



BEAM PARKLANDS NATURAL CAPITAL ACCOUNT

Final Report

For the Greater London Authority

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LIST OF ABBREVIATIONS

ANGSt	Access to Natural Greenspace Standard
BAP	Biodiversity Action Plan
CNCA	Corporate Natural Capital Accounting
FCERM	Flood and Coastal Erosion Risk Management
FHRC	Flood Hazard Research Centre
GLA	Greater London Authority
HLS	Higher Level Stewardship
LBBD	London Borough of Barking and Dagenham
NCC	Natural Capital Committee
SoP	Standard of Protection

EXECUTIVE SUMMARY

1. Introduction

Beam Parklands is a multi-functional greenspace in the London Borough of Barking and Dagenham. Its redevelopment during 2009 - 2011 is recognised as a highly successful green infrastructure investment. Managed by the Land Trust (Box ES.1), Beam Parklands delivers a range of benefits to the local community in one of the most deprived areas in the country. This includes flood protection and a multi-use open space that provides recreation and education opportunities, enhances local environmental amenity, and contributes to the conservation of important habitats and wildlife.

This report presents a natural capital account for Beam Parklands. ‘Natural capital’ is a way of thinking about the elements of nature that directly and indirectly produce value or benefits to people. These elements include species, freshwater, land, minerals, the air and oceans, as well as natural processes and functions that are collectively termed ‘ecosystem services’ (NCC, 2014). Maintenance and enhancement of green infrastructure delivers natural capital benefits in the urban environment, contributing to the wellbeing of local communities.

Box ES.1: About the Land Trust

The Land Trust is an independent Charitable Trust that manages open spaces on behalf of, and in partnership with, local communities. The strategic aim for the Land Trust is to sustainably maintain and improve high quality green spaces that deliver environmental, social and economic benefits.

Originally established to restore derelict brownfield sites to public open spaces through regeneration initiatives, the Trust now holds a diverse portfolio of land, including country parks, heritage sites, multi-functional wetlands, coastal areas, inner city parks, restored cultural attractions, community woodlands, and an ecology park.

The Land Trust acquired Beam Parklands on a long term lease from former owners the London Borough of Barking and Dagenham and the Environment Agency. The Trust’s involvement has been instrumental in securing long term funding for the management of site for the benefit of the local community.

2. Natural capital accounting

This natural capital account for Beam Parklands follows the framework for corporate natural capital accounting (CNCA) set out by the Natural Capital Committee (eftec et al., 2015) (Box ES.2). The purpose of the framework is to help organisations make better decisions about the natural capital assets (or green infrastructure) that they own and manage. It does this by providing clear and explicit recognition of the value of natural capital benefits and the costs of maintaining natural capital assets. This information is critical to making informed decisions concerning strategic priorities within an organisation - such as prioritising investments and budgets. But too often this information is missing and, consequently the value and benefits of natural capital assets are not accounted for.

The result can be under-investment and inadequate management of natural capital assets, neglecting the substantial benefits available to both the organisation and wider stakeholders. This can even be the case when improved management of natural capital reduces other costs of an organisation, e.g. through improved resource efficiency.

Box ES.2: Corporate natural capital accounting (CNCA)

Organisations typically assess the value of their assets through conventional financial accounting processes. This includes balance sheets that summarise the assets and liabilities that the company holds, and profit and loss accounts that record flows of values in an accounting period. This basic information underpins multiple decisions in an organisation, such as knowing when funds will be required for maintenance and improvement, and how to capitalise on increasing the value of their assets.

Most of the natural capital benefits do not appear in financial accounts. Where they do appear it is ordinarily as a liability - for example a local park will be recognised as a liability in a local authority's account due to the cost of maintaining it for public use year on year. Since the park generates no revenue stream, no asset value is recorded. This ignores, amongst other benefits, the recreation and amenity value gained by local residents and visitors who use the park. As this value is not visible in the financial accounts, it could be difficult to justify maintaining liabilities and/or setting budgetary priorities to improve such non-financial benefits.

Corporate natural capital accounting addresses this missing information. CNCA is a framework that collates and presents information about natural capital in a similar way to other capital assets (e.g. financial and physical assets). It records the benefit to both the organisation that owns the natural capital asset and to society which benefits from it, by answering four key questions:

1. What natural capital assets does the organisation, own, manage, or is responsible for?
2. What flows of benefits do those assets produce, for the organisation and wider society?
3. What is the value of those benefits?
4. What does it cost to maintain the natural assets and flows of benefits?

Natural capital assets can take a variety of different forms, from the grasslands where children play to the wetlands that provide a habitat for wildlife and flood risk protection for local residents. They contribute to the production of various goods and services and are often conceptualised in terms of the flow of 'ecosystem services' or natural capital benefits. These are the flows of benefits from the natural capital that are recorded in a corporate natural capital account.

3. Natural capital balance sheet for Beam Parklands

The main reporting statement for the CNCA framework is the natural capital balance sheet. This reports the value of natural capital assets and the costs (liabilities) of maintaining those assets. In order to produce this reporting statement, an organisation needs to compile a range of financial and environmental data.

The supporting schedules compiled for Beam Parklands address the four key questions set out in Box ES.2. This includes a register of natural capital assets for Beam Parklands, measurement of the flow and value of benefits provided by these assets, and cost associated with their long term maintenance. Further details are provided in the Main Report.

Figure ES.1 presents the natural capital balance sheet for Beam Parklands. It reports a net natural capital asset value at the 31st December 2014 of approximately £42m in present value terms. The net value is calculated as the value of natural capital assets (approx. £43m) less their total maintenance costs (approx. £1m). All valuations are calculated as the (discounted) flow of benefits/costs over 99 years.

Figure ES.1: Beam Parkland Natural Capital Balance Sheet, as at 31st December 2014 (£m)

		Year 2014
		Total Value
		£m
	Natural Capital Assets	
1	Asset value (2009)	21
2	Gain in asset value	10
3	Adjustments	12
4	Gross asset value	43
	Natural Capital Liabilities	
5	Total maintenance provisions	(1)
6	Total Net Natural Capital	42

Notes:

- All values in 2014 prices (£m) in present value terms over 99 years.
- Negative values are presented in parenthesis.
- Figures have been rounded to the nearest £1m.

Understanding the natural capital balance sheet

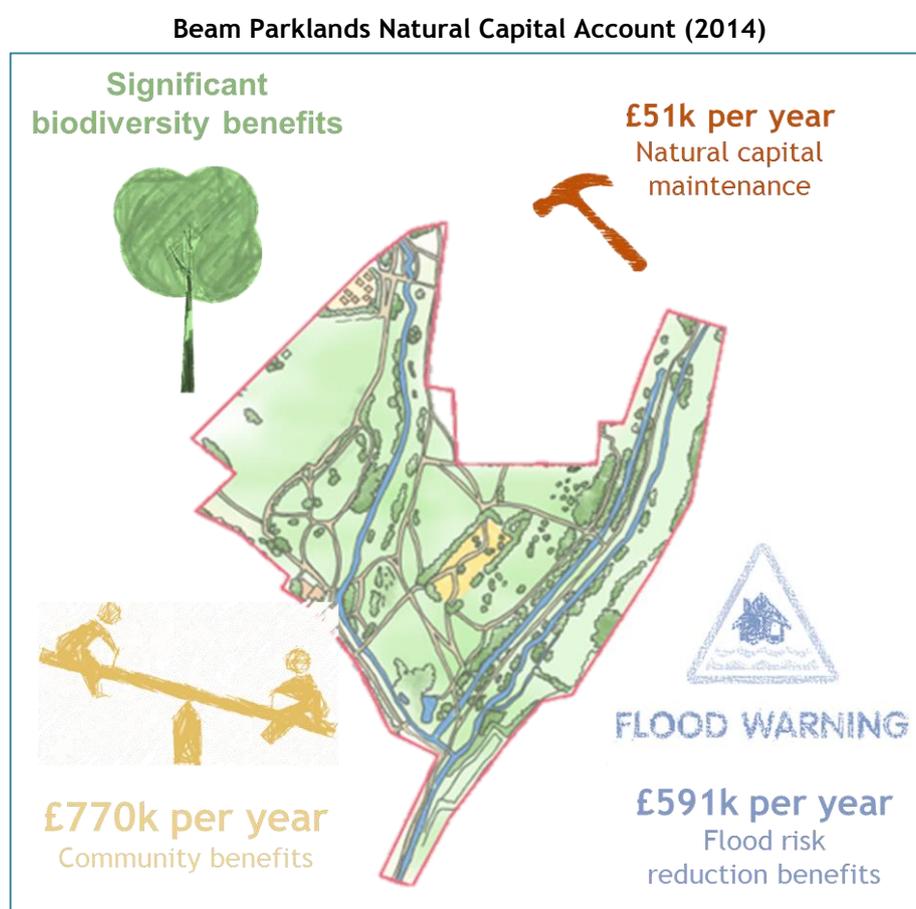
- **Asset value (2009):** the 'baseline' natural capital asset value for Beam Parklands is estimated to have been £21m in 2009. This measures the flood protection benefits and the amenity value (recreation, health, and education opportunities) of the park to the local community.
- **Gains in asset value:** a £10m increase in the natural capital asset value is recorded between 2009 and the 2014 reporting date for the account. It reflects the enhanced amenity value for the local community due to the green infrastructure investment and redevelopment of Beam Parklands between 2009 and 2011.
- **Adjustments:** a further £12m increase in the natural capital asset value is recorded due to population growth and development in the local community resulting in more people benefitting from the flood protection and amenity value of Beam Parklands since 2009.
- **Total maintenance provisions:** the cost of maintaining natural capital assets at Beam Parklands is estimated to be £1m over the 99 year time horizon. This is based on the 2012 - 2017 management plan for Beam Parklands and the assumption that similar natural capital maintenance objectives will be set beyond this.

Overall, the balance sheet and natural capital account for Beam Parklands reflects the substantial benefits provided by the site to the local population. The calculated asset value significantly exceeds the long term natural capital maintenance costs. It provides a very different picture to a conventional financial account that would likely recognise only the maintenance liability, or at most, value the asset at replacement cost¹.

The balance sheet also highlights the impact of the enhancements to Beam Parklands undertaken between 2009 and 2011, which increased flood storage capacity, improved its amenity value and increased interconnectivity to nearby residential areas. These enhancements, in combination with adjustment made for an increase in the local population, are calculated to have added £22m to the natural capital asset value. This is roughly a 100% increase on the 2009 valuation - a substantial enhancement of the estimated asset value, facilitated by the green infrastructure investment.

4. Estimating the natural asset value of Beam Parklands

The components of the natural capital asset value for Beam Parklands are shown below:



¹ Estimated to be approximately £4.5m based on the capital expenditure incurred for the redevelopment of the site (just over 10% of the estimated natural capital asset value). See Main Report.

The account is partial as a number of other potential benefits are not currently captured. This includes the role of Beam Parklands in helping to regulate local air quality and climate, through the woodland, parkland and wetland habitats, and the role of the wetland habitat in regulating water quality.

Some aspects of the wildlife and habitat conservation benefits are captured in the account, as they contribute to the local community benefits. However, this is only a partial account of the biodiversity benefit. Overall, the account should be interpreted as providing a lower-bound estimate of the natural capital value of Beam Parklands.

5. Conclusions

For an organisation like the Land Trust, corporate natural capital accounting provides an explicit tool for demonstrating the value that is delivered by its activities. The CNCA framework is well suited to encompass the Land Trust's range of environmental, social and economic objectives. Natural capital is a critical input to the production of all of these outcomes - particularly in relation to managing flood, using these green spaces to improve health and wellbeing, increasing biodiversity and the quality of habitats on its sites, facilitating vocational outdoor education and training, engaging communities in maintaining sites, and helping to support local economic development around sites.

The account for Beam Parkland provides an illustration of the scale of social value provided by the Land Trust. The approach used here enhances the case that can be made for financing the management of similar sites currently in the Land Trust's portfolio, or for adding new sites to the portfolio. The natural capital framing explicitly demonstrates the 'return' that can be secured through endowments and other sources of financing that ensure the long-term maintenance of natural capital assets.

The supporting information compiled for the account - such as the valuations of flows of benefits - also provide a basis for determining investment priorities at a site, or across a portfolio of sites. This directly addresses the challenge typically faced in communicating the multiple benefits provided and demonstrating how they weigh against the costs of maintenance. The purpose of integrating this information into the evidence that informs decision-making is to help ensure that all benefits are properly accounted for, that the resources and assets are effectively utilised, and sufficient funding is available for to maintain these assets and benefits.

1 INTRODUCTION

1.1 Purpose of report

This report presents a natural capital account for Beam Parklands following the framework for corporate natural capital accounting (CNCA) published in 2015 by the Natural Capital Committee (NCC) (eftec et al., 2015). The account for Beam Parklands adds to the set of pilot accounts that have tested the CNCA framework across different types of organisations and natural capital assets². The Beam Parklands natural capital account is part of the evidence that informs the response of the Green Infrastructure Task Force³ to the London Infrastructure Plan 2050 (Mayor of London, 2014; 2015).

The Task Force defines green infrastructure as:

The network of green spaces - and features such as street trees and green roofs - that is planned, designed and managed to deliver a range of benefits, including: recreation and amenity, healthy living, mitigating flooding, improving air and water quality, cooling the urban environment, encouraging walking and cycling, and enhancing biodiversity and ecological resilience.

[Green Infrastructure Task Force, 2015]

The account for Beam Parklands demonstrates how natural capital benefits and the cost of maintaining them can be measured and valued in the context of the urban environment, providing an explicit account of the role of green infrastructure in contributing to the wellbeing of local communities.

1.2 Beam Parklands

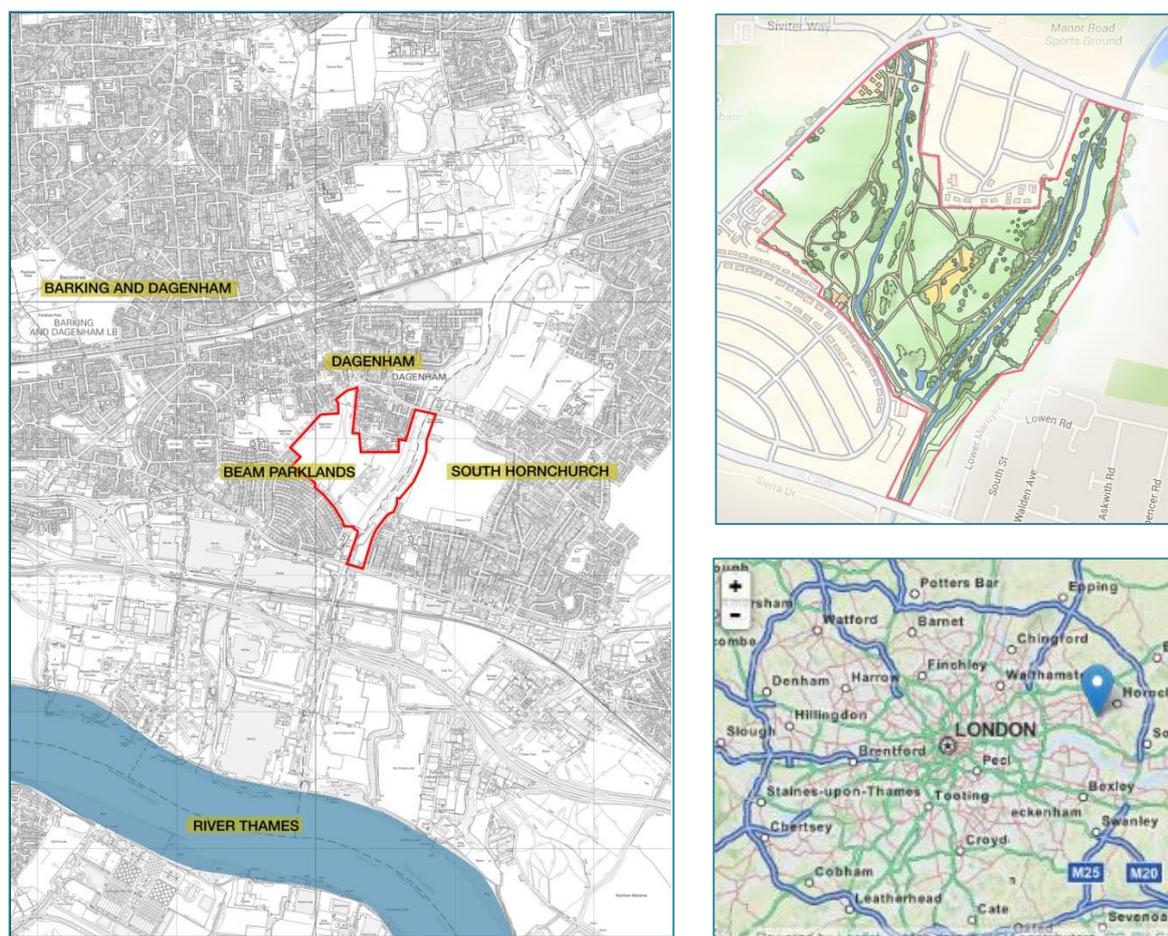
Beam Parklands is a multi-use community space and flood storage area situated in the southeast of the London Borough of Barking and Dagenham (LBBd). The site lies on the borough boundary between Dagenham and South Hornchurch (Figure 1.1). Historically, the land has been used for a variety of different purposes. In the Victorian era, a smallpox isolation hospital was constructed on part of the site. However, for the majority of the 20th Century, the site was open space and was eventually designated as part of the Green Belt to protect the openness of the corridor along the Beam River.

Before its most recent transformation, the site was used primarily for two separate purposes. The majority of the land area (Beam Washlands) was owned and managed as a flood storage area by the Environment Agency, functioning as a floodplain to the Beam River and Wantz Stream. A smaller pocket of land was owned by the LBBd for use as park space. This was largely unmanaged with low levels of accessibility for some nearby communities, contributing to high levels of deprivation in the area, and subject to instances of antisocial behaviour.

² For further information see: <http://www.naturalcapitalcommittee.org/corporate-natural-capital-accounting.html>.

³ The Green Infrastructure Task Force was established by the Mayor of London to bring together a wide range of interests and expertise to identify how to encourage a more strategic and long-term approach to investment in and delivery of green infrastructure in London. See: <https://www.london.gov.uk/priorities/business-economy/vision-and-strategy/infrastructure-plan-2050/progress/green-infrastructure-task-force>

Figure 1.1: Beam Parklands



Source: LBBD (2012); inset Beam Parklands website (<http://www.beamparklands.co.uk>)

Between 2009 and 2011, the two plots of land were redeveloped - packaged as a green infrastructure investment - into a single award-winning multi-use parkland⁴, and placed under the management of the Land Trust. The management costs are primarily paid for by interest received from the deposit of an endowment (in the region of £2m) from the East London Green Grid, to be used solely for the purpose of maintaining the parkland in perpetuity. Beam Parklands still acts as a flood storage area, with an increased storage capacity, but also provides additional benefits to the local community with, a well-managed park, a variety of different habitats, and increased interconnectivity to nearby residential areas.

The redevelopment of Beam Parklands occurred in parallel with wider development in the local area, which featured replacement of adjacent council housing with newer developments (e.g. Orchard village). As well as initiatives to stimulate business activity along the Thames corridor, including the planned London Riverside Opportunity Area⁵. The development at the Beam Parklands is also part of the growing All London Green Grid⁶ and acts as a prime example of green infrastructure development.

⁴ Examples of awards received include: the Brownfield Award for Best Use of Brownfield Space (in October 2011) and the CIWEM Living Wetlands Award (in May 2011)

(See: <http://www.thelandtrust.org.uk/business/sites.html?SID=beamparklands>).

⁵ See: <http://www.london.gov.uk/priorities/planning/publications/london-riverside-opportunity-area-planning-framework>

⁶ See: http://www.london.gov.uk/sites/default/files/ALGG_SPG_Mar2012.pdf.

1.3 Beam Parklands natural capital account

The natural capital account for Beam Parklands has been prepared based on information and management data for the site provided by the Land Trust, data sourced from previous reports concerning the development of Beam Parklands, and further secondary sources (e.g. ONS data). The Environment Agency has also been consulted and information has been provided in relation to the flood risk management function of the site.

The remainder of this report is structured as follows:

- Section 2 presents the natural capital balance sheet for the Beam Parklands. This is the main reporting statement within the CNCA framework, which summarises the natural capital asset values and liabilities for Beam Parklands;
- Section 3 describes the methods used for estimating the natural capital asset values and liabilities that are reported on the natural capital balance sheet for Beam Parklands. This includes the benefits to the local community from the flood risk regulation function of the washlands and the amenity value from community uses of the parklands; and
- Section 4 concludes with a summary of the main findings from the natural capital account for Beam Parklands and outline recommendations for further development of the account to address gaps and wider conclusions with respect to the remit of the London Green Infrastructure Taskforce.

The report is supplemented by four supporting annexes. Annex 1 summarises the scope of the natural capital account for Beam Parklands, based on a scoping exercise that was undertaken as part of this study. Annex 2 provides a (partially) populated natural capital asset register, which underpins the account by providing information on the natural capital assets at Beam Parklands, and their current condition. Annex 3 provides the underlying schedules for the calculation of the natural capital asset values and liabilities that are reported on the natural capital balance sheet. Finally, Annex 4 provides a glossary of definitions.

2 NATURAL CAPITAL ACCOUNT

2.1 Corporate natural capital accounting framework

The purpose of the CNCA framework is to help organisations make better decisions about the natural capital assets that they own and manage. Typically, organisations assess the value of their assets through conventional financial accounting processes. This includes the balance sheet that summarises the assets and liabilities of the company, and profit and loss accounts that record flows of values in an accounting period. This basic information underpins multiple decisions in an organisation, such as knowing when funds will be required for maintenance and improvement, and how to capitalise on increasing the value of their assets.

Most of the natural capital benefits do not appear in financial accounts. This is demonstrated quite clearly in the way parks are typically treated in local authority accounts. The park is the physical asset. It gives rise to a liability via the cost of maintaining the park for public use year on year. This is shown in the financial accounts of the local authority as a cost. However, although the park also generates recreation and amenity value for the local community and other users, this is not recorded financially as entry to the park is free. Financial accounts therefore register nothing for this element of asset value of the park.

Corporate natural capital accounting (CNCA) addresses this missing information. CNCA is a framework that collates and presents information on the natural capital in a similar way to other capital assets (e.g. financial and physical assets). It records the benefit to both the organisation that owns the natural capital asset and to society, by answering four key questions:

- What natural capital assets does the organisation, own, manage, or is responsible for?
- What flows of benefits do those assets produce, for the organisation and wider society?
- What is the value of those benefits?
- What does it cost to maintain the natural assets and flows of benefits?

Natural capital assets can take a variety of different forms, from the grasslands where children play to the wetlands that provide a habitat for wildlife and flood risk protection for local residents. They contribute to the production of various goods and services and are often conceptualised in terms of the flow of 'ecosystem services' or natural capital benefits. These are the flows of benefits from the natural capital that are recorded in a corporate natural capital account.

The principal reporting statement for presenting this information is the natural capital balance sheet, which reports the value of natural capital assets and the costs (liabilities) of maintaining those assets. In order to produce this reporting statement, an organisation needs to compile a range of financial and environmental data, through supporting schedules. It is likely that at some of this data will be already collected by organisations for different purposes.

For the Beam Parklands account these schedules have been populated as far as possible, given available data and information. Annex 1 outlines the coverage of the account in terms of the potential benefits derived from Beam Parklands. Annexes 2 and 3 set out the natural capital asset register and support schedules, respectively.

2.2 Natural capital balance sheet

The natural capital balance sheet for Beam Parklands is presented in Figure 2.1. It reports the net natural capital asset value for the site at the 31st December 2014.

The balance sheet is presented from the perspective of the Land Trust, as the current (legal) owner of the property. Private values refer to flows of value (assets or liabilities) that have a direct impact on the Land Trust. External values refer to flows that impact on the rest of society. All values are reported in present value terms, calculated from an estimated (constant) annual cash or benefit flow over 99 years⁷:

- Asset values represent the discounted sum of the future (estimated) benefits over the Land Trust's lease period; and
- Liabilities are the discounted sum of the Land Trust's future obligations to pay for natural capital maintenance costs over remaining lease period.

The time horizon is consistent with Land Trust's lease for the site, which commenced in 2011⁸.

Since the Land Trust does not receive any income from the management of Beam Parkland, all natural capital benefits (asset values) are assumed to be external to the organisation; i.e. benefits derived by the local community. However, most of the natural capital liability falls on the Land Trust, due to their (indirect) legal obligation to maintain the site, in order to meet the Biodiversity Action Plan (BAP) requirements and Higher Level Stewardship (HLS) requirements.

⁷ Both asset values and liabilities are discounted following the HM Treasury Green Book (2003). This prescribes a declining discount rate (3.5% for year 0 - 30; 3% for year 31-75; and 2.5% for year 76-99). This is assumed to be representative of the opportunity cost of capital for the Land Trust.

⁸ The lease for Beam Parklands is between the Land Trust (the lessee) and the Environment Agency and the London Borough of Barking and Dagenham (the lessors).

Figure 2.1: Beam Parkland Natural Capital Balance Sheet, as at 31st December 2014 (£m)

		Year 2014		
		Private	External	Total
		£m	£m	Value
				£m
Natural Capital Assets				
1	Baseline value (2009)	(<1)	22	21
2	Cumulative gains (/losses)	-	10	10
3	Additions (/disposals)	-	-	-
4	Revaluations and adjustments	<<1	12	12
5	Gross asset value	(<1)	44	43
Natural Capital Liabilities				
6	Legal provisions	(1)	(<<1)	(1)
7	Other maintenance provisions	-	-	-
8	Total maintenance provisions	(1)	(<<1)	(1)
9	Total Net Natural Capital			42

Notes:

1. All values in 2014 prices (£m) in present value terms over 99 years.
2. Negative values are presented in parenthesis.
3. Figures have been rounded to the nearest £1m (unless <£1m, whereby less than £1m (<1) or significantly less than £1m (<<1) is used). As a result component values may not sum to totals.
4. See Annex 4 for a glossary of terms used on the balance sheet.

The following provides a brief description of each line (numbered row) of the natural capital balance sheet. Section 3 sets out in more detail the calculation of the value of natural capital assets and liabilities for Beam Parklands.

1. Baseline value - natural capital reference case

The baseline (asset value) provides a reference scenario for measuring the state of natural capital at Beam Parklands. For the account the baseline is set at 2009, prior to the redevelopment of the site. The balance sheet reporting date of 31st December 2014 therefore reflects the impact of the improvements made at the site due to the green infrastructure investment over the period 2009 - 2011.

The baseline asset value (£21m total, present value terms) is based on the estimated flood risk management benefits (avoided damages to properties from flooding) and local community benefits, in terms of the amenity value of Beam Parklands (see Annex 3). These values are net of physical capital maintenance costs (see Section 3).

The baseline asset value for the Land Trust is recorded as a negative value (<-£1m) as this reflects the obligation to pay future physical capital maintenance costs. No offsetting private asset value is recorded for the Land Trust as all benefits are assumed to be derived by the local community (£22m).

In effect the baseline position mirrors the example set out in Section 2.1, where an organisation (e.g. Local Authority) responsible for maintaining the natural capital asset (e.g. the park) does not directly derive the benefits from its sustainable management.

2. Cumulative gains (/losses) - quality of natural capital

Cumulative gains/losses assess the impact on the natural capital asset value of Beam Parklands due to changes in the condition (i.e. quality) of natural capital assets within the accounting period. The improvements to the site over the baseline value are estimated to be approximately £10m in present value terms. This is based on the enhanced amenity of the site and improved local community benefits due to the green infrastructure investment and redevelopment between 2009 and 2011.

3. Additions (/disposals) - quantity of natural capital

Additions/disposals assess the change in the natural capital asset value due to additions (e.g. purchase of land) and disposals (e.g. sale of land); i.e. the 'quantity' of natural capital. For simplicity no addition/disposal is recorded in the account. There is, though, the change in ownership between the 2009 baseline and 2014 reporting date, which represents an addition to the Land Trust's portfolio. This is a transfer from the Environment Agency and LBBB to the Land Trust, but does not represent a change in the quantity of natural capital managed at the site. Effectively the account is prepared for the management of Beam Parklands site, rather than for the management of Land Trust's overall portfolio of natural capital assets.

4. Revaluations and adjustments - other factors influencing the value of natural capital

Revaluations and adjustments account for changes in natural capital asset value for reasons other than changes in the condition or quantity of natural capital, such as economic variables, valuation assumptions or methodology. The balance sheet reflects the increased population that is benefitting from Beam Parklands since the 2009 baseline, showing an increase in the external asset value (£12m total, present value terms). This is a combination of the flood risk management benefits and amenity value. A small reduction in the physical capital maintenance costs is also recorded for the Land Trust (<<£1m).

5. Gross asset value - value of natural capital

The overall natural capital asset value (or gross asset value) of Beam Parklands is reported as the sum of rows 1-4 on the balance sheet. This is estimated to be approximately £43m in present value terms over 99 years.

6. Legal provisions - cost of maintaining natural capital

Legal provisions account for statutory and contractual obligations for maintaining natural capital assets. They are reported as the present value of expected costs. For Beam Parklands it is assumed that the natural capital maintenance represents a legal obligation, given the BAP habitat management objectives for the site. This includes private liabilities incurred by the Land Trust (£1m) in fulfilling this requirement and external liabilities (<<£1m) (cost of volunteer time - see Section 3.4).

7. Other requirements - further natural capital maintenance costs

Other requirements account for any further natural capital maintenance provisions in addition to legal obligations (e.g. to meet an organisation's own natural capital objectives). No additional maintenance cost has been identified for Beam Parklands in addition to the legal provisions recorded on the balance sheet.

8. Total maintenance provision - total cost of natural capital

The total maintenance provisions reports the full natural capital maintenance requirement as the sum of rows 6 and 7. This estimated to be approximately £1m and reflects the 2012 - 2017 management plan for Beam Parklands (LBBD, 2012) and the assumption that similar natural capital maintenance objectives will be pursued beyond the current plan.

9. Total net natural capital

Total net natural capital is the indicator of the net worth of the natural capital assets reported on the balance sheet, calculated as gross natural capital asset value (row 5) less total maintenance provisions (row 8).

The total net value for Beam Parklands is estimated to be approximately £42m in present value terms. This reflects the substantial scale of (net) benefits provided by the site to the local population over the long term natural capital maintenance costs. The balance sheet captures the key external benefits of the site in terms of flood risk reduction and the amenity value to the local community. It also highlights the impact of the redevelopment and green infrastructure investment at the site, which in combination with adjustment made for increased the beneficiary population for Beam Parklands, is calculated to have added around £22m to the natural capital asset value. This is roughly a 100% increase on the 2009 baseline valuation, indicating a substantial enhancement of the estimated asset value.

The account and asset value and liability calculations are, of course, subject to a number of caveats. For the most part, conservative assumptions have been applied in estimating the asset values associated with flood risk regulation and community benefits. These are outlined in Section 3. In addition, a number of other potential benefits are not incorporated into the account - e.g. air quality, carbon regulation, and some aspects of habitat and wildlife conservation - suggesting the net natural capital asset value can be interpreted as a lower-bound and conservative estimate for Beam Parklands.

2.3 Comparison to financial accounting

In conventional accounts the asset value of Beam Parklands would likely be measured (at least) at cost on the financial balance sheet. For Beam Parklands this would be greater than or equal to the endowment (in the region of £2m). A higher value could be reported if assets are valued at the cost of replacement; i.e. the cost of bringing the site to its current condition. This is estimated to be capital expenditure of approximately £4.5m, based on Regeneris (2011), including new access, improved pathways and the enhanced flood storage capacity.

3 NATURAL CAPITAL ASSETS AND LIABILITIES

The natural capital account for Beam Parklands incorporates estimates for natural capital asset value associated with the flood risk regulation function of the site (avoided flood damage costs) (Section 3.1) and local community benefits in terms of recreation, amenity and health (Section 3.2). Natural capital maintenance liabilities are outlined in Section 3.4.

The scoping exercise for the pilot account (Annex 1) identified further potential benefits - i.e. asset values - in terms of habitats and wildlife, climate regulation and local air quality regulation. More detailed site management and environmental data is required to establish the significance of the potential climate regulation and local air quality regulation benefits, and hence these aspects are not quantified or valued in the natural capital account. They represent gaps in the account that could be addressed by future work.

Measures and indicators relevant to habitats and wildlife at Beam Parklands are set out in the natural capital asset register (Annex 2). Part of this value is captured within the amenity value derived by the local communities. Further elements are not captured in the account. Discussion is provided in Section 3.3.

3.1 Flood risk regulation

Background

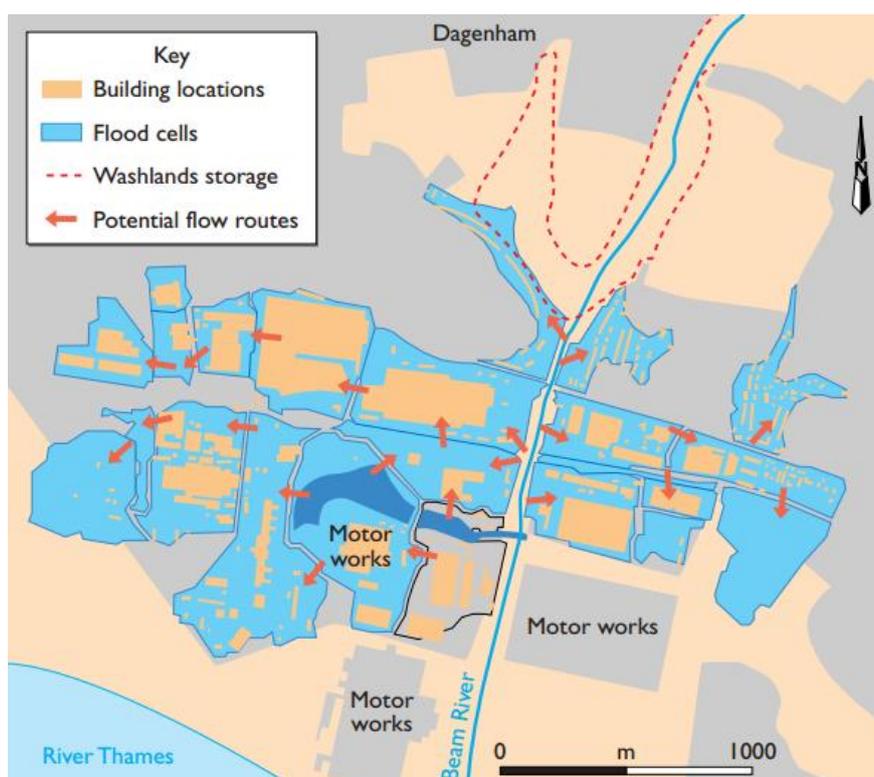
The River Beam is a tributary of the River Thames, which flows through East London. The river starts in Essex and flows as the Bourne Brook and River Rom before its confluence with the Ravensbourne. From there, the River Beam flows south to the River Thames, joining the Thames at Dagenham. The River Beam forms the boundary between the London Borough of Barking and Dagenham and the London Borough of Havering.

The River Beam catchment is a relatively small area and the river has a 'flashy' (quick) response to heavy rainfall events. The river level will rise relatively quickly, but will also fall quickly if flood water can drain into the River Thames freely. However, if water levels in the River Thames are high, there is a 'tide-lock' effect on the River Beam meaning that water is not discharged and the volume of water in the river channel increases. The River Thames has a strong influence on the drainage of the River Beam with unimpeded discharge limited to approximately 3 hours either side of low tide (Jacobs, 2008).

The lower reaches of the River Beam are heavily urbanised in the South Dagenham and Dagenham Dock areas. The land use is mixed, including residential, education, leisure and recreation, retail and industrial property. Beam Parklands (the washlands) provides an upstream flood storage area which protects the South Dagenham and Dagenham Dock areas from fluvial (river) flooding from the River Beam. Downstream of the confluence, the River Beam and Wantz Stream sluices along the A1306 road can be closed during periods of high tide in the River Thames (which prevents discharge from the River Beam via the tide-lock effect). This causes water to spill into the washlands from the River Beam. When the washlands are full, water is returned to the river via a spillway. If the fluvial flow were to top the washlands, pumps are operated at Beam Tidal and Gores Brook pumping stations.

Figure 3.1 illustrates the potential downstream extent of fluvial flooding from the River Beam in the absence of the flood regulation function of the washlands.

Figure 3.1: Flood catchment of the Wantz Stream and River Beam



Source: Hamer and Mocke (2002). Flood cells are geographic areas that are defined for the purposes of flood risk appraisal (i.e. to calculate potential damages to properties within a cell).

The original storage capacity of the washlands was approximately 433,000m³. The redevelopment of the site between 2009 and 2011 increased this capacity by 25,660m³. The process of containing the fluvial flow within the washland provides a standard of protection (SoP) to downstream properties (approximately) for up to a 1 in 25 year flood event⁹. This is assumed to represent the natural capital benefit in terms of the flood risk management function of Beam Parklands. The provision and operation of the pumping stations (physical capital) provides an enhanced SoP of up to 1 in 150 years. The flood risk management benefits associated with the higher SoP ensured by the pumping stations is not included in the account; i.e. this is assumed to be a physical capital benefit.

Methodology

The (annual) benefits from flood regulation at Beam Parklands are estimated in terms of avoided damage costs to residential and non-residential properties, Following the Environment Agency (2010) Flood and Coastal Erosion Risk Management (FCERM) appraisal guidance, flood appraisal values from the Flood Hazard Research Centre (FHRC) 'Multi-coloured Manual' are applied (Penning-Rowse et al., 2010). These values account for direct damages to property as well as indirect effects¹⁰. Annual avoided damages are calculated based on the 1 in 25 year SoP attributed to the washlands. This is interpreted as the extent of the natural capital benefit associated with flood risk regulation function

⁹ Pers. comm. Environment Agency (May 2015).

¹⁰ Examples of damages from flooding include direct tangible losses (e.g. damage to building fabric), indirect losses for flooded households (e.g. loss of utility services such as water, gas and electricity) and loss of stock/raw materials (e.g. commercial and industrial properties).

of Beam Parklands, since the higher 1 in 150 year SoP is dependent on the maintenance of physical capital (pumping stations).

Annual benefits are calculated by estimating the number of properties at risk of a 1 in 25 year flood event and the associated damages¹¹:

- *Properties at risk*: the number of properties at risk of fluvial flooding is based on available flood risk assessments. Landscape Institute et al. (2012) report that the washlands are estimated to provide flood protection for 570 residential properties and 63 industrial and commercial properties¹². Subsequent redevelopment in the area has resulted in an increase in the number of non-residential properties to 90 (Environment Agency, 2013b).
- *Avoided damages*: FHRC appraisal values for 1 in 25 year flood event with a <8 hour warning (mid-point estimate) are applied (Penning-Rowsell et al., 2010), which provides estimates in terms of weighted annual average damages (AAD)¹³.
- *Maintaining physical capital*: avoided annual damages are net of the estimated cost of maintaining the SoP. This includes operating costs related to physical capital (sluices, pumps) (Environment Agency, 2009b) which ensures a higher SoP (1 in 150 years), but it is assumed that these costs are critical to the management of Beam Parklands as a flood storage site; i.e. the washlands are a single system and would be managed differently if the physical infrastructure was not present.
- *Baseline value*: this is calculated as the estimated annual avoided damages for residential properties (£452k per year) and non-residential properties (£97k per year), net of annual physical capital maintenance costs (£151k per year). This is based on 570 residential properties and 63 non-residential properties at risk in 2009, giving a net value of approximately £398k per year.
- *Revaluations and adjustments*: this accounts for an increased number of properties at risk in 2014 due to residential and non-residential development downstream of Beam Parklands. This now consists of 90 non-residential properties (Environment Agency, 2013a) and an estimated 630 residential properties. A reported reduction in annual maintenance costs for physical capital is also included in the adjustment (Environment Agency, 2009b). This results in an adjustment to the baseline value, increasing the net asset value by £193k per year to approximately £591k per year.

Table 3.1 summarises the calculated natural capital asset value associated with the flood risk regulation function of Beam Parklands. Projected over 99 years, the baseline value is approximately £13m in present value terms. The revaluation and adjustment increases this to approximately £19m in present value terms.

¹¹ This is calculated as an expected value (likelihood of flood event × estimated damages to properties at risk of flood event).

¹² The report also identifies 2 primary schools and 3 social clubs within the flood protection zone. The potential damages these properties requires more detailed assessment and is not captured within the account.

¹³ AAD figures are computed by accounting for damage at each depth within each flood frequency return period. Therefore, it is not necessary to consider the damage costs at lower levels of flood risk. See: http://www.floodsite.net/html/partner_area/project_docs/T09_06_01_Flood_damage_guidelines_D9_1_v2_2_p44.pdf

Table 3.1: Estimate food risk regulation benefits (avoided flood damages)

		Baseline	Revaluations and adjustments	Gross asset value of avoided flood damage benefits
Annual Value	Residential property avoided damages	£452k	£49k	£501k
	Non-residential avoided damages	£97k	£42k	£139k
	Annual physical capital maintenance cost	(£151k)	£102k	(£49k)
	Total (net) avoided flood damage	£398k	£193k	£591k
Present value (over 99 years)		£13m	£6m	£19m

Caveats

The estimated (avoided) flood damages are based on ‘standard’ values sourced from flood risk appraisal guidance. Whilst these may not be fully representative of the types of property at risk in the area, they are expected to be indicative of the order of magnitude of potential (economic) losses from flooding for residential properties. For non-residential properties, however, the properties protected by the washlands includes Barking Power station and the Ford Dagenham plant. Disruption from flooding to these sites is not captured within the avoided damages estimates, as there is insufficient information on the potential impacts on these sites. It is a strong assumption to include avoided disruption costs to these sites for the entire 99 year time horizon (e.g. due to possible closure of these sites within that timescale). In addition, it has been conservatively assumed that all non-residential properties are retail class, which typically means lower avoided damage cost in comparison to manufacturing and industrial uses. This implies that the baseline and adjusted values are likely to be conservative estimates.

3.2 Local community benefits

It is well documented that Beam Parklands provides significant recreation, amenity, education and health benefits and opportunities to the local population (see for example Regeneris, 2011)¹⁴. These are underpinned by natural capital assets, but are jointly produced with other inputs such as physical capital assets (e.g. paths, footbridges, benches, and signage). This is evident from the specific management objectives for Beam Parklands related to local community benefits (LBBD, 2014):

- Raise public awareness of the Beam Parklands and the work of London Borough of Barking and Dagenham’s Ranger Service, the Land Trust and Environment Agency; and
- Provide environmental education in line with the national curriculum for schools and groups within the London Borough of Barking and Dagenham and the London Borough of Havering.

Public awareness focuses on providing a range of free public events throughout the year targeting a diverse range of people within the local community, along with promoting Beam Parklands through media, marketing, local stakeholder groups and also interpretation materials on site. Environmental education includes: the provision of programmes for different age groups, including schools and local

¹⁴ Note that while these types of benefits are often represented as ‘cultural services’ in ecosystem services type assessments of green infrastructure (e.g. see Annex 1), the term ‘local community benefits’ is used here to represent broadly the local amenity value derived from the site, which is more consistent with the overall strategic objectives of the Land Trust.

groups; opportunity to be a part of the planting and development of the wildlife on the park (e.g. planting of orchards); and the provision of bespoke trips and specialised events including talks, walks and activities made available to the local community (e.g. butterfly and bat surveying).

The breadth of the local community engagement implies a variety of benefits. Much of the existing case study evidence for the green infrastructure investment and redevelopment of Beam Parklands between 2009 and 2011 highlights the key components to be recreation and amenity, education opportunities, improved health outcomes, reduced community severance¹⁵, and volunteering (e.g. Regeneris, 2011). The perspective adopted for the natural capital accounting framework is to establish the flow of benefit over time that is underpinned by the site's natural capital assets, and to estimate this in monetary terms so that it may be included on the natural capital balance sheet. The key aspects of the local community benefits from this perspective are:

- **Health:** the association between human health and urban greenspace comes from two aspects. Firstly, the physical benefits of more frequent and active exercise encouraged by the availability of greenspace include reduced risk of coronary heart disease. These effects are generally well evidenced, both in terms of health outcomes and relationship between access to green space and more active lifestyle choices (e.g. Natural England, 2009). Secondly there is the link between greenspace and improved mental health, which is less well established in empirical analyses (Taylor et al., 2015).
- **Recreation and amenity:** potential health benefits overlap to some extent with recreation opportunities created by urban greenspace, since the former is a result of the latter. Recreation and amenity benefits, however, encompass a broader set of outcomes, and can be defined "as the increased well-being associated with living in or within close proximity to desirable natural areas and environmental resources" (Mourato et al., 2010). This relates not only to the potential health benefits, but also recreational benefits from, for example, activities such as: walking and jogging; children's play areas; increased educational opportunities from visiting historic and cultural sites within the parks; and community activities from planting trees; and volunteer work.

Previous studies have also highlighted the benefits related to improved access to Beam Parklands and reduced severance as a result of the redevelopment; in particular, the connecting bridge to Orchard Village (Regeneris, 2011). Whilst this does represent a reduction in community severance (Anciaes et al., 2014), and the benefits associated with this can be defined in terms of reconnecting the communities to various services, there is the risk of double-counting recreation and amenity benefits in attempting to account for severance separately.

Methodology

There are a number of approaches that could be applied to estimate the value of local community benefits provided by Beam Parklands. One option is to measure and value the direct use of the site, in terms of the number of visitors per year, and the associated value per visit (e.g. the value per activity type). Whilst there is substantial evidence available on the value of recreation activities associated with green space, this approach would not capture the more 'indirect' benefits from the parklands; e.g. the well-being that is derived by local residents in terms of the aesthetics and environmental quality of the local area. Alternatively, Regeneris (2011) focuses on the potential health benefits for the resident population within 300 meters of the parklands and the (indirect) savings to the economy due to created exercise. However, this again only represents a narrow focus and hence only a partial assessment.

¹⁵ Severance refers to the interconnectivity of the local community and their access to local services.

The approach adopted for the natural capital account is to consider a broader perspective of the amenity value of Beam Parklands. This may be reflected by a residential and non-residential property price ‘uplift’ in the vicinity of the site. This effect - the impact of greenspace and natural capital assets on property value - is well-established by empirical studies, with the general relationship shown to be an uplift in the value properties that are in close proximity to amenity spaces such as parks, accessible woodlands, and nature reserves (Garrod and Willis, 1992; Garrod, 2002; Dunse et al., 2007; Gibbons et al., 2014; Perino et al., 2014). For example, GLA (2010) finds, in a study for London, that each hectare of greenspace within 1km of a property increases its prices by approximately 0.1%, whilst the presence of a regional/metropolitan park within 600 metres adds 1.9 - 2.9% to property value.

The scope of local community benefits of Beam Parklands that are captured within local property values will differ though, according to the type of benefit. This approach is likely to best reflect the local amenity value of the parklands (i.e. the general increased wellbeing) and within this, the recreation opportunities that are provided. Health benefits are not directly included in terms of savings to the economy - as estimated by Regeneris (2011) - but will (to some extent) be reflected in the general wellbeing value; i.e. the demand for property reflects an individual’s preferences for living in a pleasant and healthy environment. Similarly, the benefits of environmental education activities with local schools are not explicitly captured in the approach, but again some aspect of this is likely to be reflected in the demand for property. Therefore, the approach taken for valuing local community benefits should be interpreted as indicative of the broad amenity value derived from Beam Parklands by the local resident population. Attempting to value specific outcomes (e.g. health and education) in addition to the broad amenity value would potentially risk some overlap and double-counting.

Various available studies and surveys suggest between a 1 - 19% uplift (per property) in property prices associated with urban greenspace for varying uses, proximity, quality and scarcity (see for example Garrod and Willis, 1992; Luttik, 2000; Luther and Gruehn, 2001; Garrod, 2002; GLA, 2003; 2010; CABE, 2004; 2005; Dunse et al., 2007; Gibbons et al., 2014; Perino et al., 2014). Studies that examine the relationship between greenspace and property price in London and the wider UK tend towards the lower end of this range, in the region of 1 - 5%¹⁶. For the natural capital account, a property price uplift of 3% is assumed, for both residential and non-residential property.

Local community benefits are therefore calculated by applying the 3% property value uplift to the estimated number of properties in the vicinity of Beam Parklands:

- *Number of properties*: the number of properties is calculated based on the Access to Natural Green Space Standard (ANGSt) (Natural England, 2010). For the main calculation, Standard 1 (at least 2 hectares of greenspace within 300 metres) is applied. This includes an estimated 15,625 residential properties (in 2014) and 197 square meters of non-residential floorspace (in 2008) within 300m of Beam Parklands. For reference, a sensitivity case is also considered, which uses ANGSt Standard 2 (at least one accessible 20 hectare site within two kilometres). This includes 43,559 residential properties (in 2014) and 571 square meters of non-residential floorspace (in 2008). However, the larger ‘catchment’ potentially over-estimates the beneficiary population since multiple alternative greenspaces are within the vicinity of Beam Parklands (Table 3.2). Hence the ANGSt Standard 1 is applied as a conservative assumption.

¹⁶ For example, taking the results of GLA (2010), 53 hectares at Beam Parklands implies a property price uplift of 4.2%, based on each hectare of greenspace within 1km of a property increasing its prices by approximately 0.08% per hectare.

Table 3.2: Proximity to other greenspaces

Borough	Park	Distance to park from postcode		
		RM10 9ND	RM10 8AQ	RM13 7RD
London Borough of Barking and Dagenham	Beam Parklands	0.6 km	0.8 km	1.6 km
	The Leys	0.8 km	0.5 km	1.9 km
	King George's Field	1 km	1.3 km	-
	Old Dagenham Park	1 km	-	2.2 km
	Millennium Green	1.3 km	0.3 km	2.1 km
	St Peter and St Paul's Churchyard	1.3 km	0.3 km	2.1 km
	Goresbrook Park	1.6 km	1.8 km	-
	Scrattons Farm Eco Park	1.8 km	-	-
	Pondfield Park	1.9 km	0.8 km	-
	Old Dagenham Park	-	0.6 km	-
	Eastbrookend Country Park	-	1.8 km	2.2 km
	The Chase Local Nature Reserve	-	1.9 km	-
	Heath Park Open Space	-	2.1 km	-
	Parsloes Park	-	2.3 km	-
London Borough of Havering	Rainham local nature reserve	-	-	1.8 km
	Rainham Recreation Ground	-	-	1.8 km
	Lessa Open Space	-	2.3 - 2.7 km	0.3 - 0.8 km
	Mardyke Open Space	1.3 - 1.4 km	2.4 - 2.6 km	1.3 - 1.4 km
	Brittons Playing Field	-	1.9 km	1.0 - 1.6 km
	Hornchurch Country Park	-	-	1.1 - 2.7 km
	Bretons Outdoor Recreation Centre	-	2.3 km	1.9 km
	Louis Marchasi Open Space	-	-	2.3 km

Notes: Table shows distance to a range of greenspaces from three example postcodes in the London Borough of Barking and Dagenham. Distance is truncated at 2.4 kilometres, reflecting access to greenspace within a 30 minute walk (based on average walking speed of 4.8 kilometres per hour).

- *Property value*: residential property value is calculated based on mean property value for dwellings in the wards within the ANGSt Standard 1 catchment (Land Registry, 2014). Non-residential property is calculated based on total rateable value of properties in the Middle Layer Super Output Areas (MSOAs) (ONS, 2008).
- *Maintenance cost of physical capital*: maintenance costs relating to community benefits include the salary of the community ranger who organises various events at the parks (Beam Parkland Financial Accounts, 2011; 2012; 2013), HLS education access costs (Natural England, 2013b) etc.
- *Baseline value*: no information is readily available to estimate the property price premium prior to the redevelopment of the site. As a consequence, a proportion of the valuation estimated for the 2014 reporting date of the natural capital account is allocated to the baseline. Empirical evidence to support this assumption is limited; the incremental impact of similar redevelopments has resulted in an estimated 10 - 20% increase in the number of visitors to a site (Land Use Consultants, 2006; Regeneris, 2009; Regeneris, 2011) but no assessment of the change in property price is available for a comparable green infrastructure investment. Qualitative evidence however highlights the significant improvement in the amenity value of Beam Parklands due to the redevelopment. Based on this, a 50% property price uplift (i.e. 1.5%) is allocated to the baseline valuation.

The baseline value (£316k per year) is reported net of physical maintenance costs that are incurred by the Land Trust to manage community engagement activities at Beam Parklands (approx. £19k per year). This gives the (net) baseline valuation as £297k per year.

- *Cumulative gains/losses*: cumulative gains resulting from the green infrastructure investment and redevelopment of Beam Parklands is estimated to be £316k per year, using the ANGSt Standard 1 to define the beneficiary population (catchment). This follows from the attribution of 50% of the property price uplift to the baseline, and 50% resulting from the improvement to the site within the accounting period.
- *Revaluations and adjustments (external)*: revaluations of £184k per year are estimated using the ANGSt Standard 1. This captures the (real) change in property value (price and stock) between 2011 and 2014. This accounts for the increase in the number of residential properties. No data is readily available for non-residential properties. The adjustment also includes a small reduction in the physical maintenance liability of £1k per year.

Table 3.3 summarises the calculated natural capital asset value associated with the local amenity benefits of Beam Parklands. Projected over 99 years the 2009 baseline value is approximately £9m in present value terms. Cumulative gains and adjustments increases this to approximately £26m in present value terms. A sensitivity case is reported in the notes to Schedule 2 (Annex 3) using the ANGSt Standard 2 for defining the beneficiary population.

Table 3.3: Estimated value of local community benefits

		Baseline	Cumulative gains (/losses)	Revaluations and adjustments	Gross asset value of local community benefits
Private Annual Value	<i>Maintenance cost of physical capital relating to local community benefits</i>	(£29k)	-	£2k	£27k
Present Value (over 99 years)		(<£1m)	-	<<£1m	(<£1m)
External Annual Value	<i>Local amenity benefit - residential and non-residential price uplift for ANGSt standard 1</i>	£316k	£316k	£183k	£815k
	<i>Annual physical maintenance cost</i>	(£20k)	-	£1k	(£19k)
	Total (net) local community benefits	£296k	£316k	£184k	£796k
Present Value (over 99 years)		£9m	£10m	£6m	£26m

Caveats

The approach to valuing local community benefits is indicative and assumes a general local amenity benefit provided by Beam Parklands. A number of key assumptions are entailed, including: the size of the beneficiary population and catchment for Beam Parklands; the property price uplift; and keeping the uplift constant in the catchment area, as distance from the site increases within the catchment. Furthermore, a basic assumption is applied to attribute a proportion of the property price uplift to the baseline value, as information to support a more detailed assessment is not available. This does not impact the overall asset valuation, but it should be recognised when interpreting the calculated cumulative gain.

Underpinning the analysis is the assumption that the amenity value of Beam Parklands will be reflected in local property values. This effect is well evidenced in empirical literature; however it is not expected to reflect specific aspects of the local community benefits provided by the site, but rather the higher health and general wellbeing that is afforded.

3.3 Habitats and wildlife benefits

Background

Beam Parklands supports a diverse range of habitat types, including plantation woodland, running and standing water, scattered trees and a variety of grassland types. These habitats are associated with a wide variety of protected species including water voles, great crested newts, birds, reptiles and invertebrates. The site forms an important wildlife corridor linking The Chase Local Nature Reserve, Eastbrookend Country Park and the Beam Valley Country Park.

Significant improvements to the natural habitats were made as part of the 2009 - 2011 redevelopment of the site and the management plan for 2012 - 2017 includes the following objectives related to habitats and biodiversity (LBBD, 2014):

- Maintain the full range of habitats in the Parklands, from standing and running water, wildflower meadows, scrub and woodland;
- Manage the acid grassland to ensure its continued existence and wherever possible increase its area;
- Maintain and wherever possible enhance all of the wetland habitats;
- Prevent the encroachment of alien and invasive species throughout the site;
- Increase the biodiversity of this area in terms of wildflowers and the invertebrates it supports; and
- Maintain new tree plantations.

Methodology

In the CNCA framework, the natural capital asset register represents the main accounting template for bio-physical metrics that measure and track the state of natural capital assets. The purpose is to summarise information about the physical state (e.g. extent and condition) of each natural capital asset 'accounting unit', which enables changes to the quantity and quality of natural capital to be measured and tracked over time. Typically the approach taken is to specify accounting units that are consistent with land cover types (and broad habitat types), such that measures relate to biodiversity, the extent of habitat, its condition, and indicators of species presence, and soils. This then provides the primary basis for recording wildlife and habitat benefits of the site in non-monetary terms.

Annex 2 outlines an initial asset register for Beam Parklands. It reports metrics in terms of extent, presence of species, and other relevant indicators for:

- Grassland;
- Rivers and streams;
- Standing water;
- Reedbeds;
- Fenland;
- Woodland;
- Parkland; and
- The overall site, encompassing natural capital benefits that are not related to a single land cover type (e.g. flood risk regulation, recreation and amenity).

In addition to the asset register, monetary valuation of habitat and wildlife benefits should also be included in the natural capital balance sheet calculations. In the account for Beam Parklands there is likely some overlap in the estimation of local community benefits, since the calculated amenity

value of the site will (to some extent) reflect habitat and wildlife provision (e.g. as a motivation for recreation visits, as part of the local environmental quality). There is also likely to be wider benefit that extends beyond the local community from the conservation and protection of biodiversity; however it can be challenging to capture this value as the beneficiary population is less-well defined and ‘transferable’ valuation evidence to estimate this benefit is limited¹⁷. As a result, a separate valuation for habitats and wildlife is not included in the natural capital balance sheet.

Caveats

The exclusion of an explicit valuation for habitats and wildlife supported by Beam Parklands implies that the net asset value reported on the natural capital balance sheet is likely to be partial and an under-estimate. Whilst some component of the value will be reflected in the amenity value that is estimated for local community benefits, other aspects will not.

3.4 Liabilities

In the CNCA framework, liabilities are defined as the costs associated with the maintenance of natural capital. Unlike the Environment Agency’s obligations for physical capital related to flood risk management, the Land Trust only has an (implied) obligation to sustain natural capital through the maintenance of habitats at Beam Parklands. The task for the accounting exercise is to determine the share of maintenance cost between natural (e.g. habitats) and physical (e.g. benches, signs, etc.) capital.

Background

While there are a number of different policy contexts for the redevelopment of Beam Parkland (Regeneris, 2011), two key aspects were the creation of 12.6 hectares of land to meet the UK Biodiversity Action Plan (BAP) and subscription to the Higher Level Stewardship (HLS) Scheme. The BAP was the UK’s response to its legal obligation to meet their commitment to the 1992 Convention on Biological Diversity. The redevelopment of Beam Parklands contributed to the local targets specified in the London Regional BAP Habitat Targets (City of London, 2010), with an objective to “increase habitat resource by restoring features using appropriate management”¹⁸. This requirement also extends to various BAP protected species that the parkland provides a suitable habitat for (e.g. great crested newts).

In 2013, the Land Trust also entered into a ten-year Higher Level Stewardship (HLS) agreement (an Environmental Stewardship agreement) with Natural England. The purpose of this is to provide funding to ensure the delivery of significant environmental benefits in priority areas, including the maintenance of hedges, woodland, grassland, scrubs, reedbeds, fen, wetland and ponds around the Parkland. As the HLS agreement also sets contractual requirements for these habitats, the associated natural capital maintenance liabilities are interpreted as (an indirect) legal obligation.

Methodology

The Land Trust meets its obligations for maintaining natural capital assets at Beam Parklands through a contract with the London Borough of Barking and Dagenham (LBBD), which employs a ranger to manage the 53 hectare site. The salary and maintenance costs are primarily paid for by the endowment, worth in the region of £2 million. While this was provided for the ongoing long-term

¹⁷ For further discussion see: eftc (2015) Valuing Biodiversity, Discussion Paper for Defra, November 2015.

¹⁸ While there were multiple actions, as an example see: <http://ukbars.defra.gov.uk/action/show/1944>.

maintenance and management of the park (Regeneris, 2011), smaller funding sources, e.g. the Access to Nature Fund and funding from the HLS scheme (see below), also contribute to specific natural capital maintenance activities. The endowment has been deposited by the Land Trust and earns an (undisclosed) rate of return. Other forms of funding are provided for shorter periods of time (the Access to Nature Fund) or paid for on an annual basis (e.g. HLS funding). In-kind funding is also derived from volunteer time that contributes to natural capital maintenance activities.

Overall, annual maintenance costs are an aggregation of staff costs, management costs, and any maintenance costs paid for by the HLS funding, and relevant volunteer costs:

- *Staff costs:* following consultation with the Land Trust, it is understood that there are two full-time equivalent (FTE) roles responsible for the management of the park: the Senior Conservation Ranger and the Community Ranger. Although there is some overlap in the roles, based on information provided in the management plan and the Beam Parkland Financial Accounts (2012, 2013 and 2014), the role of the Senior Conservation Ranger is assumed to be primarily related to the management of the natural capital and the Community Ranger related to community engagement activities (physical capital, as noted in Section 3.2). Hence only the former is included within the natural capital maintenance liability. Salaries are assumed to be constant in real terms over the 99-year time horizon for the account at approximately £30,000 per year.
- *Management costs:* based on information provided in the Land Trust's management plan (LBBD, 2012) this includes maintenance relating to habitat improvement and infrastructure improvement. Previously incurred costs are assumed to be indicative of future renewal costs, with £38k assumed with a renewal frequency of every 5 years.
- *Maintenance prescribed for the HLS:* payments are for the period 2012 - 2023 and remain constant over this time (Natural England, 2013b). It is assumed that these payments will continue beyond 2023 via some form of extended scheme. Payments related to natural capital maintenance activities are allocated to liabilities (approx. £6,100 per year). Payments relating to educational access of the site have been allocated to maintenance of local community benefits (approx. £900 per year).
- *Volunteer costs:* volunteer time represents an in-kind contribution to natural capital maintenance¹⁹. The main stimulus for volunteering was Access to Nature (A2N) funding received for the period (2011 - 2013), which funded the provision of community-related infrastructure and activities, such as community events (run by a Community Ranger) and volunteer activities. The number of volunteering events was a key performance indicator for the LBBD and a requirement of the A2N funding. According to The A2N Evaluation report (A2N, 2014), there were 1,168 hours of volunteer time between 2011 and 2013. This information is used to calculate an annual level of volunteer input, which based on consultation with the Land Trust is assumed to be required into future years to support maintenance of the site. Volunteer time is valued in terms of the hourly wage of equivalent work, following Parish et al. (2003)²⁰. Based on information about the tasks completed by volunteers (LBBD, 2012), the most comparable activity was that of a gardener:

¹⁹ Accounting for volunteer time (as a liability for maintaining natural capital) represents a further distinguishing feature of the CNCA framework, in comparison to conventional financial accounting. For example, The International Financial Reporting Standard for Small to Medium-sized Enterprises does not account for volunteer work at all. While the UK's Generally Acceptable Accounting Principles (GAAP) Statement of Recommended Practice only accounts for this if the benefits are reasonably quantifiable and measurable; which usually means that such values are not accounted for (BDO, 2010).

²⁰ Alternative measures include: the minimum wage; the median wage in the area (Volunteer England, 2009); and whether these costs should account for any employment overheads (Parish et al. 2003).

- Volunteer hours per year: 467 hours/year (2012-future).
- Salary of a gardener: £9.66/hour²¹.

It is assumed that this wage will remain constant in real terms over the 99-year time horizon.

On the natural capital balance sheet (Section 2.2), the cost of volunteer time (£4.9k per year) is presented as an external liability, representing a provision for future expense in terms of the calculated present value (significantly less than 1m, over 99 years). All remaining costs (£46k per year) are included as private liabilities (calculated as an equivalent annual from approximately £1m in total over 99 years).

Table 3.4: Estimated natural capital costs

		Maintenance liability of natural capital
Private Annual Value	<i>Staff costs</i>	£32k
	<i>Maintenance cost</i>	£8k
	<i>Maintenance prescribed for the HLS</i>	£7k
Present Value (over 99 years)		(£1m)
<hr/>		
External Annual Value	<i>Volunteer costs of maintaining</i>	£5k
Present Value (over 99 years)		<<£1m

Caveats

The liability to maintain natural capital currently assumes that all costs are legal obligations. However, while the HLS funding is based on a ten-year contract, it is the choice of the Land Trust to maintain the BAP habitat. Due to the indirect obligation to maintain the BAP, as a potential measure for the Green Flag award²² and the benefits these recognitions of natural capital management provide for other sources of funding, it is reasonable to maintain this definition. Regardless, these assumptions do not affect the bottom line - even if maintenance costs were simply recorded as 'other maintenance costs' within the CNCA framework (see Annex 4).

More significantly, the costs of natural capital maintenance are assumed to remain constant over time. This is intended to imply that the condition of natural capital assets will not deteriorate below their current state. This is not unreasonable given that the lease was provided to the Land Trust in order to maintain this land. Equally, this also assumes that the conditions of the BAP and HLS schemes do not become stricter or that real price changes will not impact costs over time.

²¹ See: http://www.payscale.com/research/UK/Job=Gardener/Hourly_Rate.

²² A national accreditation scheme which requires parks and green spaces in the UK achieve a benchmark set of criteria on an annual basis.

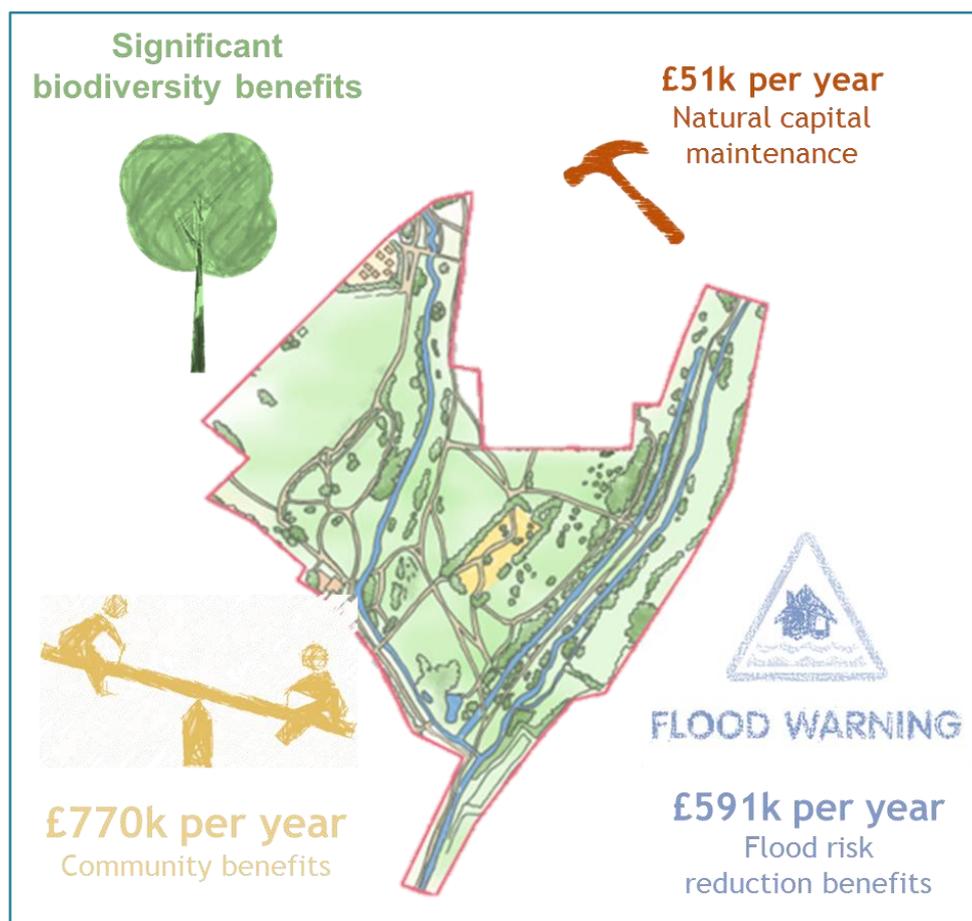
4 CONCLUSIONS

4.1 Summary

The natural capital account for Beam Parklands demonstrates the significant net benefit that is derived from the site. This is consistent with the previous case study evidence that has highlighted the redevelopment of the site as an exemplar of green infrastructure investment. However, whilst previous studies have focused on the benefits associated with the redevelopment of the site over a relative short time horizon (e.g. 10 years), the natural capital account takes a longer term perspective to understand both the ongoing natural capital maintenance costs and the resulting flow of benefits.

The calculated natural capital asset value for Beam Parklands (£42m in present value terms) significantly exceeds the long-term natural capital maintenance costs (£1m) (Figure 4.1). Whilst genuine comparators are limited due to the infancy of the CNCA framework, some context is provided by comparison to pilot accounts that were developed for the Natural Capital Committee in 2014. These include Wimpole Estate (Cambridgeshire) (£31m, net asset value) and The Windsor Estate (£46m, net asset value) (eftec et al., 2015).

Figure 4.1: Beam Parklands natural capital account



Although these pilots reflect different types of natural capital assets and benefits in rural, rather than urban, settings, the results for Beam Parklands are broadly consistent. What is particularly evident is the order of magnitude difference between long-term natural capital maintenance liabilities (£ millions), and the value of the natural capital benefits provided (£ tens of millions). This emerging evidence base will help reinforce the messages from initiatives such as the Green Infrastructure Taskforce. In particular, that current decision-making and accounting processes are not recognising the value of the multiple benefits that can be delivered by maintaining and improving natural capital and green infrastructure. Further work and practical applications will improve understanding of the natural capital and green infrastructure across stakeholders, helping to improve and refine methods and encouraging better data.

For the Land Trust, corporate natural capital accounting provides an explicit tool for demonstrating the value delivered by its activities. The CNCA framework is well suited to encompass the Land Trust's range of environmental, social and economic objectives. This is because natural capital is a critical input to the production of all of these outcomes - particularly in relation to increasing biodiversity and the quality of habitats on its sites, using these green spaces to improve health and wellbeing, facilitating vocational outdoor education and training, engaging communities in maintaining sites, and helping to support local economic development around sites.

The account for Beam Parkland provides an illustration of the scale of social value provided by the Land Trust. Measurement of this value enhances the case that can be made for financing the management of sites currently in the Land Trust's portfolio, or for sites that can be added to the portfolio. The natural capital framing is appropriate as it explicitly demonstrates the 'return' that can be secured through endowments and other sources of financing that ensure the long term maintenance of natural capital assets. The supporting information compiled for the account - such as the valuations of flows of benefits - also provide a basis for determining investment priorities at a site, or across a portfolio of sites. For example, in determining the best use of a limited budget. This further strengthens the case that can be made for supporting natural capital and green infrastructure.

4.2 Recommendations

To conclude, a number of recommendations are set out in relation to: (i) further developing the natural capital account for Beam Parklands; and (ii) the broader perspective of demonstrating the use of the CNCA framework in a green infrastructure setting.

Developing the Beam Parklands Natural Capital Account

- **Develop the natural capital asset register to support management plans:** natural capital maintenance is a core aspect of the management objectives for the site. Much progress is planned for the period 2012 - 2017 with regards to habitat maintenance and species (particularly regular surveys). There is an opportunity to develop a natural capital asset register in parallel with these management objectives, such that natural capital accounting is integrated into the continued management of the site.

This is not likely to be an onerous requirement, since the purpose of the register is to act as a central repository for information that is likely to be recorded as a consequence of these planned activities. An asset register can also provide a basis for tracking the specific outcomes that are delivered through external funding, whilst a natural capital balance sheet will demonstrate to funders and other stakeholders the value of such investments.

- **Scope the potential to extend the coverage of the account to other natural capital benefits:** the account provides only a partial coverage of the range of benefits provided by natural capital assets at Beam Parklands. A more comprehensive asset register and the planned survey work may provide supporting evidence that will allow - for example - climate regulation, air quality, water quality, and further aspects of habitats and wildlife conservation to be drawn into the natural capital balance sheet. This may also allow for refinements of the valuation associated with the flood risk regulation and the amenity value to the local community. The CNCA process should be viewed as iterative, providing an opportunity in future accounting periods to refine and update the account and valuations.
- **Assess how the natural capital account can be used to support the case for external funding:** the account reveals that the required long term provisions for the maintenance of natural capital benefits likely exceeds the endowment that is in place for the site. Part of this includes physical infrastructure costs (e.g. for flood risk management) which are separate to the Land Trust's responsibility. However, it is evident that the local community and the habitat and wildlife benefits are both dependent on securing external funds (e.g. HLS funding) and in-kind funding (e.g. volunteer time) in order to maintain these benefits in the long run. There is an opportunity to use the evidence base established by the account to support future funding applications.

Understanding the value of green infrastructure

- **Develop further case studies:** Beam Parklands is a prominent example of a successful green infrastructure investment with secure long-term funding. The case study presented in this report demonstrates the flexibility of application for the CNCA framework, illustrating how it can provide an explicit account of the role and value of green infrastructure. The specific findings - in terms of the calculated natural capital asset value - have a lower degree of transferability to other sites. This is due to the specific factors that drive the value of benefits as Beam Parklands: the prominence of the flood risk regulation function and the quality of the local environmental amenity. The evidence base concerning the value of green infrastructure needs to be developed further: both at the individual site level, by encompassing different types of sites, benefits and uses; but more importantly at the multiple site/network level. The latter case is more relevant to strategic objectives and management of urban areas and would be a valuable next step for the application of the CNCA framework in the context of green infrastructure planning.
- **Integrate the value of natural capital into business as usual decision-making:** the natural capital account for Beam Parklands demonstrates how the role and value of green infrastructure can be summarised and reported in a coherent and consistent format. This directly addresses the challenge typically faced in communicating the multiple benefits that are provided and demonstrating how they weigh against the costs of maintenance. The purpose of integrating this information into the evidence that informs decision-making is to help ensure that all benefits are properly accounted for, that the resources and assets are effectively utilised, and sufficient funding is available to maintain these assets and benefits.

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ANNEX 1 - COVERAGE OF NATURAL CAPITAL ACCOUNT

	Ecosystem service/renewable/non-renewable resource					
	Climate regulation	Air quality regulation	Flood risk reduction (hazard regulation)	Water quality regulation	Recreation and amenity	Health (mental and physical)
<i>Scope of financial account</i>						
Acid grassland	●	○	●	-	●	●
Community space	-	-	-	-	●	●
Open water bodies	○	-	●	○	●	●
Parkland	●	○	●	-	●	●
Reedbeds	●	○	●	●	●	●
Wetland	●	○	●	○	●	●
Woodland	●	●	○	○	●	●
<i>Scope of natural capital account</i>						
Acid grassland	●	○	●	-	●	●
Community space	-	-	-	-	●	●
Open water bodies	○	-	●	○	●	●
Parkland	●	○	●	-	●	●
Reedbeds	●	○	●	●	●	●
Wetland	●	○	●	○	●	●
Woodland	●	●	○	○	●	●

Key:

- Significant ecosystem service flow by habitat
- Potential but not significant ecosystem service flow
- No ecosystem service flow by habitat

	Included in account
	Partly included in account
	Not included in account

Notes: ¹ Ecosystem service classification based on NCC (2014).

ANNEX 2 - NATURAL CAPITAL ASSET REGISTER (PARTIAL)

This annex outlines the initial construction of a natural capital asset register for Beam Parklands that underpins the natural capital account presented in Section 2 and 3 of the main report.

The Natural Capital Committee proposes that natural capital be defined as, “*The elements of nature that directly and indirectly produce value or benefits to people, including ecosystems, species, freshwater, land, minerals, the air and oceans, as well as natural processes and functions*” (NCC, 2013). The purpose of the natural capital asset register is to summarise information about the physical state (e.g. extent and condition) of each natural capital asset ‘accounting unit’, which enables changes to the quantity and quality of natural capital to be measured and tracked over time. For practical reasons the asset register cannot capture all asset data at this level of detail, so the approach proposed in the CNCA framework (eftec et al., 2015) is to split the natural capital of the site down into manageable accounting units that (generally) align to land cover types.

For the Beam Parklands pilot account, an accounting unit is defined as a plot of land of a single land cover type, and is the basic unit for which data is collected (e.g. wetland). Each accounting unit (land cover) may comprise several types of natural capital; for example, soil, species, woodland etc. These units reflect the basic land cover at the site: rivers and streams, standing water, reed-beds, fenland, acid grassland, woodland, and general parkland not accounted for elsewhere (Table A2.1 below). These types of land cover also align with the UK priority BAP habitat types and are closely related to HLS options for funding.

For each accounting unit there is: (i) a measure of extent (i.e. area, supported by a map which delineates each land cover type); and (ii) selected indicators of condition which can be used to indicate the health of the natural capital in that unit. Practical considerations dictate that only a manageable number of measures of condition can be included in the register, which means that careful consideration should be given to their selection. The aim is to select measures that are good indicators of natural capital health and output but that are also measures that can be readily captured. The selected indicators will likely change over time, with experience and regular review of the function of the site. For these reasons the asset register should be taken as an initial and partial account for the time period 2009 to 2014 (the accounting period).

There are some measures or indicators that cannot be attributed to one particular accounting unit, for example flood prevention and recreation, which are features of the entire site rather than any particular accounting unit. Consequently, there are some features and indicators in the asset register that are associated with the entire site and are recorded at that aggregate level.

Generally, the presence of certain target species has been used to indicate the health of the particular habitat. This is based on the assumption that a well-functioning habitat is necessary to support the desired species and hence the presence of the species signifies the habitat is healthy. There may be legitimate reasons for a key species to be absent despite the creation of a good quality habitat. Consequently there may be a case for adopting measures of good habitat management (such as water quality in rivers, or leaving grass cuttings for a week after cutting to stimulate late flowering plants) as more immediate indicators of natural capital condition. This is another example of the need to review circumstances and management experience in the development of appropriate condition indicators.

Another consideration in the assessment of natural capital condition is the importance of understanding the relationship between condition and (both) the output and value of the services delivered by that natural capital. For example, recreational values may be more heavily determined

by aesthetic concerns of the parkland than by pure habitat condition (as measured by the abundance of certain species). Although species abundance may be important to recreational users of the parkland, there may be a net reduction in recreational value if this is achieved at the expense of (for example) an open and welcoming aesthetic to the site, or a reduction in accessibility. Measuring and improving habitat without understanding these aesthetic drivers of recreational value can lead to the condition improving without enhancing the recreational value. Developing these measures and understanding the trade-offs between potentially conflicting variables may become an important consideration in the development of appropriate asset register metrics.

Table A2.1: Natural Capital Asset Register (Partial)

Account Unit	Extent/Indicator	Units	Baseline year (2009)	Redevelopment (2011)	Reporting year (2014)	Source	Notes
Grassland	Extent: Area of lowland dry acid grassland (Priority BAP habitat)	Hectares	?	?	23.2	HLS Options map (2013) - split 11.4 ha HK6 and 11.8 ha HK16	To be confirmed Grasslands are cut annually on rotation, but arisings are not collected (FEP, 2013) HLS options could result in removal of arising and cutting after flowering plants have seeded (FEP, 2013)
	Species: reptile survey [flowering plants diversity?]	No. of species	?	One common lizard sighting (Nov. 2011)	?	LBBB (2012)	Site reptile survey planned for 2012/13 (results?). Target reptiles include; slow worm, grass snake and common lizard. [Flowering plants, invertebrates and birds survey (Skylarks & lapwings)?]
	Prevention of alien species	No. of species	?	?	?	LBBB (2012)	Prevent spread of common ragwort and other invasive species.
	Livestock	No.	n/a	n/a	None, except for illegal grazing for horses	-	Potential for future controlled grazing to maintain semi-natural grasslands {need to maintain optimum number}
Rivers and Streams	Extent: Length of Wantz Stream & Beam River	Metres	?	2,200 enhanced	? (Circa 2,500m?)	EA (2009b)	To be confirmed River Terrace Gravels deposited by Thames over the underlying London Clay, so dry and somewhat acidic
	Length of river restoration	Metres	?	600	?	EA (2009b)	To be confirmed
	Species- Otter	Sightings	Nil	Nil	?	LBBB (2012)	No reported sighting of otters, but the river system is suitable. [Fish species?]
Standing Water	Extent: Number of pools	Number	?	?	9	HLS Options Field data Sheet (2013)	Seven ponds <100m ² and two >100m ² , all of high wildlife value.

Account Unit	Extent/Indicator	Units	Baseline year (2009)	Redevelopment (2011)	Reporting year (2014)	Source	Notes
	[Include canal? - c 1.2km?]						
	Species - Great Crested Newt	Sightings	Nil	Nil	?	LBBB (2012)	Great Crested Newt is a target species of high value. Not yet recorded but the site suitability is high - especially the Romford Canal. Survey planned for 2012/13 [results?] Scrapes, pools and well established ponds and ditches with emergent vegetation, such as <i>Carex</i> , <i>Glyceria</i> , and <i>Phragmites</i> , are likely to support scarce species of beetles, spiders and flies. - (LBBB, 2012)
	Prevention of alien species	No. of species	?	?	?	LBBB (2012)	Australian swamp stonecrop has been recorded in two of the ponds adjacent to the Wantz stream. If this is not treated it will spread to the other water bodies of the site. (LBBB, 2012)
Reedbeds	Area of reedbeds	Hectares	?	+2.0	3.1	EA (2009b) HLS Options Field data Sheet (2013)	To be confirmed
	Habitat: species diversity	?	?	?	?		Plants: reed sweet-grass; reed; reedmace; hawthorn Bird: lesser whitethroats
Fenland	Extent: Total area of fen/wetlands	Hectares	?	?	9.2	HLS Options Field data Sheet (2013)	To be confirmed
	Area of Wet Fen	Hectares	?	+2.9	?	EA (2009b)	To be confirmed
	Area of Floodplain Grazing Marsh	Hectares	?	+3.7	?	EA (2009b)	To be confirmed
	Species - Water Vole	Sightings	Nil	Nil	?	LBBB (2012)	No conclusive evidence of water vole found, however the site is highly suitable for the species.

Account Unit	Extent/Indicator	Units	Baseline year (2009)	Redevelopment (2011)	Reporting year (2014)	Source	Notes	
							Water Vole survey planned for 2015/16 (LBBB, 2012)	
	Invasive species	No. species	?	?	?	LBBB (2012)	Japanese knotweed and Himalayan balsam recorded on upper banks of River Beam (LBBB, 2012) [removed?]	
Woodland	Extent: Total area of woodland	Hectares	?	?	6.2	HLS Options Field data Sheet (2013)	This includes woodland, orchard and successional areas.	
	Area of traditional orchards	Hectares	?	+0.2	0.5	EA (2009b) HLS Options Field data Sheet (2013)	To be confirmed	
	[Scattered trees to be included?]	No. of trees	?	?	?	-	Annual tree survey to be carried out on the boundary trees -London planes, (LBBB, 2012).	
Parkland (not covered elsewhere)	Extent: Total area	Hectares	?	?	c.11	-	To be confirmed - estimated as total area of 53ha less the areas identified above.	
	Hedgerows	Metres	?	1000	?	EA (2009b)	To be confirmed. 450m applied for under HLS options.	
Total site	Extent: Total site	Hectares	53	53	53	LBBB (2012)	-	
	Flood storage	Metres cubed	433,000	+30,000	?	Jacobs (2008) ; NE (2013a)	To be confirmed	
	Biodiversity	?	?	?	?	LBBB (2012)	Site invertebrate survey planned for 2013/14. Site breeding bird survey planned for 2014/15. Important bird species include; house sparrow, linnet, starling, reed bunting, kingfisher and skylark	
	Recreational Indicators:							
	Paths	Metres	?	+8000	?	?	NE (2013a)	To be confirmed

Account Unit	Extent/Indicator	Units	Baseline year (2009)	Redevelopment (2011)	Reporting year (2014)	Source	Notes
	Boardwalks	Metres	?	+65	?	EA (2009b)	To be confirmed
	Benches	No.	?	8	+4	A2N (2014)	-
	Outdoor classrooms	No.	-	2	-	A2N (2014)	-
	Litter bins	No.	-	+8		A2N (2014)	-
	Notice boards	No.	-	+4	-	A2N (2014)	-
	Interpretation panels	No.	-	+5	-	A2N (2014)	-
	Natural play grounds	No.	-	+2	-	A2N (2014)	By London Play

ANNEX 3 - SCHEDULES

The following Schedules 1 - 6 detail the calculation of the key components and estimates presented in the natural capital balance sheet:

- **Schedule 1** reports the components of the baseline natural capital asset value (as of 2009). The baseline (asset value) is a reference scenario against which subsequent changes in the state of natural capital are measured.
- **Schedule 2** reports the in-period (2009 - 2014) cumulative gains to the baseline natural capital asset value. Cumulative gains/(losses) is the impact on the baseline value (in present value terms) arising from changes in asset condition (excluding revaluations and adjustments covered below).
- **Schedule 3** reports additions/disposals, which are changes in net natural capital due to additions (by way of acquisition, creation/transformation or new discoveries) and disposals of land (by transfer or sale). However, as shown in Figure 2.1, this is not relevant in the case of Beam Parkland.
- **Schedule 4** reports revaluations and adjustments to the baseline natural capital asset value in 2014. Revaluations and adjustments are changes to asset value (in present value terms) due to changes other than condition or quantity, such as economic variables, valuation assumptions or methodology.
- **Schedules 5-6** reports legal provisions and other obligations for natural capital maintenance as at 2014. The total maintenance provisions represent the full natural capital maintenance requirement of the organisation (which only includes legal requirements in this case).

Section 3 provides more detailed information on the scope of the natural capital benefits, the calculation methodology, and key assumptions.

Schedule 1: Baseline value (assets)

Item		PV (£m)	Annual value (£k)	Source
Baseline (Private Value)	Maintenance cost of physical capital relating to local community benefits	(<1)	(29)	LBB (2012); Beam Parkland Financial Accounts (2012, 2013 and 2014).
	TOTAL	(<1)		
Baseline (External Value)	Flood risk regulation - avoided flood damages <i>See Note 1</i>	13	398	Penning-Rowse et al. (2005) standard damage costs for residential and non-residential property. Less physical capital maintenance costs (Environment Agency).
	Local community benefits - recreation, amenity, and health <i>See Note 2</i>	9	297	Various - indicative property price uplift associated with green space in the UK, plus ONS, 2011; ONS, 2008; Land Registry, 2014. Beam Parkland Financial Accounts (2012, 2013 and 2014)
	Habitats and wildlife benefits	-	-	-
	Climate regulation benefits	-	-	-
	Air quality benefits	-	-	-
	TOTAL	22		

Note 1. Baseline avoided flood damage (external value)

Description	Annual Value (£k)
Residential property avoided damages	452
Non-residential avoided damages	97
Annual physical capital maintenance cost	(151)
Total (net) avoided flood damage	398

Note 2. Baseline local community benefits (external value)

Description	Annual Value (£k)
Local amenity benefit ¹ - 3% residential and non-residential property price uplift for ANGSt standard 1 [range: 1 - 5% uplift per property]	316 [109 - 524]
ANGSt standard 2 [range: 1 - 5% uplift]	[805 - 3,942]
Annual physical capital maintenance cost	(20)
Total (net) local community benefits	296

¹ Mid-range estimate is used in account.

Schedule 2: Cumulative gains (/losses)

Item		PV (£m)	Annual value (£k)	Source
Cumulative gains/losses (Private Value)	N/A	-	-	-
	TOTAL	-		
Cumulative gains/losses (External Value)	Local community benefits -recreation, amenity, and health <i>See Note 3</i>	10	316	Various - indicative property price uplift associated with green space in the UK, plus ONS, 2011; ONS, 2008; Land Registry, 2014.
	TOTAL	10		

Note 3. Cumulative gains local community benefits (external value)

Description	Annual Value (£k)
Local amenity benefit ¹ - 3% residential and non-residential property price uplift (per property) for ANGSt standard 1 [range: 1 - 5% uplift per property]	316 [109 - 524]
ANGSt standard 2 [range: 1 - 5% uplift]	[805 - 3,942]
Total (net) local community benefits	316

¹ Mid-range estimate is used in account.

Schedule 3: Revaluations and adjustments (assets)

Item		PV (£m)	Annual value (£k)	Source
Revaluations and adjustments (Private Value)	Maintenance cost of physical capital relating to local community benefits	<<1	2	LBBB (2012); Beam Parkland Financial Accounts (2012,2013 and 2014)
	TOTAL	<<1		
Revaluations and adjustments (External Value)	Flood risk regulation - avoided flood damages <i>See Note 4</i>	6	193	Penning-RowSELL et al. (2005) standard damage costs for residential and non-residential property. Less physical capital maintenance costs (Environment Agency).
	Local community benefits -recreation, amenity, and health <i>See Note 5</i>	6	184	Various - indicative property price uplift, plus ONS, 2011; ONS, 2008; Land Registry, 2014) and maintenance cost (Parkland Financial Accounts, 2012; 2013; 2014)
	TOTAL	12		

Note 4. Revaluations and adjustments avoided flood damage (external value)

Description	Annual Value (£k)
Additional residential property avoided damages	49
Additional non-residential avoided damages	42
Reduction in annual capital maintenance cost	102
Total (net) avoided flood damage	193

Note 5. Revaluations and adjustments local community benefits (external value)

Description	Annual Value (£k)
Additional local amenity benefit ¹ - residential and non-residential property price uplift per property for ANGSt standard 1 [range]	183 [61 - 305]
ANGSt standard 2 [range]	[492 - 2,458]
Reduction in annual physical capital maintenance cost	1
Total (net) local community benefits	184

¹ Mid-range estimate is used in account.

Schedule 4: Legal provisions (liabilities)

Item		NPV (£m)	Annual value (£k)	Source	Comment
Legal provisions (Private Value)	Natural capital maintenance	(1)	(46)	Estimated based on the financial accounts of Beam Parklands (2011 - 2014). <i>See Section 3.4</i>	Calculated to exclude maintenance of physical capital assets.
	TOTAL	(1)			
Legal Provision (External Value)	Natural capital maintenance	(<<1)	(5)	Estimated based on the financial accounts of Beam Parklands (2011 - 2014). <i>See Section 3.4</i>	Accounts for cost of volunteer time for natural capital maintenance activities.
	TOTAL	(<<1)			

ANNEX 4 - NATURAL CAPITAL BALANCE SHEET GLOSSARY

1. Baseline value

Baseline values are determined by the assumptions in the valuation baseline as described in Section 3.1. The baseline value will represent the value of the asset at an appropriate baseline date. This valuation is the net present value (NPV) of the appropriate benefits (and dis-benefits), evaluated in perpetuity, and discounted at the organisation's opportunity cost of capital²³.

Item	Definition	Rationale
1a. Baseline Private Value	<p>The present value (PV) of expected revenue streams less all direct production costs (costs of sale) as assumed in the valuation baseline, calculated in perpetuity.</p> <p>This is discounted using the set of discount rates, as defined by the Green Book (2003) (or the organisation's commercial discount rate).</p> <p>This should exclude natural capital asset maintenance costs, which are reported separately and covered under liabilities.</p>	<p>It is useful to separate the value that provides the organisation with a direct economic benefit (private value) and the broader non-market benefits that accrue to others (external value).</p> <p>Values are accounted for in perpetuity to reflect the permanence of (renewable) natural capital assets.</p>
1b. Baseline External Value	<p>The present value (PV) of non-market benefits (or dis-benefits) as assumed in the valuation baseline, calculated in perpetuity.</p> <p>This is discounted using the set of discount rates, as defined by the Green Book (2003) (or the organisation's commercial discount rate).</p> <p>This should exclude natural capital asset maintenance costs, which are reported separately under liabilities.</p>	

2. Cumulative gains and losses

The purpose of this reporting line is to reveal how effectively the organisation is maintaining its existing natural capital assets, and as such it is a key natural capital maintenance performance indicator. It excludes asset value changes due to valuations (unit value changes), additions, or disposals, all of which are covered below (see items 3-4). It is not envisaged that this category would apply to non-renewable resources.

²³ In practice, this requires asset values to be forecast over a reasonable time period, and a residual value to be assumed. If appropriate (given the condition of natural capital), the residual value can be assumed to represent the 'steady state' level of benefit/cost.

Understanding the current value of natural capital relative to the baseline is important; consequently the gain or loss in value is expressed relative to the baseline value (see Section 3.2.4) and in this respect it represents a cumulative gain or loss from the baseline value.

Item	Definition	Rationale
2a. Cumulative gain/(loss) - private value	The cumulative impact on the private value (in present value terms) arising from changes in asset condition (excluding additions, disposals and changes covered below).	It is important to highlight the loss of asset value, through failing to maintain natural capital assets (relative to the baseline).
2b. Cumulative gain/(loss) - external value	The cumulative impact on the external value (in present value terms) arising from changes in asset condition, (excluding addition, disposals or changes covered below).	Similarly, it is important to measure any recovery or enhancement in asset value arising from restoration or investment.

Natural capital assets can display a wide variety of characteristics and timescales in terms of a capacity to regenerate or susceptibility to degrade, in the absence of proper maintenance. For many assets, both natural regeneration and active management may be required in order to sustain natural capital asset condition and the flows of value derived over time. Given the practical difficulties of isolating the impact on value of these two processes, this item will measure any net change in asset value arising from its maintenance activities coupled with the natural processes of regeneration.

The assessment of value change will involve a periodic review (typically annually) of asset condition and any resulting impacts on long term value. To the extent that proper maintenance is not carried out, any reduction in value may be permanent or temporary. A permanent reduction may be due to an irreversible loss that will persist in the accounts; however a temporary loss may be reversed if additional restorative work is carried out. The intent of natural capital accounting is to record any temporary loss in full, and only realise any recovery when the remedial work has had its effect. This recovery may be gradual and each incremental improvement in the benefit level should be reflected by reducing the loss in the period concerned. Similarly, the improvement of the quality of any planned investment to natural assets above baseline levels should only be recognised once the investment is complete and then as the higher benefits realised.

3. Additions, disposals and consumption

The purpose of this line item is to record any quantity changes in natural capital. Quantity changes can arise from additions to natural capital, disposals, or (in the case on of non-renewables) from consumption.

There may be additions to the natural capital asset register, typically through acquisition of land, changes to land use or by expanding the scope of the natural capital asset register. In the case of non-renewables, new discoveries or increases in estimated reserves would be treated as an addition. All of the above may be seen as increasing the quantity of the asset base. Full details of additions would be expected to be detailed in a note to the accounts.

Any sale or transfer of land and its natural capital would be recorded as a disposal. In the case of non-renewable resources, reductions would also be recorded for extraction, sale or consumption of the resource. Full details of disposals would be expected to be detailed in a note to the accounts.

Item	Definition	Rationale
3a. Additions (disposals) and (consumption) - private value	Increases or (decreases) in private value (in present value terms) arising from asset additions, disposals or consumption.	It is important to capture changes in the quantity of natural capital (as distinct from the impacts of quality improvements covered under cumulative gains/losses).
3b. Additions (disposals) and (consumption) - external value	Increases or (decreases) in external value (in present value terms) arising from asset additions, disposals or consumption.	

4. Revaluations and adjustments

There are several other potential causes of changes in valuations associated with natural capital assets that warrant separate monitoring and reporting. These may include changes in economic variables, such as market prices or societal preferences, but it may also include changes in scientific knowledge or information that may lead to a revaluation. Additionally, there may be changes arising from a change of land use. Full details of any revaluations or adjustments would be expected to be disclosed in a note to the accounts for the year in which they occur. Justification should also be given for the reasons for treating the change under this reporting line, rather than under cumulative gains/losses.

Item	Definition	Rationale
4a.Revaluations and adjustments - private value	Changes to private value (in present value terms) due to changes other than condition or quantity, such as economic variables, valuation assumptions or methodology.	It is important to highlight changes in value that are attributable to changes in external factors, as distinct from the underlying losses or gains arising from the company's management of the assets.
4b.Reassessments and adjustments - external value	Changes to external value (in present value terms) due to changes other than condition or quantity, such as economic variables, valuation assumptions or methodology.	

Gross asset value

The sum of asset lines 1-4 provides the gross asset value of the natural capital recognised. Against this gross asset value, the maintenance liabilities should be considered in order to assess the net worth of the assets held.

Of which reported in financial accounts

This is the net book value held in the financial accounts for the tangible land assets that correspond to the natural capital that is in the scope of the corporate natural capital account. This value can be usefully compared to the private value of natural capital (See Section 3.2.5). Note though that financial accounts have different objectives, scope and measurement methods and hence they are expected to produce different results.

5 and 6: Legal provisions and other maintenance provisions

The organisation may have legal or contractual obligations to the preserve condition of natural capital, which may or may not be related to the private benefits of the natural capital. For example, maintaining public access to woodland is unrelated to the benefits of timber production. However, a water company with an obligation to improve water quality may find that the costs of watershed improvement also lead to reductions in treatment costs and hence enhanced private value.

Other maintenance provisions represent the remaining costs (above and beyond the legal obligations above) associated with natural capital maintenance that sustains the asset condition. These should relate to the additional costs to maintain natural capital to the baseline level (or enhancing it beyond this).

Item	Definition	Rationale
5. Legal maintenance obligations	The present value (PV) of expected costs associated with any legal or contractual obligations to preserve natural capital, calculated in perpetuity using the organisation's commercial discount rate.	This captures the minimum natural capital maintenance obligations on the organisation.
6. Additional provisions for maintenance	The present value (PV) of expected costs of maintenance or enhancement activities required to meet baseline (or enhanced) condition using the organisation's commercial discount rate.	This captures the remaining natural capital maintenance requirement on the organisation to sustain the planned natural capital asset values.

Total maintenance provisions

Total maintenance provisions are defined as the sum of the legal obligations, and the additional maintenance provisions. This figure should represent the full natural capital maintenance requirement of the company.

Of which reported in financial accounts

This is the value of the liabilities that are already reported in the organisation's existing financial accounts. This should be compared to the legal provisions section of the corporate natural capital account (See Section 3.2.5). Note though that financial accounts have different measurement methods and hence they are expected to produce different results.

Total net natural capital

Total net natural capital is defined as the gross natural capital asset value less total maintenance provisions. This is an indicator of the net worth of the natural capital assets captured within the balance sheet.