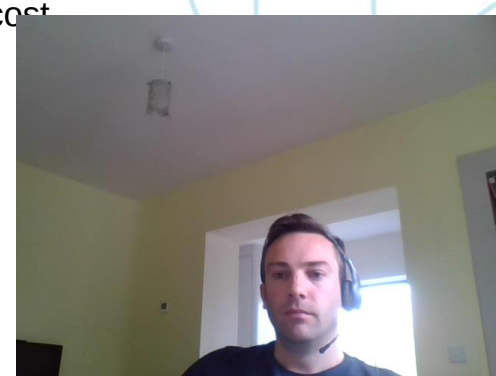
- We want to include NBS.
- Engineered solutions are designed with freeboard to account for uncertainty.
- Before we can reduce the scale of engineering options, we need to develop evidence to gain confidence in the performance of NBS.
  - UK Working With Natural Processes
  - SEPA guidelines for NBS opportunity mapping

Options to deliver NBS

- Use of additional benefit available for NBS measures as part of the scheme.
  - Must not compromise or cause delay in approval of a flood scheme.
- Identify desirable measures that complement the scheme.
  - Deliver through integrated catchment projects
- Future CAP funding may make this the economically preferable approach for land use management.

Pre-requisites

- Community and landowner buy in to make measures cost effective.
- Efficient, simple and auditable process for transfer of ecosystem services.

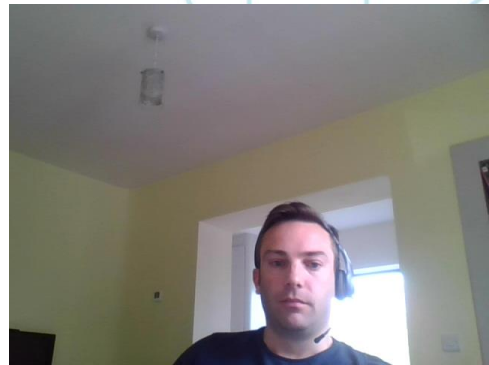


Prevention and Resilience

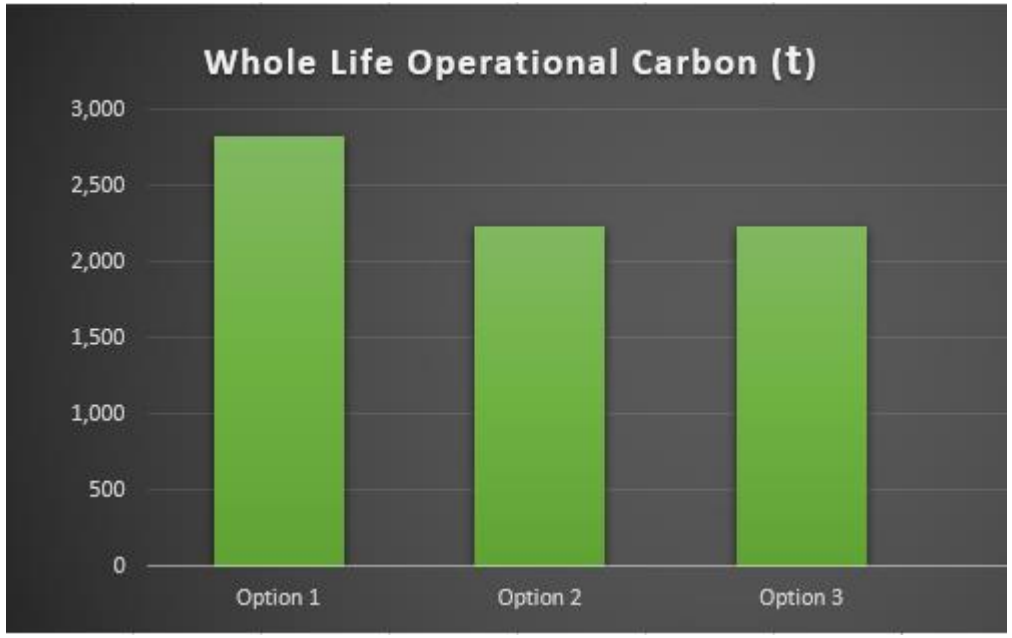
- Flood Risk Management is more than flood defences.

- Development planning to account for climate change scenarios.
- Will avoid future increase in exposure to hazard.
- This includes designing for resilience, which can include many NBS.

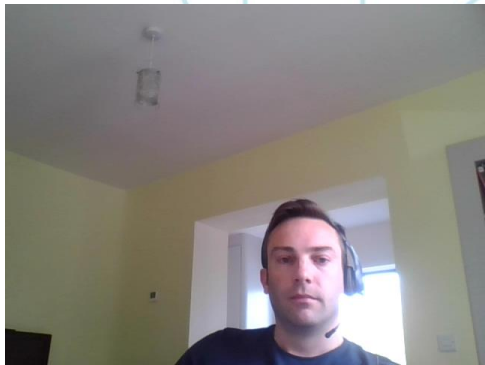
- Learning to live with flooding is a natural solution to flood risk.
- This needs understanding of hazards, exposure and vulnerability to prepare, respond and recover (i.e. resilience)



Carbon Mitigation as NBS

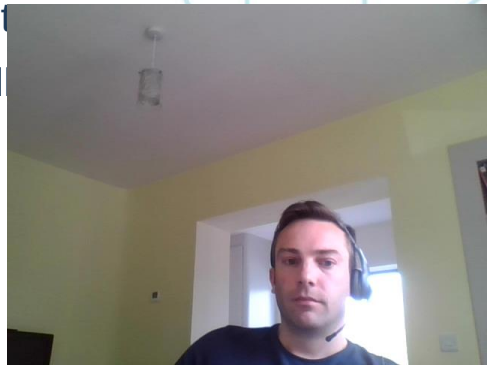


- Whole life carbon equivalent for flood risk scheme options appraisal.
- Movements towards including value of carbon sequestration from wetlands, woodlands and grasslands.
- Not yet converted to a monetary value for inclusion in Cost Benefit Analysis.



Change needed?

- Stop being so cautious – currently it's not always possible to quantify the benefit with sufficient confidence to satisfy the Public Spending Code.
- Multi disciplinary teams and genuine stakeholder engagement.
- Proper valuation of services and mechanisms for transfer of payments and make this attractive and simple for land owners and funding bodies (those keen to invest)
- Start with root cause rather than sticking plaster.
- Change the discourse from *sterilisation of land* to *restoration of land*
  - e.g. alternative farming practices or re-naturalisation.
  - ensure funding streams value and encourage this change.
- Multiple funding streams and multi functional benefits will be needed to maximise the economic case.
- Build the evidence base – currently engineers need to over spec structural solutions due to low confidence in performance of the NBS component.
- Challenge of funding eligibility for flood scheme measures on private land.
- Remember the urban environment - NBS can reduce sewer flood risk by adding capacity to existing syst
- Variable design standards where we cannot fully protect - becomes tricky for insurance pricing, especiall need for governance of NBS if they form part of the equation.



Key messages

- A strategic approach is necessary to identifying and appraising catchment and local scale Nature Based Solutions as core components, or complementary measures to flood risk management schemes.
- The starting point can be either to map and identify opportunities, or to use hydrological and hydraulic models to determine the potential scale of benefits from nature based solutions.
- Integration of existing and future funding streams will be critical to delivering Nature Based Solutions as standalone and complementary measures for flood risk management.
- Change will be required to deliver – this has started.