Burnby Lane

Natural and Social Capital Assessment

It's part of our Blueprint for Yorkshire

YorkshireWater

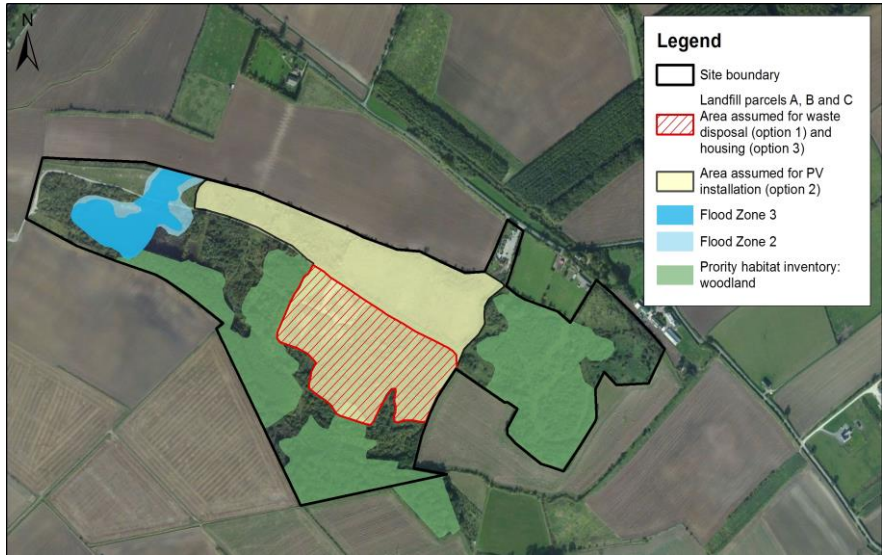
Burnby Lane

Yorkshire Water owns a site at Burnby Lane in North Yorkshire which is currently used to dispose of sludge produced through its operations. The landfill site is coming to the end of its current use because it is nearly full. An innovation project has been examining future options for the site, including the potential to apply innovative approaches to extract and recover valuable materials for re-use. One of these is the 'Aquacritox' process to recover Aluminium Oxide (Al_2O_3) which is found in the landfilled sludge following its use as a chemical additive to the water treatment process.

As one element of this wider project, Yorkshire Water appointed Arup to carry out a natural and social capital assessment to compare future land use options at the site. The aim was to inform the wider innovation project at Burnby Lane, and to provide a case study to test and develop our approaches to sustainable accounting: feeding into our ongoing work on total impact assessment.

The options considered for Burnby Lane are summarised below:

Baseline	• 'Do nothing' • Site left in current state with no further activity
Option 1	• Extract aluminium under 'Aquacritox' programme • Re-use the site for disposal of non-hazardous waste
Option 2	• Develop land as a small scale residential area
Option 3	• Use land for solar electricity generation
Option 4	• Pass land to a third party charitable body committed to enhancing the environment and working with the local community



At the time of this assessment, no option had been decided on as preferred, and the findings of this appraisal are just one piece of evidence which may be used to help shape the final option for the land.

Materiality study

Following the method set out in the Natural Capital Protocol, and testing it against Arup's bespoke natural capital assessment framework, a materiality study was conducted to determine the material impacts and drivers to quantify in the assessment. The results are shown below, with up arrows indicating a positive effect, down arrows a negative effect and horizontal arrows a potential 'each way' effect or no change.

The considerations for the materiality study were as follows:

- Is there an existing ecosystem service provided (or impacted upon) by the site in its current form?
- Do the services identified at the baseline change significantly under the defined options?
- Are new services provided under a specific option?
- Can a clear beneficiary be defined?
- For impacts, are there nearby receptors?

Ecosystem Service	Detail	Effect				
		B'line	Opt 1	Opt 2	Opt 3	Opt 4
Air quality regulation	Removal of air pollutants by on-site vegetation	↔	↓	↓	↑	↑
	Avoided emissions to air from recycling materials	n/a	↑	n/a	n/a	n/a
Global climate regulation	Carbon emissions associated with energy use and avoided emissions from renewable energy generation	↔	↕	↕	↕	n/a
	Carbon sequestration	↔	↓	↓	↔	↔
Regulation of flood water flows	The capacity of the site to accommodate flood water which would otherwise flood local homes/businesses.	n/a	n/a	↑	n/a	n/a
Pollination	The presence of flower-rich habitats and vegetation on site	↔	↓	↓	↔	↔
Recreation	Informal recreation on site	↔	↓	↓	↑	↑

Quantifying impacts

Having determined the material potential impacts of the different options, ecosystem services assessments including primary research and value transfer techniques were used to quantify the impacts in more detail. An overview of data sources and techniques is shown below.

Ecosystem Service	Impact Type	Indicator	How to measure and source
Air quality	Pathway – removal of atmospheric pollutants	Area of different habitats with the capacity to remove pollutants	Phase 1 habitat survey (Arup) Published research on sequestration rates by habitat
Global climate regulation	Driver – energy use and transport (also including avoided energy use)	Energy or fuel use, converted to GHG emissions	Yorkshire Water's knowledge of site operations and published research.
	Driver – land disturbance	Area of soil disturbed annually during operation	Yorkshire Water's knowledge of site operations and published research.
	Pathway – carbon sequestration	Area of different habitats with the capacity to remove CO_2 from the atmosphere	Phase 1 habitat survey Natural England (2012) carbon storage by habitat
Regulation of water timing/flows	Pathway – flood plain	Area covered by flood plain and Number of nearby (existing and future) homes/businesses	Environment Agency flood map, OS mapping (locations, topo) and Streetmap
Pollination	Pathway – supporting pollinators	Area covered by the mosaic of habitats supporting refuge and foraging opportunities.	Phase 1 habitat survey (Arup)
Extractive resources (Al_2O_3)	Driver – avoided raw material consumption	Tonnes of material recovered	Yorkshire Water and Arup estimates of metal recovery
Recreation	Pathway – recreation space	Land dedicated to recreation (existing and planned)	Assumptions relating to number of visitors
Educational and inspirational values	Pathway	Number of visitors on educational events	Assumptions relating to number of visitors on educational visits

Non-financial values were converted to financial indicators using value transfer techniques and published research such as the ORVaL tool[1] and Powe and Willis' quantification of the morbidity and mortality impacts of pollutant sequestration by woodland[2].

The use of value transfer and the conversion of non-financial metrics into financial values requires a number of assumptions and estimations to be made. These were reported transparently, and the results of natural and social capital assessments must be always be evaluated in the context of these assumptions.

Cashflows resulting from each option were calculated over a 40 year period, and the net present value for each was calculated using a discount rate of 3.5% for the first 30 years, and 3% subsequently.

Findings

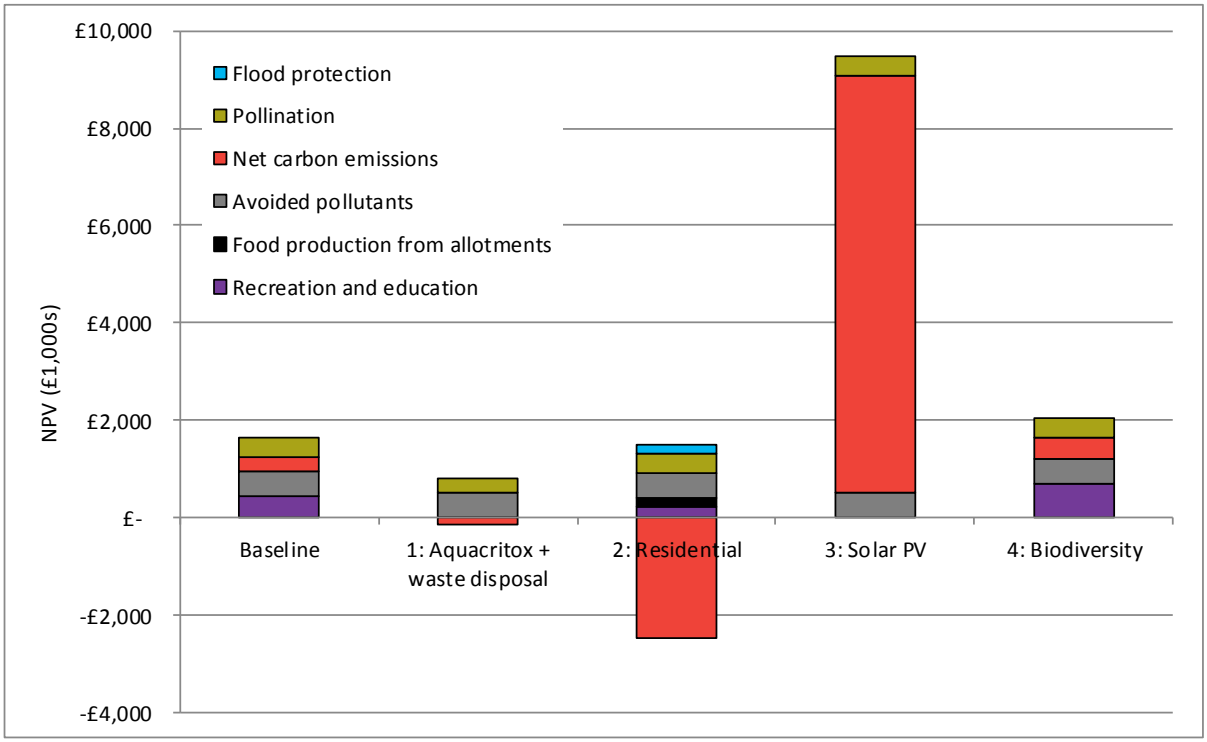
Summary table	Net Present value
Baseline	£1,648,506
Extraction	£605,345
1: Waste disposal (after extraction)	£34,171
2: Low density residential	-£984,183
3: Solar PV	£9,500,387
4: Biodiversity and recreational use	£2,057,589

The assessment suggests that the most beneficial long term use of the land in terms of natural and social capital would be conversion to a solar farm. All options confer some net benefit, with the exception

[1] http://leep.exeter.ac.uk/orval/
[2] https://www.forestry.gov.uk/pdf/airpollf.pdf/

of Option 2 (residential development), which is evaluated as detrimental to natural and social capital over the 40 year period. The limitations of the study scope should be noted however: housing may still be a social imperative for the local community – an aspect not explored by this study.

The graph below gives a breakdown of the positive and negative impacts of the options. The most and least beneficial options are dominated by the effects of increased or avoided carbon emissions.



The study also afforded Yorkshire Water the opportunity to evaluate the use of the Natural Capital Protocol for this type of options appraisal. It was observed that it provides a useful framework for evaluation, although since it is an organisationally focused protocol some modifications are required to apply it to this type of spatial appraisal due to its limited emphasis on geography or receiving landscape. This reinforces observations from a previous retrospective case study at Rivelin[3]: that natural and social capital assessments can provide very valuable quantitative evidence to inform decisions about Yorkshire Water's assets, but that they should be used as one piece of an evidence framework, rather than in isolation.

This case study is part of an ongoing programme of work to maximise the value of underutilised operational land; identifying and evaluating opportunities to use innovative management techniques. Yorkshire Water is committed to continuing work on total impact assessment, using case studies such as this to improve our approach and inform our future work.

For more information on our sustainable accounting projects, click here.

[3] https://www.yorkshirewater.com/sites/default/files/Rivelin%20Water%20Works%20Natural%20Capital%20Assessment%20Report%2C%20May%202016.pdf

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