

HOlistic Management of Brownfield REgeneration (HOMBRE)

## Soft re-use of Brownfields: Decision support and the Brownfield Opportunity Matrix

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GLOCOM Global Partners in Contaminated Land Management



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#### In this presentation:

The implementation of soft re-use during brownfield regeneration is often difficult.

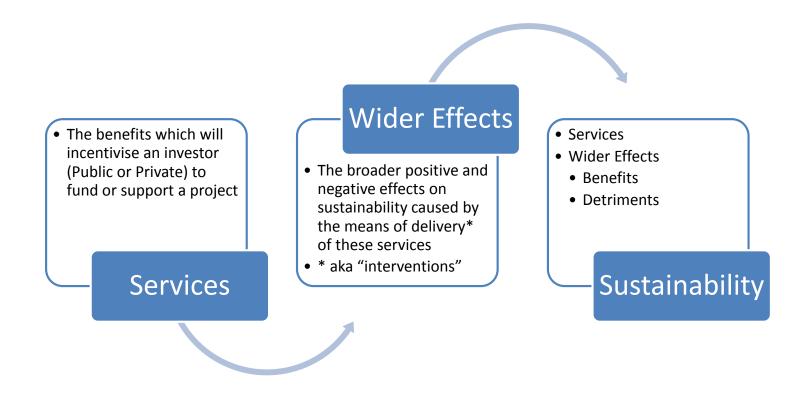
There is still a (knowledge) gap between 'What do I want?' and 'What can I do?'

Coupling 'Soft re-use services' with 'Soft re-use interventions' How to use this knowledge in a regeneration process?

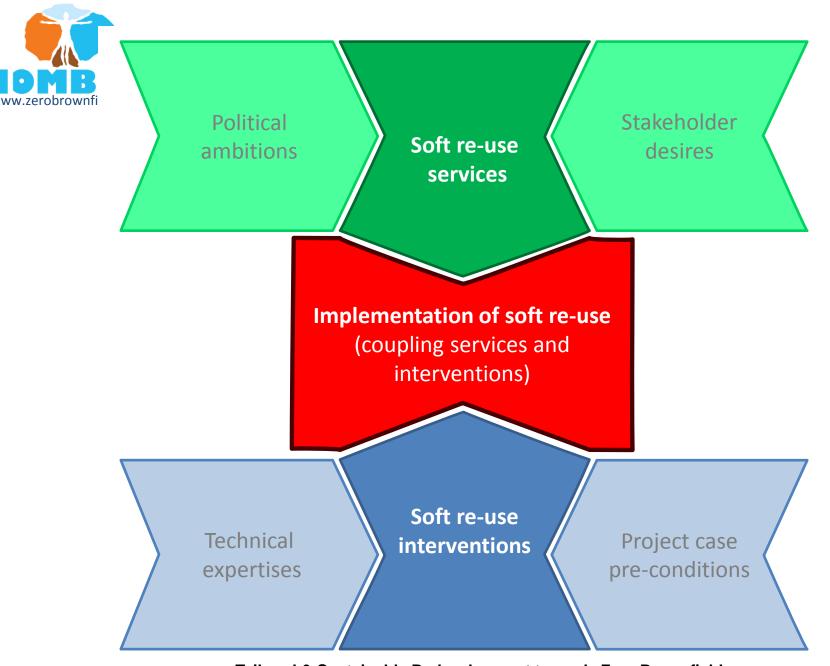




#### Interventions facilitate services, but also wider effects!



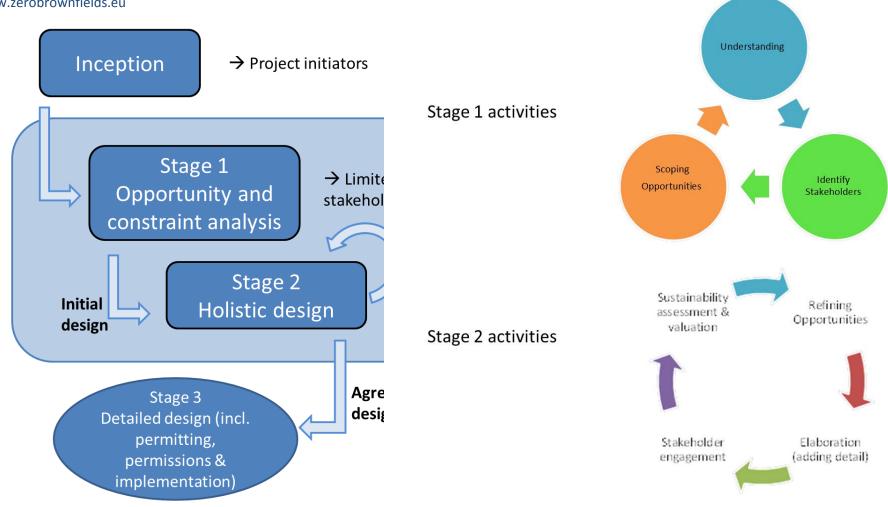








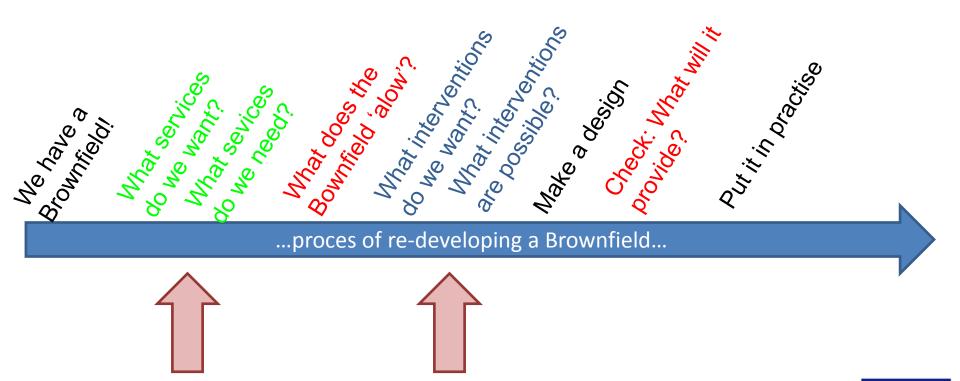
#### Possible process for re-design of a Brownfield







# *Where is this gap between 'What do I want?' and 'What can I do?'?*







### The opportunity matrix plots Soft Re-use

<i>IN</i> Inte	Soft re-use	Service 1	Service 2	n ate
the	Intervention 1			er
	Intervention 2			

## The goal is to encourage redevelopment of Brownfield land so that it re-enters the landuse cycle.





## Who is the Matrix for?

- Land owners
- Potential investors
- Local Authority/Government
- And so on...





#### Soft re-use interventions

Level 1	Level 2	Level	1		Level 2
	Phytoremediation			Ecologie	cal Engineering
Gentle Remediation Options (GRO)	Amendment Addition	Implementin Infrastruc	-	Env	iversity and ironmental nagement
	Natural Attenuation of Groundwater			Сог	nservation
	Ex Situ Remediation	Renewał	nles		ing Renewable edstock's
Other Remediation Options	In Situ Remediation	nene wax	5103	Energ	y Generation
	Traditional Remediation Options	Sustainable			lopment Of menities
Soil Management	Re-naturalization of soil	Soft re-use		vice 1	Service 2
Activities	Amendment Addition	Intervention 1			
Water Management	Attenuation Of Contaminated Surface Waters	Intervention 2			
Activities	Flood/Drainage Engineering	velopment toward	rds Zero B	rownfields	*** * ***



#### Soft re-use services

Level 1	Level 2		l	evel 1	Level 2
Risk Mitigation of Contaminated	Biosphere (including protection of Humar Health)		Provisi	ion of Green	Enhancing Ecosystem Services
Land an Groundwater	Hydrosphere (protecti of water resources/environmen receptors)			astructure	Enhancing Local Environment
	Soil Fertility				Renewable Energy Generation
Soil Improvement	Soil Structure		•	ion of Human Climate Change	Renewable Material
				al warming)	Generation
Water Resource	Water Resource Efficiency and Qualit	So	ft re-use	Service 1	Service 2
Improvement	Flood and Capacity	Inte	rvention 1		
	Management	Inte	rvention 2		
	Rehabilitation of Wat	ei			LLUHUHIL ASSELS



	Brownf	elds	Servio	æ level					8						Serv	vice	S									
	Opportu Matı	unity	Lev	vel 1			sion of rastruc		1				of Hun ige (gl		bed							gn	ific	ice canc atio		
desi <u>o</u> opp	gned to dei portunities	ligh Levo Operatin Window	g Lev	rel 2	Enhancing Ecosystem	Services		Enhancing Local Environment		E	newat nergy nerati		Renewable material generation	A DO AND	Greenhouse Gas Mitigation				Am	enity					Economic Assets	1
Intervention level	Level 1	(HLOW)		nples	Protection of habitat and biodiversity (where existing and for	Developing new habitat and increasing biodiversity	Improve urban soundsacpes and air quality	Limiting visual intrusion by landscaping (buildings, transport	Urban Climate Management (such as mitigation of urban heat island	Energy for on-site use	Energy for off-site use	Supply to an integrated energy mix Biofeedstocks (for	biofuel/gas/plastics]	Reduced GHG Emissions	Carbon Sequestration	Open Space	Leisure Education	Improved health and wellbeing	Access (footpaths, cycle routes)	Tourism	Community Centre Views and viewpoints	Framing Built Developments	Grazing	uod usereration Land value recovery over time	Area value uplift	Interim land management
su	Renewables	Energy Generation	Geothermal/Ground Biomass Energy Cre biofuel, Biogas etc) Photo-voltaic/solar generation and heatin Wind turbines	ation (e.g. Wood, panels for power	€8		Ì	<b>©</b> 1	•	1.00	ā () Dutte		e <b>ä</b> ( The second seco							(	Ор	po	orti	nd unit ws	у	
iterventions	Sustainable Land Planning and Development	<u>Development of</u> Amenities	Landscape planning Leisure design, devel management Educational Facilitie: Facilities, fencing, pa	lopment and	itti (	i© )€	€ð	©#	<b>h</b> @									¢	Dette	<b>⊛</b> €	8			€₫(	9din ^*	3

Tailored & Sustainable Redevelopment towards Zero Brownfields

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			Service level									Services	_	_	_		
	5 6 1		Level 1	<u>Res</u>	Mitigation of insted Land and	Soil Impro		1000	Nesource Imp		Dentition of	Services	Mtigation o	f Human Indu	ced Climate	Socio-Economic Benefits	
	Brownfield	Land	Level 1	9	roundwater	soumpro	vement	water	nesource imp	rovement	Provision of	green intrastructure	Chang	te (giobal warr	mina)	Socio-Economic benefits	
	Valoriza Opportunity		Level 2	Bosphere (including huma he abh.)	Water Resources (Invideosphere)	for this y	angan gungan	increased drink ing walter (potable) resource	Rood Management	Refabilitation of water	Enhancing Ecosystem Services	Britancing Local Environme	Renewable Energy Generation	Nene woble material generation	Greenhouse Gas Miligation	Ameriliy	Économic Assets
Intervention level	Level 1	Level 2	Examples	Human Health Protection Businetion of Ecolomy	Treatr e.g.) a	Manuging nubrient and micronutrient availability usupport twopolation improving set By dogupark functionality improving uol constition to support desired	improve sol realitance Providing weget allow cover Miligation measures for sold and tenditating	Drivanced Groundwater Recharge Surfacce Water Storage	Retention of runoff Rood militigation (incorporating militigation of severe weather events)	Cirrey water reuse Treated water reuse Landfill leacture the diment	Protection of hubital and lacoliwinary (where existing and for protected slars) Developing mew hattleaf and increasing biodiversity	Interprete unition 1 countriescopes and all quality Unitable Variant interfucion by Landoucciente Qualitation Varianteriante entre di Utaban Chinate Anthrongement of usual sustain magnetion of usuals in the all halance entre of	erin vajs-wo za juđi va og Ajdeng erin vajs-wo zaj Albieng erin vajs-wo zaj Albieng	Bofeetsbooks (for biofus/gas/plastics) Re-useof organics	Reduced CH3 Emisions Carbon Sequestration	I chan sume Lotaine I change I mayoride and the set A care of the set of the set Toward of the set Uncome and exampted is Toward of the set of set Uncome and the set of set of the set of set Uncome and the set of set of the set of set Uncome and the set of set of set Uncome and the set of set of set of set Uncome and the set of set of set of set of set Uncome and the set of set of set of set of set of set of set Uncome and the set of s	Jub Generation Land value recovery onertime Avea value uptit Indern Land management
		Phyto-Remediation	Phyto-extraction Phyto-stabilization Phyto-containment	€ 69		€∰∰	€a©min@	5 m(	ā m(	€ø⊇nth	* 6 m 3	* 4 m 📀	€ 69 ∰	€®®	€ <b>(</b> )©	* <b>@@</b> #	€ 400 mt 🕎
			Phyto-filtration Phyto-degradation/stimulation	9						•		<b>U</b> 111 (12	C			Co (Dam	
	Gentle Remediation Options	Amendment Addition	In situ stabilisation - Char/Biochar	€ 😰	th E AD AN	₹ € <b>6</b> 9 mi (*)	€øm@	* <b>6</b> m			* 6 @ 6		*€ 6©	*€ 😰	€ (19)	* @m@	* Æm 🛞
		homent woldbon	In situ stabilisation - slags, compost etc	• 😯				<b>e</b> 111			C miles		- ( <del>?</del> )	- 😯 -	0	the market of the second se	Contraction (1)
		Natural Alternation	Monitored Natural Attenuation of Groundwater	() 6 6	° 📀 🔊 🤅						<b>⊛</b> ,@€						
	Contaminant Hot Spot	Zx Situ	Ex-shu Bioremediation Soit Washing Ex-shu chemical Treatment Stabilization/Solidification Ex-shu thermal Treatment Ex-shu thermal Treatment	4 💮 E	<b>6</b> (96)	* <b>4</b> 0 ( <b>P</b> C	* 🚳 🌾	۸			@m@				^		110 E ()
	Attenuation	<u>In Situ</u>	In-situ treatment (SVE, DPE, Air Sparging Free product recovery, PRB, Chemical Oxidation) In-situ Biorennediation Source locitation (sheet piles, cut off walls, pump and treat)	4 (} ©€	" s @@	* <b>6</b> 0(%¢	* 😰 🌾	٨			@##@				G		<b>₩0 8</b>
	Active Soli	Re-naturalisation of soils	Breaking out/removing artificial (concrete, tarmac for e.g.) surfaces and substructures. Tilling - unsealing the surface and reducing compaction.	1	1										^		
	Management (for non- contaminated site)	Amendment Addition	Use of Organic Matter (mushroom compost/sludge/CLO etc) Use of Inorganic Amendments Use of Biochar	1	1	6 😒	ð 🔅					(∳nn©€			O		
ons	Active Water	Attenuation of mine discharge	Passive Treatment (lagoons, wetlands, aeration weirs etc) Active Treatment (High Density Sludge Process Plant, Chemical Dosing).	() 18 E	4 (@m@ 4	@m@	۲. ۲	( <b>क</b> ) <b>8€</b> © ##	## 3	^	֎ՠ֎	*@@	<b>@ 6</b> ⊇€	*@ Æ	* <b>?</b> **	<b>m∢</b> @	m@€
Interventions	Management	Flood/Drainage Engineering	Rood/Storage Engineering Drainage Design (Sustainable Urbans Drainage Systems (SUDS) for e.g.) Maintenance and improvement of water ways onaite	I.	I.			<b>19 (</b> ) 									
		Ecological Engineering	Bioswales, Wetlands Ecoducts and Green Bridges Blacts for slove stability	! *©?	4 *©(*)	6 ®	ð 🅐	<b>6 (P</b> )	<b>6 💬</b>	ð 🏵	á 💬		€ ð 🍘	E 🕹 🋞	03	€@m	€ <b>å ∰</b> ttt
	Implementing Green Infrastructure	Biodiversity and Environmental Management	Creating Parks In Urban Areas Densely populated forests Natural Revegetation Wetland Creation	! *©?	4 *©@1	<b>6 (P</b> )	ð 🕐	<b>6 (P</b> )	<u>6</u> 🎲	ð 🏵	6 💬	5 🖗	€ § ∰	€ å 🌸	03	€∕∳m	€ <b>ā (∰</b> ith
		Conservation	Developing, enhancing, protecting habital (e.g. Meadowland)	! *©(*	<mark>ه</mark> ا *©ۍ	6 ®	ð 🌮	6 ®	ð 🌮	* 6 🌮	ð 🏈	4 💬			*©?)	€∲th	€ð∰m
		Producing renewable feedstocks	Biofredutock/Biomass Topsoil substitute production On site recycling/valorisation	!	I.												
	Renewables	Inergy Generation	Geothermal/Ground Source Biomass Energy Creation (e.g. Wood, biofuel, Biogas ekc) Photo-oblaic/solar panels for power generation and heating waker Wind burbines	! *€⊛	6 I.A.						€ 49 m ⊘	€₽₩∲	€ & 🦃	€ 49 (∳ ∰	€ <b>4</b> 9 (∳∰	€ø©∲th	€ø©m
	Suntainable Land Planning and Development	Development of Amenities	Landscape planning and development Leisure design, development and management Educational Facilities Facilities, functing, paths, paving and other small building works Vuitor Facilities	!	!						#1 <b>@</b> @ €	€@₩₽				©m(£š	€ቆ≌∰∢∲
		Strategic Planning of, land use over time	Promotion Df Green/Soft Keuse Integration of hard and soft devilopments	ļ	l.	tt ő 😌	ð ઉ				<b>⊛m ā</b>	€₽₩₽	€ <u>6</u> 0 m (∳	€ <u>8</u> 9 ∰ (∲	€ <u>8</u> 9 ∰ (∳	© ## 🔮 8	€ 69 m 📀

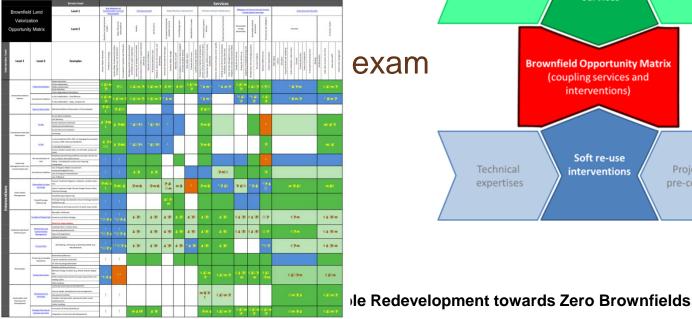


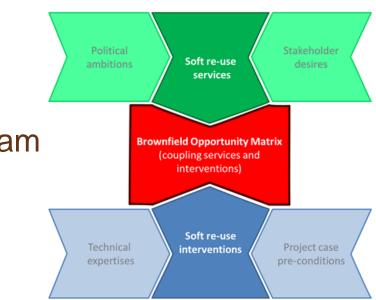


# **Opportunity Windows**

Opportunity Windows provide relevant information using a range of exploratory tools relevant within the matrix:

- Advantages/Disadvantages
- Grouping/Compatibility with other services
- **Beneficiaries and Value**
- Potential Stake Holders

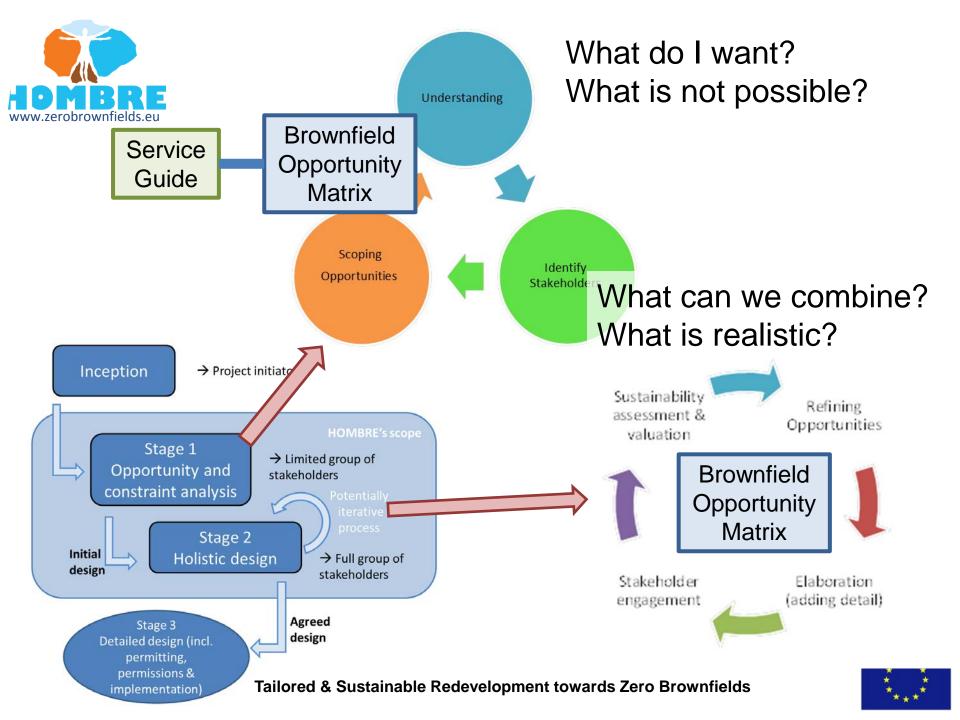






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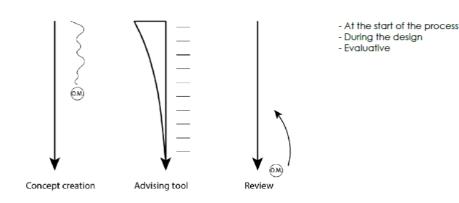
What are you looking for?		More detailed ambiti	ons	
Society and economy				
Ze Ambition: A liveability improvement in the area. Ambition: Economic development of the area.	Group: <b>Socio-Economic Benefi</b> t	I want to attract touri	ation possibilities. ational elements. sts. Ith and well-being for the neigh is.	bourhood.
Sustainability				
Ambition: Componentian of slabel warming	Group: Mitigation of Human	I want to produce sust I want to produce bio-	tainable energy for the Brownfie fuel, gas, or plastics.	and/or it surroundings.
ciety and economy			l something while re-using org pon.	a ics.
			nhouse gas emissions.	
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## Take home messages

- Bridging the gap between 'What do I want?' and 'What can I do?' = Connecting interventions with services.
- The Brownfield Opportunity Matrix is a tool that shows:
  - Dos and don'ts of soft re-use interventions
  - Which interventions to combine to get multiple services
- The Brownfield Opportunity Matrix can be used in three ways:







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# THANKS FOR YOUR ATTENTION

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