

Strategies for reusing canal sediments in the Scottish Circular Economy

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Genoa, 14-17th June 2017

Scottish
Canals

**Alasdair
Hamilton**
Senior Project
Manager



@ScottishCanals

Safeguarding our heritage.
Building our future.



Scottish Canals

7766
mega litres of
water in canals

19
reservoirs
800 hectares of water
825 hectares of land

92 buildings
worthy of statutory
protection

Crinan Canal

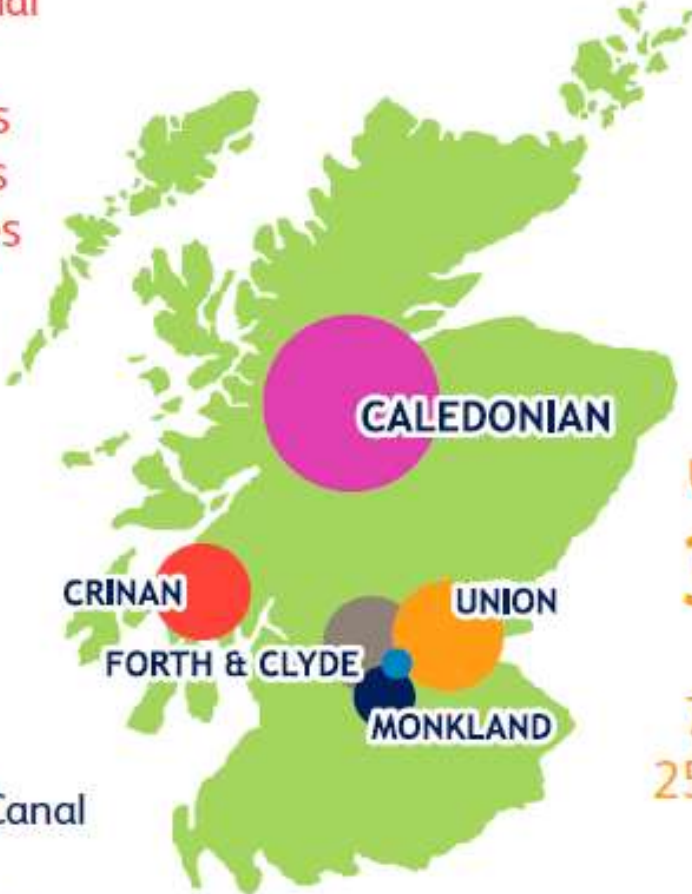
9 miles
15 locks
7 bridges

Caledonian Canal

29 locks
4 aquaducts
8 road bridges
2 rail bridges

Forth & Clyde Canal

35 miles
41 locks
58 bridges



Union Canal

32 miles
2 locks
72 bridges
25 aqueducts

Almost 500k
visitors to the Falkirk
Wheel every year

Monkland Canal

12 miles
6 bridges

Figure 1: Scottish Canals map, facts and figures
Source: Scottish Canals



Scottish Canals

We are
here →



Launch

Growth

Maturity

Decline

Launch

Growth...

1768

1790

1820

1900

2000



















Pinkston

Water
sports

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Water
sports

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outwardbound.org.uk



Bringing North Glasgow to Life

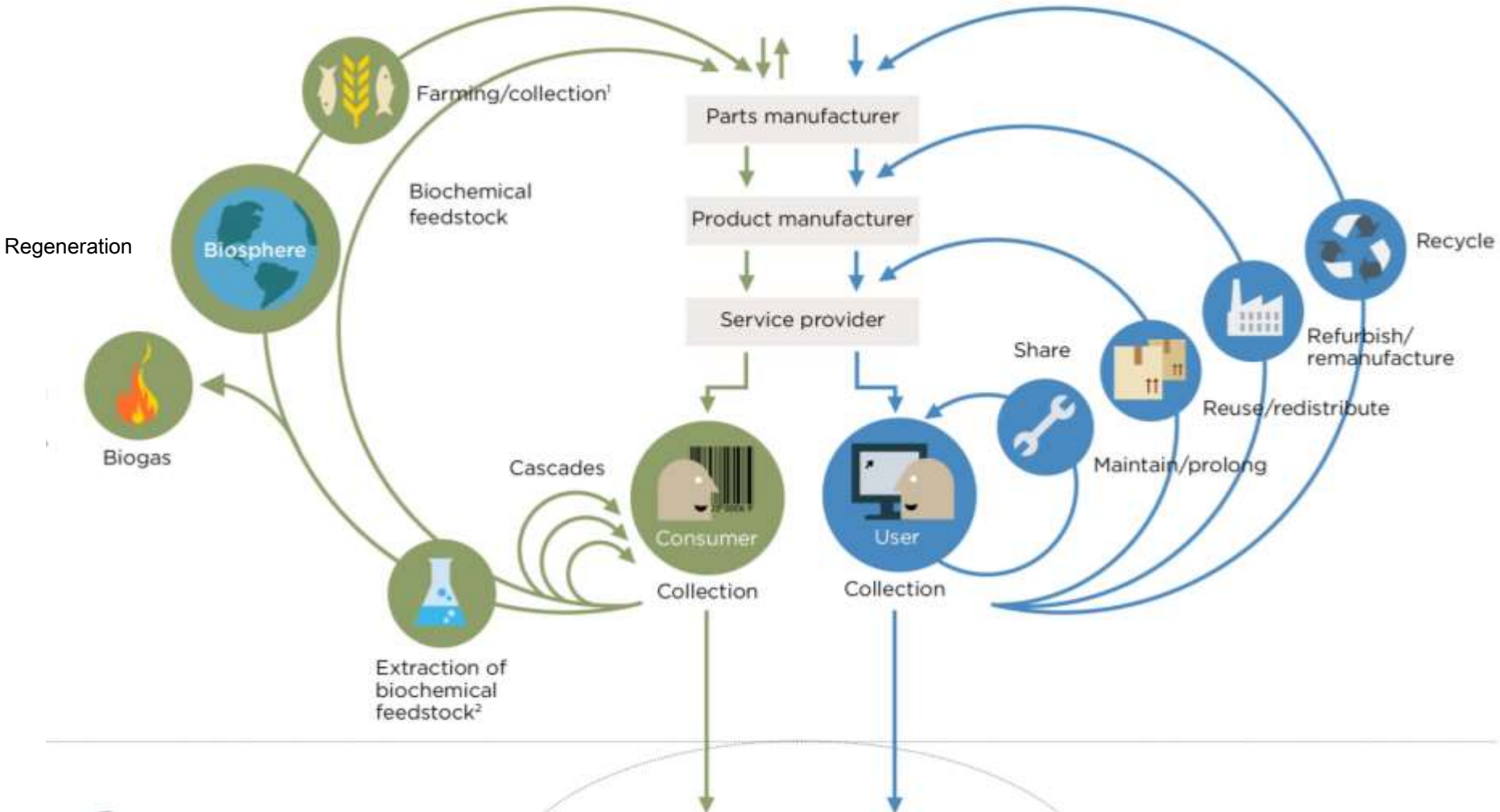


Renewables   Finite materials

Regenerate Substitute materials Virtualise Restore

Renewables flow management

Stock management



Scottish Circular Economy Strategy 2016



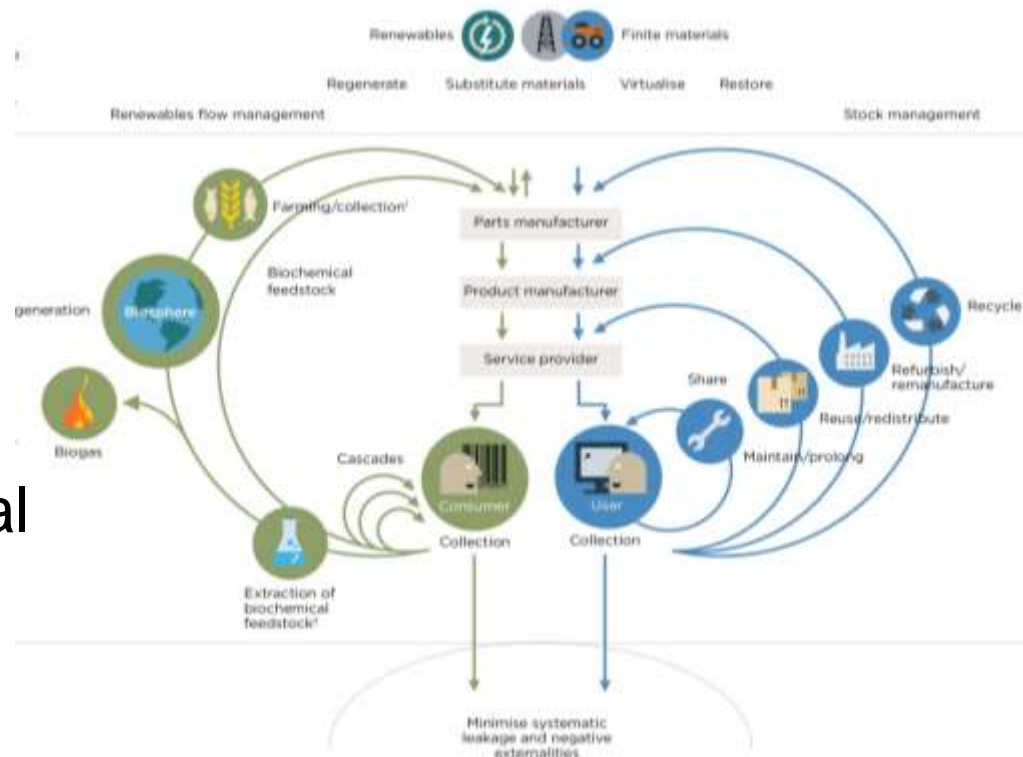
- Scotland first country to join EMF CE100 programme in 2013
- A more circular economy could reduce C emissions by 11 MT pa by 2050
- £620M additional turnover and 5,700 new jobs by 2020
- Focus: food, bio-economy, energy infrastructure, construction sectors (last is 50% of total waste)
- Reduce food waste by 33% by 2025

Making Things Last

A Circular Economy Strategy for Scotland

Challenges (opportunities) for Circular Economy applied to sediments

- What are the “restorative & regenerative” options for dredged sediments?
 - Use in bank repairs?
 - Replacing eroded soils?
 - Contaminant removal?
- Renewable energy recovery?
- Soil/nutrients for bio-based economy?
- Preserve/enhance natural capital (eco-system services)



Scottish Canals

Knowledge Transfer Partnership 2012-15

University of
Strathclyde
Engineering



Scottish Canals Knowledge Transfer Partnership

“To embed an environmentally sustainable approach to sediment management, reducing operational costs, generating opportunities for revenue growth and addressing emerging waste legislation requirements”

Knowledge
Transfer
Partnerships



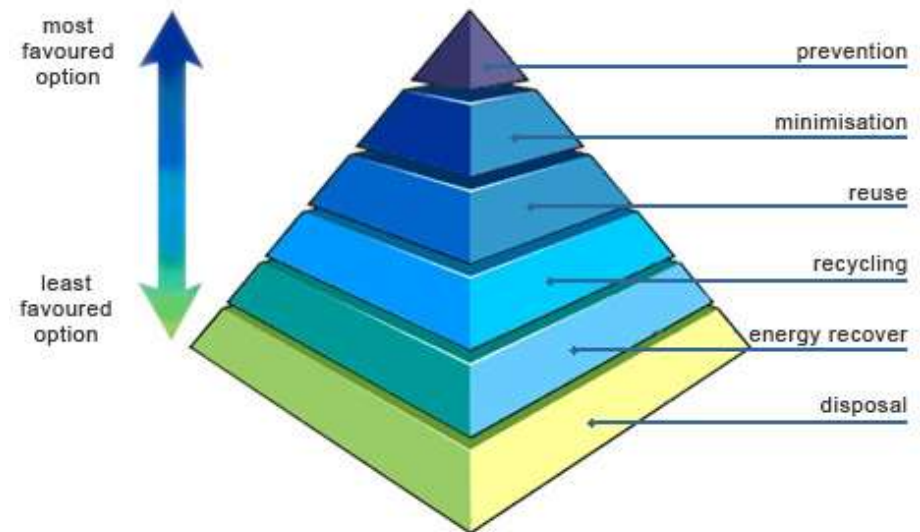
The challenges

- Dredged sediments considered as “waste”
- EU Landfill Directive, Regulations and Landfill Tax makes landfilling “waste” costly
- Scotland’s Zero Waste Plan (2010): 70% recycling, 5% landfill by 2025
- Distributed, potentially contaminated, liquifaction on transport
- Uncontaminated treated as inert waste (but more likely non-haz)

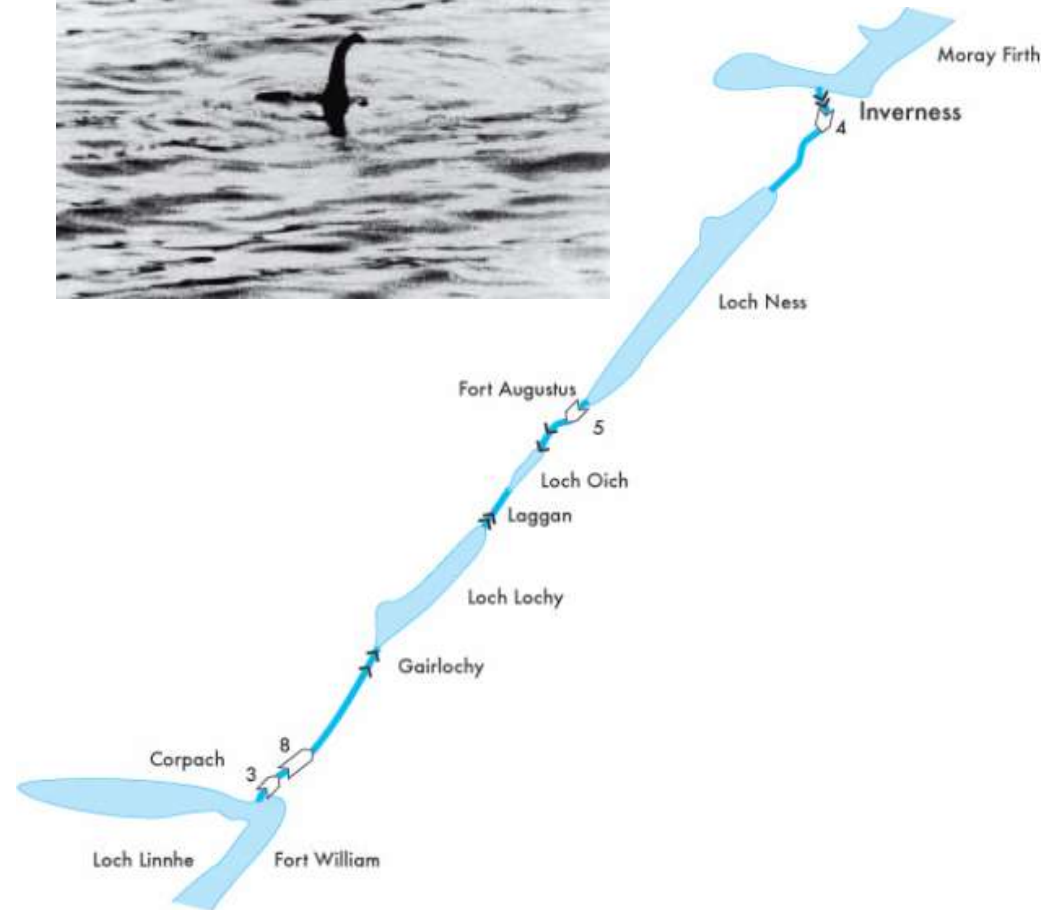


Waste hierarchy approach

- **Reduction:**
preventing siltation &
targeting dredging
- **Reuse:** of materials
- **Recycling:**
processing of
materials for
recyclates
- Renewable **energy
recovery**



Reduction: (1) Plough dredging in lochs on Caledonian Canal



(2) Targeted spot dredging



(3) In-house dredging capability (\neq landfill)



Reuse: (1) Bankside restoration under exemption Mar '14



Jun '14



Sept '14



Jan '15



May '16



Jun '17





(2) Nicospan* trial
(with Scheduled
Ancient Monument
consent)

*www.greenfix.co.uk



Recycling (1) Pinkston Basin

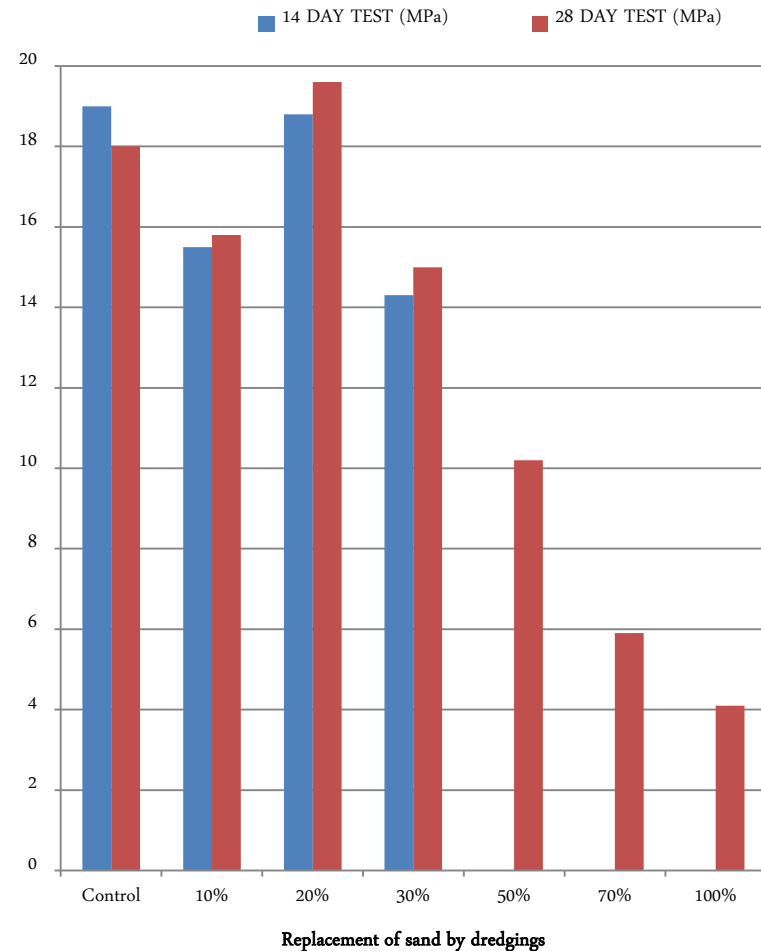




Two Brothers' Friendship Bridge Nelly Fackel



Pinkston Basin – cube tests



Cement (19), stone (45), sand (37)

Recycling: (2) Co-composting & soil manufacture









CAUTION
LORRIES
TURNING

CAUTION

CAUTION

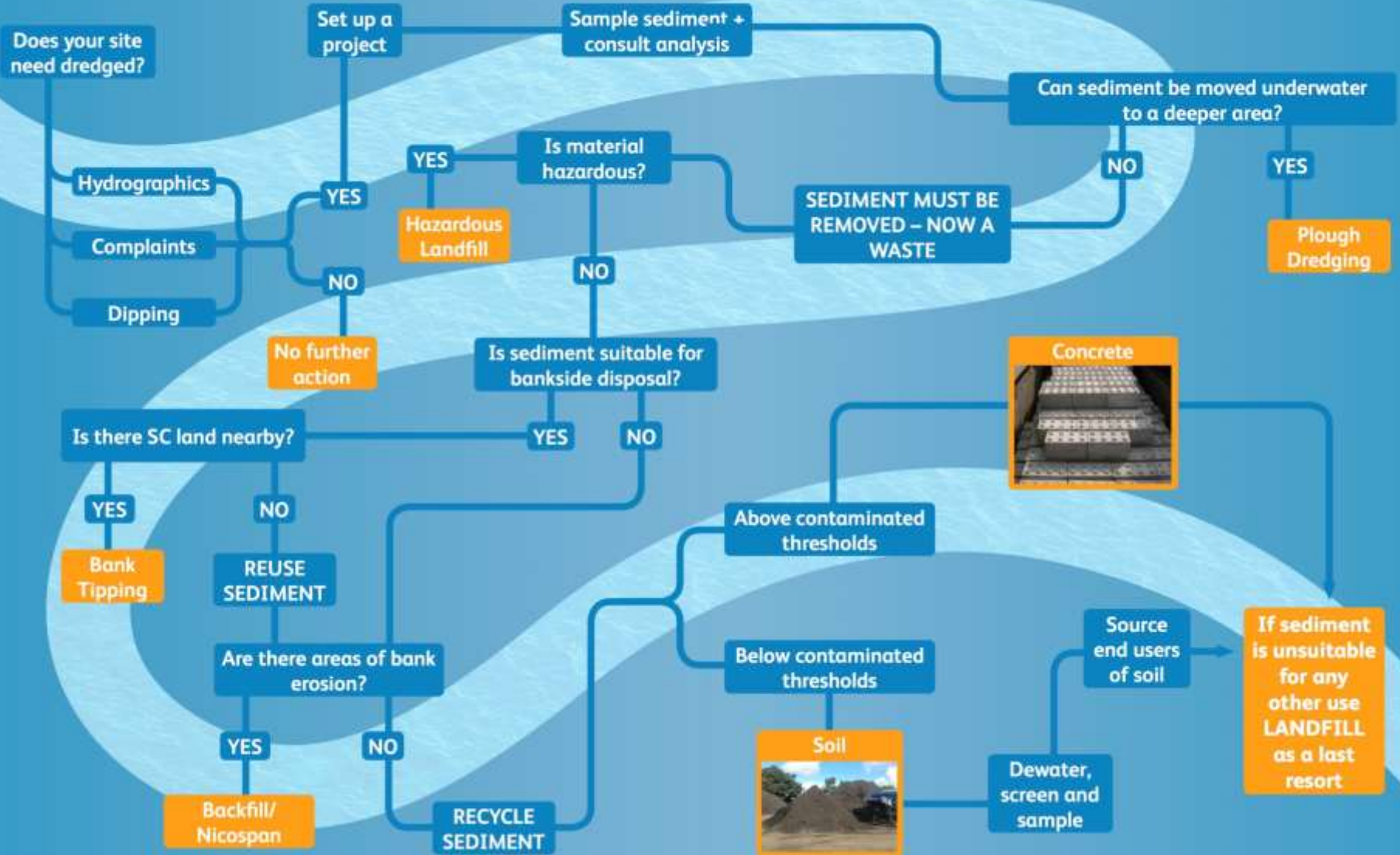
LAND







HOW TO REUSE YOUR DREDGED SEDIMENT



BioReGen Life Project 2005-10

Biomass

Remediation

(Re)Generation

Re-using brownfield sites
for renewable energy crops

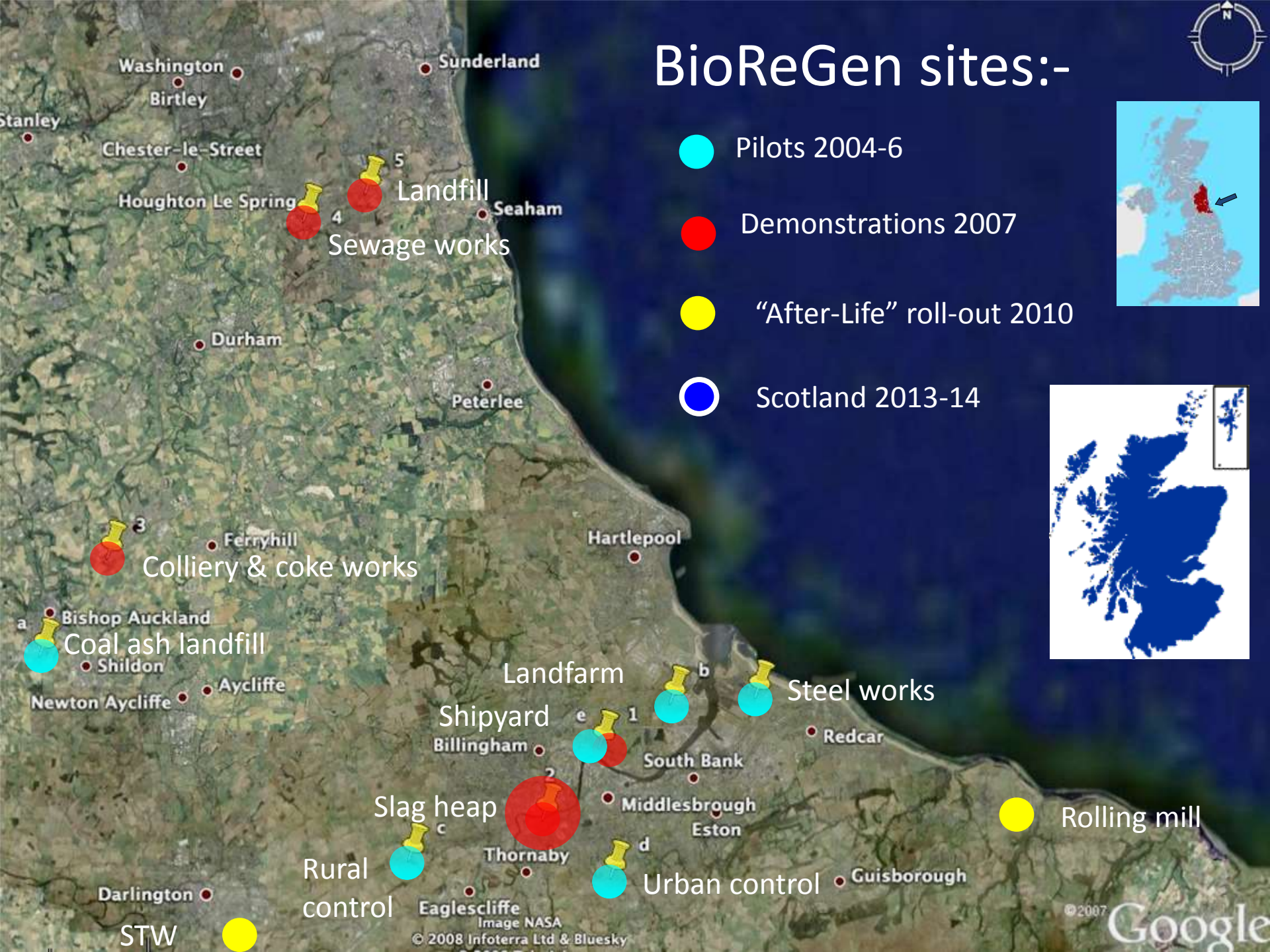




BioReGen sites:-



- Pilots 2004-6
- Demonstrations 2007
- "After-Life" roll-out 2010
- Scotland 2013-14



Tees Barrage 2007-2012



Material change for
a better environment



Placed dredgings, Tees Barrage (2007)







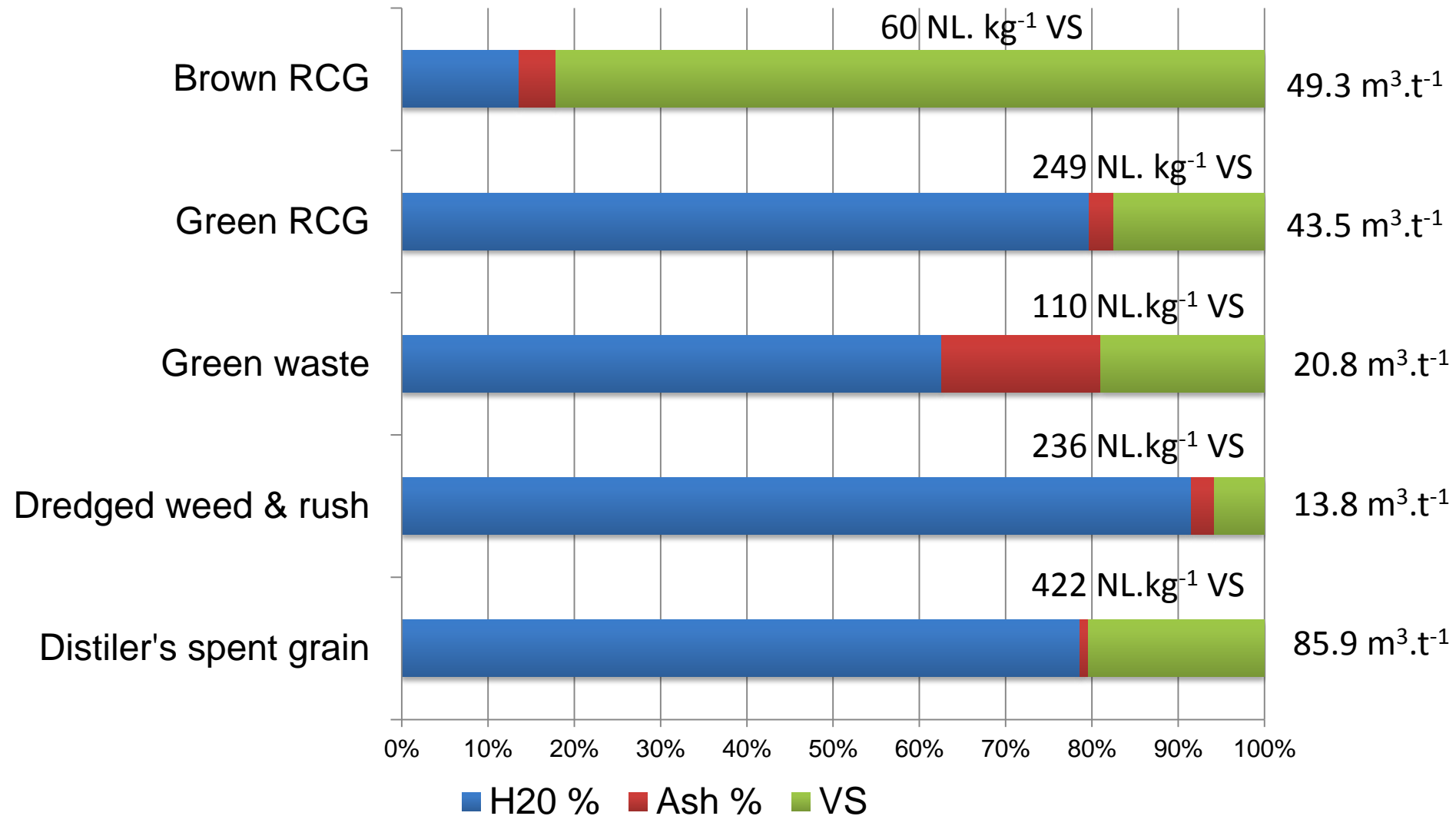
Renewable Energy: (1) Bankside vegetation – *Phalaris arundinacea*



(2) Weed cutting (the Berky)



Methane yields (m³ per wet tonne)

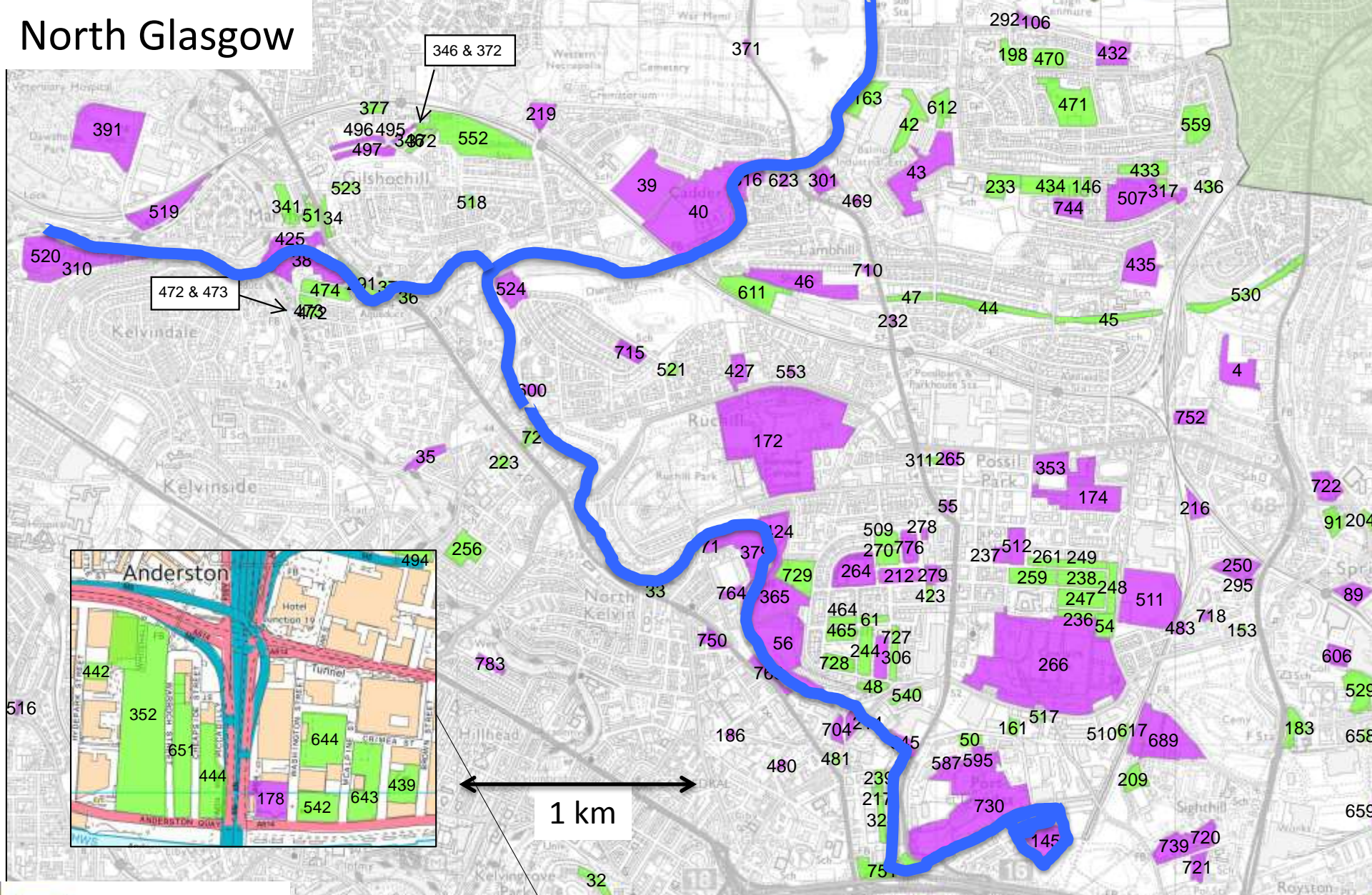



(3) Reuse dredgings to restore
canalside brownfield land or landfills?

Then use to grow renewable fuels?



North Glasgow



-  Derelict Land
-  Vacant Land

Scottish Vacant & Derelict Land Survey 2016 (2017)

(4) Future: Advanced phyto-conditioning?



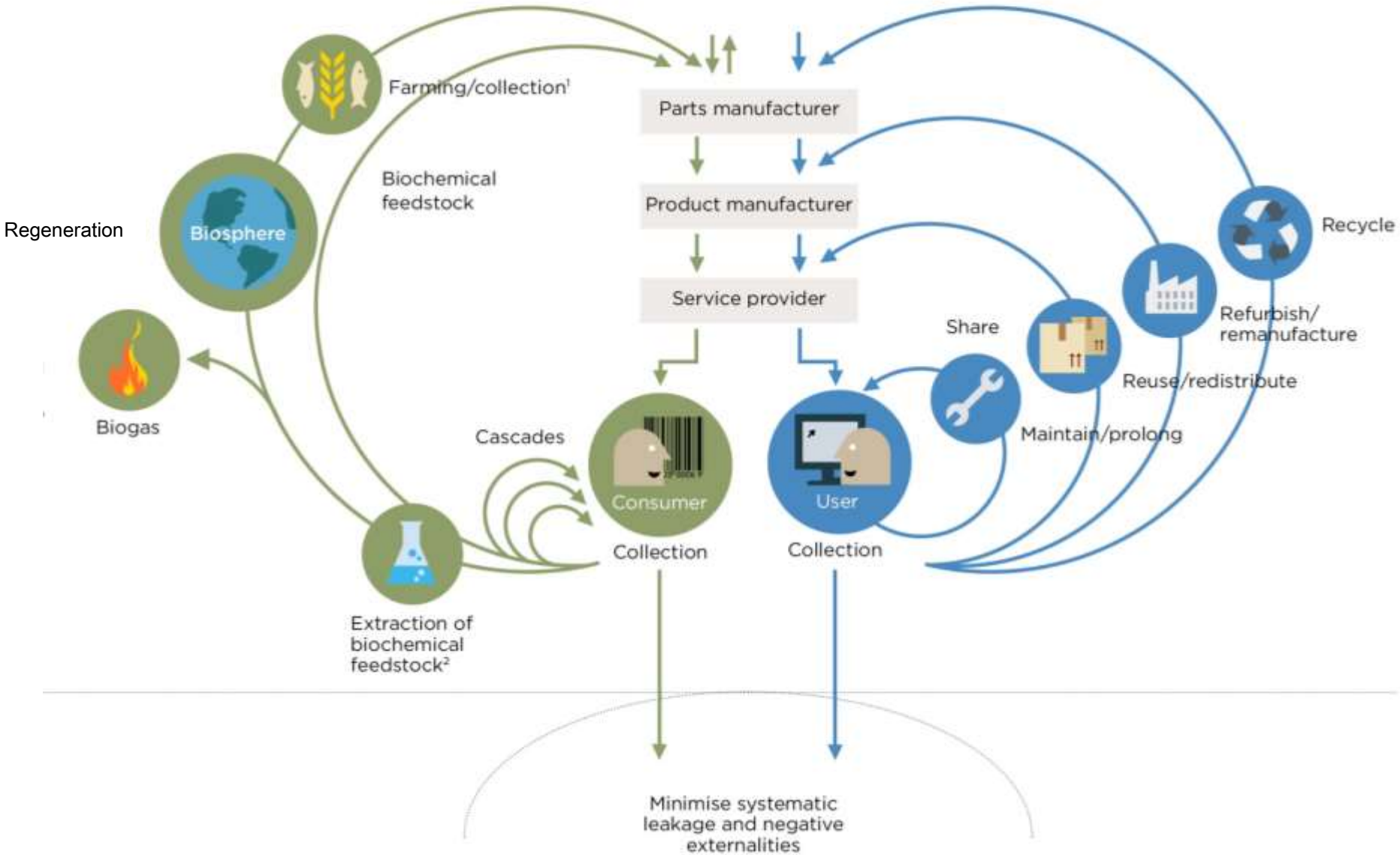
Yorkshire Water using ryegrass (*Lolium multiflorum*) to de-water sewage sludge (or sediments), blended with chipped recovered wood & sand for reuse as soils.

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