

# River Peffery Flood Protection Study

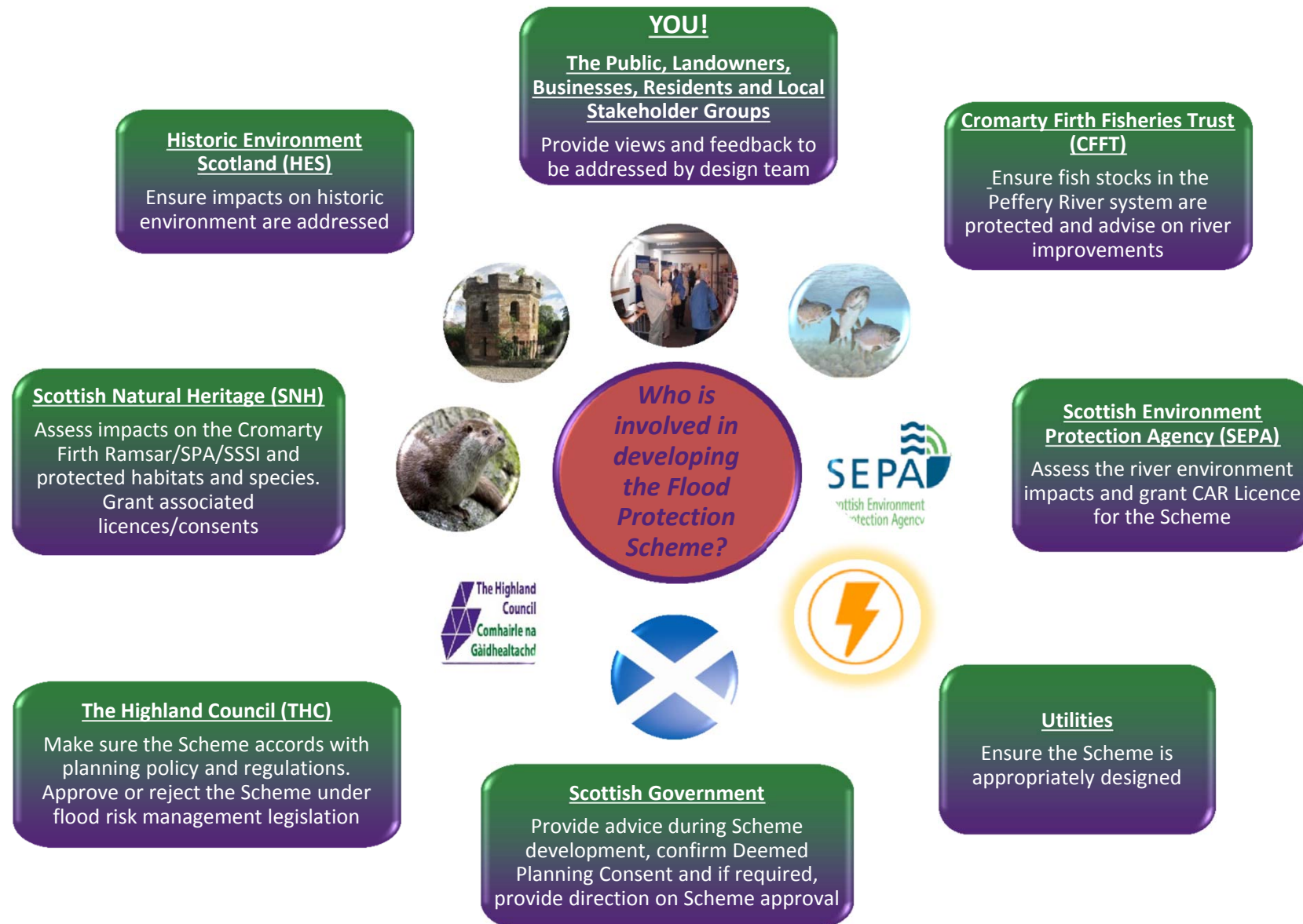
Sgrùdadh Dìon Thuiltean Abhainn Pheofhair

## Public Consultation on Potential Measures



The Study is at an early design stage, therefore the option proposals on display at the exhibition are indicative and are subject to feedback from this and other consultation events. If you have any questions or wish to discuss any aspect of the Study, please ask a member of the team.

# Consenting Bodies & Consultation Groups



# Study objectives



The main objective of the River Peffery Flood Protection Study and Natural Flood Management Study is to develop solutions that will help reduce the risk of flooding to Blairninich and Dingwall from fluvial and coastal sources whilst taking account of the impact of climate change.

The Highland Council will seek to promote a Flood Protection Scheme (or Works) that:

1. Morphology – delivers morphological improvements to the River Peffery.
2. Economic – has a positive benefit to cost ratio
3. Sustainability – maximises sustainability benefits, such as by reducing whole life carbon, minimising waste, and sourcing materials and resources locally where possible.
4. Social – reduces stress and anxiety of local residents and businesses, improves quality of life through reduced flood risk, and promotes where possible opportunities for improved amenity.
5. Environmental – minimises potential impacts on the key environmental features, including the local ecology of the River Peffery catchment and the Cromarty Firth SPA, and promotes where possible opportunities for environmental benefits.
6. Technical – includes a sustainable combination of measures that provide an appropriate standard of protection for the target area.

# Why does Blairninich & Dingwall need a Flood Protection Scheme?

1829: The River Peffery overflowed its banks at Tulloch near Dingwall, and the Burn of Dingwall flooded the west end of the Burgh

1947 and 1977: Flooding affecting properties

November 2005: A road flooded due to capacity and blockage issues at culverts and the breaching of the river bank at a cattle access point

October 2012: the River Peffery overtopped and flooded properties along the A834 in Blairninich and Fodderty

February 2016: after a period of heavy rain the Peffery overtopped its banks in Dingwall

1800

2017

1895: A combined river and coastal flood affected roads and properties

1982: Flooding affecting properties, businesses and an electricity substation

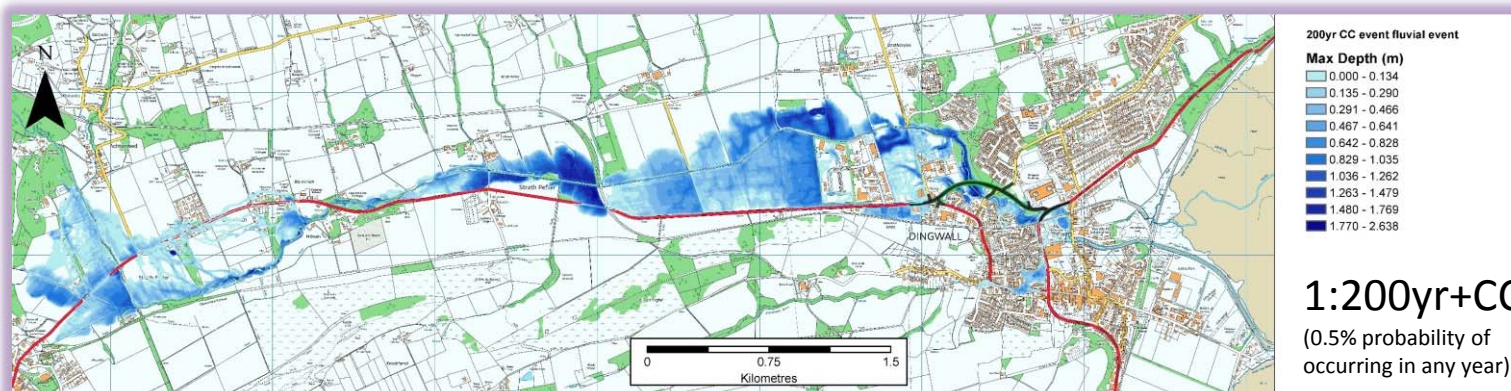
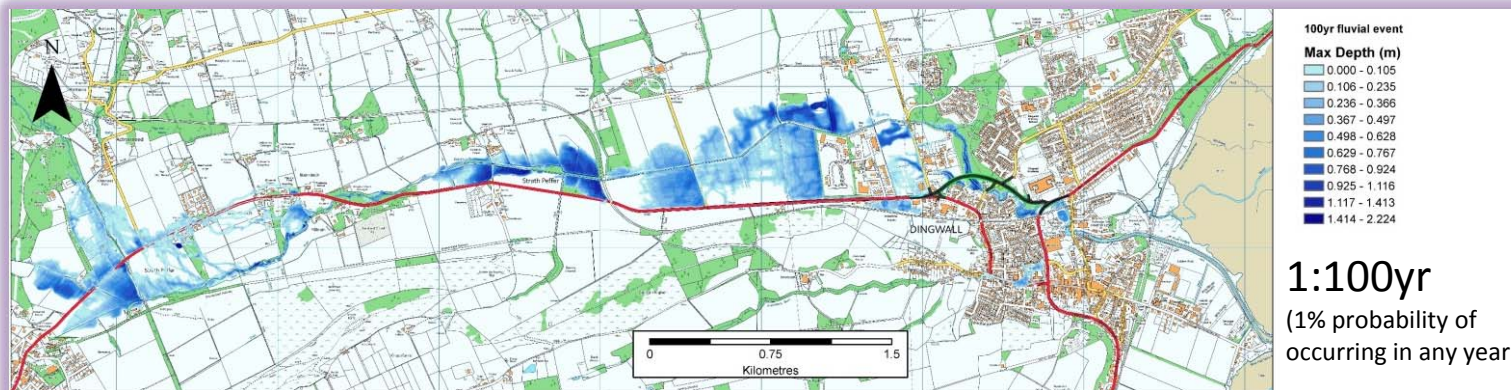
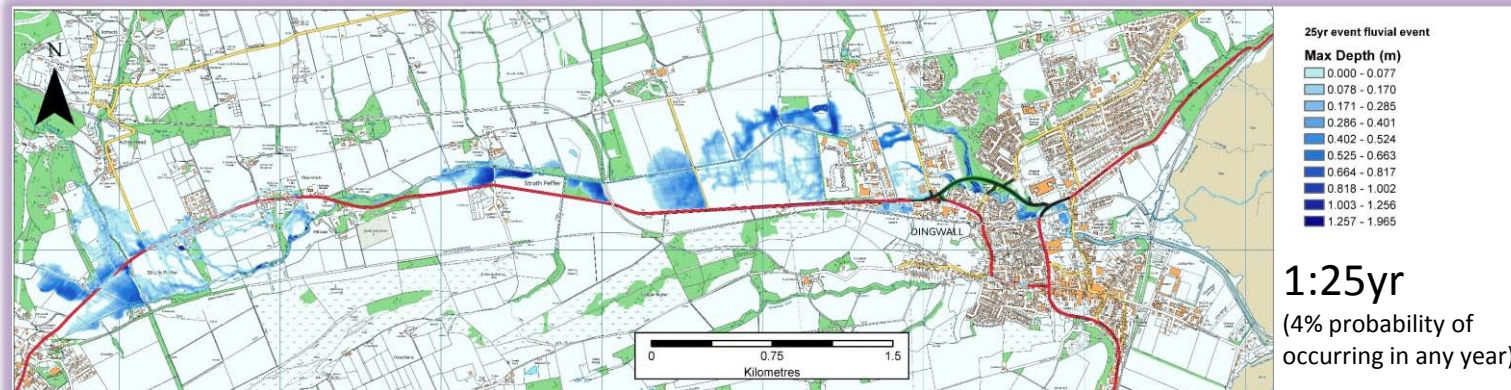
October 2006: the Knockbain Burn burst its banks and screens became blocked causing significant flooding to properties in Dingwall. The River Peffery was close to the underside of the bridge on Tulloch Street and there was a landslide on Mitchell Hill

December 2013: the River Peffery overtopped in Strathpeffer

SEPA's Flood Risk Management Strategy (December 2015) identified that there are approximately 90 residential and 90 non-residential properties at risk of flooding, with an average of £310,000 in annual damages

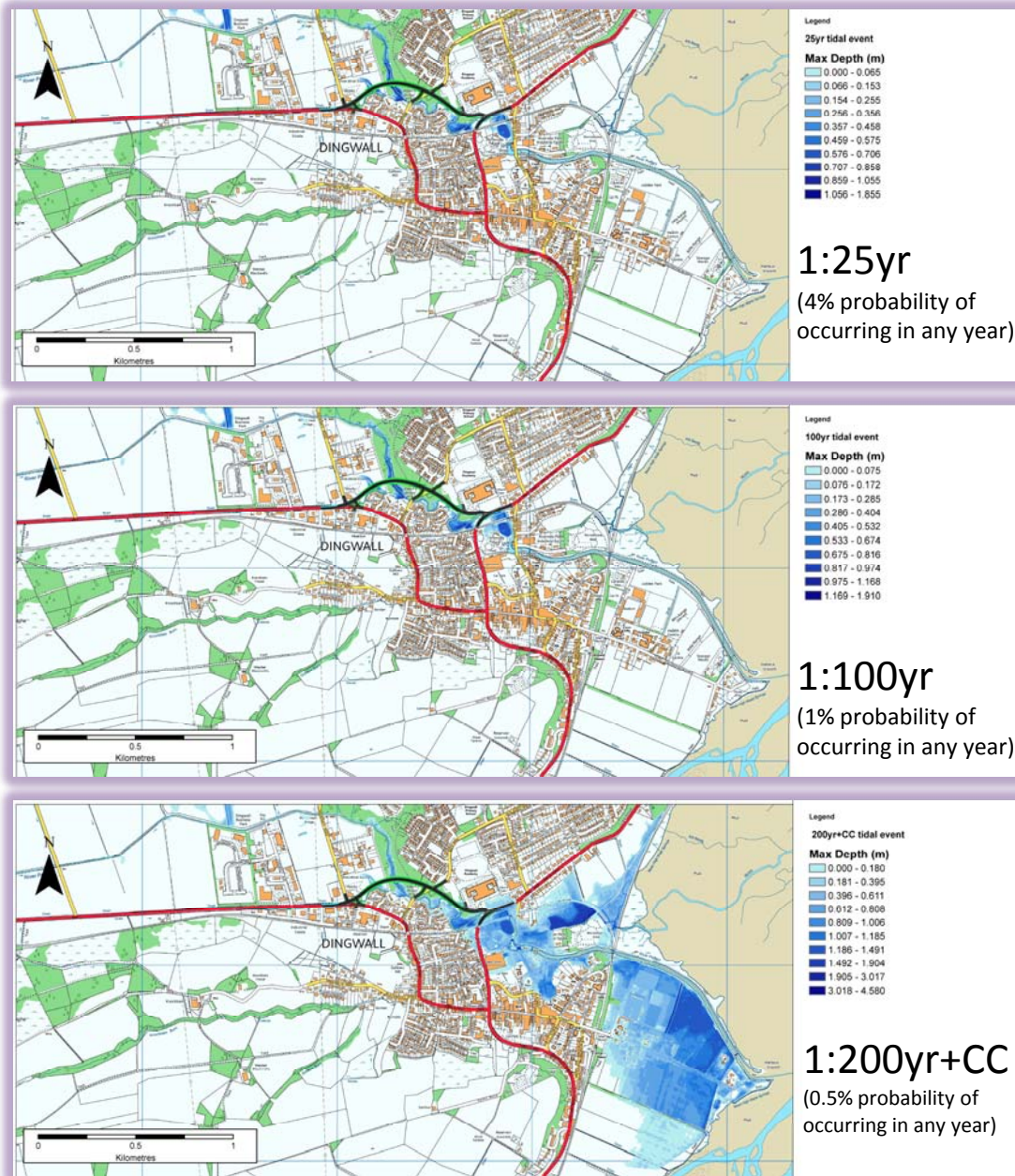


# Fluvial flood extents (from the river) for various return period events



Decreasing Annual Flooding Probability

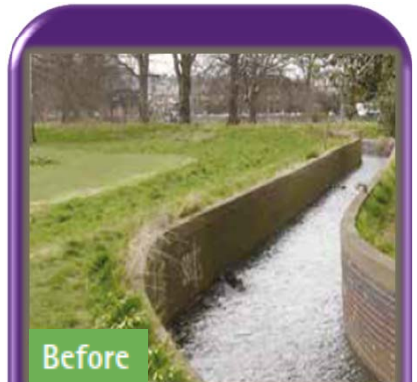
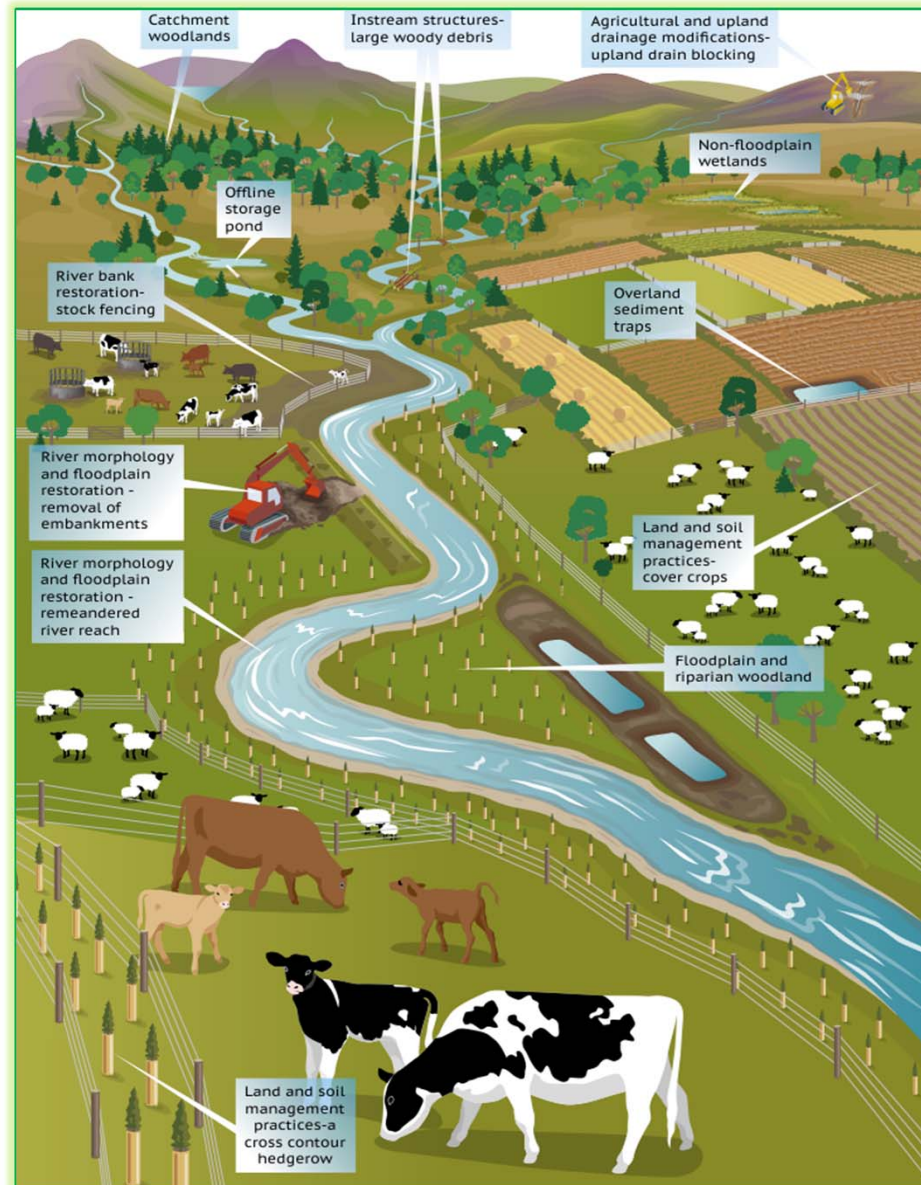
# Coastal flood extents for various return period events



Decreasing  
Annual  
Flooding  
Probability

# What is Natural Flood Management (NFM)?

Natural Flood Management (NFM) aims to slow down the flow of water from the land by e.g. planting trees, creating small temporary flood storage areas and allowing areas to flood where no damage is done. Trees also help to stabilise the river banks and prevent erosion, thereby reducing the amount of gravel in the river.



# Areas with potential for in-channel Natural Flood Management Measures

Example of phases of riparian planting along a river bank (© Tweed Forum).



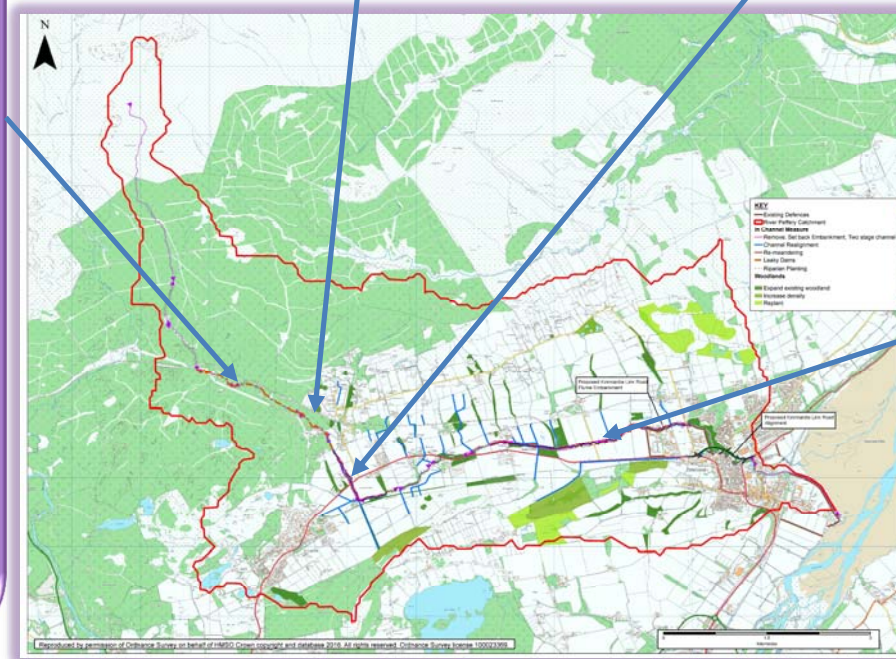
Example of a 'leaky dam' using logs.



Typical two-stage (set-back) channel.



A re-meandered reach to reduce flooding in downstream towns and improve river ecology (© Tweed Forum).





# Areas with potential for catchment-wide Natural Flood Management Measures

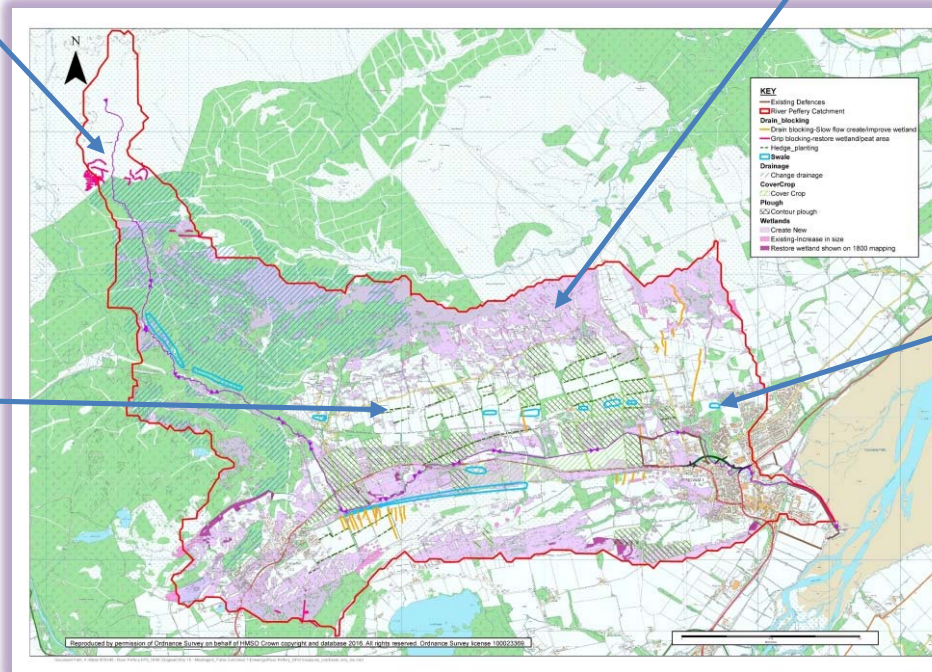
Restoration of blanket bog by blocking drains across the peat bog.



Marsh extension to provide wetland habitat and temporary flood storage.



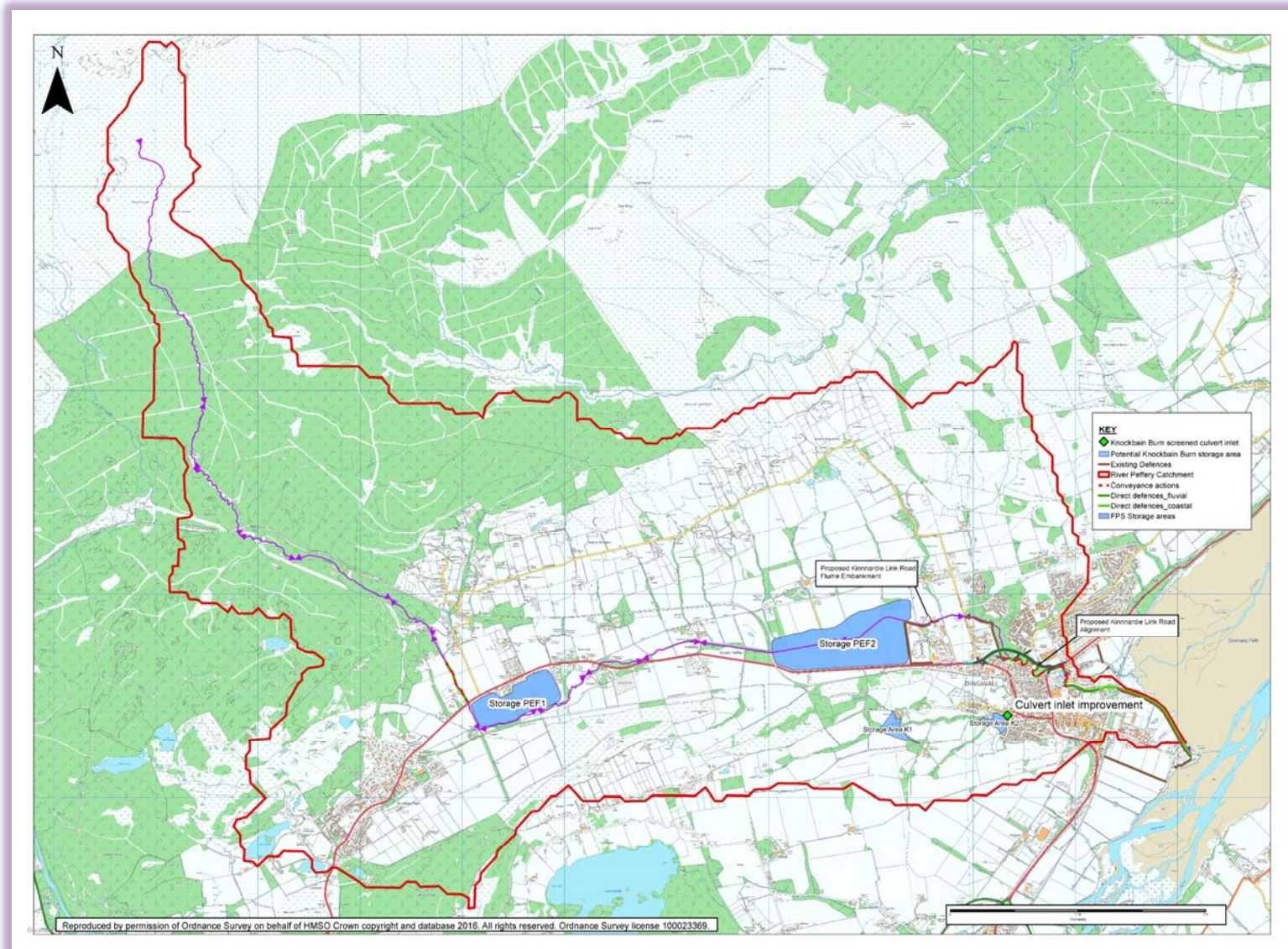
Example of newly planted hedgerow (© Tweed Forum).



Typical swale /wetland sediment trap (© Tweed Forum).



# Areas with potential for Engineered Protection Measures



Traditional Flood Protection Scheme (FPS) measures aim to mitigate or remove flood risk by impounding flood waters and /or protecting receptors at risk from flooding. The measures considered are flood storage reservoirs, direct defences (walls and embankments) and conveyance improvements (clearing silt from below bridges to restore flow capacity).

# Potential measures upstream of Blairninich

## Measures being considered:

### FPS Measures

- Flood Storage
- Conveyance actions (e.g. clearing local to river structures)

### In-channel NFM measures

- Remove, breach, setback embankments/Two stage Channels
- Channel realignment
- Riparian planting
- Re-meandering

Right:  
Example of two-stage setback embankment solution with meandering low flow channel (Courtesy of Selkirk FPS)



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# Potential measures upstream of Dingwall

## Measures being considered:

### FPS Measures

- Flood Storage
- Conveyance actions (e.g. clearing local to river structures)

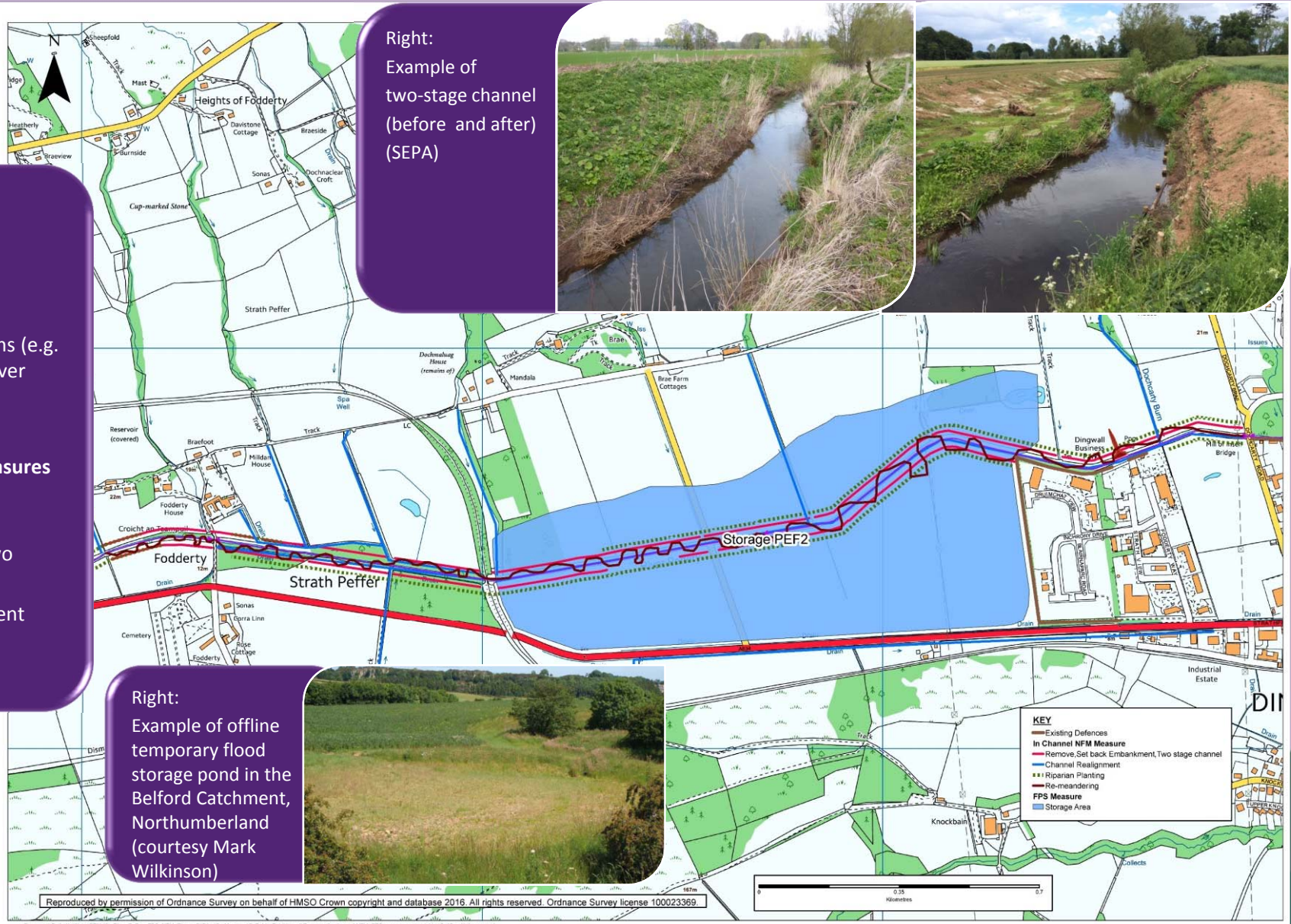
### In-channel NFM measures

- Remove, breach, setback embankments/Two stage Channels
- Channel realignment
- Riparian planting
- Re-meandering

Right:  
Example of  
two-stage channel  
(before and after)  
(SEPA)



Right:  
Example of offline  
temporary flood  
storage pond in the  
Belford Catchment,  
Northumberland  
(courtesy Mark  
Wilkinson)



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# Potential measures within Dingwall

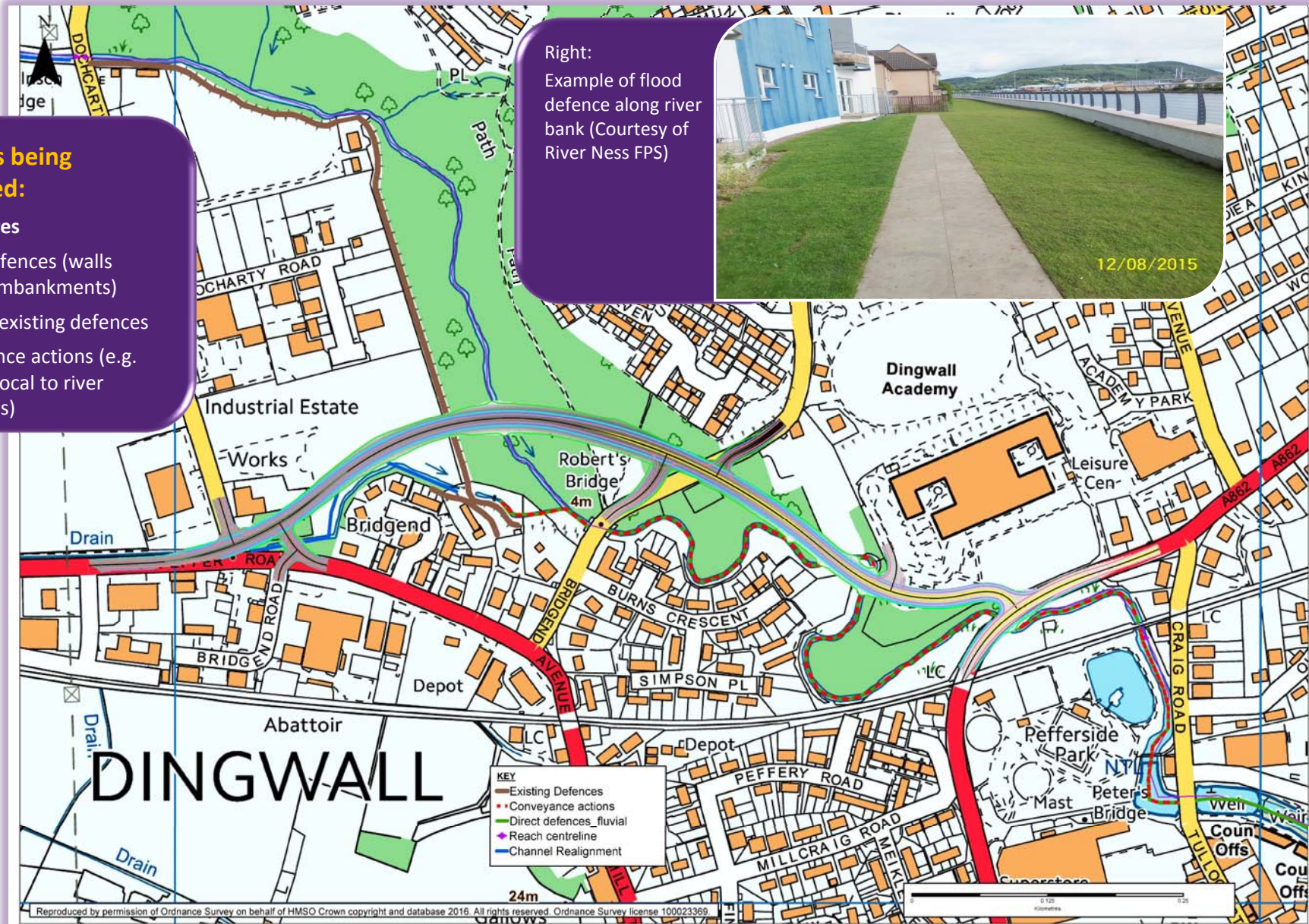
## Measures being considered:

### FPS Measures

- Direct defences (walls and/or embankments)
- Improve existing defences
- Conveyance actions (e.g. clearing local to river structures)

Right:

Example of flood defence along river bank (Courtesy of River Ness FPS)



# Potential Measures within Dingwall

## Measures being considered:

### FPS Measures

- Flood Storage
- Increasing culvert capacity through Dingwall
- Increasing storage tank capacity
- Culvert screen inlet improvement)

Right:  
Example of flood storage measure involving impoundment of a watercourse  
(*Courtesy of White Cart Water FPS*)



Right:  
Example of improved 2-stage screen to culvert  
(*Courtesy of Smithton/Culloden FPS*)



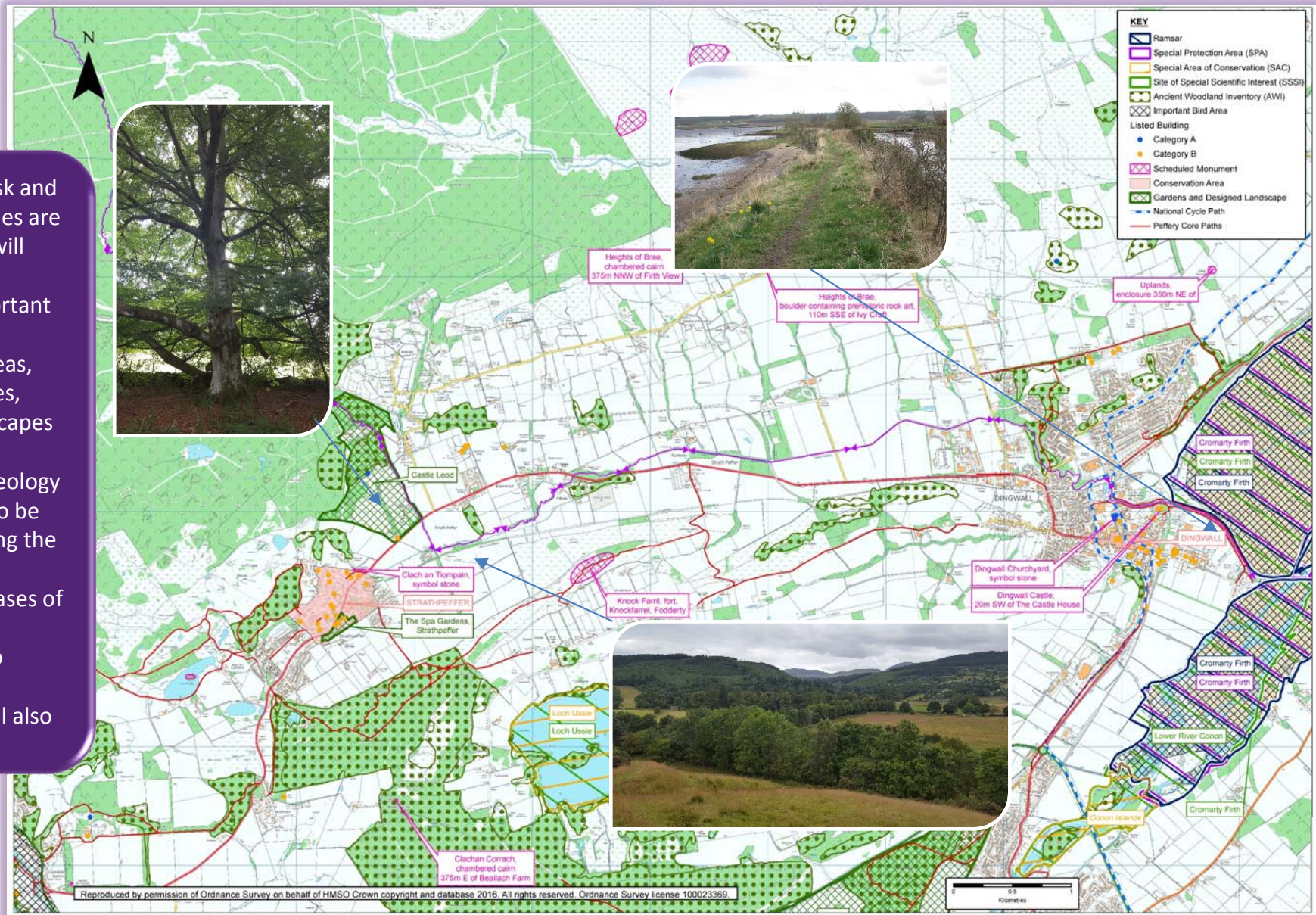
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# Potential measures downstream of Dingwall



# Identifying Environmental Constraints and Opportunities

A number of desk and field based studies are underway that will help identify potentially important features (e.g. conservation areas, protected species, important landscapes and historical buildings, archaeology etc.) that have to be considered during the design and construction phases of the Scheme. Opportunities to improve the environment will also be explored.





# Environmental Impacts, Mitigation and Opportunities

## Environmental Work to-date

- Desk study (all environmental disciplines) ongoing and incorporating info/data from stakeholders to support both studies
- Team site visit and photo file build
- Extended Phase 1 Habitat Surveys (2016-17)
- Protected species surveys (focus on otter, badger, water vole, great crested newt including invasive species)
- Geomorphology study
- NFM opportunities study

## Future Studies:

Targeted protected species surveys (breeding birds, bat, otter, riparian species)



## Enhancement of the River Peffery

- Improve river morphology to slow flows
- Re-meander straightened sections of the river
- Improve biodiversity (habitat creation and tree planting)
- Improve access and recreation opportunities

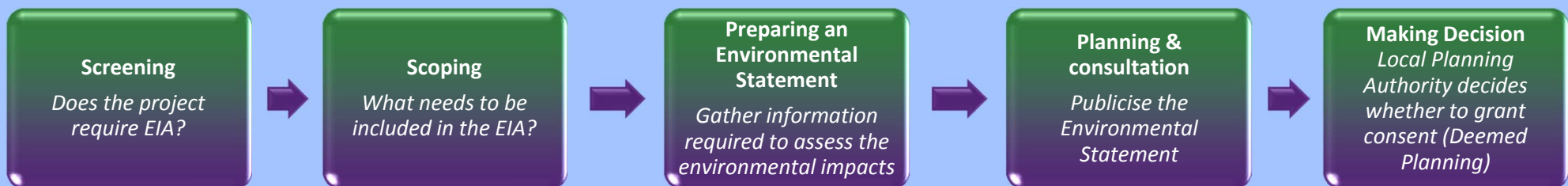


## Conservation Area, Archaeology and Heritage

- Dingwall Conservation Area
- Scheduled Monuments and Listed buildings
- Potential archaeological remains



## Stages of Environmental Impact Assessment (EIA):



# Timescales: current progress and next steps

