A Multi- Capitals Assessment at Little Don

Final Report

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YorkshireWater

Contents

Introduction

Context

Yorkshire Water is committed to becoming *"a recognised leader in the recreational use of land and water by 2020"*.[1] Part of this commitment is to make their land and reservoirs accessible for the public to enjoy and a recreation strategy has been developed to achieve this goal. As part of the recreation strategy, Yorkshire Water is planning to undertake a flagship project at the Langsett, Midhope, and Underbank Reservoirs, the details of which are set out in the Little Don Recreation Plan.

The Little Don Recreation Plan aims to promote health, fitness, and wellbeing by creating opportunities for outdoor recreation that is inclusive and open to all; particularly those who are often absent from visitor surveys but are nonetheless part of Yorkshire Water's customer base. These absent groups include those from less well-off backgrounds, ethnic minority groups, children and youth, and those with disabilities. The Little Don Recreation Plan offers a significant opportunity for innovative ideas and solutions that will benefit the natural environment and the local and wider community, and aligns closely with the capitals work Yorkshire Water is undertaking as part of the revisions to its Service Measure Framework (SMF).

The SMF aims to allow Yorkshire Water to go beyond a standard financial cost-benefit analysis to quantify and monetise the wider social and environmental impacts of their investment decisions. The SMF is based around quantifying impacts on six capitals – natural, social, human, intellectual, financial, and manufactured capital – which represent different types of assets that provide valuable flows of services over time. Natural capital, for example, is defined as the natural assets that provide vital services to humanity such as food, water and clean air. For the water industry, an example of natural capital is the recreational value provided by good coastal bathing waters.

Following a meeting with Yorkshire Water on 3 November 2016, AECOM prepared a proposal that identified some of the potential areas where the capitals could be integrated within the development and evaluation of options underpinning the design of the Little Don project. A follow-up meeting was then held at Yorkshire Water's offices on 1 December 2016 to discuss the objectives and scope of the project in more detail. It was agreed that the broad objectives would be to:

- Contribute towards a longlist of social and environmental opportunities that could be implemented to support the objectives of the Little Don Recreation Plan.

- Undertake a high level prioritisation exercise to enable more detailed focus on a shortlist of priority options.

- Develop a prioritised list of options based on quantification and monetisation of their impacts on natural, human, social, manufactured, and financial capital.

- Advance Yorkshire Water's understanding of social capital assessment.

During the prioritisation exercise a number of challenges were identified with undertaking a standardised assessment using a qualitative scoring process which meant that it was difficult to replicate the approach in different decision making contexts. In light of this, it was decided that the objectives of the project would be shifted so that the core aim would be to develop a quantitative tool that could be used to compare impacts across the capitals in a range of different land and asset management decision making processes.
It was therefore agreed that the objectives of the project would be amended to:

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[1] Yorkshire Water (2016), 'Recreation on YW Land and Waters Policy Statement' [online]
https://www.yorkshirewater.com/sites/default/files/Recreational%20Use%20of%20Land%20and%20Waters%20-%20Policy%20statement%20v5.pdf

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- Develop a quantitative tool that can be used to compare a wide range of options for the Little Don site as well as other sites owned by Yorkshire Water.

- Pilot the tool using data collected as part of a third party company's proposal for a woodland-based climbing activity centre.

- Test and revise the tool by comparing a wider range of options for the Little Don site.

- Develop a case study to demonstrate the approach in a way which is communicable to a wide range of stakeholders.

This report provides an overview of the results of this project and is divided into five sections:

- **Section 1:** provides an overview of the baseline conditions for natural, social, and human capital assets at the Little Don site (note, financial, manufactured, and intellectual capital were not included in the baseline assessment as they were not included within the scope of works at this stage).

- **Section 2:** sets out a longlist of options for enhancing the value of these assets and the results of a qualitative prioritisation exercise which aimed to identify a shortlist of priority options, together with an overview of the challenges of this process.

- **Section 3:** provides details on the quantitative tool developed and the results of five shortlisted scenarios for developing the Little Don site (note, the agreed scope of the tool was focused on the five capitals – natural, social, human, and financial/manufactured – intellectual capital could be added into future versions of the tool).

- **Section 4:** concludes with a set of recommendations for using the tool and refining it in future.

- **Appendix A:** provides details of the calculations and data sources used within the tool.

In addition to this report, the 'Capitals Valuation Tool v1.0' was produced as a separate Excel workbook, together with a further Excel workbook setting out the full results of the qualitative prioritisation exercise. These can be used by Yorkshire Water for future decisions and projects. An infographic summarising the key findings also accompanies this report.

1. Baseline

1.1 Overview

This section provides a high level overview of the natural, social, and human capital baseline within the Little Don site. The baseline assessment is divided into an 'Environmental Study Area' which focuses on natural capital assets and a 'Social Study Area' which looks at social and human capital assets (note, financial, manufactured, and intellectual capital were not included in the baseline assessment as they were not included within the scope of works at this stage).

1.2 Environmental Study Area

Yorkshire Water's Little Don Recreation Plan comprises three Yorkshire Water owned reservoirs – Midhope, Underbank, and Langsett – located towards the edge of the Peak District National Park. The Environmental Study Area consists of a mix of habitats including woodlands, moorlands, freshwaters, farmlands, grasslands, as well as built up areas and gardens. An overview of the natural capital assets within the Environmental Study Area is shown in Figure 1 and a brief description of some of the key ecosystem services provided is set out in

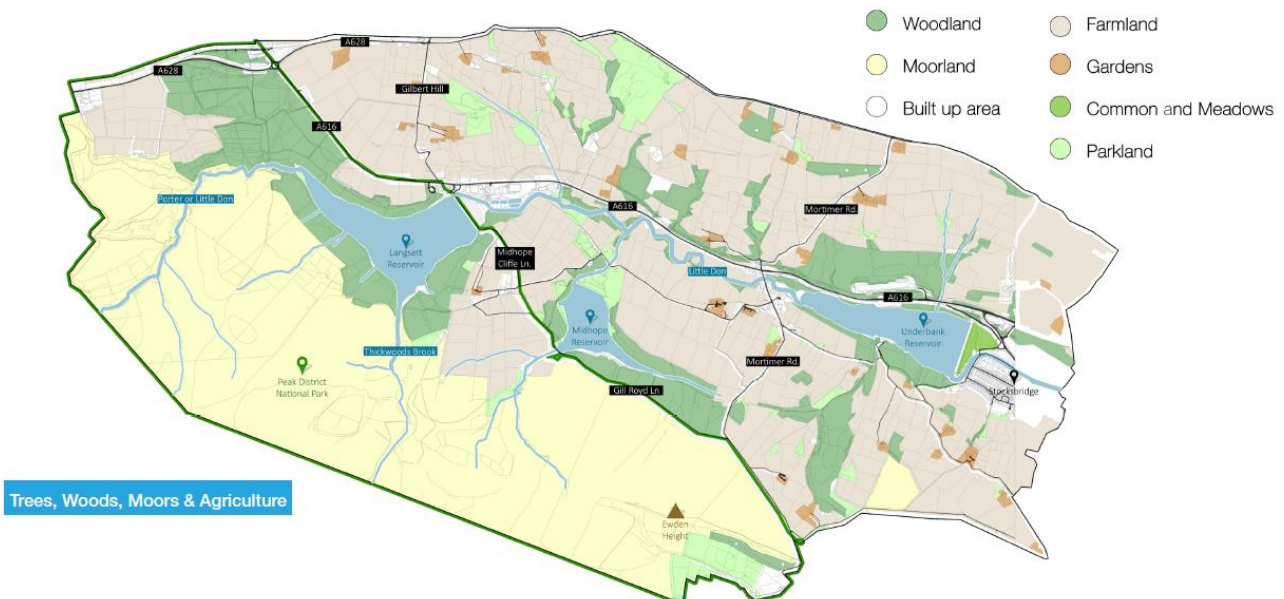**Figure 1. Overview of habitats within the Environmental Study Area**

Table 1. Overview of ecosystem services provided within the Environmental Study Area

Ecosystem service	Baseline overview
Provisioning services	
Crops & livestock	There are a number of agricultural tenancies on Yorkshire Water's land which are agreed on the basis of minimising pollution into the reservoirs. The total agricultural area is around 280 ha which is mainly used for grazing sheep and cattle; although there are also some horses, grassland management for hay and silage, as well as crop production.
Capture fisheries	No evidence was found of any commercial fisheries within the Environmental Study Area (note, recreational fisheries are covered in the 'Tourism & recreation' service).
Aquaculture	No evidence was found of any aquaculture activities within the Environmental Study Area.
Wild foods	Woodlands within the Environmental Study Area may support foraging activities such as harvesting of wild mushrooms or berries although, based on the results of visitor feedback surveys, it is not considered likely that these are of significant importance to beneficiaries.
Timber	Woodlands were planted around the reservoirs throughout the 20th century in order to provide timber for the mining industries of South Yorkshire. They cover an area of around 224 ha. The woodlands are no longer solely used for commercial timber production although there is an element of 'production' as part of a wider management plan to ensure water quality and future resilience through species and age diversity. There is currently a scheme being undertaken to increase broadleaved tree species and reduce conifer species. When felled, the timber is sold into the commercial trade where it is used mainly for particle board, pallet construction, fence materials, saw logs, and firewood.
Energy	There is some level of firewood production as part of the woodland management scheme. In addition, some of the tenant farmers have wind turbines and solar panels installed on their land. Installation of a hydropower scheme was previously investigated at Underbank but was rejected as uneconomical.
Biochemicals & medicine	There may be plants in the Environmental Study Area with medicinal properties although, based on the findings of visitor feedback surveys, it is not considered likely that these are of significant importance to beneficiaries.
Water supply	The reservoirs provide a supply of drinking water to towns in South Yorkshire and other areas of Yorkshire as required. Langsett Reservoir can hold around 5.5 million m^3 of water, Midhope around 1.9 million m^3, and Underbank around 2.9 million m^3.
Fibres	There may be plants in the Environmental Study Area with useful properties (e.g. thatch or reeds) although, based on the findings of the visitor feedback surveys, it is not considered likely that these are of significant importance to beneficiaries.
Genetic resources	No evidence was found to suggest that there are unique genetic resources within the Environmental Study Area.
Regulating services	
Local climate regulation	The trees and vegetation in the Environmental Study Area are likely to play some role in regulating the local climate e.g. through providing shelter and shade, and through evapotranspiration.
Global climate regulation	The woodlands, wetlands, and moorlands in the Environmental Study Area provide carbon storage as well as ongoing carbon sequestration. Carbon emissions are generated through activities on site such as agriculture, livestock, and peatland degradation.
Air quality regulation	Trees and vegetation in the Environmental Study Area filter pollutants from the surrounding air although background pollution levels are likely to be relatively low given the rural setting.
Hazard regulation	Flooding is an issue in the surrounding area (with the nearby town of Stocksbridge being at risk). Moorland areas play a role in slowing the flow of water during flood events. The reservoirs are not used for flood management although could potentially be used for such purposes in future.
Water quality regulation	The land surrounding the reservoirs that is owned by Yorkshire Water is used to regulate water quality. For example, work is being undertaken to restore moorlands to reduce DOC (dissolved

| Ecosystem service	Baseline overview
	organic carbon) concentrations, to create woodlands and wetlands to filter water pollution and regulate sediment levels, and to work with farmers to restrict agricultural runoff from pesticide and fertiliser use. The moorlands outside Yorkshire Water's ownership are regularly burnt, which may contribute to water quality regulation issues.
Pollination	Gardens and grassland areas are likely to support populations of natural pollinator species which may provide pollination services to crop growers within the surrounding area.
Disease & pest control	No evidence was found to suggest that the ecosystems within the Environmental Study Area play an important role in regulating pests or diseases.
Noise regulation	Roadside woodlands and tree verges may play a role in regulating traffic noise and providing a tranquil area for recreational visitors.
Soil quality regulation	Woodland and other areas of natural habitats are likely to play a role in regulating soil quality through the decomposition of leaf matter and immobilisation of pollutants. Low intensity farming leases may also have beneficial impacts on soil quality in agricultural areas.
Cultural services	
Tourism & recreation values	The reservoirs are used for recreational activities such as walking, dog walking, cycling, mountain biking, angling, water sports, and picnicking. Langsett Reservoir and the immediate area have several 'attractors' such as a car park, toilets, café, and pub. The area also formed part of the route for the Tour de France and is close to the annual Tour de Yorkshire cycling route. Walkers and birdwatchers visit the less accessible Midhope reservoir for wildlife watching. Underbank is popular with children and a company called Peak Pursuits has an activity centre which provides a range of water sports such as sailing, canoeing, and kayaking. The centre also has a climbing / abseiling tower and a high ropes course. The activity centre building has a meeting room, toilets, and changing facilities. Peak Pursuits offer other on-site activities such as raft building, orienteering, and archery, alongside off-site activities such as mountain biking, scrambling, and Duke of Edinburgh expeditions. Underbank has a catch and return coarse fishery and is known for the quality of its pike, bream, roach, and perch.
Cultural & spiritual values	Visitors to the area are attracted by its perceived 'unspoilt' nature, the scenery, and the peace and quiet. There is a rich cultural history associated with the reservoirs which were of strategic importance during the war. Elements of this cultural history are still visible around the reservoirs and moorland (e.g. former target ranges).
Scientific & education values	Schools use Langsett and Underbank for educational visits which are led by a ranger as part of an annual visit program. Pond access has been developed for 'pond dipping' activities. Underbank is used by groups for active sports and events led by Peak Pursuits during the school holidays.
Wild species diversity	There is a Special Protection Area (SPA), Special Area for Conservation (SAC), and several Sites of Special Scientific Interest (SSSIs) within the Environmental Study Area including: Dark Peak; Little Don Stream Section; and Spring Meadows, Alderman's Head & Cow Croft Meadows. There are also areas of semi natural woodland to the north and east of Midhope reservoir as well as ancient planted woodland to the north of Underbank. The mix of habitats (which includes wetlands, rivers, and water bodies) supports a wide range of bird species including crossbills, goldcrest, redpoll, siskin, woodcock, and willow tit. Goshawks used to be found in the area although are no longer present. A great grey shrike was observed on land adjacent to the west of Midhope reservoir which attracted interest during winter 2014/15. Other species supported include badgers, dragon flies, frogs, newts, and toads. A fish pass is being built at Langsett to aid wild brown trout access over a weir for river spawning.

1.3 Social Study Area

The Social Study Area is defined by a 20 mile radius from the centre of the Little Don reservoirs (the 'site'). This is in line with the boundaries set out in the Little Don Recreation Plan and takes into account the results of the 'Yorkshire Water, Langsett Super Site Report' (2007) which indicated that 81% of visitors to Langsett reservoir came from 20 miles away or less, with one third of visitors travelling from 5-10 miles away. The same survey indicated that 92% of all visitors were Yorkshire Water customers.

The Social Study Area comprises the cities of Sheffield and Bradford; a number of large towns such as Barnsley, Huddersfield, Wakefield, and Rotherham; and a number of smaller towns and villages such as Stocksbridge, Denby Dale, and Holmfirth. In addition, part of the resident population of the Peak District National Park falls within the Social Study Area.

According to the District Borough Unitary Region Dataset, there are 21 local planning authorities which fall within 20 miles of the site including Barnsley District, Bolsover District, Bradford District, Calderdale District, Cheshire East, Chesterfield District, Derbyshire Dales District, Doncaster District, High Peak District, Kirklees District, Leeds District, Manchester District, North East Derbyshire District, Oldham District, Rochdale District, Rotherham District, Selby District, Sheffield District, Stockport District, Tameside District, and Wakefield District. The district boundaries (dashed lines) are shown in Figure 2.

Figure 2. Local planning authority boundaries within the Social Study Area
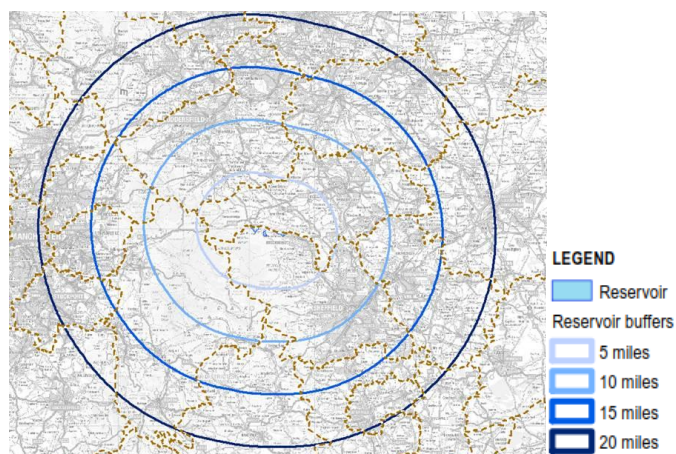
The total population of the Social Study Area has been estimated at around 1.4 million (see Figure 3). Within each of the buffer areas, this corresponds to:

- 19,000 people within 0-5 miles.

- 233,000 people within 5-10 miles.

- 456,000 people within 10-15 miles.

- 696,000 people within the 15-20 mile buffer.

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Figure 3. Overview of the surrounding population context within the Social Study Area
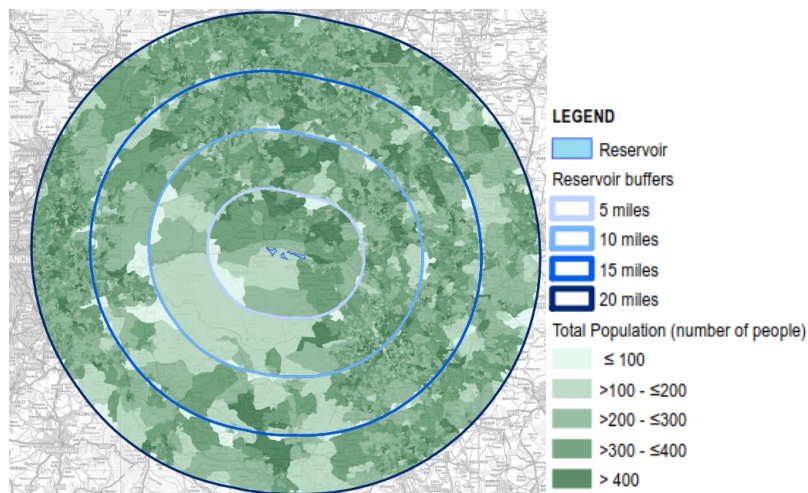

Indices of Multiple Deprivation (2015) indicate that levels of employment deprivation within 5 miles of the site are in the 60th to 100th percentile of the least deprived areas in the country. Employment deprivation refers to the proportion of the working age population in an area involuntarily excluded from the labour market. This includes people who would like to work but are unable to do so due to unemployment, sickness or disability, or caring responsibilities. Figure 4 presents the levels of employment deprivation in the Social Study Area.

Figure 4. Employment deprivation in the Social Study Area
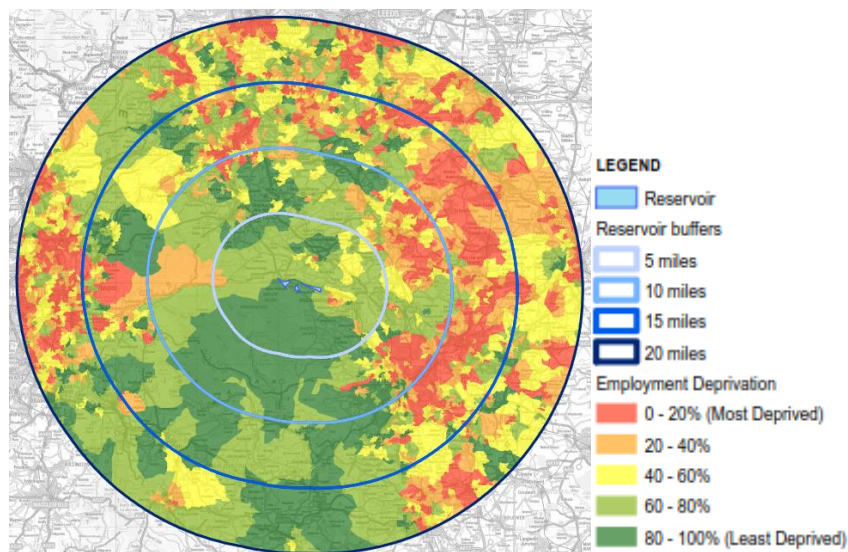
Levels of income deprivation are also relatively low within 5 miles of the site as illustrated by Figure 5, and correlate to levels of employment deprivation within the same boundary. Income deprivation refers to the proportion of the population that is out-of-work, and those that are in work but who have low earnings (and who satisfy the respective means tests).

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Figure 5. Income deprivation in the Social Study Area
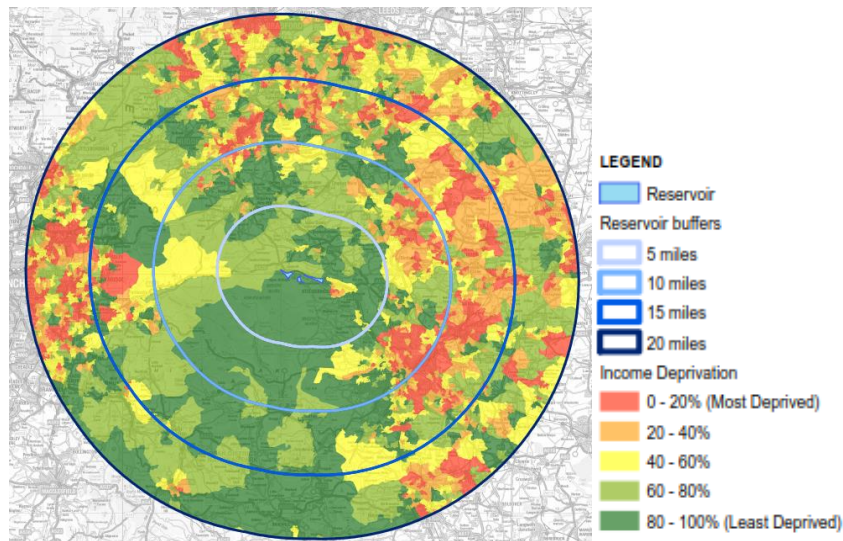
Health deprivation refers to the proportion of the population at risk of premature death and the impairment of quality of life through poor physical or mental health. Within a 5 mile radius of the site there are relatively low levels of health deprivation in comparison to national levels, with the exception of a cluster of deprivation to the east of Stocksbridge which falls within the 0-20% 'most deprived' category (see Figure 6).

Between 5-20 miles from the site, levels of deprivation increase substantially; for example, clusters of health deprivation are present to the east in Worsbrough, Grimethorpe, Thurnscoe, Bolton Upon Dearne, Adwick Le Street, and surrounding areas of Rotherham. High levels of deprivation exist to the south east in Brimington and to the north of the Social Study Area around Morley and to the east of Bradford. A high density area of health deprivation exists to the west of the Social Study Area, in Stalybridge, Denton, and areas to the east of Manchester.

Figure 6. Health deprivation in the Social Study Area

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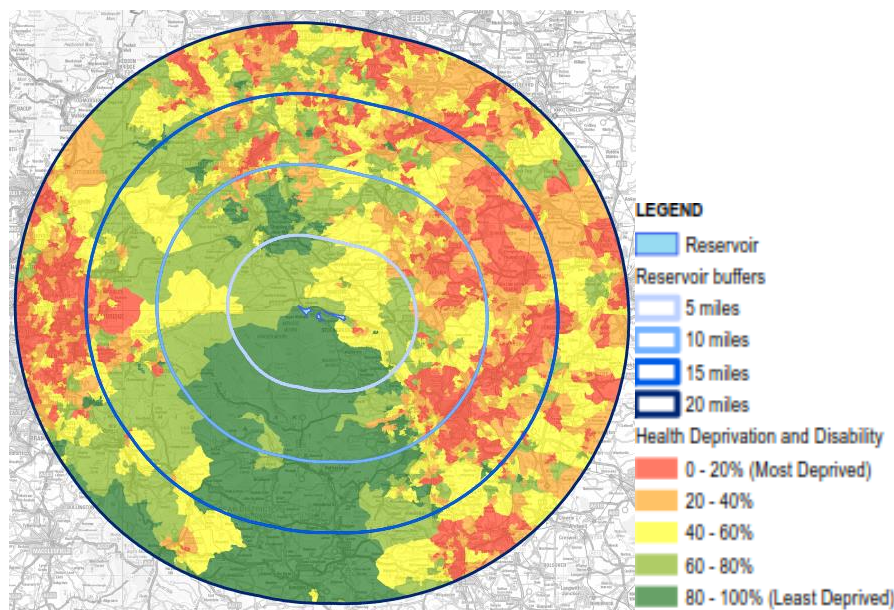
A brief description of some of the activities that contribute to the human and social capital present within the Social Study Area is set out in Table 2.

Table 2. Overview of the human and social capital activities present within the social study area

Human capital	Baseline overview
Employment	There are three full-time equivalent (FTE) jobs associated with managing water production and treatment, recreation, and woodlands on the site. Additionally there is a Peak Park ranger based at Langsett who is supported by other staff (e.g. cleaners) providing around 0.5 FTE. Agricultural land on site provides jobs, while building/asset maintenance, land management, recreation, and woodland management services delivered via contractors support a further 3 FTE. Gamekeepers manage the moor for sporting purposes (1 FTE) which supports sporting days and grouse shooting. The Peaks Pursuit activity centre at Underbank reservoir (2 FTE) and the pub and café at Langsett reservoir (5 FTE) also provide employment opportunities. Within a 5 mile radius of the site, there are relatively low levels of unemployment amongst adults in comparison to national levels and the area is principally categorised as 'least deprived' in terms of employment deprivation. Pockets of unemployment exist within 5 to 10 miles of the site to the south east surrounding Sheffield. Within 10 to 15 miles east of the site, there are larger clusters of adults not in employment and a higher percentage of employment deprivation. Further than 15 miles west from the site, to the east of Manchester, there are clusters of high levels of employment deprivation and a greater number of unemployed adults. This is also the case to the north of the site.
Skills	The site contributes to Yorkshire Water's training and apprentice programme for water production and treatment. Volunteer opportunities are provided by the Peak Park ranger service and the Steel Valley Project runs countryside training programmes in the area.
Health & safety	There are occasional incidents where visitors to the site suffer minor injuries; in 2016, for example, there was a reported case of a broken foot. Data is not collected on incidents related to third party activities such as visitors to the outdoor center, or amongst anglers or farmers.
Local economy	The Peaks Pursuit activity centre at Underbank reservoir, the pub and café at Langsett reservoir and the pub and holiday cottage at Midhopestones provide income-generating activities.

Social capital	Baseline overview
Wellbeing	The site offers extensive opportunities for recreation. Peak Pursuits has an activity centre which provides a range of water sports such as sailing, canoeing, and kayaking. The centre also has a climbing / abseiling tower and a high ropes course as well as angling facilities. Langsett reservoir is popular with walkers and mountain bikers due to its scenic and 'unspoilt atmosphere'. Langsett offers well developed routes for horse riding, cycling, and walking. There are good transport links to the area via road and extensive rights of way and open access land on the site. The area is promoted by tourism groups as a destination to visit although Midhope is currently underused by visitors. Access for disabled people at Langsett is recognised as being good. Yorkshire Water visitor profile surveys reveal that 99% of visitors are 'White' and 1% are 'Black & Minority Ethnic' (BAME). Of these visitors, 34% are families with 55% of all visitors aged between 5-10 years old. 3% of the visitors surveyed come with infants in pushchairs and 0% are wheelchair users. 35% of visitors come from the AB category, 30% from C1, 24% from C2, and 10% from DE. This indicates that the largest proportion of visitors comes from an upper middle class or middle class background and a significantly lower proportion come from a working class or non-working class background. The visitor profile to the site is consistent with visitor profiles to the Peak District and other national parks in England in that the majority of visitors tend to be middle class and white with other ethnic and socioeconomic groups being underrepresented. Volunteer opportunities are provided by the Peak Park ranger service.

Quality of place	The site offers significant amenity and aesthetic value which is reflected in the high levels of satisfaction recorded in visitor surveys and the 'Yorkshire Water, Langsett Super Site Report' (2007). Accessibility was rated by 96% of respondents as being 'satisfactory' or 'very satisfactory' and 89% of all respondents were 'totally satisfied' with parking. Additional facilities were rated as 'totally satisfactory' by 84% of respondents. Information provided on site was considered 'totally satisfactory' by 77% of respondents.
	Access to quality outdoor greenspace is available in the Social Study Area. For example, the extensive Peak District National Park is present within the Social Study Area, parts of the site are designated for wildlife and conservation, and there are extensive rights of way and open access.
Trust	The social licence to operate refers to the level of acceptance or approval by local communities and stakeholders of an organisation's activities and is dependent on trust in Yorkshire Water's ability to provide a clean, safe, and secure service. High levels of trust amongst visitors to the site is evident from the visitor survey results which indicated that Yorkshire Water had met or exceeded expectations of 92% of all visitors to the Langsett site. Levels of trust by Parish Councils and local residents and tenants are not monitored, and may differ. The Local Authorities and Peak District National Park are generally supportive of Yorkshire Water's recreation services.

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2. Option Prioritisation

2.1 Overview

This section provides a high level overview of the results of an option prioritisation exercise which compares a longlist of potential options for the Little Don site against a range of qualitative scoring criteria. A discussion of some of the challenges of undertaking this exercise is then provided.

2.2 Approach

A longlist of options for the Little Don site was drawn up based on discussions with Yorkshire Water. While the options on the longlist were all anticipated to be realistic and achievable with resourcing, detailed investigation on suitability was not undertaken.

Each of the options was then classified in terms of the target user group and the broad theme. A summary of this process is set out in Table 3 and full details were made available in a separate Excel workbook.

Table 3. Outline of the longlist of options

No	Theme	Future opportunities / possibilities	Current user group	Active groups	BAME	Disabled / special needs	Elderly	Local businesses	Nature lovers	Families with children	Vulnerable people	School aged children	Local communities
1	Community events	Retail opportunities e.g. sports equipment/clothing hire/sales, pop-up shops, cafés, and farm shops	✓	✓	✓	✓		✓					✓
2	Community events	Community events space with music, fairs, stalls, art exhibitions etc.	✓		✓	✓	✓	✓	✓	✓			✓
3	Community events	Dark skies observation centre	✓		✓	✓						✓	
…	…	…	…	…	…	…	…	…	…	…	…	…	…

Each of the options was then assessed against a set of criteria to identify a shortlist of priority options. Given the large number of options, this was a high level, qualitative exercise based on the data available and professional judgement. The criteria used in the prioritisation exercise were as follows:

- What would be the impact on natural capital (i.e. provisioning, regulating, and cultural services)?

- What would be the impact on human capital (i.e. employment, health & safety, and the local economy)?

- What would be the impact on social capital (i.e. wellbeing, quality of place, and trust)?

- What would be the impact on manufactured and financial capital (i.e. private benefits, funding opportunities, and costs to Yorkshire Water)?

- What would be the impact on other criteria not captured within the capitals (i.e. risks, alignment with Yorkshire Water policy objectives, and alignment with wider policy objectives)?

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Each of these criteria was scored as follows: ↑↑/↓↓ = significant positive/negative impact; ↑/↓ = minor positive/negative impact; and - = no or overall neutral impact. A total score was then aggregated (by assigning a numerical value to each arrow) and used to rank the options in order of priority and develop a shortlist of options. An example is set out in Table 4 and full details were made available in a separate Excel workbook.

Table 4. Example of option prioritisation exercise

| No	Natural capital			Human capital			Social capital			Financial / manufactured			Other criteria			Total score
	Provisioning services	Regulating services	Cultural services	Employment	Health & safety	Local economy	Wellbeing	Quality of place	Trust	Private benefits	Funding opportunities	Private costs	Risks	YW policy priority	Wider policy priority	
1	-	-	-	↑↑	-	↑↑	-	↑	-	↑↑	-	↓↓	-	-	-	**5**
2	-	-	-	↑	-	↑	-	↑↑	-	-	↑	↓	-	-	-	**4**
3	-	-	↑↑	↑↑	-	↑↑	-	↑↑	-	-	-	↓↓	-	-	-	**6**
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

2.3 Findings

The findings of the prioritisation exercise identified five options which scored more highly than the rest (note, these options are not mutually exclusive and combinations of options could be selected):

- **Option 8 – Woodland creation (Score = 8):** leading to an increase in provisioning services such as timber and woodfuel production, regulating services such as carbon storage and air quality, and cultural services such as aesthetic values and species diversity. Quality of place could also be improved by the visible addition of new native woodland and the woodland could provide benefits to the wellbeing of visitors to the site. The woodland could also provide private benefits to Yorkshire Water through the generation of timber and carbon credits, and grants are likely to be available to offset the costs of planting and maintenance.

- **Option 20 – Moorland restoration (Score = 8):** leading to an increase in provisioning services through more secure water supplies, regulating services such as water quality and carbon storage, and cultural services such as species diversity and aesthetic enjoyment. Quality of place could also be improved as well as providing benefits to the wellbeing of visitors. Yorkshire Water may benefit from improvements in water quality, generation of carbon credits, and reduced water treatment costs.

- **Option 49 – Artificial beach with paddling/swimming and children's play area (Score = 7):** leading to increased provision of cultural services around engagement and enjoyment of the outdoor environment. The creation of a beach may also act as a significant recreational destination due its uniqueness which would have associated benefits for jobs and expenditure in the local area. This option may generate wider social benefits by encouraging hard-to-reach groups to recreate in an outdoor environment which could provide benefits to their physical and mental wellbeing, as well as creating benefits to the quality of place within the area.

- **Option 3 – Dark skies observation centre (Score = 6):** a dark skies observation centre could lead to an increase in cultural services through encouraging interest and engagement with the night sky and by generating educational opportunities for local schools. The centre would require direct employment of staff and could generate benefits to local expenditure from increased visitor expenditure. Quality of place could be boosted by increasing night time use of the site and creating a unique tourist destination in the area.

- **Option 42 – Water sports activities such as boat hire, zorbing, canoeing, kayaking, paddle boarding, raft building, wind surfing, scuba diving, rowing, jet skiing (Score = 6):** provision of such activities could provide benefits in terms of encouraging outdoor recreation and engagement with the natural environment. Increased visitor numbers could generate jobs and expenditure which could benefit the local economy. Better facilities at the site could lead to an increase in the perception of the quality of the area and increased outdoor

recreation, potentially amongst hard-to-reach groups, and so could create benefits for the users' health and wellbeing. Water sports activities may also disturb habitats and other users of the site less than similar land based activities such as motor biking, zip wires, 4x4 driving, zip wires, camping sites etc.

A summary of the findings of the option prioritisation exercise is set out in Figure 7. Full results were made available in a separate Excel workbook.

Figure 7. Overview of scores for prioritisation exercise
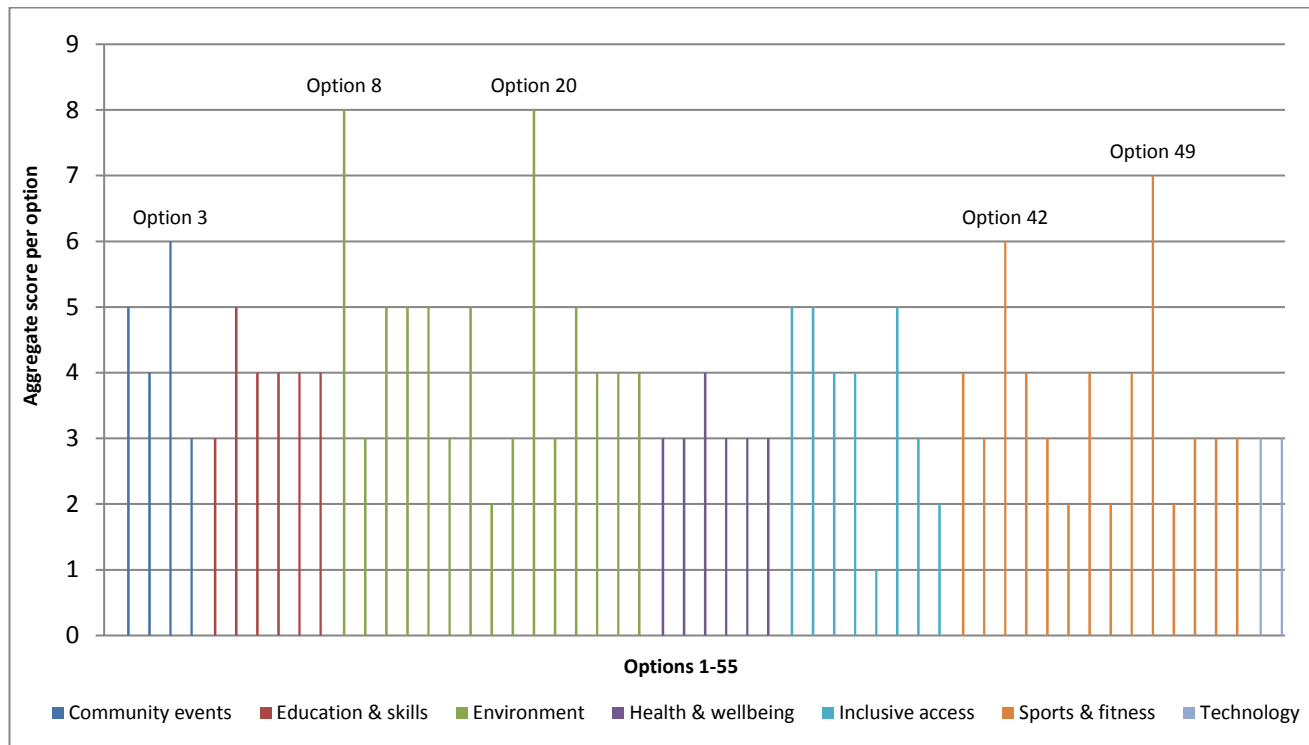
The options were presented to Yorkshire Water at a meeting on 4 July 2017. The aim of the meeting was to discuss the outcomes of the prioritisation exercise and to agree a shortlist of three options for more detailed assessment. However, a number of limitations with the high level option prioritisation exercise were raised at the meeting:

- It was challenging to assess the options against some of the criteria given current data availability; the impact of the options on 'Trust' for example was particularly difficult to assess.

- Assessing 55 options against 15 criteria was an extensive process and required a large number of simplifying assumptions and subjective judgement.

- It was assumed that all criteria are weighted equally when in reality, some aspects may be more important than others.

- For some of the options the extent to which they would generate a change from the baseline was not clear, for example, pond dipping was included as an option although this is already available on the site to some extent.

In light of these challenges with the option prioritisation exercise it was decided that, rather than undertaking a more detailed assessment for the shortlisted options, a quantitative tool would be developed that could be used on the full range of options to support more robust comparisons of each option's strengths and weaknesses, with a focus on health and wellbeing and economic impacts.

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3. Capitals Valuation Tool v1.0

3.1 Overview

This section provides a high level overview of the approach to developing the 'Capitals Valuation Tool v1.0' together with an overview of five scenarios which were used to test and refine the tool using Little Don as a case study site.

3.2 Approach

The tool was developed with an aim of allowing the user to compare a wide range of land management options across the capitals at the Little Don site as well as at other sites owned by Yorkshire Water. In addition the tool was developed with an aim to be:

- Easy-to-use with limited data input required.

- Consistent with Yorkshire Water's Service Measure Framework (SMF): the framework used to define and monitor our service levels.

- Able to be used for comparing the costs and benefits of each option across the capitals.

- Flexible enough to allow use across multiple options and multiple sites.

- Able to be used to evaluate options prior to as well as post implementation.

A draft version of the tool was developed and presented to Yorkshire Water for testing and feedback. A revised version was then piloted using data collected as part of third party company's proposal for a woodland-based climbing activity centre at Langsett reservoir, with the findings of the pilot contributing to further revisions. This revised version of the tool was then used to compare five different scenarios for the Little Don site. A final version of the tool (v1.0) was developed based on the feedback gathered during this exercise.

Version 1.0 of the tool contains the following sections:

- **Data Entry:** the user is asked to enter data on the baseline conditions of the site for a range of natural, social, human, manufactured, and financial capital metrics, and how these metrics are likely to change across four potential scenarios.

- **Net Gain:** the user is asked if a 'Net Gain' biodiversity assessment is required to be undertaken and if so is asked to input data on the habitats present on the site and how these will change under the various scenarios.

- **Results Summary / Full Results:** an overview of the results is provided in graphical and tabular format.

- **Show Tabs / Hide Tabs:** the option is provided to show or hide the detailed workings of the tool; if the details are selected the tool displays the full set of calculations and data sources used in generating the results.

- **New Report:** the user is provided with the option of clearing the data within the report and generating a new workbook for completion.

Full details of the calculations and data sources used within the tool are set out in Appendix A.

3.3 Findings

In order to pilot the tool in a practical setting, Yorkshire Water developed five possible scenarios for developing the Little Don site:

- **Inclusive Environment:** encouraging all groups to interact with the environment.

- **Active Recreation:** planting trees and encouraging sports such as mountain biking.

- **Active Biodiversity:** protecting and restoring nature, with limited visitor access.

- **Sustainable Farming:** working with farmers to better balance the needs of the environment.

- **Sustainable Forestry:** planting the majority of the site with broadleaved woodland and hedgerows.

These five scenarios were entered into Version 1.0 of the Five Capitals Valuation tool based on data provided by Yorkshire Water. The impacts of the scenarios were calculated over a 40 year assessment period. The results of each scenario, compared against the baseline (i.e. a do-nothing scenario) are set out in tabular format in Table 5 and in graphical format in

Figure 8.

The results suggest that facilitating active sports on site has the greatest potential positive impact of the five scenarios, despite having the highest costs. The results also demonstrate that there are pros and cons to each of the options for the Little Don site, and that there can be important trade-offs between goals of encouraging visitor diversity, protecting biodiversity, and creating employment opportunities.

Table 5. Net Present Value for the five Little Don scenarios relative to the baseline (tabular output, values rounded to nearest £10,000)

Value (£m 2016 prices)	Inclusive Environment	Active Recreation	Active Biodiversity	Sustainable Farming	Sustainable Forestry
Five capitals	**£11.46 million**	**£21.29 million**	**£4.37 million**	**£3.51 million**	**£2.44 million**
Natural capital	**£6.62 million**	**£4.86 million**	**£1.87 million**	**£0.82 million**	**£2.46 million**
Crops & livestock	£0.00 m	£0.00 m	£0.00 m	£0.12 m	£0.00 m
Global climate	£0.36 m	£0.99 m	£0.21 m	-£0.02 m	£1.17 m
Air quality	£0.06 m	£0.22 m	-£0.01 m	£0.04 m	£0.28 m
Flood regulation	£0.03 m	£0.01 m	£0.16 m	£0.01 m	£0.00 m
Water quality	£0.02 m	£0.01 m	£0.13 m	£0.01 m	£0.00 m
Pollination	-£0.15 m	-£0.14 m	-£0.07 m	-£0.01 m	-£0.11 m
Recreation	£0.47 m	£0.47 m	£0.47 m	£0.47 m	£0.02 m
Amenity	£5.83 m	£3.30 m	£0.98 m	£0.20 m	£1.10 m
Social capital	**£0.95 million**	**£3.85 million**	**£0.68 million**	**£0.76 million**	**£0.03 million**
Wellbeing	£0.95 m	£3.85 m	£0.68 m	£0.76 m	£0.03 m
Human capital	**£4.04 million**	**£15.54 million**	**£1.97 million**	**£1.96 million**	**£0.10 million**
Employment	£0.76 m	£4.54 m	£0.00 m	£0.00 m	£0.00 m
Skills	£0.00 m	£0.05 m	£0.00 m	£0.00 m	£0.00 m
Health & safety	-£0.00 m	-£0.00 m	-£0.00 m	-£0.02 m	-£0.00 m
Local economy	£3.29 m	£10.95 m	£1.97 m	£1.97 m	£0.10 m
Financial/manufactured capital	**-£0.15 million**	**-£2.96 million**	**-£0.15 million**	**-£0.02 million**	**-£0.15 million**
Private costs	-£0.04 m	-£6.13 m	-£0.04 m	-£0.02 m	-£0.04 m
Private benefits	-£0.11 m	£3.18 m	-£0.11 m	£0.00 m	-£0.11 m

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Figure 8. Net Present Value for the five Little Don scenarios (graphical output)
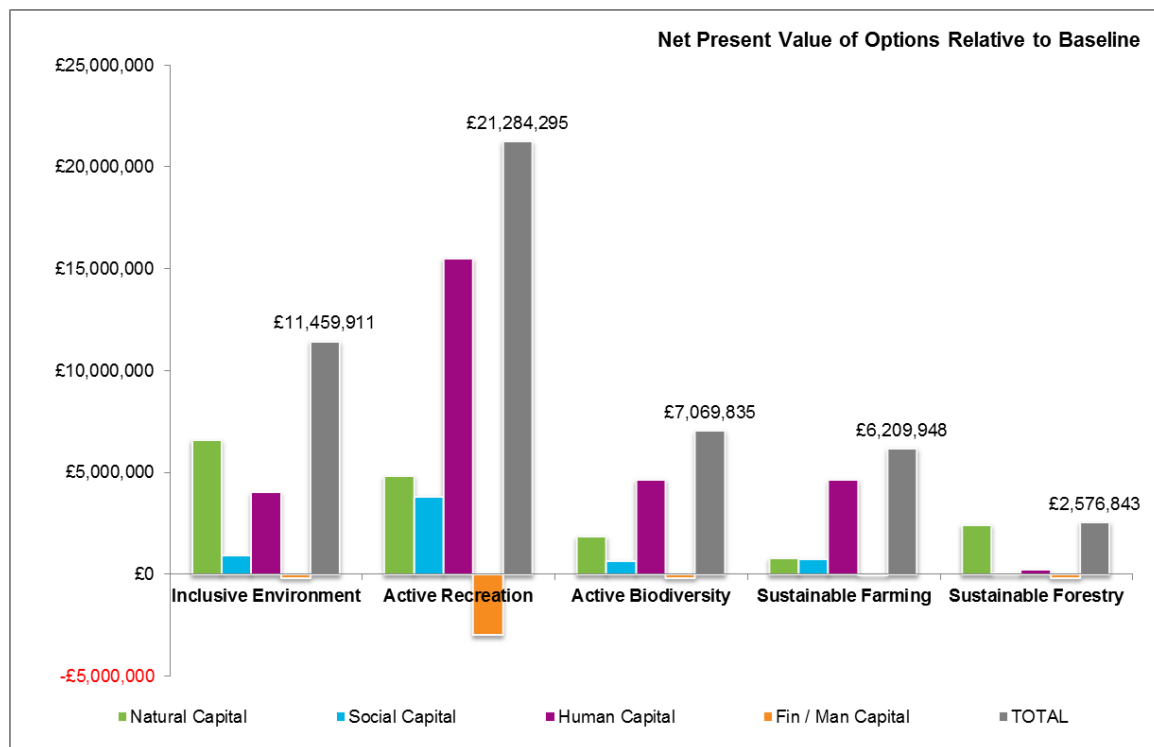
In some cases, the detailed results seemed counter-intuitive. This was largely due to the way in which values are allocated between the capitals, and partly due to a lack of monetary values for complex or interlinked facets of natural capital and biodiversity. For example:

- The 'Active Recreation' option gives the same value for recreation (Natural Capital) as the other options, despite a much greater focus on recreation. In the current version of the model, these 'recreation' values are derived from research which quantified visitors' hypothetical 'willingness to pay' for visits to freshwater environments. The health and wellbeing benefits of outdoor recreation and exercise are reflected under wellbeing (Social Capital), the value of which for 'Active Recreation' is significantly higher than the other options.

- The value of flood mitigation for the 'Sustainable Forestry' option is not as high as might be expected given the importance of reforestation for flood management. At present, monetary values for flood mitigation are only available for wetlands, floodplains, coastal margins, mountains, moors and heaths. Robust values for tree planting in non-upland areas were not available and hence were not incorporated into this version of the model.

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4. Conclusions and Recommendations

4.1 Overview

This section provides an overview of the overall findings of the project following a demonstration of the tool to Yorkshire Water staff.

4.2 Findings

The Five Capitals Valuation tool and the results of the five scenarios for Little Don were presented at a meeting with Yorkshire Water on 6 October 2017. At this meeting it was recognised that there were a number of potential uses of the tool at the Little Don site. Yorkshire Water are now talking to stakeholders and looking at a hybrid approach to maximise benefits across the capitals, with a focus on recreation.

It was also recognised that the tool would be useful in wider decision making processes throughout Yorkshire Water. Some of the potential uses identified include:

- **High level optioneering:** providing a method for informing land management decisions (such as whether to focus on planting woodland or encouraging active sports). It was noted that the tool would not typically provide a single best solution, however, could be used to identify trade-offs more clearly and provide an evidence base to help to refine and improve potential options.

- **Communicating results:** providing a clear basis for quantifying the impact of potential decisions and communicating these results to stakeholders within and outside of Yorkshire Water.

- **Complementing the SMF:** supporting more detailed analysis of particular issues (e.g. the wellbeing impacts associated with encouraging visitor groups who are typically inactive to exercise on Yorkshire Water sites).

- **'Net Gain':** informing the approach to biodiversity offsetting and design of capital delivery schemes.

The tool has already been used at two of our operational sites to provide quantified assessments of enhancement options.

At the same time a number of potential areas were identified where the tool could be further developed:

- Providing more detailed site specific analysis to support practical site decisions rather than higher level strategic decisions – this could include analysis at an individual species level, for example, and could include development of a suite of tools optimised to work at different spatial scales.

- Adding functionality to the tool in order to allow displaying and accounting for changes over different time periods within the same scenario e.g. woodland planting may be undertaken in the first year and footpaths and other improvements may then be created once the trees are established.

- Collecting evidence which could be used to monitor the impacts of particular schemes over time – this could include, for example, development of an asset register which monitors changes in asset extent and condition in addition to measurement of the value of service flows.

- Revising and extending the 'Net Gain' approach within the tool which at this stage is highly simplified and does not capture some of the challenges and risks of implementing biodiversity offsetting in practice – this could include for example a revised habitat classification scoring system for the Yorkshire area as well as inclusion of the multipliers required for designing a Net Gain scheme.

It was also agreed at the meeting that a useful next step following completion of this project would be to test the tool in a range of practical settings to identify the key priorities for development.

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Appendix A: Detailed methodology

Overview

All impacts are discounted over a period specified by the user using a declining discount rate as set out in HM Treasury (2016) i.e. 3.5% for Years 1-30 and 3.0% for Years 31-40;[2] aside from the 'health & safety' and 'wellbeing' impacts which use the 1.5% discount rate recommended for health and wellbeing impacts.[3] All prices are converted into 2016 prices using an ONS RPI index.[4] The key steps involved in each of the calculations included within the tool are set out below.

Natural capital

Crops & livestock

- Area of land under crop production and livestock grazing input by user (e.g. 2 / 5 ha)

- Market value of crop land in Yorkshire region drawn from RICS/RAU (2015) (e.g. £395 / £264 per ha per year).[5]

- Total agricultural rental income paid to Yorkshire Water input by user (e.g. £500 per year)

- Total agricultural surplus (e.g. (2*395)+(5*264)-500=£1,609 per year).

Fisheries

- Not included in this version of the tool.

Energy

- Not included in this version of the tool.

Water supply

- Not included in this version of the tool.

Global climate

- Area of different habitat types on site input by user (e.g. 3 ha broadleaved woodland).

- Carbon storage in vegetation drawn from Cantarello et al. (2011)[6] (e.g. 407 tCO_2e per ha for broadleaved woodland). Note this is accounted for in Year 1.

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[2] HM Treasury (2016), 'The Green Book: Appraisal and Evaluation in Central Government'.

[3] HSE (2017), http://www.hse.gov.uk/risk/theory/alarpcba.htm

[4] ONS (2016), 'RPI All Items Index: Jan 1987=100'.

[5] RICS/RAU (20160, 'RICS/RAU Rural Land Market Survey H2 2015'.

[6] Cantarello et al. (2014), 'Potential Effects of Future Land-use Change on Regional Carbon Stocks in the UK'.

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- Carbon sequestration in vegetation drawn from Christie et al. (2010),[7] Abson et al. (2010),[8] Natural England (2010),[9] Beaumont et al. (2010)[10] (e.g. 4.97 tCO_2e per ha per year for broadleaved woodland). Note this is accounted for in Years 1-40.

- Operational carbon emissions input by user (e.g. 1,500 tCO_2e per year). Note this is accounted for in Years 1-40.

- Embedded carbon emissions input by user (e.g. 200,000 tCO_2e). Note this is accounted for in Year 1.

- Central non-traded carbon price drawn from BEIS (2017)[11] (e.g. £57 per tCO_2e in Year 1).

- Total carbon impacts (e.g. ((3*407)+(3*4.97)+1,500+200,000)*57=£13.6m in Year 1).

Air quality

- Area of different habitat types on site input by user (e.g. 3 ha broadleaved woodland).

- Value of air pollution removal by vegetation drawn from CEH (2017)[12] (e.g. £394 per ha per year for broadleaved woodland). Note this is accounted for in Year 1.

- Air pollution emissions input by user (e.g. 100 tonnes NO_x pollution per year).

- Rural damage costs of air pollution drawn from Defra (2015)[13] (e.g. £7,956 per tonne of NO_x).

- Total air quality impacts (e.g. (3*394)-(100*7,956)=-£0.8m per year).

Flood regulation

- Area of different habitat types on site input by user (e.g. 4 ha wetlands and floodplains).

- Value of flood regulation service provided by wetland habitats drawn from the benefits transfer function set out in Morris & Camino (2011) (e.g. £472 per year for wetlands and floodplains).[14] See AECOM (2017)[15] for further details.

- Total flood regulation impacts (e.g. 4*472=£1,888 per year).

Water quality

- Area of different habitat types on site input by user (e.g. 4 ha wetlands and floodplains).

- Value of water quality regulation service provided by wetland habitats drawn from the benefits transfer function set out in Morris & Camino (2011) (e.g. £383 per year for wetlands and floodplains).[16] See AECOM (2017)[17] for further details.

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[7] Christie et al. (2010), 'Economic Valuation of the Benefits of Ecosystem Services Delivered by the UK Biodiversity Action Plan'.

[8] Abson et al. (2010), 'Valuing Regulating Services (Climate Regulation) from UK Terrestrial Ecosystems'.

[9] Natural England (2010), 'England's Peatlands: Carbon Storage and Greenhouse Gases'.

[10] Beaumont et al. (2010), 'Coastal Margins and Marine Habitats'.

[11] BEIS (2017), 'Green Book Supplementary Guidance: Valuation of Energy Use and Greenhouse Gas Emissions for Appraisal'.

[12] CEH (2017), 'Developing Estimates for the Valuation of Air Pollution Removal in Ecosystem Accounts'.

[13] Defra (2015), 'Full list of damage costs 2015'.

[14] Morris & Camino (2011), 'Economic Assessment of Freshwater, Wetland and Floodplain (FWF) Ecosystem Services'.

[15] Integrating Natural, Social, and Human Capital into the SMF Valuation Methodology v0.21.

[16] Morris & Camino (2011), 'Economic Assessment of Freshwater, Wetland and Floodplain (FWF) Ecosystem Services'.

[17] Integrating Natural, Social, and Human Capital into the SMF Valuation Methodology v0.21.

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- Total water quality regulation impacts (e.g. 4*383=£1,532 per year).

Pollination

- Area of different habitat types on site input by user (e.g. 4 ha semi-natural grassland).

- Value of pollination service provided by grassland habitats drawn from the approach set out in AECOM (2017)[18] (e.g. £162 per year for wetlands and floodplains).

- Total pollination impacts (e.g. 4*162=£648 per year).

Recreation

- Number of recreational visitors to site input by user (e.g. 100 visitors per year).

- Consumer surplus per visit to freshwater environments drawn from Sen et al. (2014)[19] (e.g. £2.14 per visit).

- Length of river water quality and number of bathing waters improved input by user (e.g. 10 km / 1 bathing water).

- Consumer surplus associated with increased recreational visits due to improvement of river water quality and bathing water drawn from the approach set out in AECOM (2017)[20] (e.g. £3,548 per km of river improved and £4,612 per bathing water improved).

- Total recreation impacts (e.g. (100*2.14)+(10*3,548)+(1*4,612)=£40,306 per year).

Amenity

- Area of different habitat types on site input by user (e.g. 4 ha greenspace).

- Amenity provided by greenspace habitats (in terms of increases in local house prices) drawn from the benefits transfer function set out in Mourato et al. (2010) (e.g. £8,440 per year for greenspace).[21] See AECOM (2017)[22] for further details.

- Length of river water quality and number of bathing waters improved input by user (e.g. 10 km / 1 bathing water).

- Amenity value associated with increased recreational visits due to improvement of river water quality and bathing water drawn from the approach set out in AECOM (2017)[23] (e.g. £9,739 per km of river improved and £0 per bathing water improved).

- Total amenity impacts (e.g. (4*8,440)+(10*9,739)+(1*0)=£0.1m per year).

- Note, the amenity values are based on increases in house prices associated with being located near to (i.e. <1 km distance) areas of green space while the recreation values are based on the consumer surplus associated with each visit to the natural environment.

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[18] Integrating Natural, Social, and Human Capital into the SMF Valuation Methodology v0.21.

[19] Sen et al. (2014), 'Economic Assessment of the Recreational Value of Ecosystems: Methodological Development and National and Local Application'.

[20] Integrating Natural, Social, and Human Capital into the SMF Valuation Methodology v0.21.

[21] Mourato et al. (2010), 'Economic Analysis of Cultural Services'.

[22] Integrating Natural, Social, and Human Capital into the SMF Valuation Methodology v0.21.

[23] Integrating Natural, Social, and Human Capital into the SMF Valuation Methodology v0.21.

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- A potential issue of double counting would arise if: (1) a significant component of the increase in house prices associated with proximity to the natural environment is dependent on the consumer surplus people gain from visiting those natural areas (and less so for other aspects such as aesthetic value, more pleasant leafy neighbourhood etc.); and/or (2) there is a significant overlap between the numbers of people visiting Yorkshire Water sites and the people living near to them such that the consumer surplus generated by visitors to the site would be mostly captured by people who live within 1 km of the site.

- While the significance of the first condition is difficult to quantify the second can be estimated based on the location of Yorkshire Water sites (e.g. are they typically in urban areas or more remote, rural areas) and the visitor make-up (i.e. do they usually travel less than a km or more than a km). Looking at the Little Don visitor profile, around 21% of visitors come from 'less than 5 miles' and 79% from larger distances.[24] Given that the number coming from less than 5 miles is relatively small, that 5 miles is a greater distance than 1 km, and that house prices are also likely to reflect other aspects of wellbeing (e.g. around aesthetic value) it seems that the extent of double counting is likely to be relatively small.

Non-use value

- Not included in this version of the tool.

Social capital

Wellbeing

Recreation

- Total number of visitors input by user (e.g. 100 visitors per year).

- Type of activity undertaken input by user (e.g. 100% of visitors undertake 'walking with a dog').

- Level of exercise intensity associated with each activity type drawing on White et al. (2016)[25] i.e. if the Metabolic Equivalent of Task (MET) rate[26] <3 then a score of 0 is assigned, if 3 – 5.99 then a score of 1, and if >6 then a score of 2 (e.g. if the activity is 'walking with a dog' the MET rate is 3.50 which is assigned a score of 1).

- Number of visits less than 30 minutes (and therefore not producing exercise benefits)[27] input by user (e.g. 20% of visits less than 30 minutes).

- Total number of beneficial exercise visits to the site (e.g. 100*100%*1*(1-20%) = 80 visits per year).

- Proportion of visits from non-white visitors input by user (e.g. 5%).

- Proportion of non-white visitors who are already meeting the recommended level of physical activity drawn from Natural England (2017)[28] (e.g. 21%).

- Number of non-white visitors benefitting from exercise on site (e.g. 80*5%*(1-21%)=3.2 visitors per year).

- Total remaining visitors (e.g. 80-(80*5%)=76 visitors per year).

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[24] mruk Research (2007), 'Yorkshire Water Langsett Super Site Report November 2007'.

[25] White et al. (2016),'Recreational Physical Activity in Natural Environments and Implications for Health: A Population Based Cross-Sectional Study in England'.

[26] The metabolic equivalent of task (MET), or simply metabolic equivalent, is a physiological measure expressing the energy cost (or calories) of physical activities. One MET is the energy equivalent expended by an individual while seated at rest.

[27] White et al. (2016),'Recreational Physical Activity in Natural Environments and Implications for Health: A Population Based Cross-Sectional Study in England'.

[28] Natural England (2017), 'Monitor of Engagement with the Natural Environment'.

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- Proportion of visits from disabled visitors input by user (e.g. 2%).

- Proportion of disabled visitors who are already meeting the recommended level of physical activity drawn from Natural England (2017)[29] (e.g. 30%).

- Number of disabled visitors benefitting from exercise on site (e.g. 76*2%*(1-30%)=1.1 visitors per year).

- Total remaining visitors (e.g. 80-(80*5%)-(80*5%*2%)=74 visitors per year).

- Proportion of visits from different socio-economic groups input by user (e.g. 2%/10%/15%/73%). Note this approach groups people by their propensity to exercise as the defining characteristic for belonging to a particular group.

- Proportion of different socio-economic groups who are already meeting the recommended level of physical activity drawn from Natural England (2017)[30] (e.g. 43%/38%/35%/31%).

- Number of visitors from different socio-economic groups benefitting from exercise on site (e.g. [74*2%*(1-42%)]+[74*10%*(1-38%)]+[74*15%*(1-35%)]+[74*73%*(1-31%)]=50.2 visitors per year).

- Total number of visitors benefitting from exercise on site (e.g. 3.2+1.1+50.2=54 visitors per year).

- Quality Adjusted Life Year (QALY) per visit drawn from White et al. (2016)[31] (e.g. 0.000205327).

- Total number of QALYs generated (e.g. 0.000205327*54=0.01 QALYs per year).

- Value per QALY drawn from White et al. (2016)[32] (e.g. £20,000).

- Total wellbeing benefit from recreation (e.g. 20,000*0.01=£223 per year).

River and bathing water quality

- Length of river water quality and number of bathing waters improved input by user (e.g. 10 km / 1 bathing water).

- Wellbeing benefits associated with increased recreational visits due to improvement of river water quality and bathing water drawn from the approach set out in AECOM (2017)[33] (e.g. £1,866 per km of river improved and £976 per bathing water improved).

- Total wellbeing benefit from river and bathing water quality improvements (e.g. (10*1,866)+(1*976)= £19,636 per year).

Volunteering

- Total number of volunteer positions input by user (e.g. 10 volunteers per year).

- Wellbeing value for 'regular volunteering to an individual of unknown age and geographically outside of London in the UK' drawn from HACT (2017)[34] (e.g. £3,199 per year).

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[29] Natural England (2017), 'Monitor of Engagement with the Natural Environment'.

[30] Natural England (2017), 'Monitor of Engagement with the Natural Environment'.

[31] White et al. (2016),'Recreational Physical Activity in Natural Environments and Implications for Health: A Population Based Cross-Sectional Study in England'.

[32] White et al. (2016),'Recreational Physical Activity in Natural Environments and Implications for Health: A Population Based Cross-Sectional Study in England'.

[33] Integrating Natural, Social, and Human Capital into the SMF Valuation Methodology v0.21.

[34] HACT (2017), 'Housing Associations Charitable Trust (HACT) valuation database'.

- Total wellbeing benefit from volunteering (e.g. 10*3,199=£31,990 per year).

Jobs

- Total number of FTE jobs created input by user (e.g. 10 jobs).

- Wellbeing value for employment drawn from The National Institute for Health and Clinical Excellence, and Centre for Mental Health, and the National Account:

- Wellbeing from work: assigned proportion of a QALY (under personal and social wellbeing) equalling £634.

- Sense of confidence in capabilities: assigned proportion of a QALY equalling £845.

- Reduced isolation: assigned proportion of a QALY equalling £1,225.

   Generating a total benefit of 634+845+1,225=£2,704 due to employment.

- Total wellbeing benefit from job creation (e.g. 10*2,704=£27,040 per year).

Quality of place

- Not included in this version of the tool.

Trust

- Not included in this version of the tool.

Human capital

Employment

- Total number of FTE jobs created input by user (e.g. 1 job).

- Estimated rates of leakage, displacement, substitution, and deadweight drawn from SCWconsulting (2010)[35] (e.g. 7% / 3% / 10% / 0%).

- Estimated multiplier drawn from ONS (2014) (e.g. 1.37).[36]

- Net impact on jobs (e.g. 1*(1-7%)*(1-3%)*(1-10%)*(1-0%)*1.37)=1.1 jobs.

- Estimated GVA per FTE drawn from ONS (2016)[37] (e.g. £20,680 per job per year).

- Total impact from jobs created (e.g. 1.1*20,680=£23,002 per year).

Skills

- Total number of apprenticeships input by user (e.g. 10 apprenticeships).

- Average economic benefit per apprenticeship drawn from New Economy (2015)[38] (e.g. £2,261 per year).

- Total economic benefit from apprenticeships (e.g. 10*1,925=£22,615 per year).

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[35] SQWconsulting (2010), 'The Economic Impact of Military Presence in North Yorkshire'.

[36] ONS (2014), 'Type I Employment Multipliers and Effects by SU114 Industry and Sector (Market, Government and NPISH)'.

[37] ONS (2016b), 'Regional Gross Value Added (Income Approach), UK: 1997 to 2015'.

[38] New Economy (2015) 'Unit Cost Database V1.4'.

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Health & safety

- Number of visitors to site input by user (e.g. 100 visitors per year).

- Frequency of accidents input by user (e.g. 0.001 accidents per visitor per year).

- Total cost per minor injury drawn from HSE (2017)[39] (e.g. £903 per accident).

- Length of river water quality and number of bathing waters improved input by user (e.g. 10 km / 1 bathing water).

- Health & safety benefits associated with improvement of river water quality and bathing water drawn from the approach set out in AECOM (2017)[40] (e.g. £883 per km of river improved and £16,120 per bathing water improved).

- Total health and safety impact (e.g. (100*0.001*-903)+(10*883)+(1*16,120)=£24,860 per year).

Local economy

- Total number of visitors input by user (e.g. 100 visitors per year).

- Type of activity undertaken input by user (e.g. 100% of visitors undertake 'walking with a dog').

- Average expenditure associated with activity type drawn from Natural England (2017)[41] (e.g. visitors walking with a dog typically spend £3.01 on their trip). Note, the user can input a specific expenditure value if known.

- Length of river water quality and number of bathing waters improved input by user (e.g. 10 km / 1 bathing water).

- Increased expenditure associated with improvement of river water quality and bathing water drawn from the approach set out in AECOM (2017)[42] (e.g. £4,400 per km of river improved and £6,897 per bathing water improved).

- Total expenditure in local economy (e.g. (100*100%*3.01)+(10*4,400)+(1*6,897)=£51,598 per year).

Financial / Manufactured capital

Private costs

- CAPEX costs input by user (e.g. £1,000). Note, CAPEX costs are assumed to be split over Years 1 – 3.

- OPEX costs input by user (e.g. £1,500 per year). Note, OPEX costs are assumed to be incurred over Years 4 – 40.

- Total private costs (e.g. (1,000/3)=£333 in Year 1).

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[39] HSE (2017), http://www.hse.gov.uk/economics/eauappraisal.htm

[40] Integrating Natural, Social, and Human Capital into the SMF Valuation Methodology v0.21.

[41] Natural England   (2017), 'Monitor of Engagement with the Natural Environment'.

[42] Integrating Natural, Social, and Human Capital into the SMF Valuation Methodology v0.21.

Private benefits

- Income from agricultural rental agreements, other revenues, avoided costs, and grants or subsidies input by user (e.g. £500 / £100 / £2,000 / £150 per year).

- Total private benefits (e.g. £2,750 per year).

Module 1. Net gain

Biodiversity units

- Area/length of Warwickshire County Council (2014)[43] habitat types on site input by user (e.g. 10 ha mixed plantation in good condition).

- Score for the distinctiveness of each habitat type drawn from Warwickshire County Council (2014)[44] such that: 'high' distinctiveness is assigned a score of 6; 'medium-high' a score of 5; 'medium' a score of 4; 'medium-low' a score of 3; 'low' a score of 2; and 'none' a score of 0 (e.g. mixed plantation = low = 2).

- Score for the condition of each habitat type drawn from Defra (2012)[45] such that: 'good' condition is assigned a score of 3; 'moderate' a score of 2; and 'poor' a score of 1.

- Number of biodiversity units generated using approach set out in Defra (2012)[46]:

$$Units = Area/Length * Distinctiveness * Condition$$

For example, 10*2*3=60 Biodiversity Units.

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[43] Warwickshire County Council (2014), 'Guide to Warwickshire, Coventry and Solihull Biodiversity Offsetting Biodiversity Impact Assessment Calculator v18'.

[44] Warwickshire County Council (2014), 'Guide to Warwickshire, Coventry and Solihull Biodiversity Offsetting Biodiversity Impact Assessment Calculator v18'.

[45] Defra (2012), 'Technical paper: The metric for the biodiversity offsetting pilot in England'.

[46] Defra (2012), 'Technical paper: The metric for the biodiversity offsetting pilot in England'.

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