



LONDON BOROUGH OF BARNET CORPORATE NATURAL CAPITAL ACCOUNT

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List of Abbreviations

ANGSt	Accessible Natural Greenspace Standard
CO2e	Carbon equivalent
CNCA	Corporate Natural Capital Account
GIS	Geographic information systems
LB Barnet	London Borough of Barnet
MENE	Monitor of Engagement with the Natural Environment
NICE	National institute for Health and Care Excellence
ONS	Office for National Statistics
ORVal	Outdoor Recreation Valuation Tool
OSA	Open Space Assessment
SEG	Socio-Economic Group

Executive Summary

Introduction

In common with all London local authorities, the London Borough of Barnet (LB Barnet) recognises the huge contribution made by green infrastructure to the wellbeing of its residents and the success of its economy. Barnet has always been characterised as a green and leafy borough of low density housing interspersed with public parks and river valleys.

Barnet's population is set to increase significantly over the next twenty years, placing increased pressure on the borough's green infrastructure assets. At the same time, the council is facing significant budgetary pressures. The creation of a Corporate Natural Capital Account (CNCA) for Barnet provides the council with an evidence base to quantify the economic, social and environmental benefits accruing from its green infrastructure assets.

The London Borough of Barnet is the first London Borough to produce a borough-wide CNCA for 200 of its parks and open spaces. The account has been developed using the quality and value assessment data of these spaces assembled for the borough's Parks and Open Spaces Strategy (2016-26), which was adopted in May 2016.

This account shows the enormous value of these open spaces for the wellbeing of residents of Barnet. The total value of benefits from them is estimated at more than £1 billion over the next 25 years. The costs of maintaining these open spaces are estimated at £72 million over the same period – less than a tenth of the benefits they provide.

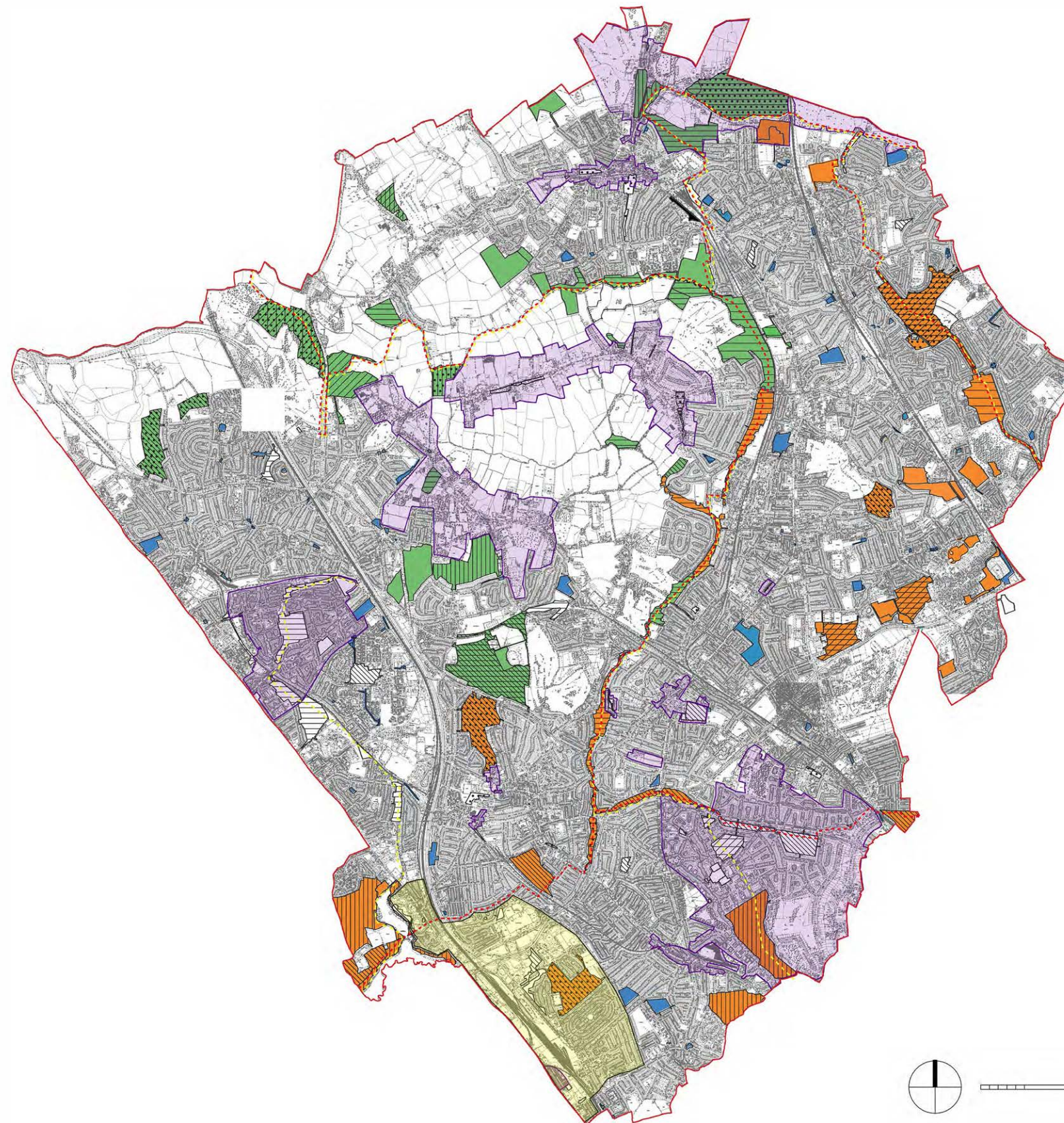
Background - Natural Capital Accounting

Natural capital refers to the stock of natural assets, such as parks and gardens, which provide benefits to people, such as recreation and its health and wellbeing benefits. The Natural Capital Committee has developed a CNCA framework to capture the financial value of natural capital assets and to quantify the costs of sustaining these benefits over time. The CNCA provides a balance sheet that shows the benefits provided by natural capital against the cost of maintaining them. Production of CNCA conforms to newly-published recommendations from the Natural Capital Committee's fourth report that "the government should actively promote corporate natural capital valuation, accounting and reporting; local authorities and major infrastructure providers should ensure that natural capital is protected and improved" (Natural Capital Committee, 2017). This study represents the first borough-wide application of the CNCA framework in London and the UK.

What natural capital assets does LB Barnet own?

LB Barnet owns and manages around 850 hectares of natural capital assets. As shown in the chart below, the assets cover a wide range of habitat types, but the majority of this is amenity grassland and woodland

Barnet's Parks and Open Spaces by planning designation



Open space provision across all types of green space, (parks, playgrounds, sports sites, natural and semi-natural greenspaces) is 888.76 Hectares (approximately 10% of the area of the borough).

What benefits to these assets provide to people?

LB Barnet's natural capital assets produce essential benefits for residents of Barnet and the rest of society. Barnet's open spaces improve:

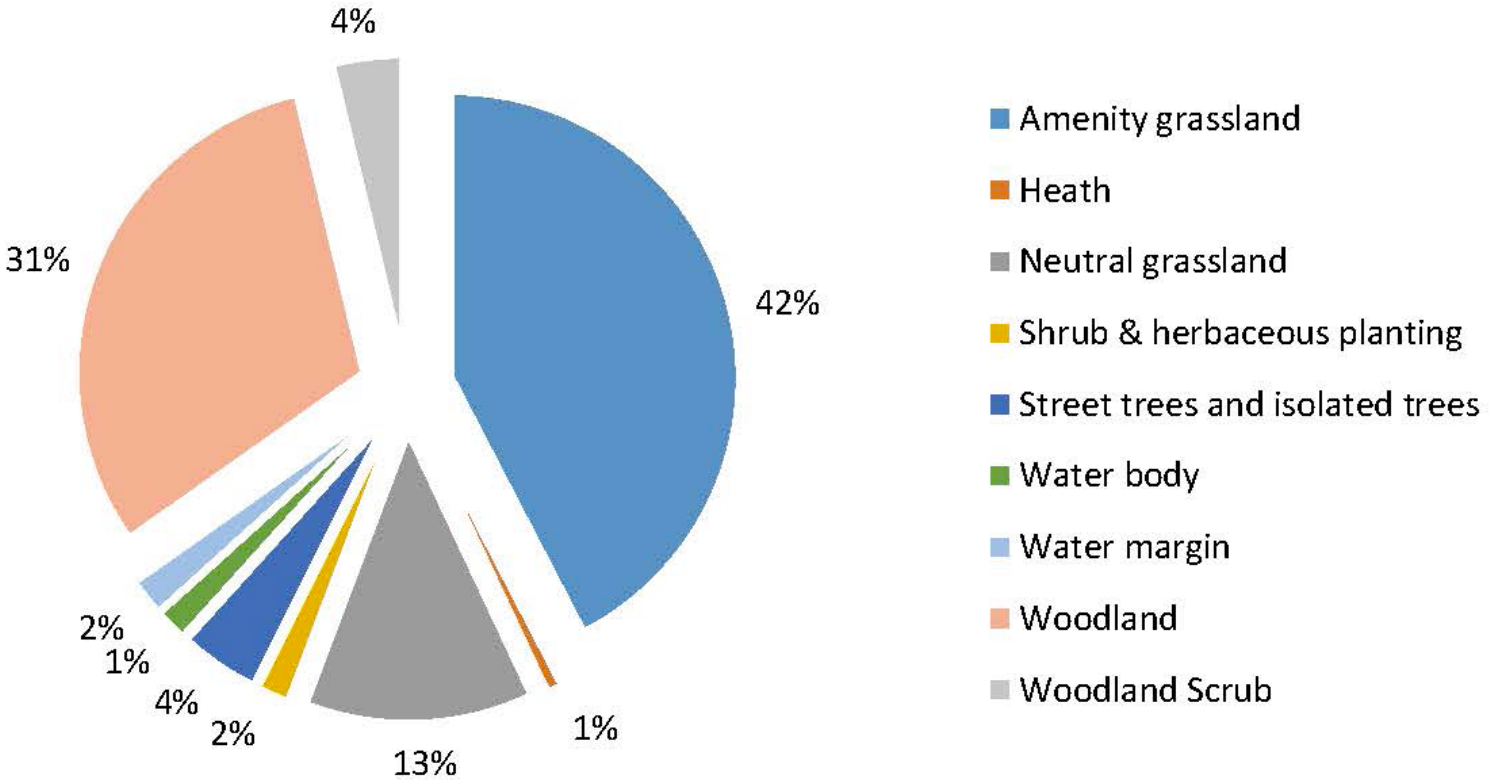
- Air quality by absorbing pollutants,
- The local climate by cooling during heatwaves,
- Resilience to flooding by slowing water flows,
- Water quality by filtering water to reduce water treatment costs,
- Opportunities for outdoor recreation in more natural environments, and
- Habitat for a broad range of species

These benefits make Barnet a more attractive place to live and work, and crucially enable people to live healthier lifestyles. Access to a good level of supply of good quality greenspace has a positive influence on physical and mental health, social cohesion and educational attainment. Good quality greenspace makes Barnet an attractive place to work and support the prosperity of town centres. All of the benefits have a financial value.

Benefits captured within the CNCA for Barnet include:

- Recreation: Over 10.5 million visits are made to LB Barnet greenspaces each year.
- Physical health benefits: Over 100,000 people (~30% of the population) meet their physical activity guidelines through visits to Barnet's greenspaces.
- Property premiums: Case studies of five sites suggest they provide property value premiums of 10% – 15% to over 2,000 residential properties and of 3% to over 50 commercial properties in close proximity.
- Climate regulation: Barnet's woodland and grassland sequester over 1,000 tonnes of CO2 equivalent each year.

LB Barnet's Natural Capital by habitat



What are the benefits worth in monetary terms each year?

Using available data and valuation evidence, this report estimates the monetary value of some of the largest benefits that natural capital assets within Barnet provide. These include:

- Recreation: Visits made to LB Barnet greenspaces have an estimated value of over £41m per year.
- Physical health benefits: The value (through the avoided health costs of inactivity) of the physical activity supported by Barnet's greenspaces is over £19m per year.
- Property premiums: Five case study sites are estimated to provide between £70 million - £140 million in residential property premiums for the surrounding area. In addition, the same sites may contribute over £0.2 million in rental premiums each year.
- Climate regulation: Carbon sequestered by LB Barnet's woodland and grassland is valued at over £70,000 per year

It is likely that all visitors to green spaces (not only those who actively engage in exercise), are gaining health benefits through

exposure to natural environments. A significant amount of evidence supports that exposure and access to the natural environment can produce positive mental health benefits including stress reduction and mental health promotion (e.g. eftec & CRESR, 2013; UK NEA, 2014; Gascon, 2015), the provision of opportunities to engage in mental-health enhancing physical activity (e.g. Hunter et al., 2015; Lachowycz & Jones, 2011) and the encouragement of positive social interactions and enhancement of community cohesion (e.g. Holtan et al., 2014; Weinstein et al. 2015).

While mental illnesses represent the largest category of NHS 'disease' expenditure in the UK, the quantified evidence to measure the mental health benefits of exposure to the natural environment and estimate its value, remains underdeveloped. The full measurement of these benefits are therefore considered a gap in the current natural capital account. Nonetheless it can be reasonably assumed that the mental health benefits are likely to be as significant, if not more significant, than physical health benefits.

Health costs of physical inactivity and natural capital solutions

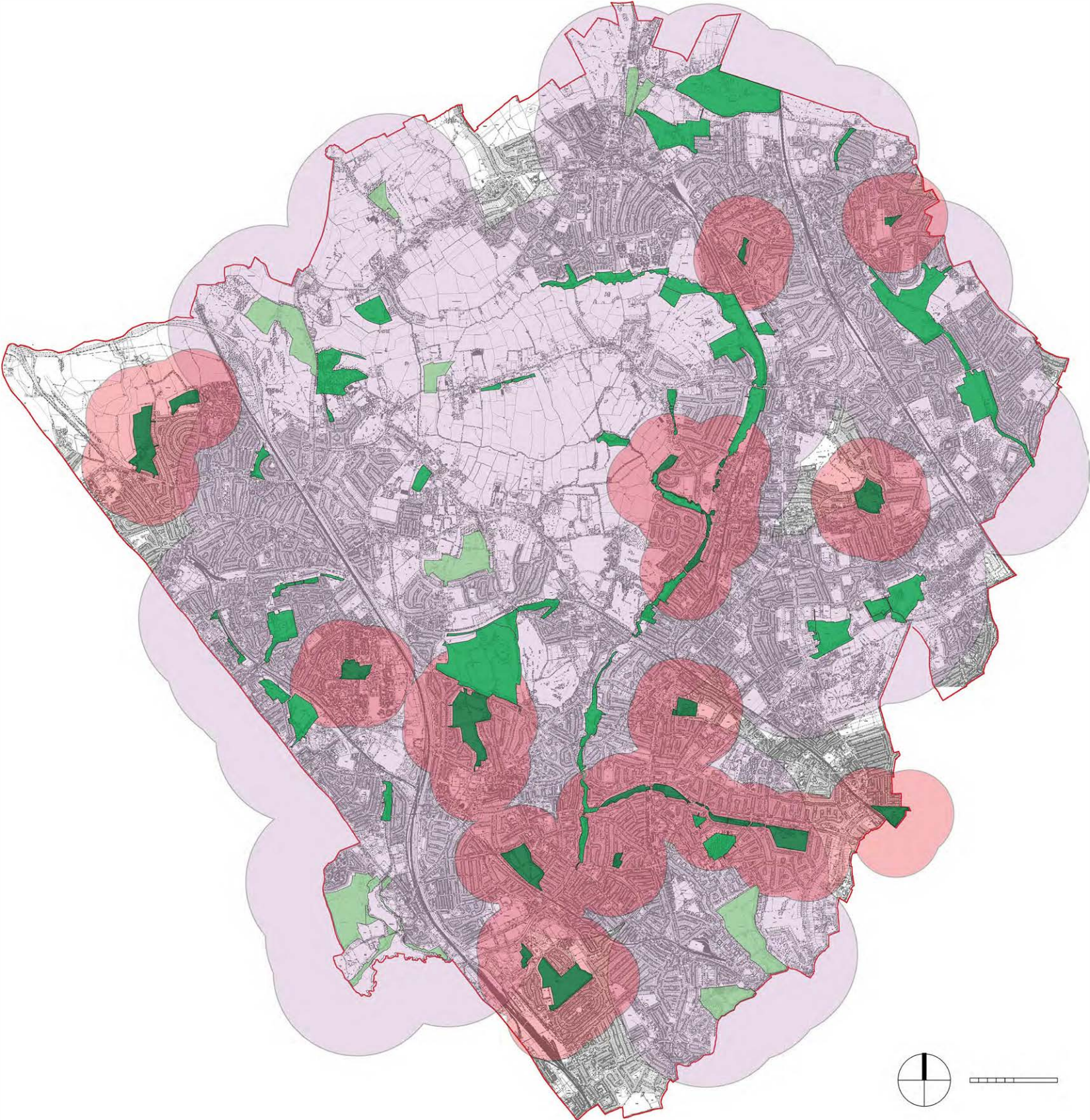
UKActive (2014) estimated that in Barnet, the total cost of inactivity to the economy, including treating diseases and sickness absences from work, is over £17m each year. There is growing evidence to support that careful urban design, including elements of natural capital such as parks and public greenspaces, gardens and allotments, street trees, rivers and canals, can promote health and well-being in urban communities. Studies have also shown that good quality, accessible green spaces can encourage people to undertake physical activity more frequently and for longer periods of time (Bird, 2004).

The significant links between greenspaces and physical health is already evident in Barnet, where a Sports and Physical Activity Consultation found that half of Barnet's residents use parks and green spaces for their physical activity and exercise, making them the most popular locations for exercise in the Borough (LB Barnet, 2013).

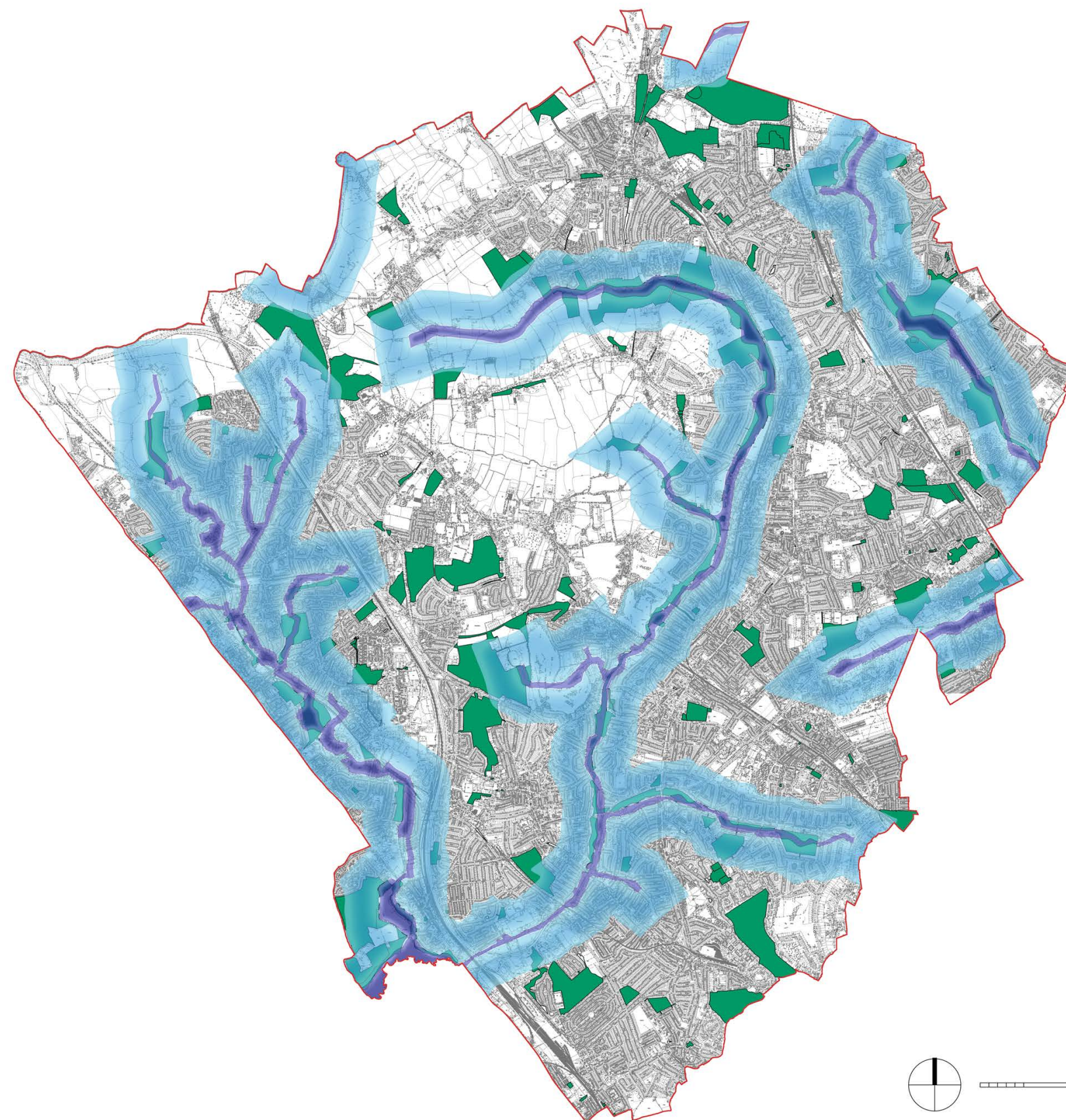
However, the consultation also showed that 71% of residents reported that they would like to take part in any/more sports/physical activity/other forms of exercise. This suggests that there is scope to increase the amount of physical activity and the number of active residents in the Borough in the future. Providing well-managed outdoor spaces as the most accessible opportunity for physical activity can support this increase.

As demonstrated by the development of the natural capital account, physical activity undertaken within and supported by Barnet's greenspaces already provides significant benefits, worth tens of millions of pounds in avoided health costs each year. There is an opportunity to increase these benefits through strategically designed and well maintained greenspace that provides safe, attractive venues for physical activity and that attracts new users. Encouraging the greater use of outdoor spaces will help to address some of the significant physical and mental health costs associated with inactivity, providing a number of benefits to residents and wider society.

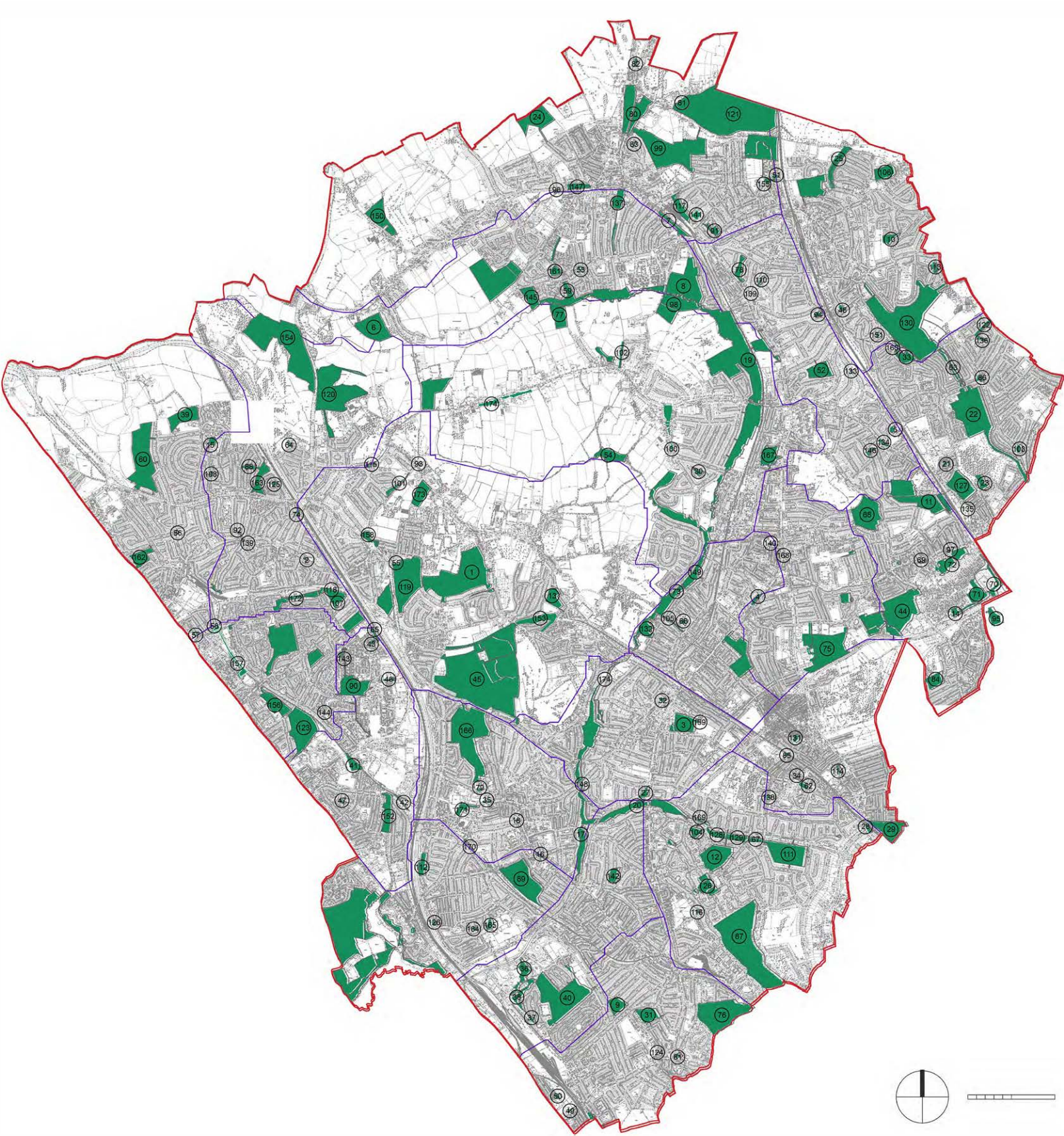
Sites of Importance for Nature Conservation (SINC) with catchment areas



The Barnet's NCA can influence flood risk management strategy



Sites assessed for the Barnet NCA



What does it cost to maintain these monetary benefits?

Working with Barnet Council's finance officers, the costs to the council of maintaining the natural assets it owns have been estimated. The maintenance cost account has been prepared on the basis of the total costs required to maintain all the services provided by parks and open spaces, including operating, cleaning and maintaining buildings and fixed assets (e.g. playground equipment) as well as natural elements such as woods and grassland. The table below provides a breakdown of costs by type.

The estimate of £4.2m is an annual maintenance cost in perpetuity equating to an ongoing liability of £134m in present value terms. This is the estimated total costs of maintaining the 200 open spaces into the future. These maintenance costs cover the whole borough and represent the on-going natural capital maintenance liability on the balance sheet.

Breakdown of costs by type

Cost Centre	Forecast Annual Cost (£m)	Basis of Estimate/allocation to Parks & Open spaces
Parks & Open Spaces	1.38	100% of the costs of this cost centre are attributable. Income from playing fees and rents is excluded.
Sports Grounds	2.66	100% of the costs of this cost centre are attributable excluding the costs of work done for Barnet Homes which is reimbursed on a cost recovery basis. All other Income is excluded.
Tree Management	0.07	The manager of the service estimated that £70k is the cost of maintaining trees in parks & open spaces. Income from fees is excluded.
Management Overhead	0.09	A 10% allocation of the costs of the Streetscene management team and business improvement team.
Total	£4.20m	

Natural capital balance sheet for LB Barnet

The estimated benefits provided by open spaces in Barnet and the annual costs of maintaining them are shown in a natural capital balance sheet. The capitalised values are presented in present value terms.

The asset values included on the balance sheet are:

- Benefits delivered by natural capital assets – estimated to be £1,944m : This includes the value of recreational visits to greenspaces, physical health benefits (avoided health costs) supported by greenspaces, commercial property rental premiums, and climate regulation (carbon sequestration) benefits. These benefits represent external values arising to the rest of society, rather than financial values to the Council itself.

Liabilities are allocated to 'other maintenance' provisions (line 6 of the balance sheet). Liabilities included in the balance sheet are 'private' costs to the Council and are estimated to be £134m in perpetuity.

Total net natural capital assets are therefore estimated at £1,810 in perpetuity. The benefits provided are estimated at over ten times the cost of maintaining them in perpetuity.

Natural capital balance sheet for 200 open spaces in LB Barnet (2015-2016)

	Private Value (PV £m)	External Value (PV £m)	Total Value (PV £m)
Assets			
Baseline Value		1,944	1,944
Cumulative Gains/(Losses)			
Additions/(Disposals or Consumption)			
Revaluations and Adjustments			
Gross Asset Value	-	1,944	1,944
Liabilities			
Legal Provisions	-		
Other Maintenance Provisions	(134)	nil	(134)
Total Net Maintenance Provisions	(134)		(134)
Total Net Natural Capital Assets	-	1,944	1,810

Notes: This balance sheet is based on the natural capital account which provides adequate coverage of the benefits from LB Barnet's assets for the purposes of developing a CNCA. Further iterations of the account might aim to extend this coverage, for example, by including estimates for benefits not currently covered, such as mental health benefits. Asset values and liabilities are reported in present value (PV) terms calculated as the discounted flow of future value over 100 years, using a variable discount rate as suggested by Green Book Guidance (2003 & updated 2011): 3.5% for 0 - 30 years, 3.0% for 31-75, and 2.5% for 76 - 100 years.

Conclusions and recommendations

The CNCA for the London Borough of Barnet highlights the significant values delivered by its natural capital assets. It also organises data about open spaces in Barnet into an accounting framework that can be updated each year, linking physical assets to their benefits and economic values.

Barnet is the first London Borough to formally create a baseline CNCA for all its open spaces. As a result, there are likely to be opportunities for further learning and refinement of the account and to expand it to cover benefits such as improvements to air quality and flood risk reduction. However, the existing results show that even without valuation of all important benefits, the values delivered by open spaces are substantial, with net benefits of around 10 times the cost of maintenance.

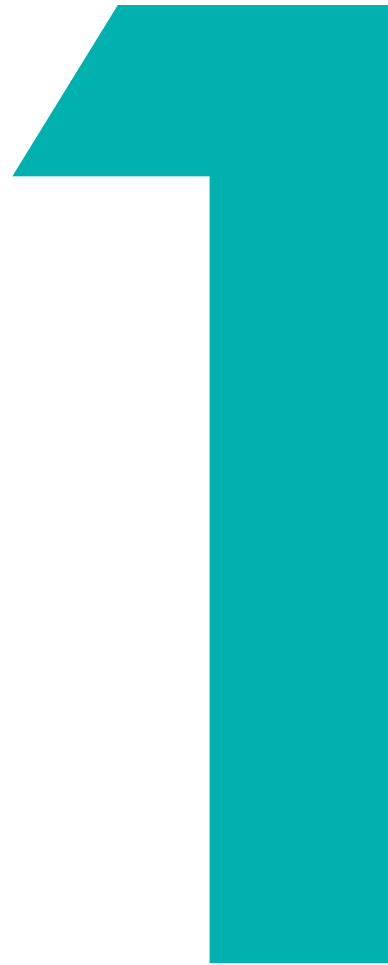
The CNCA project for Barnet has been jointly funded by the London Borough of Barnet and the Greater London Authority. The broad range of benefits accruing to society and to cities such as London from natural capital are now understood at a greater level of detail than ever before.

Natural capital data will inform future strategic decision-making around planning, regeneration and health promotion. The CNCA study for Barnet provides a template for future work by local authorities in the assessment of the value of their green infrastructure assets. Equipped with this best practice guidance, land managers will be equipped with a robust evidence base to support the future management of natural capital assets

NOTES

¹Assessment of the value of an asset, based on the total income expected to be realized over its economic life span, in this case, in perpetuity.

²Residential and commercial property premiums are not included within the balance sheet in order to avoid double-counting of health and recreation benefits.



INTRODUCTION

This report presents a Corporate Natural Capital Account (CNCA) of the parks and open spaces of the London Borough of Barnet (LB Barnet). The CNCA aims to provide LB Barnet with an improved understanding of the value of these areas to its residents in order to support better decisions about their future management.

1.1 Background

Barnet's natural capital, also referred to as green infrastructure¹, is a significant contributor to sustaining Barnet as an attractive place to live, to work and to do business in. In order to maximise the benefits accruing from Barnet's green infrastructure, the Council has adopted a new Parks and Open Spaces Strategy (OSS). The Strategy will inform the further development of the Borough's Infrastructure Delivery Plan, and will align the Borough's green infrastructure policy with the GLA's London Infrastructure Plan (GLA, 2015) and the report of the Mayor's Green Infrastructure Task Force (Green Infrastructure Task Force, 2015).

Increased public budget pressures suggest that future management and funding arrangements for green infrastructure assets over the strategy period are uncertain. In parallel, Barnet will see significant population growth that will result in increasing demand for the benefits and services provided by green infrastructure, putting further pressure on its capacity to sustain and enhance the quality of life enjoyed by Barnet's residents.

As a result, the London Borough of Barnet has a need to understand the costs and benefits provided by the green infrastructure it manages in more detail. In particular, CNCA allows for better alignment between the non-statutory service of natural capital asset management and LB Barnet's mandatory duties and purposes (e.g. health and social care, regeneration and land-use planning, transport, environmental protection).

The corporate natural capital accounting (CNCA) framework provides a strong basis for further developing the understanding of the value of Barnet's green infrastructure, and this in turn can be used to inform decision-making around future funding and governance for green infrastructure.

In the Barnet context, the application of the CNCA approach is aimed at helping to deliver four objectives:

- To develop a CNCA for Barnet's natural capital and green infrastructure assets, using the asset register developed as part of the emerging Open Spaces Strategy. This will provide the Council with a tool for understanding the benefits and costs associated with natural capital assets and allow the

Council to make informed decisions about how to allocate scarce revenue resources based on 'outcomes' data;

- To support the development of the Borough's emerging green infrastructure supplemental planning document and align Barnet's green infrastructure policy with the London Infrastructure Plan and other emerging open space policy and best practice;
- To review options and develop an outline business case for future management, funding and governance arrangements for Barnet's green infrastructure assets based on the future funding and governance options set out in the Open Spaces Strategy, and
- To support the delivery of green infrastructure actions identified in the adopted Open Spaces Strategy.

1.2 Report structure

This report summarises information reported to LB Barnet within the CNCA Excel workbook. The workbook holds all of the spatial and habitat data behind the account, as well as cost and benefit calculations and should be used in conjunction with this report.

The report is structured as follows:

- Section 2: a brief background of the CNCA approach;
- Section 3: the natural capital asset register for LB Barnet;
- Sections 4 – 6: the physical flow account, the monetary account, and the maintenance account for LB Barnet, respectively;
- Section 7: information from the natural capital reporting statements; and
- Section 8: conclusions and recommendations.

The report is also supported by annexes:

- Appendix 1: a more detailed explanation of the CNCA approach; and
- Appendix 2: a detailed overview of methods and sources used to develop the CNCA.

NOTE

¹Green infrastructure is the network of green spaces (as well as features such as street trees and green roofs) that is planned, designed and managed to deliver a range of benefits, including:

- 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).

It is a term that represents approaching particular natural capital assets from a land use planning point of view; green infrastructure is a type of natural capital. Natural capital refers to the wider natural environment, including geology, soil, air, water and all living things.



BACKGROUND TO CNCA

This natural capital account for LB Barnet follows the framework for corporate natural capital accounting (CNCA) developed for the Natural Capital Committee (efftec et al., 2015). The purpose of the CNCA framework is to help organisations make better decisions about the natural capital assets (or green infrastructure) that they manage. It does this by compiling data and information on the natural capital assets, their benefits and costs of maintaining them in a single accounting structure, providing clear and explicit information necessary for long-term management. This information is critical to making informed decisions concerning strategic priorities within an organisation, such as prioritising investments and budgets.

By recording this information in a systematic way, CNCA statements will help LB Barnet to

- demonstrate the value open spaces provide to society (even if value of only a subset of such benefits can be demonstrated)
- define who receives such benefits and how these benefits can help with the delivery of the statutory services of the Council

- improve decision-making by making clearer the link between the environmental management and the economic performance (value) of natural capital assets.

The account can also provide the basis for developing a business case for future management and funding arrangements and the leveraging of investment. Appendix 1 provides further information on the CNCA approach, including an explanation of the different stages of the process and key terms.

3

NATURAL CAPITAL ASSET REGISTER

The natural capital asset register shows the natural capital assets, their size and (where data is available) their condition.

This section describes how the project team and staff in LB Barnet developed the asset register, giving an inventory that holds details of the stocks of natural capital assets it owns and/or manages.

3.1 Development

The natural capital asset register for LB Barnet has been compiled by allocating the sites identified within Barnet's Parks and Open Spaces Strategy that correspond to the broad habitat types (accounting units) used in the UK National Ecosystem Assessment (2011) (see Table 3.1 for a list of these).

The asset register is largely complete in terms of the spatial extent of assets based on data available, but there are gaps – the largest of which are likely to be in relation to parts of the green belt and agricultural land that were not included within the scope of the Parks and Open Spaces Strategy. Further data on these sites can be sought, but priorities for filling gaps should be based on its potential to inform management. (i.e. whether the data is of relevance to fulfilling the objectives of decision-makers).

3.2 Results

Table 3.1 presents the natural capital asset register for LB Barnet, organised by greenspace typology as identified in the London Plan (2015) and the accounting units for CNCA. The register includes the overall extent (area in hectares) of different types of habitat as well as the proportion in 'Good', 'Fair', or 'Poor' condition.

As shown, amenity grassland (360 ha), woodland (260 ha), and neutral grassland (109 ha) comprise the largest area of habitat for each type of park. Local Parks make up the largest area (500 hectares), followed by District Parks (300 hectares). The majority of District Parks are 'Good' quality (60%), and Local Parks 'Fair' (60%). Pocket Parks and Small Open Spaces have the highest proportion of area classified as 'Poor' quality (10%).

Quality is based on the methodology set out in the Parks and Open Spaces Strategy, which included an assessment of the quality of each greenspace against a set of criteria based on the Green Flag standard. For further details on the method, see LB Barnet's Open Spaces Strategy.

Figure 3.1: LB Barnet natural capital asset register, 2015 data (hectares)

Typology	Accounting unit	Extent	Good	Fair	Poor
District Parks	Amenity grassland	102	48	50	4
	Neutral grassland	52	33	19	0
	Shrub & herbaceous planting	2	0	2	0
	Heath	6	4	2	0
	Woodland Scrub	6	3	3	0
	Woodland	116	80	34	2
	Street trees and isolated trees	6	2	4	0
	Water body	2	0	1	0
	Water margin	4	0	3	0
	Total (area)	294	170	118	7
	Total (%)	-	58%	40%	2%
Local Parks	Amenity grassland	234	100	128	7
	Neutral grassland	55	28	27	1
	Shrub & herbaceous planting	9	2	6	1
	Heath	0	0	0	0
	Woodland Scrub	24	4	18	2
	Woodland	139	32	106	1
	Street trees and isolated trees	23	8	14	0
	Water body	11	1	8	2
	Water margin	13	2	8	3
	Total (area)	508	178	315	15
	Total (%)	-	35%	62%	3%
Small Open Spaces	Amenity grassland	18	4	13	1
	Neutral grassland	1	0	1	0
	Shrub & herbaceous planting	1	0	1	0
	Heath	0	0	0	0
	Woodland Scrub	2	0	2	0
	Woodland	8	2	4	2
	Street trees and isolated trees	6	1	3	1
	Water body	1	0	1	0
	Water margin	0	0	0	0
	Total (area)	38	8	25	5
	Total (%)	-	23%	59%	18%
Pocket Parks	Amenity grassland	7	2	3	1
	Neutral grassland	0	0	0	0
	Shrub & herbaceous planting	1	0	1	0
	Heath	0	0	0	0
	Woodland	1	0	1	0
	Street trees and isolated trees	2	0	2	0
	Water body	0	0	0	0
	Water margin	0	0	0	0
	Total (area)	11	3	7	2
	Total (%)	-	20%	66%	13%

Note: Information sourced from LB Barnet's Open Space Assessment / Jon Sheaff and Associates.

3.3 Data gaps and limitations

The most important gap that could be addressed by further research to develop the natural capital asset register is to include areas within LB Barnet that are not currently included within the scope of the Parks and Open Spaces Strategy (including green belt, street trees, agricultural land, and cemeteries). These areas may contribute significantly to the benefits provided by green infrastructure in LB Barnet, including carbon sequestration and air pollution mitigation. They may also provide significant values to large populations that have few alternative greenspaces available.

As further iterations of LB Barnet's account are completed, the asset register can be used to track the extent and quality of natural capital assets over time.

4

PHYSICAL FLOW ACCOUNT

Physical flow accounts show the annual flows of environmental (ecosystem) services provided by natural capital in biophysical terms. This Section describes how we developed this account for the services captured in the CNCA for LB Barnet.

4.1 Development

Following the compilation of habitat area and quality information in the asset register, the physical flow account reports the estimated annual benefits provided from these assets. The account reports the annual flow in the baseline year 2015/16 (Table 4.1). It currently captures a subset of benefits from the assets, including:

- Recreation (focusing on the number of visits to greenspaces);
- Physical health benefits (welfare benefits from exercise undertaken outdoors);
- Property value uplift (explored through a few case studies); and
- Climate regulation (focusing on tonnes of carbon sequestered).

These benefits have been selected in order to identify those that are expected to be amongst the most significant in the LB Barnet account, and where data is available. The methods for estimating each of these benefits in physical terms are as follows:

- Recreation – The number of visits to sites within LB Barnet has been estimated using the Outdoor Recreation Valuation Tool (ORVal) developed by the University of Exeter for Defra . ORVal is an online tool that allows users to explore the recreational use and welfare value of accessible open spaces in England. The tool is based on the nationally representative Monitor of Engagement with the Natural Environment (MENE) survey which uses interviews with a weekly quota sample, conducted since 2009. This data is aggregated, using population weights, to estimate visits to open spaces across the whole of England. The tool takes into account substitutes when estimating the recreational values of a given site, e.g. existence of parks nearby. The model can also estimate what proportion of visits to a site will be new (additional) or displaced from elsewhere, when the quality/ accessibility of a site changes. ORVal estimates that 10.6 million visits are made to LB Barnet greenspaces each year. These results are subdivided by socio-economic groups:

- 4 million are from the AB socio-economic group (SEG)⁵;
- 3.5 million from C1;
- 1.5 from C2, and
- 1.6 million visits are from DE.

A particular point of interest is that the proportion of visits from each SEG broadly aligns with LB Barnet's population breakdown. So although people from SEG AB and C1 are making more than double the visits of people in SEG C2 and DE, they also make up more than half of the population in Barnet. LB Barnet may find it useful to track this information in future, as changes in the make-up of visits can have implications for health inequalities and may help to assess whether resources are evenly distributed across the Borough, and that certain parts suffer from poor access. It should be noted that methods for estimating numbers of visits by social groups are still under development in ORVal, and so this information has greater uncertainty than the overall visitor numbers.

- Physical health – Public Health England (2016) estimates that approximately 60% of LB Barnet residents meet weekly recommended physical activity guidelines each week. This data is based on the Active People Survey, a large, national survey administered by Sport England of over 100,000 residents in England. Barnet's Sports and Physical Activity Consultation estimates that of the proportion of active residents approximately 50% exercise outdoors. Applying these proportions to the total population of LB Barnet, it is estimated that over 110,000 people (or approximately 30% of the population) meet their physical activity guidelines through visits to the natural environment (i.e. parks and open spaces). The benefit of active engagement with parks and open spaces avoid the costs of dealing with ill health due to inactivity.
- Property value premiums – The most local of the Accessible Natural Greenspace Standard (ANGSt) criteria is used as a basis for assuming that benefits are obtained from accessible green space of at least 2ha within a distance of 300m. Geographic information systems (GIS) were used to analyse ONS property data to estimate the number of residential and commercial properties in such areas around five green spaces:
 - Sunny Hill Park;
 - Clarefield Park;
 - Victoria Park;
 - Court Way OS; and
 - Princes Park

Overall, the analysis identified an estimated nearly 2,000 residential properties and over 50 commercial properties within 300m of the selected sites. The property premium potentially covers some of the recreational benefits (for example people who want to visit the parks frequently live near them) but could also reflect other values such as preference for natural views from the home or office. Therefore, the recreational and property value premiums are not added together in the accounts.

Table 4.1: LB Barnet physical flow account (various units) (2015-2016)

Spatial accounting unit by natural capital benefit	Indicator	Units	Baseline year 2015/16
Recreation			
	SEG AB visits	million visits per year	4.0
	SEG C1 visits	million visits per year	3.5
	SEG C2 visits	million visits per year	1.5
	SEG DE visits	million visits per year	1.6
	Total number of visits	million visits per year	10.6
Physical health			
	Population meeting activity guidelines outdoors	no. of people	110,000
Property value premiums			
	Total residential properties in buffer	no. residential properties	1,876
	Total commercial properties in buffer	no. commercial properties	55
Climate regulation			
	Total carbon dioxide equivalent sequestered from woodland	tCO ₂ e per yr	882
	Total carbon dioxide equivalent sequestered from amenity grassland	tCO ₂ e per yr	223
	Total carbon dioxide equivalent sequestered from neutral grassland	tCO ₂ e per yr	69

- Climate regulation – The average UK carbon sequestration rates for the three main habitat types (i.e. woodland, amenity grassland, and neutral grassland) present in Barnet have been applied to the area of each habitat (as measured and compiled based on LB Barnet and Jon Sheaff and Associates (2016) as part of this study). Woodland is associated with total carbon equivalent (CO₂e) sequestration of nearly 900 tonnes each year, while amenity and neutral grassland are associated with over 200 tonnes and 70 tonnes annually. Further details on sources, methods, and assumptions for each calculation are provided in Annex 2.

4.2 Results

Table 4.1 shows the physical flow account for the natural capital benefits that are within the scope of this CNCA.

4.3 Data gaps and limitations

The gaps to consider for research to further develop the natural capital physical flow account are:

- For some services provided by natural capital data is not readily available. For example, air pollution mitigation and water flow attenuation (for flood risk management) from different sites in LB Barnet would require modelling that is not in the scope of this project.
- Recreational visitors may represent a significant underestimate as values do not include benefits to tourists and children under the age of 16.
- The impact that open spaces and greenspaces have by enhancing property values is likely to be significant (e.g. in the hundreds of millions), however due to the scope of this project and the complexities in modelling the number of properties within GIS, a full analysis for the Borough was not undertaken. With adequate GIS knowledge and data layers, this analysis could be carried out in future. If this benefit is used in future, overlap with other types of benefits need to be assessed.

NOTES

²Available online: <http://leep.exeter.ac.uk/orval/>.

³SEGs are a classification that groups people with similar social and economic status: A – High managerial, administrative or professional; B - Intermediate managerial, administrative or professional; C1 – supervisory, clerical and junior managerial, administrative or professional; C2 – Skilled manual workers; and D – Semi and unskilled manual workers; and E - state pensioners, casual or lowest grade workers, unemployed with state benefits only.

⁴ ANGSt is a range of accessibility standards for natural sites and areas within easy reach of people's homes. The standards were developed by Natural England to address the variation in access and proximity to green space of the population. It recommends that everyone, wherever they live, should have an accessible natural green space of: at least 2 ha in size no more than 300 meters from home; at least one accessible 20 ha site within 5 km from home; one accessible 100 ha site within 5 km of home; one accessible 500 ha site within 10 km of home; and a minimum of one ha of statutory Local Nature Reserves per thousand population (Natural England, 2010).

5

MONETARY FLOW ACCOUNT

The monetary flow account shows the economic value of the benefits from natural capital that accrue to the organisation which owns / manages the assets (private benefits) and those that accrue to others (external benefits). This Section describes how we developed the monetary flow account for LB Barnet building on the physical flow account presented in Section 4.

5.1 Development

The advantage of using the UK NEA habitat types in the natural capital asset registry (as in Table 3.1) is that it is an established classification that aligns with the evidence base, developed as part of the UK NEA (2011), and a number of economic valuation studies. It is also consistent with the classifications used in the Defra ecosystem services guide (Defra, 2007) and supplementary guidance to the Green Book on valuing environmental impacts (HM Treasury and Defra, 2012). Further, it is easily reconciled with the Natural Capital Committee's classification of broad habitats. The habitat classifications therefore help in linking the physical flow account to the valuation evidence used to construct the monetary flow account.

Monetary estimates were developed as follows:

- Recreation – The recreational value of trips to Barnet's greenspaces was estimated using ORVal. Each year the 10.6 million visits made to greenspaces in LB Barnet are estimated to provide a value of over £40 million per year. Of this total:

- around £16 million are associated with SEG AB;
- £14 million from C1; and
- £6 million from C1; and £6 million are associated with C2 and DE.

Once again, a particular point of interest is that most of the value is derived by people from SEG AB and C1.

- This estimated value does not take into consideration visits by tourists and children under the age of 16, and so is a significant underestimate. Based on a UK-wide assessment of public park usage (DTLGR 20002), the total number of visits to Barnet's parks could be closer to 15 million per annum. Nonetheless, the assessment highlights that LB Barnet's open spaces provide significant recreational benefits to the local population.
- Physical health – From the development of the physical flow account, it was estimated that over 100,000 residents meet their weekly recommended amount of physical activity within Barnet's greenspaces. To estimate the value of this physical activity, UKActive

estimates of Barnet's % inactive population (approx. 26%) and annual cost to LB Barnet's economy as a result of physical inactivity, including treating diseases and sickness absences from work (over £17million) were used to estimate the average costs per inactive person in Barnet (£178) (UKActive, 2014). Applying the cost per inactive person to the number of greenspace users meeting physical activity guidelines gives an estimate of the value of physical activity undertaken outdoors, in terms of avoided health costs, of over £19million per year. It is important to note that it is not being assumed that active residents would not partake in physical activity if the greenspaces did not exist, rather this estimate is highlighting the value of physical activity undertaken in, and support by, Barnet's greenspaces.

- Property value premiums – Literature supports that greenspace can positively impact property values in the surrounding areas. For residential properties, the estimates of the size of the premium vary between under 1% and 19%, though the majority fall within the 5

to 10% range (Mourato et al., 2011; Thomy et al., 2016; Garrod and Willis, 1992; Garrod, 2002; Wolf, 2007; Luttik, 2000; Dunse et al., 2007; Luther and Gruehn, 2001; CABE, 2004; 2005). For commercial properties, a conservative 3% rental premium was estimated by Gensler and the Urban Landscape Institute (ULI) (2011). The estimated number of residential and commercial properties within 300m of five greenspaces was combined with local ONS and Valuation Office Agency (VOA) data regarding the value of residential and commercial properties (respectively). The estimated property premiums were then applied to these property values. Residential property premiums are reported as total values while commercial rent premiums represent annual values. As shown in Table 5.1, the value of proximity to greenspace can be significant – the five sites explored in Barnet may be supporting between £70 million - £140 million in residential property premiums for the surrounding area. In addition, the same sites may support over £0.2 million in commercial rental premiums each year. These estimated values reflect a premium people will pay for property near green space, in order to benefit from it through enhanced neighbourhood liveability and access to recreational opportunities. As a result this uplift could double-count the recreational and health values and so are not included in the monetary account to eliminate a potential error.

- Climate regulation – DECC guidance (2014) was followed to estimate the value of carbon sequestered. The average sequestration rates for the three main habitat types presented in the physical flow account were coupled with DECC non-traded carbon values. The total estimated value of carbon sequestered is just over £100,000 per year, with carbon sequestered by woodland representing the vast majority of this value. The comparatively low values for carbon sequestration highlight that it is not currently a significant service provided by sites within the Borough. However, it is likely that green belt sites not included within this assessment may provide a more important climate regulation service.

A detailed description of the methods and sources used to estimate monetary values is provided in Annex 2.

Table 5.1: LB Barnet monetary flow account (various units) (2015-2016)

Spatial accounting unit by natural capital benefit	Indicator	Units	Baseline year 2015/16		
Recreation					
Total value of visits		£m per yr	41.2		
	SEG AB	£m per yr	15.7		
	SEG C1	£m per yr	13.6		
	SEG C2	£m per yr	5.6		
	SEG DE	£m per yr	6.2		
Physical health					
	Value of physical activity supported (avoided costs of inactivity)	£m per yr	19.6		
Property values for five example sites					
			Residential 5%	Residential 10%	Commercial (£m per yr)
Total value of premiums		£m	72.3	144.6	0.22
	Sunny Hill Park	£m	23.6	47.3	0.02
	Clarefield Park	£m	5.6	11.1	0.18
	Victoria Park	£m	11.7	23.4	0.02
	Court Way OS	£m	9.2	18.4	0.00
	Princes Park	£m	22.2	44.4	0.00
Climate regulation					
Total value of carbon sequestered		£m per yr	0.1		
	Woodland	£m per yr	0.1		
	Amenity grassland	£m per yr	0.01		
	Neutral grassland	£m per yr	0.004		

5.2 Results

Table 5.1 presents the monetary flow account for LB Barnet. The value of each natural capital benefit has been estimated based on information compiled as part of the physical flow account.

The figure of £61m (£41.2m + £19.6m + £0.1m - note that property premiums are not included in order to avoid double-counting) is used as an estimate of annual benefits, in perpetuity, which have a total value over time of £1,944m in present value terms (see Figure 7.1).

5.3 Data gaps and limitations

The monetary flow account presented in this section should be interpreted in the context of the following key limitations:

- The account does not assess all services provided by LB Barnet's natural capital assets; however it does include several of those deemed to be most significant to urban greenspace. Other services which likely provide important values, such as pollution mitigation (air quality), biodiversity, and water flow attenuation, are not currently assessed in the account. This is due to the measuring of some services being beyond the scope of the study (i.e. the detailed air quality modelling required to derive physical values for pollution mitigation was not in scope), a lack of scientific evidence (e.g. for flood risk mitigation), and a lack of economic valuation evidence (e.g. for biodiversity) regarding these services. It is likely that these services are partially captured in the value of other ecosystem services that they support. Overall, the account conveys significant values attributable to Barnet's natural capital assets, and subsequent iterations can build on these estimates and provide a more up to date and uniform picture of the account.
- Recreational values may represent a significant underestimate as values do not include benefits to tourists (non-locals) and children under the age of 16.
- The flows of services captured in the monetary flow account for property premiums are calculated for five example sites, rather than for the Borough as a whole. They also have a risk of double-counting the benefits of recreation and thus are not included in the account.



NATURAL CAPITAL MAINTENANCE COST ACCOUNT

Monetary cost accounts demonstrate spending on maintaining natural capital assets. The information reported usually comes from the existing financial accounts of the organisations that manage the assets. This section describes how we developed the maintenance cost account for LB Barnet's natural capital assets.

6.1 Development

The benefits of parks and open spaces are an output of other forms of capital as well as natural capital. For example, a park provides benefits from its vegetation (natural capital) but also from the work of park operative staff (human capital) and infrastructure like paths (built capital) that allows access to and maintenance of natural capital. The CNCA shows the benefits (value) of the natural capital assets made possible through spending on human and built capital, or the cost of maintaining the natural capital.

The maintenance cost account has been prepared on the basis of the total costs required to maintain all the services provided by parks and open spaces, such as operating, cleaning and maintaining changing facilities, playground equipment, etc. as well as managing natural elements such as woods and grassland.

Discussion with LB Barnet's Finance Manager (Streetscene, Parking, Housing, and Re Customer and Support Group) has identified that the cost centres in Table 6.1 would provide a comprehensive basis of estimates for the relevant costs. The source of data was the Integra Finance System and Cost Centre Income and Expenditure reports. These reports provided detail on the elements for cost and income, and sense checks were

performed on the previous year's financial results (2015/16), and the current financial year (2016/17) spend to date, full year forecast and budget. There was a high degree of stability in these figures and the current year (2016) forecast was taken as the most appropriate estimate of costs for future forecasting purposes.

For each cost centre an assessment was made of the proportion of activity that related to the maintenance of parks and open spaces. This was achieved through discussions with the relevant managers and the supporting Finance Manager. The values are derived from the gross annual running costs. They are not net of any income from fees, rents or recharges. This is because most fees for using services would double-count the benefits evaluated in the previous sections. The only exception to this approach was the reimbursement of costs for work done by the Sports Grounds cost centre for Barnet Homes. The 2016/17 forecast recharge for this work was deducted from the gross forecast costs to give the appropriate estimate in Table 6.1.

6.2 Results

The costs of maintaining the services delivered by natural capital have been estimated at £4.2m per annum. A summary of the breakdown of costs by category is shown in Table 6.1 below.

The figure of £4.2m is used as an estimate of annual maintenance cost in perpetuity, equating to an ongoing liability of £134m in present value terms (see liabilities in the account in Figure 7.1). This is an estimate of the total costs of maintaining green spaces in Barnet into the future.

Table 6.1: LB Barnet natural capital maintenance cost account (£) (2016)		
Cost Centre	Forecast Annual Cost (£m)	Basis of Estimate/allocation to Parks & Open spaces
Parks & Open Spaces	1.38	100% of the costs of this cost centre are attributable. Income from playing fees and rents is excluded.
Sports Grounds	2.66	100% of the costs of this cost centre are attributable excluding the costs of work done for Barnet Homes which is reimbursed on a cost recovery basis. All other Income is excluded.
Tree Management	0.07	The manager of the service estimated that £70k is the cost of maintaining trees in parks & open spaces. Income from fees is excluded.
Management Overhead	0.09	A 10% allocation of the costs of the Streetscene management team and business improvement team.
Total	£4.20m	

6.3 Data gaps and limitations

CNCA encourages a deeper understanding of natural capital maintenance activity by promoting the splitting of maintenance costs between legal obligations and other requirements. In the context of parks and open spaces, it was recognised many legal obligations are likely to relate to the safety of equipment and facilities provided rather than requirements to maintain natural assets per se. This is an area that may provide useful insights and is worth considering for future enhancements to the accounts.

CONCLUSIONS



7.1 Natural capital balance sheet

The final output of a CNCA is the natural capital balance sheet. This quantifies the benefits of natural capital assets under ‘Assets’ and the maintenance costs under ‘Liabilities’; it is an adequate representation of material costs and of a subset of benefits. This section summarises the account evidence for the assets and benefits that are in within the scope of the CNCA for LB Barnet.

Based on the information compiled for the account, Figure 7.1 sets out a natural capital balance sheet for LB Barnet. Asset values and liabilities are reported in present value (PV) terms calculated, in perpetuity, as the discounted flow of future value. This method is based on the concept that the value of an asset is the total value of the benefits it can provide over its lifetime. The values that accrue in different future periods are discounted to express them all in present value terms through discounting at a rate recommended in the HM Treasury Green Book (2003 & update 2011).

The asset values were calculated by first aggregating all annual values presented in Table 5.1. This excludes property premiums, in order to avoid double-counting. Discounted annual costs and benefits were then subtracted to arrive at a net value.

The rows in the asset and liability parts of the balance sheet mirror a financial balance sheet in that they explain the reasons for change in the asset value over time, and type (and degree of flexibility) with the type of liability.

Figure 7.1: LB Barnet natural capital balance sheet (£)(2016)

	Private Value (PV £m)	External Value (PV £m)	Total Value (PV £m)
Assets			
Baseline Value		1,944	1,944
Cumulative Gains/(Losses)			
Additions/(Disposals or Consumption)			
Revaluations and Adjustments			
Gross Asset Value	-	1,944	1,944
Liabilities			
Legal Provisions	-		
Other Maintenance Provisions	(134)	nil	(134)
Total Net Maintenance Provisions	(134)		(134)
Total Net Natural Capital Assets	-	1,944	1,810

Notes: Asset values and liabilities are reported in PV terms calculated as the discounted flow of future value over 100 years, using a variable discount rate as suggested by Green Book Guidance (2003 & updated 2011): 3.5% for 0 - 30 years, 3.0% for 31-75, and 2.5% for 76 - 100 years.

7.2 Key results

The account details the benefits delivered which accrue to the population of LB Barnet and in the case of carbon sequestration, to the rest of society. The services captured within the account include:

- Recreation – The number of visits to sites within LB Barnet have been assessed using the ORVal which estimates that 10.6 million visits are made to LB Barnet greenspaces each year. The analysis suggests that the value of this recreation is over £40 million per year
- Physical health – The analysis estimates that over 100,000 people (approximately 30% of the population) meet their physical activity guidelines through visits to the natural environment (i.e. parks and open spaces) in Barnet each week. The value (avoided health costs of inactivity) of this physical activity supported by LB Barnet's greenspaces is estimated at over £19 million per year.
- Property value premiums – Overall, the analysis identified an estimated 2,000 residential properties and over 50 commercial properties within the established property premium buffers for five selected sites. It found that property premiums around these sites may range from £6 - £50 million of total residential values (i.e. not per annum) and £0.2 million per year in commercial property rent premiums.
- Climate regulation – The average sequestration rates for the three main habitat types (i.e. woodland, amenity grassland, and neutral grassland) present in Barnet have been applied to the area of each habitat. The total value of carbon sequestered by these habitats is estimated to be £0.1 million per year.

Development of the maintenance cost account found that the costs of maintaining the services delivered by natural capital are estimated at £4.2 million per annum.

The results show that the net value of natural capital assets is estimated at over £1.8 billion. The benefits from open spaces in LB Barnet are over ten times the costs of maintaining them in perpetuity.

The CNCA also shows the costs of managing natural capital in LB Barnet's open spaces appear in financial accounts of the Council but the resulting health, wellbeing and economic benefits for the population of Barnet do not.

7.3 Discussion

The CNCA for LB Barnet highlights the significant values delivered by the natural capital assets in its scope. It also provides a valuable resource in terms of organising and linking data on natural capital and communicating benefits that are commonly understood but invisible if only the financial accounts are considered.

LB Barnet is the first London Borough to formally create a baseline CNCA for all its open space (there have been partial benefit assessments developed for other Boroughs). As a result, there are likely to be opportunities for further learning and refinement of the account, but the results show that the values delivered by open spaces are substantial, with net benefits around ten times the costs. The CNCA will provide an evidence base for future investment in the maintenance of natural capital assets and should support a joined-up approach to planning, regeneration, health provision, education, climate change adaption and leisure.

The development of the account has (firstly) confirmed that there is enough information available to develop a meaningful account that highlights the significance of values from the natural capital assets that are not captured in conventional financial accounts. This account can be updated over time, providing a useful resource for future monitoring, decision-making and analysis.

It should be noted that the aggregation of recreation and physical health values has the potential to double-count some of the benefits, as some people partake in recreation actively enough to generate health benefits. However, the use of avoided health costs to value the physical activity undertaken within greenspaces minimises this double-counting to a level where it is not considered a significant inaccuracy.

Although residential property premiums are not included within the balance sheet, discounted asset value results suggest that they are in the correct order of magnitude. Property values

represent an asset value and an indication of market value through the anticipation of future benefits. In other words, the value of a property is somewhat influenced by the expected future benefits to the users of that property (e.g. through the expected changes in the local area, expected total lifespan of the property). In this way, the loss or gain of property values are similar to present value calculations, as they can be seen to represent capitalised value (future benefit flows) for the property.

This iteration of the balance sheet aims to establish a baseline against which gains and losses can be calculated in future accounting periods. Further iterations of the account may also extend the coverage of the monetary account, which can in turn change the balance sheet position. It can also provide a more detailed analysis of the benefits from natural capital that are already captured by the council in terms of rents and captured by others in terms of spending.

The physical and monetary flow accounts can be used to track how and why natural capital asset values change over time, including the influence of management decisions by LB Barnet. For example, changes in the number of visitors to the open spaces (which is likely given a projected increase in the population of the borough) changes in their habits and/or changes in the quality of or access to the open spaces would be reflected in the physical flow account. This would then result in a change in the monetary flow account where the number of visitors is multiplied by the value per recreational visit. A change in the value per recreational visit would only be reflected in the monetary flow account. Both such changes would feed into the balance sheet and their interpretation can help decision makers to identify opportunities and risks to better manage the factors that affect asset values.

7.4 Data gaps and limitations

An important gap that could be addressed by further research to develop the natural capital asset register is to include areas within LB Barnet that are not currently included as part of the Parks and Open Spaces Strategy (including green belt, agricultural land, and cemeteries). These areas are likely to contribute significantly to the benefits provided by green infrastructure in LB Barnet, especially in respect carbon sequestration and air

pollution mitigation. They may also provide significant values to large populations that have limited access to parks and open spaces under council management few alternative greenspaces available.

The account does not encompass all of the benefits delivered by natural capital assets, although it does include those considered to be most significant. Further research could cover:

- The calculation of air quality regulation provided by habitats through pollution absorption. Methods for developing these estimates are currently being further developed through work led by the Centre for Ecology and Hydrology, involving eftec, for the Office for national Statistics (ONS). Results from this work can inform future iterations of this account
- The flood risk reduction benefits provided by natural habitats, which require local modelling could also be estimated.
- The impact that open spaces and greenspaces have on property value uplift is likely to be significant (e.g. in the hundreds of millions). However due to the scope of this project and the complexities in modelling the number of properties within GIS, a full analysis for the borough was not undertaken. With adequate GIS knowledge and data layers, this analysis could be carried out in future.
- Recreational values are likely to be a significant underestimate as values do not include benefits to tourists and children under the age of 16.
- This study provides an estimate of natural capital maintenance costs and opportunities for refinement have been identified and will be shared with LB Barnet's finance team.
- Further discussion is required to confirm whether or not some of the health benefits identified (the avoided health costs) are actually private values to LB Barnet, in that they are avoided health treatment costs that would have to be met from the social care budget of LB Barnet. Evidence is not currently available to estimate what proportion of the avoided health costs would have to be met by LB Barnet and what proportion from other sources (e.g. the NHS for most treatments, and employers for lost workforce productivity) in order to attribute them between the private and external parts of

the account. Further investigation could try to establish whether evidence is available to attribute benefits in this way.

It should be noted that many of the services provided are co-dependent or intrinsically linked and the addition of estimates of the values of different services provided by the same habitats/spaces increases the risk of double-counting. The returns on efforts to include more and more services therefore diminish, as further values cannot always simply be added to the account. However, further valuations of services they would contribute to understanding the distribution of values provided, both spatially and across social groups. This should remain a point to be considered in future updates of the account.

Previous work has highlighted the need to develop a formal plan to communicate the findings of the natural capital account. The CNCA can be a very powerful tool as long as it is used appropriately. It is recommended that maintenance cost estimates in the account are linked to Barnet's accounting system to automate their production as far as practical in future.

NOTES

⁵ Estimated residential property premiums, a significant value, were not included within the balance sheet to avoid double-counting. The figure is the present value in perpetuity for recreational, physical health and carbon sequestration benefits.



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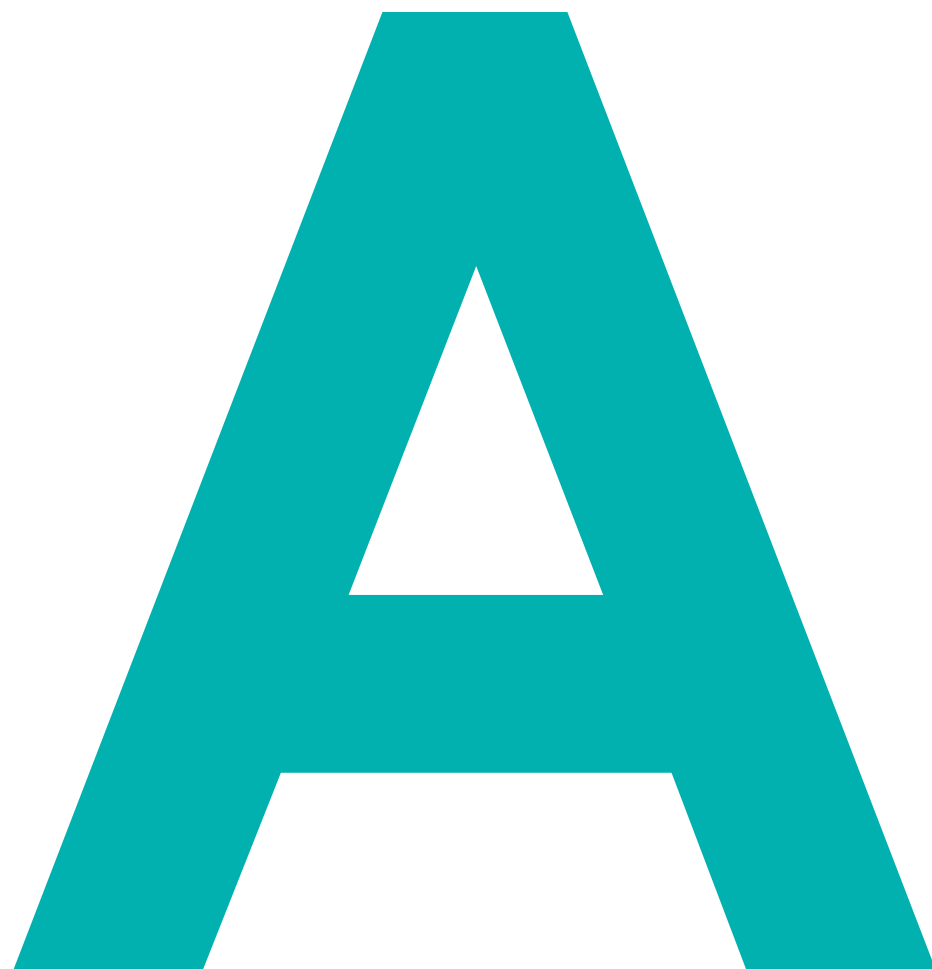
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ANNEX 1: Background to CNCA

This Section summarises the account evidence, in particular a natural capital balance sheet reports the value of the (in-scope) natural capital (assets) and the ongoing costs of maintaining natural capital at the reporting date (liabilities).

A1.1 Concept of Natural Capital and Accounting

Natural capital refers to the stock of natural assets upon which our economies and societies are built. Like other forms of capital, natural capital produces value for people in the form of 'goods' (e.g. timber, fish stocks, minerals) and 'services' (e.g. water provision, air purification, flood prevention). In order to effectively and sustainably manage natural capital, information on its condition and productivity needs to be collated in a structured and systematic way so that informed decisions can be made to achieve higher (long term) benefits while minimising costs.

The Corporate Natural Capital Accounting (CNCA) framework developed by eftec and partners for the Natural Capital Committee produces a set of reporting statements that can be used by an organisation to monitor and measure the health and value of natural capital it owns or manages. CNCA can also be used to make strategic and business decisions about the future management and development of that natural capital (as well as the wider business).

The CNCA framework collates and presents information about natural capital in a similar way to how other capital assets (e.g. financial and physical assets) that are reported on an organisations balance sheet. It reports the benefit to both the organisations that own natural capital assets and the communities that benefit from them with reference to the following issues:

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?

To this end, the CNCA:

- records the condition of natural capital owned or managed by an organisation (natural capital asset register and physical flow accounts)
- measures the value that the natural capital produces for the organisation itself and society in general (asset values) (monetary flow accounts)
- establishes the costs (liabilities) of maintaining this value (maintenance cost accounts).

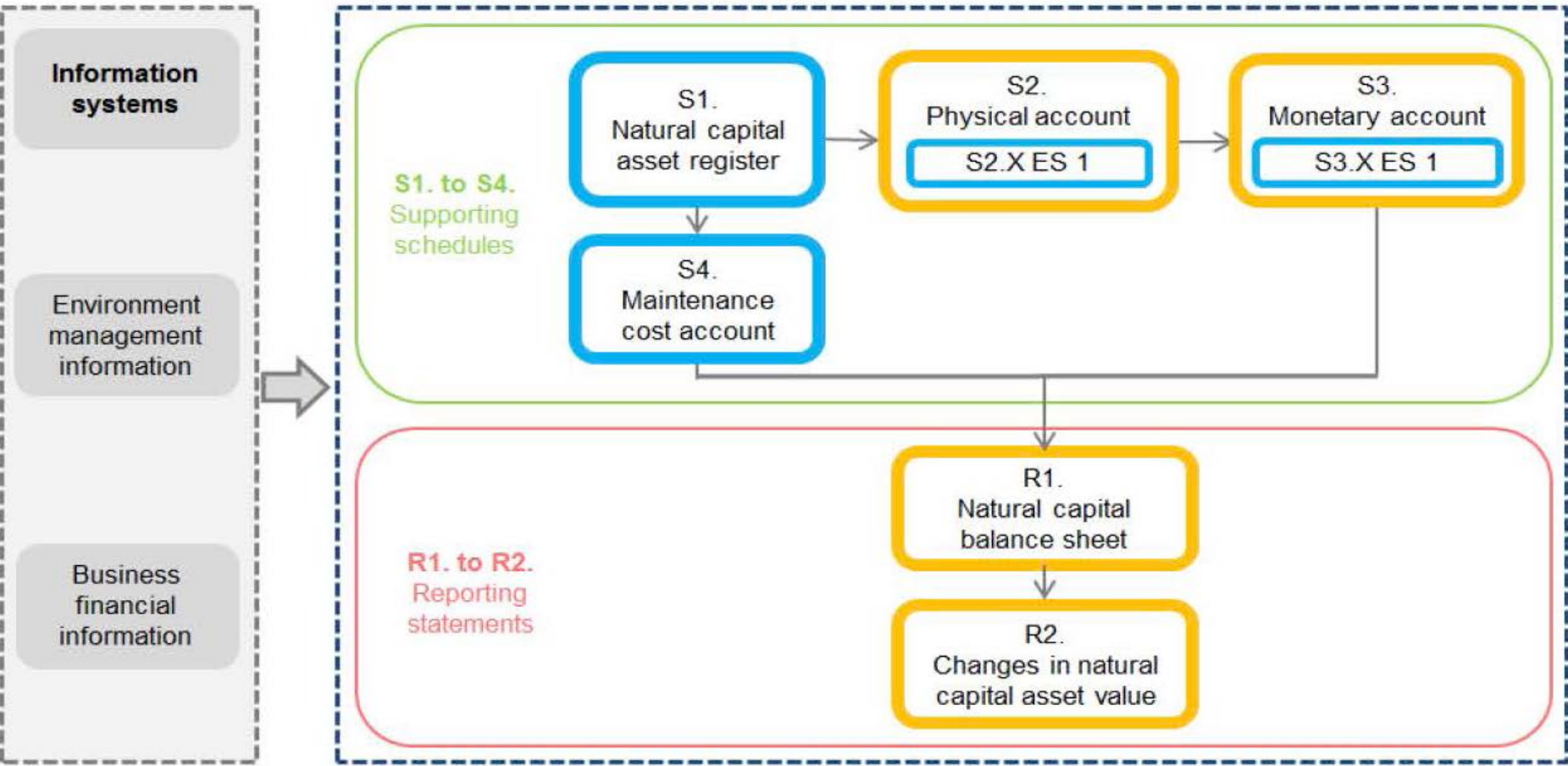
A1.2 Overview of CNCA process

CNCA is made up of four supporting schedule and two reporting schedules (see Figure A.1).

Supporting schedules are:

- Natural capital asset register which shows the size and the condition of the assets (Section 3 of the main report);

Figure A.1. The Corporate Natural Capital Accounting (CNCA) framework structure



A1.3 LB Barnet CNCA

The CNCA for LB Barnet is:

1. Composed of:
 - a. An asset register for the sites included within the Parks and Open Spaces Strategy;
 - b. A natural capital balance sheet for the benefits of these sites that are possible to quantify and monetise
2. Consistent with the guidance on CNCA including from the Natural Capital Committee and the Natural Capital Protocol as well as existing CNCA examples; and
3. Replicable so that LB Barnet staff can update it every year to allow future statements of changes in net natural assets.

- Physical flow account which measures the (ecosystem) services provided by these assets in biophysical terms – as relevant to each service (Section 4);
- Monetary flow accounts which estimates the benefits of these services to the organisation itself (private values) and to others (external values) (Section 5), and
- Maintenance cost account which shows how much the organisation spends maintaining the natural capital assets within the scope of the CNCA (Section 6).

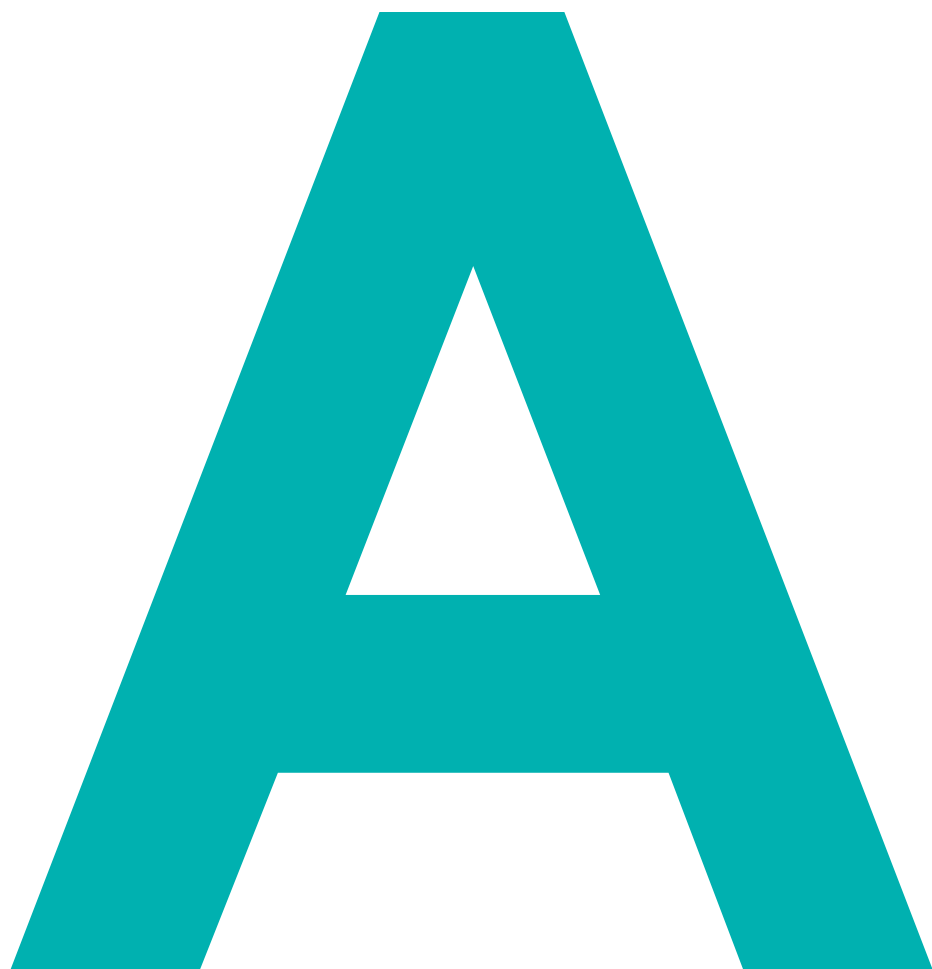
The reporting statements are:

- A natural capital balance sheet which reports the value of natural capital assets and the costs (liabilities) of maintaining those assets and
- A statement of change in natural assets which reports the change (gain or loss) in asset values and liabilities over a given accounting period. As the application in LB Barnet was for the first (base) year only, this statement cannot be produced.

This study produced the natural capital balance sheet as an opening account. An Excel workbook has also been produced for future use by LB Barnet to develop a statement of change.

NOTES

⁷See: effec et al. (2015) Developing corporate natural capital accounts, Final Report for the Natural Capital Committee, January 2015; and effec et al. (2015) Developing corporate natural capital accounts, Guidelines for the Natural Capital Committee, January 2015.



ANNEX 2: METHODOLOGY

This annex provides information regarding sources, methods, and assumptions used to develop the CNCA for LB Barnet. Detailed steps of each subsequent calculation of the analysis are provided within the (automated) Excel workbook developed for LB Barnet as part of this account. The Excel workbook and accompanying calculations will be presented to Council staff during a training exercise aimed at enabling LB Barnet to update the CNCA in the future. The section is organised along the lines of the benefits assessed.

A2.1 Recreation

Sites considered for the analysis of recreation benefits are those included in the Parks and Open Spaces Strategy. As highlighted in Section 4, the number of visits to sites within LB Barnet has been estimated using the Outdoor Recreation Valuation Tool (ORVal) developed by the University of Exeter for Defra. The tool is based on the nationally representative Monitor of Engagement with the Natural Environment (MENE) survey (n=280,790) which uses interviews with a weekly quota sample, and population weights, to estimate nature visit frequency across England, and provides details on these visits. The tool also takes into account substitutes in determining recreational values, and distinguishes between displaced and additional recreation activity. For the purposes of this CNCA, and with the aim of aligning the analysis to the Parks and Open Spaces Strategy, the following types of greenspaces were filtered out (i.e. unselected within the tools interface) of the LB Barnet boundary during ORVal analysis:

- Agricultural land;
- Allotments;

- Cemeteries;
- Coastal;
- Estuary;
- Golf;
- Parking;
- Verges and SLOAP sites; and
- Seaside.

One (unnamed) greenspace site that was included within ORVal, but not included within the Open Space Assessment was also removed from the analysis. The filtered ORVal results, aggregated provide an estimate of 10.6 million visits made to LB Barnet greenspaces in the Open Spaces Assessment each year.

The tool also provides an estimate for the welfare values (in monetary terms) associated with these visits. The estimation of welfare values identifies how much welfare an individual enjoys as a result of visiting a greenspace and its attributes (e.g. the size, the amenities). In addition, it identifies how much welfare is lost from each extra pound of cost incurred in travelling to a

greenspace. The figures reproduced in Table A.1 are net welfare values for open spaces in LB Barnet based on the visitor and value estimates in ORVal.

Table A.1: ORVal recreation welfare value estimates (£ million per year)

		£m per yr
Total value of visits		41.2
SEG	AB	15.7
	C1	13.6
	C2	5.6
	DE	6.2

These values were used within the CNCA as indicative of the recreational value provided by LB Barnet's greenspace, and are driven by the number of visits.

A2.2 Physical health

Access to local, safe and natural green space can help individuals sustain higher levels of physical activity. In addition, the motivation to continue physical activity schemes is more likely to be sustained through the natural environment. People tend to be more likely to continue activities in which exercise becomes secondary to environmental or social benefits (e.g. gardening, Green Gym or walking in green space) than activities in which exercise remains the primary driver (Bird, 2004).

This analysis explores the potential value of physical activity supported by greenspace in LB Barnet in terms of avoided health costs of inactivity. In England, the direct costs of inactivity and its associated health costs have been estimated at around £10 billion per year (Designed to Move, 2013; Walking for Health, 2010; National Institute for Health and Care Excellence, 2006). Inactivity has been identified globally as the fourth leading risk factor for mortality (WHO, 2010). Further, a report by the Association of Public Health Directors showed that if everyone in England met guidelines for physical activity nearly 37,000 deaths a year could be prevented (Network of Public Health Observatories, 2013).

Public Health England (2016) reports that 60% of Barnet residents meet the weekly recommended physical activity requirements

(i.e. 150 minutes of physical activity per week in accordance with UK Chief Medical Officer recommended guidelines on physical activity), which is around 220,083 people. A Sports and Physical Activity Consultation found that half of Barnet's physically active residents use parks and green spaces for their physical activity and exercise, making them the most popular locations for exercise in the Borough (LB Barnet, 2013). The number of people in Barnet meeting their physical activity requirements outdoors by LB is therefore estimated as half of the active population, or around 110,041 people (i.e. 220,083 x 50%).

To estimate the economic value of this physical activity, UKActive estimates of: (i) the % population inactive (~26%) and (ii) the annual cost to Barnet's economy, including treating diseases and sickness absences from work (over £17million), were used to estimate the average costs per inactive person in Barnet (£178) (UKActive, 2014). Applying the cost per inactive person to the number of greenspace users meeting physical activity guidelines gives an estimate of the value of physical activity undertaken outdoors, in terms of avoided health costs, of over £19 million per year.

It should be noted that these estimates have been calculated against a counterfactual of this physical activity having not taken place. This is not representative of a realistic scenario as it is likely that many people who currently exercise outdoors would, if faced with an absence of outdoor facilities in LB Barnet, shift to indoor exercise, or travel to other Boroughs (both alternatives do involve additional costs and hence welfare loss) for outdoor

exercise opportunities. These assumptions mean the account represents the health benefits supported by use of open spaces, but not necessarily the impact of those spaces. This is considered acceptable for accounting purposes.

It should also be noted that a proportion of the social value of increased physical activity would manifest itself as a decrease in costs to LB Barnet local health facilities and services. In general, as a person's mental and physical health and quality of life increases, their dependency on various local health care facilities and services decrease. Additional benefits to Barnet arise because, as recognised within Barnet's Joint Health and Wellbeing Strategy, health and wellbeing of an individual or population can positively influence wider factors such as education, employment, income, and welfare (LB Barnet, 2016).

A2.3 Property values

Well-designed and maintained green space or green infrastructure can add to the aesthetic setting of an area, which can impact its attractiveness to prospective residents and businesses. In this way, it has been shown to positively impact land and property values, as people wanting to live / work in close proximity to green space are shown to pay more for a property in such a location. This premium on property prices reflect the scale of the benefits, and other factors such as the competition for this access (e.g. due to limited green space, increasing demand for it) (eftec and CRESR, 2013).

Property value premiums resulting from close proximity to green space can be applied to the total value of surrounding properties, therefore estimating the potential proportion of property value that may be attributable to green space proximity. For this analysis, proximity is defined as having a good quality green space within 300 meters from home. As described in Section 4, this is in line with the most local criteria with ANGSt (Natural England, 2010).

For residential property, the majority of estimates of the size of the premium as a result of proximity to green space fall within the 5% to 10% range (Mourato et al., 2010; Thomy et al., 2016; Garrod and Willis, 1992; Garrod, 2002; Wolf, 2007; Luttik, 2000; Dunse et al., 2007; Luther and Gruehn, 2001; CABE, 2010; 2005). This premium is related to the total value of the property, not a yearly flow of

value, and therefore results should not necessarily be described in present value terms. These estimates take account of other factors that influence the price of a property such as the size and characteristics of the property, and the characteristics of the general area and the population.

For non-residential properties, a survey conducted by Gensler and the Urban Land Institute (ULI) (2011) exploring the preferences of real estate developers, investors, consultants and public sector workers across Europe found that 93% of respondents are prepared to pay at least 3% more to be within close proximity of open green space. Commercial rents near accessible green space of good quality generally exceed rents in surrounding submarkets (Ernst & Young, 2003; CABE, 2005; Gensler and ULI, 2011).

Some of the value reflected in property premiums may double-count other benefits. For example, willingness to spend more on a house in close proximity to greenspace may be indicative of the extra recreation value and physical health benefits that the buyer might expect to receive in future. The following assessment of value provided to the residential and commercial and industrial market from proximity to green space should therefore be read keeping these factors in consideration.

The accompanying Excel workbook presents estimates for the value of residential properties and non-residential rental premiums attributable to green space within 300m of five case studies:

- Sunny Hill Park;
- Clarefield Park;
- Victoria Park;
- Court Way OS; and
- Princes Park.

The estimates (presented in Table A. 2) have been calculated using the aforementioned values from literature: 5% to 10% price premium for residential properties; and 3% rent premium for non-residential properties. These premiums were applied to data from the ONS and the Valuation Office Agency (VOA) regarding the value of residential and commercial property in the area (respectively).

As the estimates are dependent upon the value and number of residential and/or non-residential properties within 300m of each case study, those surrounded by more properties, or in areas

Table A.2: Property value premiums (£ million)

Site	Residential 5%	Residential 10%	Commercial (£m per yr)
Sunny Hill Park	23.6	47.3	0.02
Clarefield Park	5.6	11.1	0.18
Victoria Park	11.7	23.4	0.02
Court Way OS	9.2	18.4	0.00
Princes Park	22.2	44.4	0.00
Total premiums	72.3	144.6	0.22

where property values are higher, are estimated to be linked to higher premiums.

The estimates (presented in 2) have been calculated using the aforementioned values from literature: 5% to 10% price premium for residential properties; and 3% rent premium for non-residential properties. These premiums were applied to data from the ONS and the Valuation Office Agency (VOA) regarding the value of residential and commercial property in the area (respectively).

As the estimates are dependent upon the value and number of residential and/or non-residential properties within 300m of each case study, those surrounded by more properties, or in areas where property values are higher, are estimated to be linked to higher premiums. (Refer to Table A.2)

As shown, estimates for premiums range around the low to mid tens of millions of pounds per park. The largest value of residential property premiums is attributable to Princes Park, representing an estimated £22 million – £44 million in price premiums for the residential properties in the surrounding (300m) area. The second-highest values are attributable to proximity to Sunny Hill Park from around £23 million and £47 million for the surrounding homes. Clarefield Park is estimated to have the largest impact on commercial rents, at around £0.18 million per year.

The provision of open spaces and other green infrastructure can provide significant value in terms of property price premiums within a local area. Therefore, its quality and accessibility, and measures impacting upon them, can impact this value. In addition, the proximity to populations, their density, income levels and the availability of substitutes all vary with location and are crucial drivers of the value provided by urban greenspace. Previous studies and approaches have been able to take many, but not all, of these spatial factors into account.

A2.4 Climate regulation

Climate regulation includes reducing greenhouse gas emissions and/or their concentrations in the atmosphere. Mitigation is a vital response to a changing climate as the greater the reduction of emissions and concentrations of greenhouse gases, the less severe the negative impacts of climate change will be. Investments to enhance greenspaces can contribute to the following factors which aid mitigation:

- Carbon storage and sequestration in soil and vegetation;
- Fossil fuel substitution – e.g. through increased biomass resource;

- Material substitution – e.g. through increased / alternative fibre resource;
- Space for local food production; and
- Reducing the need to travel to access green space.

In addition, by helping to manage high temperatures, green infrastructure could also reduce energy demand for cooling in buildings, further helping to reduce greenhouse gas emissions. This also highlights how green infrastructure can play a role in climate change adaptation, but this issue is not explored further in this study.

Carbon sequestration rates differ for different types of habitats and different land management choices can either maintain or increase the carbon store for long periods of time, or result in net emissions. Therefore, land use and management choices can have an important role in determining the amount of carbon released into the atmosphere or stored in the soil (mitigation) and, as a consequence, in global climate regulation (Smith et al., 2007; Thompson, 2008).

For this analysis average sequestration rates for the three main habitat types (provided by (Soussana et al., 2009; eftec, 2010) present in LB Barnet (i.e. woodland, amenity grassland, and neutral grassland) were applied to the area of each habitat. The total amount of carbon sequestered was then applied to central non-traded carbon values following DECC Guidance (DECC, 2014). DECC estimates for the £ per tonne of non-traded carbon used within the valuation calculations is provided within the accompanying Excel workbook.

A2.5 Maintenance costs

A summary of the cost by cost centre and expense type is shown below (Table A.3) .

NOTES

¹³ For more information, see: <http://leep.exeter.ac.uk/orval/>

¹⁴ In this case, a figure describing the monetary equivalent of the welfare enjoyed by individuals as a result of having access to a greenspace.

Population for Barnet in 2016 sourced from London Borough of Barnet (2013). Population projections. Available online: <https://open.barnet.gov.uk/dataset/population-projections-barnet-2013/resource/36ed919d-add3-4de2-a42a-4c1cec30a72b> .

¹⁰ Property values can be seen as a capitalised value; they represent an indication of market value through the anticipation of future benefits. In other words, the value of a property is somewhat influenced by the expected future benefits of that property (e.g. through the expected changes in the local area, expected total lifespan of the property). In this way, the loss or gain of property values are similar to present value calculations, as they can be seen to represent capitalised value (future benefit flows) of the property.

Table A.3: Summary of the cost by cost centre and expense type

Detailed Maintenance Costs

Cost Centre/Expense type	Code	2015/16 Actual	2016/17 Forecast	% Attrib	Est. Cost	Est. Income	Notes/Comments
Parks & Open Spaces	01764	£	£		£'m	£'m	
Staff Pay, Agency & Training		332,752	308,029	100%	0.31		All staff engaged in parks activity
Buildings Maint, utilities, cleaning		459,275	499,172	100%	0.50		Park buildings upkeep and running costs
Grounds Maint.		172,562	133,000	100%	0.13		Broad range of grounds maint activity. All parks.
Travel & Misc expenses		99,866	130,211	100%	0.13		Travel, clothing and equipment costs. All parks related
Insurance		143,523	159,720	100%	0.16		Tree Root Insurance (22% allocation of central contract)
Other services/expenses		205,801	90,000	100%	0.09		Broad range of equipment/expenses. All parks.
Recharges		65,875	62,541	100%	0.06		Misc. recharges
Capital replenishment				100%	-		TBD
Income		(831,159)	(847,321)	100%		- 0.85	£214k for fees, £575k for rents/lettings
Sports Grounds	10765						
Staff Pay, Agency & Training		2,397,220	2,482,073	100%	2.48		All staff engaged in sports grounds activity
Buildings, grounds maint		83,334	98,790	100%	0.10		Buildings insurance, refuse and maint.
Vehicle, travel & misc.		154,777	221,900	100%	0.22		
Recharges		475,959	538,867	100%	0.54		Mainly Vehicle expenses recharges
Capital replenishment				100%	-		TBD
Income		(503,430)	(684,000)	100%		- 0.68	£489K from Barnet Homes?
King George Playing Fields	10768						
Insurance & Maint		24,830	25,195	0%	-		Largely recharged from expenses incurred above.
Trees Management	10952						
Staff Pay, Agency & Training		197,769	239,850	9%	0.02		Staff costs
Grounds maint		692,484	600,000	9%	0.05		Costs of external tree contractors
Travel		5,585	5,850	0%	-		Misc travel costs
Insurance		469,712	522,710	0%	-		Highways related allocation of tree root insurance
Misc Expenses		10,701	11,802	0%	-		Misc. expenses
Recharges		79,202	-	100%	-		
Income		(137,102)	(44,500)	100%		- 0.04	Charges for services provided.
Cost recovery from Barnet homes					-0.677	0.677	
Total					4.12	- 0.90	
Overheads							
Streetscene Mgt team	11369		572,000	10%	0.06		
Business Improvement	11372		299,000	10%	0.03		
Total Costs					4.21		