Forestry Commission England

Business opportunities in multifunctional woodlands, particularly wood fuel

28th November 2014

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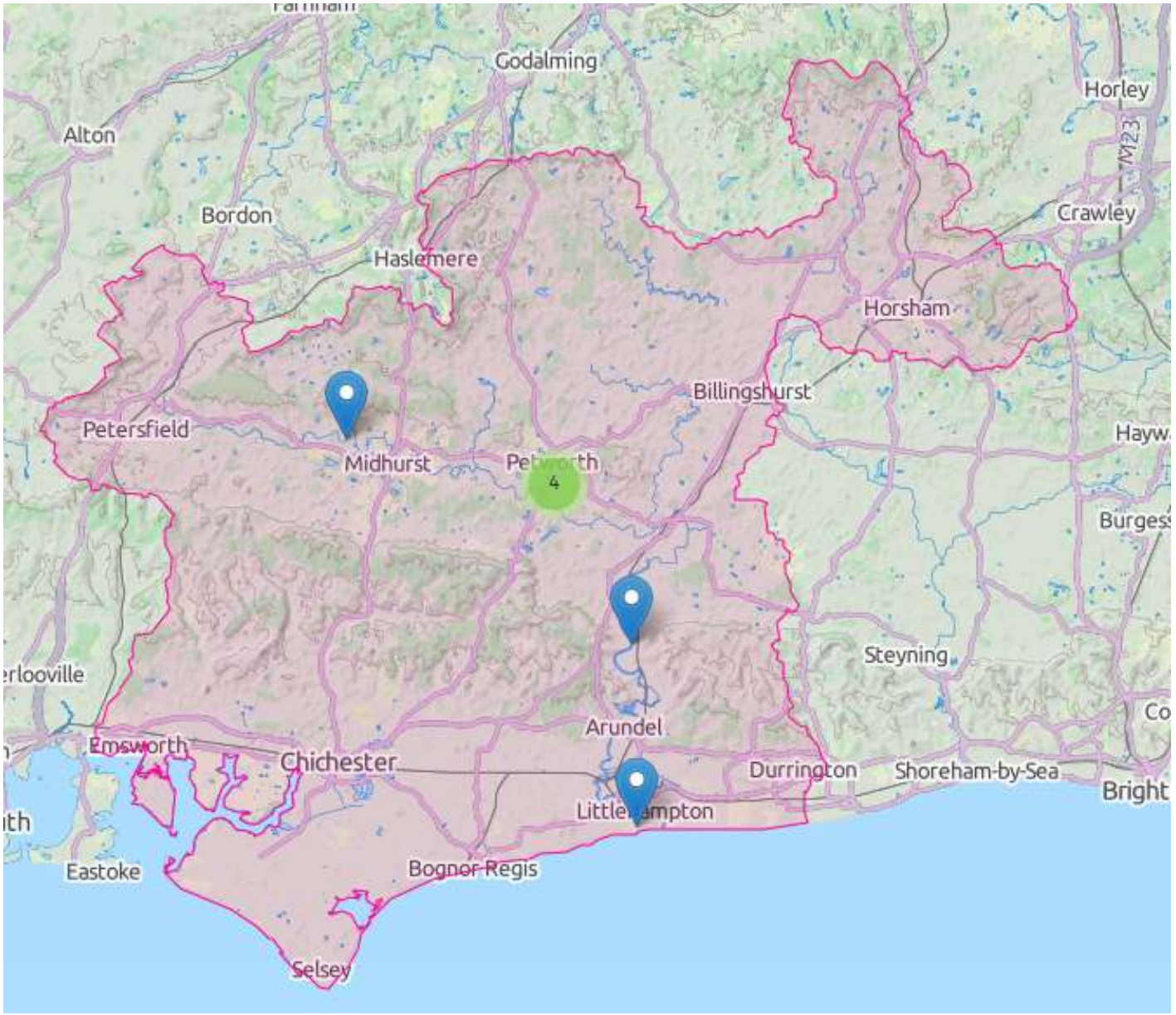
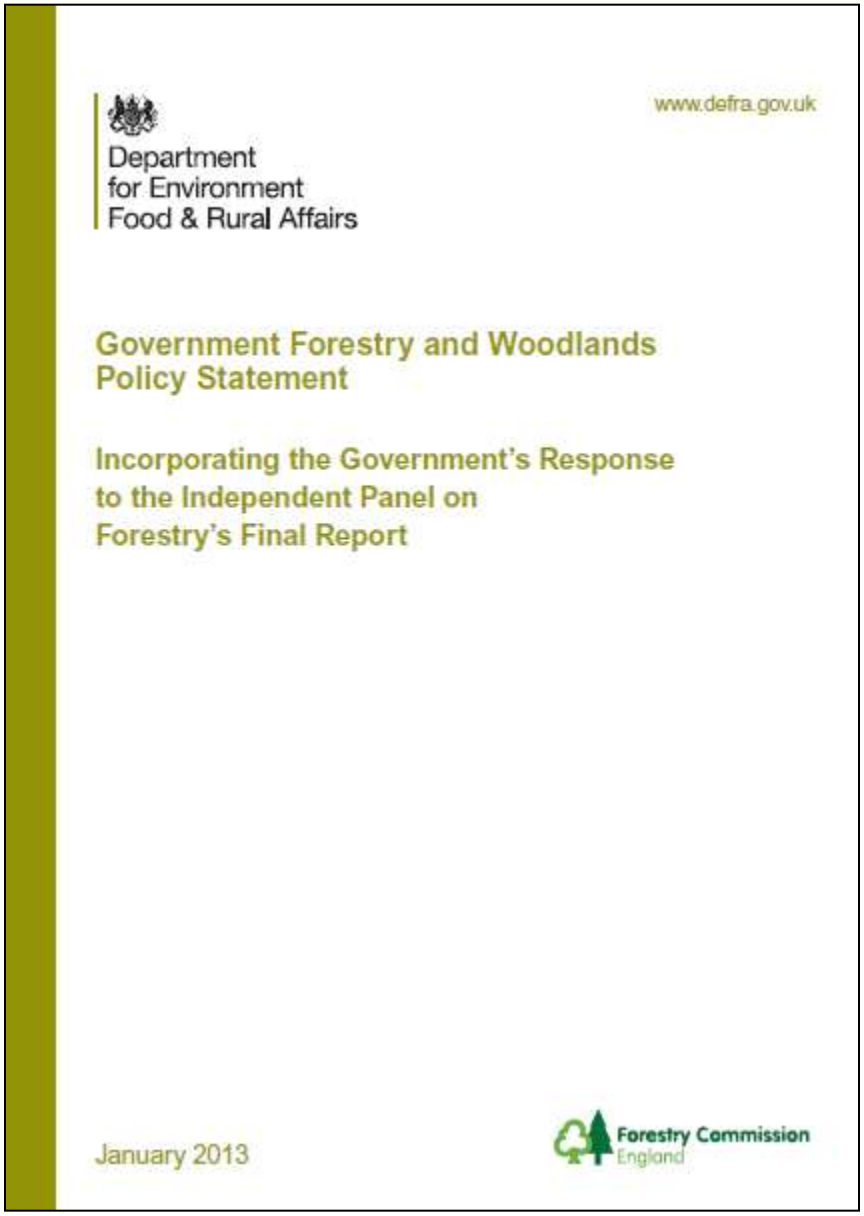
Forestry Commission England

Arun & Western Streams



Nothing new!

Forestry & Woodland Policy Statement



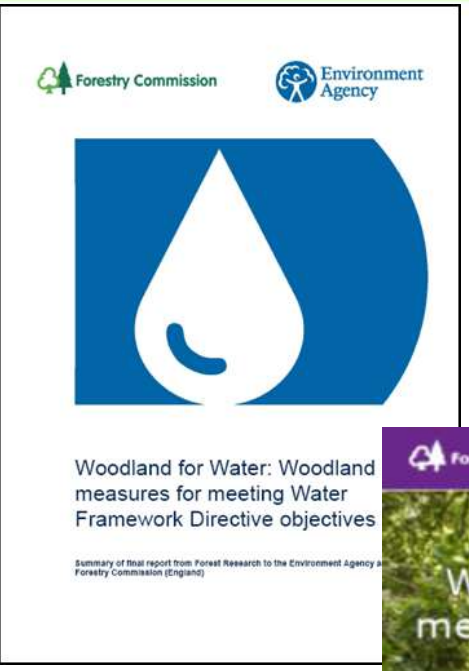
Objectives:

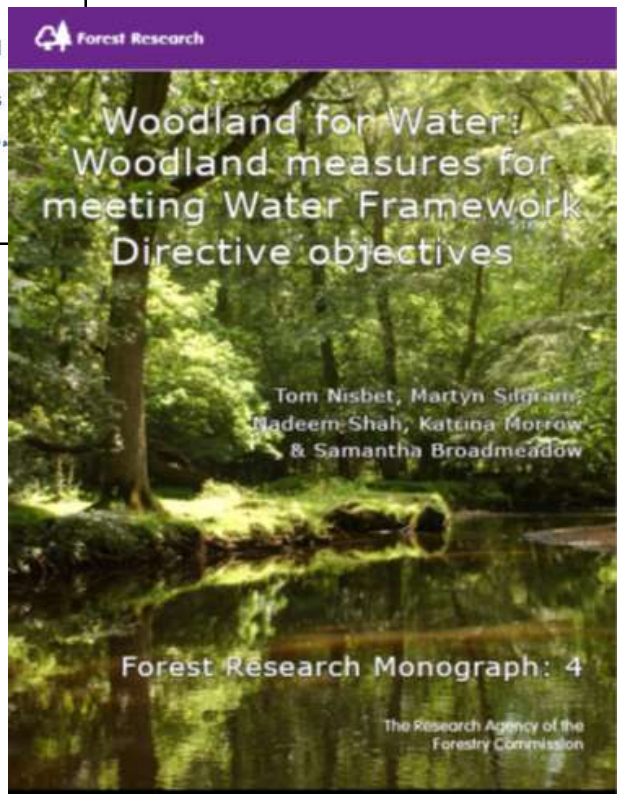
PROTECT – plant health, resilience, no net deforestation

IMPROVE – to drive economic growth; to benefit people & communities; to benefit wildlife and the natural environment

EXPAND – ambition is 12% by 2060 = c.5000ha/yr

Woodland for Water Report





Main conclusions:

- Well sited and designed new woodland can help improve water quality and manage flood flows
- Woodlands help to trap and retain nutrients and sediment in polluted runoff
- Riparian and floodplain woodland helps:
  - protect river banks
  - Moderate stream temperatures; and
  - Help mitigate downstream flooding

www.forestry.gov.uk/fr/woodland4water

Understanding Processes

Trees can assist in the following ways:

- by intercepting and using more water than most other vegetation types;
- by increasing infiltration and reducing water runoff;
- by slowing the flow when rivers are in flood;
- by protecting stream banks from erosion;
- by protecting sensitive soils from erosion and reducing sediment delivery to water courses;
- by intercepting sediment and pollutants in runoff;
- by intercepting pesticide spray drift; and
- by reducing fertiliser and pesticide usage

LOCATION, LOCATION, LOCATION

Scale of Potential WQ Benefit

Potential % reduction of pollutant loading

(NB assumes ideal location in the landscape, planting design and on-going management)

	Nitrate	Phosphate	Sediment	FIOs	BOD	Pesticides	Ammonia
Replacement of agricultural activity forming pollutant source	**70-90%**	**90-100%**	**90-100%**	**90-100%**	**90-100%**	**90-100%**	**70-90%**
Planting of woodland buffer, either riparian or downslope/field edge	**50-90%**	**70-100%**	**50-100%**	**50-100%**	**50-100%**	**60-100%**	**50-90%**

Approaches to Targeting

For the next Rural Development Programme, three stages to targeting are envisaged for forestry measures:

- **Mapping** – where spatial data is available and makes sense for national targeting
- **Target statement** – to clarify how to interpret maps, or where maps aren't available
- **Scoring** – to differentiate between objectives and within an objective

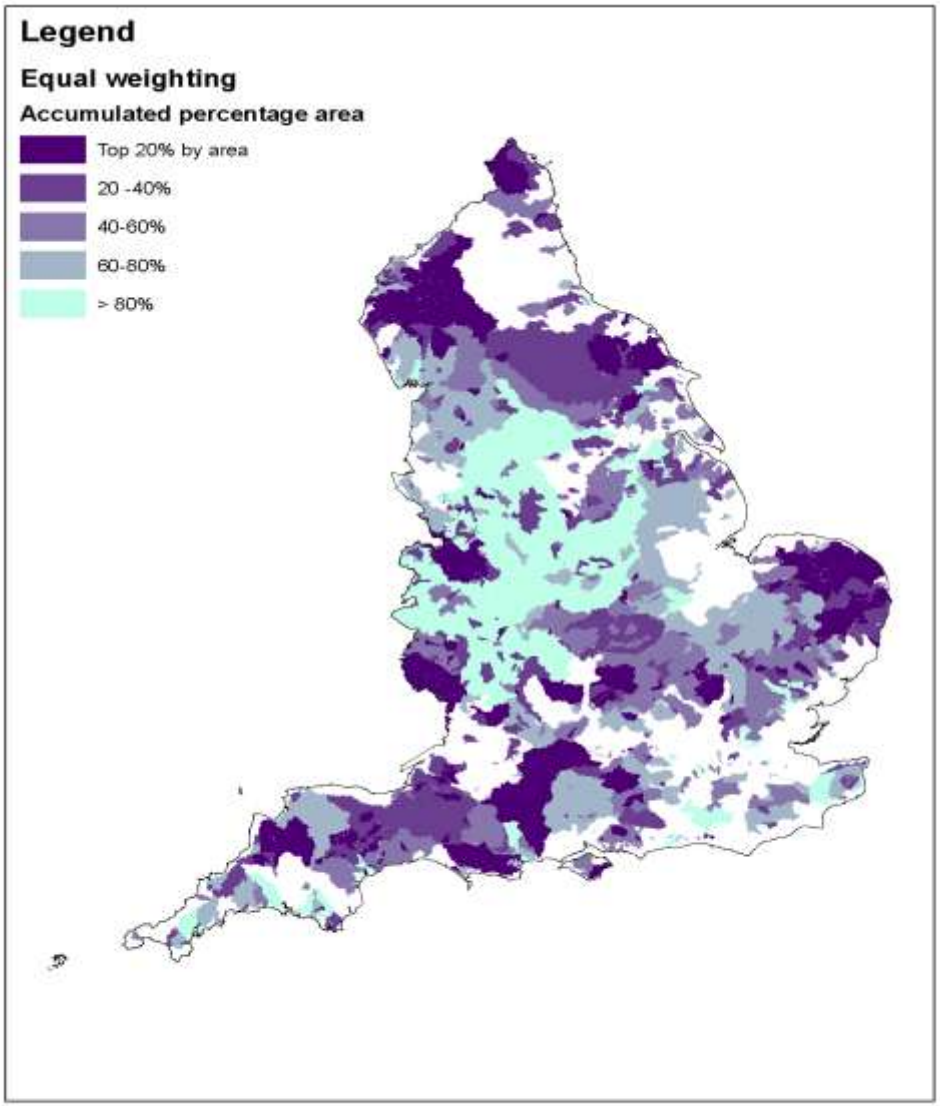
Diffuse Pollution from Agriculture

FC Opportunity Mapping will focus on

- Phosphates
- Nitrates
- Pesticides
- Sediment
- Faecal Indicator Organisms

Woodland creation can help but opportunities need to mapped against areas where that help is most needed.

Darker areas in map to the right are possible priority areas (yet to be confirmed)

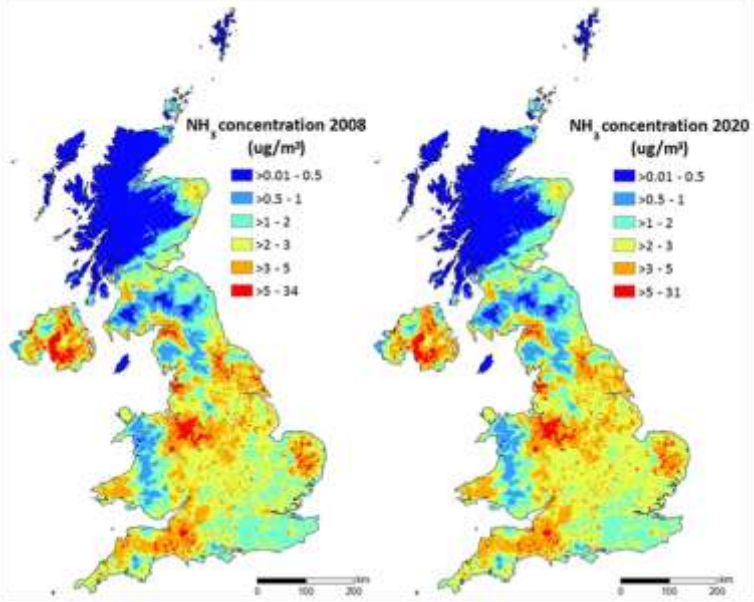


Environment Agency - Risk and Forecasting 8/1/2014

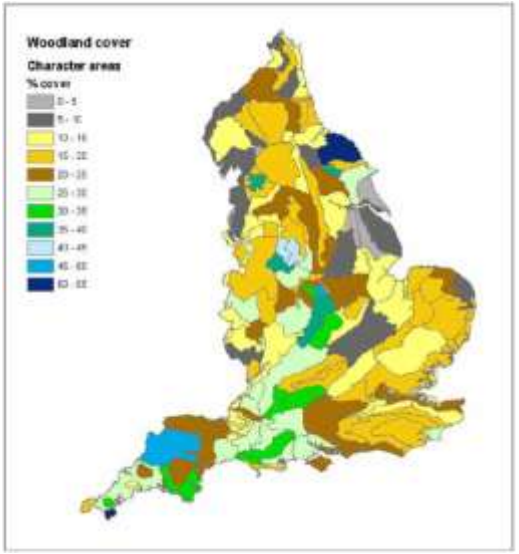
Other Priorities for Woodland

Other spatial priorities for woodland for water are likely to include:

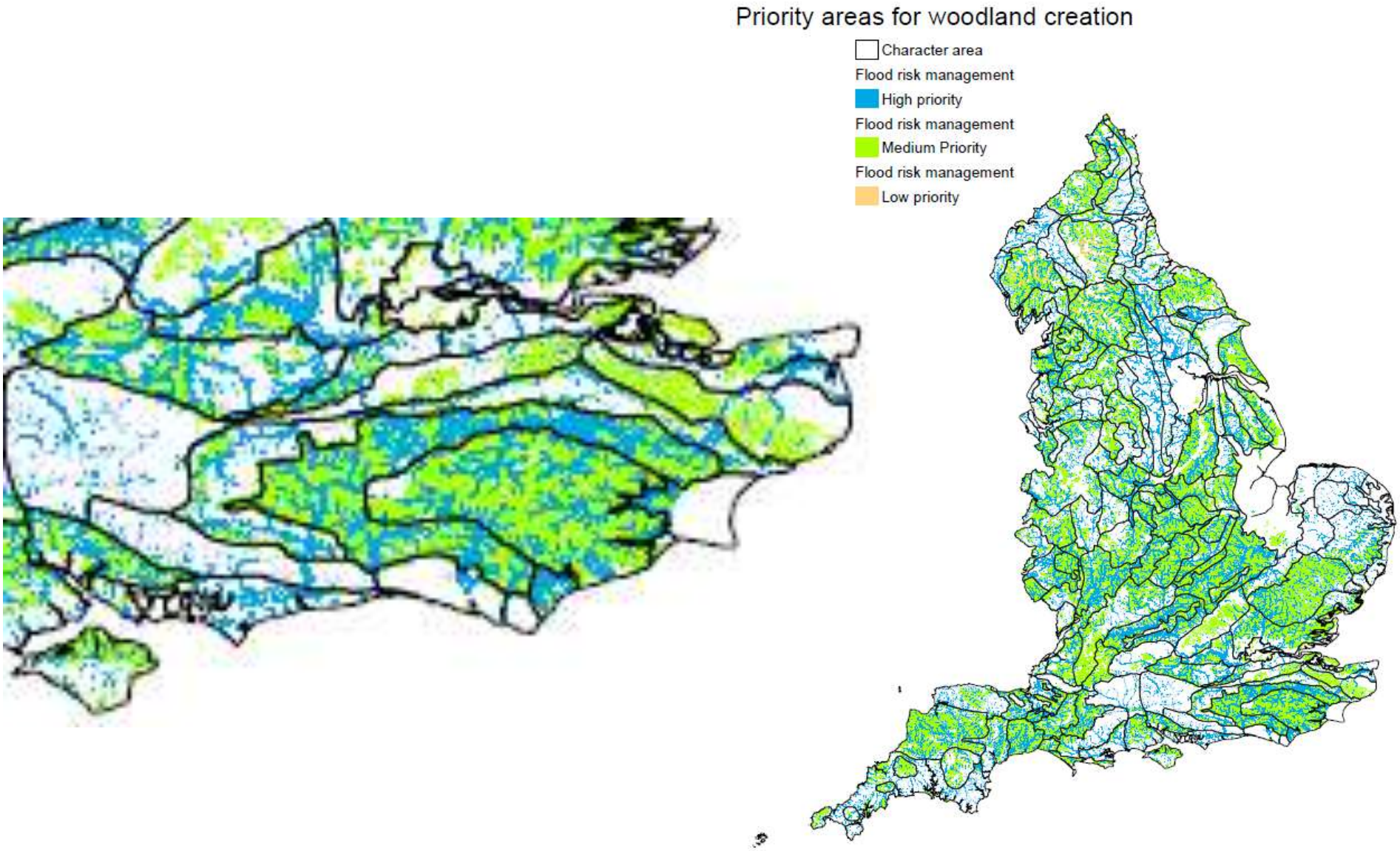
- **Ammonia concentration** (top maps) – source is mainly from pig & poultry units, with receptors such as SSSIs being adversely affected



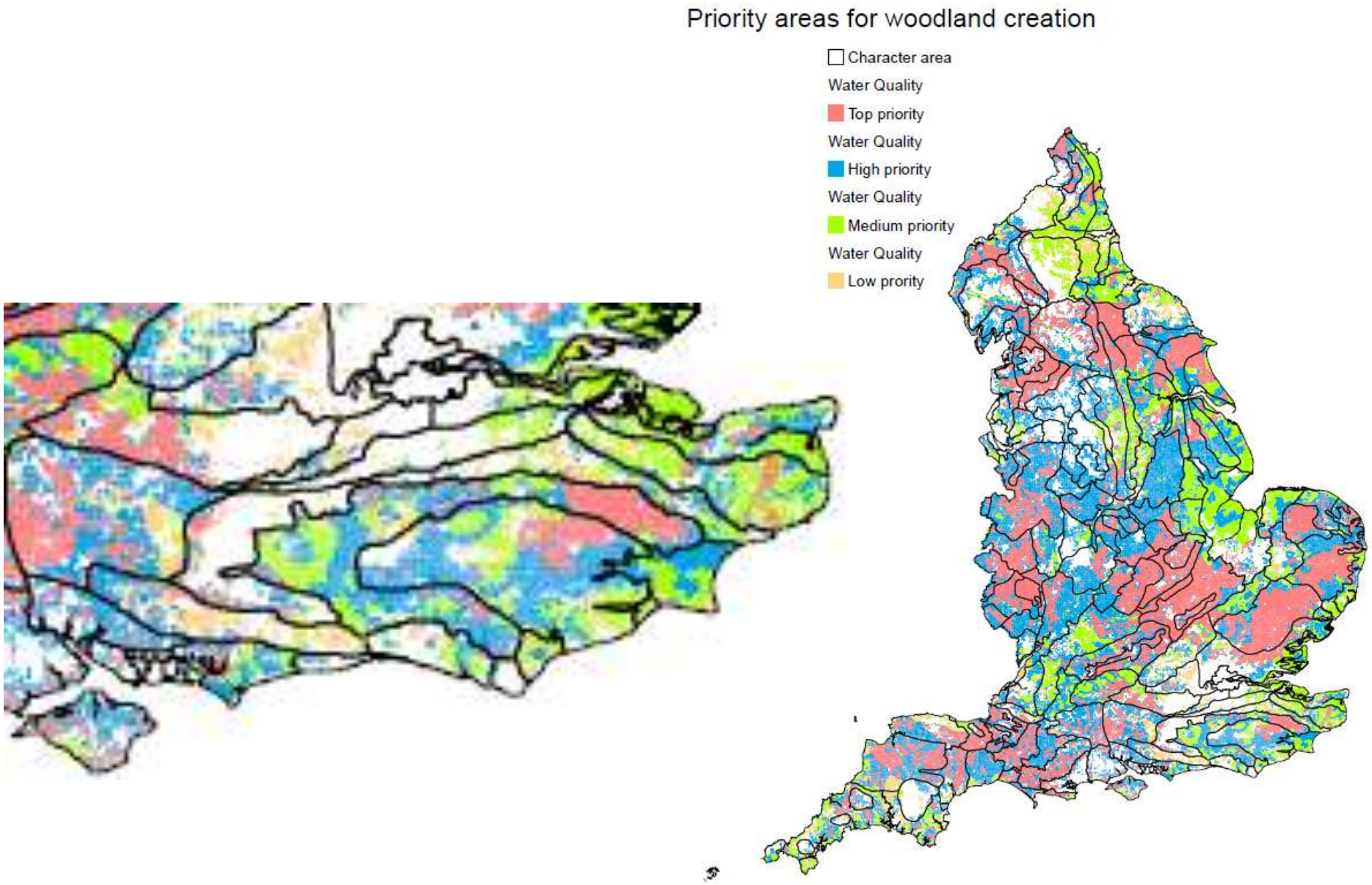
- **Water temperature** (bottom map shows % woodland cover adjacent to rivers) – high summer river temperatures now sometimes exceed lethal temperatures for salmonids. Tree planting needed to provide shade.



Flood risk management



Water quality



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Market drivers

Energy value of conifers

Species	Volume per tonne, green	Green density	Basic (oven dry) density	Moisture content (green, wet basis)	Weight at 30% moisture content	Energy value at 30% moisture content	ROUNDED Energy value	Estimated Yield based on maximum MAI (Mean Annual Increment)	Estimated Energy yield per ha per year
	m^3/tonne	kg/m^3	kg/m^3	%	kg per m^3	kWhs per m^3	kWhs per m^3 at 30% mc	m^3 per ha per year	kWh per ha per year
Scots pine	0.980	1020	410	60%	586	2,050	**2,000**	8	**16,400**
Corsican pine	1.000	1000	400	60%	571	2,000	**2,000**	8	**16,000**
Lodgepole pine	1.050	950	390	60%	557	1,950	**1,900**	8	**15,600**
Sitka Spruce	1.080	920	350	62%	500	1,750	**1,700**	14	**24,500**
Norway Spruce	1.040	960	340	65%	486	1,700	**1,700**	10	**17,000**
European Larch	1.110	900	450	50%	643	2,250	**2,200**	8	**18,000**
Japanese or hybrid Larch	1.200	830	410	51%	586	2,050	**2,000**	8	**16,400**
Douglas Fir	1.150	870	430	51%	614	2,150	**2,100**	12	**25,800**
Western Hemlock	1.070	930	360	62%	514	1,800	**1,800**	10	**18,000**
W Red Cedar & Lawson Cyprus	1.120	890	320	65%	457	1,600	**1,600**	8	**12,800**
Grand Fir	1.170	850	300	65%	429	1,500	**1,500**	8	**12,000**
Noble Fir	1.070	930	310	67%	443	1,550	**1,500**	8	**12,400**
Baseline for Softwood (excluding Grand Fir, Noble Fir)	***1.080***	***927***	***386***	***59%***	551	1,930	1,900	8	**15,440**

Energy value of broadleaves

	m^3/tonne	kg/m^3	kg/m^3	%	kg per m^3	kWhs per m^3	kWhs per m^3 at 30% mc	m^3 per ha per year	kWh per ha per year
Oak	0.940	1060	560	47%	800	2,800	**2,800**	4	**11,200**
Beech	0.970	1030	550	47%	786	2,750	**2,700**	4	**11,000**
Sycamore	1.200	830	490	41%	700	2,450	**2,400**	4	**9,800**
Birch	1.070	930	530	43%	757	2,650	**2,600**	4	**10,600**
Elm	0.970	1030	430	58%	614	2,150	**2,100**	4	**8,600**
Ash	1.280	780	530	33%	757	2,650	**2,600**	6	**15,900**
Hornbeam			570	42%	814	2,850	**2,800**	4	**11,400**
Sweet Chestnut			440	55%	629	2,200	**2,200**	12	**26,400**
Cherry (European)			500	44%	714	2,500	**2,500**	6	**15,000**
Lime (European)			440	34%	629	2,200	**2,200**	6	**13,200**
Alder (Common)			420	48%	600	2,100	**2,100**	6	**12,600**
Poplar	1.11	900	360	60%	514	1,800	**1,800**	18	**32,400**
Poplar (Black)			350	60%	500	1,750	**1,700**	12	**21,000**
Poplar (Grey)			390	50%	557	1,950	**1,900**	12	**23,400**
Willow (Crack)			350	50%	500	1,750	**1,700**	12	**21,000**
Willow (White)			360	53%	514	1,800	**1,800**	12	**21,600**
Willow (SRC)				est 60%		1,800	**1,800**	18	**32,400**
Eucalypts									
Baseline for Hardwood (excluding Poplar and SRC Willow)	***1.072***	***943***	***515***	***45%***	736	2,575	2,500	4	**10,300**

Market Growth

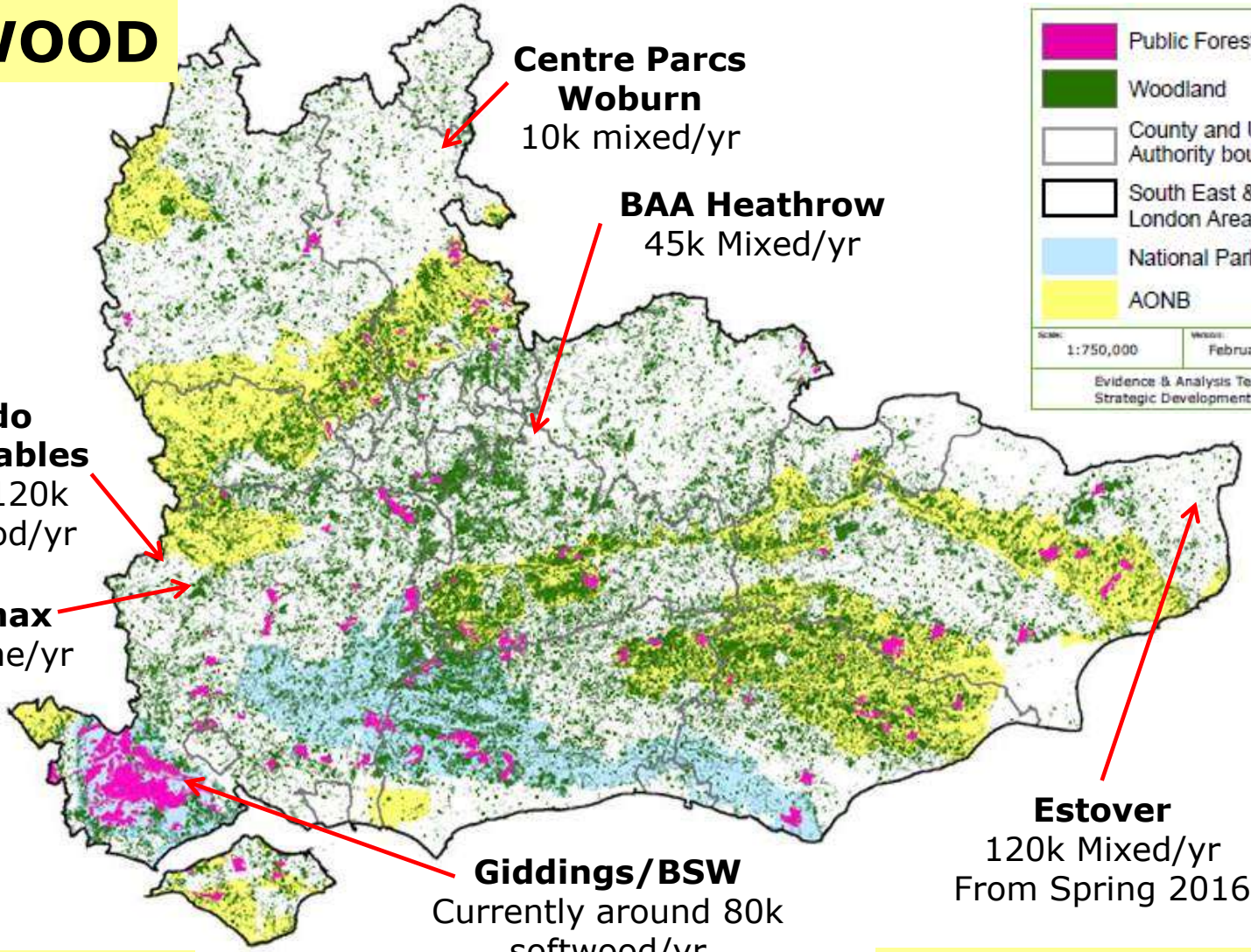
FIREWOOD

Centre Parcs Woburn
10k mixed/yr

BAA Heathrow
45k Mixed/yr

Verdo Renewables
Up to 120k softwood/yr

Bedmax
50k pine/yr



Estover
120k Mixed/yr
From Spring 2016

Giddings/BSW
Currently around 80k softwood/yr
Exploring expansion to 175/yr

WOODHEAT

CONSTRUCTION

Conventional Logs

Convenient as long as you don’t mind loading the systems and superb if you have your own woodland

Wood burning stoves:

Batch Boilers:

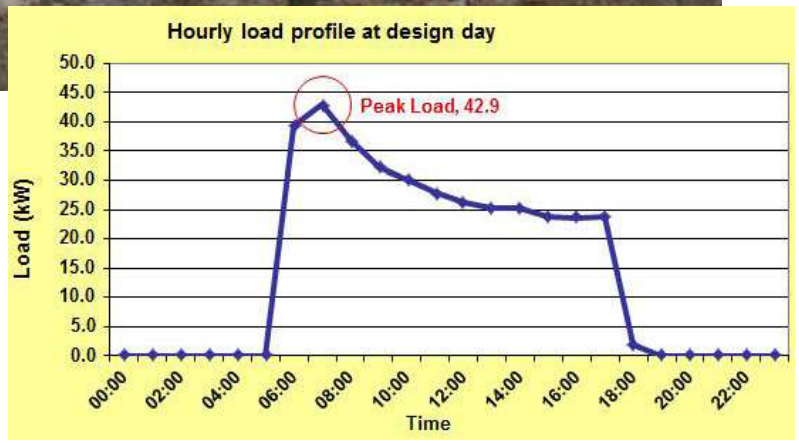
Accumulator tanks

- 30kW for 4 bed semi
- Installed for £7,000
- Uses > 12 tonnes of wood per year

Wood pellets

Offer the convenience of an oil fired boiler, require less space and cope well with varied loads – but the fuel costs more than logs or chips

FC Bucks Horn Oak



- Average heat demand over design day = 15kW
- Total energy demand over design day = 370kWh
- Annual energy use = 35,000kWh
- Annual pellet use = approx 8 tonnes (approx £2,000)
- Annual service costs = approx £500
- Annual RHI income = approx £2,800
- Previous heating system = electric storage heaters
- Installation costs (all inc VAT):
  - Boiler et al approx £30,000 (includes: self cleaning boiler, 5000 litre accumulator, 5.3 tonne pellet store, 8.0 metre flue and RHI application)
  - Energy Centre approx £16,000 (includes: reinforced concrete floor to cope with weight of accumulator and fuel store, design to match office and locally sourced timber)
  - Conversion of office to wet radiators heating: £17,000

BHO Energy Centre

BHO Woodpellet heating system

Woodlands for Water

Woodchips

Well suited to medium heat users but requires space and easy access for the woodchip storage and delivery. Particularly well suited to farms and estates with their own woodland and farm equipment to facilitate self supply.

Heathrow Terminals 2 & 5

Estover Energy

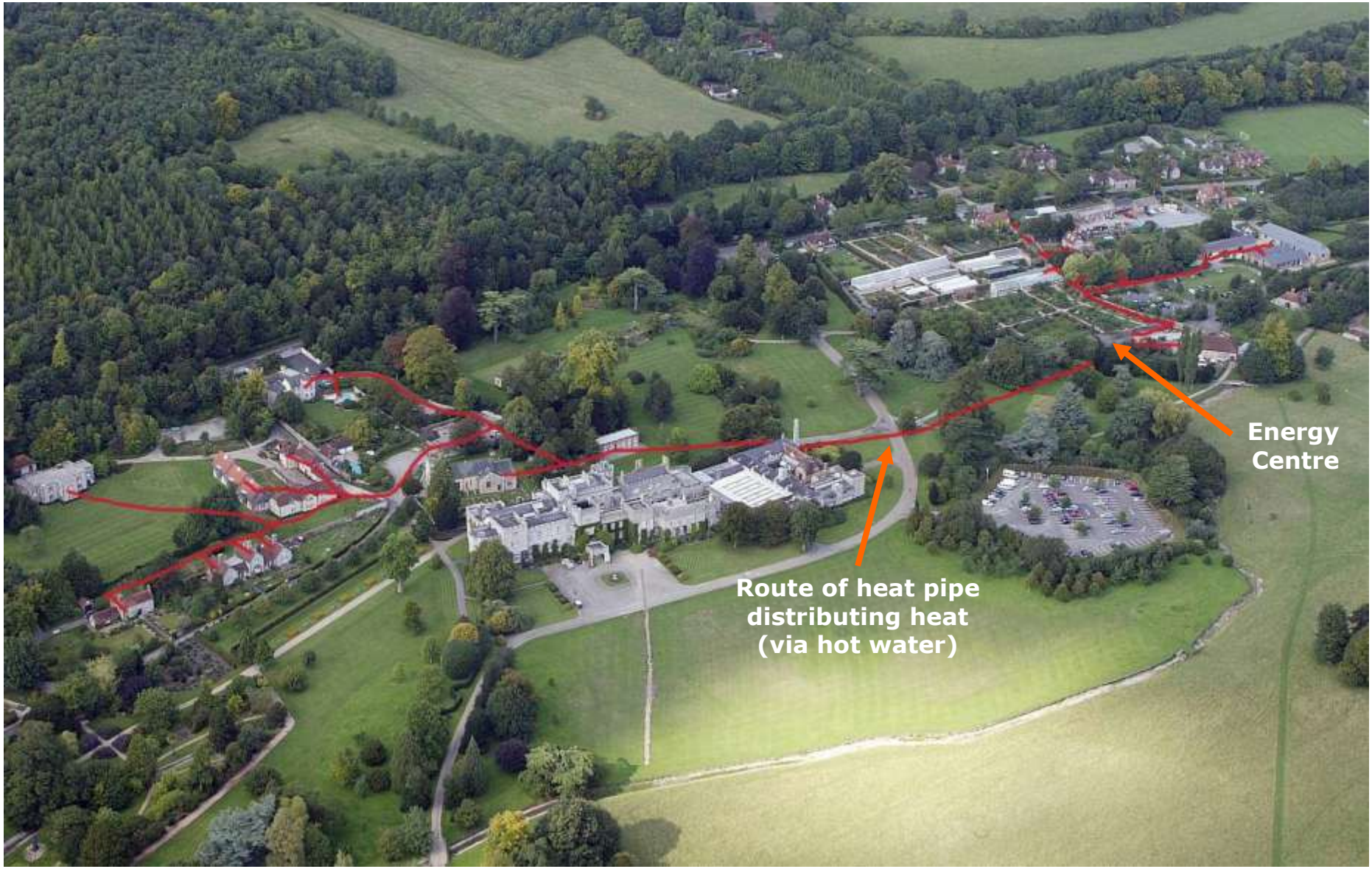
- **Located to supply low-carbon heat and power to Discovery Park**
- **Up to 11MW power and 8MW heat - enough energy to power 21,000 homes**
- **Fuelled from low-grade wood sourced locally**

Small scale CCHP?

Stansted Park

Stansted Park

West Dean – district heating



Community woodheat -Hoathly Hill

Energy centre

Heat distribution network (underground hot water pipe)

Hoathly Hill community have about 33 properties, previously heated individually LPG & electricity) converted to a community woodfuelled energy centre in 2007


Heat pipe connection


Heat Exchanger


Heat meter in each building/home

Highfields School

Renewable Heat Incentive (from 1 Jan 2015)

Non-Domestic	**i.e. > 1 property**			
Boiler size kW	**Teir 1** First 'X' kWh produced. 'X' = 1345 (hrs) x boiler capacity (kW)	**Teir 2** > 'X' kWh produced.	Duration of payments Years	
Up to 200 kW	6.8 pence per kWh	1.8 pence per kWh	20	
200 – 999 kW	5.1 pence per kWh	2.2 pence per kWh	20	
> 1 MW	2.0 pence per kWh		20	
Solid Biomass CHP	4.1 pence per kWh			Must be certified to CHPQA
Domestic	**One domestic property**			
	12.2 pence per kWh		7	EPC Certificate required Usually paid on deemed heat load

Be the price maker

Farm diversification

Difficult land

Two birds with one stone?

Harvesting willow coppice

Biomass Baler

Conventional woodland:

Re-establishing markets

Torry Hill Chestnut products factory
(Est. > 30 jobs from 800 ha of SC coppice)

Coppice products

Local use: Flood Defence

Pilings with brushwood matting (faggots)

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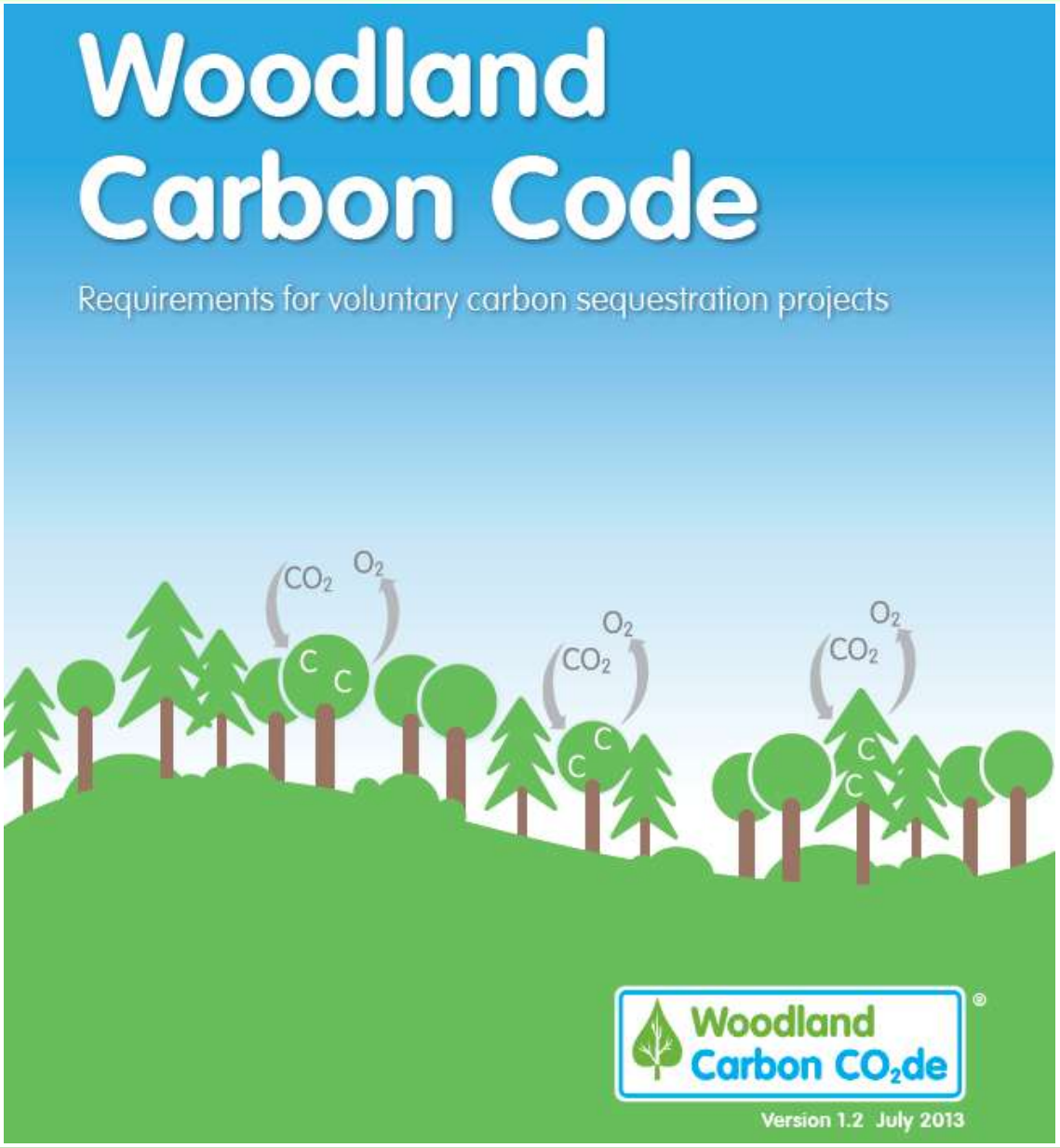
Carbon Sequestration

Woodland Carbon Code



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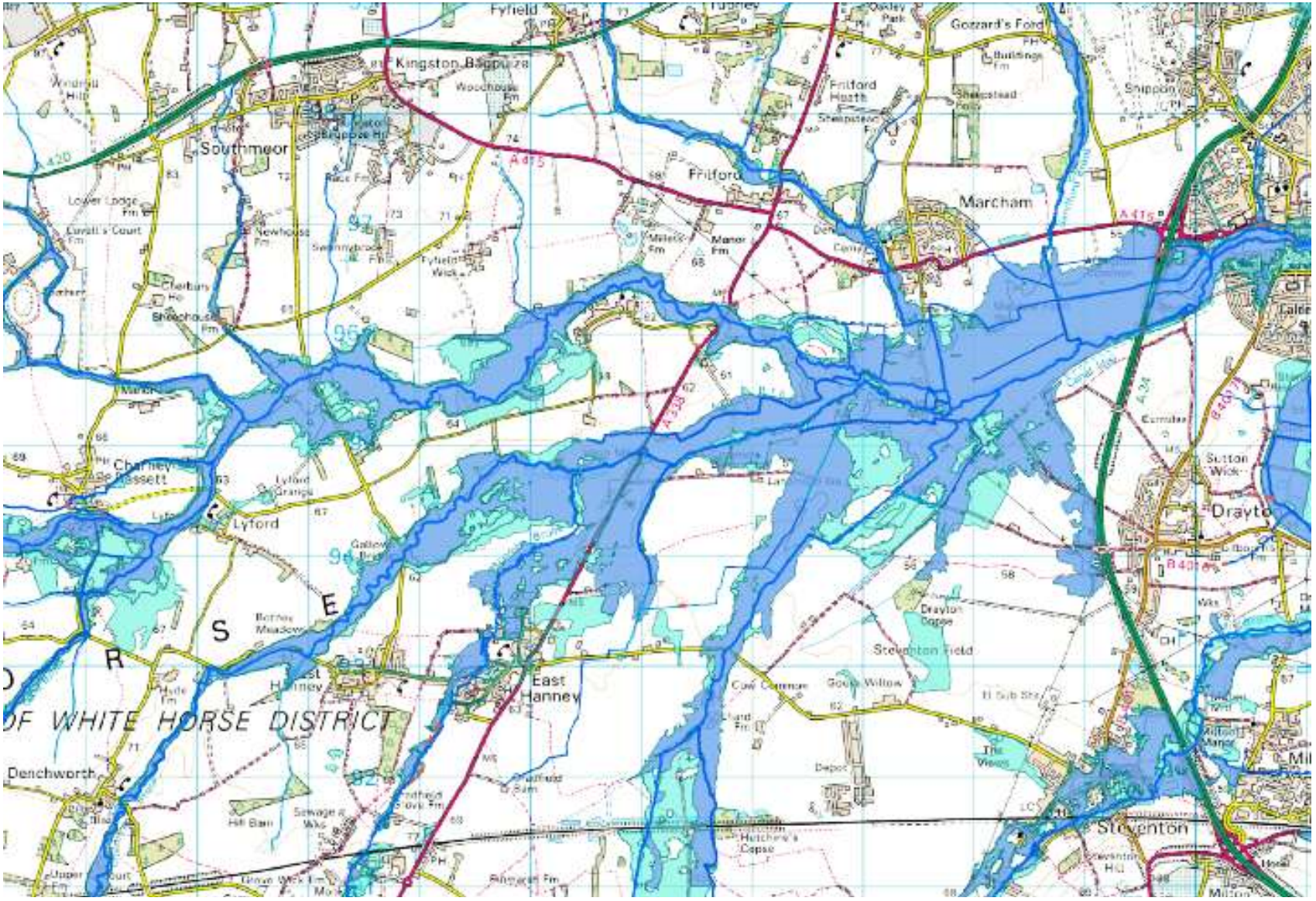
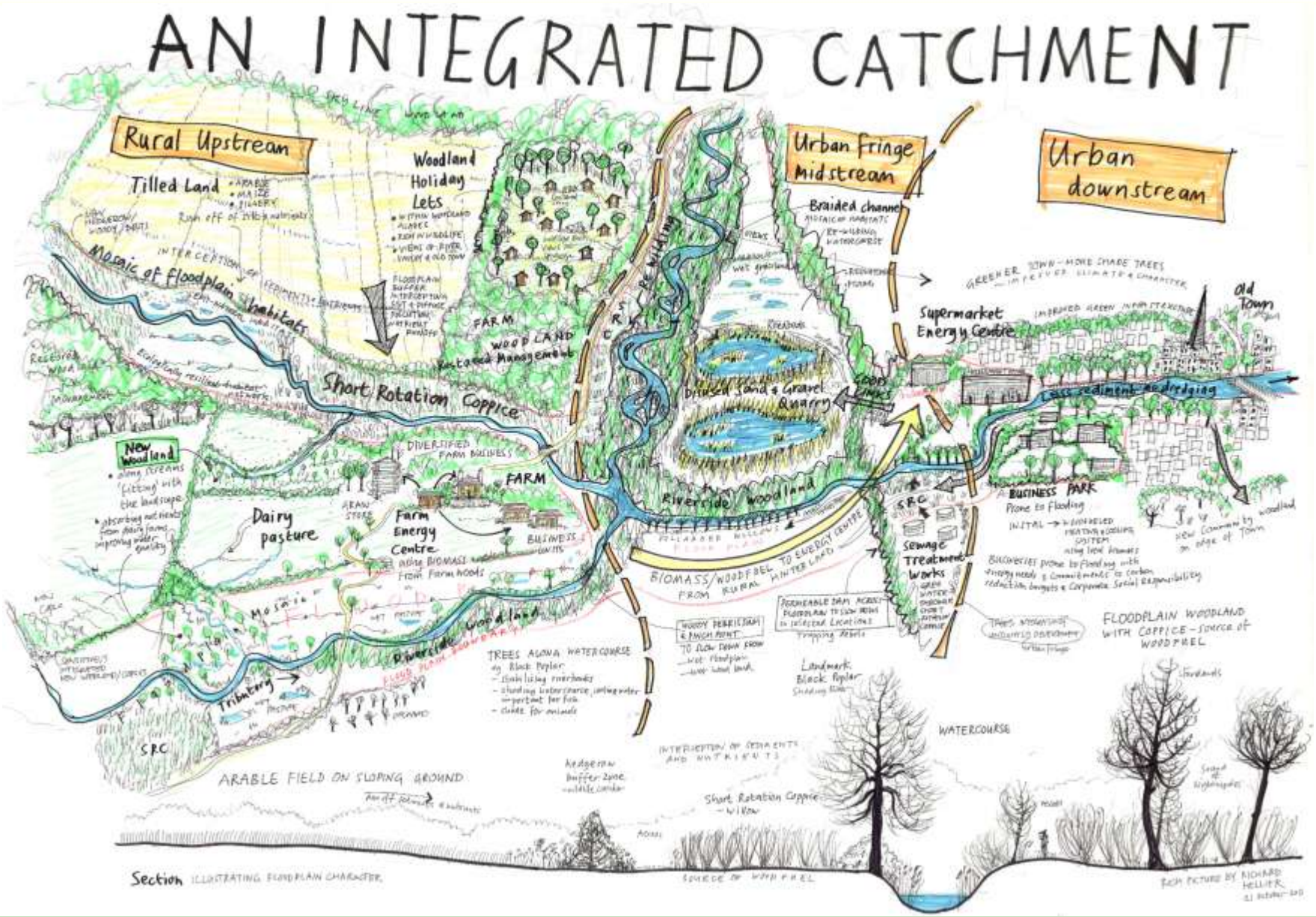
Catchment scale

Integrated landscapes?



Bring it all together into:



Thank you