

# Beneficial Reuse Of Any Dredged Sediment Environmental Assessment Tool (BROADSEAT)- An open access tool for circular economy optioneering

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**Introduction:** BROADSEAT stands for "Beneficial Reuse Of Any Dredged Sediment Environmental Assessment Tool" [1]. It is designed to help you analyze the environmental merits (and any trade-offs) of a proposed or completed beneficial reuse/use dredging project. It uses your professional judgement of a real or hypothetical Beneficial Reuse Option (BRO) compared to the Business As Use (BAU) case, which is what you would do otherwise, or what would normally be common practice.

**Methods:** It works by scoring your qualitative assessment of whether the BRO is better/the same/worse than the BAU reference case on a binary scale (plus one/zero/minus one), using your answers to a series of questions. These questions attempt to address the range of factors which might be considered. For each question you answer by selecting a decision from the dropdown list. There are 52 questions each relating to a single factor, split between 10 categories (transport comparison, energy comparison, circular economy aspects, waste management aspects, waste regulation aspects, water environment, ecosystem services, biodiversity & conservation, socio-economic impacts, UN Sustainable Development Goals), which are then arranged into 4 groups (Energy, Waste, Environment, Societal).

**Results:** For each factor a weighting is provided, which is multiplied by the binary score generated by your answer to each question to give a score for the performance on this factor. The cell containing the resulting score is coloured, red (poor) through white (same) to green (good), reflecting the answers visually (Fig. 1). The weightings are designed to give equal emphasis to the four groups, with a maximum score of

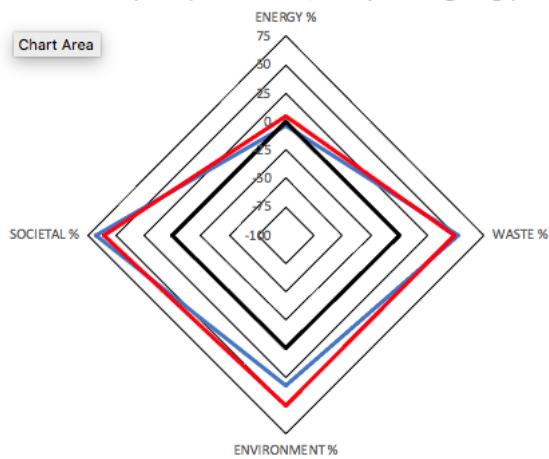
	Default weightings	Your weightings
<b>Total scores (%)</b>	37	41
<b>Validity check</b>	Valid default weightings BRO score	Your valid BRO score
<b>Component scores</b>		
<b>ENERGY %</b>	-4	5
<b>WASTE %</b>	52	49
<b>ENVIRONMENT %</b>	32	50
<b>SOCIETAL %</b>	68	60
<b>ENERGY</b>		
<b>WASTE</b>		
<b>Environment</b>		
<b>SOCIETAL</b>		

**Fig. 1:** Output scores from BROADSEAT as applied to the Falkirk dewatering trial [2].

25 for all factors/categories in each group. Thus the maximum (or minimum) possible score overall is 100 (or minus 100). The scores for each factor are shown as a radar plots (Fig. 2). Here each factor ranges

between 100 and minus 100. The cells containing the scores for each group and the overall score are colour-coded, blue (higher) through white (same) to red (lower). The example used here is for the Falkirk trial where clean dredged canal sediment was allowed to dewater naturally before being planted with grass seed. The results illustrating the possible trade-off between energy use and the waste, environmental and societal benefits of the BRO compared to the BAU, in this case natural dewatering and phyto-conditioning of sediment to make topsoil, rather than disposal to landfill.

**Discussion:** The BROADSEAT tool is designed to compare the merits of your Beneficial Reuse Option to the Business As Usual case in an objective and comprehensive way. It avoids having to have actual numerical values for factors. You decide whether the BRO is better, worse or the same for a particular factor using your professional judgement or stakeholder opinion and preferences. This in turn means that actual data (e.g. tonnes of CO<sub>2</sub>, miles, areas, species etc) are not required. This avoids having to make the very difficult numerical conversions between different units or factors, which may not be readily quantifiable, e.g. extra transport distance versus flood risk protection gained, extra cost versus biodiversity gains). It is your answer, there is no right answer, different people will score the same project in different ways, reflecting their own perception or profession. The English version of the BROADSEAT model is available to download and use via a permanent DOI [1] and a French translation is currently in preparation.



**Fig. 2:** Output radar plots from BROADSEAT as applied to the Falkirk trial [2], for default (blue) and bespoke (user-defined) weightings (red).

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**References:** [1] Lord R. A. & Torrance K (2021) DOI: [10.15129/2e620d12-44bc-42fb-9b14-b0e89a8a7457](https://doi.org/10.15129/2e620d12-44bc-42fb-9b14-b0e89a8a7457); [2] Harrington et al., (2022) *J Soils Sediments* 22:2900-2911; [3] <https://www.nweurope.eu/projects/project-search/suricates-sediment-uses-as-resources-in-circular-and-territorial-economies/>; [4] <https://www.linkedin.com/company/suricates-project/>; [5] <https://twitter.com/SuricatesNWE>