Communities Scrutiny Commission
Supplementary Information

Date: Tuesday, 23 November 2021

Time: 5.30 pm

Venue: The Writing Room - City Hall, College Green, Bristol, BS1 5TR

Distribution:

Councillors: Henry Michallat (Vice-Chair), Martin Fodor (Chair), Amirah Cole, Alex Hartley, Barry Parsons, James Scott, Helen Godwin, Hibaq Jama and Emma Edwards

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Supplementary Agenda

11. Parks and Open Spaces Strategy

- Appendices 3A and 3B as PDFs **(Pages 3 - 63)**

Natural Capital Account - Bristol

Prepared for Bristol City Council

Contents

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:vivideconomics

Bristol's Natural Capital Account: Executive Summary

Bristol's greenspaces provide services worth £385 million gross per year

Bristol's greenspaces receive an estimated **17 million recreational visits per year.**

This results in **£385 million per year in gross benefits to local communities.**

£261 million per year results from health benefits, composed of improvements to mental wellbeing (61% of the gross value), and increases in the quantity and quality of life from physical activity (33% of gross value).

Health and wellbeing services deliver approximately **£22 per visit** on average.

Bristol's greenspaces help regulate the climate by **removing £0.3 million worth of carbon** every year and also provide **£24 million in benefits to property owners** through an annualised uplift in the value of residential properties

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Overview of Natural Capital Accounts: definition, purpose, methods

Why use Natural Capital Accounts ?

Natural Capital Accounts (NCA) present the estimated visits and annual monetary value of a place's publicly accessible greenspaces. They are an instrument for strategic planning and making the case for funding.

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Strategic greenspace planning
The NCA can highlight how different parks are performing in terms of the ecosystem services they create, providing policymakers with data for planning and future investment

### Effective funding proposals
Better strategic planning leads to a stronger business case for additional funding or green space development.

Note: Additional details on benefits valuation can be found in the methodological annex

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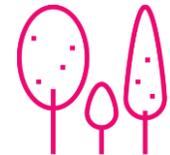
A Natural Capital Account (NCA) creates a clear framework for linking natural assets with the value of services they provide to people
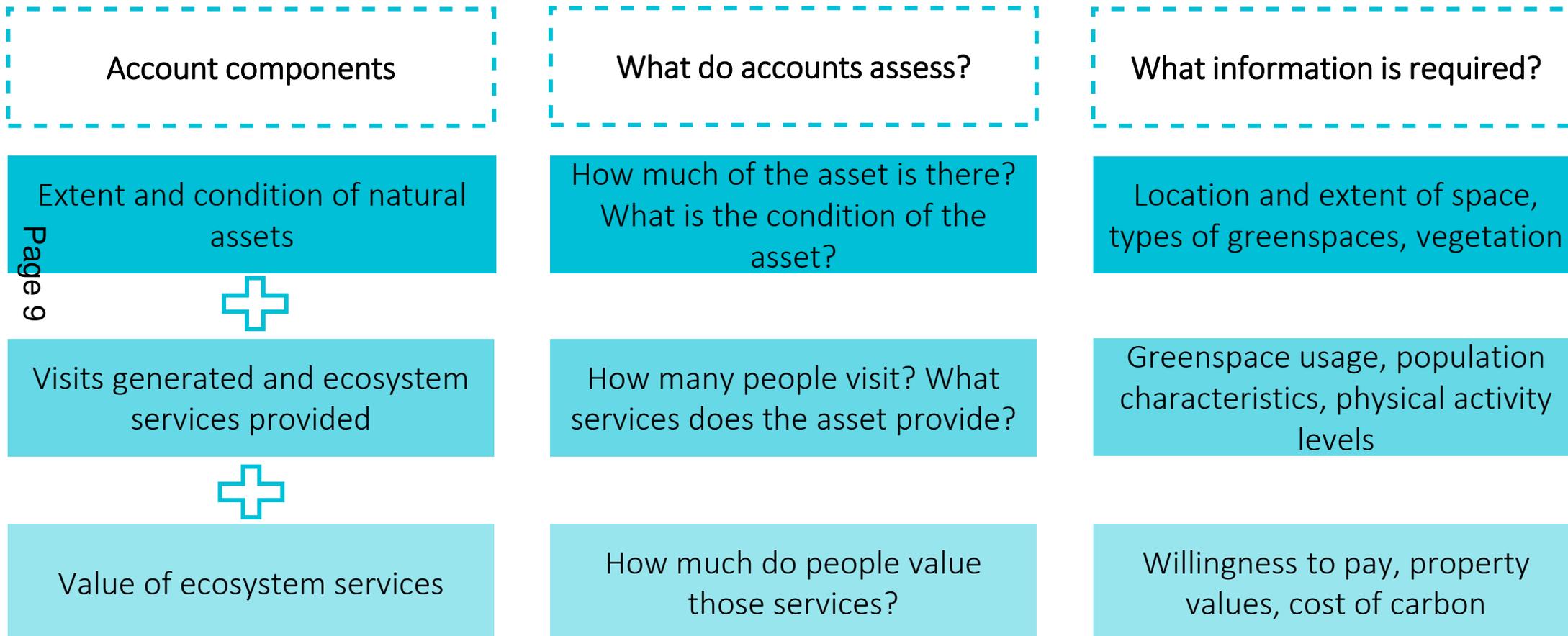
Account components	What do accounts assess?	What information is required?
Extent and condition of natural assets	How much of the asset is there? What is the condition of the asset?	Location and extent of space, types of greenspaces, vegetation
Visits generated and ecosystem services provided	How many people visit? What services does the asset provide?	Greenspace usage, population characteristics, physical activity levels
Value of ecosystem services	How much do people value those services?	Willingness to pay, property values, cost of carbon

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To provide robust NCAs, Greenkeeper creates a comprehensive and consistent database on UK greenspace assets
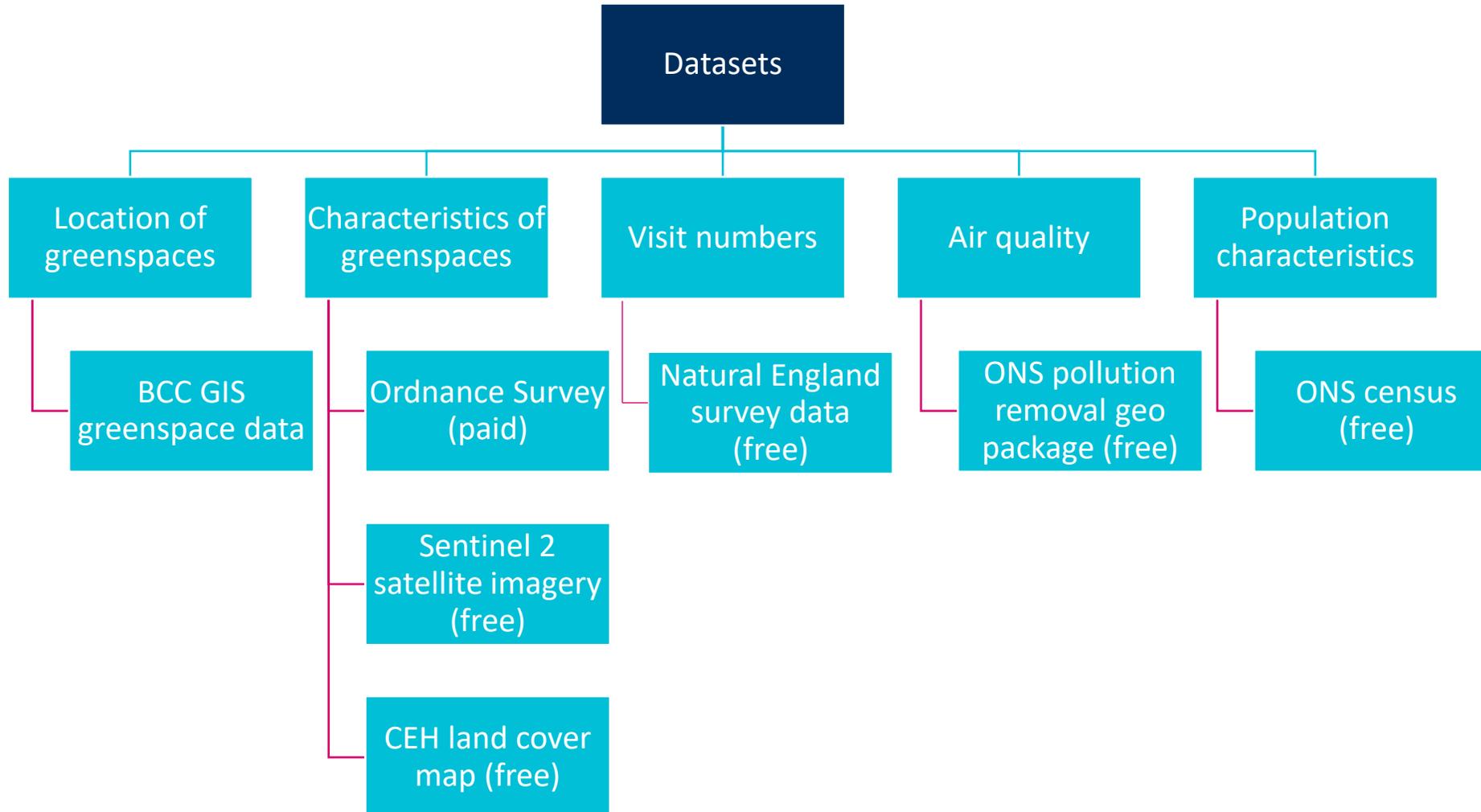
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Datasets

- **Location of greenspaces**
  - BCC GIS greenspace data
- **Characteristics of greenspaces**
  - Ordnance Survey (paid)
  - Sentinel 2 satellite imagery (free)
  - CEH land cover map (free)
- **Visit numbers**
  - Natural England survey data (free)
- **Air quality**
  - ONS pollution removal geo package (free)
- **Population characteristics**
  - ONS census (free)

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Greenkeeper predicts how people use UK greenspaces and the benefits they receive.

Page 11
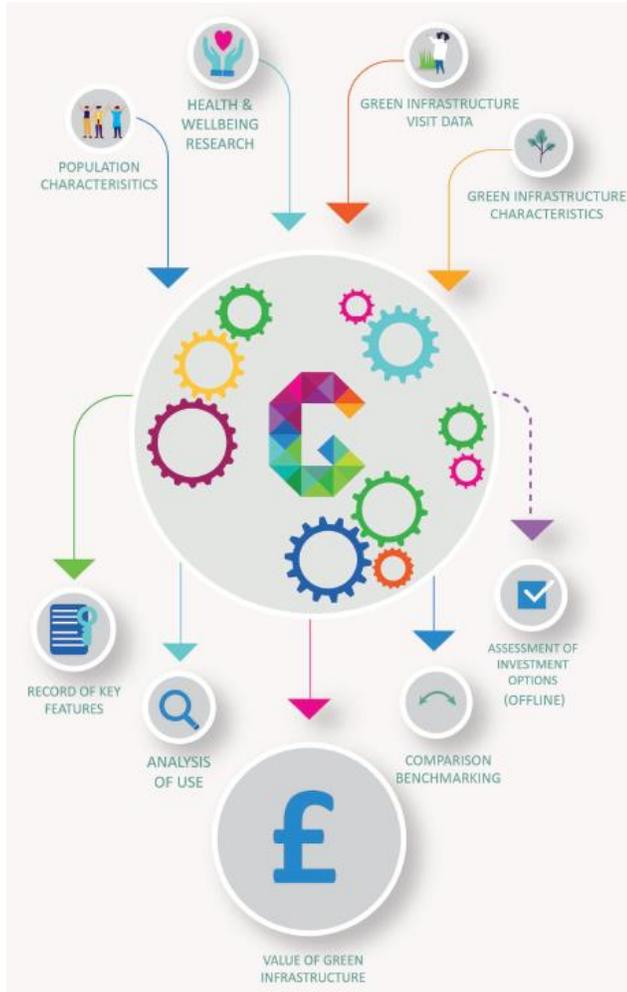
Step 1: predict visit numbers

| Population number and characteristics | Distance (accessibility) |
| Greenspace characteristics | Size |

estimate:

Number of visits

Step 2: value annual ecosystem services
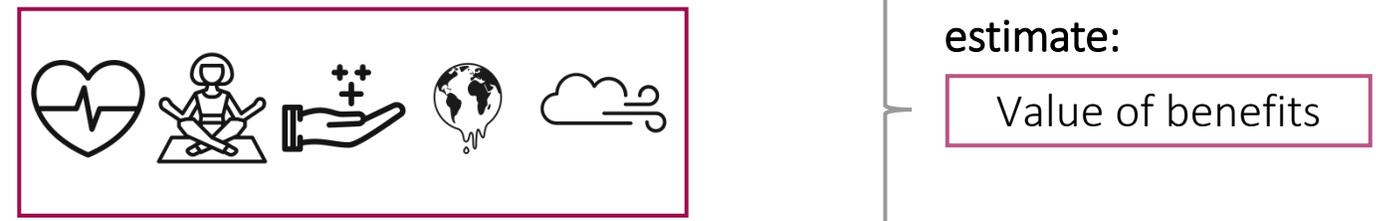
estimate:

Value of benefits

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Visit numbers are estimated based on the location and characteristics of the greenspace and population

Observational data is used as an input to estimate greenspace visits:

Page 12
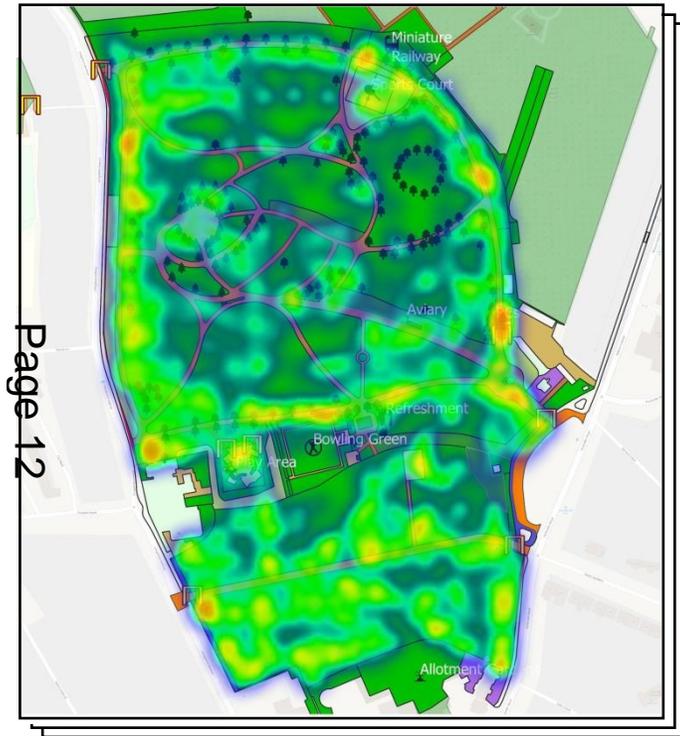
Visit numbers for individual greenspaces

+
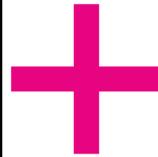
Location, characteristics of greenspaces and population

>

Demand model: statistical model that predicts visit numbers for more than 20,000 greenspaces in the UK based on location and characteristics

Visit numbers for any urban greenspace in the UK, as well as future developments

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Based on visit numbers and characteristics, benefits are estimated and valued

visit numbers characteristics

Ecosystem Services

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Health Services → benefits to the lives of visitors and residents → physical health / mental wellbeing

Location Services → preferences for accessing greenspaces → annual property value uplift

Regulating Services → benefits for the local and global environment → carbon sequestration, air pollution removal

We measure ecosystem services as benefits that would be lost if a green space were removed or changed – or the benefits gained by providing a new greenspace. Other benefits not measured by Greenkeeper today include biodiversity, flood management, and education.

Note: Further details on ecosystem services and their valuation methods are provided on slide 21 and the appendix, respectively.

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Bristol City Council's natural assets

The new Bristol natural capital account is based on a comprehensive set of changes to the City's greenspace portfolio

Page 15
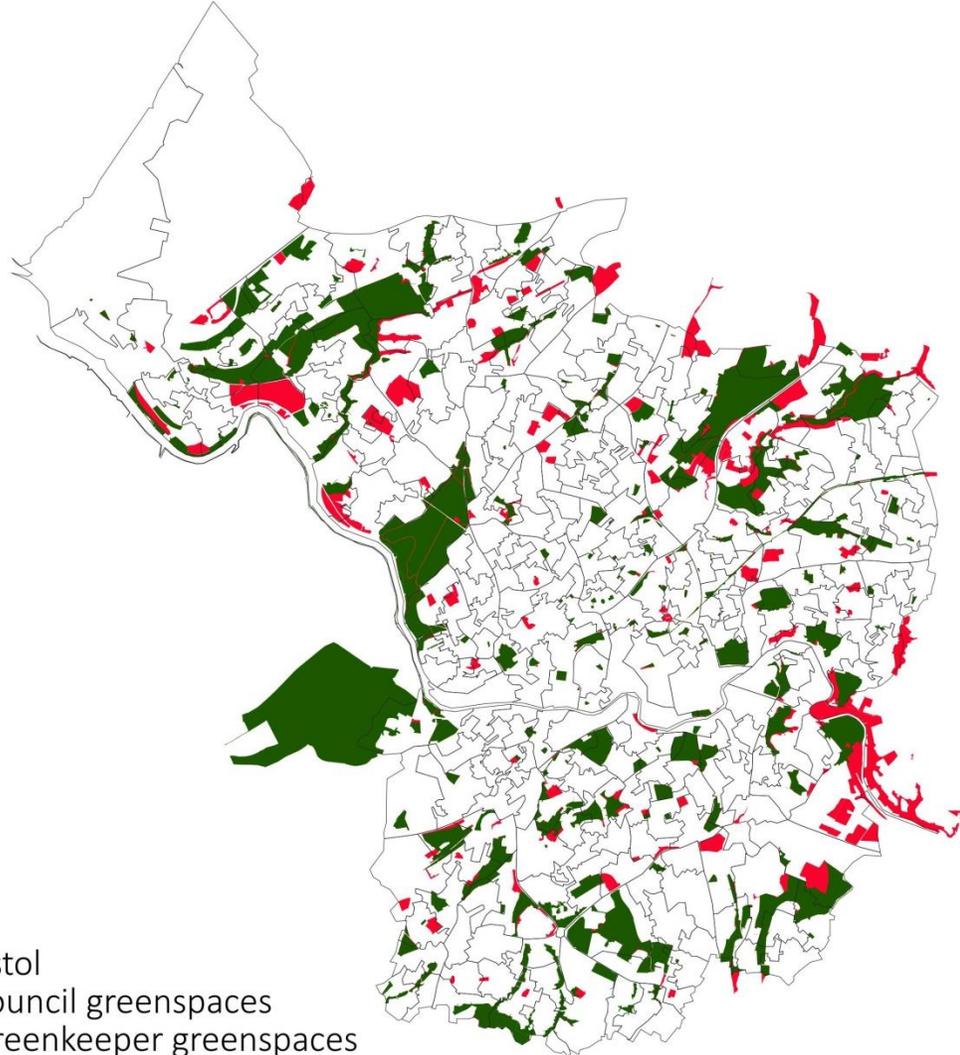
In consultation with Bristol City Council, multiple changes to the City's greenspaces have been made, including:

- updated characteristics and features for every greenspace; and

- removal of non-council-owned greenspaces (shown in red) and the addition of new council-owned greenspaces

In total, our analysis covers 237 greenspaces – **an additional 82 greenspaces from the previous natural capital account**

☐ City of Bristol
■ Revised Council greenspaces
■ Original Greenkeeper greenspaces

Greenspaces are grouped into five categories based on Bristol City Council's greenspace classification

Classification	Area in hectares	Number of parks
Pocket Park/ Greenspace	25	47
Neighbourhood Park/ Greenspace	499	138
District Park/ Greenspace	353	26
Destination Park	799	11
Other	64	15
Total	1,741	237

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Greenspaces are grouped into five categories based on Bristol City Council's greenspace classification

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City of Bristol

Greenspaces by type
- Pocket Park/Green space
- Neighbourhood Park/Green space
- District Park/Green space
- Destination Park
- Other
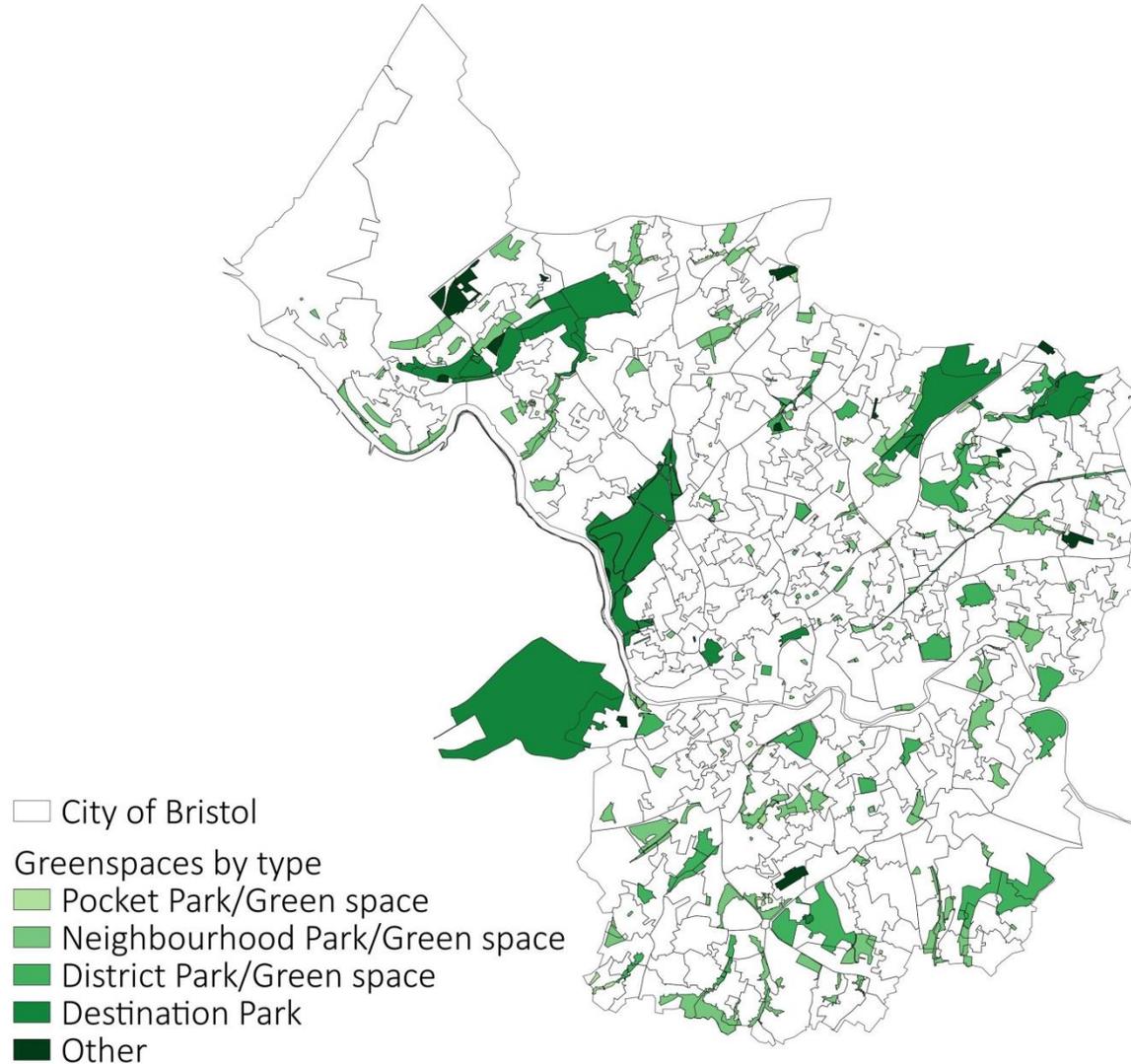
The average resident in Bristol typically lives within 5 minutes walking distance to a greenspace of at least two hectares in size

Greenkeeper calculates travel times to predict annual visits to greenspace. The travel time corresponds to the time spent walking on footpaths or driving on roads to a publicly accessible greenspace from each LSOA in Bristol.

Bristol is generally characterized by high accessibility to greenspaces. The average individual in Bristol typically spends less than five minutes on foot to reach a greenspaces that is 2 hectares in size or larger.

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Average travel time to nearest greenspace (walking)
- 🟩 < 2 minutes
- 🟩 2- 3 minutes
- 🟨 3- 4 minutes
- 🟧 4- 5 minutes
- 🟥 > 5 minutes
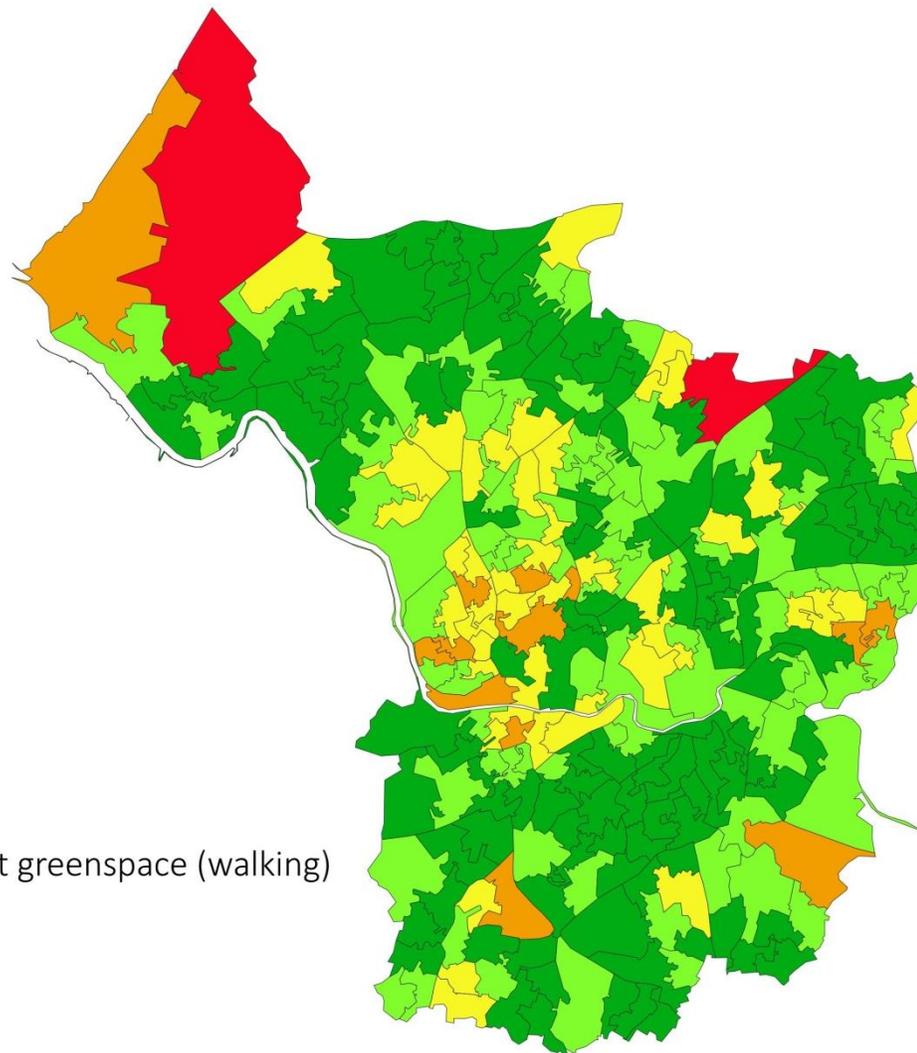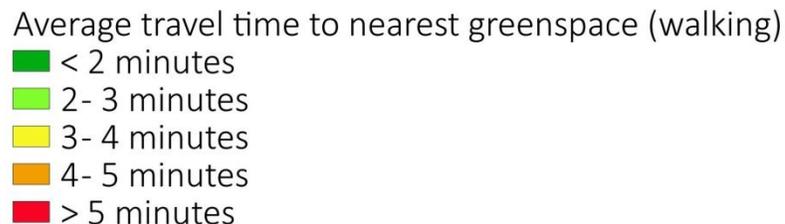
Note: Lower-level super output area (LSOA). Travel time to nearest greenspace is calculated as the time spent walking from a population-weighted centroid to the nearest greenspace that is 2 hectares in size or larger. See Office for National Statistics Survey data for more information.

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Visits to Bristol greenspaces

Visit numbers are predicted using observational data taken from the Measuring Engagement with the Natural Environment survey

Visit numbers are calculated based on **a recreational demand model,** which uses national survey data from the Measuring Engagement with the Natural Environment (MENE) survey to estimate visits to greenspaces based on local population characteristics.

The MENE survey captures how often individual's living in England visit greenspaces and, most importantly, **reveals which greenspaces are visited the most**, allowing us to infer relationships between the features and characteristics of a greenspace, and whether an individual is likely to visit that greenspace.

The MENE survey is limited to individuals aged 16 or older, meaning the visit numbers produced by Greenkeeper are predictions for adults only. **A visit to a greenspace can originate from any urban location in the UK**, so long as the time it would take them to travel to that greenspace is less than 60 minutes. A visit from a non-UK resident, such as a tourist from abroad, is not captured within our model.

Greenkeeper uses detailed information on greenspace characteristics, accessibility and amenities in order to predict annual visits

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Characteristics and accessibility	Cafes	Attractions	Play areas	Sports facilities	Toilets
Size	Cafes, snack bars and tea rooms	Archaeological sites	Playgrounds	Athletics facilities	Public toilets
Location	Fast food and takeaway outlets	Historic and ceremonial structures	Children's activity centres	Bowling facilities	
Crime rates	Pubs, bars and inns	Historic buildings		Climbing facilities	
Accessibility to public transport	Restaurants	Museums		Golf ranges, courses and clubs	
Water cover and waterbody count		Designated scenic features		Sports ground, stadia and pitches	
Grey cover i.e. buildings, footpaths, etc.		Observatories and planetariums		Gymnasiums, sports halls and leisure centres	
Green flag awards				Swimming pools and tennis facilities	

Note: Greenkeeper only considers amenities located within greenspaces. Amenities located near or adjacent to greenspaces are not included.

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The model estimates that 17 million recreational visits are made to Bristol's greenspaces every year

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City of Bristol

Annual visits

- < 10,000
- 10,000- 50,000
- 50,000- 100,000
- 100,000- 500,000
- 500,000- 1,000,000
- > 1,000,000
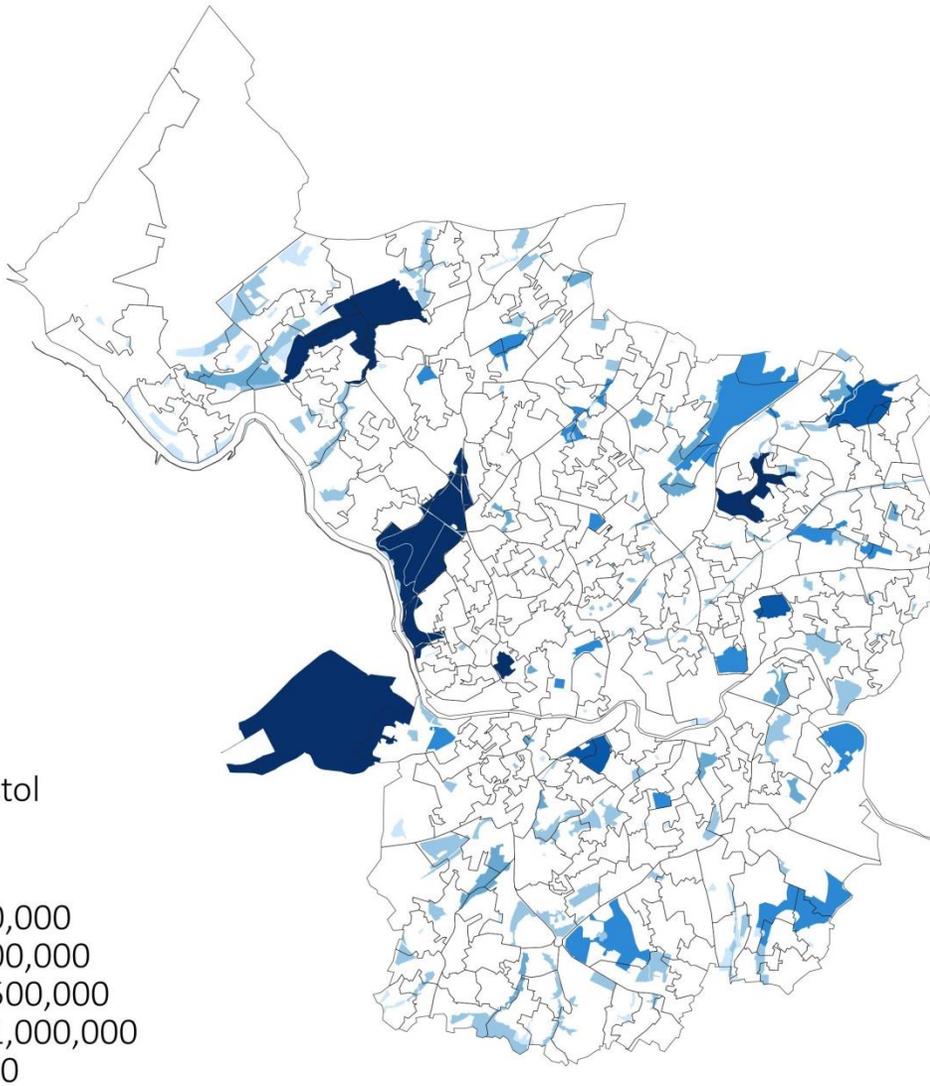
Bristol receives 17 million visits to the city's greenspaces annually.

- on average, 323 thousand visits are made per week to Bristol greenspaces

- each hectare of greenspace in Bristol receives approximately 9 thousand visits annually

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3
Green estate

**4
Predicted visits**

5
Ecosystem service benefits

6
Next steps

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Large greenspaces that offer a variety of different amenities are typically the most visited in Bristol

Amenities such as cafes, toilets, attractions and play areas are associated with more visits in Bristol

- the ten most visited greenspaces are home to 162 different local amenities, over 30% of all greenspace amenities

64% of all visits to greenspace in Bristol are made to ten parks, primarily due to:

- a greater number and variety of amenities; and
- larger total area, to accommodate for various forms of recreation and physical activity

However, the parks receiving the most visits per hectare of greenspace are smaller in size, suggesting that smaller parks can be more efficient at attracting visitors.

- when considering weekly visits per hectare of greenspace, the ten most frequented greenspaces are all less than 8 hectares in size

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Note: Table shows most visited parks in Bristol in descending order.

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Ecosystem services of Bristol greenspaces

Ecosystem services are the benefits that humans derive, either directly or indirectly, from the natural environment

Greenspaces are an essential source of ecosystem services for urban populations. Individuals directly benefit from the recreational and cultural services that greenspaces provide, making themselves healthier and happier in turn. At the same time, these spaces provide us with indirect benefits such as climate regulation and the removal of local air pollution.

Greenkeeper focusses on the value of four ecosystem services

- improvements to health from physical activity in greenspace

- improvements to mental wellbeing from time spent in greenspace

- increases in the value of properties for homeowners due to locations near greenspace

- removal of greenhouse gases from the atmosphere

The four pillars of ecosystem services

Physical health benefits

Mental wellbeing benefits

Annual property value uplift

Carbon sequestration

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Bristol greenspaces provide services valued at £385 million per year, 75% of which is attributable to Neighbourhood and Destination Parks

Neighbourhood Parks and Destination Parks occupy the most land cover and attract the most visits in Bristol. However, **Neighbourhood Parks tends to be more accessible for local populations**, attracting visits from nearby residents. **Destination Parks typically attract visitors from across the city** due to their size and the greater variety of amenities offered to visitors.

Total annual benefits (£m)

£450
£375
£300
£225
£150
£75
£0

£8m — Other
£8m — Pocket Park/Green space
£80m — Neighbourhood Park/Green space
£99m — District Park/Green space
£189m — Destination Park
£385m — All greenspace

■ Carbon sequestration   ■ Property uplift   ■ Physical health   ■ Mental wellbeing
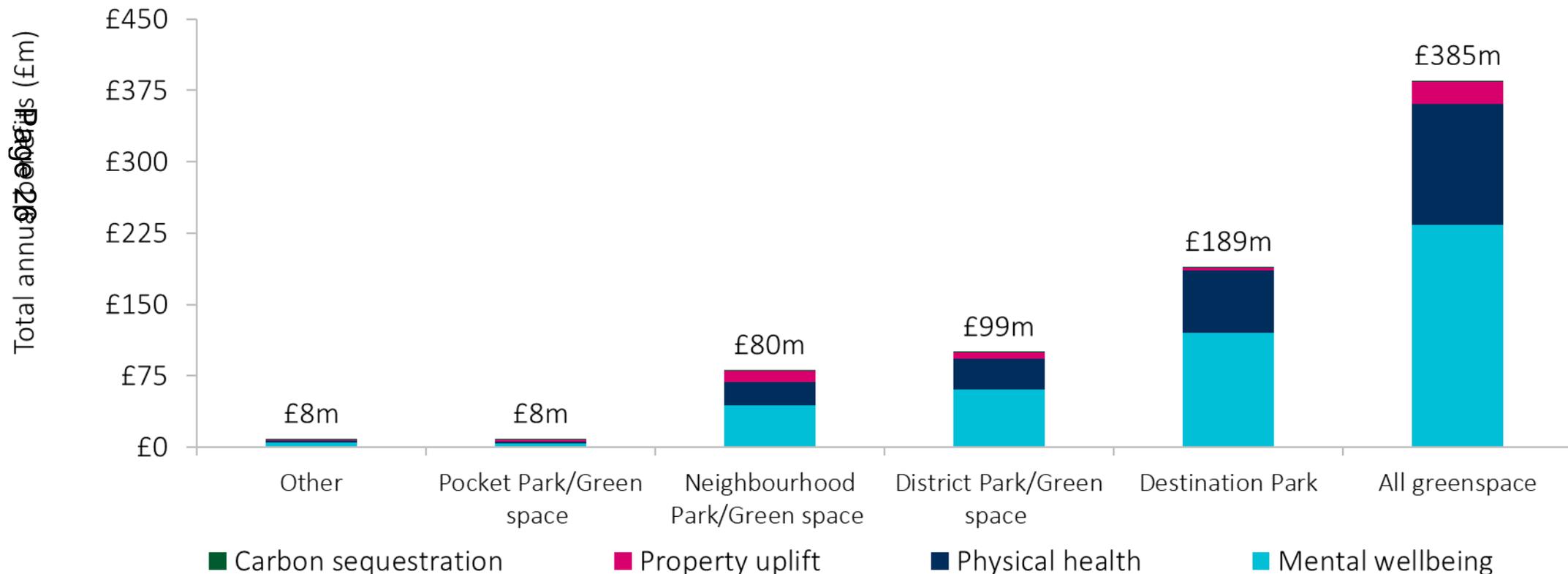
Note: Greenspaces ordered by total annual benefits from smallest to largest

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Mental and physical health account for 94% of greenspace benefits in Bristol

0.1%

7%

33%

61%
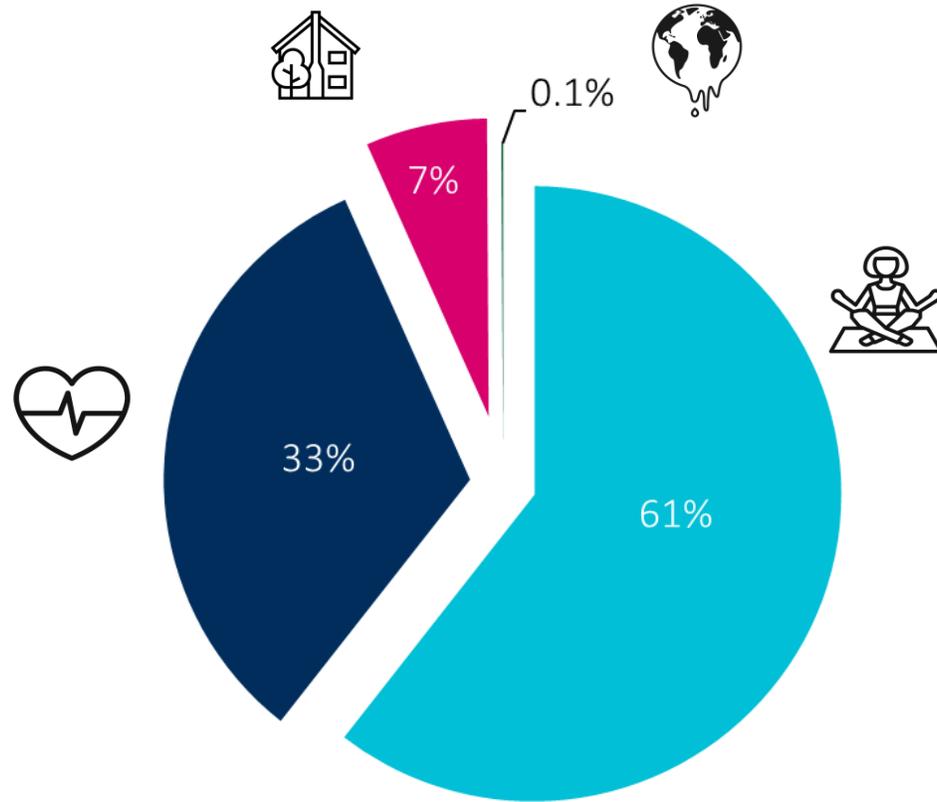
Improvements to mental wellbeing and physical health for greenspace visitors are valued at **£361 million per year**, accounting for to 94% of the total value of Bristol greenspace

■ Mental wellbeing   ■ Physical health

■ Property uplift   ■ Carbon sequestration

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Note: Benefits defined as the monetary value of the four ecosystem services

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Mental wellbeing benefits are valued at £234 million per year, approximately £14 per visit

Time spent in greenspace affects an individual's reported level of life satisfaction. More time spent in greenspace is associated with a higher level of life satisfaction according to studies comparing self-reported wellbeing with time spent outdoors.

We place a value on this increase in life satisfaction to calculate mental wellbeing improvements. The value is based on the amount of money a person would need to be compensated in order to achieve the same increase in life satisfaction gained from their time spent in greenspace.

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Mental wellbeing benefits	Value
Mental wellbeing benefits	£234 million per year
Mental wellbeing benefits per visit	£14 per visit

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Physical health benefits are valued at £127 million per year, approximately £8 per visit

Green space visitors achieve physical health benefits from undertaking activity in green spaces e.g. running, cycling, etc.

We measure health outcomes in terms of risk of mortality and quality-adjusted life years (QALYs). Physical activity reduces disease rates and improves quality of life.

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Physical health benefits	Value
Physical health benefits	£127 million per year
Physical health benefits per visit	£8 per visit

Note: A QALY is unit of measuring life expectancy, weighted by quality of life.

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Greenspaces remove £0.3 million worth of CO_2 per year, with approximately 45% of removals occurring in Destination Parks

Value of annual carbon sequestration (£m)

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<£0.01m

£0.01m

£0.07m

£0.10m

£0.15m

£0.30

£0.15

£0.00

Carbon sequestration

- Pocket Park/Green space
- Other
- District Park/Green space
- Neighbourhood Park/Green space
- Destination Park
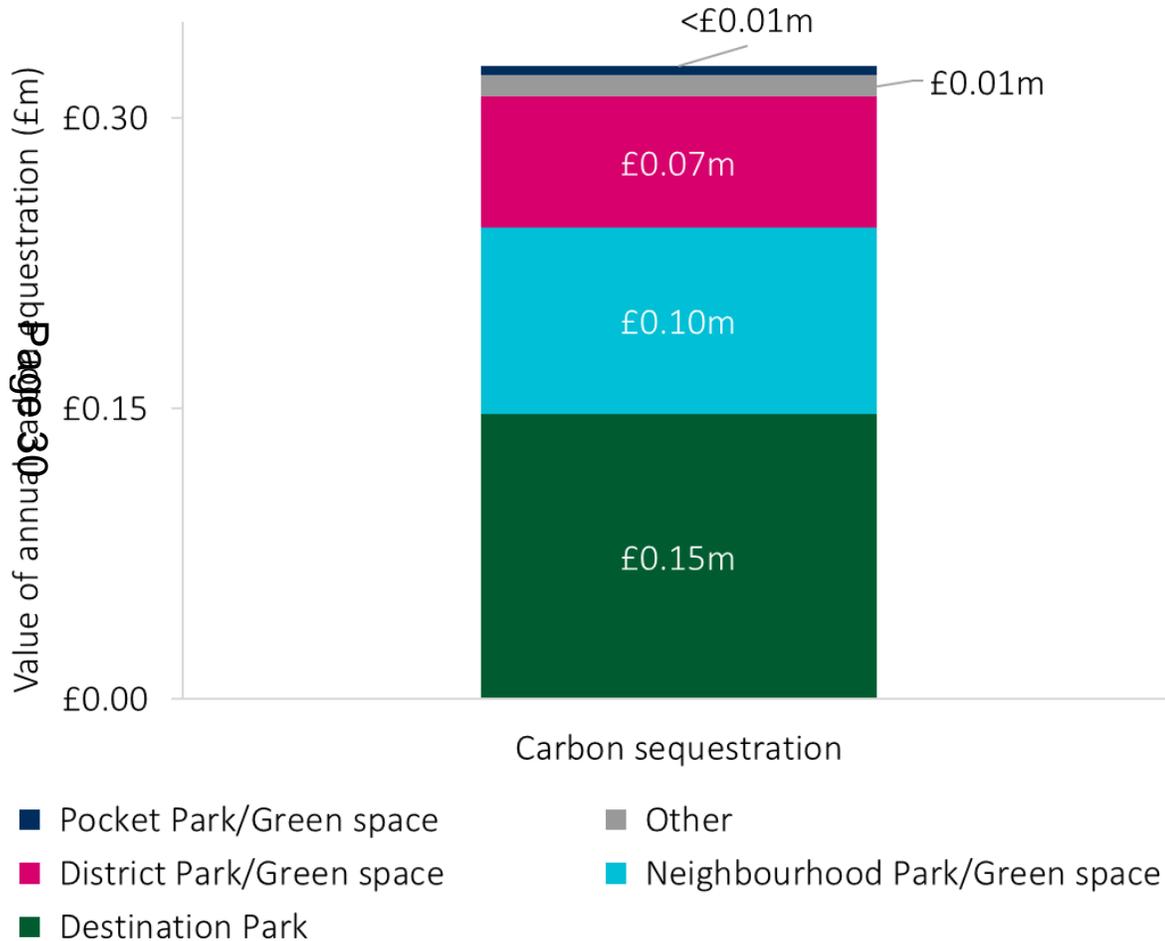
Bristol greenspaces capture thousands of tonnes of CO_2 per year. Tree canopy cover within green spaces indicates the amount of carbon sequestered.

The largest share of CO_2 sequestration primarily occurs in destination parks, which contains 45% of greenspace tree cover in Bristol.

The value of carbon sequestration is £330 thousand per year, approximately £190 per hectare of greenspace. We value the reduction in atmospheric carbon using the UK government's non-traded price of carbon.

Note: Tree cover is calculated using 10m resolution optical imagery from the European Space Agency's Sentinel 2 satellite during Summer 2018.

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Greenspaces provide £24 million in property uplift annually, representing 7% of the total value of Bristol's greenspaces
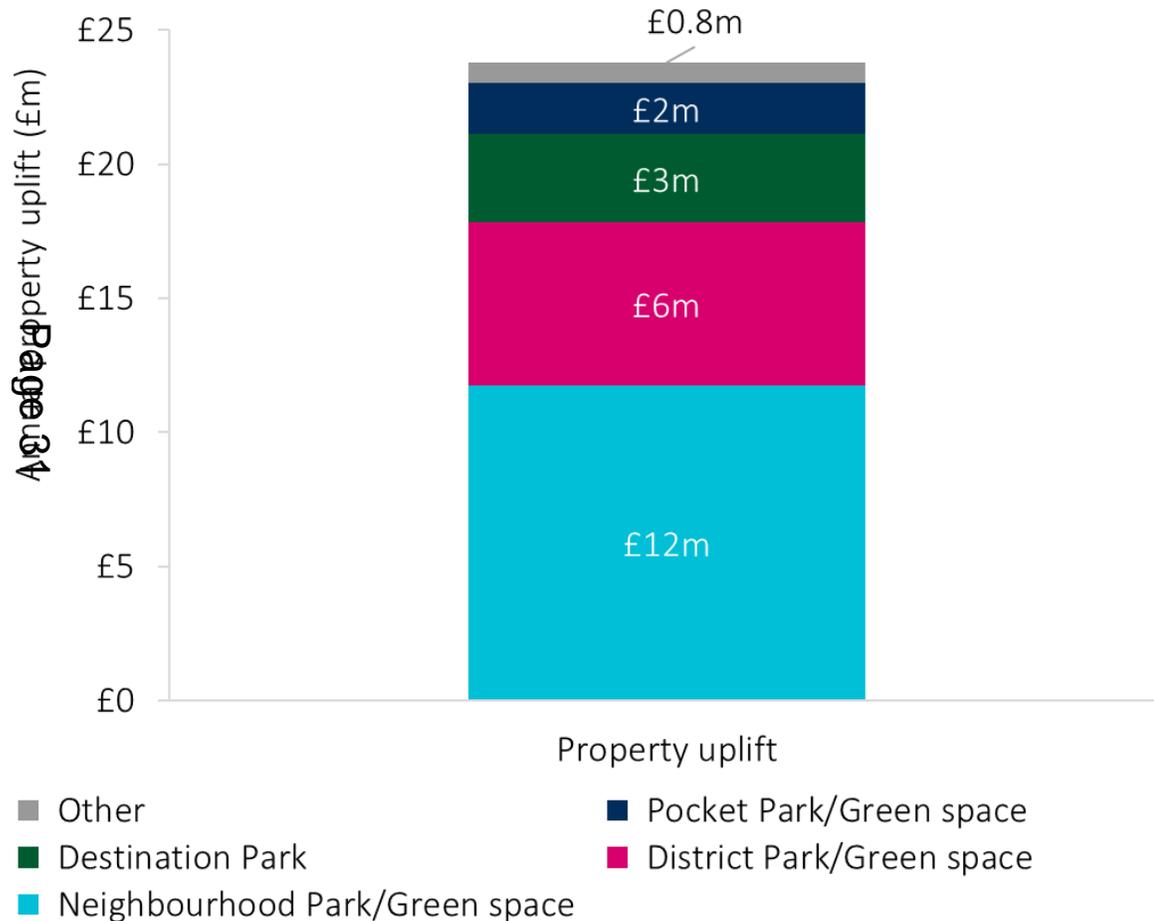
Annual property uplift measures people's preference for living near green spaces. This is reflected in higher property prices near greenspaces.

The uplift of house prices near greenspaces reflects its value to residents through their use of the space and also its contribution to the attractiveness of a residential area.

Properties near Neighbourhood Parks receive 50% of all property uplift in Bristol, partly due to location, but also due to the large number of local parks.

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Smaller greenspaces derive a greater share of their value from property uplift due to locations in denseley populated areas

The relative importance of annual property uplift among smaller parks is driven by their locations, typically in densely populated areas, which results in a higher number of residential properties receiving an annual property uplift. On the other hand, residential properties are less frequently located near destination parks, the value of which is typically driven by mental and physical health benefits from park visitors. This can be seen below, where the share of total value per hectare attributable to housing price uplift decreases with park size.

Total annual benefits per hectare (£k)

£319k — Pocket Park/Green space
£161k — Neighbourhood Park/Green space
£281k — District Park/Green space
£236k — Destination Park
£125k — Other

■ Carbon sequestration   ■ Property uplift   ■ Physical health   ■ Mental wellbeing
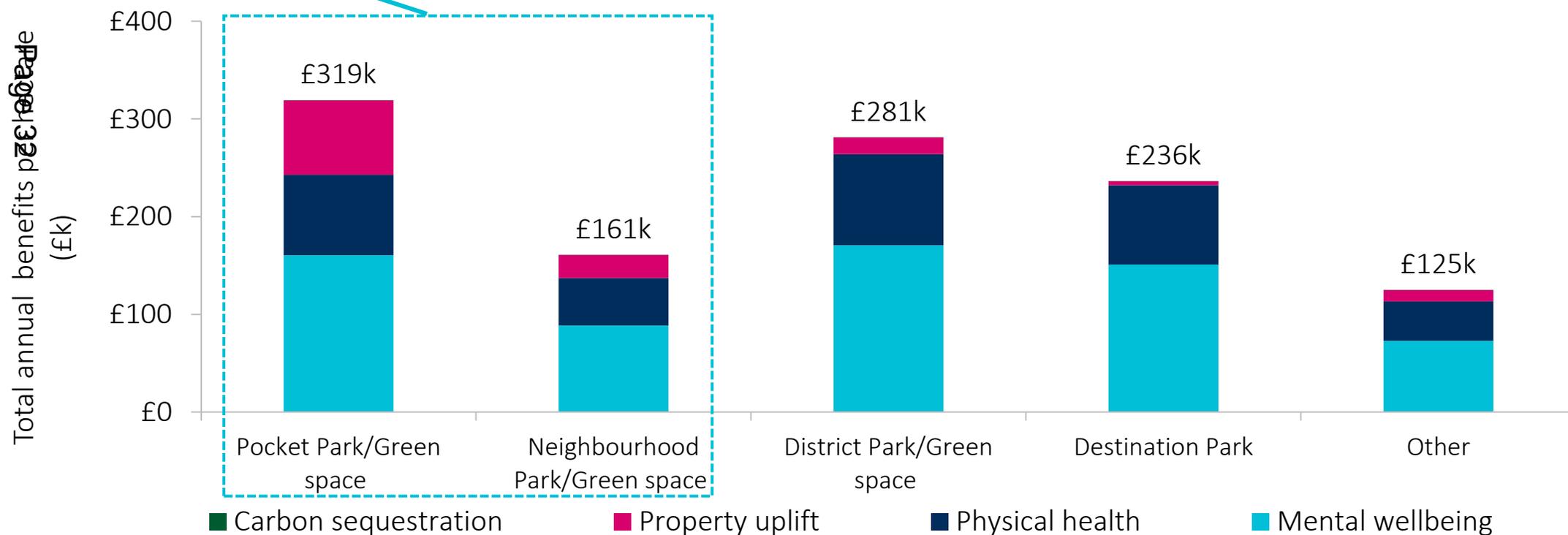
Note: Greenspaces ordered by size from smallest to largest. The 'other' category, which consists of greenspaces of different sizes, is placed at the end.

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Recap: £385 million of gross value is created by the city's greenspaces, 94% resulting from improvements in health and wellbeing

Smaller greenspaces are better at delivering benefits to homeowners, owing to locations in densely populated area. However, **larger parks deliver more health benefits** by attracting greater footfall from across the city.

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Visits to all greenspaces have significant benefits for mental wellbeing and physical health, valued at £361 million per year.

Going forward, **increasing the frequency of visits to greenspaces and the level of physical activity in these spaces could unlock even greater value** from existing parks. Similarly, new greenspace developments could **target densely populated areas where accessibility is low.**

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Glossary of terms

Term	Description
LSOA	Lower-layer super output area. A small geographic area used for reporting localised statistics in the UK.
Ecosystem services	Ecosystem services are the benefits that humans derive, either directly or indirectly, from the natural environment.
Carbon sequestration	CO_2 captured from the atmosphere and stored within organic matter such as trees.
QALY	Quality-adjusted life year. A unit for measuring the quantity and quality of life. One QALY equals a year lived in perfect health.

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Appendix

Bristol's natural capital account

Ecosystem Benefits (£m)	Park Size					
	Other	Pocket Park	Neighbourhood Park	District Park	Destination Park	All Parks
Carbon sequestration	<1	<1	<1	<1	<1	0.3
Amenity value	1	2	12	6	3	24
Physical health	3	2	24	33	65	127
Mental wellbeing	5	4	44	60	121	234
Total Benefits	8	8	80	99	189	385

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Note: total benefits may not sum up to the same number due to rounding

There are nearly 500[1] amenities in Bristol's greenspaces

Types of greenspace	Tree cover (ha)	Blue cover (ha)	Grey cover (ha)	% tree cover	% blue cover	% grey Cover	# cafes	# attractions	# play areas	# sports facilities
Other	31	1	1	49%	1%	1%	0	1	2	33
Pocket Park	13	0	1	53%	1%	5%	0	1	25	2
Neighbourhood Park	264	3	14	53%	1%	3%	2	4	78	73
District Park	185	4	14	52%	1%	4%	3	6	30	83
Destination Park	405	3	9	51%	0%	1%	13	27	7	41
TOTAL	898	11	40	52%	1%	2%	18	39	142	232

Note: [1] Waterbodies and toilets not shown in the table.

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Most visitors to greenspaces undertake some physical activity but fail to meet NHS recommendations of 150 minutes of exercise per week

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Inactive

Low-activity

High-activity

9%
of visitors do not get any physical health benefits from activity in parks

61%
of visitors undertake low levels of activity in parks, leading to reduced risks of mortality

30%
of visitors undertake high levels of activity in parks and have active lifestyles, leading to higher quality and longer lives

+£500

+£1,600

£0 → £500 → £2,100
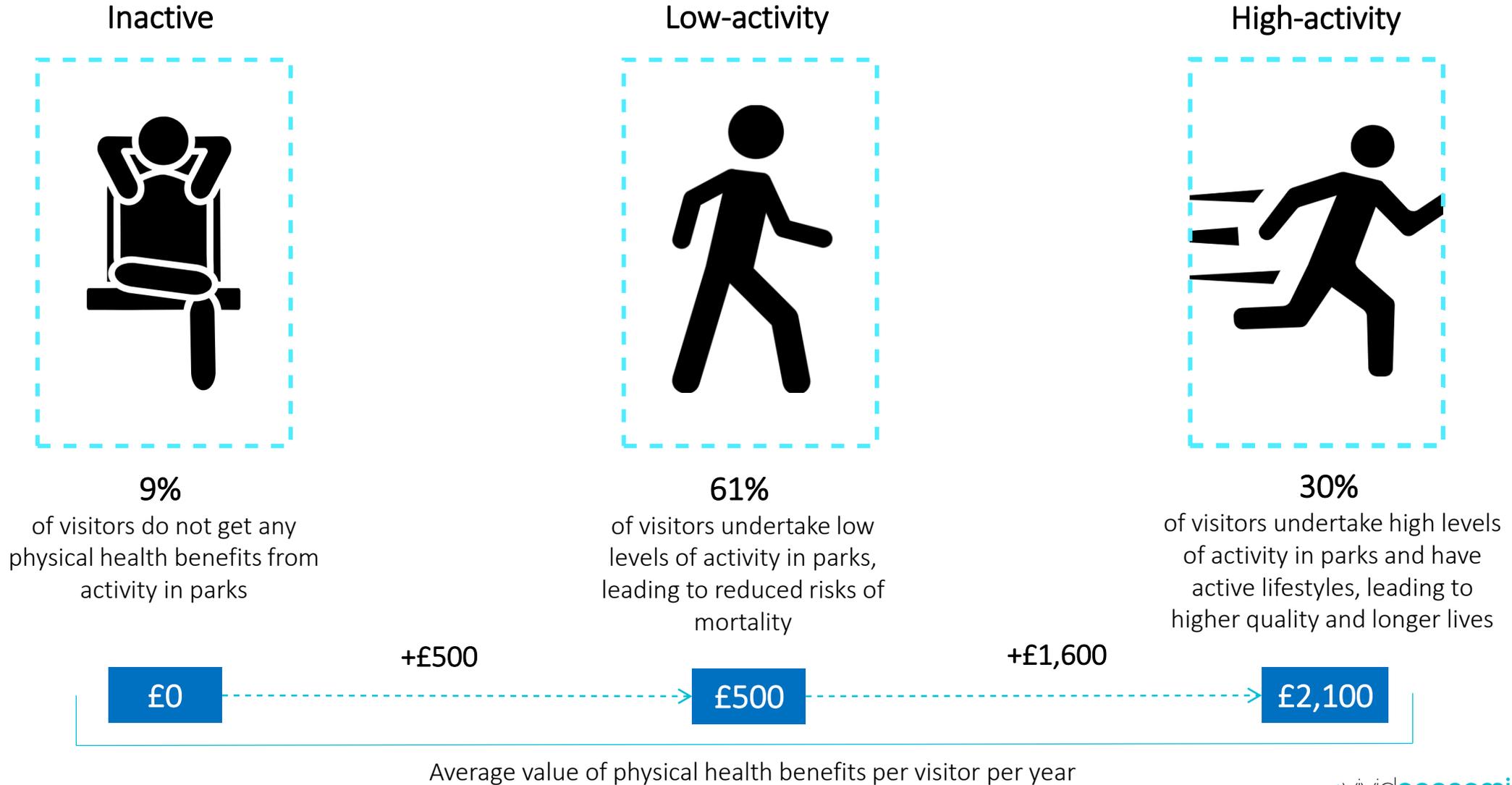
Average value of physical health benefits per visitor per year

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Note: Values in this slide reflect the average activity levels in medium sized parks. The average value of physical health benefits will vary in small and large

Visitors with an active lifestyle, or those meeting NHS guidelines, are those who report being active for more than 30 minutes on 5 or more occasions per week

We estimate the share of visitors making active visits and exercising at least 150 minutes a week by identifying the share of respondents in the MENE survey who reported undertaking an activity during their visit with a 'Metabolic Equivalent of Task' (MET) of 3 or higher, and who also reported being active for more than 30 minutes on 5 or more occasions per week. Visitors who meet these criteria are classified as **high activity visitors,** and they represent **30% of greenspace visitors.**

A separate share of visitors are those who report undertaking exercise in greenspace with a MET of 3 or higher, but who do not meet the NHS guidelines of 30 minutes of activity on five or more occasions per week. These visitors are classified as **low activity visitors,** accounting for **61% of all greenspace visitors.**

The last share of greenspace visitors are those individuals that meet neither the criteria for high activity visitors or low activity visitors. In other words, these are visitors who do not undertake physical activity in greenspace with a MET of 3 or higher. These are **inactive visitors** who make up the remaining **9% of greenspace visitors.**
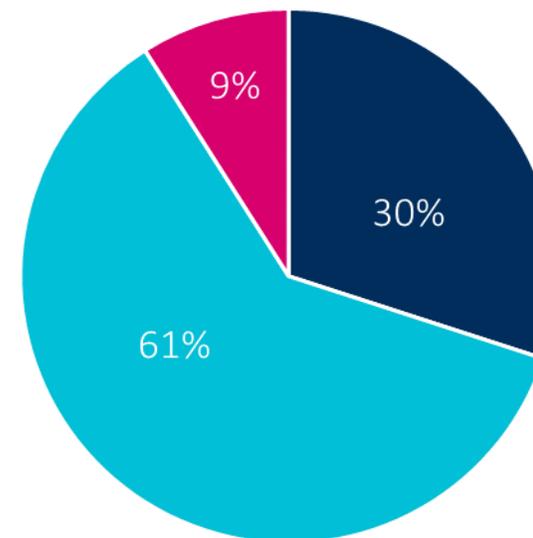
- ■ High activity visitors
- ■ Low activity visitors
- ■ Inactive vistors

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61% of visitors to greenspace do less than 150 minutes of physical activity per week

What is a low-activity visitor?

A low activity visitor undertakes physical activity in greenspace at intensity levels that are beneficial for health, but for less than the NHS recommend 150 minutes per week. The proportion of low-activity visitors is calculated based on reported physical activities within greenspaces from MENE survey data.

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How do we measure the physical health benefits gained by these visitors?

- We estimate the reduction in risk of all-cause mortality as a result of physical activity in greenspaces
- Using this change in risk, we calculate the number of fatalities prevented among low activity users due to green space, and multiply total lives saved by the value of a prevented fatality (VPF = £2.2m) [1]

Low-activity
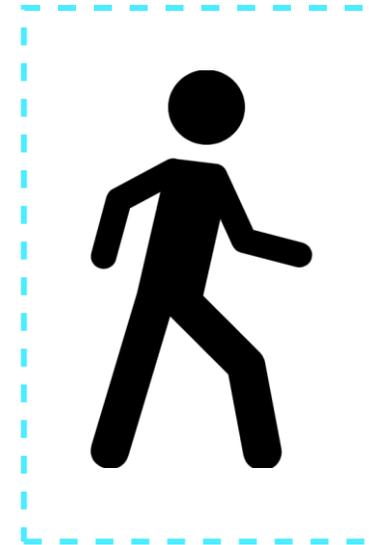
61%
of visitors undertake low levels of activity in parks, leading to reduced risks of mortality[2]

Note: [1] VPF represents the value used in cost-benefit analysis to determine how much a public entity is willing to spend preventing a fatality. The VPF used by the UK Government is £2.2 million (HM Treasury, 2018); [2] values are indicative of activity levels in medium sized parks, and will vary for small and large parks
Sources: NHS (2011) Fact Sheet 4: Physical Activity Guidelines for Adults (19-64 years); World Health organization (WHO) Health Economic Assessment Tool (HEAT).
Accessible from: https://www.heatwalkingcycling.org/#homepage

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30% of visits are made by high-activity people who do more than 150 minutes per week

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What is a high-activity visitor?

A high activity visitor undertakes physical activity in greenspace at intensity levels that are beneficial for health for 150 minutes or more per week. The proportion of high-activity visitors is calculated based on reported physical activities within greenspaces from MENE survey data.

How do we measure the physical health benefits achieved by these visitors?

- We estimate the number of Quality Adjusted Life Years (QALYs) [1] gained by high activity visitors each year
- We value improvements based on the HM Treasury Green Book guidance on the value of an additional QALY

High-activity

30%
of visitors undertake high levels of activity in parks and have active lifestyles, leading to higher quality and longer lives[2]

Note: [1] A QALY is unit of measuring life expectancy, weighted by quality of life; [2] values are indicative of activity levels in medium sized parks, and will vary for small and large parks
Source: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/685903/The_Green_Book.pdf.

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Regular visits to greenspaces improve wellbeing similarly to having full time employment or being married

University of Exeter and Vivid Economics have developed a new method to value the improvements in wellbeing based on the relationship between visit frequency and reported wellbeing. We use a recreation demand model to estimate the number of greenspace visits added by a park and the resulting quality of life improvements

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Increase in life satisfaction

Minutes spent in parks each week

—— Increase in life satisfaction per minute spent in parks each week compared to 0 minutes spent in parks per week

- - - Average estimated effect on life satisfaction above and below the 120 minute threshold

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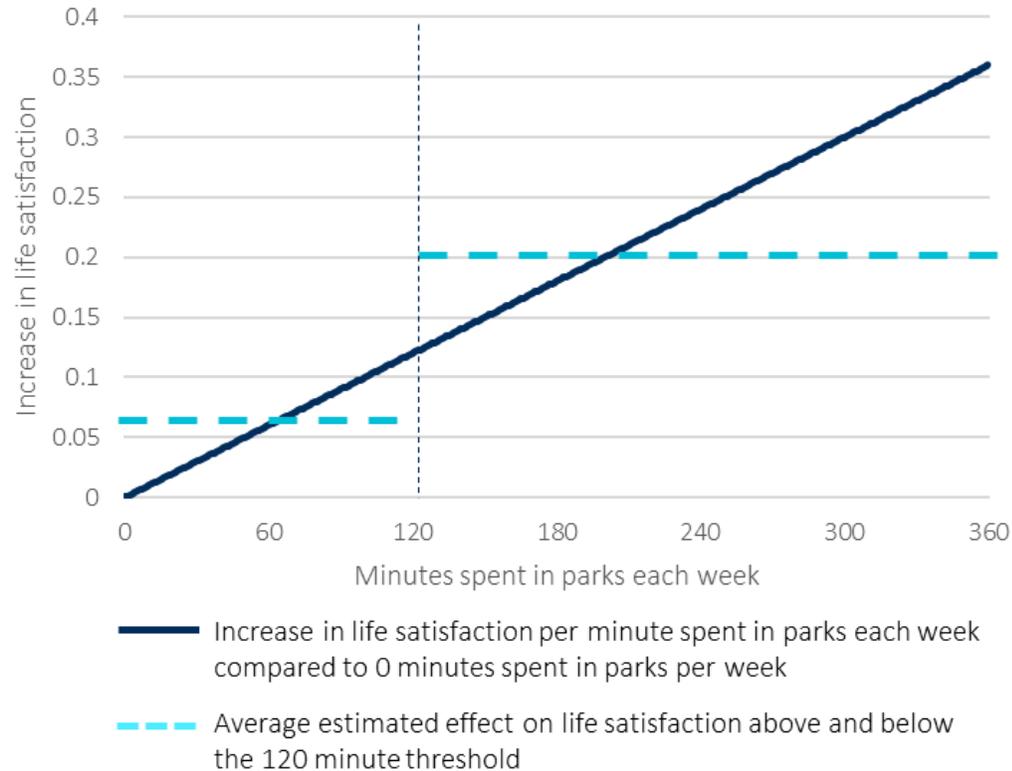
Amenity value measures the additional amount of money that people are willing to pay to live in a location close to greenspace

Amenity value measures people's preferences for living closer to green spaces, which is expressed by their willingness to pay in the housing market. Research has shown that individuals are willing to pay more to live next to greenspace. As such, the value of residential properties located near greenspace receive an uplift in value that can be detected when looking at transactions in the property market.

The uplift value is estimated for properties within 200 metres of greenspaces. Uplift value coefficients are based on the hedonic pricing model from the ONS (shown to the right). Property uplift values are spread over 30 years as an annuity using a discount rate of 3.5% to calculate the annualised value of greenspace as a local amenity.

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Park size	Property price uplift
Small	0.53%
Medium	0.60%
Large	1.07%
Extra Large	1.45%

Source: Uplift coefficients from ONS (2017) hedonic price model.

Carbon sequestration is calculated using satellite data and average sequestration rates for tree in the UK

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Tree canopy cover is found using 10 resolution optical imagery from the European Space Agency's Sentinel 2 satellite during the of Summer 2018. Using this imagery, we can calculate the hectares of tree cover found in each greenspace.

The monetary value of carbon sequestration is calculated by multiplying the value of carbon by the average sequestration rate for a single hectare of trees. In the UK, the average hectare of trees sequesters 5.4 tCO_2 annually. We use this sequestration rate and a value of £66/ tCO_2 to arrive at an annual value for carbon sequestration in greenspaces.

Greenkeeper does not take into account sequestration that occurs outside of greenspace. For example, sequestration may also occur on green streets or private gardens and properties.

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putting economics to good use

Bristol City Council Scenario Analysis

Future Parks Accelerator Programme

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Contents

This slide deck presents the results of Vivid's scenario analysis of Bristol's greenspace interventions. Scenarios were devised in consultation with Bristol City Council (BCC) considering results from the baseline natural capital account for Bristol as well as local priorities. In each scenario, the impact on annual visit numbers and annual benefits are estimated using Vivid's Greenkeeper Toolkit.

The slide deck is structured as follows:

1. Context of scenario analysis

2. Outline of scenarios

3. Headline results

4. Scenario 1: The 10 Minute Standard

5. Scenario 2: Bristol 2043

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In Phase II we have assessed the impact of potential greenspace interventions and future greenspace use

Inefficient asset use

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Maximised benefits

Phase I: Diagnostics

1. Develop natural capital accounts

Gain a better understanding of Bristol's greenspaces
- how many visits do greenspaces receive?
- how many cost benefits do greenspaces provide annually?

Phase II: Intervention assessment

2. Assess greenspace interventions

Identify and evaluate how greenspace interventions can achieve Bristol's objectives
- identify how and where investment can help achieve local objectives e.g. improved health
- assess the long-term returns on investment

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Bristol greenspaces currently provide services valued at £385 million annually

Bristol's greenspaces attract an estimated 17 million visits each year, creating benefits valued at £385 million annually.

Following the construction of a baseline, the Greenkeeper Toolkit was implemented in order to better understand how a set of interventions may enhance the benefits of greenspaces for local communities, and also how overall greenspace use is expected to change in the future.

The scenario analysis for the BCC is composed of two parts, namely:

- Scenario 1: The 10 Minute Standard, which would bring 94% of the Bristol population within 10 minutes walking distance to a high quality park; and

- Scenario 2: Bristol 2043, which models the effects of population growth from 2018 to 2043.

□ City of Bristol
■ Bristol greenspace

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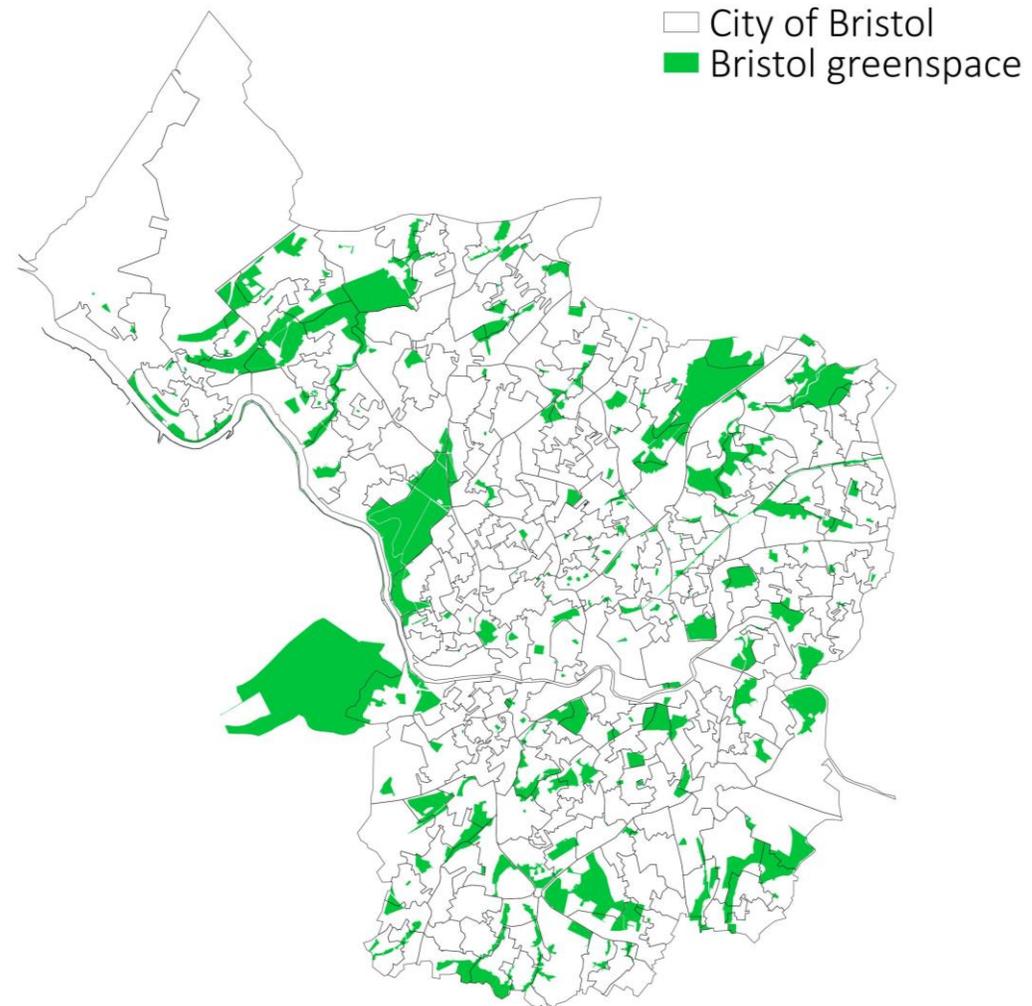
Scenario 1: The 10 Minute Standard Scenario is designed to deliver transformational change to Bristol's existing greenspaces

The **10 Minute Standard scenario would provide near universal access to greenspace to high-quality greenspace for Bristol's residents.** To reach this 10 Minute Standard, the majority of Bristol's existing parks are elevated to a recognisable level of quality. The scenario involves interventions in 123 parks across the city which brings 94% of the population within a 10-minute walking distance of a high quality greenspace.

We model increases in quality by assigning Green Flag Awards to the 123 parks where interventions take place. Green Flag Awards represent the benchmark standard of quality in the UK: only parks that are well-managed and maintained are eligible to receive the award.

The 10 Minute Standard creates the opportunity for people to enjoy Bristol's greenspaces to the fullest extent by providing them access to safe, well-maintained and excellently managed greenspaces. The scenario represents the highest levels of ambition for greenspace improvements and would fundamentally change peoples' engagement with Bristol's parks.

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☐ City of Bristol
⚑ Green Flag Award
▪ Bristol greenspace

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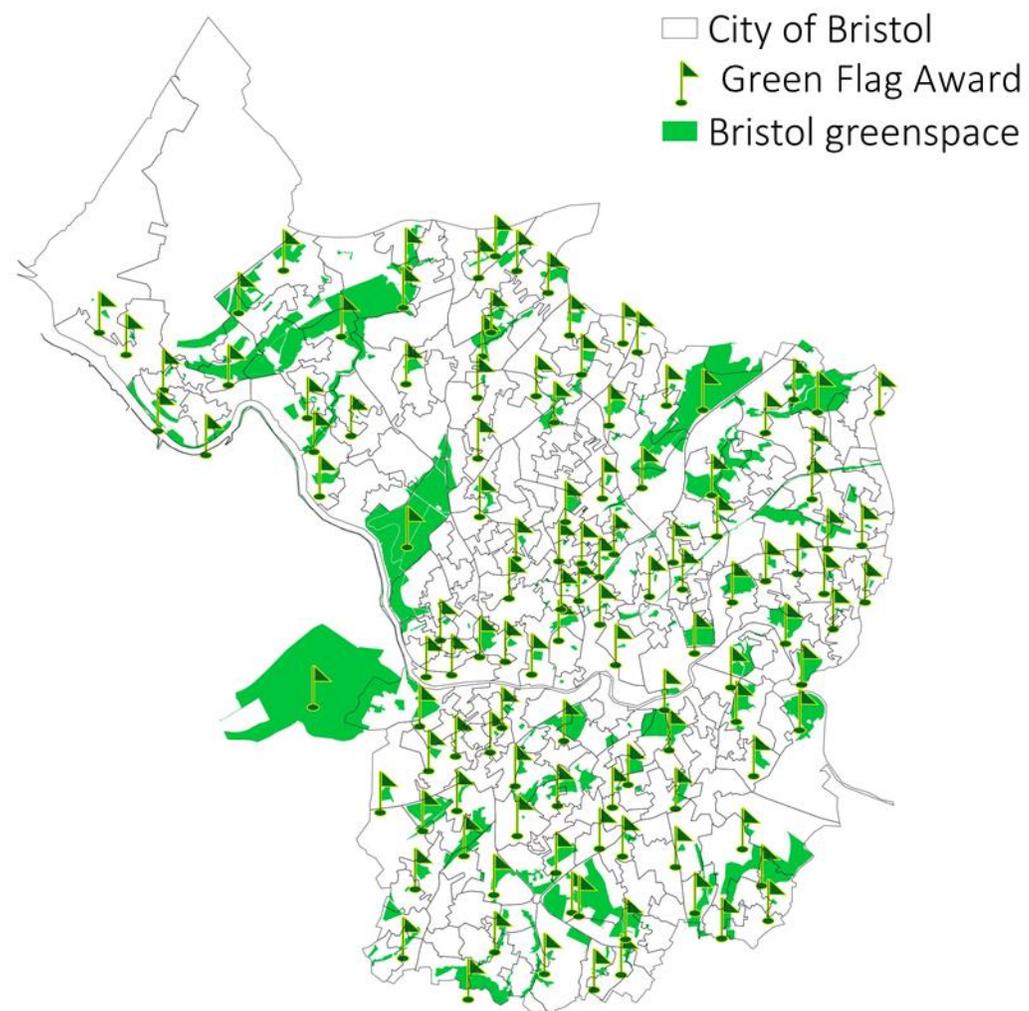
Scenario 2: The population of Bristol is projected to increase by over 50,000 by 2043

In the Bristol 2043 Scenario, we model the effects of an additional 53,000 residents throughout the city. The population of Bristol as of 2018 was 463,000. The additional population expected by 2043 is equivalent to a 12% increase from 2018 levels, with the largest increases expected in wards such as Avonmouth and Lawrence Weston, Central and Westbury-on-Trym and Henleaze.

Population projections were provided by BCC at the ward level and distributed to the lower-level super output area (LSOA) level. The increase in population distributed to each LSOA is proportional to that LSOA's share of the total 2018 ward population it is a part of.*

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Bristol greenspace

Additional population, 2018 to 2043
- < 200
- 200- 400
- 400- 600
- > 600
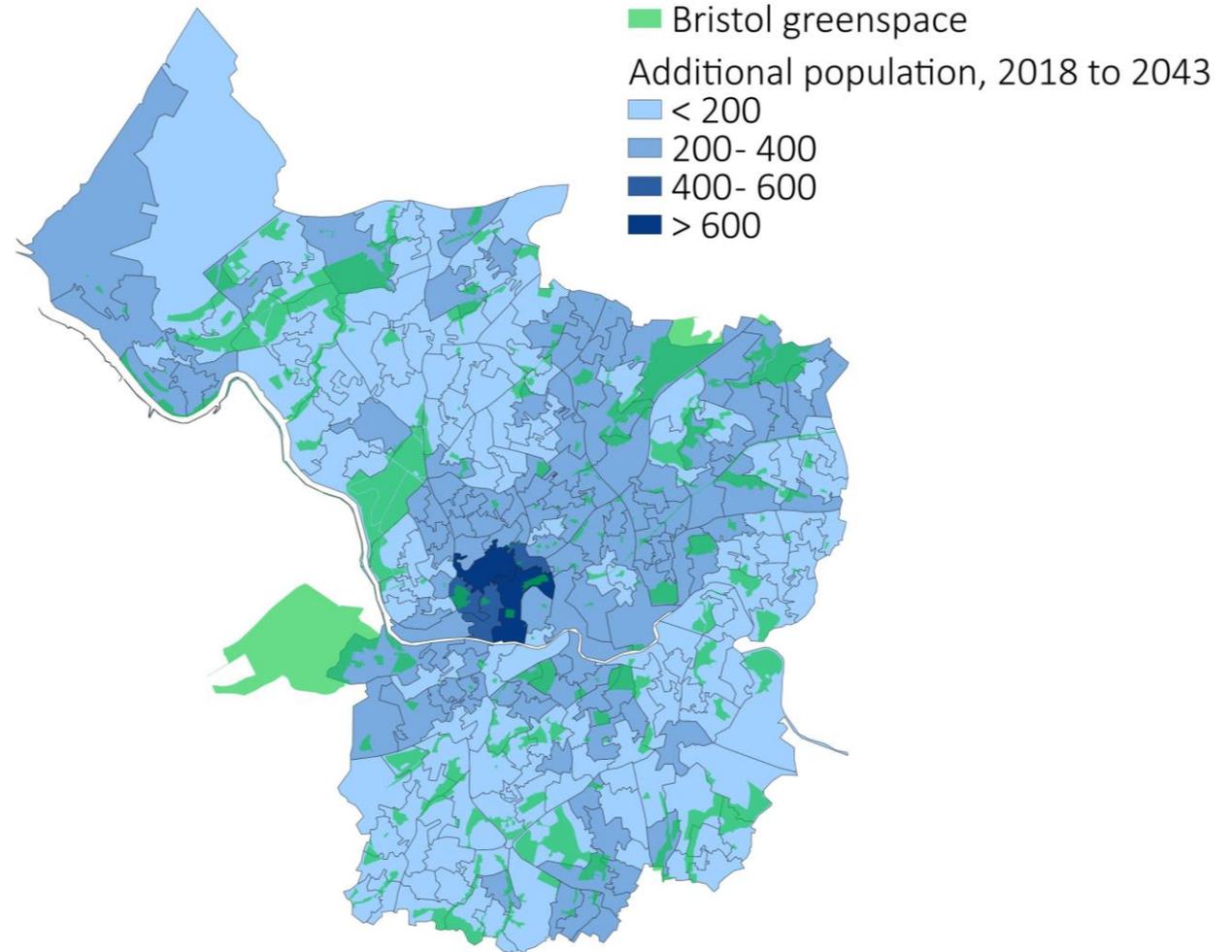
Note: *For example, Ward A is composed of two LSOAs: LSOA 1 and LSOA 2. If each LSOA was responsible for 50% of the total population of Ward A in 2018, both LSOAs receive 50% of the total projected population increase by 2050.

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Results from the analysis reveal that both increased greenspace quality and a larger population will significantly increase visitation to Bristol's greenspaces

Scenario 1: The 10 Minute Standard

In the 10 Minute Standard scenario, we estimate that annual visits to greenspaces could increase by as much as 7.3 million – a 43% increase from the baseline NCA. These results are consistent with the ambition of the scenario, which would make Bristol's parks considerably more attractive to visit. An increase in annual visitation of this magnitude leads to a pronounced effect on mental wellbeing and physical health benefits. In particular, we estimate that the scenario could lead to additional health benefits valued at £156 million per year.

BCC could maximise potential benefits by prioritising improvements in a handful of parks where the most significant changes to benefits are predicted. In particular, improving the quality of 34 District Parks and Destination Parks to Green Flag levels alone may lead to an additional £136 million in health benefits.

Scenario 2: Bristol 2043

In the Bristol 2043 scenario, annual visits are estimated to increase by approximately 2 million, or 12%, leading to additional benefits valued at £47 million per annum. Increases in annual visits and benefits are projected to increase by 11% to 13% across all classes of greenspaces by 2043.

Health benefits represent 92% of additional benefits in 2043. A larger population implies a larger pool of potential visitors to greenspaces, which is expected to drive mental wellbeing and physical health benefits upward. Similarly, the new population is estimated to create an additional £3 million in annual property uplift for future residents, assuming that dwellings are built to accommodate.

We estimate that the 10 Minute Standard scenario could increase annual visits and benefits by 43% and 41%, respectively

Estimated annual visits (millions)		Estimated annual benefits (£ millions)	
Bristol Baseline	10 Minute Standard scenario	Bristol Baseline	10 Minute Standard scenario
17	24	385	541

Additional 7 million annual visits i.e. a 43% increase from the baseline NCA

17m

24m

Bristol baseline annual visits

10 Minute Standard Scenario annual visits

Additional £157 million annual benefits i.e. a 41% increase from the baseline NCA

£385m

£541m

Bristol baseline annual benefits

10 Minute Standard Scenario annual benefits

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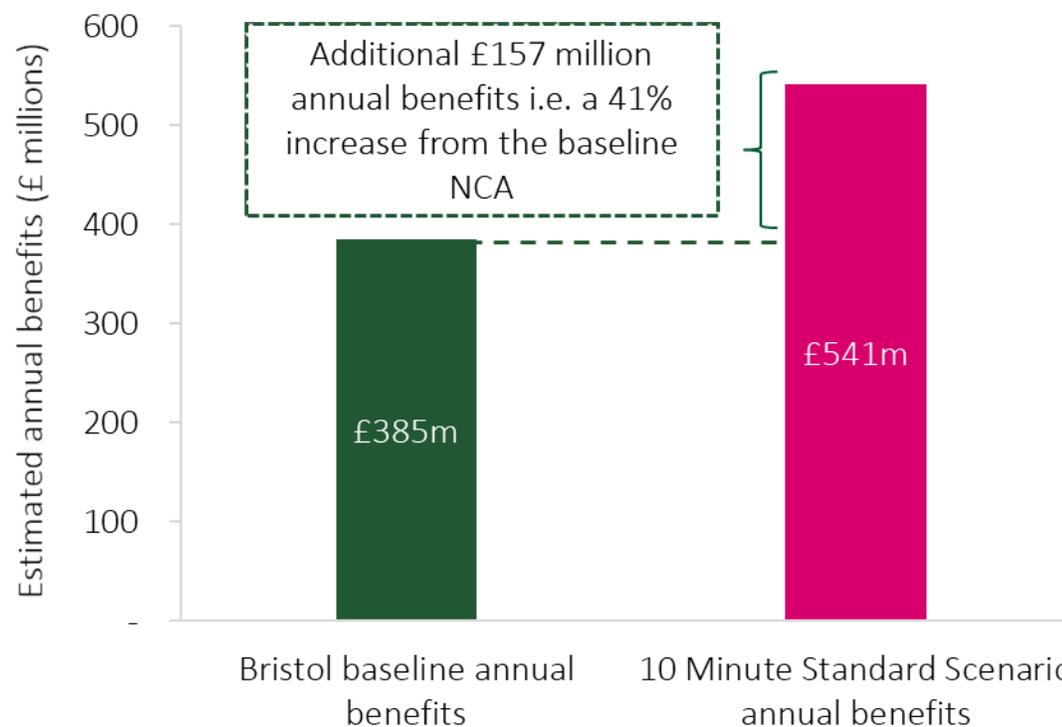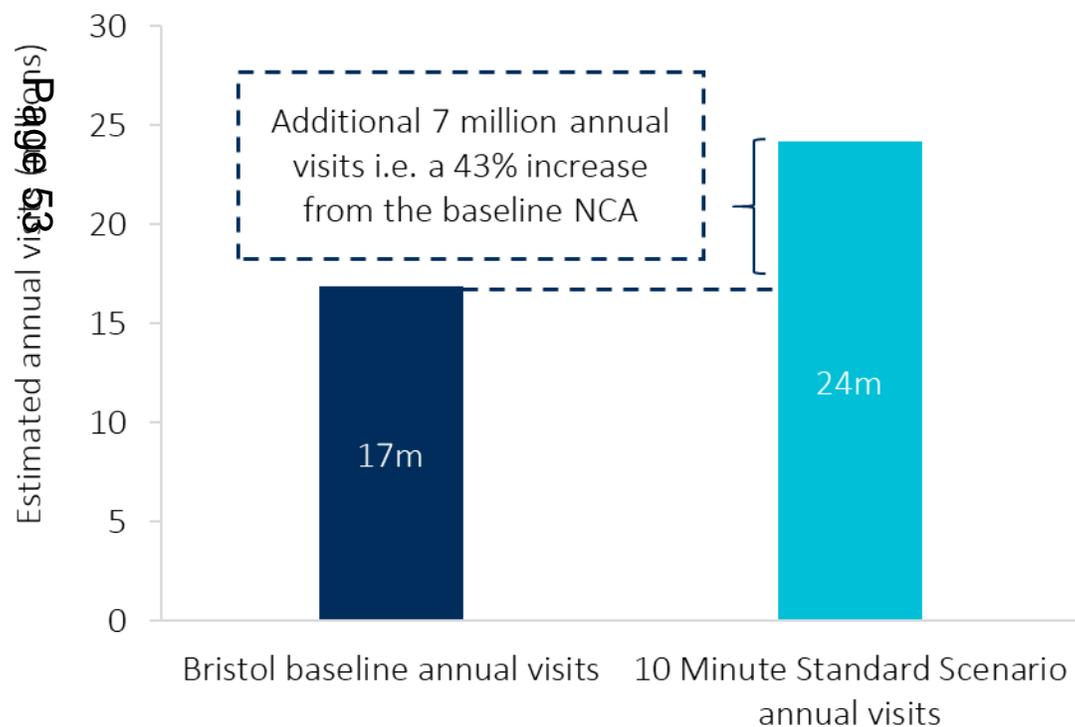
A small decrease in visits to non-Green Flag greenspaces is more than offset by a substantial increase in visits to Green Flag allocated greenspaces

Category	Baseline annual visits (millions)	10 Minute Standard annual visits (millions)	Change in annual visits (millions)	% change in annual visits
Green Flag Award allocated	15	22.5	(+) 7.5	(+) 50
Green Flag Award not allocated	1.9	1.7	(-) 0.2	(-) 11
All greenspaces	16.9	24.2	(+) 7.3	(+) 43

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Green Flag Award not allocated   -0.2m

Green Flag Award allocated   7.5m

All greenspaces   7.3m

Legend:
- Baseline annual visits
- 10 Minute Standard increase in annual visits
- 10 Minute Standard decrease in annual visits

-5   0   5   10   15   20   25   30

Estimated annual visits (millions)
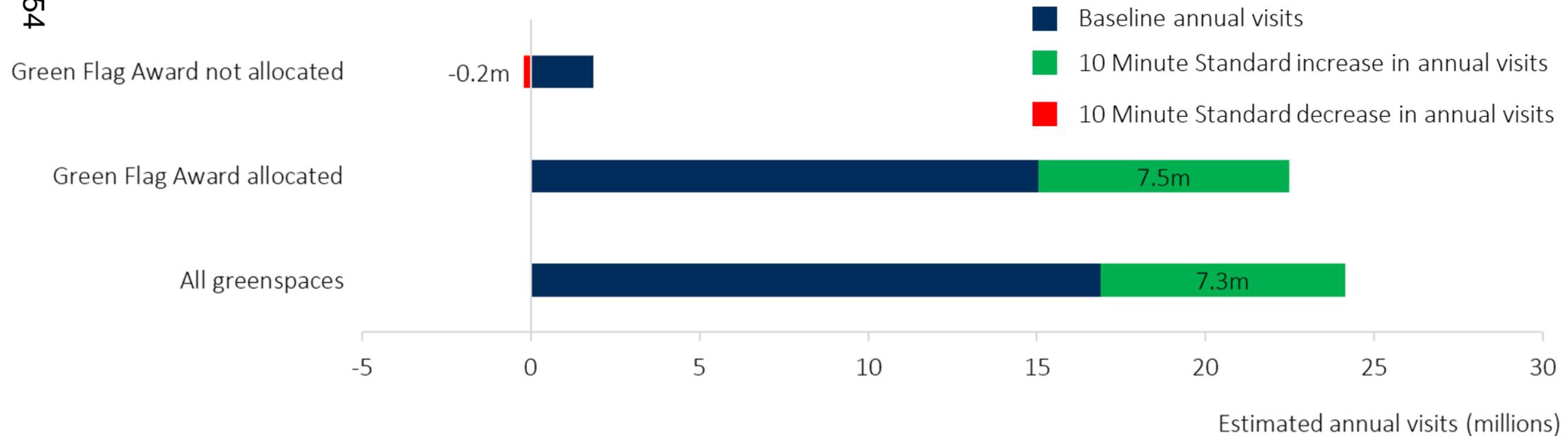
Additional benefits under the 10 Minute Standard scenario are driven by improvements to mental wellbeing and physical health for visitors

Increasing the quality of a greenspace has a pronounced, positive effect on annual visitation, which drives improvements in mental wellbeing and physical health. However, because both the size and locations of greenspaces are unchanged, the value of annual property uplift remains constant in the 10 Minute Standard scenario. The same can be said for carbon sequestration: since tree cover is assumed to stay constant, the annual value of carbon sequestration does not change despite increased quality of the greenspace.

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Legend:
- Mental wellbeing
- Physical health
- Property uplift
- Carbon sequestration

Bristol baseline annual benefits by type
- £234m (Mental wellbeing)
- £127m (Physical health)
- £24m (Property uplift)
- £0.3 (Carbon sequestration)

10 Minute Standard Scenario annual benefits by type
- £336m (Mental wellbeing)
- £182m (Physical health)
- £24m (Property uplift)
- £0.3 (Carbon sequestration)

X-axis: 0, 150, 300, 450, 600

Estimated annual benefits (£ millions)

Note: Property uplift is a function of distance to greenspace and the size of a greenspace. Since neither the distance or size of greenspaces are changing, amenity value remains constant. Similarly, annual carbon sequestration is directly related to tree cover which is also assumed to remain unchanged.

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On average, annual visits to a park brought up to Green Flag levels of quality increase by approximately 60,000 per year

Every park that reaches Green Flag quality sees an increase in annual visits.

- On average, annual visits to a park brought up to Green Flag levels of quality increase by approximately 60 thousand or 50%

However, large increases in a select number of parks can misrepresent the true change in annual visits brought about through higher greenspace quality, which, varies greatly from park to park.

- Changes to annual visits range from a 1,000 increase to 0.9 million increase relative to the baseline

- Greenspaces classified as district parks or destination parks typically experience the largest increase in annual visits as a result of reaching Green Flag levels of quality

☐ City of Bristol

⚑ Green Flag Award

Change in annual visits
- ■ <-10,000
- ■ -10,000 to 0
- ■ 0 to +1,000
- ■ +1,000 to +10,000
- ■ +10,000 to +100,000
- ■ > +100,000
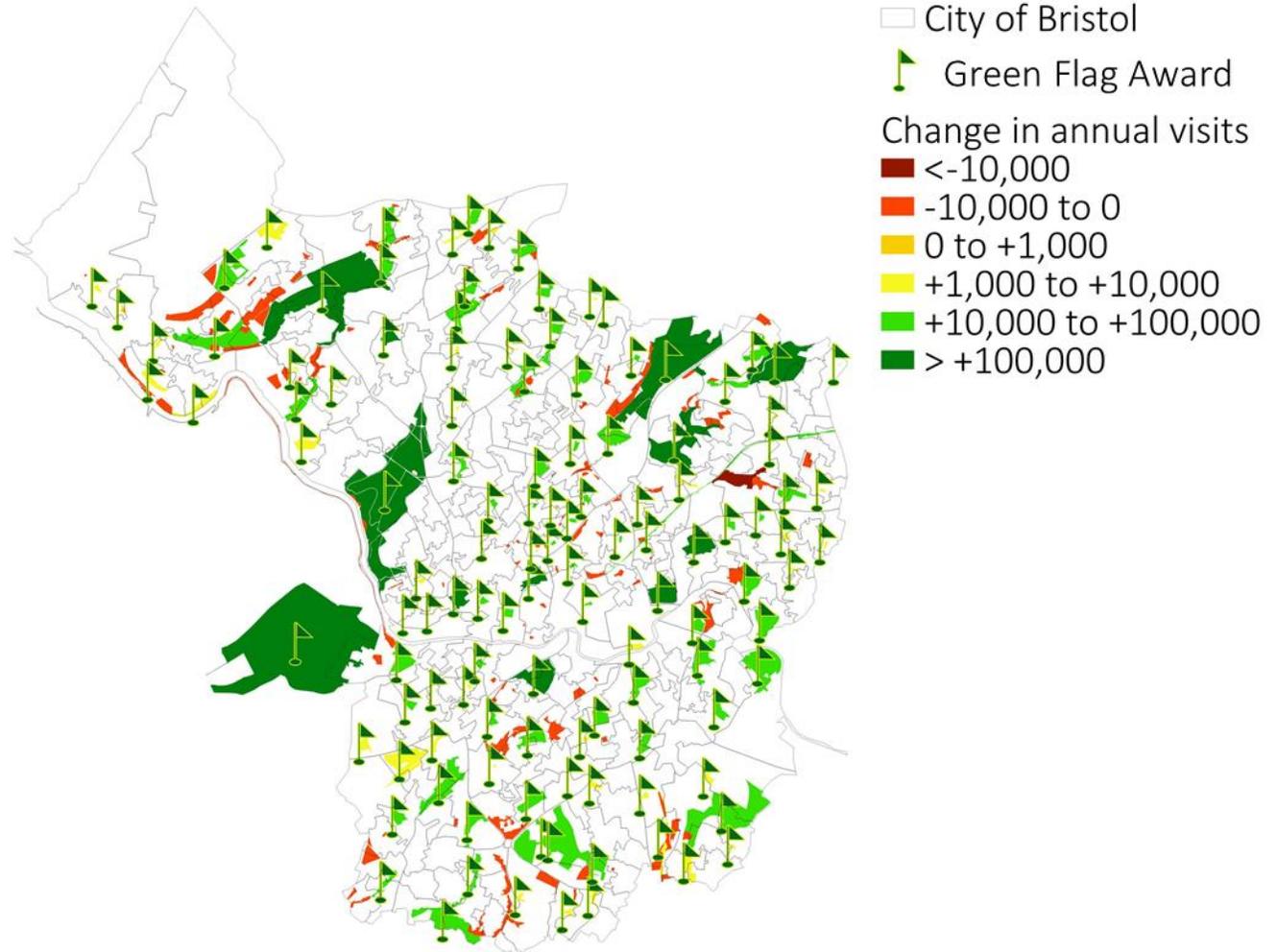
District and destination parks create 86% of all additional benefits, but significant increases from baseline values are seen across all classifications of greenspaces

While almost every district park and destination park receives a Green Flag Award under the 10 Minute Standard scenario, a large share of parks in the other classes of greenspaces do not. Accordingly, looking only at parks that are allocated Green Flag Awards is more informative since it filters out non-Green Flag Allocated parks where decreases in annual visits occur. As shown below, all greenspaces, regardless of their classification, are subject to a large increase in annual visits when expressed as a percentage of their baseline value.

46% average increase

300

■ Additional annual benefits from 10 Minute Standard scenario - Green Flag allocated parks

250

□ Total annual benefits - Bristol baseline, Green Flag allocated parks

£87

50% average increase

200

Estimated annual benefits

150

£189

45% average increase

£49

100

£21

£99

50% average increase

38% average increase

52% average increase

50

£1

£3

£46

0

£3

£5

Pocket Park   Other   Neighbourhood Park   District Park   Destination Park

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From an efficiency perspective, BCC should consider prioritising investments in parks where increased quality is expected to create the most value for visitors

Our analysis suggests that the marginal benefit of improving greenspace quality is higher for district and destination parks than for other greenspaces in Bristol.

On average, bringing a district or destination park to Green Flag level quality results in an additional £2.1 million and £9.6 million worth of health benefits annually, respectively. On the other hand, the average increase in annual benefits for the other classes of greenspaces are considerably lower. For example, allocating a Green Flag Award to a neighbourhood park results in additional health benefits of approximately £0.3 million per year on average. Accordingly, from an efficiency standpoint, there is a strong case for making investments in particular types of greenspaces over others, especially if the BCC is constrained by limited resources.

Category	Average increase in annual benefits (millions)	Average % increase in annual benefits
Pocket Park	< £0.1	38%
Other	£0.7	52%
Neighbourhood Park	£0.3	45%
District Park	£2.1	50%
Destination Park	£9.6	46%

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Annual visits and benefits are estimated to increase by 12% as a result of population change by 2043

Estimated annual visits (millions)		Estimated annual benefits (£ millions)	
Bristol Baseline	Bristol 2043	Bristol Baseline	Bristol 2043
17	19	385	432

Additional 2 million annual visits i.e. a 12% increase from the baseline NCA

Additional £47 million annual benefits i.e. a 12% increase from the baseline NCA

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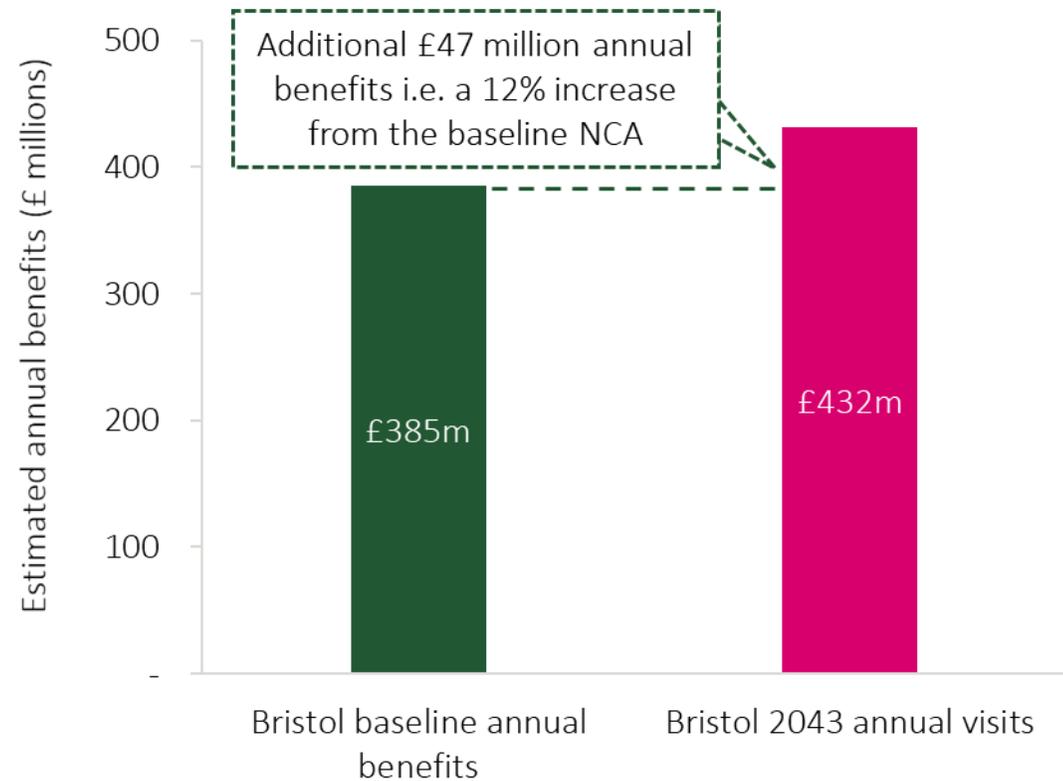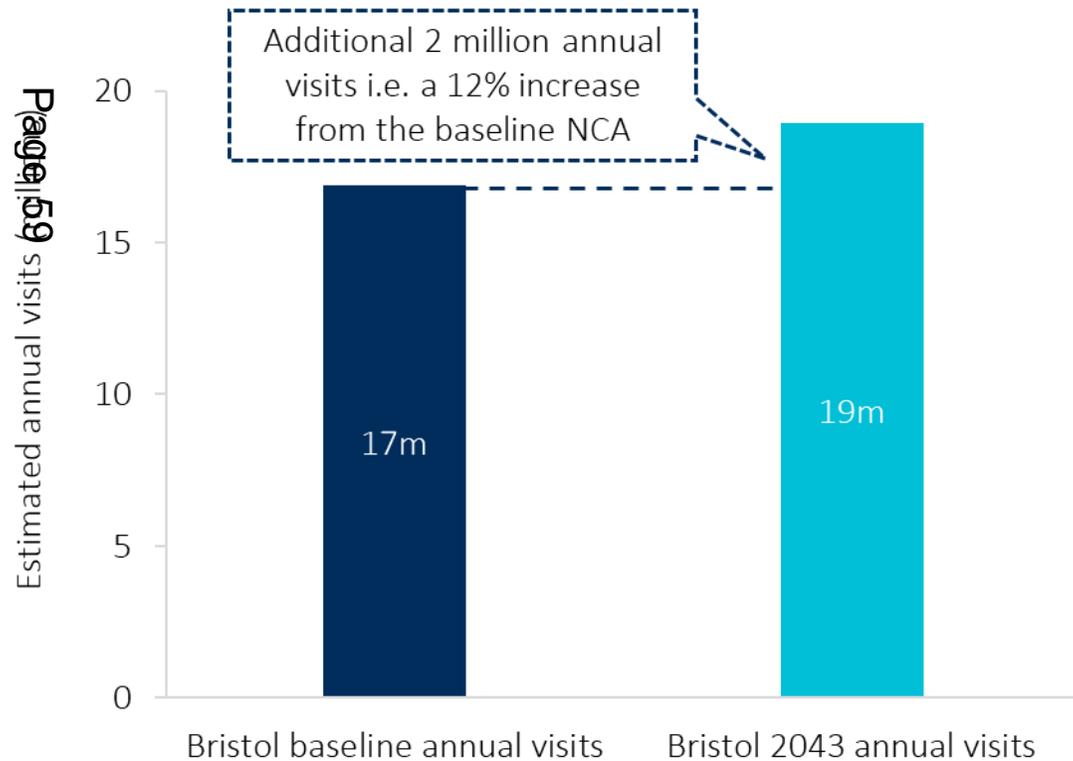
As found in the 10 Minute Standard Scenario, additional benefits in 2043 are primarily driven by improvements in mental wellbeing and physical health

The majority (92%) of additional benefits from population growth are attributable to mental wellbeing and physical health improvements for greenspace visitors. A further 8% is derived from additional property uplift, assuming that new dwellings are built to accommodate a growing population and that the distribution of said population within each LSOA remains relatively constant over time.

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Legend:
- Mental wellbeing
- Physical health
- Property uplift
- Carbon sequestration

Bristol baseline annual benefits by type
- £234m (Mental wellbeing)
- £127m (Physical health)
- £24m (Property uplift)
- £0.3 (Carbon sequestration)

Bristol 2043 annual visits
- £262m (Mental wellbeing)
- £142m (Physical health)
- £27m (Property uplift)
- £0.8 (Carbon sequestration)

X-axis: 0, 150, 300, 450, 600

Estimated annual benefits (£ millions)

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Increases in annual visits from population growth are distributed relatively equally across the different classes of parks in Bristol

Absolute changes in annual benefits in 2043 relative to baseline shows that destination parks and district parks see the most additional value as a result of population change. However, when expressed as a percentage of baseline benefits, annual benefits in 2043 are estimated to increase relatively equally across all classes of greenspaces—between 11% and 13%.

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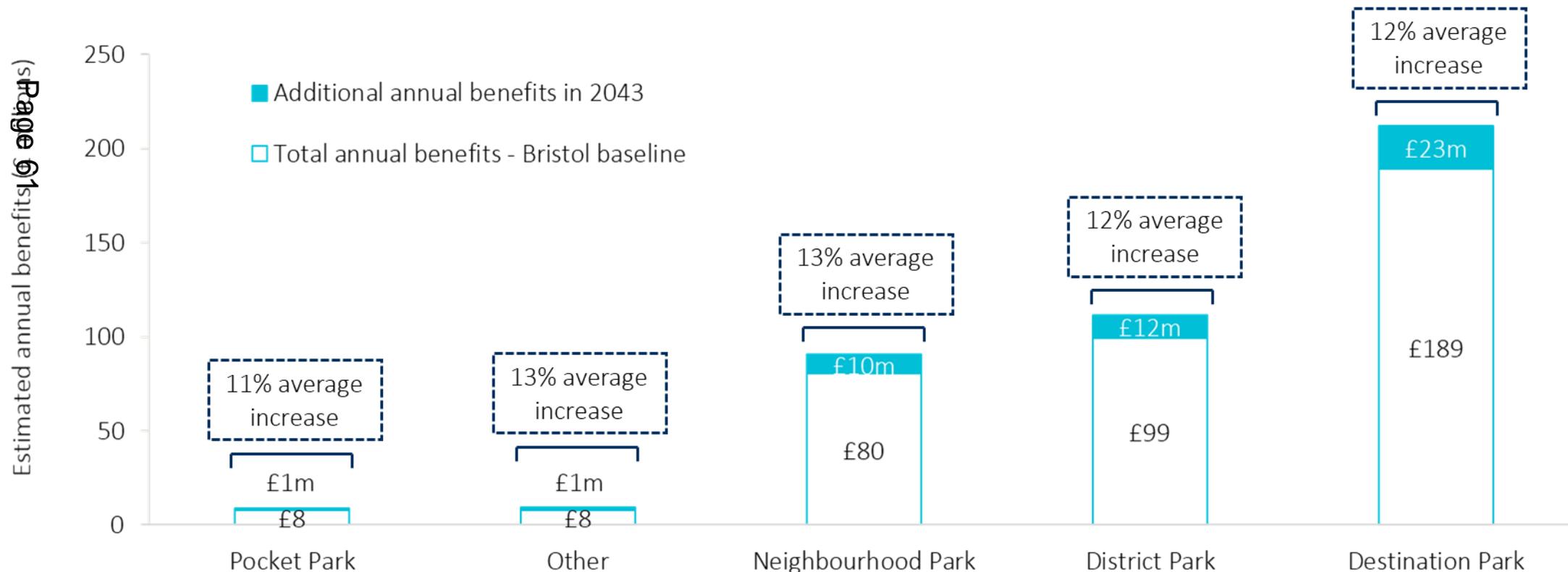
Implications of scenario analysis for BCC

Scenario 1: The 10 Minute Standard

- **The 10 Minute Standard could have a profound affect on annual visits to BCC greenspaces.** Interventions at this level of ambition and scale would be met with considerable benefits for human wellbeing and health.

- **The 10 Minute Standard is desirable from an equity standpoint.** Access to quality greenspaces is a large determinant of human health and wellbeing, and this scenario would make access nearly universal for all of Bristol's residents.

- **However, prioritising quality improvements in district parks and destination parks may be more efficient.** On average, interventions in these parks create considerably more annual benefits than what is seen in other classes of greenspaces.

Scenario 2: Bristol 2043

- **A larger population will create an increase in demand for greenspace across Bristol.** Overall, annual visits are projected to increase by 12%, with the largest numbers of new visits going to district and destination parks that are already highly visited.

- **BCC should consider where, and by how much, population will change in the coming decades when considering greenspace interventions.** In particular, areas with high projected population growth may not always have good access to high-quality public greenspace or alternatives such as private gardens and allotments. Targeting densely populated areas could be a beneficial strategy if ensuring access for new residents is a high priority.

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