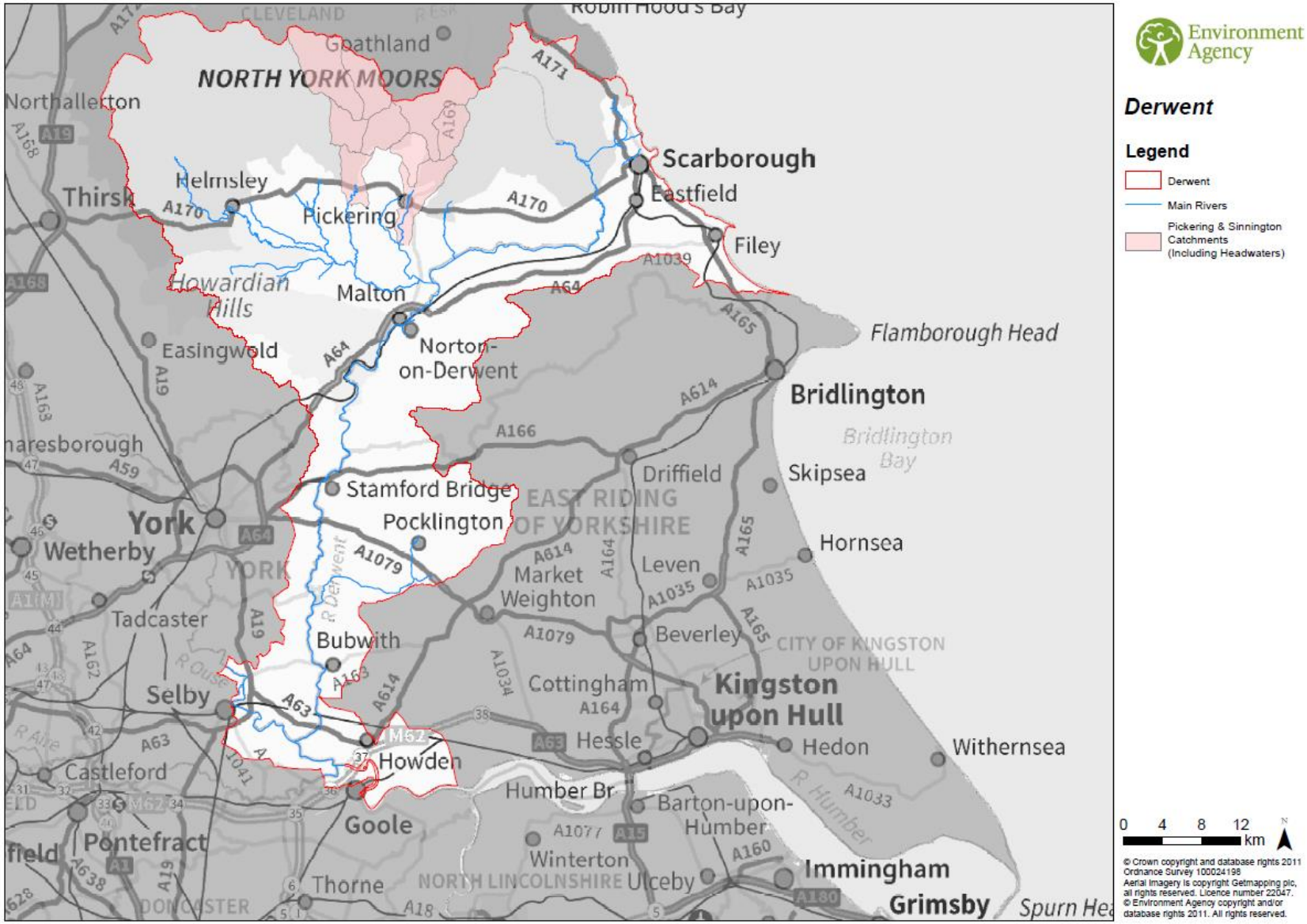
Slowing the Flow Partnership

ICF STUDY VISIT TO YORKSHIRE
4/5 OCTOBER 2017

Slowing the Flow: Partnership

Slowing the Flow: Derwent Catchment



Environment Agency

Derwent

Legend

- Derwent
- Main Rivers
- Pickering & Sinnington Catchments (Including Headwaters)

Slowing the Flow: Overview and Principles

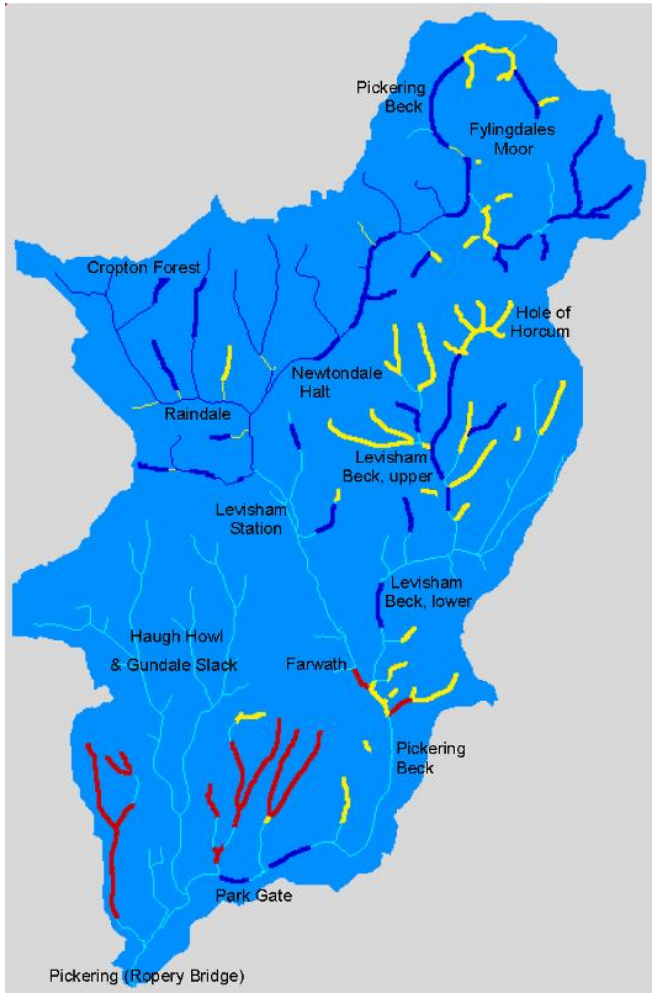
- Two catchments: River Seven (Sinnington) and Pickering Beck.
- Defra funded, multi-objective, demonstration project, post Pitt review.
- Science based partnership of national and local agencies
- Fluvial flooding is a function of channel capacity, water volume and time. The scheme works to reduce the second and extend the third.
- Measures work as planned; more evidence/modelling needed to understand cost benefits fully.

Slowing the Flow: origins

- Pickering is a frequent flooder in rapid response catchment
- Conventional schemes planned and abandoned 2001 to 2005
- Community pressure
- Academic interest and background work by FR
- Concern on part of main agencies + political head of steam
- Pitt Review post 2007 floods
- Defra funding for three pilots for NFM
- Partnership formed and made successful bid led by FR and FC

Slowing the Flow: Overflow Model

- Hydrological-hydraulic model developed by Durham University;
- Calculates runoff percentages and then accumulates and routes flow through catchment;
- Flow time maps used to generate flood hydrograph.
- Ensures peak flows are desynchronised.



Slowing the Flow: Land Management Measures

- Ten farms implemented catchment sensitive farming practices
- No burn zones established along moorland streams
- Moorland restoration, and heather re-seeding; footpath and track maintenance to counter “path river” effect
- 187 heather bale check dams blocking moorland grips
- 44 hectares of tree planting – less than planned
- Restoration of riparian woodland along 2.8 km of stream sides.

Slowing the Flow: Moorland Measures & Tree Planting

Far left - part of 15 ha woodland creation scheme at Skipster Hagg;

Top right – riparian tree planting by National Park volunteers in Hole of Horcum;

Mid right - heather bale check dams on Levisham Moor;

Slowing the Flow: Heather reseeding in Hole of Horcum

Slowing the Flow: Watercourse Interventions

- 167 woody debris dams installed (£5 - £22 per m^3 flood storage, depending on size).
- 2 large timber bunds constructed (£1.70 per m^3 flood storage).
- Reconnected Pickering Beck to flood plain to create 120,000 m^3 flood storage area (£26 per m^3).

Slowing the Flow: Large Woody Dams

Far left – active large woody dam on Pickering Beck during flood;

Top right – ‘leaky’ woody dam on Sutherland Beck during low flow;

Bottom right – smaller woody dam on tributary stream.

Slowing the Flow: Building LWDs

Slowing the Flow: Timber Bunds

Far left – timber bund on Sutherland Beck during November 2012 flood;

Top left – log bracing against tall tree stump to secure timber wall;

Mid-left – Centre span of timber bund above river channel during high flows;

Bottom left – view looking across upstream timber bund (57 m wide and storing up to 3,600 m^3).

Slowing the Flow: Flood Storage Area

Far left – view of flood storage area in spring 2016, after completion in September 2015;

Top left – construction of grasscrete protection for bund face in summer 2015;

Mid-left – approach channel showing flow controlled inlet and network of poles to retain any debris;

Bottom left – outflow reach and new channel below bund.

Slowing the Flow: Does it work?

- Measures individually do the job they were designed to do
- River behaviour has been seen to change
- Both before and after the large flood storage area was built
- And downstream too on basis of informal observations
- But more data needed to quantify impacts more precisely

Slowing the Flow: Boxing Day 2015 Event

Far left – picture taken looking upstream of lower timber bund during ‘typical’ flows;

Near left – same view taken at 14.03 on Boxing Day 2015 during flood conditions, showing the timber bund in action.

Slowing the Flow: Boxing Day 2015 Event

Far left – view of flood storage area at 14.03 during Boxing Day 2015 event, showing some active water storage;

Top right– View of flood water levels on Beck Isle at 14.30 during Boxing Day 2015 event;

Bottom right – Similar view of water levels on Beck Isle during previous November 2012 event.

Slowing the Flow: Costs

- In total, upstream measures cost around £400k
- Important contributions in kind by partners
- Construction of flood storage area cost £2.7m; higher than expected
- Site imposed higher costs because of the railway and the requirements of the Reservoirs Act.
- Most funding for flood storage area came from local authorities,

Slowing the Flow: Key Outcomes

- Better understanding of measures and where to use them
- The measures work as designed; river behaviour has changed and flood risk reduced
- Natural measures can work well ***both*** when integrated with engineered measures, ***and*** when functioning on their own.
- More time for local communities to prepare for likely floods.
- Multiple ecosystem services benefits - positive net present values on all aspects.
- Partnership working critical to success

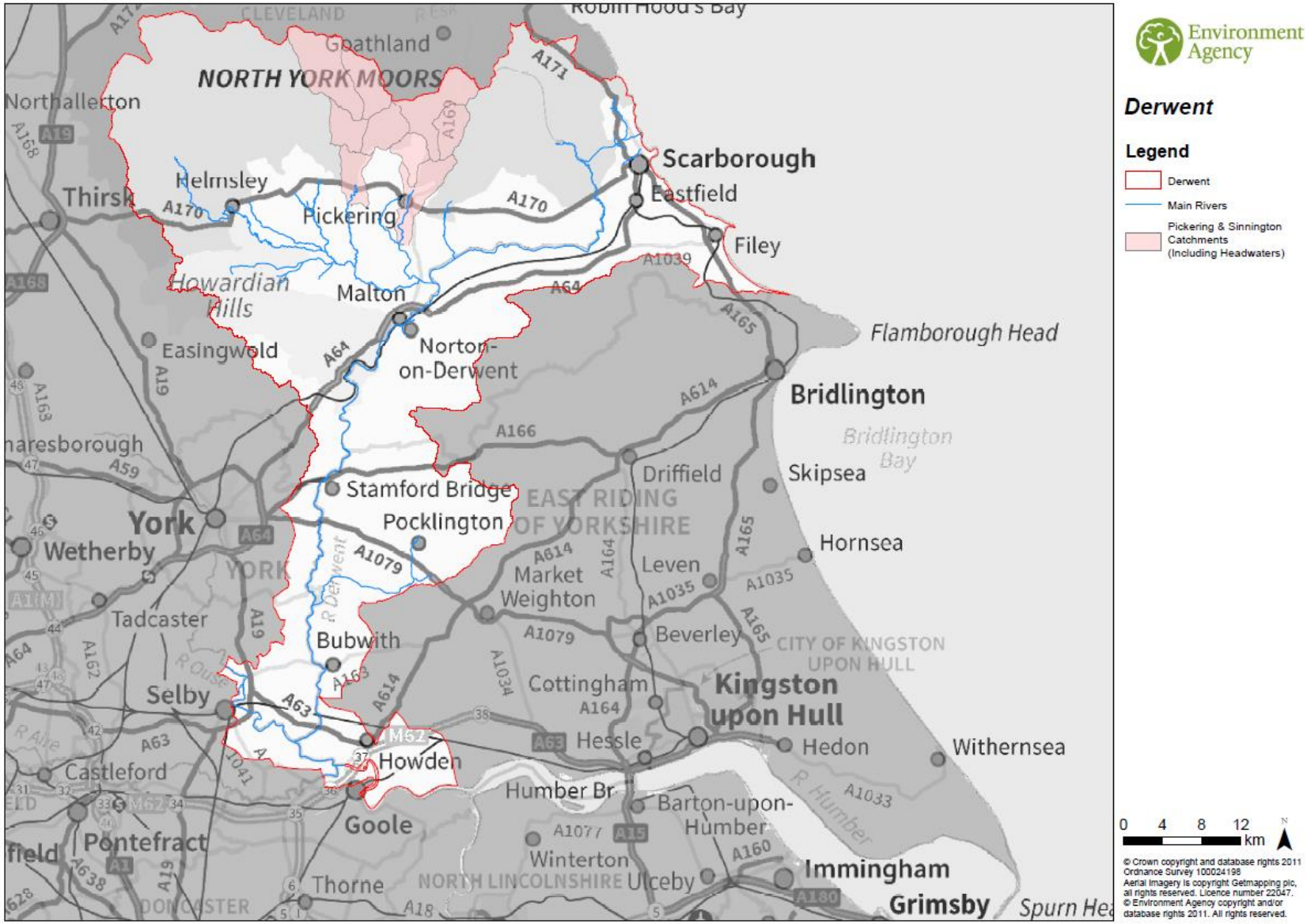
Slowing the Flow: Partnership Issues

- Different starting points – and beliefs…….
- Varying effect of different interventions – flood storage vs. trees & LWDs
- Maintaining LA commitment - and investment level
- Reservoir Acts
- Managing disappointment
- Finding storage site(s)
- Working with the North York Moors Railway
- Pickering Town Council
- Cost escalation

Slowing the Flow: What Next?

- Continues as demonstration project
- Partners will add interventions as part of ongoing land management
- More data gathering and modelling, as resources allow
- Potential to influence funding models for land use measures
- Lots of interest in attempting an integrated, catchment scale approach for Yorkshire Derwent
- Yorkshire Derwent Partnership – also includes other key partners
- Enormous potential for FRM, environmental and economic benefits

Slowing the Flow: Derwent Catchment



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Slowing the Flow

HAVE A GREAT DAY TOMORROW!

QUESTIONS?