

Beneficial use of river sediments as topsoil for
passive carbon capture and storage
during land restoration and energy crop
production

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SURICATES: Sediment Uses as Resource In Circular And Territorial Economies

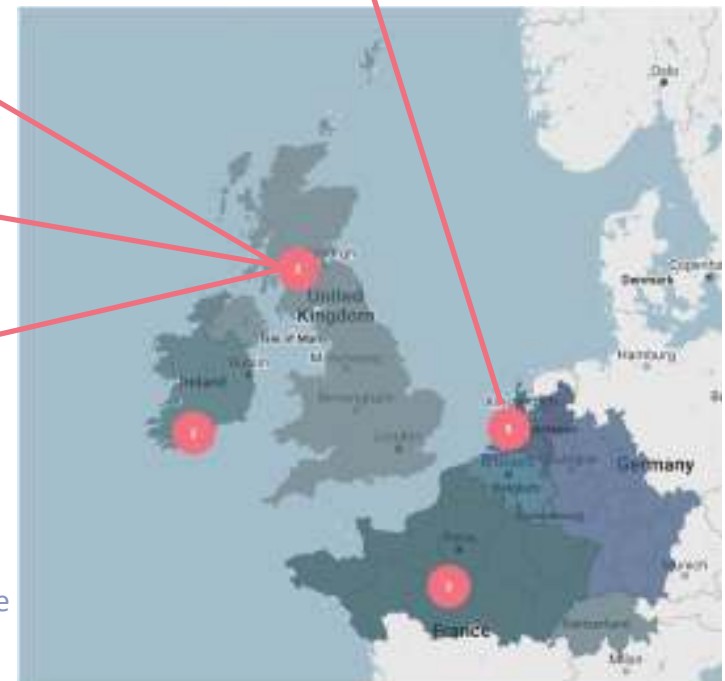


Bioengineering (e.g. phyto-conditioning & enhanced dewatering for soil)

Pozzolanic addition (e.g. opc & ggbs as strengthened soil)

In concrete (e.g. replacing sand)

Sediment reallocation



@SuricatesNWE

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Sediment dewatering – an essential precursor to reuse



Total Organic Carbon 10% (5-18%)



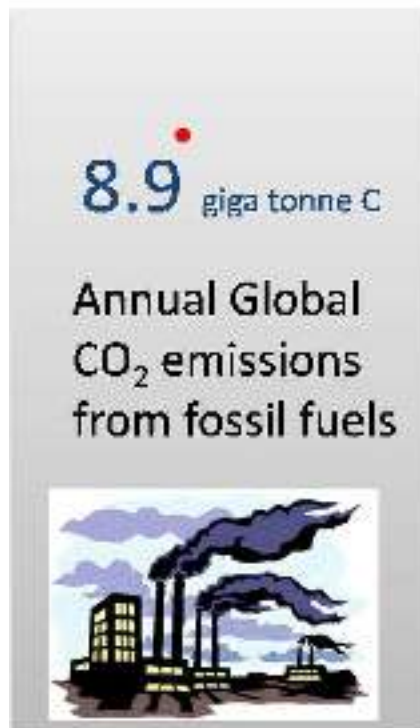
- OM issue for concrete strength –bioreduction?
- Fate of C in light of Net Zero?
- Opportunities for C storage in technosoils?



**Scottish
Canals**

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The 4 per mille initiative (4per1000/4pour1000/4p1000)




$$\frac{8.9}{2400} = 4\text{‰}$$

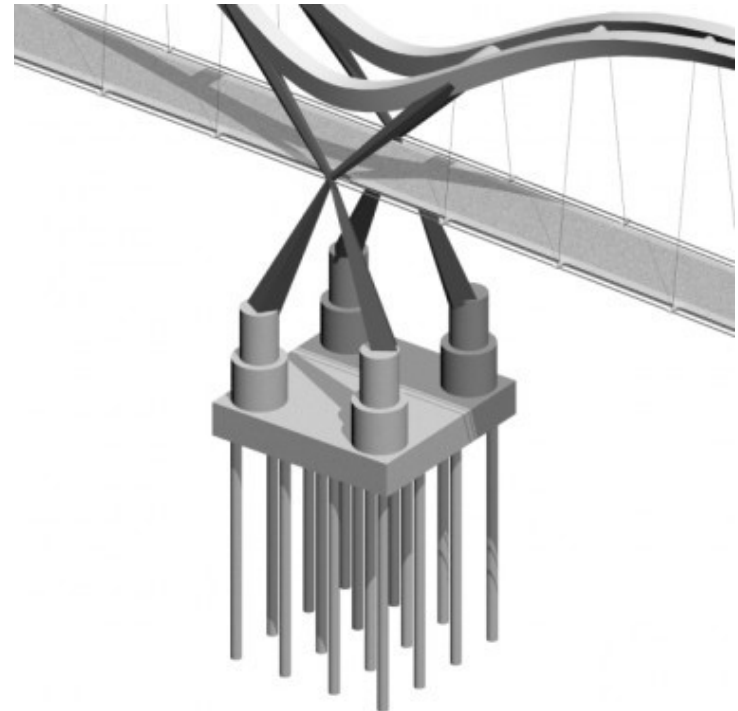
Amount of
C stock
increase
needed to
offset CO₂
emission



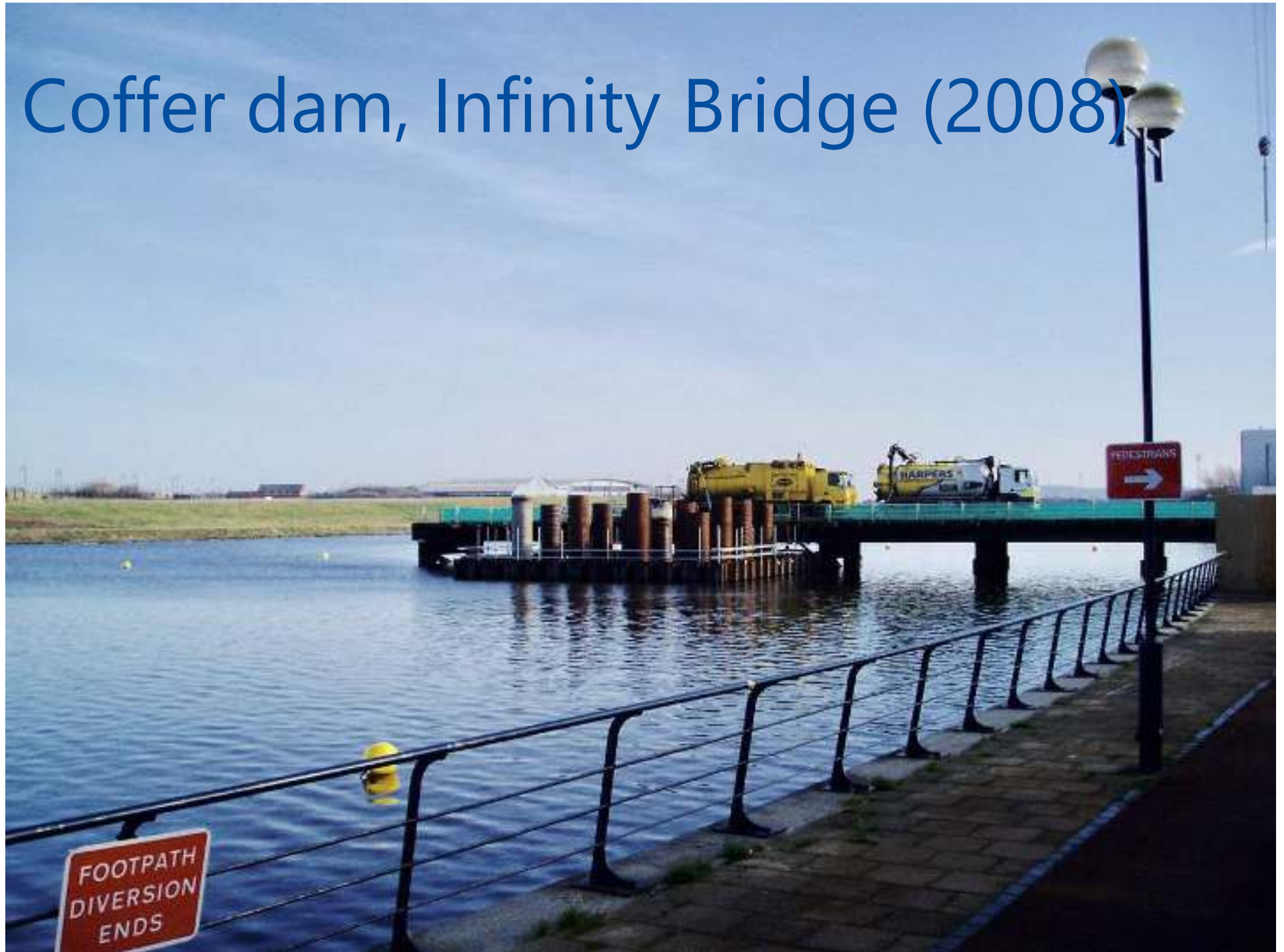
4 per mille (= 0.4%) averages 0.6 Tonnes C/hectare/annum

Infinity Bridge, Stockton-on-Tees (2007-8)





Coffer dam, Infinity Bridge (2008)



Placed sediments, Tees Barrage (2008)



Tees Barrage Brownfield biomass trials 2007-2012



Material change for
a better environment



Feb
2008



Apr
2008





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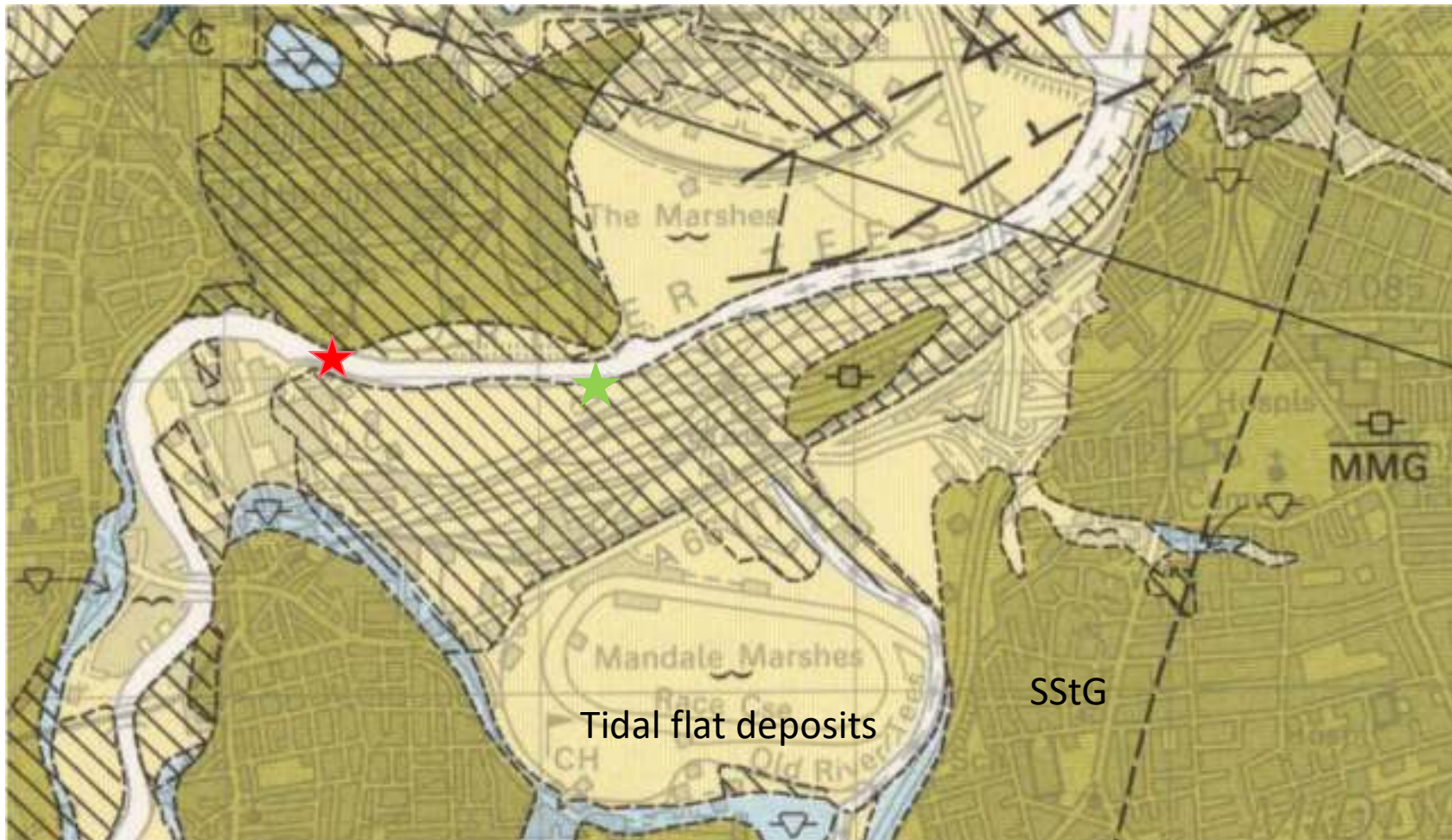
Baseline soil analyses



Granulometry: Sand to silty sand sediment (loamy sand to sandy loam soil)

	Placed sediment	CEFAS Action Level 1 current/revised	<u>CEFAS Action Level 2</u> <u>current/revised</u>	<i>BS3882 Topsoil 2015</i>	CIEH/LQM S4ULs POS _{PARK}
Cr ^T mg.kg ⁻¹	135-195	40/50	<u>400/370</u>	<i>N/a</i>	33000
Cu mg.kg ⁻¹	45-49	40/30	<u>400/300</u>	<i><135</i>	44,000
Ni mg.kg ⁻¹	21-26	20/30	<u>200/150</u>	<i><75</i>	3,400
Zn mg.kg ⁻¹	196-221	130/130	<u>800/600</u>	<i><200</i>	170,000
Organic matter %	<i>1.8-2.8</i>	-	-	<i>LOI 2-20%</i>	-
N ^T %	<i>0.07-0.17</i>			<i>>0.15</i>	-

Geology map



★ Bridge

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★ Trial

Jul 2008



Phalaris arundinacea

Feb
2010



Feb
2010



Jul 2012



wrap

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a better environment

Nov
2012



wrap

Material change for
a better environment

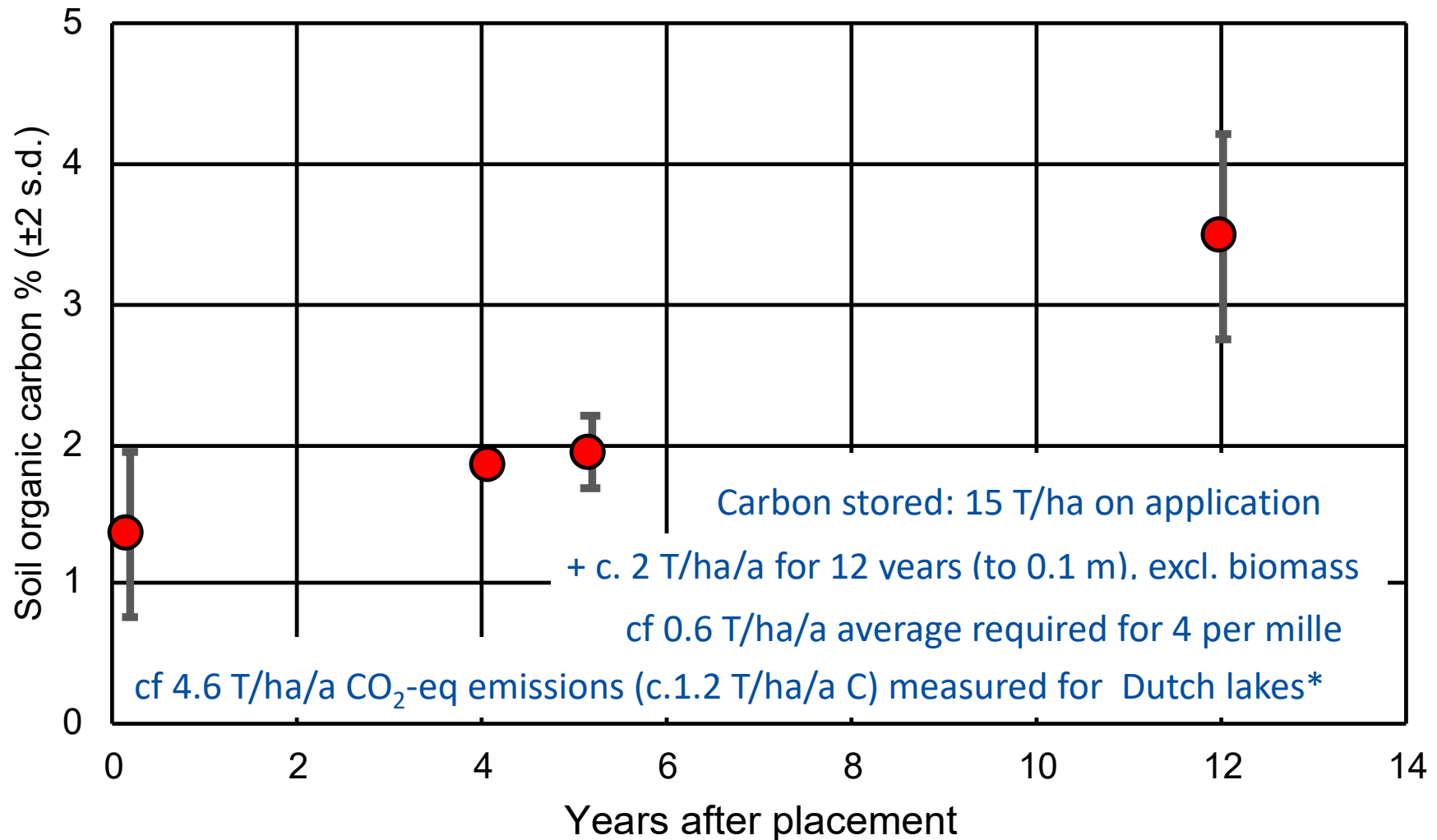
Feb
2020

Interreg 
North-West Europe
SURICATES
European Regional Development Fund

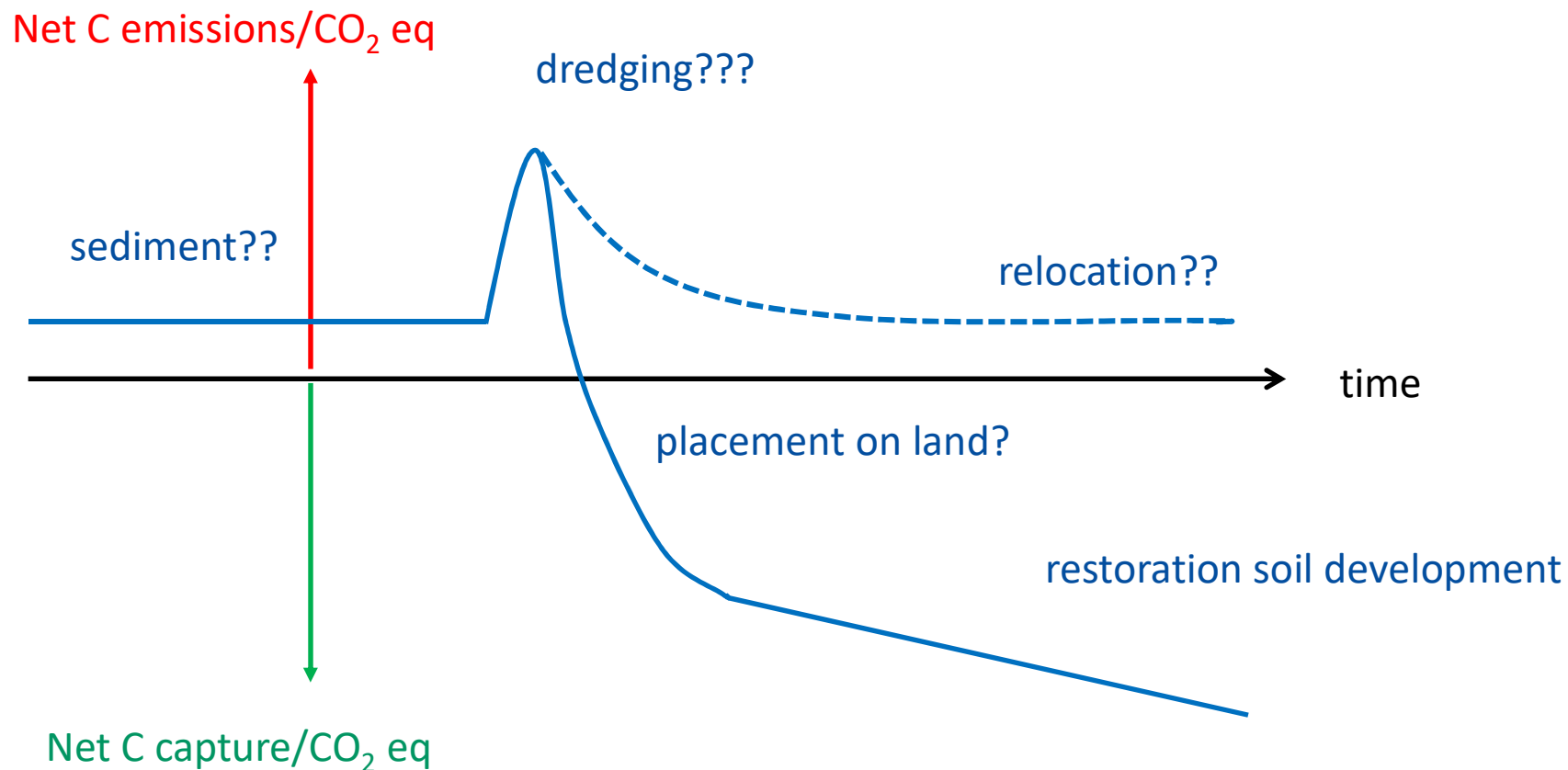




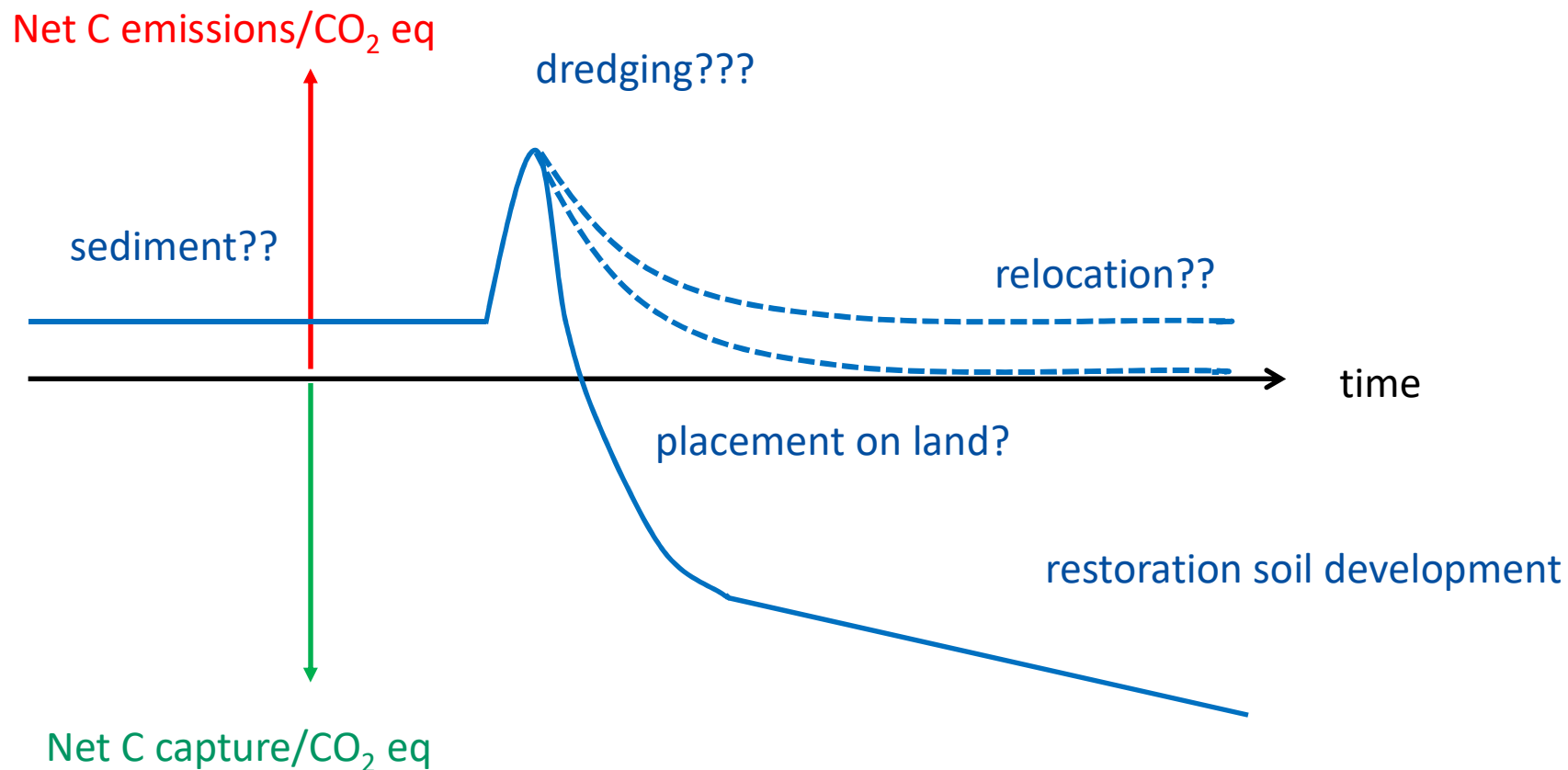
Soil Carbon 2008 to 2020



Comparative C emissions/capture?



Comparative C emissions/capture?





Sediment management to address climate change:



- **Challenges:**

- Reaching Net-Zero dredging
- Fugitive emissions from dredging & initial sediment placement (first trapped CH_4 , then CO_2 on aeration)

- **Opportunities**

- Retain and store C in relocated/recycled sediments
- Enhance & extend storage via biomass & passive soil C capture in vegetated sediments?

Infinity Bridge, Stockton-on-Tees

