Oxford City Council

Green Infrastructure Study

(2022)

Final Version (July 2022)

ethos
Environmental Planning

Ecology | Green Space | Community | GIS
Unit 1, Brassmill Lane Enterprise Centre | Bath | BA1 3JN
01225444114 | info@ethosep.co.uk
www.ethosep.co.uk

OXFORD CITY COUNCIL GREEN INFRASTRUCTURE STUDY

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EXECUTIVE SUMMARY

This study highlights the vital importance of Green Infrastructure (GI) and identifies and maps the strategic GI network within Oxford, which is comprised of various types of open space (public and private), green belt and agriculture land, blue infrastructure, designated sites, priority habitats and historic parks and gardens. Key strategic GI corridors have also been identified.

The principal focus of this GI study are the open spaces within the city which are freely accessible to the general public, including parks and recreation grounds, amenity green space, children's and youth play space and accessible natural green space. It also considers other types of open space which have varying levels of public access and use, including allotments, churchyards and cemeteries, outdoor sports space and private open space.

The study analyses the quality, multi-functionality and accessibility of open space, alongside a review of the environmental and socio-economic context of the city. It makes recommendations for improving GI to reduce these deficiencies and address local needs. This will help ensure that a connected and resilient GI network is protected and restored, and that new GI is created, in order to optimise the multiple functions and associated environmental, social and economic benefits it provides.

The study has been undertaken in accordance with the National Planning Policy Framework (NPPF, 2021) and Planning Policy Guidance Note 17 (PPG 17) and covers the following steps:

- Step 1: Identify the study context and local needs
- Step 2: Identify the GI network
- Step 3: Assess the quality, multi-functionality, and access to GI
- Step 4: Identify key strengths, gaps and deficiencies
- Step 5: Strategic priorities and recommendations

Key priorities within the city which GI can help tackle include mitigating and adapting to the impacts of climate change; improving physical and mental health and reducing health inequalities linked to deprivation; improving biodiversity; and supporting tourism and inward investment.

The quality audits undertaken in March 2022 assessed the majority of public open spaces (84%) as being good or excellent quality, however there are opportunities to improve quality, with 16% assessed as fair or poor quality (there may also be local aspirations that haven't been identified as part of the quality audits, irrespective of a sites quality score). The desk-based multifunctionality assessment found that generally high quality sites are delivering high numbers of functions. Sites delivering the highest number of functions tend to be parks and recreation grounds and accessible natural green spaces. Areas where there are lower levels of multifunctionality are in the south and east of the city (which generally corresponds with areas of high deprivation).

The access analysis found that there is generally good access to open space across the city, although there are significant gaps in access to certain typologies in some areas of the city, including allotment's, children's play space and accessible natural green space.

Recommendations are made for local plan policy relating to GI around the following areas: Protect what we have, enhance what we have, and create new GI. The study also touches on wider council action and delivery mechanisms.

1.0 INTRODUCTION

1.1 Overview

Ethos Environmental Planning was commissioned by Oxford City Council to produce a Green Infrastructure (GI) Study for the city. This will inform the development of the Council's new Local Plan, which will set out planning policy up to 2040.

Oxford's green infrastructure incorporates parks, meadows, playing pitches, cemeteries and allotments, as well as trees and hedgerows, but also blue spaces like the rivers and the canal.

The focus of the study is on the quality, multi-functionality and access to open space. It builds on and updates existing work undertaken for the current Local Plan (2036) evidence base - the Oxford Green Infrastructure Study and Appendix (2019) and the Oxford Parks and Open Spaces Strategy (2013-2027).

The UK government declaration of an environment and climate emergency in May 2019, and the legacy of Covid 19 has put the climate, environment, and health at the centre of government policy. This is also reflected locally within Oxford City's Corporate Plan and Local Plan Policy.

Good quality GI can provide multiple social, environmental, and economic benefits (also known as ecosystem services), which are essential in helping to combat the climate, nature and health crises. By protecting, restoring and creating good quality green infrastructure, we can help ensure that a network of healthy ecosystems and semi-natural areas is managed as a coherent and multifunctional resource i.e., the same area of land is able to perform several functions and offer multiple benefits, such as providing clean air and water; flood prevention, pollination, wildlife habitat, carbon capture and storage, providing space for recreation and connection with nature (among others).

The concept of GI is firmly embedded in the National Planning Policy Framework (NPPF), requiring local planning authorities to set out a strategic approach in their Local Plans, to maintaining and enhancing networks of habitats and green infrastructure, and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries.

1.2 Scope of the Study

1.2.1 Definition of GI

Green Infrastructure (GI) is a network of multi-functional green and blue spaces and other natural features, urban and rural, which is capable of delivering a wide range of environmental, economic, health and wellbeing benefits for nature, climate, local and wider communities and prosperity. (National Planning Policy Framework, 2021).

1.2.2 Scope of the Study

The principal focus of this GI Study are the open spaces[1] within the city which are freely accessible to the general public, including parks and recreation grounds, amenity green space, children's and youth play space and accessible natural green space. It also considers other types of open space which have varying levels of public access and use, including allotments, churchyards and cemeteries, outdoor sports space and private open space. These spaces form an important part of the overall GI network within the city. The wider GI network which includes blue GI assets, designated wildlife sites, natural heritage assets and green belt land is also covered as part of this study though to a lesser degree.

The study provides an up-to-date assessment of the type, location, and quantity of GI within Oxford. This is alongside an assessment of the quality, multi-functionality, and accessibility of open space. It identifies gaps and deficits within the GI network, and opportunities for addressing these, considering future need and contextual environmental and socio-economic challenges. Several draft policies and strategic recommendations have been set out around protecting, enhancing and providing new GI.

The study brief did not require the development of quantity standards for open space. Current policy aims to protect existing open space and GI (Local Plan 2036 Policies G1 – G8). The Council recognise that it is unlikely that the quantity of open spaces can be increased significantly within the city, due to the constrained nature of the city and competing priorities. Therefore, the focus for the Council is to improve the quality, multifunctionality and accessibility of existing open space.

A separate Playing Pitch Study (PPS) has been commissioned by the Council which covers formal playing pitch provision.

[1] The NPPF definition of open space: *All open space of public value, including not just land, but also areas of water (such as rivers, canals, lakes and reservoirs) which offer important opportunities for sport and recreation and can act as a visual amenity.*

1.2.3 Structure of the Study

The GI Study consists of the following parts:

- Main report (this report);
- Supporting appendices; and
- GIS database (provided to the Council) - this is a key resource drawing together all the relevant information on the GI network that can also inform future studies.

1.3 The Study Area

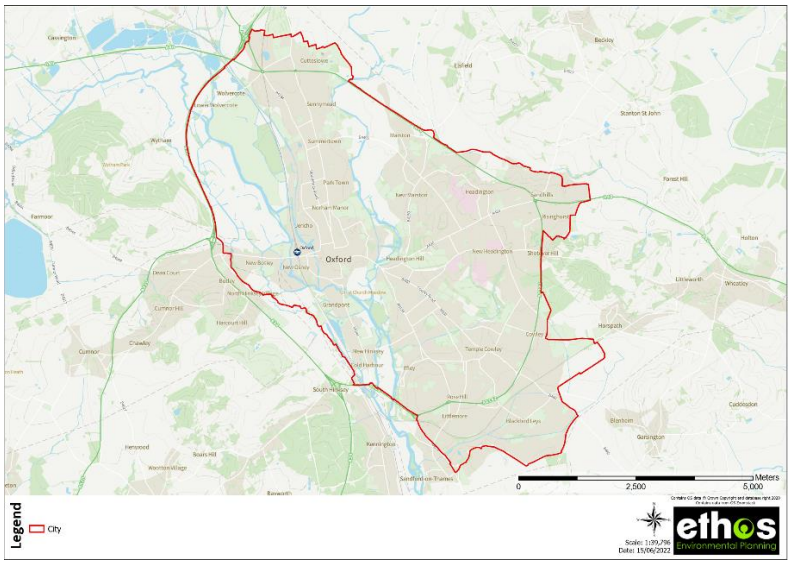


Figure 1 Study area

Oxford is a compact city with a population of 151,584[2], situated in central southern England. It has a world-renowned historic core, with the University of Oxford being one of the leading universities in the world. The wealth of historic and architectural assets in Oxford is a significant draw for investors, visitors, and those looking to locate in the city.

Beyond the historic core, the city is made up of a series of communities with clear and distinct identities and character. The city is at the centre of the Oxford Green Belt and has a rich natural environment. The two rivers (Thames and Cherwell) run through Oxford and meet south of the city centre. These rivers and their floodplains constrain the size of the city centre and are important for wildlife and provide opportunities for recreation. There are a number of designated wildlife sites within the city, of local, national and international importance.
There are a variety of open spaces which provide opportunities for formal and informal recreation across the city, and many of these are within the Green Belt. These provide a vital green lung to the city and are important for people's health and wellbeing. Key open spaces include the University Parks and Port Meadow.

Oxford is a major draw for visitors from overseas, domestic tourists and day visitors. It attracts approximately 7 million visitors per year and its role in the regional and national economy is vital.

[2] Census 2021 figures were not available at the time of writing therefore, ONS mid-year 2020 estimates have been used.

2.0 VALUING THE FUNCTIONS AND BENEFITS PROVIDED BY GI

2.1 Overview

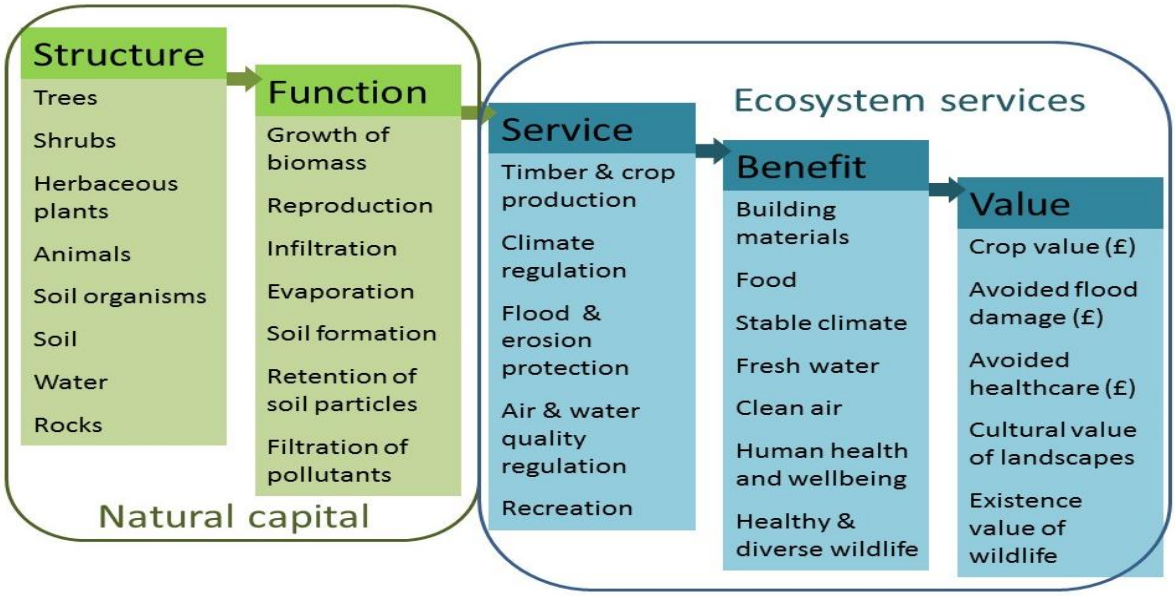


Figure 2 The ecosystem service cascade model[3]. It is important to see how the concept of natural capital with its focus on stocks (structure and function) has been conceptually linked to flows (service, benefit, and value) of ecosystem services.

GI takes many different forms and can be delivered at multiple scales. It provides multiple functions, which in turn provide significant environmental, social, and economic benefits (also known as ecosystem services). The key benefits provided by GI are set out in the table below.

Optimising the multifunctionality and resulting benefits provided by GI within the city will help the Council achieve their vision set out within 'Oxford City Council – Our Strategy 2020-24', which is:

*'**Building a world-class city for everyone** by creating successful places in which to live and work, supporting our communities and addressing the climate emergency, we will build a fairer, greener city in which everyone can thrive'.*

[3] M.B. Potschin, R.H. Haines-Young Ecosystem services: exploring a geographical perspective Prog. Phys. Geogr., 35 (5) (2011), pp. 575-594.

Table 1 Benefits provided by GI

Environmental
• Supports and provides biodiversity (which underpins healthy and resilient ecosystems) and species movement/dispersal including through providing habitat, wildlife corridors and stepping-stones. • Provides climate change mitigation and adaption e.g., through providing flood and soil erosion protection, carbon sequestration and storage, and urban cooling. • Improves air and water quality (pollution absorption and removal). • Enables food production and supports pollination. • Supports and creates attractive and sustainable places and landscapes i.e., quality placemaking.
Social/health and wellbeing
• Provides opportunities for outdoor recreation, exercise, play and access to nature. • Provides attractive and safe spaces for people to enjoy and improve social contacts – a key component of 'liveable' towns and cities where people want to live. • Supports the development of skills and capabilities. • Improves air and water quality, provides urban cooling and shade, reduces noise pollution. • Provides green active travel routes.
Economic
• Provides attractive places to live and work, attracting inward investment and tourism. • Increased land and property values. • Supports sustainable homes and communities e.g., through providing local food and building materials, encouraging low carbon lifestyles e.g., through well connected and attractive walking and cycling routes. • Provides health and wellbeing benefits that result in avoided healthcare costs. • Provides local food, energy, and timber production. • Climate change mitigation and adaption.

2.2 National Research

2.2.1 Outdoor Recreation Valuation (ORVal) Tool

The benefits provided by the natural environment are essential to our survival, health and wellbeing are now widely understood and evidenced. Nevertheless, the management and provision of GI can still be seen as a liability, rather than an asset, and the full extent of the benefits are often unrealised. However, a variety of natural capital accounting methodology and tools have now evolved to support decision makers and local government to understand the true value of their green estate.

An example is provided below, using the ORVal tool[4]. For Oxford, the tool estimates the following:

[4] Released in 2018, ORVal is a freely accessible web-based tool that predicts the number of visits to existing and new greenspaces in England and estimates the welfare value of those visits in monetary terms: https://www.leep.exeter.ac.uk/orval/

- Welfare Values: **£19,998,623** (Per Year)
- Estimated Visits: **6,428,998** (Per Year)

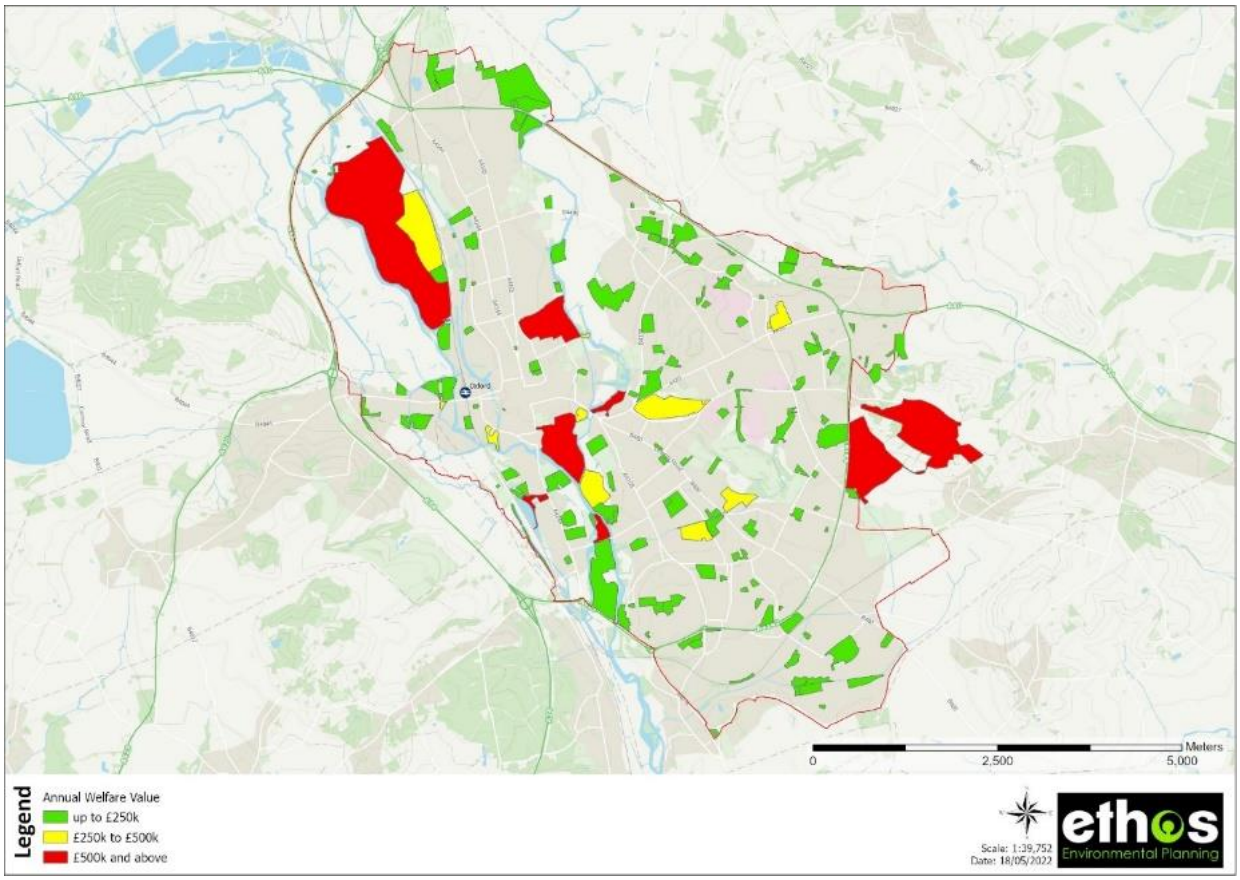


Figure 3 ORVal Tool - Open Space Annual Welfare Values

The annual welfare values for individual parks and open spaces included within the ORVal tool for Oxford are shown in the figure above. The green sites have been estimated to have an annual welfare value of up to £250k, the yellow ones up to £500k, and the red ones up to £1m.

2.2.2 Making Parks Count (The Parks Alliance (TPA), 2020)

This report makes the business case for parks, why they matter, and why they are a 'smart investment'. It illustrates how parks in England deliver over £6.6bn of health, climate change and environmental benefits each year including £2.2bn in avoided health costs alone and worth £140 per year for each urban resident. For every £1 spent on parks in England an estimated £7 in additional value for health and wellbeing and the environment is generated. Some of the other key figures referenced in the report are:

- Urban green spaces raise house prices by an average of £2,500;
- London's parks alone help avoid an estimated £370m of mental health related costs each year;
- Parks are among the most species rich types of urban green spaces, and over 1,500 species of UK's pollinators deliver an estimated £680m in value to the economy;

- The benefits of air pollutant removal by trees in public parks in England is estimated at £60m per year;
- The value of carbon sequestration by trees in public parks in England is estimated at £9m per year;
- Parks in England provide an urban cooling benefit of £4.8m per year.

2.2.3 Revaluing Parks and Green Spaces - Measuring their economic and wellbeing value to individuals (Fields in Trust (FIT), 2018)

This report provides a robust economic valuation of parks and green spaces in the UK as well as valuing improvements in health and wellbeing associated with their frequent use. This is the first research study on parks and green spaces to use welfare weighting methodology, allowing for more informed evidence-based policy decisions. The headline figures are:

- **The Total Economic Value to an individual is £30.24 per year** (£2.52 per month), and includes benefits gained from using their local park or green space and non-use benefits such as the preservation of parks for future generations. The value of parks and green spaces is higher for individuals from lower socio-economic groups and from black and minority ethnic backgrounds. The findings show that any loss of parks and green spaces will disproportionately impact disadvantaged and underrepresented communities, precisely those who value them the most.
- **The Wellbeing Value associated with the frequent use of local parks and green spaces is worth £34.2 billion per year** to the entire UK adult population.
- **Parks and green spaces are estimated to save the NHS around £111 million per year** based solely on a reduction in GP visits and excluding any additional savings from prescribing or referrals.

2.2.4 The importance of grasslands in resilience to climate change

The importance of woodland and trees in storing and capturing carbon is widely understood. However other habitat types[5], including grasslands are also vital in mitigating and adapting to climate change.

Wildflower meadows and species rich grassland habitats capture and store carbon within vegetation and the soil (soil is the planet's second largest active store of carbon after the oceans[6]). Research has also shown that greater grassland floral species diversity leads to enhanced carbon capture and storage[7]. This highlights the importance of open spaces within Oxford such as Port Meadow and Wolvercote Common in contributing to reducing the scale and future impacts of climate change. These sites have been highlighted on the canopy cover map (see Section 4.3.2).

[5] Marine ecosystems are the largest long-term sink for carbon in the biosphere, storing and cycling an estimated 93% of the Earth's CO_2. Wetland habitats also store high levels of carbon: https://www.eea.europa.eu/publications/carbon-stocks-and-sequestration-rates

[6] https://www.eea.europa.eu/signals/signals-2015/articles/soil-and-climate-change

[7] https://www.pnas.org/content/115/16/4027#ref-6

Huge carbon stores under grasslands discovered

Published in the leading journal Global Change Biology[8], the study shows that decades of intensive grassland farming across the UK, involving high rates of fertilizer use and livestock grazing, have caused valuable soil carbon stocks to decline.

They found 60% of the UK's total soil carbon stored in grasslands - which cover around a third of UK land surface - is between 30cm and 1 metre deep, and that this deep carbon is sensitive to the way land has been farmed. The findings suggest that by managing our grasslands in a less intensive way, soil carbon storage could be important to our future global carbon targets, as well as bringing benefits for biodiversity conservation.

2.3 Regional and Local Research

2.3.1 The value and benefits from the ecosystem services of the OxCam Arc[9]

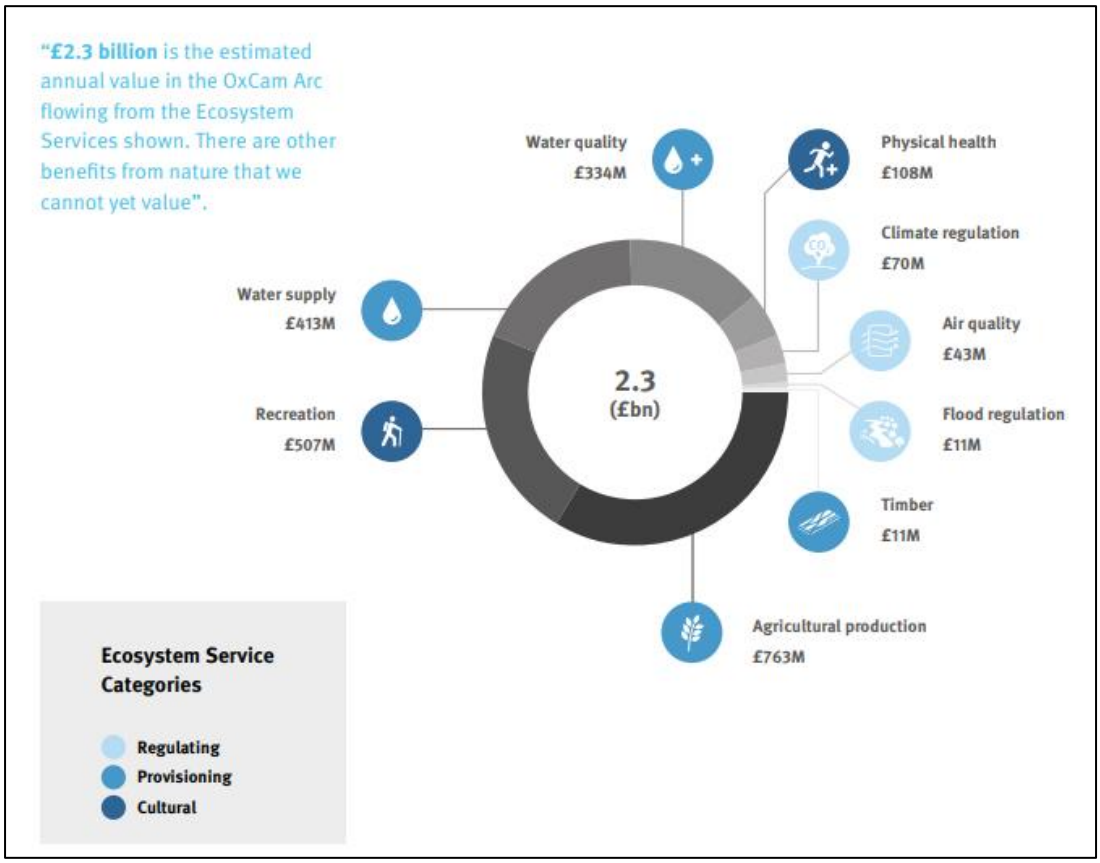


Figure 4 The value and benefits from Ecosystem Services of the OxCam Arc (Extracted from report: The Natural Capital Story of the OxCam Arc).

[8] Legacy effects of grassland management on soil carbon to depth (February 2016) https://onlinelibrary.wiley.com/doi/full/10.1111/gcb.13246

[9] The Oxford to Cambridge (OxCam) Arc is the name given to a cross-government initiative that supports planning for the future of the five ceremonial counties of Oxfordshire, Bedfordshire, Buckinghamshire, Cambridgeshire and Northamptonshire up until 2050. https://www.oxcamlncp.org/

2.3.2 Oxford i-Tree Study

The Oxford Urban Forest Strategy[10] highlights the value of its trees, as summarised below.

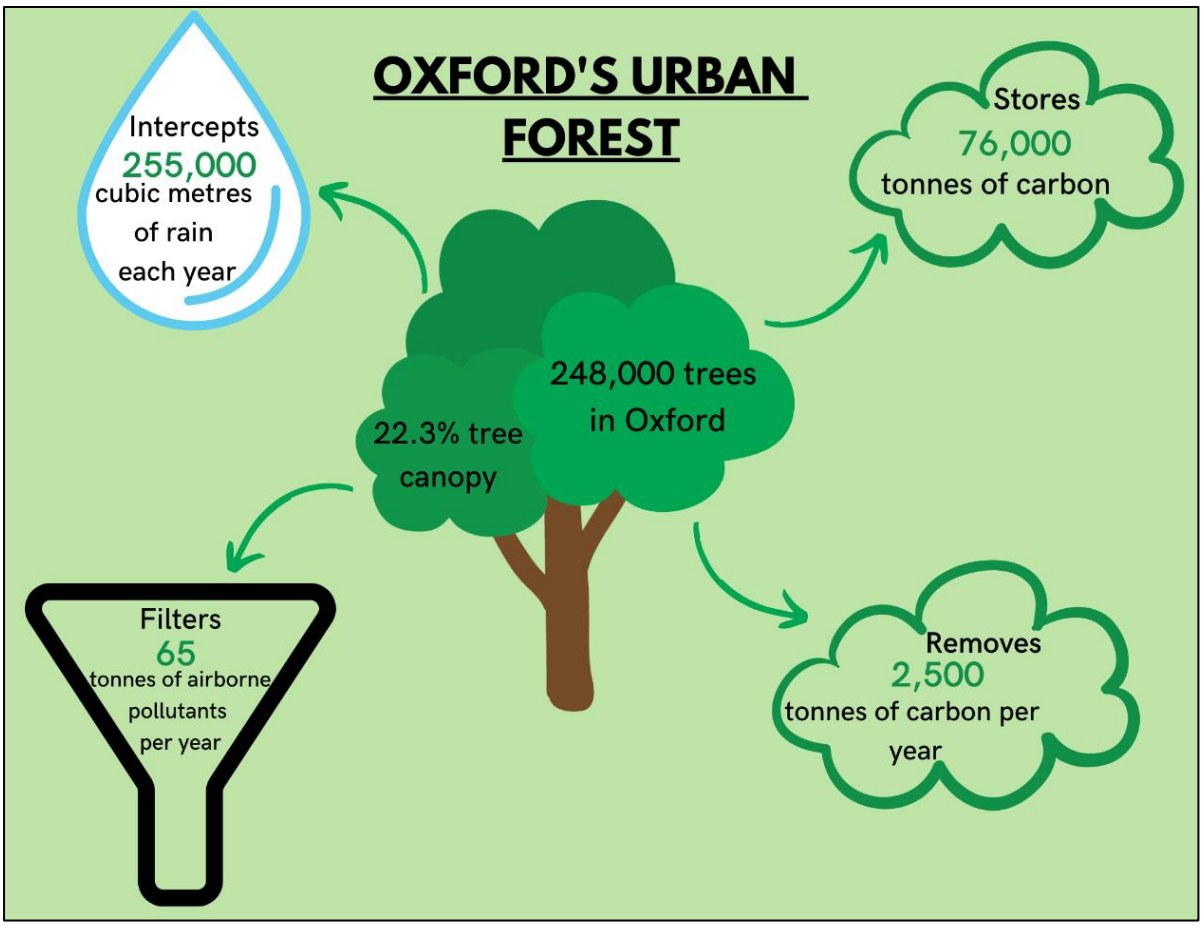


Figure 5 The value of Oxford's urban forest

[10] https://www.oxford.gov.uk/info/20198/trees_woodlands_and_hedges/1482/trees_and_our_urban_forest

3.0 METHODOLOGY

3.1 Overview

The study has been undertaken in accordance with the National Planning Policy Framework (NPPF, 2021) and National Planning Practice Guidance (NPPG)[11] which requires that local planning authorities to set out a strategic approach in their Local Plans, to maintaining and enhancing networks of habitats and green infrastructure.

There is no national guidance available on how to conduct a GI Study. The overall approach adopted for this study has been guided by Planning Policy Guidance Note 17 (PPG 17)[12] and is summarised below:

- Step 1: Identify the study context and local needs
- Step 2: Identify the GI network
- Step 3: Assess the quality, multi-functionality, and access to GI[13]
- Step 4: Identify key strengths, gaps and deficiencies
- Step 5: Strategic priorities and recommendations

The methods and techniques that have been employed within this study are explained at the relevant point in the report and summarised below.

3.2 Identify the study context and local needs (Step 1)

The brief for the study did not require consultation to identify local need. However, local needs have been identified through the following:

- A review of relevant strategies and policies and the local, regional and national level.
- A review of the spatial context of the area, considering key contextual information such as biodiversity, access to gardens, flooding, and levels of deprivation.
- A review of consultation findings from relevant studies such as the recent Local Plan 2040 issues consultation (conducted summer 2021).

These findings have been used to identify key issues that the strategy needs to address.

[11] NPPG is a web-based resource which brings together guidance on various planning topics in one place. It largely draws on the government's planning policies within the NPPF.

[12] Although PPG 17 has been omitted from the NPPF, and the government has not published anything specifically to replace this document, there is still a clear reference made to the principles and ideology established in PPG 17. Therefore, it is logical and acceptable to utilise this guidance, which is a tried and tested methodology and takes a consistent approach with many other local authorities.

[13] Quality and access standards are only proposed for publicly accessible open space. It was not part of the remit of this study to set provision standards for the wider GI network. National Standards for GI are currently being developed by Natural England as part of their GI Standards Framework.

3.3 Identify the GI network (Step 2)

In order to build up an accurate picture of the current GI provision in Oxford, an initial GIS desktop audit of the open space and wider GI assets was carried out, which included a review of Council GIS data, open data, Ordnance Survey data and use of aerial photography. Sites were mapped using ArcGIS. Further detail is provided in Section 5 of this report.

3.4 Assess the accessibility, quality and multi-functionality of GI (Step 3)

3.4.1 Access

Evidence from previous studies and consideration of national benchmarks have been used to develop access standards for open space. Standards are expressed as walk time buffers and take account of barriers to access. A series of maps assessing access for different typologies are presented in Section 6.3 of this report.

3.4.2 Quality

Site visits were undertaken by Ethos at 248 open spaces to assess the existing quality of sites, as well as checking accessibility/typologies/site boundaries where there was any uncertainty from the desktop mapping. The methodology and summary of results from the quality audits are included in Section 6.1 of this report.

3.4.3 Multi-functionality

A desktop analysis was undertaken to provide an indication of the number of functions a site provides, based on a set of agreed measurable criteria. This was applied across the wider GI network. Multi functionality is picked up to a degree within the quality audits. Further detail and the results of the multi-functionality assessment are provided in Section 6.2.

3.5 Identify key strengths gaps and deficiencies (Step 4)

Following steps 1 to 3 above, a summary of the key strengths, gaps and deficits relating to Oxford's GI network has been provided (see Section 7).

3.6 Strategic priorities and recommendations (Step 5)

Strategic options and policy recommendations have been made under the following areas:

- Protect what we have
- Enhance what we have
- Provide new GI

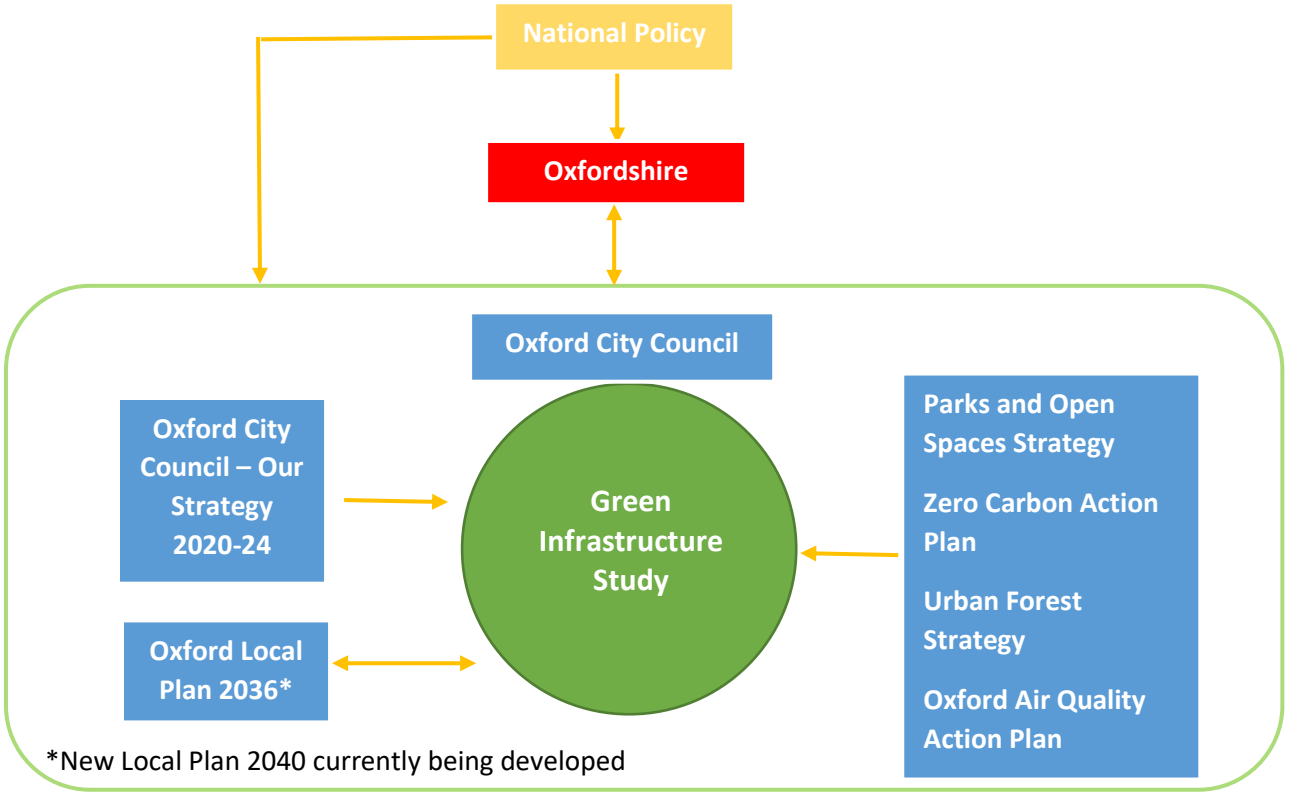
This section also considers some of the key GI delivery mechanisms.

4.0 STUDY CONTEXT AND LOCAL NEEDS (STEP 1)

4.1 Overview

This section of the report provides a summary of the key national, regional, and local policies and strategies of relevance to the GI Study[14], with further detail provided at Appendix 1. It also includes an overview of the local environmental and socio-economic context, and a summary of results from recent relevant public consultation.

4.2 Policy Context



4.2.1 National

The **UK government declaration of an environment and climate emergency** in May 2019 has put climate and the environment at the centre of government policy. The government has made a legally binding commitment to achieve net zero emissions by 2050 (through the **Climate Change Act 2008**, as amended in 2019), and has committed to planting 30,000 hectares of trees annually by 2025 (through the **England Trees Action Plan 2021-24**), helping to form part of the green recovery from Covid-19 and support the transition to net zero. In September 2020, the Prime Minister signed the Leaders Pledge for Nature, committing to

[14] Policies and strategies are subject to regular change, therefore the summary provided in this section was correct at the time of writing. Oxford City Council reserve the right to change and update this section as policies change.

protect 30% of the UK's land by 2030, to protect nature and boost biodiversity, as well as committing to prioritise a green recovery following the coronavirus pandemic.
The **National Planning Policy Framework (NPPF) (July 2021)** sets out the government's planning policies for England. This is supported by the **National Planning Practice Guidance (NPPG)** website, which includes guidance on key areas such as design, which is fundamental to achieving high quality GI and livable places. **The National Design Guide** illustrates how well-designed places that are beautiful, healthy, greener, enduring and successful can be achieved in practice.

The **Levelling Up and Regeneration Bill (2022)** provides a framework for levelling up to ensure all parts of the country share equally in the nation's success. Ensuring new development meets clear design standards which reflect community views is a key part of this.

The government's **25 Year Environment Plan** sets out an ambition to develop a growing and resilient network of land, water and sea that is richer in plants and wildlife. The **Nature Recovery Network (NRN)** is a key policy commitment. **The Environment Act (2021)** places the 25 YEP on statutory footing and will include mandating developments to achieve at least 10% Biodiversity Net Gain.

Natural England's **National Green Infrastructure Framework** will be fully available in autumn 2022. It will establish national Standards for GI in England and will include GI Principles, a GI mapping database and analysis[15], Design Guide and Case Studies. It will support existing national GI standards such as **Building with Nature**[16].

4.2.2 Regional

The **Emerging Oxfordshire Nature Recovery Network (NRN)**[17] aims to protect and restore wildlife, as well as providing greater public enjoyment of the countryside, increased carbon capture, and improvements in water quality and flood management. It aims to double the extent of land of high value for nature in the county by 2050. The draft network map sets out core habitat zones and the recovery zone for targeting improvements.

The overarching objective of the **OxCam Local Natural Capital Plan**[18] is to enable delivery of environmental protection and enhancement in the OxCam Arc. Baseline mapping of environmental assets identifies the most important assets, and the benefits and values (ecosystem services) that flow from them, that should be protected. A series of ecosystem service maps show where there are relatively high and low levels of the service present. The Natural Capital Account provides figures for the value of the ecosystem.

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[15] This study provides a more in-depth analysis of GI provision within Oxford and provides a more localised dataset to supplement this national mapping database.
[16] Building with Nature is the UK's first benchmark for GI. It provides a framework of robust, and evidence-based quality standards which define what good looks like at each stage of the planning process, so that developments deliver for the natural world and healthy communities. It can be used to guide physical development and also strategic planning policy documents, and there are accreditation options available for both physical developments and policy documents.
[17] https://www.wildoxfordshire.org.uk/biodiversity/oxfordshires-nature-recovery-network/
[18] https://www.oxcamlncp.org/our-project

4.2.3 Local

The adopted **Oxford Local Plan 2036**[19]sets out how the shape of the city up till 2036, guiding new development whilst protecting the existing landscape of Oxford and improving the future of the city's people and the environment. The local plan recognises the importance of protecting and enhancing Oxford's green and blue infrastructure network to ensure that Oxford is a healthy and attractive place, biodiversity is protected and enhanced, and the city can cope with the impacts of climate change. It acknowledges that due to the compact nature of the city, which has to accommodate new development, that quality of and accessibility to green and blue spaces is essential.

The Council is currently preparing its new Local Plan 2040, which will replace the Local Plan 2036. The findings from this study will form a key piece of background evidence supporting the new policy framework.

The **Oxford Green Infrastructure Study (2019)**[20] was produced by the Council to inform the Oxford Local Plan 2036 about how green and blue spaces are used and provided. The results of the study are reflected in the Local Plan policies map, which maps the Green and Blue Infrastructure Network. The study helps to meet the objectives set out in the Green Space Strategy and the Oxford Biodiversity Action Plan[21].

The **Oxford Green Spaces Strategy 2013-2027**[22] sets out a vision and objectives for how the city's green spaces should be planned and managed over a period of 15 years. The strategy looks at protecting and improving parks and open spaces alongside how they should be managed. It also looks at the ways in which this can be done in a coordinated way along with providing value for money. Additionally, the strategy provides the Council with a basis to make development decisions and negotiating planning gain.

The **Oxford Air Quality Action Plan (AQAP)**[23] sets out the action the Council will take to improve air quality in Oxford from 2021 – 2025. The main aim of the plan is to reduce NO_2.

Following Oxford City Council's declaration of a climate emergency in 2019, the **Zero Carbon Action Plan**[24] was developed which sets out what is required to achieve net zero carbon emissions in Oxford by 2040. It provides five yearly carbon targets for the city using a co-benefits approach to show that becoming zero carbon can improve lives through clean air, better health and green spaces.

[19] https://www.oxford.gov.uk/info/20067/planning_policy/1311/oxford_local_plan_2016-2036
[20] https://www.oxford.gov.uk/downloads/file/5749/grs8_-_oxford_green_infrastructure_study
[21] https://www.oxford.gov.uk/downloads/file/2109/biodiversity_action_plan_2015-20
[22] https://www.oxford.gov.uk/downloads/file/2874/green_space_strategy_2013-2027
[23] https://www.oxford.gov.uk/downloads/20052/air_quality
[24] https://www.oxford.gov.uk/downloads/download/1221/zero_carbon_action_plan

The **Urban Forest Strategy**[25]aims to protect, manage, grow, and expand Oxford's urban forest in light of the climate and ecological emergencies. The strategy follows the principle of "right tree, right place" seeking to ensure that high quality planting will maximise benefits for nature and for people.

4.3 Environmental, socio economic and health context

4.3.1 Identification of priority areas

There are a number of environmental and socio-economic factors which contribute to health outcomes within the city. The study has considered several datasets to help prioritise areas of the city where GI provision and enhancement can contribute to improved health and wellbeing.

A Public Health England report[26] highlights that improving access to quality green space has the potential to improve health outcomes for the whole population, in a number of ways:

- Promoting health behaviour including encouraging physical activity and active travel;
- Improving social contacts and giving people a sense of familiarity and belonging;
- Supporting the development of skills and capabilities; and
- Mediating potential harms posed by the local environment for example air pollution, heat, noise and flood risk.

However, this is particularly true for disadvantaged communities, who appear to accrue an even greater health benefit from living in a greener environment. This means that green space also can be an important tool in the ambition to increase healthy life expectancy and narrow the gap between the life chances of the richest and poorest in society. This is also known as equigenesis, which is a term that comes out of the health field to refer to when something in the environment disrupts the usual relationship between economic disadvantage and a poor health outcome, making lower and higher economic status groups more equal.[27]

A summary of the contextual data used in the prioritisation is provided below.

Indices of Multiple Deprivation (IMD)

IMD provides a set of relative measures of deprivation. Although there is generally good health across the general population within Oxford, some areas of the city fall within the highest levels of deprivation within the country, and large health and socio-economic inequalities are generally associated with these areas. High levels of deprivation exist in the south of the city, with pockets in the centre and eastern areas (Further information on IMD is provided in Appendix 1).

[25] https://www.oxford.gov.uk/downloads/file/7722/urban_forest_strategy_september_2021
[26] Public Health England Report - Improving access to greenspace: a new review for 2020
[27] The Equigenic Effect: How Nature Access Can Level the Playing Field for Children - Children and Nature Network

Population density

Densely populated cities tend to have good access to public transport, local shops and services, with good levels of active travel (walking, cycling). A basic access analysis has been undertaken by Ethos to understand if and where there are gaps in access to the city and district centres, using a 15-minute walk time buffer (See section 4.3.7).

Environmental conditions can also be worse in densely populated areas e.g., air pollution from high levels of transport, and urban stressors can be increased e.g., noise pollution, vandalism, crime. Evidence shows that increased residential density can be associated with a higher risk of mortality[28].

More people in an area will also result in higher demands on services and facilities, including public open space. Conversely, more people are also likely to benefit from targeted interventions in these areas. High quality design and management of open space within areas of high population density will be important in terms of optimising the multi-functionality and carrying capacity of public open space.

Areas with high population density and high levels of deprivation (see section 4.3.4 below) will be some of the highest priority areas for green infrastructure interventions to help improve health outcomes. A population density map is provided at Appendix 1.

Environmental conditions

Environmental issues linked to climate change, such as increasing urban temperatures, localised flooding, water quality and poor air quality can also have a negative impact on health and wellbeing (further information is provided in Appendix 1). The prioritisation below drew on surface water flooding data from the Environment Agency. Urban heat and air pollution data is only available at 1km^2 resolution (see Appendix 1) which isn't granular enough for analysis at the LSOA scale. However, it is reasonable to assume that denser, urbanised areas of the city are likely to be more at risk from heat stress due to the Urban Heat Island effect and exacerbated by increasing temperatures due to climate change. Future work/analysis could therefore consider these issues in addition to help further identify priorities.

Access to private gardens, open space and tree canopy cover:

As already discussed, there is increasing evidence demonstrating the benefits that the natural environment can provide to human health and wellbeing. Greenspace, such as parks, gardens, woodland, fields, Public Rights of Way and allotments as well as natural elements including street trees, green walls, roofs and incidental vegetation, are increasingly being recognised as important assets for supporting health and wellbeing. The open space GIS dataset was a key output of this study and is covered in Section 5.3. Access to different types of publicly accessible open space is also covered in Section 6.3.

There is increasing evidence showing how important gardens and gardening are for physical mental and social wellbeing. Gardens can also be important for wildlife, alongside helping to

[28] https://www.sciencedirect.com/science/article/pii/S1353829218300881

reduce flood risk and improve water quality through attenuating rainwater. Access to private gardens data is provided at Appendix 1.

Trees not only help to break up urban fabric and improve quality of a place, but also provide a range of benefits as summarised in Section 4.3.2. Tree canopy cover analysis has been undertaken by Ethos and is summarised in Section 4.3.2 below.

Prioritisation criteria

Small geographical areas (Lower Super Output Areas (LSOAs)) have been used as the basis for mapping and identifying key contextual issues within the city. Table 2 below sets out the datasets and criteria that have been used.

For each criteria, the median figure across all LSOAs was used as the threshold for counting it as a priority factor (for example, the IMD median score across all LSOAs in the city is 6, and therefore any LSOAs with a decile of 5 or below have been identified as a priority for this criterion), the exception being tree canopy cover which was set at 20% in accordance with the target set by Forest Research for urban areas.

Table 2 LSOA prioritisation criteria

Dataset/Priority Factor	Criteria
1. Index of Multiple Deprivation (2019)	IMD decile of 5 or below
2. Population Density (ONS Mid-year estimate 2020)	4773 people per Sq Km or above
3. Tree Canopy Cover (Ethos APGB analysis 2m+)	Tree canopy cover below 20%
4. Number of Addresses with Access to Private Gardens (ONS 2020)	87% or below
5. Percentage of Open Space (Ethos open space mapping 2022)	9.9% or below
6. Percentage at Risk of Surface Water Flooding 1in1000 chance (Environment Agency 2022)	14% or below

Results

The resulting map below brings together the scoring for each of the individual priorities highlighted above. It indicates the areas with the highest number of priority factors (symbolized with red and dark orange). They primarily fall in the south and east and part of the city centre. These areas could therefore be considered as priority areas for enhancing GI provision and/or quality based upon this initial contextual analysis.

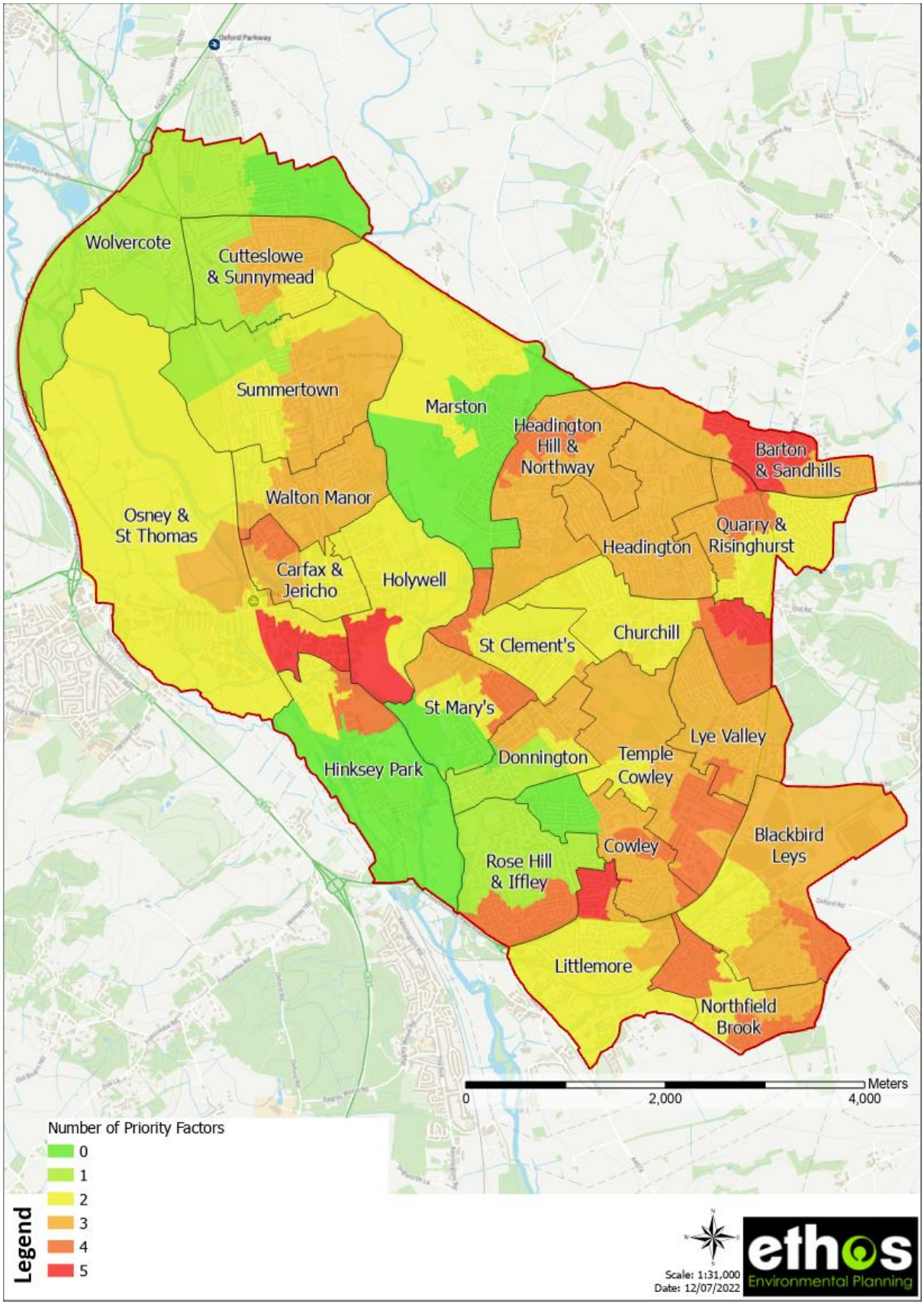
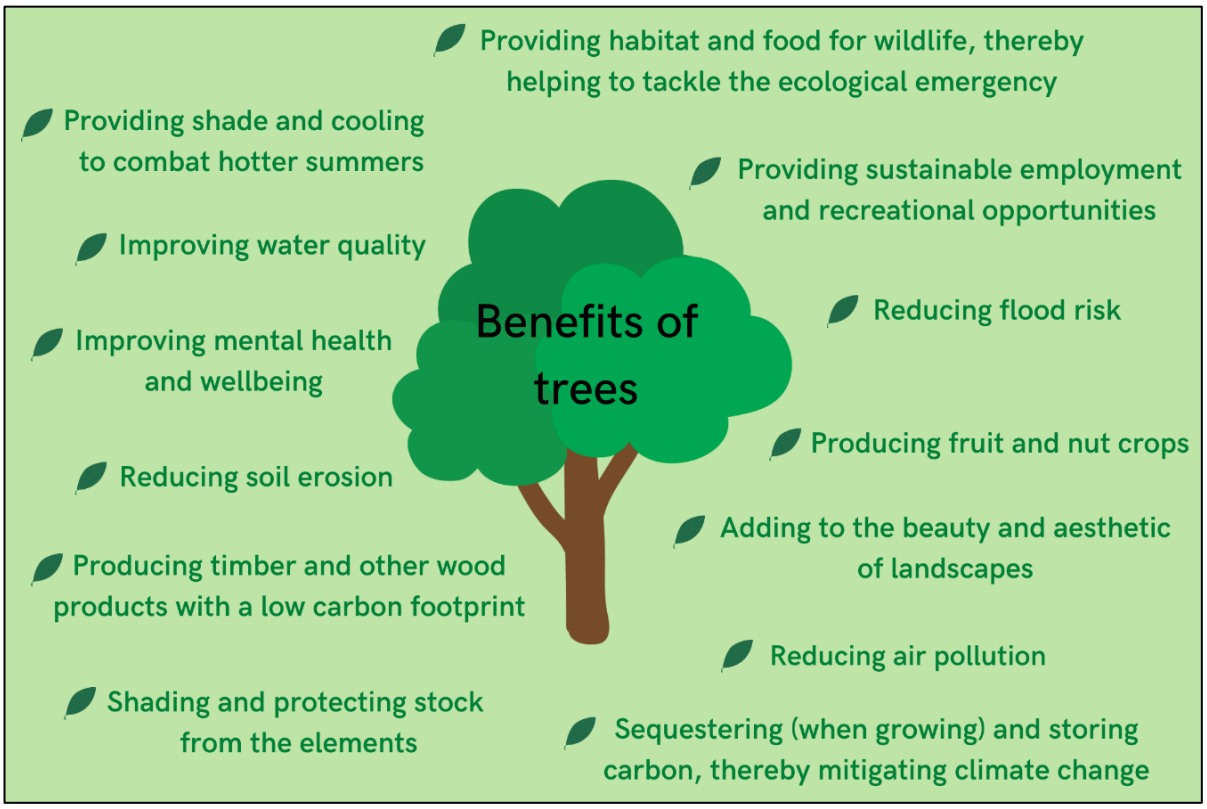


Figure 6 Priority areas (where red areas have the highest number of priority factors)

4.3.2 Canopy Cover



The Oxford Urban Forest Strategy estimates that the urban forest in Oxford contains approximately 248,000 trees which equates to a total canopy cover of **22.3%**[29]. This is above the 20% minimum recommended by Forest Research for urban areas.

Ethos have also developed their own methodology for assessing canopy cover (see Appendix 3 for methodology), which is based on the latest LIDAR imaging provided by Bluesky International. This allows the option to recalculate every time new imagery is created (currently every 3 years). This method gives more accuracy than the random samples used in the i-Tree canopy cover assessment and can be robustly repeated. It is also able to be more height sensitive; it can pick up shrubs / hedges and emerging trees at 2-3m, and maturing or mature trees at 3m+. In addition, the i-Tree canopy cover assessment only provides figures at ward level, whereas LIDAR-derived canopy is a truly spatial dataset meaning that it can be used to calculate canopy cover statistics at any geographical scale.

The resulting dataset indicates a canopy cover of 17.74% (for mature trees at 3m+) for the city. When including trees/vegetation above 2m in height, this results in a canopy cover of 21.02% (shown spatially in Figure 7 below).

[29] Urban Forest Strategy estimate is based on Treeconomics i-Tree canopy cover assessment (2015)

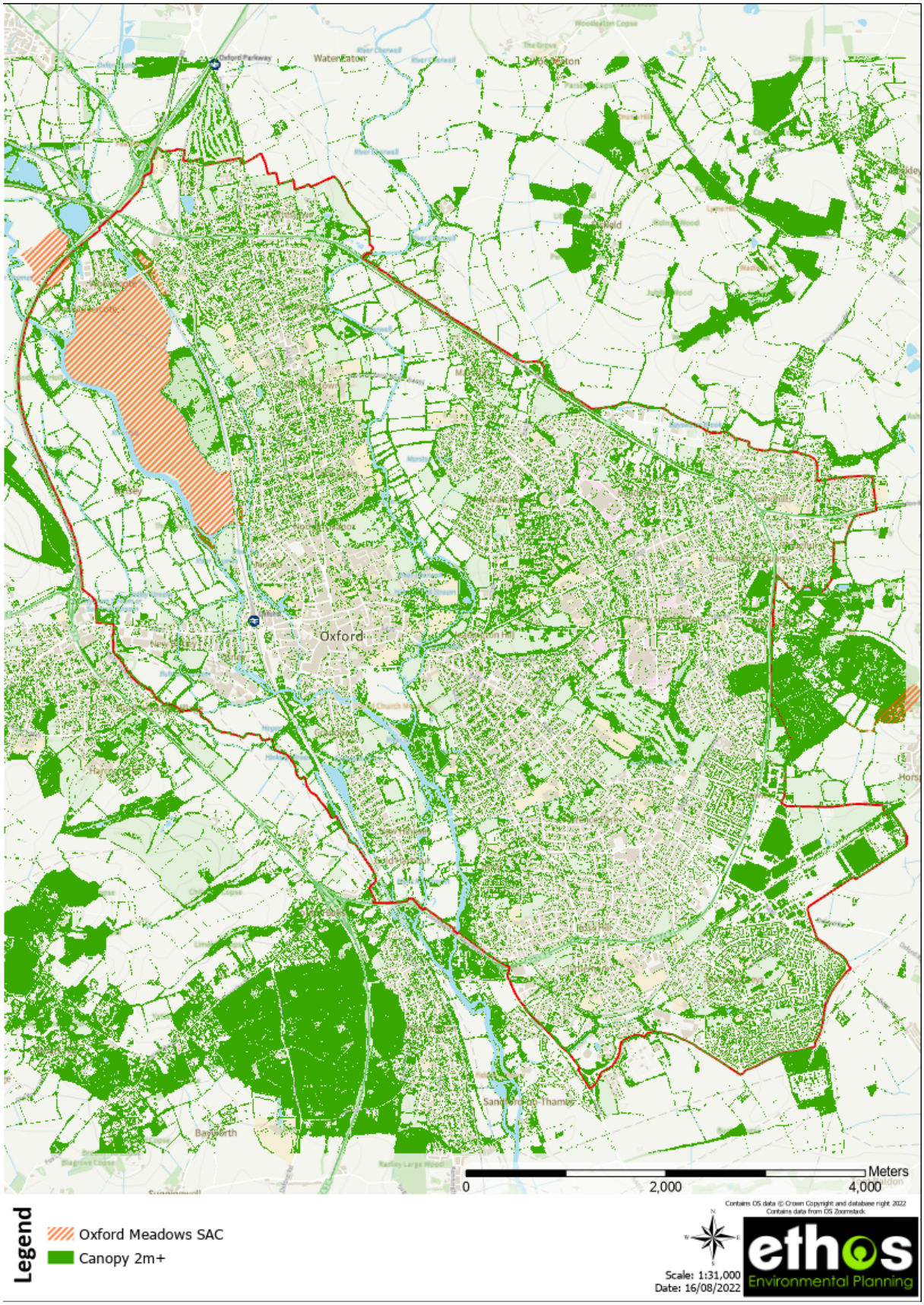


Figure 7 Ethos Canopy Cover Map (2m+ height vegetation height derived from 2020 APGB)

Port Meadow and Wolvercote Common are important grassland sites (designated as Oxford Meadows Special Area of Conservation) which have been shaded out in pink on the canopy

map above. The lack of trees here reflects the character of the land, and this area is not appropriate for tree planting (in accordance with the right tree, right place, right reason principle). Other areas with a lack of trees e.g., dense urban areas with narrow streets, such as Jericho, will be unlikely to be able to support opportunities for significant tree planting in the near future, without a significant change to the layout of the streets/urban environment. However, there may be opportunities in more open areas.

4.3.3 Comparing tree canopy cover with IMD

The percentage canopy cover by ward (using Ethos 2m+ height analysis) is provided in the table below.

As can be seen from the table below, generally levels of canopy cover within wards are above the 20% minimum recommendation by Forest Research (however this does not mean that tree cover should not be increased in these areas). The ward with the lowest percentage of canopy cover and also a high level of deprivation is Blackbird Leys – this ward could therefore be a priority for tree planting.

Table 3 Ward canopy cover and IMD

Ward	Canopy Cover (%) – Ethos analysis 2m+	Highest level of deprivation in ward (1 is most deprived).
Barton & Sandhills	21.82	2
Blackbird Leys	9.69	2
Carfax & Jericho	15.9	6
Churchill	28.1	3
Cowley	19.71	4
Cutteslowe & Sunnymead	31.02	4
Donnington	22.28	4
Headington	28.33	9
Headington Hill & Northway	32.54	5
Hinksey Park	24.07	4
Holywell	22.42	2
Littlemore	22.54	2
Lye Valley	22.74	5
Marston	22.59	7
Northfield Brook	19.62	1
Osney & St Thomas	11.64	7
Quarry & Risinghurst	29.45	4
Rose Hill & Iffley	30.26	2
St Clement's	27.64	3
St Mary's	33.27	5
Summertown	26.36	8
Temple Cowley	21.69	6
Walton Manor	26.74	9
Wolvercote	21.75	6

Bivariate maps

Appendix 3 provides a series of bivariate maps, which compare a number of variables. The figure below summaries the priority areas from the bivariate map which compares canopy cover with IMD. The highest priority areas are highlighted red (low relative canopy cover and high deprivation) and medium priority areas are shown yellow (middle canopy cover and high deprivation). These high and medium priority areas could be prioritised for new and enhanced open space and GI provision. Any projects would need to consider wider contextual issues and constraints as well as the analysis later in this report that could help further define priorities.

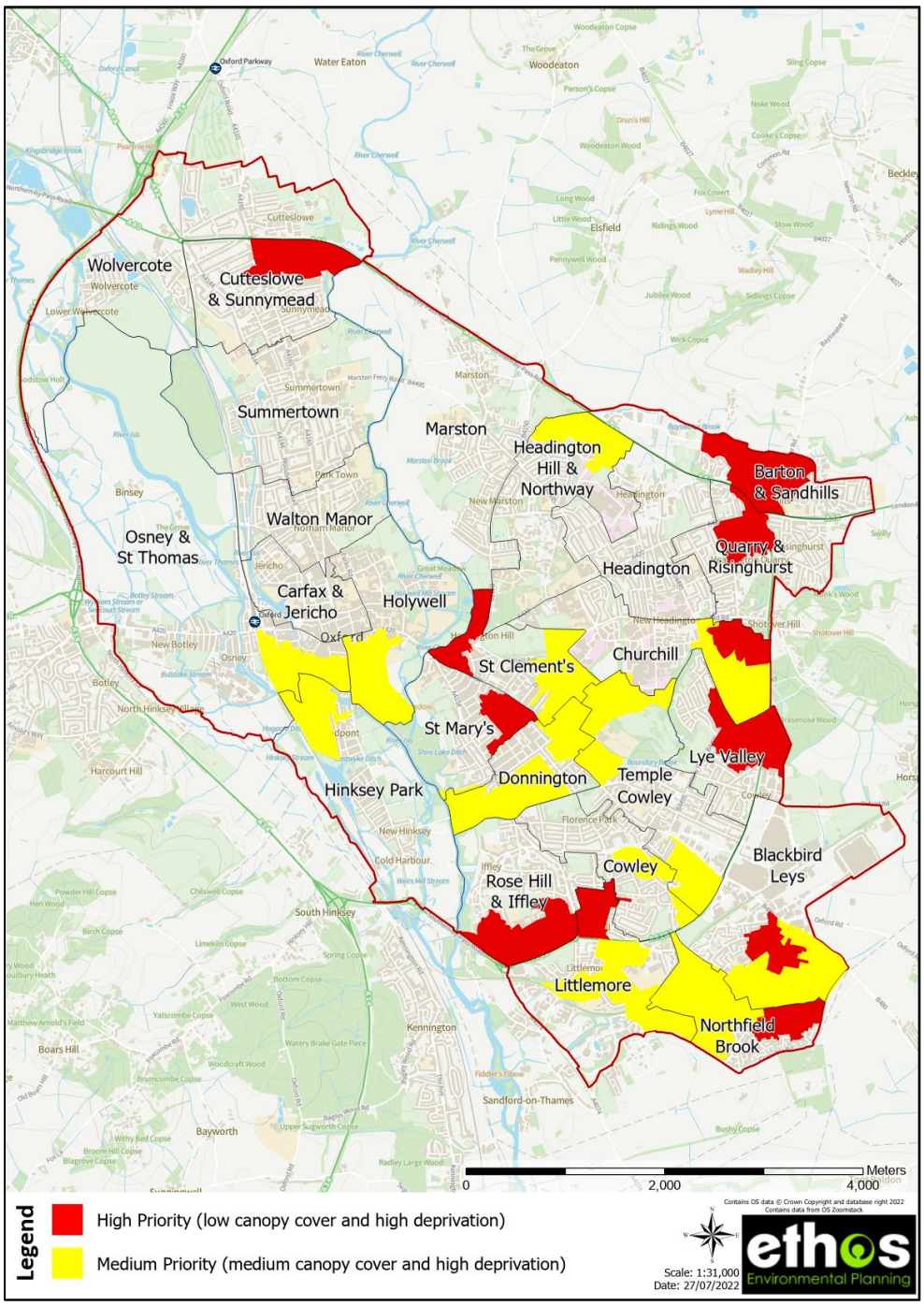


Figure 8 Extract from Bivariate map comparing percentage canopy cover and IMD (see Appendix 3 for full map)

4.3.4 Comparing population density with IMD

The figure below shows the high priority areas (highest population density and highest levels of deprivation) highlighted red and medium priority areas highlighted yellow (medium population density and highest levels of deprivation).

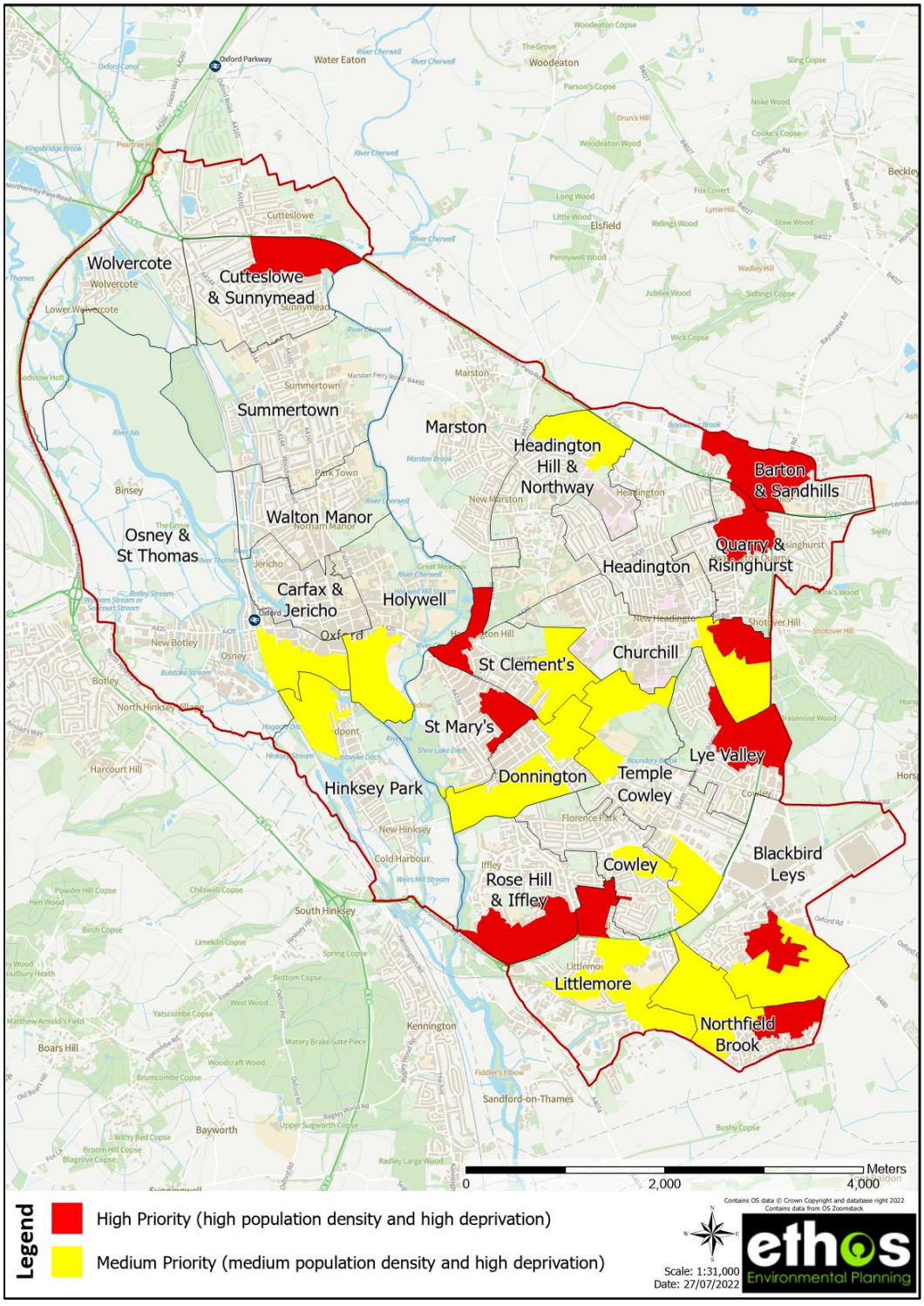


Figure 9 Extract from bivariate map comparing population density with IMD (see Appendix 3 for full map)

4.3.5 Comparing percentage of open space with IMD

Those areas of the city with the lowest relative proportion of publicly accessible open space[30] and highest levels of deprivation are highlighted red (high priority) on the figure below. Medium priority areas (high levels of deprivation and medium levels of public open space) are shown yellow. The open space access analysis (Section 6.3) also needs to be taken into consideration as even if an LSOA has a relatively low percentage of open space, there may be good access to open space in the surrounding areas.

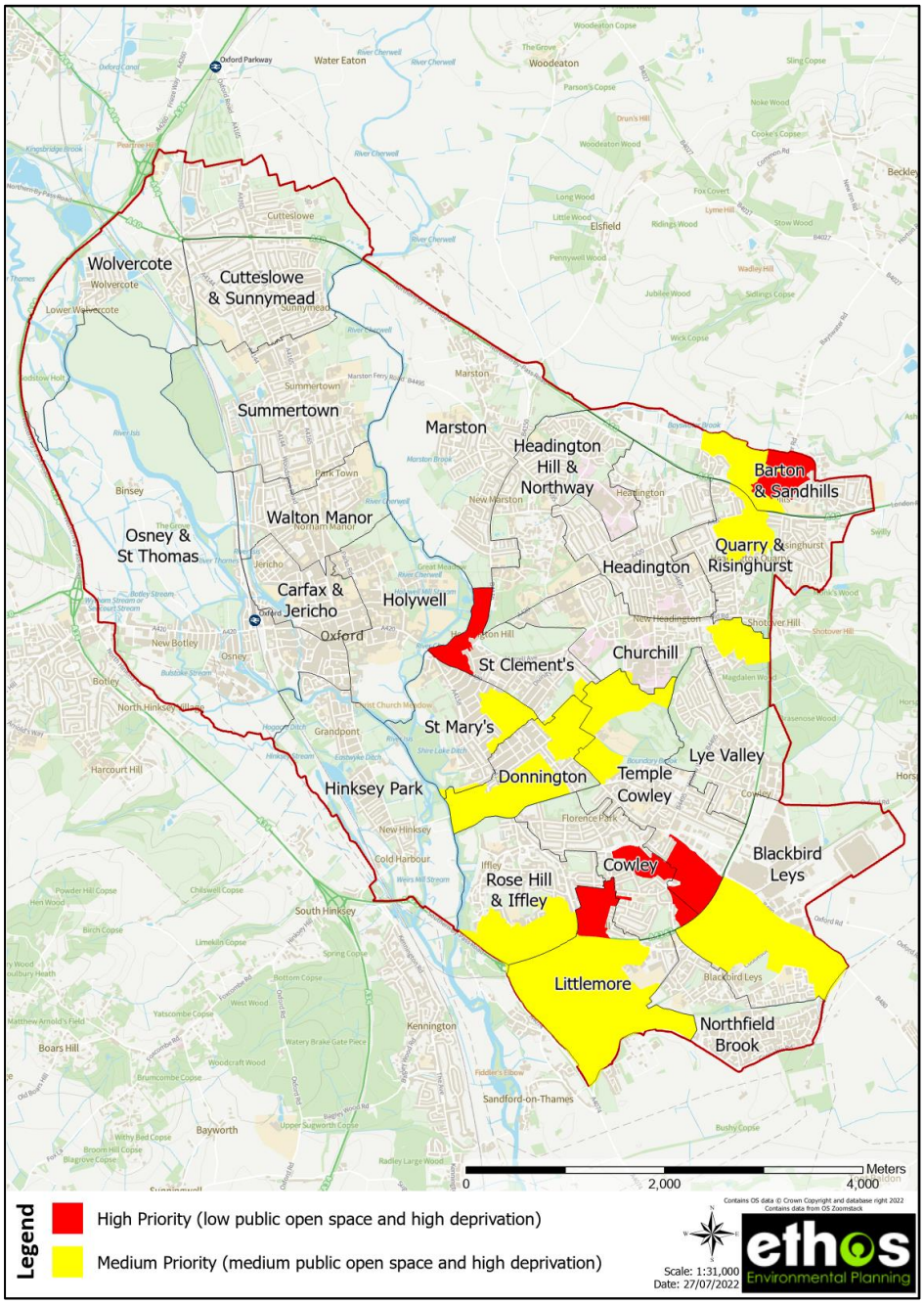


Figure 10 Extract from bivariate map comparing percentage public open space with IMD (see Appendix 3 for full map)

[30] Includes accessible natural green space, amenity green space, parks and recreation grounds, play space (children and youth), churchyards and cemeteries, civic space and allotments.

4.3.6 Comparing percentage of public open space with percentage of homes with gardens

The red areas show those areas with the lowest proportion of both open space and access to private gardens (high priority areas). The yellow areas show areas with low proportions of public open space and medium access to private gardens (medium priority).

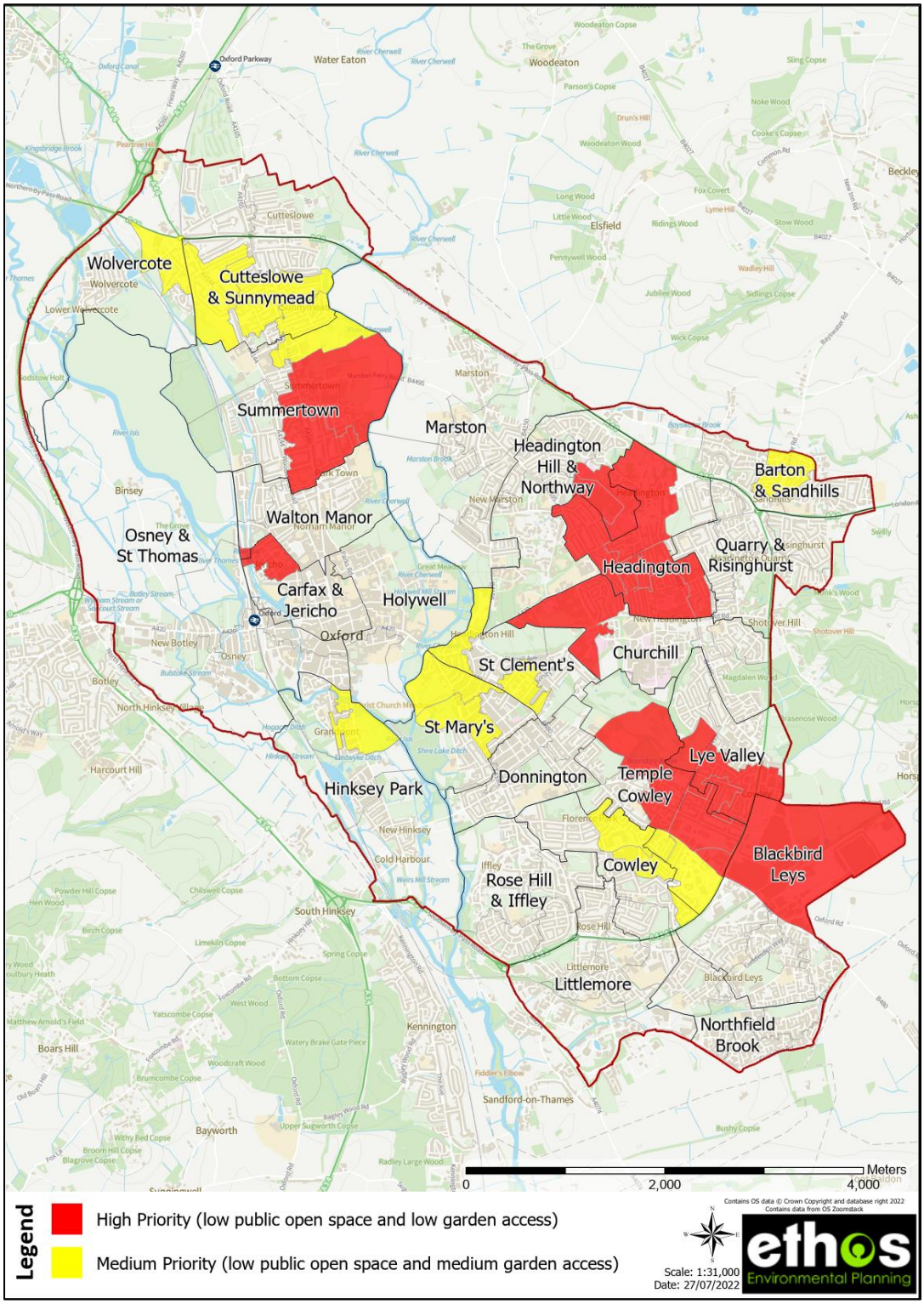


Figure 11 Extract from bivariate map comparing percentage of public open space with percentage of homes with gardens (see Appendix 3 for full map).

4.3.7 15-minute city analysis

The '15-minute city/neighbourhood' concept aims to transform urban spaces into connected and self-sufficient cities/neighbourhoods. This means that a resident can fulfil their basic needs such as gaining access to local goods, services and leisure within a 15-minute walk or cycle ride of their home. Essentially, it creates self-sufficient communities with grocery stores, parks, cafes, leisure and sport facilities, health centres, schools and even workplaces that are readily accessible using sustainable transport means. This concept is closely aligned with low traffic neighbourhoods (also known as liveable neighbourhoods – see Section 8.3).

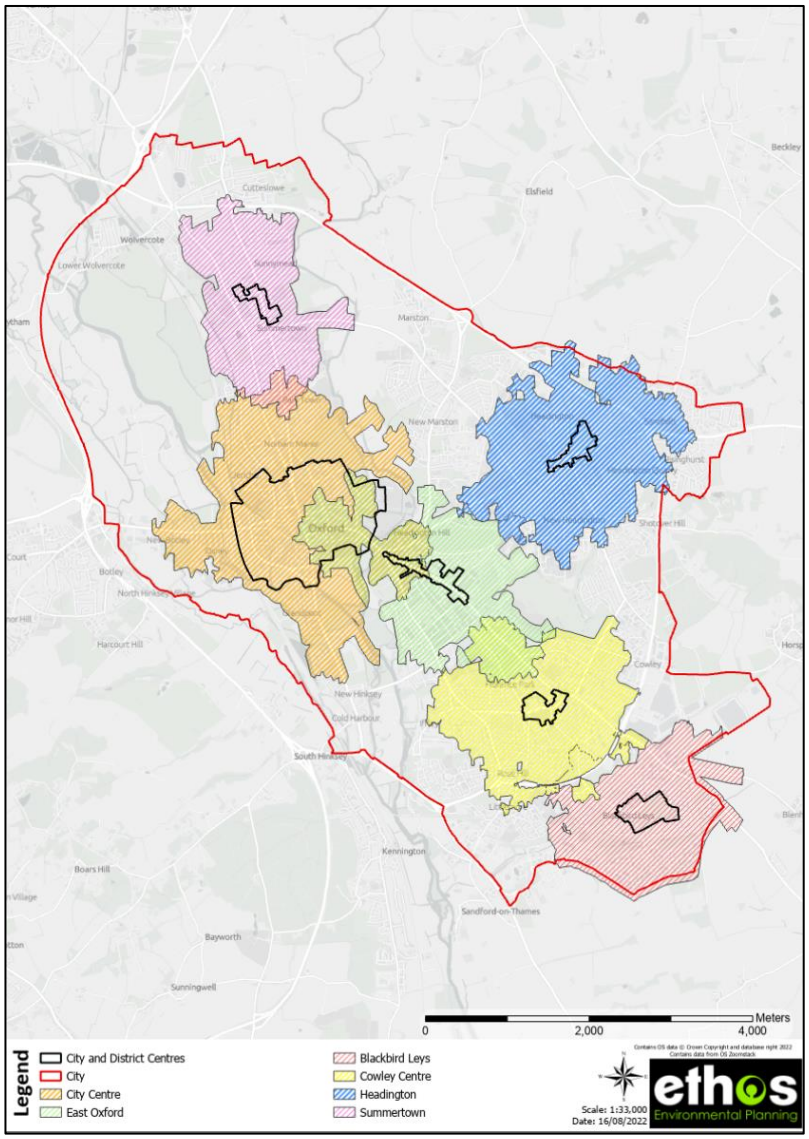


Figure 12 District/City Centre Walking Buffers (15-minute walk time)

Ethos have applied 15-minute walk-time buffers to the city and district centres[31] (see figure opposite and Appendix 3 for the methodology). The main areas that fall outside of a district or city buffer are Cutteslowe, Marston, New Marston, Risinghurst, Shotover Hill, Cowley and Littlemore.

These buffers have been considered alongside the open space access maps (Section 6.3) to provide an indication of the access to open space within these areas (see Section 7.4).

It should be noted that areas that fall outside a district centre may be covered by proximity to a local centre. Though this coverage has not been directly considered in this report.

[31] This study has used the existing district centres as set out in the Local Plan 2036. The Council is proposing to retain these centres in its upcoming consultation on the new Local Plan, though they may be subject to some refinement which has yet to be determined.

4.3.8 Biodiversity

Oxford contains a variety of international, national and local designated sites, with important habitats including grazing marsh and neutral grassland, broadleaved and wet woodland, wood pasture, parkland and veteran trees, canals, rivers and ditches and urban habitats. These habitats support protected species including great crested newts, water voles, swifts and bats.

The large majority of nationally important SSSI (Site of Special Scientific Interest) habitat within the city is in favourable condition (condition assessments are undertaken by Natural England, survey dates vary from 2009 to 2019 and are detailed in Appendix 1). However, restoring those areas/sites that are in unfavourable condition offers opportunity for improving biodiversity (See Appendix 1).

Nationally, dramatic declines in biodiversity continue as a result of multiple pressures including urbanisation, agricultural management, climate change, pollution and invasive species, woodland management and hydrological change (among others). The Oxfordshire State of Nature Report (2017) identified that long-term declines in farmland and woodland biodiversity are continuing, with some species at serious risk of extinction, such as the turtle dove; and there is continued fragmentation and loss of connectivity across the county's landscapes, effecting the future viability of habitats and species. Positive findings included an increase in the area of woodland recorded in the county over the last 30 years, cleaner rivers compared to 30 years ago, and some of the rarest and finest grasslands in the county.

This study does not provide an in-depth ecological analysis and the quality/condition and connectivity of sites from an ecological perspective has not been assessed in detail. However, the study has drawn on existing evidence to identify strategic spatial opportunities for improving habitat connectivity and resilience, as part of the overall GI network. This includes:

- The draft Nature Recovery Network (Recovery Zone).
- Natural England Habitat Network Mapping.

Further information regarding these datasets is provided in Appendix 1. These datasets have been overlain in Figure 13 below to identify the strategic priority areas where GI could potentially contribute to the protection and enhancement of ecological networks and biodiversity e.g., through habitat restoration and creation (although these indicative corridors would need to be explored further with specific ecological studies/expertise). These are:

1) The river Thames corridor
2) The river Cherwell corridor
3) Corridor between New Hinksey and Shotover Hill (via Florence Park)
4) Corridor along Littlemoor Brook and Northfield Brook
5) South Park and it's connectivity with corridors 2 and 3
6) The northern boundary of the city.

Outside of these strategic corridors there will also be opportunities for improving biodiversity, providing habitat stepping-stones and improved connectivity e.g., through habitat creation and management within open space, tree planting, green roofs and walls.

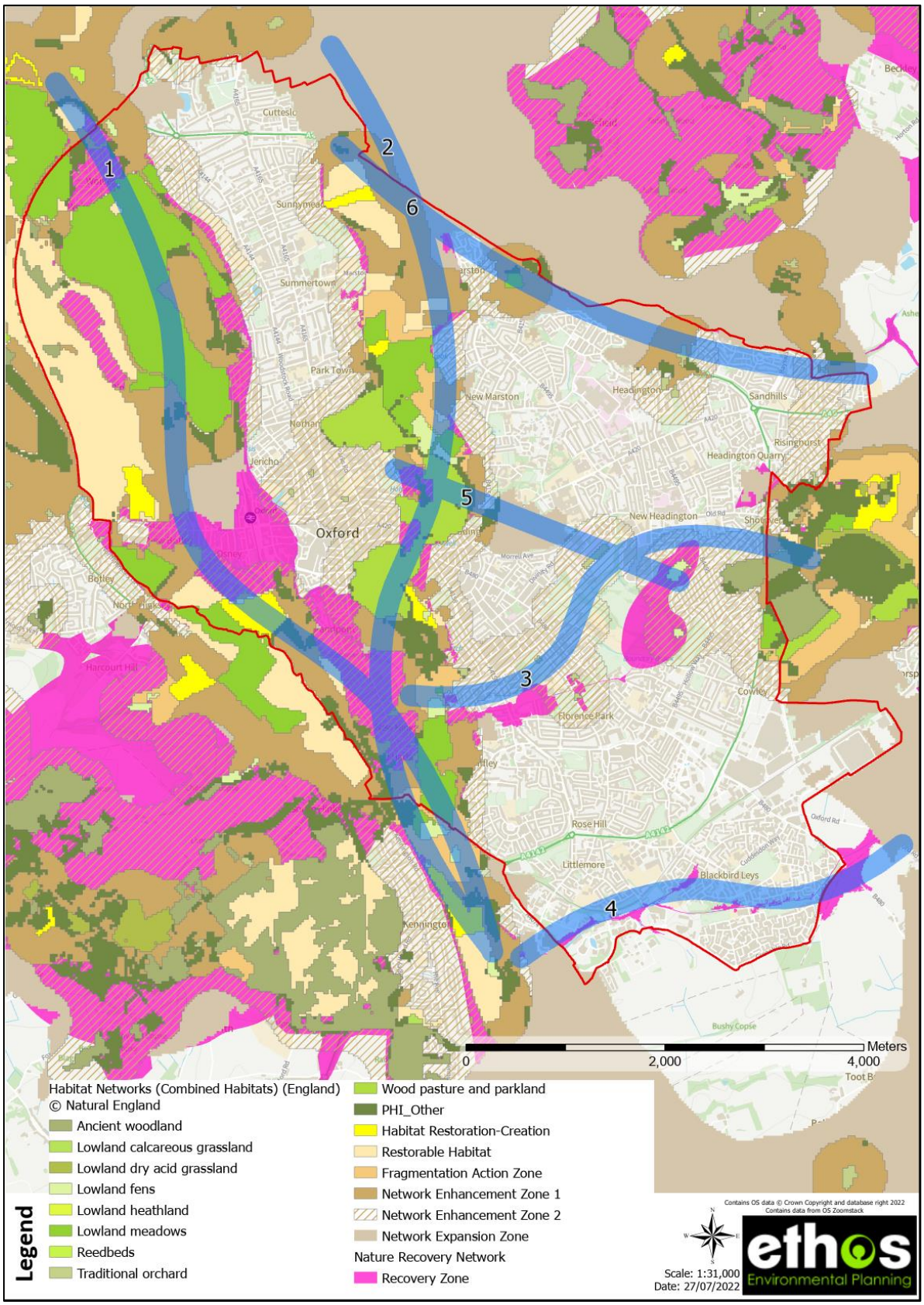


Figure 13 Habitat Network Mapping and Nature Recovery Network Recovery Zone

4.4 Review of recent consultation data

4.4.1 Local survey

Oxford Local Plan 2040 Issues and Options Consultation (2021)

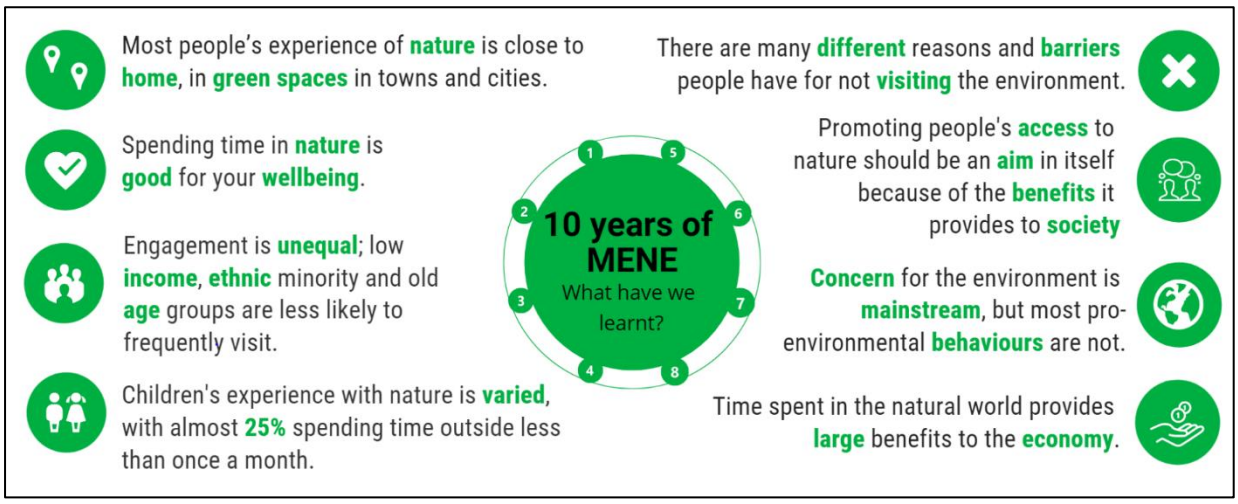
Some of the key points relating to GI arising from the Local Plan 2040 Issues and Options consultation, undertaken during summer 2021, are highlighted below.

- A range of comments received regarding green infrastructure and the natural environment, and this was a key concern for many who responded to the consultation.
- There was particular concern that green spaces are too easily lost to development.
- Responses also highlighted the concern that there can be inadequate commitment to preserving existing green infrastructure.
- Some responses highlighted a feeling that existing green spaces and features do not do enough to provide adequate relief and amenity to residents and that much more is needed.
- Concern about an increase in hard surfacing not just with large schemes and public realm but also with domestic developments, which cumulatively is harmful to drainage increasing flood risk, biodiversity and overall amenity.

4.4.2 National Survey

Monitor of Engagement of the Natural Environment (2009 - 2019)

From 2009 to 2019, Natural England ran the Monitor of Engagement of the Natural Environment (MENE) survey. It collected data about outdoor recreation, pro-environmental behaviours, attitudes towards and engagement with the natural environment across England. It was estimated there were 4 billion visits to the natural environment in 2019, up from 2.9 billion over 10 years. The survey highlights the importance of access to nature for our health and wellbeing, but also clear inequalities between different age, ethnic and socio-economic groups, and those with different states of health, in how they use and experience the natural environment.



4.5 Summary and key issues

Following the review of policy, environmental and socio-economic data, and recent consultation results, the key issues and narratives in the city are summarised below:

Environment

- Climate change, biodiversity loss and health inequalities are core issues that the Council aims to address, and Green Infrastructure protection, provision and enhancement provides an essential tool in doing so. This is recognised across council planning policies and strategies, and within national planning policy and legislation.
- Oxford has a variety of designated sites for wildlife, priority habitats and protected species. However, there is a need to not only protect these sites but also to improve connectivity (and management), and reduce fragmentation at multiple scales, to ensure that the natural environment is biodiverse and resilient to pressures including climate change (alongside a need to reduce existing pressures on the environment).
- Oxford has a rich natural and built heritage which must be taken into account when considering the management and provision of GI. Existing high quality GI is integral to the natural and built heritage and character of the city.
- The Thames and Cherwell rivers and their floodplains run through the city and are important for wildlife and recreation and are a source of flood risk that can constrain new development in certain areas of the city.
- Canopy cover across the city is estimated to be at 21.02% (Ethos) or 22.3% (Oxford Urban Forest Strategy), which is above the Forest Research recommended minimum target of 20% for urban areas. However, coverage is not equal and when considering tree canopy cover at the ward level, some wards fall below this minimum target.

Health

- Although the health of Oxford's population is generally better than the England average, there are large health inequalities that exist within the city, with several areas with high levels of deprivation.
- Oxford is a compact city, and there is generally good access to district/city centres (within a 15-minute walk time), however, there are areas of high population density coupled with high levels of deprivation.
- Homes with the lowest percentage of gardens are within the city centre and the Headington area (compared to other parts of the city).
- Climate change is resulting in wetter winters, and increased incidences of heavy rainfall events which increases the risk of flooding. Surface water flooding and poor water quality of the rivers also impact the city.
- The council has set a target for nitrogen dioxide (NO2) levels of 30µg/m^3 (this is the local annual mean target set within the Oxford Air Quality Action Plan), but continued reductions in NO_2 beyond this will provide continued improvements in health outcomes. The highest levels of NO_2 emissions and concentrations are around the city centre, Headington and Blackbird Leys.
- Climate change is resulting in warmer and drier summers, which are exacerbated due to the Urban Heat Island effect generated by expanses of artificial, impermeable materials which absorb incoming solar radiation and re-radiate it throughout the day and into the night, boosting the local temperature. This can lead to heat stress which can seriously impact health.
- A key priority for the council is to support modal shift towards walking and cycling, to help reduce carbon emissions, improve air quality and encourage active lifestyles. Creating green and attractive routes, and greening existing routes (alongside other measures such as infrastructure improvements and low traffic neighbourhoods) is key to this.

5.0 IDENTIFY THE GI NETWORK (STEP 2)

5.1 Overview

In order to build up an accurate picture of the current GI provision in Oxford, an initial desktop audit of the open space and wider GI assets was carried out, this included:

- analysis of existing open space and GI GIS data held by Oxford City Council.
- review of national and regional open datasets e.g., from Natural England, Environment Agency.
- desktop mapping of open space from aerial photography and OS Greenspace.
- liaison with council officers.
- Site visits to check any queries around open space access/typologies or boundaries (along with quality audits).

The full list of datasets (and their source) is provided in Appendix 3.

Publicly accessible open spaces are the primary focus of the study, and the wider GI network has also been mapped and considered. Open spaces were mapped using ArcGIS into their agreed typologies (see Section 5.3) and site boundaries were snapped to MasterMap to ensure accuracy. Key strategic cross boundary sites have also been mapped and considered. The mapping was signed off by the project team in May 2022.

A GIS database containing all mapped sites, and the results of the access, quality and multi-functionality assessment has been provided to the Council.

5.2 The Green Infrastructure Network

5.2.1 GI network map

The figure below shows the key GI assets that have been identified and mapped. These include:

- Open space (see Section 4.3 below)
- Strategic blue GI – Rivers, streams, canals, lakes and ponds
- Green belt land
- Statutory and non-statutory designated wildlife sites
- Priority habitat Index
- Historic parks and gardens

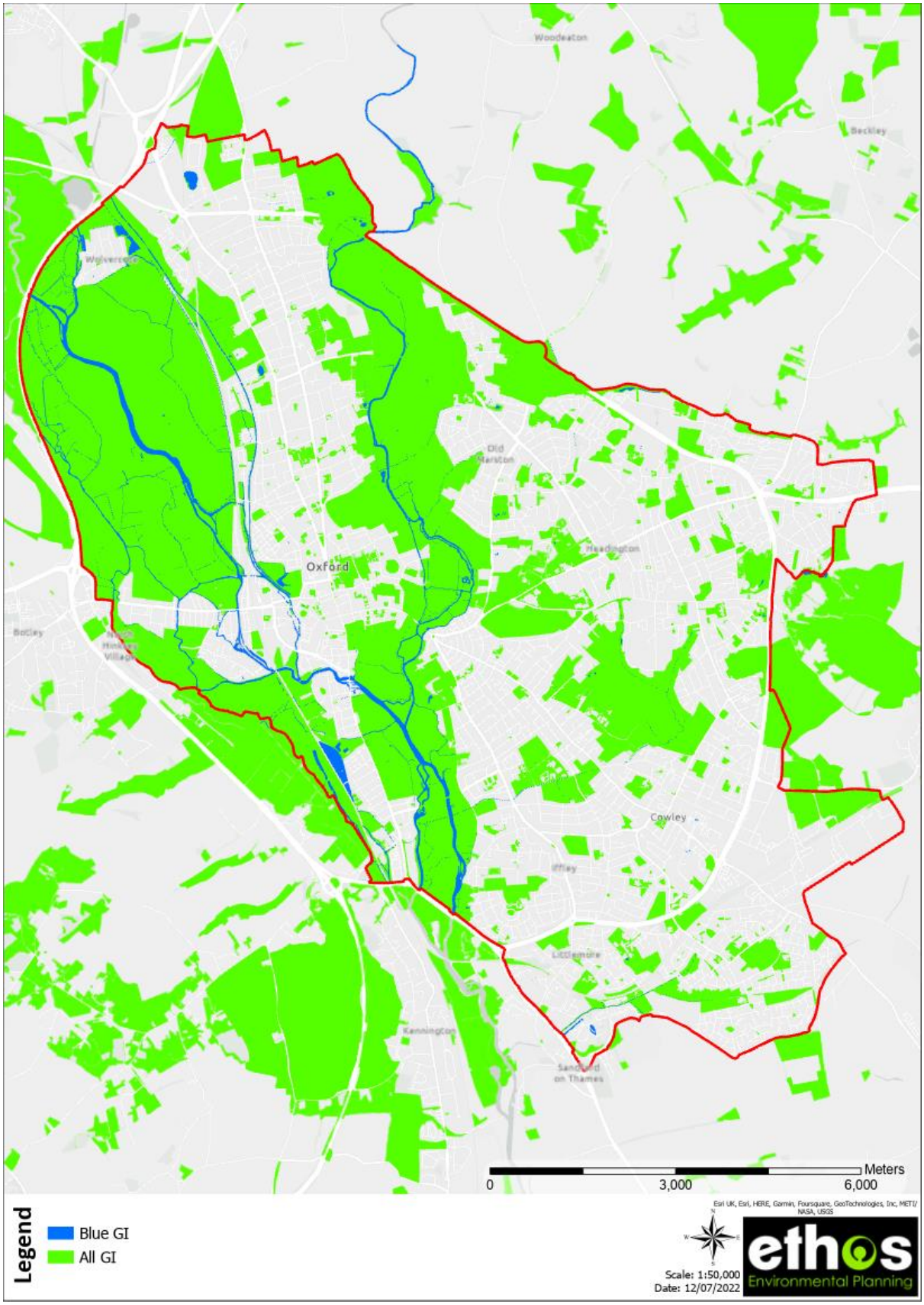


Figure 14 Oxford's GI Network

5.3 Open Space Typologies

This section sets out the open space typologies which have been mapped and had quality and access standards developed as part of this study (these typologies are the primary focus of the study), and those which have been mapped, but do not have quality and access standards, but form part of the wider GI network. The typologies of open space have drawn on guidance provided within PPG 17, and through discussions with the project team. The agreed list of typologies is seen to be locally derived and appropriate for the type and range of open spaces that exist within the study area[32].

Table 4 Open Space Typologies

Typologies mapped with standards (primary focus of study)	Typologies mapped but no standards[33]
• Allotments • Amenity Green Space (>0.15ha) • Park and Recreation Grounds • Play Space (Children and youth) • Accessible Natural Green Space (>0.15ha)	• Churchyards and Cemeteries • Outdoor Sport (Private) • Outdoor Sport (Restricted Use) • Open Space (Private) • Civic Squares

Below is a brief description of each open space typology, with further detail provided at Appendix 2.

Allotments: Allotments provide areas for people to grow their own produce and plants. Allotments have not been quality assessed as part of this study; however, access standards have been set.

Amenity Green Space (>0.15ha): Those spaces open to free and spontaneous use by the public, but neither laid out nor managed for a specific function such as a park, public playing field or recreation ground; nor managed as a natural or semi-natural habitat. Amenity green spaces smaller than 0.15ha have been mapped but not included within the analysis for this typology, as it is considered that these sites will have limited recreation function and therefore should not count towards public open space provision, however they will potentially provide visual amenity and biodiversity value and contribute to the overall GI network.

Parks and Recreation Grounds: For the purpose of this study, a Park and Recreation Ground is defined as an open space that:

- Has at least two facilities e.g., a children's play area and tennis courts, or;
- Is formally laid out with areas of formal planting/bedding; or
- Has provision of formal sports pitches e.g., football or cricket pitch (informal football would be excluded); and

[32] There are instances where primary typology classifications are not always clear cut, and in these instances a judgement call has been made.

[33] An explanation for not developing standards for these typologies is outlined in the following sections

- Is owned/managed by the Council (or Town/Parish Council or University), for general public access.

Play Space (children and youth): The study has recorded the following:

- Play Space (Children) – equipped areas of play that cater for the needs of children up to and around 12 years of age.
- Play Space (Youth) i.e., Teenage Facilities – informal recreation opportunities for, broadly, the 13 to 17 age group, including skateboard parks, basketball courts, BMX ramps and 'free access' Multi Use Games Areas (MUGAs).

Accessible Natural Green Space (>0.15ha): For the purpose of this study, accessible natural green space covers a variety of spaces including meadows, woodland, copses, river valleys and lakes all of which share a trait of having natural characteristics and biodiversity value and are also partly or wholly accessible for informal recreation. A minimum size threshold of 0.15ha is used for this typology.

Churchyards and Cemeteries: Churchyards and Cemeteries have been identified and mapped where known, however, no access or quality standard has been set, as it is outside the scope of this study to make recommendations related to requirements for new provision.

Outdoor Sport (Private): Outdoor sports spaces which are privately managed, and which are only available for private use/sports clubs. This includes school/college/university sports grounds and other private sports grounds which do not provide community use. Quality and access standards are not being proposed for private outdoor sports space - these spaces are covered within a separate Playing Pitches Study/Strategy.

Outdoor Sport (Restricted Use): Outdoor sports spaces (on education and other private land) which are privately managed but do provide some form of community use/access on an informal or formal basis. As per Outdoor Sport Private, quality and access standards are not being proposed.

Open Space (Private): Those open spaces which are not accessible to the general public or are paid access only. Although these do not provide a recreation function for the wider community, they form an important part of the overall GI network and could provide other benefits (e.g., climate resilience or biodiversity). The majority of these sites are education land which does not provide formal sports e.g., such as university quads. Quality and access standards have not been set for private open space. A minimum size threshold of 0.15ha is used for this typology.

Civic Squares: Civic and market squares and other hard surfaced areas designed for pedestrians have been identified and mapped, as it is recognised that these provide important space for community events and areas for 'hanging out' and can often contain an element of GI. Quality and access standards have not been set for this typology, as it is outside of the scope of the study.

6.0 QUALITY, MULTIFUNCTIONALITY AND ACCESS ASSESSMENT (STEP 3)

6.1 Quality (of publicly accessible open space)

6.1.1 Quality Criteria

Open space quality audits were undertaken in the field using the Esri Field Maps app during March 2022. A total of 248 parks and recreation grounds, amenity green spaces, accessible natural green spaces and play spaces (children and youth) were quality assessed using the criteria set out below, which were developed with the project team and adapted from the Green Flag Award criteria[34]. Children and youth play spaces were audited applying a smaller number of criteria considered to be relevant from the list below (highlighted with a *).

For each site there is also a description of the site, recommendations for improvement, and geo-located photos. The quality audit information is held within the GIS database which has been provided to the Council.

Table 5 Quality Criteria

Criteria	Key points for consideration
1. Welcoming*	• Are the entrances well maintained and safe? • Is the site managed/laid out so that there is an overall sense of welcome? • Are there clear and well-maintained signs/maps/information boards, which are appropriate to the site.
2. Good and safe access*	• Are the paths clean and tidy? • Are the paths accessible for mobility scooter/wheelchair users? • Are there good links to adjacent green spaces/community facilities? • Is the site easy to find, with directional signage where needed?
3. Appropriate provision of facilities	• Are there a range of good quality facilities which are appropriate to the site?
4. Play value*	• For children's play areas, is there good 'play value' (i.e., high quality and variety of play experiences (physical, sensory and social) on offer?
5. Personal security*	• Is the site overlooked by housing? • Are there clear sight lines? • Does it look like the site has a problem with anti-social behaviour (e.g., graffiti, dumping)?

[34] The Green Flag Award® scheme recognises and rewards well managed parks and green spaces, setting the benchmark standard for the management of recreational outdoor spaces across the United Kingdom and around the world. https://www.greenflagaward.org/

Criteria	Key points for consideration
6. Dog Fouling and Litter*	• Are dog bins available and visible and is there dog fouling present? • Are litter bins/signs available and visible and is there a litter issue/fly tipping across the site?
7. Maintenance of soft landscaping/grounds maintenance*	• Are the grounds, horticultural areas and trees managed appropriately?
8. Building, infrastructure and equipment maintenance*	• Is equipment fit-for-use and well-maintained and has redundant equipment been removed? • Is the infrastructure (paths, lighting, fencing, seating) and buildings (if present) well-maintained and safe? • Are equipment and facilities safe and dangers/hazards cordoned off? • Do surfaces drain well?
9. Biodiversity	• Does the site contribute positively to biodiversity through providing a diversity of habitats which are well managed and connected within the site? (Wider connectivity assessed through desktop criteria). • If woodland is present, does it have good structure (i.e., canopy layer, understorey and ground flora?) • Identify areas of sites that contain a patchwork of bare, previously disturbed ground and stands of vegetation with good diversity (the building blocks of open mosaic habitat).
10. Landscape, heritage and sense of place	• Does the site contribute significantly to the quality, character and setting of the area through the overall character and quality and visibility of the site? • Does the site offer attractive plant assemblages that support place character and quality? • Is the cultural or historical significance of the site clearly evident, with features well maintained and appropriate interpretation, significantly contributing to the sense of place and providing distinctive/memorable features.
11. Climate Change Adaption	• Are there mature trees which provide shade and cooling, help attenuate rainwater provide biodiversity benefits, store and capture carbon? • Are there wetlands or SuDs on site to help attenuate rainwater and improve quality? • Are these wetlands/SuDs well managed and designed to create better places for people and wildlife?
12. Tranquillity	• Does the site provide high levels of tranquillity, with low levels of disturbance from busy roads or industrial facilities?

6.1.2 Scoring

Very poor	Poor	Fair	Good	Very Good	Excellent	Exceptional
0 -1	**2, 3, 4**	**5, 6**	**7**	**8**	**9**	**10**

Each of the 12 criteria were scored between 1 (very poor) and 10 (exceptional). The scores for each site were combined and the mean calculated (acknowledging that for some sites, not all the criteria were applicable – for example, sites without an equipped play area were not given a play value score). The scores were the multiplied by 10 to produce a final percentage score. Sites have been categorised as follows:

Excellent	**80%>**
Good	**66 – 80%**[35]
Fair	**43 – 65%**
Poor	**>43%**

Audits of this nature can only ever be a snapshot in time and their main purpose is to provide a consistent and objective assessment of a site's existing quality rather than a full asset audit. Clearly, local communities may have aspirations which are not identified in the quality audit, but it is hoped that these can be explored further outside of this study through site management plans and neighbourhood/parish plans as appropriate.

The desk-based multifunctionality assessment has also helped provide a fuller picture of the sites overall value.

6.1.3 Summary of results

Figure 15 below provides a summary of the quality audits undertaken. As can be seen, the majority of sites have been assessed as being of good or excellent overall quality.

- 83.80% of the open spaces assessed were found to be good or excellent quality.
- 16.20% of the open spaces assessed were found to be fair or poor quality (only 1 site within the city was assessed as being poor quality (see Table 10).

The wards with generally higher numbers of poorer scoring sites are Marston, Headington Hill and Northway, Quarry and Risinghurst, Barton and Sand Hills, Churchill and Lye Valley.

A breakdown of the quality scores by typology is provided in Section 7. There is no clear difference in general quality associated with the different types of open space assessed – the average quality score across all typologies is in the region of 70-75% (good).

Table 6 Numbers of sites and average quality score by typology

Typology	Number of Sites	Average Quality Score (%)
Amenity Green Space	47	70.01
Play Space (Youth)	34	72.57
Parks and Recreation Grounds	37	73.66
Accessible Natural Green Space	52	73.86
Play Space (Child)	78	75.84

[35] A total pass mark of 66% is required for a Green Flag Award. Just because a site scores above this in this quality assessment does not mean it is automatically suitable for a green flag award, as the green flag award criteria and considerations differ to some degree.

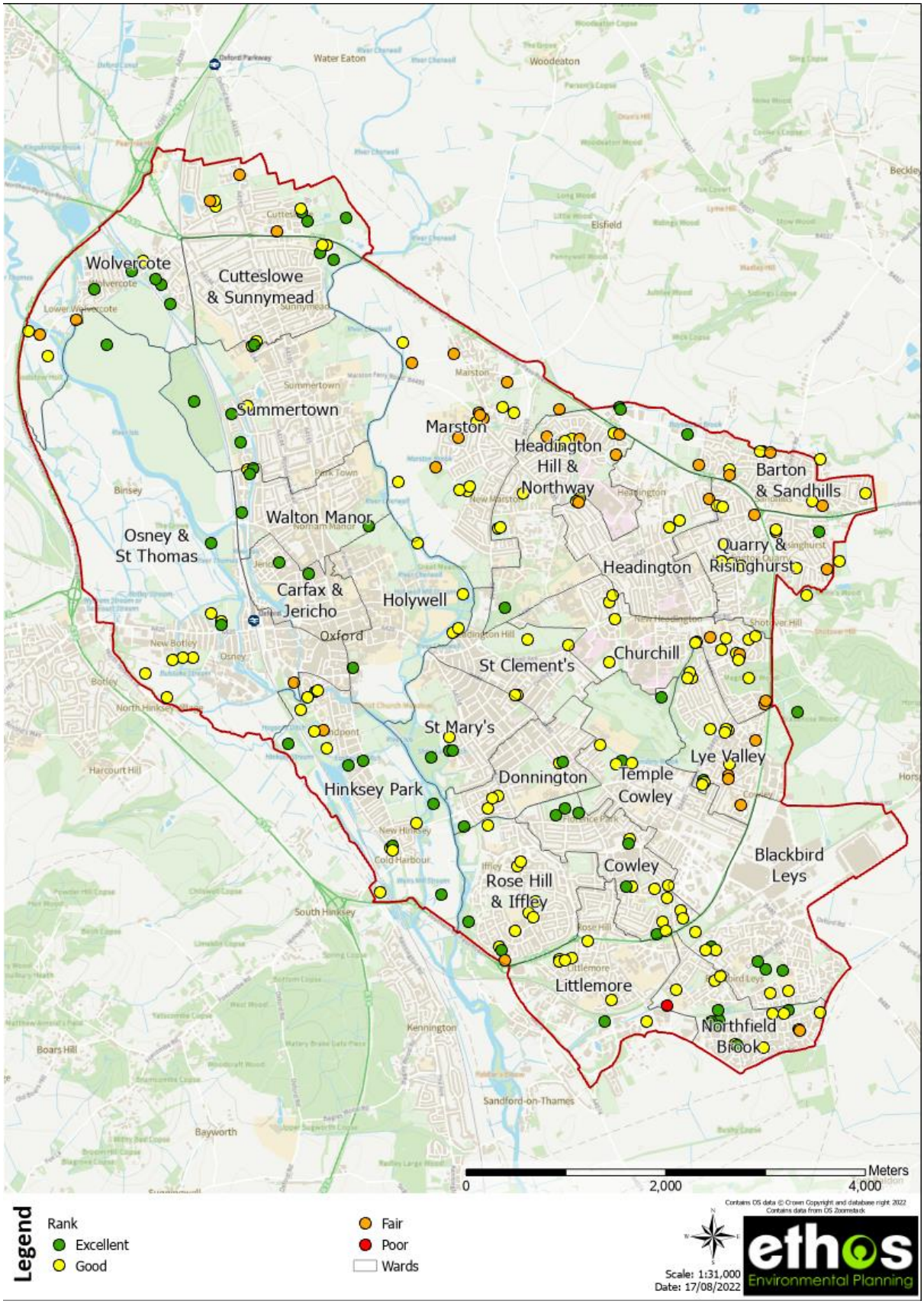


Figure 15 Results of Quality Audits (March 2022)

The top ten and bottom ten sites for parks and recreation grounds and accessible natural green spaces are summarised in the tables below.

The top 10 ten quality parks and accessible natural green spaces generally fall within areas of lower deprivation, although this is not always the case. Exceptions, where higher quality sites are located in more deprived areas, include Blackbird Leys Park, Gillians Park, Sunnymead Park, Fry's Hill Park, Lye Valley Nature Reserve and Land adjacent to Eastern Bypass (Science Park). When looking at the bottom ten sites for both types of open space, there is less of a clear pattern, with lower scoring sites found in areas of low deprivation as well as high deprivation.

For the poorest scoring sites, some of the common quality issues include low biodiversity value, poor access (e.g., path quality and overgrown vegetation), management of soft landscaping, dog fouling, litter and lack of signage.

Top 10 Parks and Recreation Grounds

Table 7 Top 10 Parks and Recreation Grounds

Site Name	Suggestions for Improvement	Total Score	Rank	IMD Decile
Cutteslowe Park	None.	96.67	Excellent	6
Hinksey Park	None.	90.00	Excellent	8
Florence Park	Nature area appears incomplete and unmanaged - could install signage to inform the community of the plans for this area. Could also formalise informal football area into full football goals.	88.33	Excellent	8
Blackbird Leys Park	None.	85.00	Excellent	2
Gillians Park	Some of the park signage is dated and would benefit from replacing/ improving.	83.33	Excellent	2
Aristotle Lane Recreation Ground	There is space for some welcoming signage and perhaps a community noticeboard if need identified.	81.67	Excellent	10
Sunnymead Park	The wildlife areas could be better managed to improve their biodiversity value, particularly the meadow areas.	80.83	Excellent	4
Fry's Hill Park	Space for additional sports provision such as football. Opportunities to plant more vegetation to support climate change and biodiversity.	80.00	Excellent	1
University Parks	None.	80	Excellent	9
Botley Park	None.	77.5	Good	6

Bottom 10 parks and recreation grounds

Table 8 Bottom 10 parks and recreation grounds

Site Name	Suggestions for Improvement	Total Score	Rank	IMD Decile
Foxwell Drive Park	Improve access to children's play area. Better maintenance of landscaping.	59.10	Fair	5
Broad Oak Nature Park	Install welcome signage and directional signage and replace damaged footpath sign by cycle path. Reinstate stone dust paths, upgrade basketball area to a MUGA. Litter pick.	59.17	Fair	3
Sandfield Road Park	More regular emptying of bins. Regular litter picks. Improve access points to make more welcoming with hard surfaced paths.	60.00	Fair	10
Mortimer Hall Recreation Ground	Add signage to other entrance point. Remove graffiti from infrastructure.	60.00	Fair	10
Five Mile Drive Recreation Ground	There is scope to increase biodiversity through planting along the edges of the site, specifically trees. There also may be a need to increase dog waste collections.	61.67	Fair	10
Court Place Farm Nature Park	Add welcome signage at entrance points. Improve paths around the site. At time of audit site was wet and boggy.	64.55	Fair	10
Quarry Hollow Pocket Park	Potential to improve play value with additional play equipment. Better management of soft landscaping including maintenance of bramble which is overgrown.	65.00	Good	9
Peat Moors Recreation Ground	Access could be improved by extending the stone dust path to the MUGA entrance and past the MUGA to the children's play area. Potential to improve biodiversity value with tree planting and/or wildflower margins.	65.00	Good	7
Northway Recreation Ground	Add welcome signage at entrance. Potential to enhance biodiversity through shrub planting around edge of site.	66.67	Good	8
Barton Road Recreation Ground	Potential for more tree and shrub planting on site. Remove graffiti from welcome board.	67.27	Good	4

Top 10 accessible natural green spaces

Table 9 Top 10 accessible natural green spaces

Site Name	Suggestions for Improvement	Total Score	Rank	IMD Decile
Trap Grounds	None.	95.45	Excellent	9
Port Meadow with Wolvercote Common & Green	None.	93.00	Excellent	7
Hogacre Common Eco Park	None.	90.90	Excellent	8
Wolvercote Lakes	None.	89.09	Excellent	9
Lye Valley	May be potential to improve access in some areas e.g., upgrade steps. Friends group may benefit from a community notice board.	88.18	Excellent	4
Iffley Meadows	None	87.77	Excellent	6
Land Adj to Eastern Bypass	Unsure if publicly accessible, within science park. Install signage to make access clear.	86.25	Excellent	3
Wolvercote Hurst	None.	85.83	Excellent	9
Wolvercote Common	None.	84.55	Excellent	9
Walton Well Road Open Space - North	None	84.55	Excellent	10

Bottom 10 accessible natural green spaces

Table 10 Bottom 10 accessible natural green spaces

Site Name	Suggestions for Improvement	Total Score	Rank	IMD Decile
Littlemore Brook	Formalise the site as an accessible natural green space - improve access, manage vegetation and add signage.	40.00	Poor	2
Barton Village Nature Park	Improve management of woodland. Add litter bins at entrances. Add signage. Create a circular path through the site.	51.11	Fair	4
Dunston Park	Potential site for biodiversity net gain. Better management of the site. Potential for more tree planting	58.89	Fair	5
Green Ridges	Better management of woodland to improve biodiversity and climate adaptation.	60.00	Fair	8

Site Name	Suggestions for Improvement	Total Score	Rank	IMD Decile
Godstow Bridge Meadow	Install smoking signage and repair the riverside path as it is waterlogged and damaged in places. Consider adding some seating as well.	62.00	Fair	9
Victoria Arms Spinney	Potential to improve woodland.	62.22	Fair	7
Land Adjacent to Court Place Farm Allotments	Improve access to site from roadside.	63.33	Fair	7
Peasmoor Piece	Add litter bin at entrance points. Better manage woodland.	63.33	Fair	5
Arlington Drive	Potential for biodiversity net gain.	63.33	Fair	8
Barracks Lane Meadow	Provide welcome/info signage on wildlife value of site, and perhaps involve the community in its management.	65.55	Good	4

6.2 Multifunctionality

Green infrastructure can provide multiple functions and benefits, as set out in Section 1.5. Optimising the multifunctionality and resulting benefits provided by GI within the city will help the Council meet diverse policies and objectives around the nature, climate and health emergencies, and ensure that the same area of land is delivering for both people and wildlife, where possible and appropriate.

There is no set method for assessing the multi-functionality of sites. It was agreed with the project team that a desk-based approach using measurable criteria (from existing GIS datasets and the site visits) would be used, in order to provide an indication of multifunctionality. The method does not use any detailed habitat mapping data, or model, but takes a basic approach that is easily repeatable. The criteria/considerations used in assessing multifunctionality are set out in Table 5 below. All GIS data sources are listed in Appendix 3. The multi-functionality assessment is applied to all open spaces (as set out in Section 5.3), whether publicly accessible or private.

The results of the multi-functionality assessment are held within the GIS database which has been provided to the Council.

Table 11 multi-functionality desktop assessment criteria

Function	Delivering function? 1/0
Accessibility	1 – allotments, parks, amenity, accessible natural green space and play space, churchyards and cemeteries, outdoor sport restricted use (derived from open space typologies mapping). 0 – all others
Tourism	1 – Destination sites identified by Council 0 – all others

Function	Delivering function? 1/0
Heritage	1 – within 50m of a conservation area, historic park and garden or scheduled ancient monument, or ancient woodland. 0 – all others
Food production	1 – all allotments (derived from open space typologies mapping), and sites that are classed as agricultural/pasture on OpenStreetMap (OSM) 0 - all others
General recreation	1 – parks, amenity, accessible natural green space, churchyards and cemeteries (derived from open space typologies mapping). 0 – all others
Formal sports provision	1 – sites that contain pitches (identified from Open Street Map) and/or outdoor sport fixed, all outdoor sport (private) and outdoor sport (restricted use). 0 – all others
Children's play	1 – sites that contain an equipped children's play area (derived from open space typologies mapping) 0 – all others (noted that all accessible spaces will provide playable space, even though they may not have equipped provision).
Youth facilities	1 – sites that contain a youth play space (derived from open space typologies mapping). 0 – all others
Tranquillity	1- Sites that scored 7 or above in quality audit are providing this function (not possible to assess all sites against this function). 0 – Sites that scored below 7 in quality audit.
Biodiversity	1 – Sites within 50m of a designated site (statutory or non-statutory), priority habitat, or a core or recovery NRN zone; or classed as natural green space, allotments or score 7 or above for Biodiversity in the site visit criteria. 0 – all others
Carbon storage	1 – Site largely falls within an area of OxCAM carbon storage scoring 3 or above. Those sites that score 10 have been highlighted to show the most important sites for carbon storage. 0 – all others
Climate change adaptation*	1 - Designated wildlife sites, Priority habitat, Accessible natural green space, sites with min 0.5ha tree cover, within flood zone 2 or 3, within surface flooding area (up to 1 in 1000). 0 – all others

*It is acknowledged that the majority of green spaces will deliver some level of climate change adaptation e.g., even short mown amenity grassland provides some rainwater/runoff attenuation.

For each open space, the number of functions is added together to provide an overview of multifunctionality, as shown in Figure 16 below. The darkest green sites have the highest levels of multifunctionality.

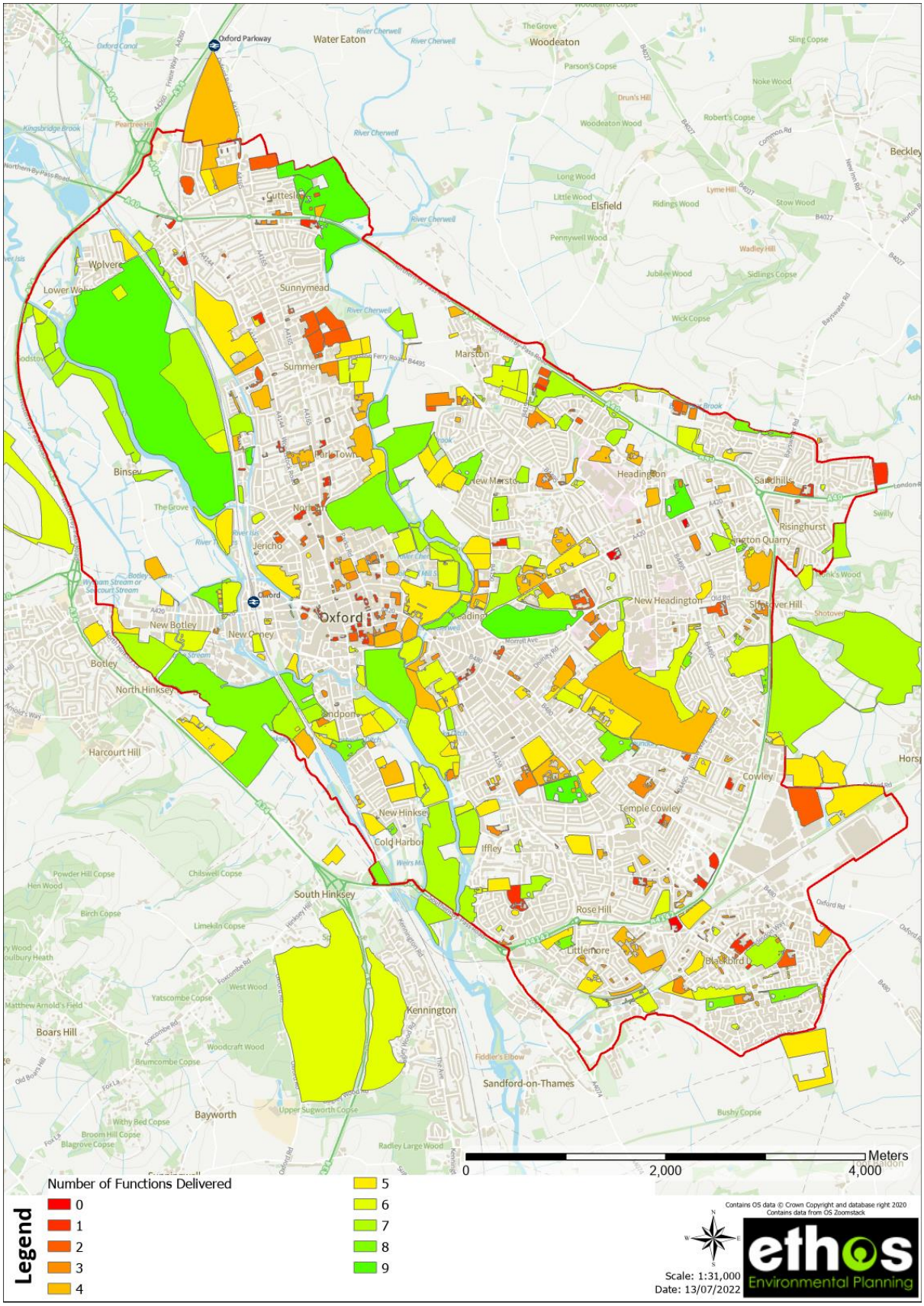


Figure 16 Overview of multi-functionality

The sites that are delivering the greatest number of functions (9 out of 12) include Port Meadow with Wolvercote Common and Green, South Park, Cutteslowe Park, Sunnymead Park, Bury Knowle Park, Florence Park and Aristotle Lane Recreation Ground. These are all destination parks (large parks that attract visitors from a wide area due to the range of facilities), with the exception of Aristotle Lane.

Other sites that are delivering high numbers (there are 22 sites that have been identified as delivering 8 or more functions) include Hinksey Park, Wolvercote Common, Gillians Park, University Parks, Christchurch Meadow and Angel and Greyhound Meadow. These are all either parks and recreation grounds or accessible natural green spaces (with the exception of 1 site, which is an amenity green space). There is generally a good spread of these sites across the city, although notable areas where there are open spaces with lower levels of multifunctionality and where this could be improved is in the south and east of the city (around Rose Hill, Blackbird Leys and Headington – also areas with high levels of deprivation).

Those sites that are generally providing fewer functions are sites with no public access/restricted access, as many of the measurable criteria relate to access to facilities/recreation space. There are also a large number of amenity green spaces which are providing low numbers of functions. Churchyards and cemeteries have also scored low in some cases, but this is a limitation of the multifunctionality criteria and reflects that not all sites can be expected to be multi-functional in the same way.

A key consideration in assessing multifunctionality and in seeking to improve multifunctionality is the appropriateness of doing so, which can be linked to the typology and of the site. Improving multifunctionality in one area must not adversely impact the other functions a site provides. Some sites will be providing a very specific function/purpose, and it may not be possible or appropriate to increase the multi-functionality in some cases. For example, an accessible natural green space may score very highly for biodiversity and climate change adaptation, and it may not be appropriate to increase the functionality in terms of play and recreation provision, at the cost of the site's high wildlife value.

The size of the site is also an important determinant in the existing level of multi-functionality and also the potential to improve multi-functionality in the future. The larger the site the higher the likely quality/value of the function, and also the higher the potential to increase multifunctionality. There are notable differences in the size of open spaces delivering multi-functionality across the city. In general, the smaller open spaces appear to be delivering fewer functions. Examples of smaller sites providing high numbers of functions include Bertie Park in New Hinksey, Woodhouse Way Nature Area in Iffley and Peat Moors Recreation Ground in the Lye Valley. There are no large public open spaces (parks, accessible natural green space and amenity green space) delivering very low numbers of functions.

Improving multifunctionality shouldn't only consider the number of functions that a site is providing, but also the quality of those functions e.g., just because a site is providing a children's play area, it may have scored poorly against this criterion in the quality audit. The multifunctionality assessment did not consider quality of function within the scope of the

work, however many public sites did have a quality assessment, and this can begin to inform a picture of quality. Future work could consider quality of functions on the other sites.

There does appear to be some relation between quality and multifunctionality, with some of the highest quality public open spaces also delivering high numbers of functions. The scatter chart below compares the quality scores (for parent sites only) with the number of functions assessed. As can be seen, public open spaces with the highest number of functions (9) have a minimum quality score of 68% (good), compared with sites with the lowest number of functions (2) which have a minimum quality score of 53% (fair) and a maximum quality score of 60% (fair). However, there are some outliers, with several lower quality scoring sites providing relatively good levels of multifunctionality, and several sites with good levels of multifunctionality scoring lower for quality.

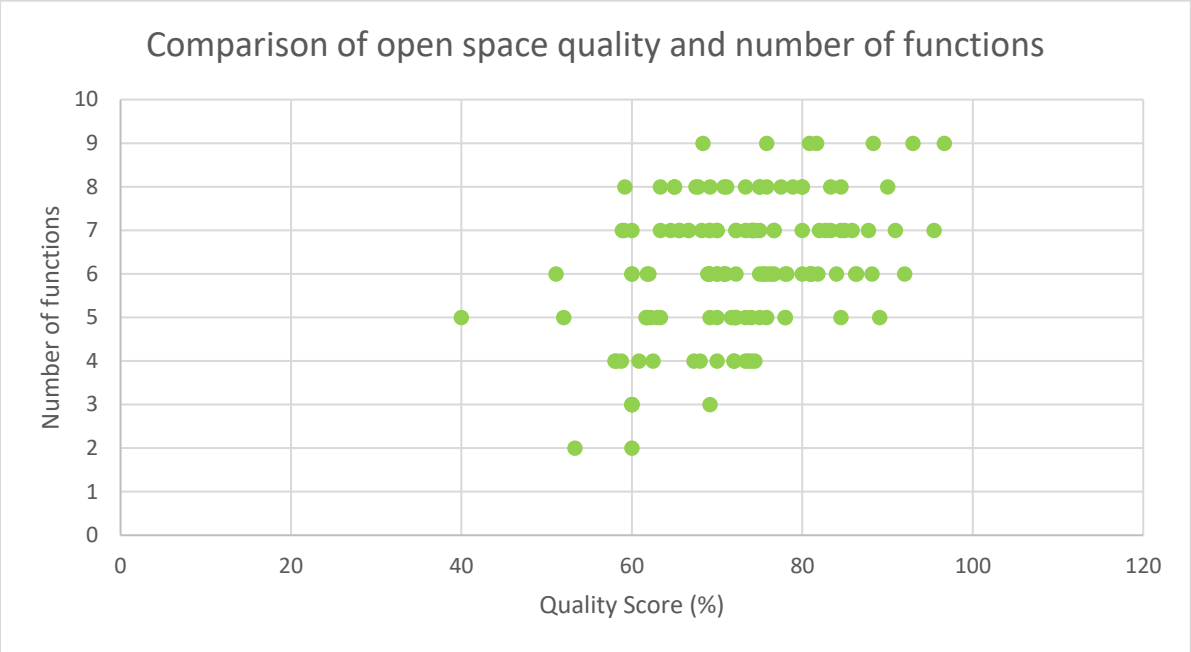


Figure 17 Scatter chart comparing assessment of open space quality with numbers of functions

Maps showing the results of the multifunctionality assessment by each individual function are provided in Appendix 3. A number of examples are also discussed in Section 8.

6.3 Access

6.3.1 Access buffers

Evidence from previous studies and consideration of national benchmarks and existing standards, including benchmarking with neighbouring local authorities have been used to develop access standards for open space (see Appendix 4), which are summarised in the table below.

Table 12 Summary of open space access standards

Open Space Typology	Proposed Access Standard
Allotments	15 minutes' walk time (720m straight line)
Amenity Green Space (above 0.15ha)	10 minutes' walk time (480m straight line)

Open Space Typology	Proposed Access Standard
Parks and Recreation Grounds	• Local and Neighbourhood Parks: 12 – 13 minutes' (600m straight line) • Destination Parks: 20-minute walk time (960m straight line) for destination sites.
Children's Play Space	10 minutes' walk time (480 metres straight line)
Youth Play Space	15 minutes' walk time (720 metres straight line).
Accessible Natural Green Space (above 0.15ha)	15 minutes' walk time (720m straight line) + Natural England ANGSt

There is increasing evidence demonstrating that access to high quality open space and Green Infrastructure plays an important part in people's health and wellbeing. This is true for the whole population, but particularly for disadvantaged communities who appear to accrue an even greater health benefit from living in a greener environment (see Section 4.3.1). The value of green infrastructure has also been keenly recognised during the COVID 19 pandemic where access to green space has played a key role in people's well-being: alongside a wider appreciation of nature.

Public Health England's report Improving Access to greenspace (2020), outlines 3 main barriers to accessing green space. These are:

- **Physical barriers**: proximity, physical obstacles, transport, and lack of facilities.
- **Social and cultural barriers:** social experiences, cultural experiences, and different values.
- **Perceptions, awareness, self-efficacy, and interest:** perception of safety, lack of awareness, low confidence, time constraints, and lack of interest.

The maps below show the application of the proposed access standards above. The walk time buffers take account of key physical barriers to access within the city, such as the rivers, railway and canal. The detailed methodology for the access buffers is provided in Appendix 3.

There is generally good access to parks and recreation grounds and youth play space across the city, but there are some large gaps in access to amenity green space, children's play space, allotments and accessible natural green space. When parks and amenity green spaces are considered together, there is good access to either a park or amenity green space.

In addition to the Accessible Natural Green Space Standards (ANGSt) buffers considered below, Natural England also recommend that there should be 1 hectare of statutory Local Nature Reserves per 1000 population. Within Oxford there are 3 small LNR's, which equates to 0.04ha per 1000. This is well below the ANGSt recommendation.

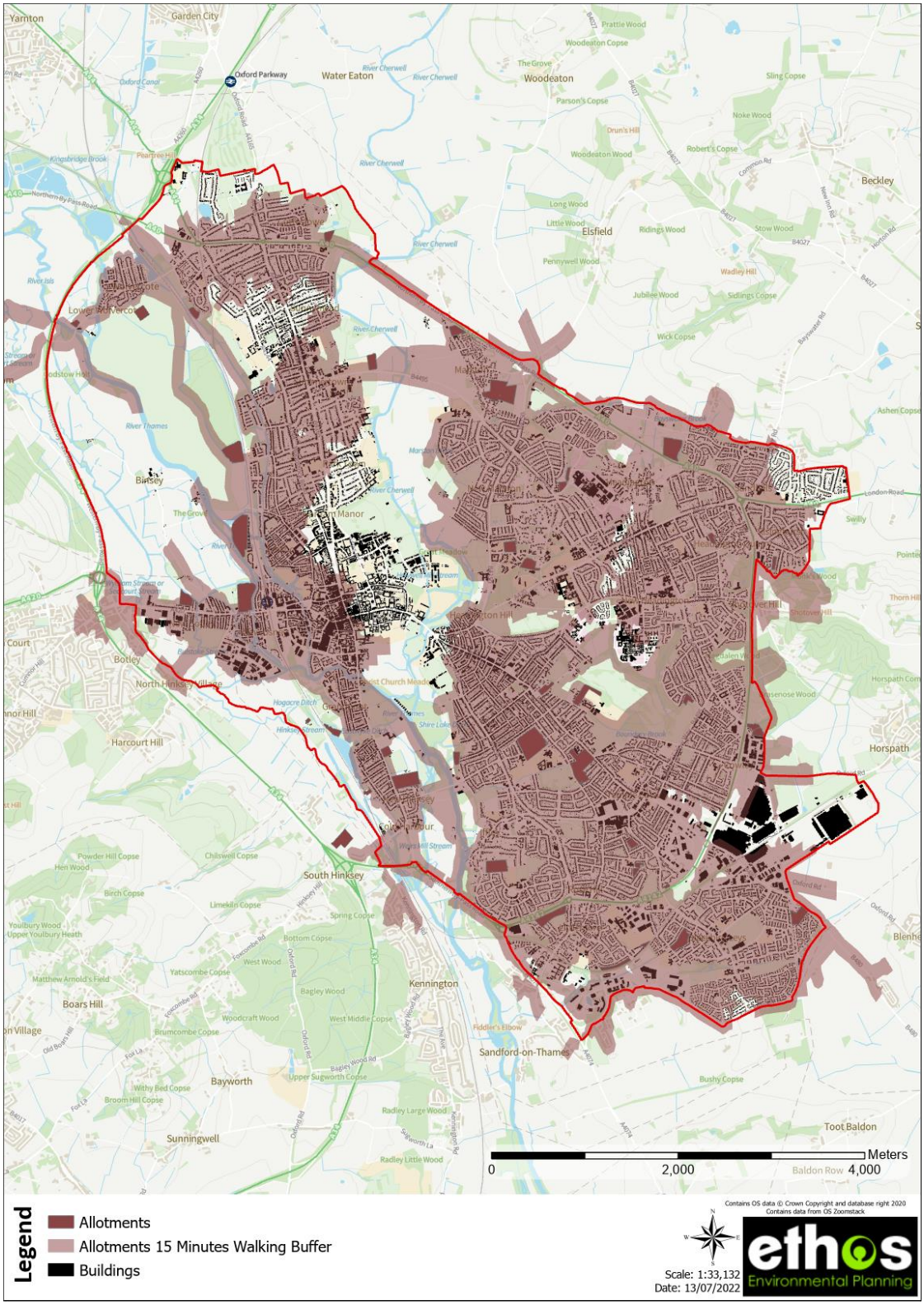


Figure 18 Allotments Walking Time Buffers (15 minutes)

Allotments: Generally good access across the city, although there is a gap in access in the eastern part of the city centre (low deprivation) (much of this area is university land), and smaller gaps in the north (low deprivation) and west (pocket of high deprivation) of the study area.

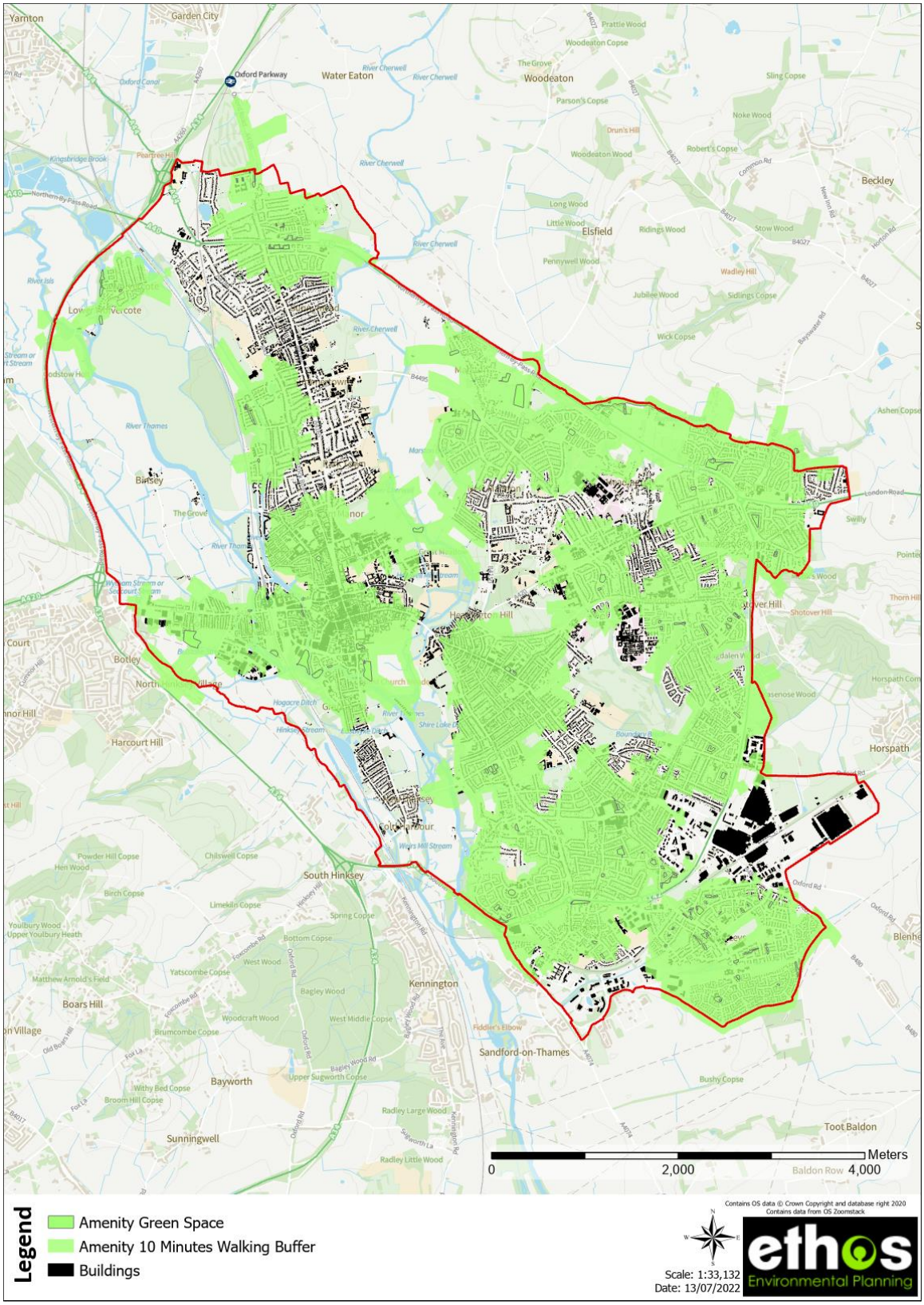


Figure 19 Amenity Green Space Walking Time Buffers (10 minutes)

Amenity green space: There are a number of large gaps in access in the north and east of the city (low levels of deprivation), and small gaps in the south in Littlemore and Temple Cowley (high levels of deprivation). However, the good access to parks and recreation grounds across the city mitigates this.

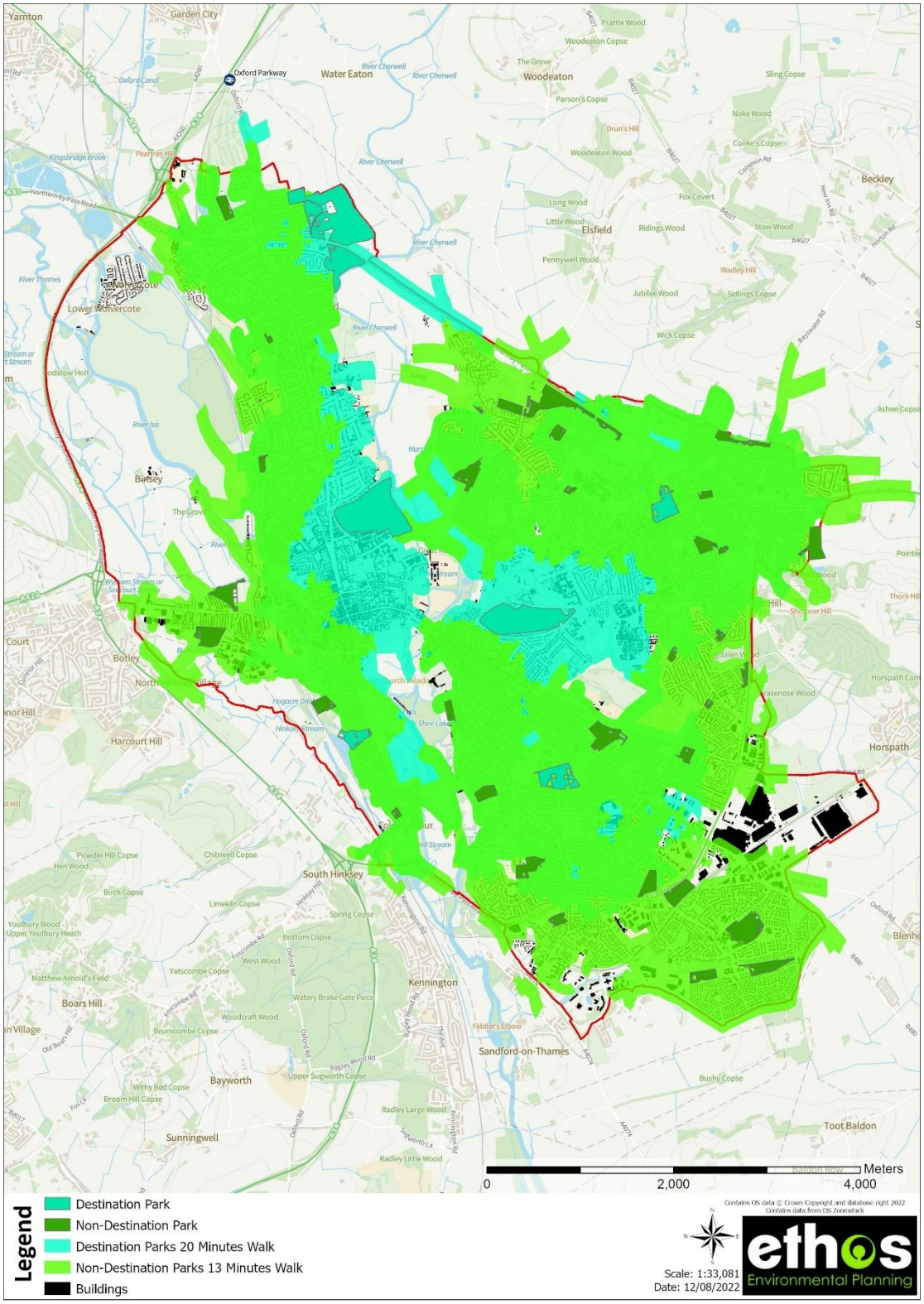


Figure 20 Parks and Recreation Grounds Walking Time Buffers (20 minutes for destination parks, 13 minutes for all others)

Parks and Recreation Grounds: Good access across the residential areas of the city. Small gaps in the north in Wolvercote (low levels of deprivation) but there is access to amenity green space and accessible natural green space in this area, which helps to mitigate this gap in access (although it is acknowledged that these types of spaces do not typically offer the same level of facilities that a park might).

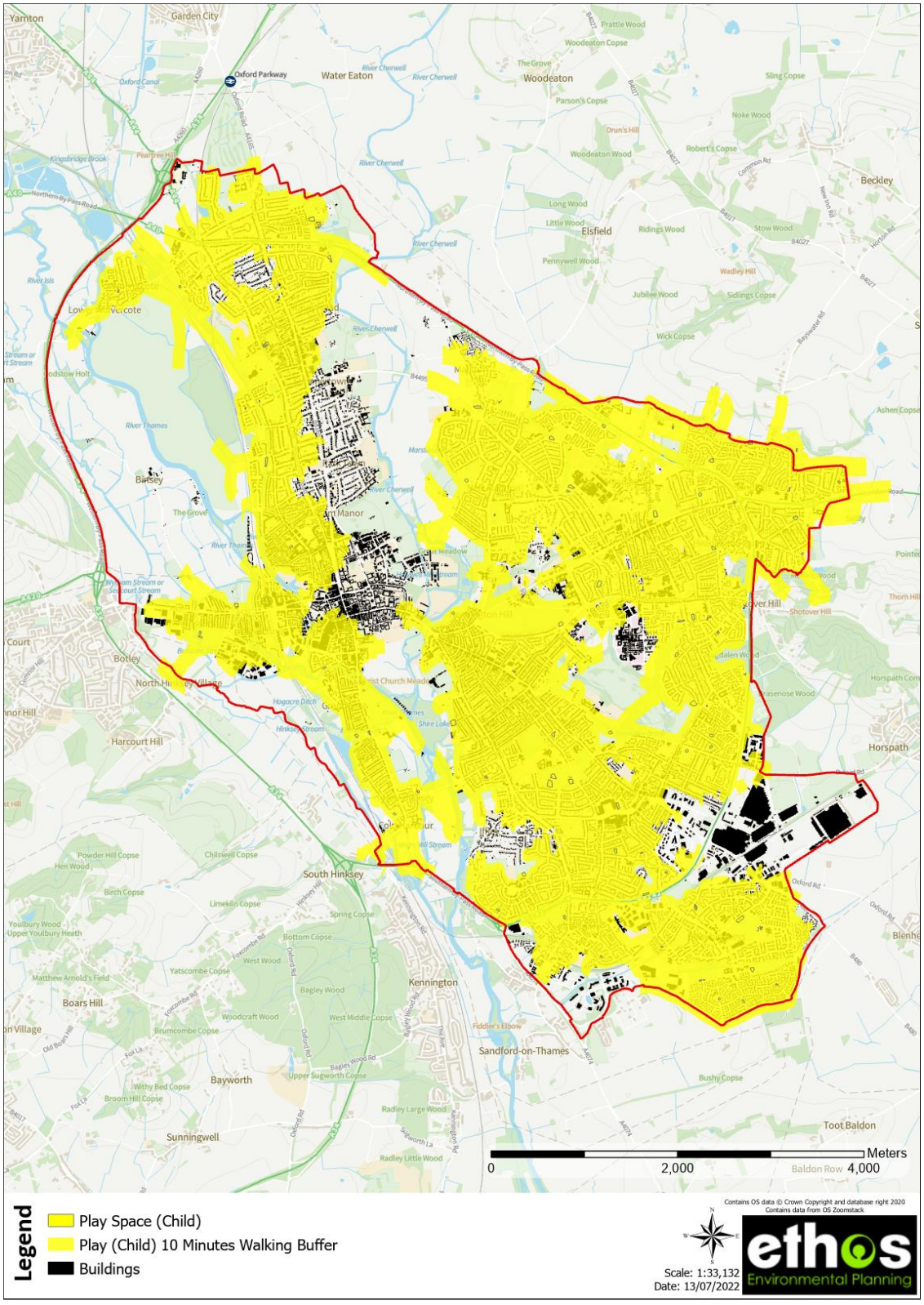


Figure 21 Play Space (Child) Walking Time Buffers (10 minutes)

Play space (Child): Generally good access, although there two large gaps in access in the city centre (although much of this area is university land) and North Oxford (low levels of deprivation). There is also a gap in the south in Iffley (IMD decile of 6).

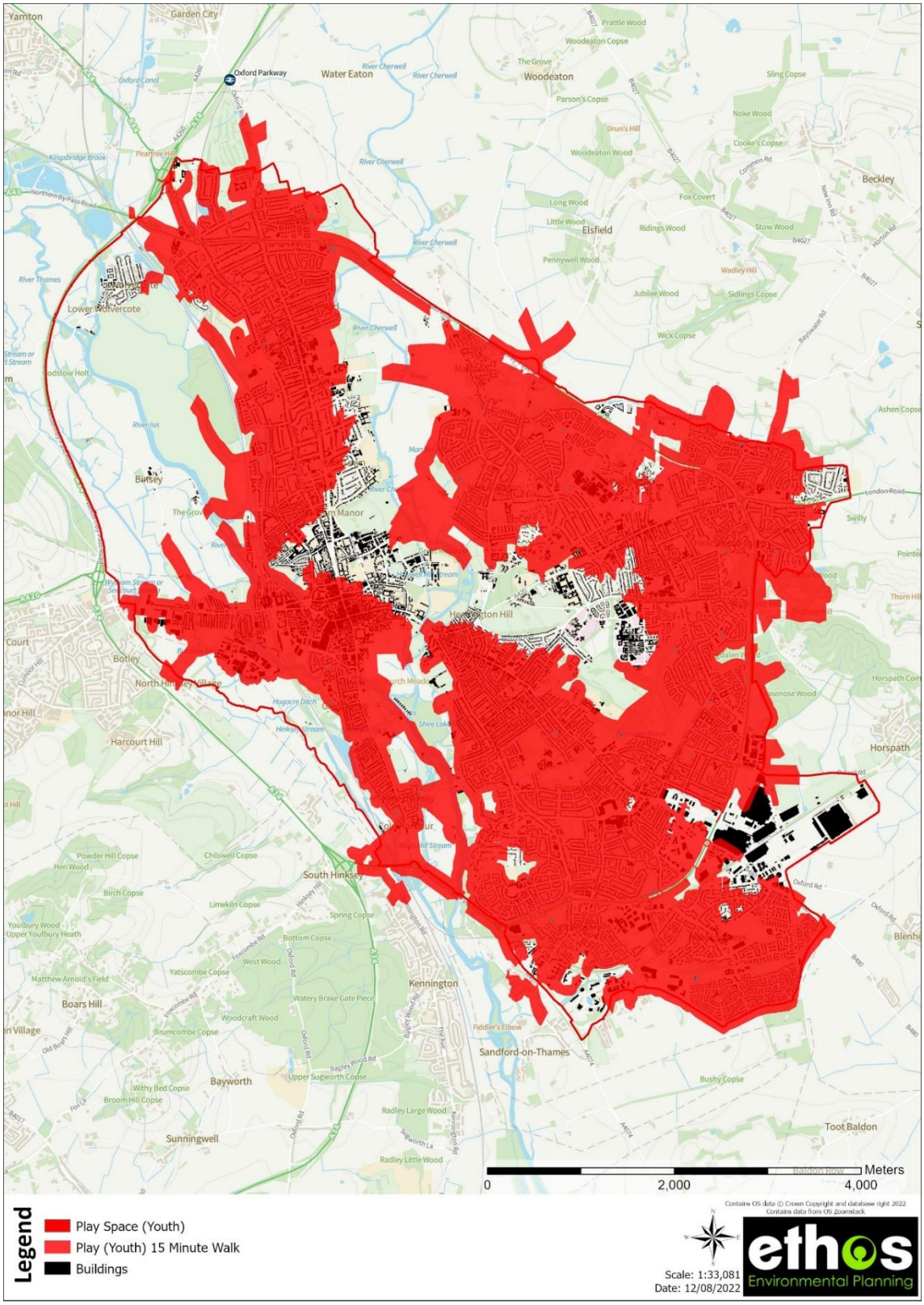


Figure 22 Play Space (Youth) Walking Time Buffers (15 minutes)

Play space (youth): Generally good access across the city, although there are gaps in access around the city centre/to the north of the city centre (in an area of low deprivation) (although much of this is university land) and one around South Park (middle to low deprivation). There is also a smaller gap in access in Wolvercote.

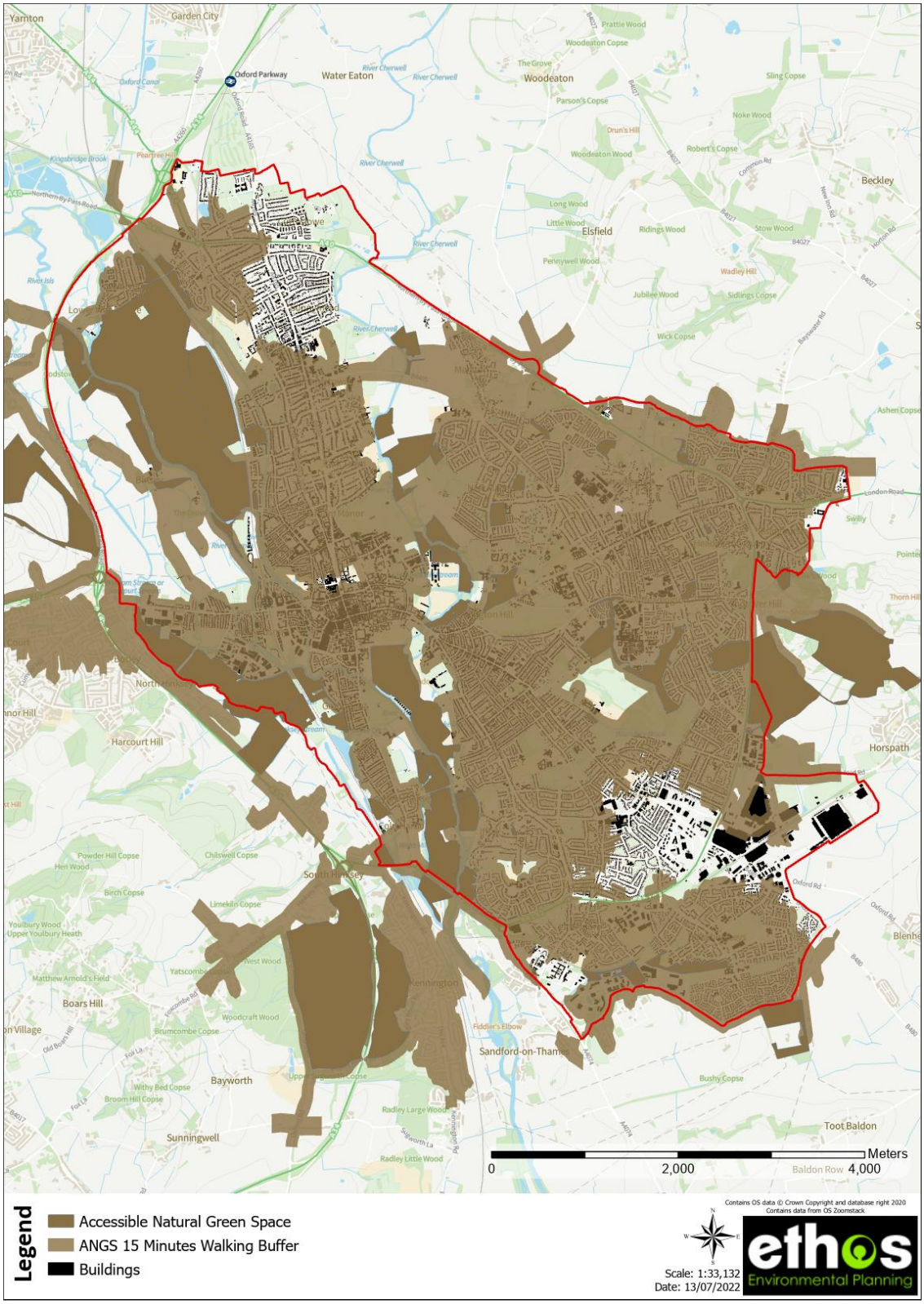


Figure 23 Accessible Natural Green Space Walking Time Buffers (15 minutes)

Accessible Natural Green Space (15 minutes' walk time buffer): Generally good access although there are two large gaps – one in Cowley/Temple Cowley in the south (relatively high levels of deprivation – IMD decile 4), the other in the North (around Sunnymead) (there is a pocket of relatively high deprivation here – IMD decile 4). The maps below directly apply the Natural England ANGSt standards which define straight line buffers and not walk times.

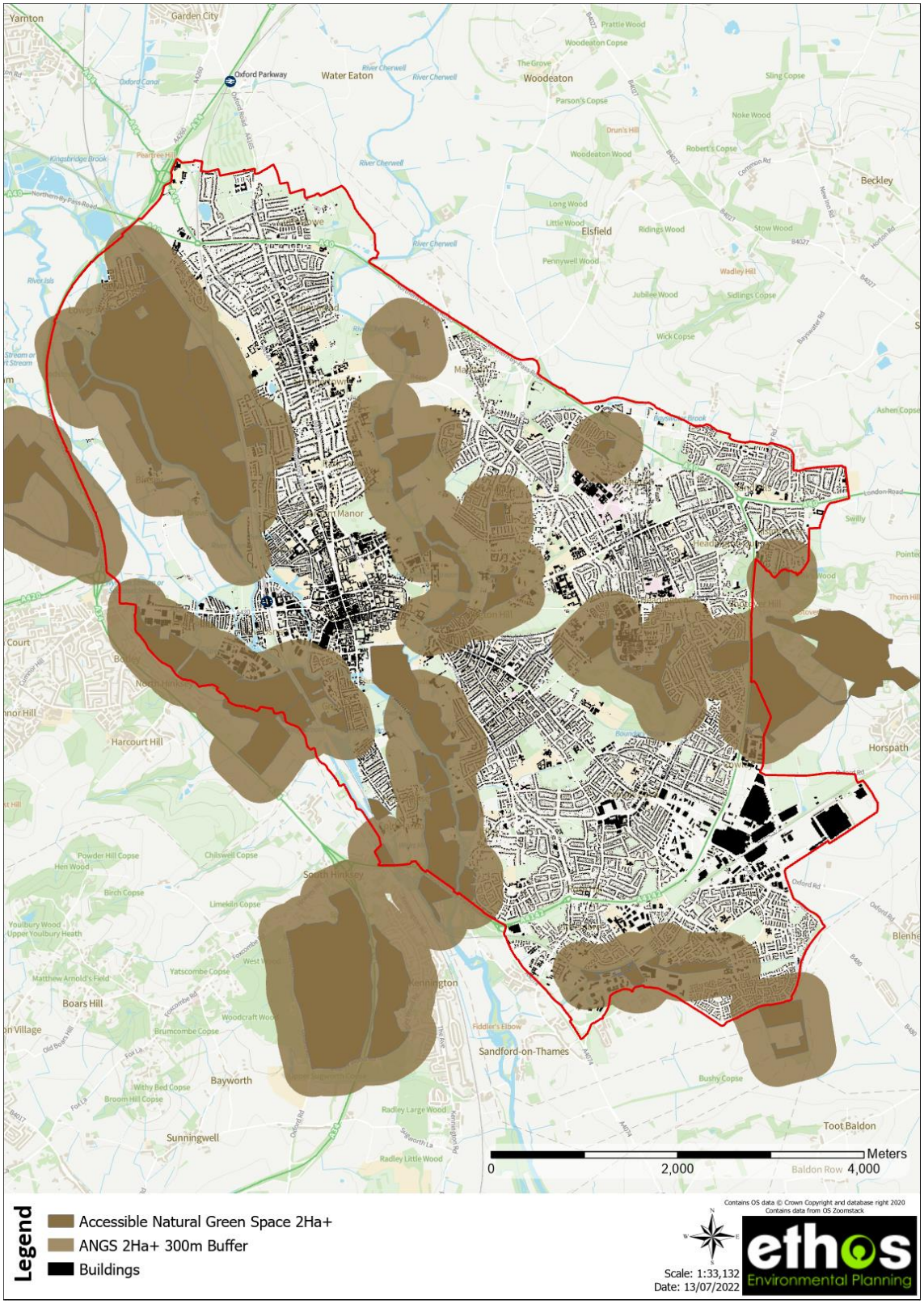


Figure 24 Accessible Natural Green Space 300m Linear Buffers

Accessible natural green space (ANGSt 2ha+ sites within 300m): Large gaps in access across the majority of the city.

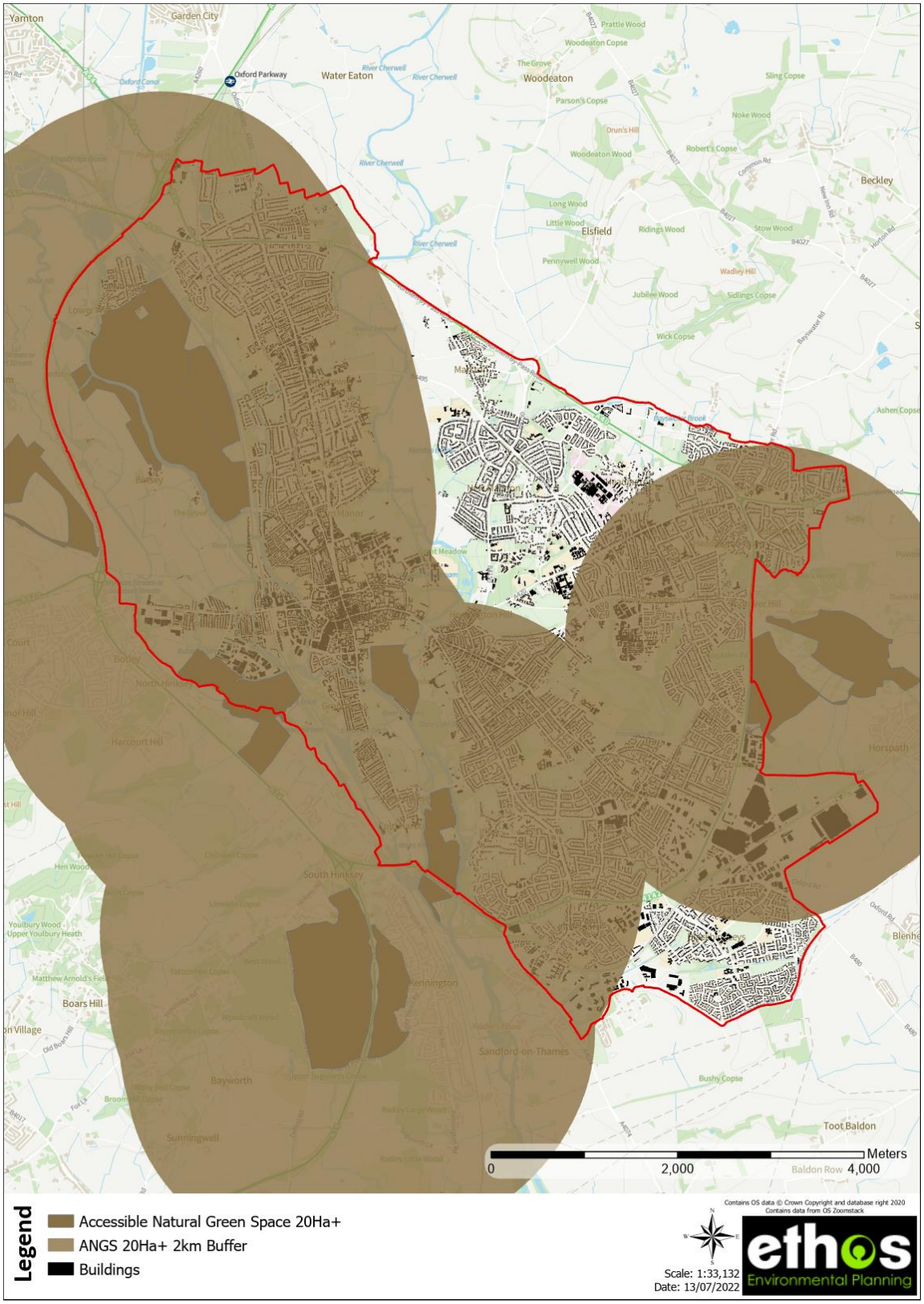


Figure 25 Accessible Natural Green Space 2km Linear Buffers

Accessible natural green space (ANGSt 20ha+ sites within 2km): Generally good access, although two large gaps – one around Old Marston and the other in the South around Greater Leys.

Figure 26 Accessible Natural Green Space 5km Linear Buffers

Accessible natural green space (ANGSt 100ha+ sites within 5km): Good access across the study area.

6.3.2 Quality audit results – good and safe access

The quality audits also provide information regarding if sites have 'good and safe access' (appropriate to the open space typology). This considered the quality of paths and links to adjacent green spaces/community facilities, and also if sites were easy to find. Figure 27 below shows that the majority of sites scored well for good and safe access, however a number scored on the lower end, and have been labelled on the figure below. Common reasons for these sites scoring poorly include poor quality paths and surfacing, entrance points that limit access for all, and lack of signage.

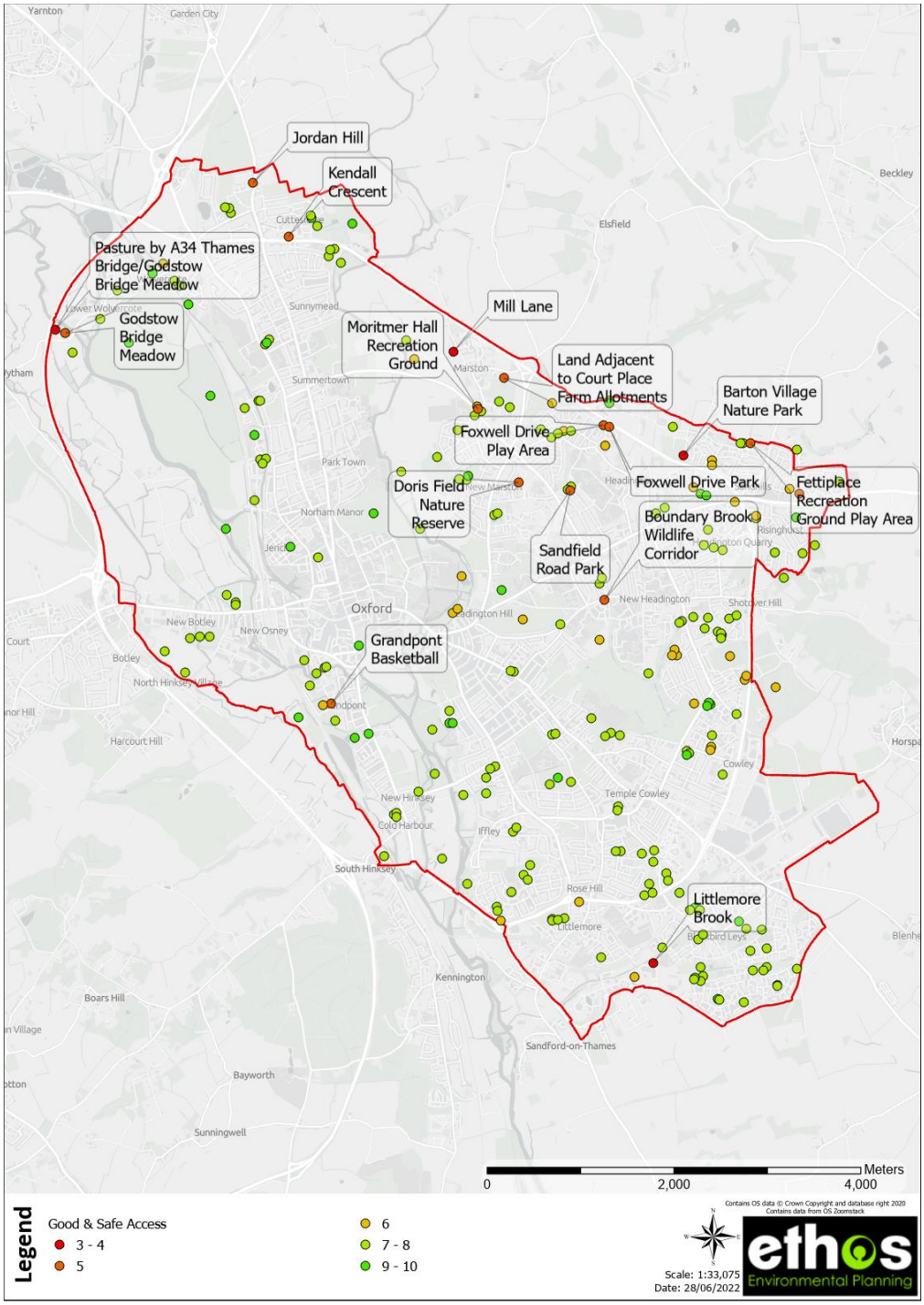


Figure 27 Site Scores for 'Good and Safe Access'

7.0 KEY STRENGTHS, GAPS AND DEFICIENCIES (STEP 4)

7.1 Overview

This section provides a summary of the key strengths, gaps and deficiencies relating to GI, from the analysis in Sections 4 (Study Context and Local Needs), 5 (Identifying the GI Network) and 6 (Quality, Multi-functionality and Access Assessment).

7.2 Quality

7.2.1 Public Open Space

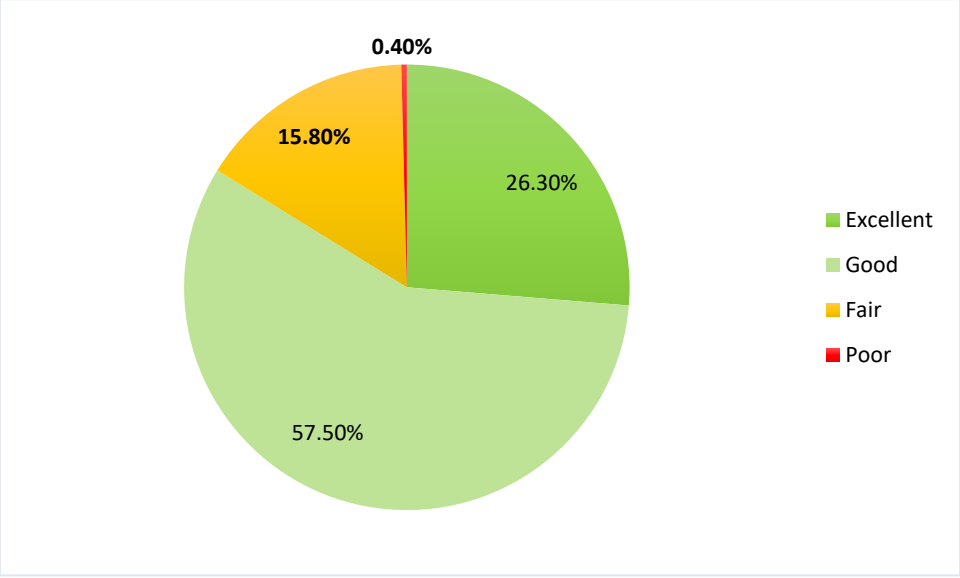
The majority of public open spaces assessed as part of this study (parks, amenity green spaces, accessible natural green spaces and play spaces (children and youth)) were evaluated as being of good or excellent quality across the study area. Some of the best scoring sites are Cutteslowe Park (and children's play area), Hinksey Park (and children's play area), Trap Grounds, Port Meadow with Wolvercote Common and Green, Meadow Lane Park Play Area, Memorial Garden, Hogacre Common Eco Park and Wolvercote Lakes.

However, a number of open spaces (40 sites – just over 16%) were assessed as being of poor or fair quality and with room for improvement in future. Common quality issues include low biodiversity value, poor access (e.g., path quality and overgrown vegetation), management of soft landscaping, dog fouling, litter and lack of signage.

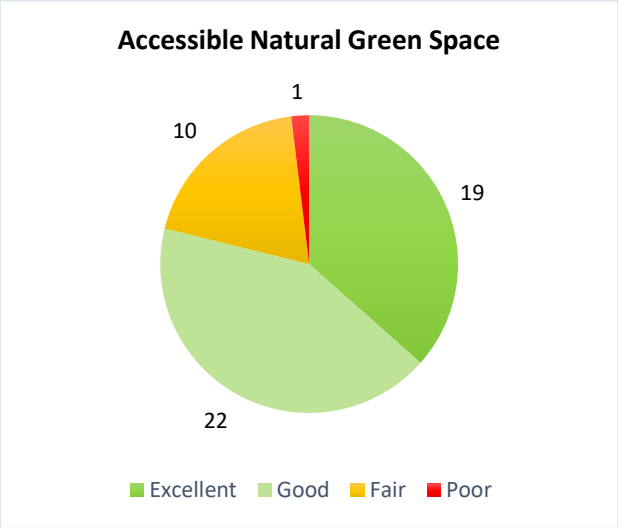
In general, the highest quality sites fall within areas with lower levels of deprivation, however there are exceptions to this e.g., Blackbird Leys Park, Gillians Park, Sunnymead Park, Fry's Hill Park and Lye Valley Nature Reserve.

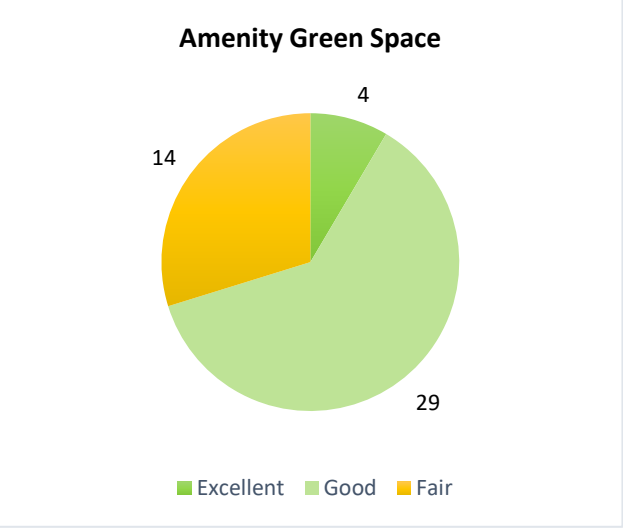
A summary of the quality results across the city and by typology is provided in the charts below.

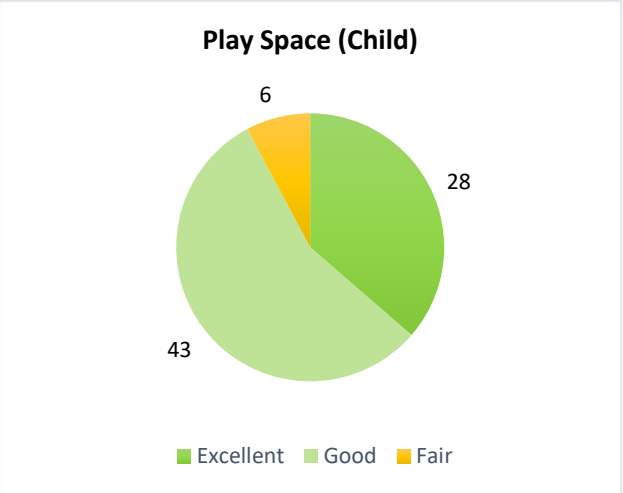
Overview of open space quality across Oxford (Percentage excellent, good, fair and poor)



Overview of open space quality by typology (numbers of sites)







7.2.2 Biodiversity

The city has a wealth of designated sites and important wildlife habitat which form a vital part of Oxford's GI network. A key issue for the city is reducing fragmentation and improving habitat connectivity to improve ecological resilience. Although this study does not provide a detailed assessment of the quality/condition or connectivity of ecological sites (it's focus is on the quality, multifunctionality and access to public open space), spatial opportunities have been identified for improving connectivity of the GI network for wildlife, drawing on the Nature Recovery Network and Natural England's Habitat Network mapping.

Management of green space, including designated sites is also key to improving biodiversity within the city. There is limited information available on the quality of designated sites and priority habitats, however Natural England provide quality data for SSSI's (which also underpins the condition of internationally important sites) and Site Improvement Plans for Special Areas of Conservation (SACs) and Special Protected Areas (SAC's). The condition of the majority of SSSI habitat across the city is generally favourable, although there is some opportunity to improve management. Although the majority of the Oxford Meadows (SAC) SSSI components are in favourable condition, the Site Improvement Plan highlights that the key threats to the qualifying features of the site (lowland hay meadows and creeping marshwort) are hydrological changes and also invasive species.

7.2.3 Water/Blue GI

The River Thames and River Cherwell and their floodplains constrain the size of the city centre and are key wildlife and recreational corridors, both within the city and cross border. Other important blue GI within the city includes the canal, streams, ponds and lakes such as Wolvercote Lakes.

The Water Framework Directive sets out requirements to prevent the deterioration of aquatic ecosystems; protect, enhance and restore water bodies to 'good' status; and achieve compliance with standards and objectives for protected areas. Local planning authorities must, in exercising their functions, have regard to River Basin Management Plans. Oxford falls within the Thames River Basin District.

Water quality data is collected by the Environment Agency. Although ground water quality within the city is good, the Water Framework Directive River status is poor for the River Cherwell and moderate for the River Thames. Pollution from wastewater (or sewage), and physical modifications to waterbodies, and pollution from rural areas are the most significant water management issues within the Thames River Basin District.

The connectivity and quality of the pathways alongside the rivers and blue infrastructure is also important for recreation, active travel and nature. These paths provide corridors for people and wildlife, linking various green and blue spaces throughout the city. This study has not looked at these paths in depth, but this could be an area for further analysis as part of future work.

7.3 Multifunctionality

The multifunctionality assessment provides an indication of the variability in number of functions that sites provide across the study area. Many of the open spaces are delivering multiple functions, however there are also those that are providing few (against the assessment criteria).

The sites that are delivering the greatest number of functions (9 out of 12) include Port Meadow with Wolvercote Common and Green, South Park, Cutteslowe Park, Sunnymead Park, Bury Knowle Park, Florence Park and Aristotle Lane Recreation Ground.

Key observations:

- Some of the highest quality sites also delivering high numbers of functions.
- Sites delivering the highest number of functions tend to be parks and recreation grounds and accessible natural green spaces.
- Generally, a good spread of these sites across the city, although notable areas where there are open spaces with lower levels of multifunctionality and where this could be improved is in the south and east of the city (which corresponds with areas of high deprivation).
- There are notable differences in the size of open spaces delivering multi-functionality across the city, with generally smaller open spaces within the south and east of the city, and within the city centre. In general, the smaller open spaces appear to be delivering fewer functions.
- Sites delivering very low numbers of functions tend to be private spaces and amenity green spaces.

7.4 Access analysis

Generally, there is good access to open space against the access standards applied, although there are some key gaps in access in the following areas:

- **Allotments:** Gap in access in the eastern part of the city centre (low deprivation) (however much of this area is university land), and smaller gaps in the north (low deprivation) and west (pocket of high deprivation) of the study area.
- **Amenity green space**: large gaps in access in the north and east of the city (low levels of deprivation, and small gaps in the south in Littlemore and Temple Cowley (high levels of deprivation). However, the good access to parks and recreation grounds across the city mitigates this.
- **Parks and recreation grounds:** Good access across the city. Small gap in the north in Wolvercote (low levels of deprivation) but there is access to amenity green space and accessible natural green space in this area, which helps to mitigate this gap in access (although it is acknowledged that these types of spaces do not typically offer the same level of facilities that a park might).
- **Children's play space:** gaps in access in the city centre (although much of this area is university land) and North Oxford (low levels of deprivation). There is also a gap in the south in Iffley (IMD decile of 6).

- **Youth play space:** Small gaps in access in the centre and north of the city centre (in areas of low deprivation).
- **Accessible Natural Green Space (15-minute walk time buffer):** large gaps access in Cowley/Temple Cowley in the south and in the North (around Sunnymead), both in areas with relatively high levels of deprivation.
- **Accessible natural green space (2ha+ within 300m):** Large gaps in access across the majority of the city.
- **Accessible natural green space (20ha+ within 2km):** large gaps around Old Marston and the other in the south around Greater Leys.

The main areas of the city that fall outside of a 15-minute walking district or city buffer (see Section 4.3.7, Figure 12) are Marston and New Marston in the north, and smaller gaps around Cowley and Littlemore in the south. The key gaps in access to open space within these district/city buffers areas are as follows:

- **Blackbird Leys Centre:** No access to large/destination parks but good access to local/neighbourhood parks. Gaps in access to accessible natural green space (against the 2ha+/300m standard and 20ha+/2km standard).
- **City Centre**: gap in access to children's play space, youth play space, allotments, amenity green space and accessible natural green space (against the 2ha+/300m standard). Small gap in access to local/neighbourhood parks (but good access to large/destination parks).
- **Cowley Centre:** small gap in access to children's play (around Iffley) and accessible natural green space (against the 2ha+/300m standard and the 15 minutes' walk time standard).
- **East Oxford Centre:** overlaps with Oxford city centre where there are gaps in children's play space, allotments and local/neighbourhood parks (but good access to large/destination parks). Also gaps in access to accessible natural green space against the 2ha+/300m standard only.
- **Headington Centre:** gaps in amenity green space, youth play space and local/neighbourhood parks (there is access to destination parks within 20-minute walk time), gaps in access to accessible natural green space (against the 2ha+/300m standard and 20ha+/2km standard).
- **Summertown Centre:** gaps in access to children's play space, local/neighbourhood parks (but good access to large/destination parks), amenity green space, allotments and accessible natural green space (against the 2ha+/300m standard and 15 minutes' walk time standard).

8.0 STRATEGIC PRIORITES AND RECOMMENDATIONS (STEP 5)

8.1 Overview

This section sets out strategic options and policy recommendations for GI within the study area. It draws on all the previous steps of the study to bring together informed recommendations across the following key areas:

- Protect what we have
- Enhance what we have
- Provide new green infrastructure
- Delivery mechanisms

The National Planning Policy Framework (NPPF) sets out the government's planning policies for England and how these are expected to be applied. The purpose of the planning system is to contribute to the achievement of sustainable development. The planning system has three overarching objectives (economic, social and environmental), which are interdependent and need to be pursued in mutually supportive ways. Green Infrastructure (protection, enhancement and new provision) and the ecosystem services it provides are key components of all three of the objectives, and vital in tackling the current nature, climate and health emergencies.

Whilst local authorities have an important role in delivering GI (as do the private sector), in some cases their role may move from that of 'deliverer' to 'facilitator'. The aim will be to work with communities and organisations to make local decisions about how GI will be provided. It is likely that a range of interventions will need to be considered in different areas (no one-size-fits-all approach due to differences in local context/opportunities).

The information provided within this study will form a good basis to inform any decisions related to the provision of GI.

8.2 Protect what we have

This GI study has clearly demonstrated the vital importance of green (and blue) infrastructure in helping to improve people's health and wellbeing and in tackling climate change and biodiversity loss, which are all key issues for the city. The research and analysis undertaken as part of this study demonstrates that Oxford's GI network is providing multiple functions and benefits: for Oxford's residents and visitors, the environment, and the economy. These are helping to address key contextual issues within the city.

Examples include: helping to reduce health inequalities in areas of deprivation through providing recreational opportunities and mediating potential harms posed by the local environment for example air pollution, heat, noise and flood risk; providing climate resilience (e.g., carbon capture and storage); providing wildlife habitat, corridors and stepping stones; providing attractive places to live and work, attracting inward investment and tourism.

However, there are parts of the city where the provision of green infrastructure, such as open space, is limited, and the constrained nature of the city may limit the provision of substantial

new GI such as open space. Oxford's existing GI should therefore be protected to help ensure a robust and resilient GI network which optimises the benefits provided to society, the environment and the economy, within the city and the wider area.

This study has identified the overall GI network within Oxford (as set out in Section 5.2 of this report). This is comprised of open space (both publicly accessible and private), blue GI/water, green belt land, statutory and non-statutory designated wildlife sites, priority habitat index and historic parks and gardens. Together these assets provide a multifunctional GI network within the city, and beyond.

Green infrastructure is essential infrastructure and should be considered and incorporated at the earliest stages of development and treated like other types of essential infrastructure.

Example GI function: Carbon capture and storage

Climate change mitigation means avoiding and reducing emissions of greenhouse gases. The protection of existing habitats and habitat management (following good practice) of existing natural capital and GI does this through a combination of protecting stored carbon (in soils, plant biomass etc); and through enabling the continuation of carbon capture (through photosynthesis).

Figure 28 below shows sites that provide a carbon storage function. This is an output from the multifunctionality assessment (see Section 6.2), which utilises the OxCam Natural Capital mapping for Carbon Storage (license credits provided in Appendix 3). Sites which fall within an area of OxCAM carbon storage scoring 3 or above are considered to deliver this function, and those sites which score highest (10) have been identified as 'delivering well' – these are the best sites for carbon storage (based on the desktop audit).

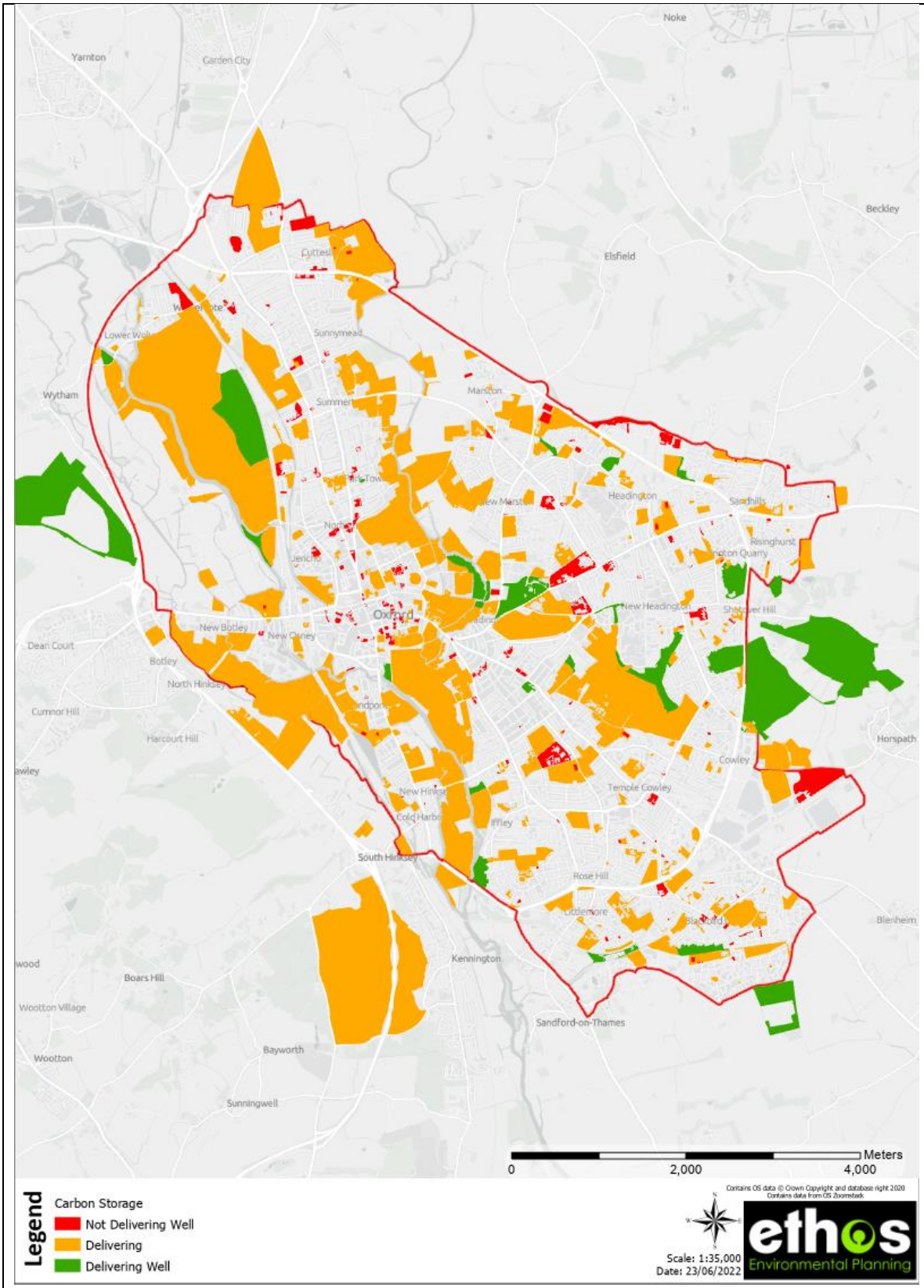


Figure 28 Carbon Storage

Recommendations for the Local Plan – Protect what we have

Local Plan policy should continue to protect the overall GI network. The more detailed analysis in this report helps to understand where the highest priority areas for protection are likely to be. For example, sites that:

- Have nature conservation, heritage or cultural value
- Are important in avoiding deficiencies in accessibility or quality (those sites that scored highly in the quality assessment, and where gaps in access would be created or worsened).
- Provide high levels of multifunctionality.
- Fall within areas of need e.g., areas of high deprivation, poor air quality or flood risk.

Development proposals will need to protect as well as contribute to new and existing GI. The starting point will be the protection and enhancement of existing GI on site and ensuring GI links (both for people and wildlife) with the surrounding area. GI must be embedded into the layout of new development from initial project thinking, identification of constraints and opportunities identified in the master planning process, through to implementation, management and maintenance. Development proposals should be guided by best practice standards for GI, which includes Natural England's GI Standards Framework and the Building with Nature Benchmark.

Development that will cause material or demonstrable harm to the functioning of the GI network should not be permitted, unless mitigation or compensation can be provided to ensure the overall multifunctionality and connectivity of the GI network is maintained.

Recommendations for wider Council action – Protect what we have

The Council should continue to work across its service areas, and externally with partners locally, regionally and beyond to drive collaborative action to protect existing GI and natural capital. This could involve nominating 'GI champions' across relevant council service areas, who advocate a GI approach – protecting and enhancing GI in order to optimise the benefits provided to society, the environment and the economy.

8.3 Enhance what we have

This study has established the need to protect the existing GI network (in Section 8.2 above). There are also opportunities to enhance this existing GI provision, in order to optimise the functions and benefits provided. These opportunities are summarised, and are:

- Improving open space quality
- Improving open space multifunctionality
- Improving access to open space
- Re-location/redesignation of open space
- Improving the biodiversity through habitat management and restoration

The following section (8.4) then goes on to consider opportunities and recommendations for new provision of GI.

Open Space Quality

Those sites that have been assessed as poor or fair quality (quality assessment undertaken March 2022) are highest priorities for improvement. Key observations from the quality assessments include:

- The quality of the majority of publicly accessible open spaces across the city is generally high, although there are a number of open spaces in need of improving.
- In general, the highest quality sites fall within areas of lower levels of deprivation, however there are exceptions to this.
- The wards with generally higher numbers of poorer scoring sites are Marston, Headington Hill and Northway, Quarry and Risinghurst, Barton and Sand Hills, Churchill and Lye Valley.
- The large/destination parks within the city are high quality sites providing multiple functions and are important sites for tourism and built/natural heritage.
- The importance of accessible natural green space within the study area, and the need to maintain and enhance provision for biodiversity, across all typologies of open space – not only accessible natural green space (where appropriate).
- For lower scoring sites, common issues appeared to be low biodiversity value, poor access (e.g., path quality and overgrown vegetation), management of soft landscaping, dog fouling, litter and lack of signage.

As discussed in Section 4.3.1, improving access to high quality open space can improve health outcomes for the whole population, but especially for disadvantaged communities. Considering this, quality improvements should also be targeted in areas of high deprivation**.** Figure 29 below shows the IMD deciles with the open space quality rank scores overlain. Those sites that are labelled show those open spaces that have been ranked as poor or fair quality, and also overlap with higher levels of deprivation within the city (with a decile of 5 or below).

The analysis in Section 4.3.1 also considered priority areas for targeting improvements to GI for health and wellbeing based on a number of factors which included IMD, population density, percentage of existing publicly accessible open space, access to private gardens and surface water flood risk. There are priority areas within the majority of wards in the central and southern part of the city including:

- Osney and St Thomas/Holywell/Hinksey Park (the city centre)
- Northfield Brook
- Blackbird Leys
- Cowley
- Temple Cowley
- Rose Hill and Iffley
- Lye Valley
- Littlemore
- Headington Hill and Northway
- Barton and Sandhills
- Churchill
- St Mary's
- St Clements.

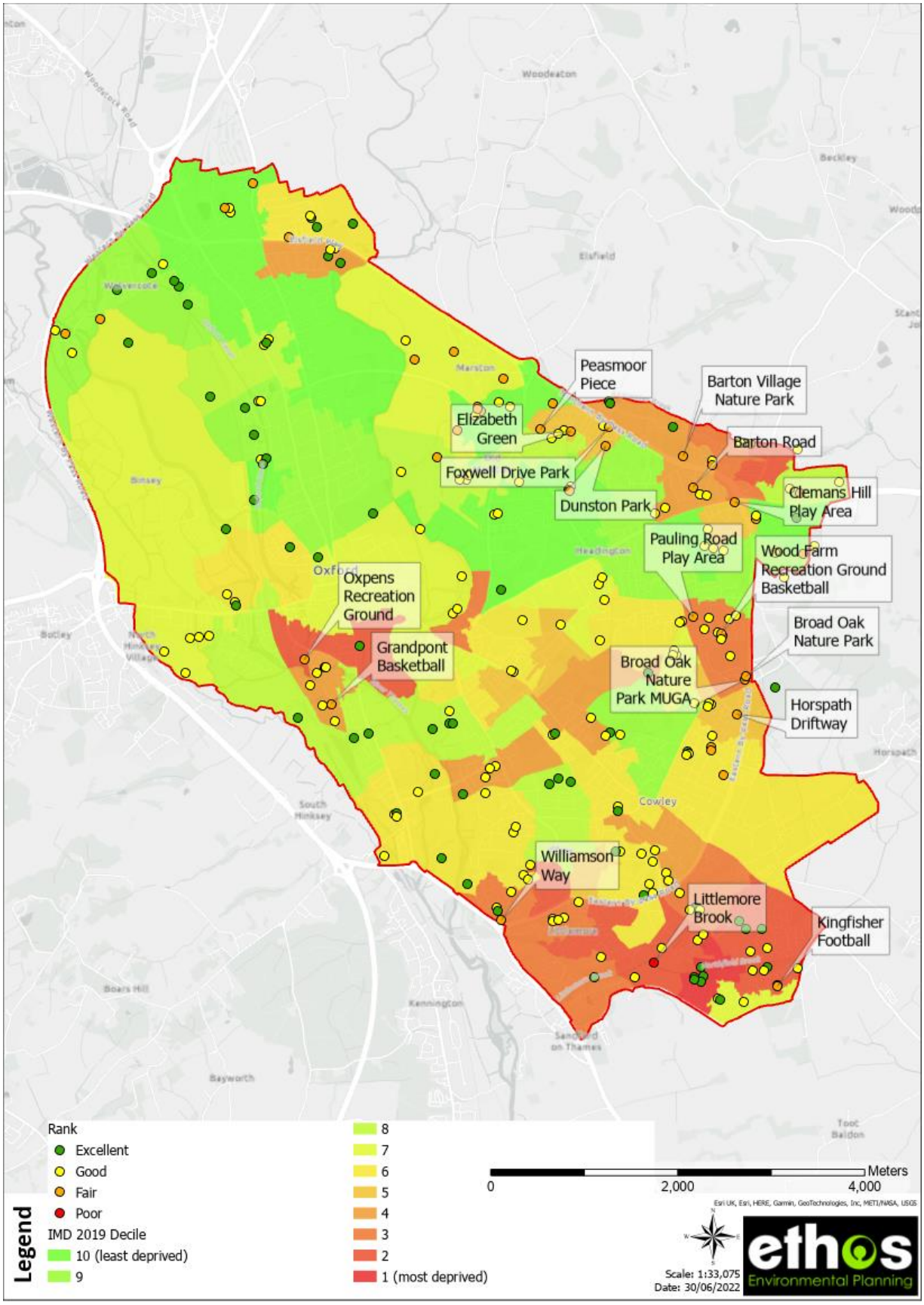


Figure 29 Map showing IMD deciles overlain with open space quality ranks

Multi-functionality

The multifunctionality assessment (Section 6.2) highlights that generally the existing open spaces with high levels of multifunctionality are large parks and accessible natural green spaces. However, there is potential to improve the multifunctionality of sites – the greatest opportunities are within larger open spaces that are currently scoring low, and also within spaces such as amenity green space, which often consist of large areas of short mown grass.

The planning process could support improving the multi-functionality of open space through helping to secure off site development contributions to improve a large area of short mown amenity grass which could include aspects such as: tree and shrub planting, SuDS/wetland provision, wildflower meadow management, community orchard/food growing and play provision. Introducing these types of nature-based solutions/GI interventions can help adapt to the impacts of climate change. Equally management practices of existing sites could be updated to target interventions that would secure greater multi-functionality.

Improving multifunctionality in one area must not adversely impact the other functions a site provides, and there will be sites where it is not appropriate to increase the level of multifunctionality in certain ways. For example, an accessible natural green space may score very highly for biodiversity and climate change adaptation, and it may not be appropriate to increase the functionality in terms of play and recreation provision, at the cost of the site's high wildlife value.

Example: Climate change adaptation

Adaptation refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. Green Infrastructure is among the most widely applicable, economically viable and effective tools to combat the impacts of climate change and help people adapt to the adverse effects of climate change.

The impacts of climate change include hotter temperatures, more severe storms (and flooding), increased drought, loss of species, food shortages and disease. The ongoing impact of climate change is likely to exacerbate these risks in the future, with a variety of negative consequences for property, ecosystems, as well as human health.

GI and nature-based solutions can help us adapt to these impacts in some of the following ways:

- Helping to cool the air and reduce heat islands in urban areas e.g., through trees, woodland and waterbodies.
- Trees and other vegetation planted in the right places can help improve urban air quality on a local scale by forming a barrier between people and pollutants. They also remove some particulate pollution from the air by catching the tiny particles on their leaf surfaces.
- Water management - Natural flood management techniques, SuDS, tree and woodland planting, and the creation of ponds and wetlands can help slow, store and filter water, which can reduce flood risk, improve water quality and reduce

soil erosion. These types of solutions also provide benefits for wildlife and health and wellbeing.

- Provision and enhancement of wildlife habitat and corridors and stepping stones for wildlife migration.

The figure below provides an indication of which open spaces are providing a particular climate adaptation function (although it is acknowledged that all green spaces will provide some level of climate adaption e.g., an area of short mown grass will attenuate some rainwater). This is an output from the multi-functionality assessment in Section 6.2. Those sites that are considered to be delivering a climate change adaptation function (highlighted green) are those that are fall within all/either of the following: Designated wildlife sites, Priority habitat, Accessible natural green space, sites with min 0.5ha tree cover, sites within flood zone 2 or 3, sites within an areas of surface flooding area (up to 1 in 1000).

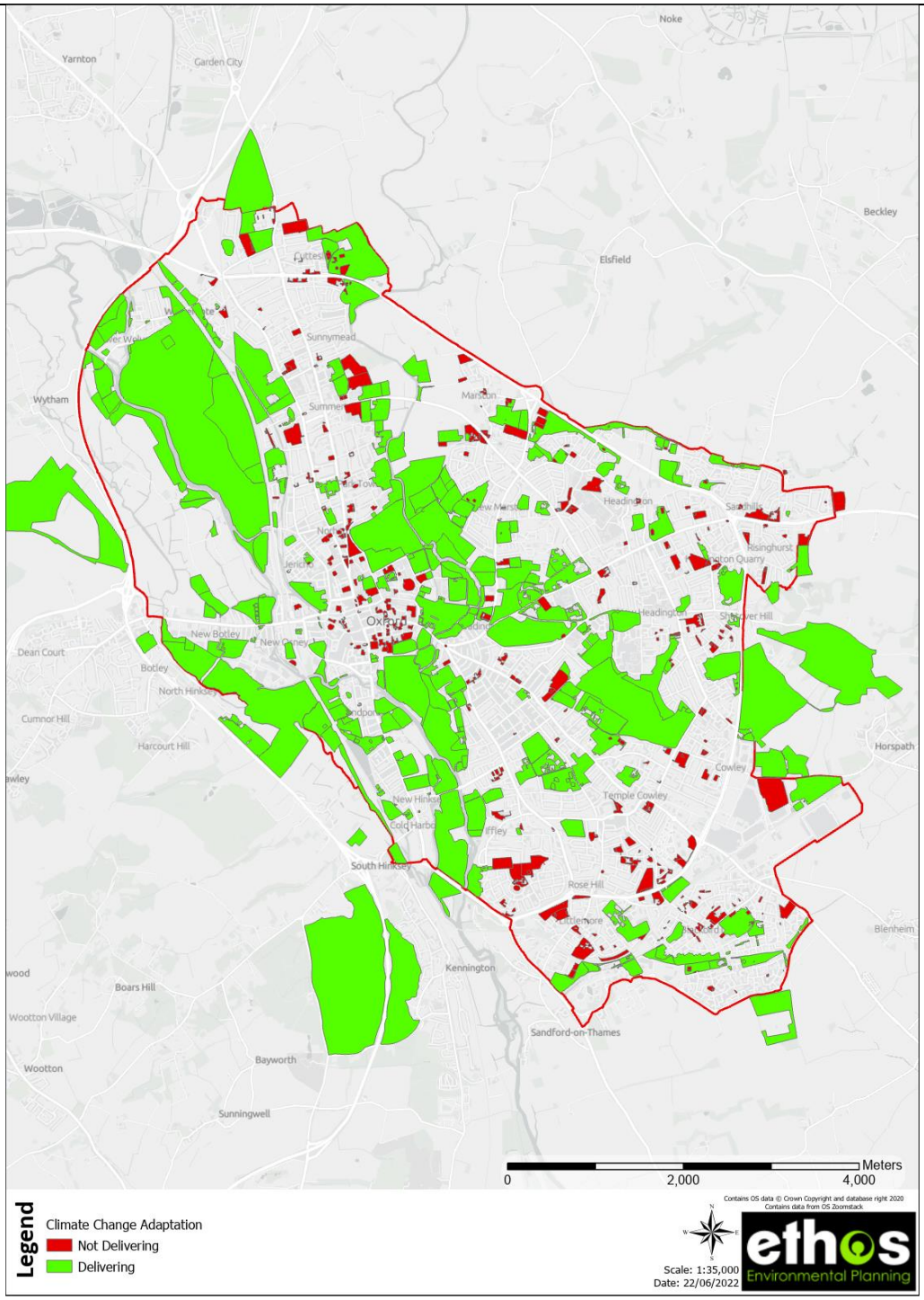


Figure 30 Climate change adaptation

Access to open space

The main barriers to access include physical barriers, such as proximity of open space, physical obstacles, and transport. The access analysis undertaken in Section 6.3 uses walk time buffers which take account of physical obstacles such as rivers and railway lines. This shows that generally there is good access to the various types of public open space across the city, although some key gaps in access have been identified.

Although there may be limited opportunity for new provision of open space to reduce gaps in access, there are opportunities to improve access within open spaces and between open spaces and where people live and work. This could be through:

- physical improvements to path surfaces and improvements to connectivity within and between sites (utilising the PROW network).
- greening existing paths to improve their attractiveness and safety e.g., providing tree lined routes that provide shade, segregating paths from busy roads.
- Implementing Liveable/low traffic neighbourhoods (see box below).
- Improving signage/information – making people aware of what is close by which is not always clear to them.

These measures will also support the delivery of the Oxford Local Cycling and Walking Infrastructure Plan (LCWIP, 2020). Improving the uptake of walking any cycling through improvements to GI which supports the PROW/active travel network will also help mitigate climate change (and support the Council's Zero Carbon Action Plan), through reducing emissions e.g., from private cars.

Other barriers to accessing green space/GI include:

- administrative and financial barriers - such as car parking charges, the cost of public transport, or allotment waiting lists (and fees, although these are often small).
- Social and cultural barriers - such as differing values across cultures, social experiences, perceptions of a lack of safety, low confidence, time constraints or lack of interest.

Inclusive design of open space, coupled with programmes of social engagement and participation, have been shown to be effective at delivering on multiple outcomes and attracting different population groups.

Example of a Liveable Neighbourhood – Waltham Forest 'Mini Holland' in London.

Liveable/low traffic neighbourhoods

Residential areas in cities and towns are often used by through-traffic, which creates noise, pollution, and hazards. A Liveable Neighbourhood (also known as a low traffic neighbourhood) is a simple and cost-effective way to reduce through-traffic while maintaining vehicle access to homes and businesses. Liveable neighbourhoods promote and prioritise walking, cycling and public realm improvements, without disadvantaging people with mobility restrictions. This can be done through a range of measures including vehicle restrictions, traffic calming, one-way streets, and residents' parking zones.

Street trees and other greening approaches such as the introduction of Parklets, play an important part of Liveable Neighbourhoods, both in terms of traffic

 *Example of a Parklet in Hammersmith and Fulham*	calming, and also in creating attractive places where people can stroll, shop or sit and enjoy being outside with others – with the aim of reducing social isolation, fostering local communities, and creating lively and prosperous local high streets.

Re-location/re-designation of open space

In some areas it may be possible to make better use of land by re-locating or re-designating open spaces. This needs to be determined at a local level and consider the quality and access to existing open space. Some key examples drawing on the access analysis are highlighted below (these are not recommendations but highlight where there may be potential for existing open space to accommodate provision to reduce existing gaps in access):

- Potential for green spaces in the city centre to reduce gaps in access to youth play space, children's play space and allotments/food growing areas by accommodating some/all of these facilities.
- Potential for South Park to accommodate youth provision to reduce the gap in access in this area
- Creating more semi-natural habitat within parks and amenity green spaces (to improve biodiversity across the city), but particularly in areas where there are gaps in access to natural green space e.g., amenity green spaces in Cowley.

Improving biodiversity through habitat management and restoration

Biodiversity underpins healthy and well-functioning ecosystems, which provide us with a range of ecosystem services or benefits. Ecosystems and the services they deliver underpin our very existence and wellbeing. There is also increasing evidence of a positive relationship between a person's connection to nature and their health and wellbeing (known as Biophilia).

Nationally, dramatic declines in biodiversity continue as a result of multiple pressures and the Oxfordshire State of Nature Report (2017) reflects these worrying trends more locally. It highlights the urgent need to create larger and more connected areas of high quality habitats, ensure better planning for GI that benefits nature and people, and increase access to green space.

The management and condition of existing green spaces and sites of nature conservation interest is key to improving the quality of the GI network for biodiversity. Priorities include restoring priority habitats and designated sites (also see Section 8.4 below), for example SSSI habitats that are in unfavourable condition (identified in Appendix 1) and managing open

space to improve its biodiversity value through smaller-scale biodiversity measures. This could focus on those spaces that scored poorly for biodiversity in the quality audit undertaken as part of this study, or other identified priorities, such as within the biodiversity review for Oxford City Council Parks and Nature Areas (2020)[36].

Recommendations for the Local Plan – enhance what we have

Local plan policy should require that development proposals enhance existing GI (on site and off site), optimising its quality, multi-functionality, accessibility and connectivity (where possible and appropriate). Development proposals should be guided by best practice standards for GI, which includes Natural England's GI Standards Framework and the Building with Nature Benchmark.

Where it is not possible to provide GI on site, development should be required to provide contributions for off-site provision and enhancement (see Section 8.6 below). Enhancements include improvements to the quality, multifunctionality and access to exiting open space, and enhancing ecological networks as identified within this study. Access to high quality open space should also be considered as part of the council's work on the 15-minute city, to help ensure that people's daily needs are being met within each district centre. The priority areas identified in this report such as poorer scoring sites, as well as the 15-minute neighbourhood analysis identifying where certain typologies of green space are not within 15 minutes of particular areas of the city, could help with selecting sites.

The Council could also consider:

- Identifying priority sites for enhancement within the infrastructure delivery plan.
- Site allocations could include specific guidance/recommendations for priority locations to be enhanced within the vicinity of a site, as well as particular green infrastructure functions (e.g., climate adaptation, biodiversity improvement, recreational access).
- Equally, ensuring that considerations of how best to design for multi-functional green infrastructure need to be incorporated into any local design guidance that may be developed in future.
- Opportunities for smaller scale greening features within new development – e.g., areas of green roofs, hedges, biodiversity measures like bird boxes, wildflower planting etc.

Recommendations for wider Council action – enhance what we have

Management plans should be developed for the key open spaces to ensure these are high quality and optimising health and wellbeing, biodiversity and water management benefits. These priorities could be considered in neighbourhood plans and by the local community.

The council should continue and increase partnership working with other organisations and landowners, to improve the management of land within the city and beyond, in order to optimise the benefits to society, the environment and the economy. Examples include

[36] https://www.oxford.gov.uk/downloads/file/7273/oxford_green_spaces_biodiversity_review_2020

encouraging/supporting wildlife and water friendly gardening, tree planting and creating wildlife gardens within school grounds, managing road verges for pollinators and other wildlife, and sustainable farming practices.

8.4 Provide New GI

The provision of new GI is required in order to strengthen the existing GI network, and improve its connectivity, functionality and resilience to pressures such as climate change. The study has informed where the priority areas for new GI provision are in the city, which include:

- New publicly accessible open space - where there are gaps in access to existing open space (see section 6.3). However, it is acknowledged that there may be limited opportunity for extensive new open space provision due to the constrained nature of the city, and therefore the focus may need to be on improving quality, multi-functionality and access to existing open space.
- Restoration and creation of habitats to provide larger, high quality and better connected habitats for wildlife. The focus for this should be within the Nature Recovery Network as identified in Section 4.3.8 and summarised below, although opportunities to implement smaller scale measures that make space for nature (e.g., wild areas) should also be considered.
- Urban greening such as street tree planting, green walls and roofs, SuDS, and the introduction of planters and parklets. These could be focused in areas of high population density where the provision of new green space may be challenging. If designed well, with appropriate plant species selection, urban greening can not only bring health and wellbeing benefits, but also provide stepping stones for wildlife such as pollinators.
- Tree (including street trees) and woodland planting – could be targeted in wards with existing low canopy cover (less than 20%[37] - see Section 4.3.3). Planting can also be prioritised to address multiple issues such as areas of poor air quality, surface water flooding, high surface temperatures and high levels of deprivation. The right tree, right place, right reason principle must underpin any new tree planting – certain areas will not be appropriate for tree planting, for example, important grassland sites. Other types of planting may be beneficial where trees are not appropriate, e.g., hedges. Community engagement and support will be key in delivering successful projects.

The location for a new strategic park has been considered (as a requirement of the brief). Due to the good access to parks and recreation grounds across the city against the standards set out in Section 6.3, it is considered that the priority should be placed on improving the quality, multifunctionality and access to existing provision. For example, this could include incorporating children's play provision within University Park to reduce the gap in access to children's play within the city centre.

The design of open space and GI to be provided as part of new development (or through other means) should follow good practice guidelines, such as the principles set out the Building with

[37] Forest Research recommend 20% as a minimum target for tree cover in urban areas.

Nature Benchmark (see Appendix 1). These standards can be applied to any scale of development and will help ensure:

- GI is multifunctional and connected, responds to climate change, maximises environmental net gains, responds to local context (heritage, landscape and policy), creates distinctive places and secures effective place-keeping.
- GI brings nature closer to people and supports equitable and inclusive places.
- GI delivers climate resilient water management and brings water closer to people.
- GI delivers wildlife enhancement and underpins nature's recovery.

Key Strategic Corridors – for people and nature

The best sites for nature within the city are the statutory and non-statutory designated wildlife sites and priority habitats, which are reflected in the Nature Recovery Network Core Zones, and Natural England Habitat Network Mapping. These sites must be afforded protection through the planning system, but key to ensuring ecological resilience is improving the connectivity between habitats, through habitat restoration and creation.

The draft Nature Recovery Network and Natural England Habitat Network Mapping (see Section 4.3.8) indicate where habitat connectivity can be improved. These datasets areas have formed the basis of identifying key strategic corridors. There are areas where there are good networks of existing GI provision, but also are key areas for targeting improvements for habitat connectivity/ecological resilience (these opportunities would need to explored further with in depth ecological studies/expertise). These are also key strategic accessible corridors for people, providing key areas of public open space and public rights of way. It is acknowledged that improving connectivity for people and nature will be more challenging within dense urban areas, but innovative solutions should be sought were possible.

The key strategic corridors are as follows:

1. River Thames Corridor – River Thames (a key wildlife and recreational corridor in itself) and Network of public rights of way including the Thames Path and Oxford Canal Path and National Cycle Network, public open spaces, NRN core and recovery zone, green belt and flood zone, blue GI.
2. River Cherwell Corridor – Network of public rights of way, National Cycle Network, public open spaces, NRN core and recovery zone, green belt, flood zone, blue GI.
3. Corridor between New Hinksey and Shotover Hill (via Florence Park) – public rights of way, public open spaces, small amount of NRN core and recovery zone, part within flood zone, ancient woodland.
4. Corridor along Littlemoor Brook and Northfield Brook – public open space, NRN recovery zone (not core), flood zone.
5. South Park and its connectivity with the river Cherwell corridor (2) and corridor between New Hinksey and Shotover Hill (3)- public open spaces, local and city wildlife sites, small area of NRN core zone.
6. The northern boundary of the city – public open space, NRN recovery zone, flood zone, part within green belt, public rights of way.

Recommendations for the Local Plan – provide new GI

Although the starting point should always be the protection and enhancement of existing GI, Local Plan policy should continue to require that development provides a range of new GI, this could include various features from trees and hedges, to green roofs, walls and blue spaces like SuDS/ponds. On larger development sites, though these are likely to be less frequent, where possible new open space provision should be considered, continuing with current Local Plan policy.

As touched upon earlier, where specific site allocations are being considered within the new Local Plan, it may be useful to provide specific guidance around expectations for type of green infrastructure to be provided, which could be informed by the analysis in this report. Development proposals should be guided by best practice standards – GI should be planned to optimise connectivity within the development site boundary, but also within the surrounding area, to improve connectivity for both people and wildlife. It should also be designed holistically to optimise multi-functionality, as opposed to simply being aesthetically pleasing.

If it can be demonstrated that it is not viable or appropriate to provide new open space on site, developers could be expected to make a contribution for off-site provision/improvements to existing open space (see Section 8.6.2 below). Particular priority sites or schemes could be identified through the accompanying Infrastructure Delivery Plan or other strategies.

The Council could consider the use of an 'Urban Greening Factor' to quantify the amount of GI that will be required (see box below) and encourage greening on new developments.

Urban greening factors

Urban greening factors (UFGs) are likely to be advocated within the Natural England GI Standards Framework. UGFs works well in higher density urban districts that generally struggle to significantly increase the quantum of green space but can benefit incrementally from the addition of greenery within development.

The London Plan 2021 includes the 'Urban Greening Factor'. This is intended to accelerate the greening of London's streets, buildings and public spaces. The policy will provide new areas of green space in the urban environment and to work alongside planning policies which protect existing green spaces. The policy encourages developers to approach urban greening as a fundamental element at the early stages so that opportunities to incorporate greening are maximised and integrated into the design process.

To calculate the UGF, each surface type within a proposal is given a rating, these ratings vary between 0 and 1 depending on their contribution to greening. For example, an intensive green roof is rated 0.8, compared to permeable paving being rated 0.1. This rating is calculated against the total area and added together with all other surface types which results in a total site score. Typically, 0.3 is the minimum accepted rating although this varies depending on development type, for example a minimum rating of 0.4 is required for major residential developments.

Recommendations for wider Council action – provide new GI

The council should continue and increase partnership working with other organisations and landowners to help provide new high quality, connected and multi-functional GI in areas of need.

8.6 Delivery mechanisms

8.6.1 Overview

This section sets out some of the main GI delivery mechanisms outside of local plan policy but associated with wider planning and development, and also touches on delivery mechanisms outside of Planning.

8.6.2 Developer contributions

Community Infrastructure Levy (CIL)

The CIL is a tool for local authorities to help fund the delivery of infrastructure. CIL is a non-negotiable standard charge on new development. It takes the form of a charge per square metre of net additional floorspace and applies to most new development. Though there are many demands upon CIL funding, it could be a useful mechanism for supporting GI provision. It should be noted that central government has indicated that CIL is likely to be replaced as part of future planning reforms with a new Infrastructure Levy system, details of how this will work in practice are still to be confirmed.

Section 106 Planning Obligations (S106)

'Section 106' planning obligations may be required for specific on-site mitigation measures and/or contributions towards off-site infrastructure, such as public open space provision. Any adverse impacts on the local environment or local infrastructure, which will arise as a direct result of development, and which can be made acceptable in planning terms, should be mitigated via a planning obligation. Planning obligations must be made in accordance with the three tests of CIL Regulation 122[38].

This study could be used to inform local decisions about where and when new on-site or off-site provision will be required. Again, the future of the S106 system is subject to some uncertainty in light of the proposed planning reforms though it is expected that some form of contribution will continue to be available to make use of.

Capital costs for providing open space

Contributions towards the provision or improvement of open space can be calculated using the capital cost of provision. The same charges apply to both provision of new facilities and

[38] https://www.gov.uk/guidance/planning-obligations

the upgrading/improvement of existing facilities (where related to new development), which will normally include at least some new provision.

Indicative costs have been calculated by Ethos Environmental Planning using Spon's[39]. A summary of the costs is outlined in the table below. These costs may be used by the local authority, however up-to-date costings may also be considered from other sources. The figures do not include land costs.

Table 13 Capital costs for providing open space

Open Space Typology	Cost (£) per m^2
Allotments	34.20
Parks and Recreation Grounds (excludes sports and play provision)	116.53
Amenity Green Space	16.40
Play Space (Child)	149.91
Play Space (Youth)	163.30
Accessible natural green space	6.20

Maintenance contributions (commuted sums) for on-site provision

It should be recognised that when designing green infrastructure, a provider needs to consider ongoing management and maintenance practices beyond the outlay associated with its initial provision. Where new open space is provided, the developer should set out how the ongoing management/maintenance of that space is to be undertaken and who will be responsible for that (e.g., themselves or through a management company). If the open space is maintained by a Management Company, then the open space should be publicly accessible in perpetuity. It is expected that a management plan for the open space would be submitted and approved by the council as a planning condition or part of the legal agreement. Details of how the Management Company will be established and managed, and the provisions put in place should the management company fail etc. should also be approved by the council.

There is likely to be an ongoing financial cost to managing/maintaining green spaces. Determining costs is challenging and will depend upon the site and facilities that are present, but indicative costs could be calculated using the figures in the table below. These figures do not include professional fees, set up costs and admin etc. The figures provide guidance on how much it costs to maintain open space per metre squared and have been provided from maintenance costs estimated by Ethos Environmental Planning using Spon's 2020[40], and include lifecycle replacement costs. These costs may be reviewed and updated by the Council.

Table 14 Maintenance costs for providing open space

Open Space Typology	Cost (£) per m^2 per annum
Allotments	0.76
Parks and Recreation Grounds (excludes sports and play provision)	3.47
Amenity Green Space/accessible natural green space	0.77

[39] Spon's Architects' and Builders' Price Book 2021
[40] Spon's Architects' and Builders' Price Book 2020.

Play Space (Child)	13.34
Play Space (Youth)	9.21

These costs may be used by the local authority, however up-to-date costings may also be considered from other sources. They are intended to provide an initial idea of costs that can be supplemented with locally relevant date/understanding.

8.6.3 Biodiversity Net Gain

Biodiversity Net Gain is an approach to development that leaves biodiversity in a better state than before. Where a development has an impact on biodiversity it encourages developers to provide an increase in appropriate natural habitat and ecological features over and above that being affected in such a way it is hoped that the current loss of biodiversity through development will be halted and ecological networks can be restored.

Mandatory Biodiversity Net Gain to compensate for loss of biodiversity through development is set to become a part of planning in late 2023 through requirements within the Environment Act 2021 which was ratified in November 2021. Once enacted, this will require any development under the Town and Country Planning Act 1990 (except Permitted Development and Householder Applications) to evidence a minimum 10% increase in biodiversity value, delivered through habitat creation or enhancement either on-site, off-site or through biodiversity credits, and 30 years management of those habitats. Further to this, BNG is supported within the National Planning Policy Framework (NPPF), which states that planning policies and decisions 'should contribute to and enhance the natural and local environment by minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.'

DEFRA have developed an accounting tool in the form of a Biodiversity Metric to measure the impacts of development on biodiversity in accordance with requirements within the Environment Act 2021. Many local planning authorities now require net gain to be considered as part of development applications. To claim BNG and to generate long-term gains for nature, the 10 BNG Good Practice Principles for Development (CIRIA, CIEEM and IEMA, 2016) should be followed. The principles provide the framework for high quality and meaningful BNG that should make a measurable and positive contribution to biodiversity.

At present, it is understood that there have been limited opportunities identified for BNG within the city boundaries, however, there may be potential for some of Oxford's landholdings to generate income through the provision of biodiversity net gain units (habitat banking), where off setting of biodiversity loss from new development sites is required. This could be investigated further as part of a BNG Strategy in the future.

8.6.4 Outside of planning and development

The Council should work with partner organisations, local groups, businesses and landowners to seek funding and opportunities for improvements to the GI network. Key opportunities could include:

- **For local authorities and public bodies:** includes Levelling up Fund and Levelling up Parks Fund, National Tree Sponsorship Scheme, Trees for Streets, Nature for Climate Peatland Grant etc.
- **For land managers and farmers:** includes Countryside Stewardship, various woodland creation and maintenance/management grants, Sustainable Farming Incentive (part of the wider Environmental Land Management Scheme[41]), Local Nature Recovery scheme, Woodland Carbon Code[42] etc.
- **For communities**: includes Power to Change, Community Ownership Fund.
- **For non-profit organisations:** Tesco community grants, Trust for Oxfordshire's Environment (TOE) Ltd.

Further details on funding sources for GI can be found on the Town and Country Planning Association (TCPA) website[43].

[41] The Agriculture Act (2020) will be vitally important in improving the value of farmland for biodiversity and health and wellbeing. The new payments system, called the Environmental Land Management Scheme - ELMS), will reward farmers for protecting and enhancing the environment i.e., protecting and enhancing natural capital and the resulting public goods/ecosystem services, with particular emphasis on soil health, biodiversity, increased flood resilience and public access (amongst other things).

[42] Carbon offsetting - Carbon sequestration through woodland creation has been identified as a cost-effective means of mitigating climate change. The Woodland Carbon Code is the voluntary standard for UK woodland creation, it is based on a 'outputs-based approach' as businesses pay for tonnes of carbon sequestered. The code allows credits to be both sold before and after planting to help raise revenue associated with both capital and maintenance costs, and also to meet upfront costs.

[43] https://tcpa.org.uk/resources/funding-sources-for-green-infrastructure/

9.0 CONCLUSION

Green Infrastructure (GI) is a network of multi-functional green and blue spaces and other natural features, urban and rural, which is capable of delivering a wide range of environmental, economic, health and wellbeing benefits for nature, climate, local and wider communities and prosperity. (National Planning Policy Framework, 2021).

This makes the protection, restoration and creation of new GI a vital tool in addressing the current climate nature and health crises, at a global, national, regional and local level. Locally it supports the Council in achieving their vision of '*Building a world-class city for everyone by creating successful places in which to live and work, supporting our communities and addressing the climate emergency, we will build a fairer, greener city in which everyone can thrive',* and helps achieve diverse planning policies around biodiversity, health and wellbeing, active transport, recreation and climate resilience.

Green infrastructure is essential infrastructure and should be considered and incorporated at the earliest stages of development and treated like other types of essential infrastructure.

Open space (which the NPPF is defines as 'all open space of public value, including not just land, but also areas of water (such as rivers, canals, lakes and reservoirs) which offer important opportunities for sport and recreation and can act as a visual amenity') is a key part of the city's overall GI network. Public open spaces provide essential opportunities for sport and recreation (both formal and informal), quiet contemplation and relaxation, wildlife habitat and opportunities for people to connect with nature, food growing, community cohesion, education, tourism, place making and climate resilience e.g., through carbon capture, cooling the air, absorbing pollution and flood alleviation. Private open space and sports grounds (including restricted use sites), although not providing access to the whole community, also provide wider benefits to communities, the environment and the economy within Oxford e.g., through providing an attractive setting/visual amenity, climate resilience etc.

Together these open spaces, along with other GI assets within the city which include agricultural and green belt land, designated wildlife sites, priority habitats, blue infrastructure and historic parks and gardens make up the city's GI network, which should be protected and restored (alongside creation of new GI), in order to optimise the multi-functionality of the network, and the benefits it provides. Figure 31 below summarises the city's GI network that has been identified and mapped as part of this study (within the city boundary), and also the connectivity with some of the key GI assets outside of the boundary.

The research and analysis undertaken as part of the study highlights that GI provision in the city is not equal and that certain parts of the city may be prioritised for improvements to GI provision, particularly when considering wider environmental and socio-economic factors. It also assesses the quality, multi-functionality and accessibility of open space and highlights inequalities across these different areas, as well as opportunities to improve in order to help reduce deficiencies. However, due to the complexity of green infrastructure systems, careful consideration is required to the type and level of GI interventions required and further

analysis and investigation will likely need to take place to inform any future planning/strategies. High quality design (following best practice and taking a context driven approach), innovation and financing for the long-term management and maintenance of GI assets are all required for successful outcomes, alongside stakeholder and community engagement and support.

The study provides a framework for protecting, enhancing and creating new GI within the city, and it also highlights the potential for further research and analysis. Where resource is available in future, further work could be undertaken in the following areas:

- Develop and evolve the multi-functionality assessment within this study to be applicable across different types of GI assets (not only open space), and also consider the quality of functions (how well they are being delivered).
- Utilise the findings of this study to inform the GI requirements/detailed GI guidance for allocated sites.
- Investigate the adoption of an Urban Greening Factor as part of GI planning policy.
- Consider how biodiversity net gain (BNG) opportunities can be maximised/supported through planning policy.
- Wider work outside of planning policy may also wish to consider how street tree planting (and other forms of planting e.g., hedgerows) could be informed by the key findings and messages in this report, to support the wider Urban Forest Strategy and complementary priorities around air quality and net zero.
- Develop an in-depth strategy for improvements to GI for both people and wildlife, including more detailed analysis of the GI corridors e.g., site visits and research to identify specific spatial opportunities for ecological enhancement, or improving linkages between open spaces and communities along key routes e.g., the river corridors.

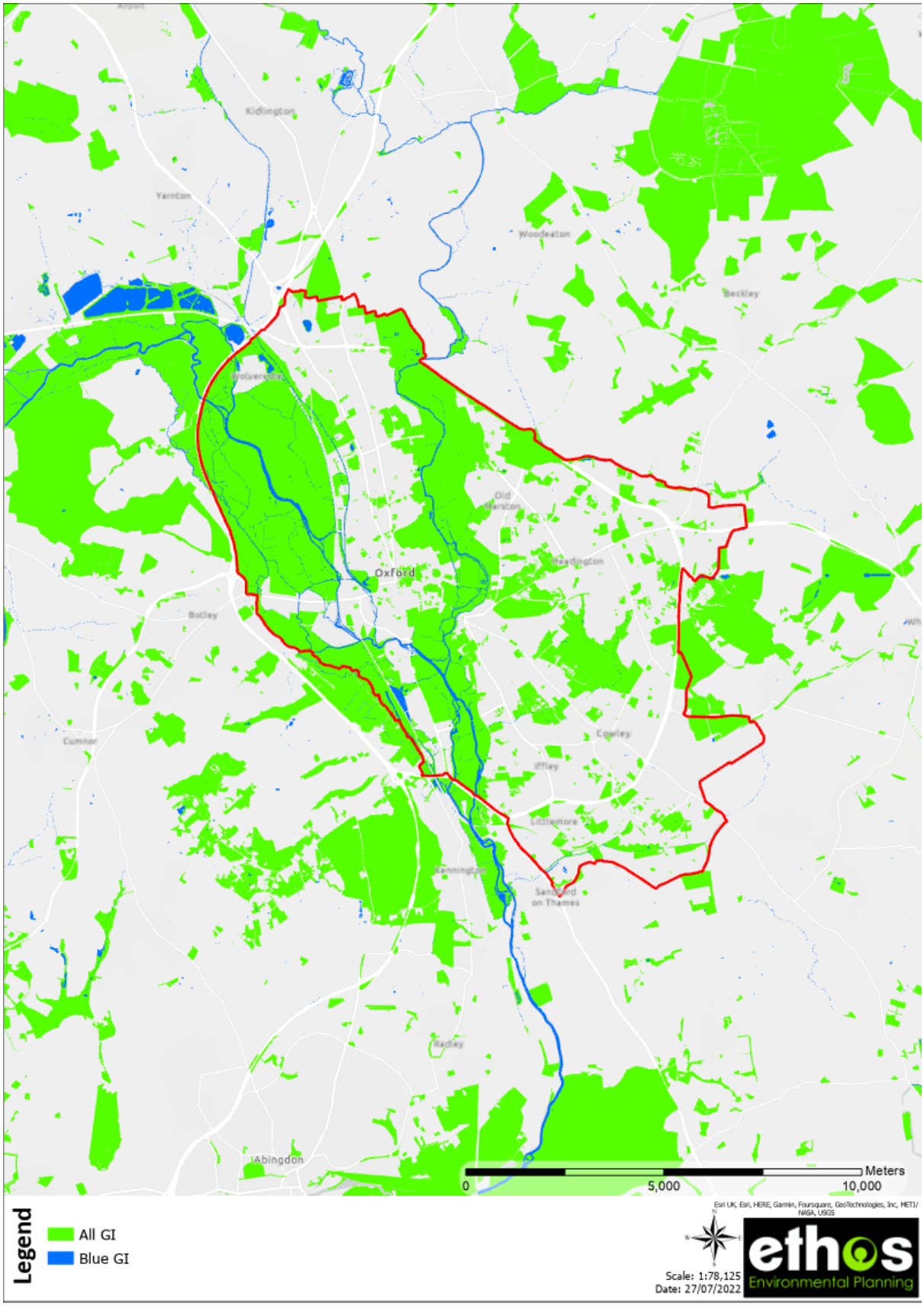


Figure 31 Oxford's GI network and links with the surrounding area