APPENDIX 1: POLICY, ENVIRONMENTAL & SOCIO-ECONOMIC CONTEXT

This appendix provides further detail around the policy (national, regional and local), environmental and socio-economic context, which underpins much of the main GI study report.

1.0   Policy Context

1.1   National

Tackling the nature, climate and health emergencies

Climate change represents an urgent and potentially irreversible threat to human societies and the planet. In recognition of this, the overwhelming majority of countries around the world adopted the Paris Agreement in December 2015, the central aim of which includes pursuing efforts to limit global temperature rise to 1.5°C. The **Intergovernmental Panel on Climate Change (IPCC) Global Warming Report (2018)** provides the scientific evidence that global warming in excess of 1.5C above pre-industrial levels will undermine life support systems for humanity. It found that global net human-caused emissions of carbon dioxide (CO2) would need to fall by about 45% from 2010 levels by 2030, reaching 'net zero' around 2050.

The State of Nature Report (Oct 2019) and **The Global Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Report (May 2019)** show the degradation and deterioration of natural environments and ecosystems which all life depends, the loss of biodiversity and a knock-on impact on human existence. Climate change, agricultural management, hydrological change, urbanisation, pollution, woodland management, and invasive non-native species as among the most significant of pressures on our wildlife.

The climate and nature emergency are inextricably linked. Biodiversity underpins healthy ecosystems that are able to mitigate and adapt to the impacts of climate change, however climate change is driving declines in biodiversity, and the degradation of our ecosystems, which means we are less able to adapt to change. Climate change is increasingly impacting health and wellbeing through extreme weather events, heat stress, air quality, water quality and quantity, food security and the spread of disease. These climate-sensitive health risks are disproportionately felt by the most vulnerable and disadvantaged communities.

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. 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[1].

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 Tree Strategy), 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 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 UK hosted the 26th **UN Climate Change Conference of the Parties (COP26)** in October-November 2021, where Nations adopted the Glasgow Climate Pact, aiming to turn the 2020s into a decade of climate action and support, with the aim of accelerating action towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change. **The UN Biodiversity Conference (Convention on Biological Diversity COP15)** is due to take place in Autumn 2022. It will see the adoption of the post-2020 global biodiversity framework, which provides a strategic vision and a global roadmap for the conservation, protection, restoration and sustainable management of biodiversity and ecosystems for the next decade.

The **National Planning Policy Framework (NPPF) (July 2021)** sets out the government's planning policies for England. This includes sustainable development and pursing the 17 Sustainable Development Goals[2]; enabling communities to access high quality open spaces and opportunities for sport and recreation; mitigating and adapting to climate change; conserving and enhancing the natural environment, including through providing for measurable net gains for biodiversity; and setting out a strategic approach to maintaining and enhancing networks of habitats and green infrastructure.

This is supported by the **National Planning Practice Guidance (NPPG)** website, which includes guidance on key areas such as Design. **The National Design Guide** and the National Model Design Code and Guidance Notes for Design Codes illustrate 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. This includes giving local communities control over what is built, where it is built, and what it looks like. Ensuring new development meets clear design standards which reflect community views (reflecting the

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[1] Public Health England Report - Improving access to greenspace: a new review for 2020

[2] The **Sustainable Development Goals** (SDGs), which are universal goals adopted by all UN Member States in 2015 to 'end poverty, protect the planet and improve the lives and prospects of everyone, everywhere'. GI protection, provision and enhancement is important in delivering many of the 17 SDGs, including 'good health and wellbeing', 'climate action' and 'life on land'.

recommendations in the Building Better, Building Beautiful Commission[3]) is a key part of this, alongside a strengthened framework of environmental outcomes, and expanded protections for the places people value.

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 in the 25 YEP. The NRN will benefit people and wildlife by increasing, improving and joining-up wildlife-rich places across England. It also requires local authorities to develop Local Nature Recovery Strategies, informed by the mapping of Nature Recovery Networks. **The Environment Act (2021)** places the 25 YEP on statutory footing, and will include mandating developments to achieve at least 10% Biodiversity Net Gain.

The **Agriculture Bill** will be vitally important in improving the value of farmland for biodiversity and health and wellbeing. It will fundamentally change direct payments to farming (through the Environmental Land Management Scheme (ELMS)), where farmers will be rewarded 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).

Natural England's **National Green Infrastructure Framework** will be fully available in autumn 2022. It establishes national standards for GI in England and currently comprises the following:

- GI Principles – underpin the framework and cover why, what and how to do good GI.
- GI Mapping Database and Analysis (currently Beta version is available) – a freely available tool providing GI Mapping layers and analyses.

The GI Standards, GI Design Guide, Case Studies and Process Journeys (to assist different audiences) are still to be published.

The Framework does not seek to duplicate existing GI standards such as **Building with Nature**[4], but rather to learn from best practice and reinforce key messages, such as that green infrastructure and natural capital needs to be considered and incorporated at the earliest stages of development and treated like other types of essential infrastructure.

The GI mapping database is a national dataset and can be used as the basis for GI planning within LPA's, however this can be supplemented with more local data and analysis.

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[3] https://www.gov.uk/government/publications/living-with-beauty-report-of-the-building-better-building-beautiful-commission

[4] 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. https://www.buildingwithnature.org.uk/
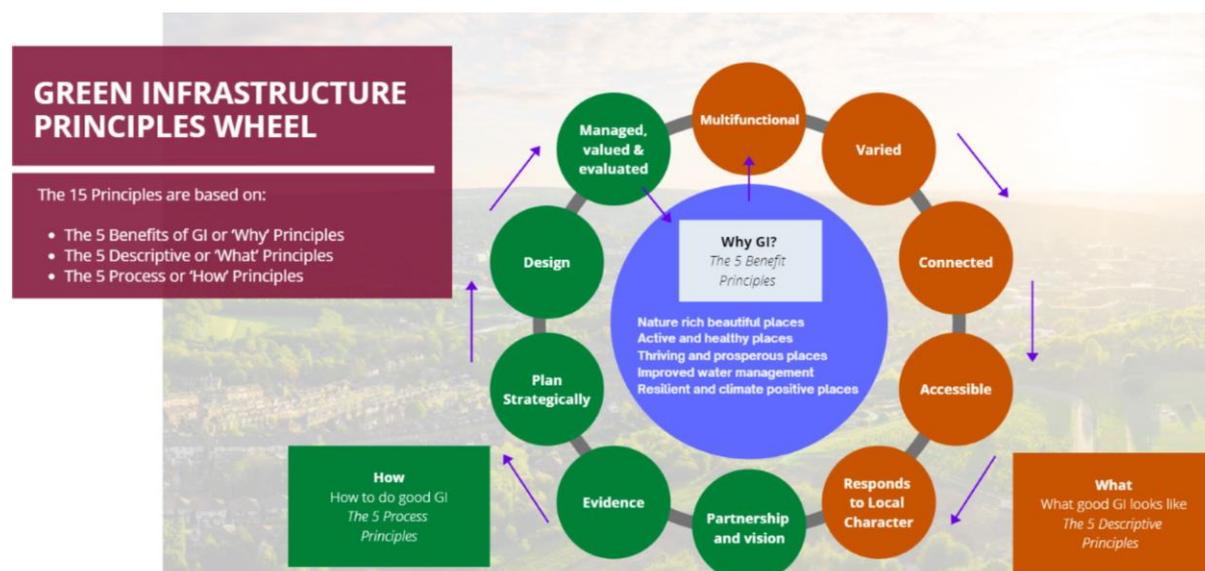
Figure 1 Natural England's GI Standards Frame - GI Principles

The **Building with Nature Benchmark** provides a robust, evidence-based set of holistic design principles which should be used to guide the design, delivery and long term maintenance of GI.

The framework of 12 standards define 'what good looks like' for placemaking, and cover the following themes:

- Core – providing multifunctional and connected GI which responds to climate change, maximises environmental net gains, responds to local context, creates distinctive places and secures effective place-keeping (long term maintenance).
- Wellbeing – brings nature closer to people and supports equitable and inclusive places.
- Water – delivers climate resilient water management and brings water closer to people.
- Wildlife – delivers wildlife enhancement and underpins nature's recovery.

It is recommended that these principles are considered as part of all new GI provision – developers should be signposted to use the BwN Standards and the Natural England GI Standards Framework to create better places for people and wildlife.

Developers can apply to have their schemes assessed for a Building with Nature Award. The accreditation/award provides an external verification of quality that can help demonstrate commitment to the design and delivery of high quality GI, and both pre- and post - construction stages. The provision of a set of holistic design principles means that high quality design, which optimises multifunctionality and is sensitive to the context of the area is achieved, creating attractive places that are nature rich and support happy and healthy lives. The Council can also advocate or require achievement of a BwN award as a preferred mechanism to demonstrate commitment to quality GI e.g., for larger schemes of 500 dwellings and above).

Example GI policies

The report 'Green Infrastructure Policies in the Central Scotland Green Network (CSGN)– A Review of Local Authority Policies on Green Infrastructure in Built Development'[5] reviewed the quality of current and/or proposed GI relevant policies in LPAs Local Development Plans and Supplementary Guidance within the CSGN area. It collated the best policies as a suite of example GI policies, which are set out in Table 4 below. These align with the Building with Nature Benchmark principles set out above.

The report also revealed the relative importance of Supplementary Guidance as the location for GI policy.

Table 1 Example GI Policy

Green infrastructure primary policy	
Green infrastructure is integral to place-making underpinned by the qualities of successful places, and therefore must be part of the design process from the outset, providing water management, access networks, habitat enhancements and open space functions.	
To achieve this, developments are expected to: • discuss what green infrastructure is appropriate for the site at pre-application meetings with the planning authority and relevant stakeholders; • appraise the site context for green infrastructure functions, undertake habitat and hydrological assessments of the site as requested through the pre-application discussions, and demonstrate how they have influenced the design; and • take opportunities to achieve multi-functionality by bringing green infrastructure functions together.	
Green infrastructure functions	
Water management	**Access networks**
Development proposals will integrate naturalised SuDS into the design of green infrastructure, and where they are part of open space obligations will be safe and accessible, creating an attractive and distinctive setting for new developments.	Development proposals will maintain and enhance the quality and connectivity of access networks, integrating active travel routes (linking workplaces, schools, community facilities and public transport hubs) and recreation routes into green infrastructure.
Habitat enhancements	**Open space**
Development proposals will conserve and enhance on-site biodiversity; habitat networks within and adjacent to the site; and habitats associated with the strategic wildlife network	Development proposals will meet local accessibility, quality and quantity standards for open space, and be designed to cater for the needs of the community.

Increasingly, Local Planning Authorities are using the Building with Nature Standards to frame their Local Plan policies and strategies. Examples include West Dunbartonshire Local Development Plan 2 and Gloucester County Council Minerals Local Plan (both have achieved the BwN Policy Award).

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[5]

https://mainstreaminggreeninfrastructure.com/reports/GI%20Policies%20in%20the%20CSGN%20FINAL%20v5.2%20Report%20and%20App%201%20(1).pdf

A Green Infrastructure Planning Policy Assessment Tool[6] has been developed with the Glasgow and Clyde Valley Green Network (GCVGN). This self-assessment tool, complete with guidance for local authorities to use, is free and designed to improve the design and wording of policies that address GI functions within strategic and local plans. It has been informed by the Building with Nature standards. The Council could utilise this assessment tool in future planning work.

1.2   Regional

Emerging Oxfordshire Nature Recovery Network[7]

The emerging Oxfordshire Nature Recovery Network 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. The vision is for a future environment rich in wildlife and valued by all with the aim to double the extent of land of high value for nature in the county by 2050.

OxCam Local Natural Capital Plan[8]

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. The plan will ensure that the concept of natural capital is woven into the fabric of decision making, putting nature at the heart of progress.

A natural capital baseline map was produced and from this a series of ecosystem service maps were created, which show where there are relatively high and low levels of these service present. The Natural Capital Account provides figures for the value of the ecosystem Services provided by the natural capital.

1.3   Local

Oxford Local Plan 2036[9]

The local plan 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 vision of the plan sees Oxford becoming a global centre for the knowledge-based economy, deprivation and inequality will be reduced and Oxford's communities to have a strong sense of togetherness and people will be able to live, fulfilled, happy and healthy lives. The city will also have an attractive, clean, and healthy environment, where heritage and the natural environment are protected.

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,

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[6] https://mainstreaminggreeninfrastructure.com/outputs-page.php?Making-Better-Policies-and-Plans-for-Green-Infrastructure:-A-Self-Assessment-Tool

[7] https://www.wildoxfordshire.org.uk/biodiversity/oxfordshires-nature-recovery-network/

[8] https://www.oxcamlncp.org/our-project

[9] https://www.oxford.gov.uk/info/20067/planning_policy/1311/oxford_local_plan_2016-2036

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.

Oxford Green Infrastructure Study (2019)[10]

This study was produced by the Council to inform the Oxford Local Plan about how green and blue spaces are used and provided. The study helps to meet the objectives set out in the Green Space Strategy and the Oxford Biodiversity Action Plan[11].

Oxford Green Spaces Strategy 2013-2027[12]

Oxford Green Spaces Strategy 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 strategy is broken down into 6 aims and a series of objectives:

Aim	Objectives
1. To establish a quantity standard of green space provision to ensure that Oxford has an agreed amount of green space to meet existing and future needs of residents, workers, and visitors.	• To maintain the total hectares of unrestricted open space (785ha) and to seek opportunities to increase this number. • To retain the number of allotments and maximise productive use.
2. To ensure everyone living in, working in, and visiting Oxford has easy access to open space.	• Residents to have their nearest large park within 1,900m, nearest medium park within 750m and Nearest small park within 400m. • Where there is a lack of access identified the following approach will be applied: offer new access points and safe routes, look at opening up inaccessible spaces, create new spaces within developments, enhance the quality of existing accessible spaces, look at access for all members of society, improve communication of accessible farmland by foot, cycle and horse and enhancing the PROW network. • Improve connectivity between sites and to sites on the outskirts of the city. • Work with communities to better understand the needs of under-represented groups.
3. To achieve high quality green spaces across Oxford, including	• Improve the quality of the park's infrastructure.

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[10] https://www.oxford.gov.uk/downloads/file/5749/grs8_-_oxford_green_infrastructure_study
[11] https://www.oxford.gov.uk/downloads/file/2109/biodiversity_action_plan_2015-20
[12] https://www.oxford.gov.uk/downloads/file/2874/green_space_strategy_2013-2027

Aim	Objectives
spaces that are nationally recognised for their quality and attractions.	- Increase the number of parks that achieve the Green Flag award. - Increase the standard of all medium and small green spaces to score an inspection score of 4 (good). - Ensure that green spaces are designed to the CABE and Green Flag design guidelines. - To ensure that play spaces are designed in accordance with the Play England manual 'Design for Play'. - Adhering to the Oxford City Council Tree Management Plan within all open spaces. - Providing high quality allotments. - Ensure that cemetery provision meets the needs of the local population and that they are of high quality.
4. To promote the central role that green spaces play in contributing to the city's biodiversity, sustainability, heritage, and culture.	- Adopt and promote sustainable practices to contribute the sustainable management of open spaces. - Adopt and promote practices that recognise that open spaces can play in climate change. - Protect and enhance biodiversity including internationally, nationally, and locally important sites, wildlife corridors and prosaic species. - Preserve, protect, promote and enhance archaeological features, built heritage and historic views in open spaces.
5. To promote the central role that green spaces play in contributing to the city's health and well-being.	- Promote link between green spaces. - Promote health benefits of parks and green spaces. - Expand on opportunities for the education sector including using spaces for outdoor learning and support projects for biodiversity and archaeology.
6. To support community cohesion and community involvement in the design and stewardship of green spaces.	- Support new and existing community involvement in the use, design, management, fundraising and enhancement of open spaces. - Increase the number of active volunteers. - Continue to gather good consultation from the community.

The Biodiversity review for Oxford City Council Parks and Nature Areas (2020)[13]

This is a live document which sets out work done to support biodiversity in the Council's green spaces and identifies a wide range of further habitat improvement projects and environmental initiatives for the next five years. It highlights the importance of volunteer involvement in achieving many of the projects. Current initiatives include: tree planting; introduction of a biosecurity policy; sustainable and bee friendly seasonal bedding; i-Tree Canopy Cover Assessment; increased partnership working with other organisations/landowners; Individual projects undertaken as part of the Wild Oxford Project to enhance the quality of the habitat at Raleigh Park, Rivermead Nature Reserve, Chilswell

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

Valley and Lye Valley (SSSI); creation of biodiversity action plans (within the Green Flag Management Plans) for Cutteslowe and Florence Parks; supporting the Friends of South Park to create a management plan. The five year action plan sets out the top 12 priority projects, and a wider range of schemes for smaller sites.

Oxford Air Quality Action Plan (AQAP)[14]

This plan 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 as Oxford's current levels are higher than the advisory limits set the by the WHO. The Council has therefore set a target to achieve a local annual mean NO_2 target of 30μg/m^3 by 2025 to go below the legal compliance level. It is hoped that by setting this target that it will lead to a significant improvement in the health of Oxford residents. Levels of particulate matter (PM) in Oxford are compliant with WHO limits, and levels have been reducing since 2013 when air quality monitoring has been in place with a 31% reduction in PM_{10} and 36% in $PM_{2.5}$. NO_2 exceeds the annual mean limit value (from the latest data available – 2019) in six locations across the city (as shown on Figure 6, Page 17).

To achieve this target the plan sets out 30 actions and measures which focus on four priority areas: developing partnerships and public education; support for the uptake of Low and Zero emission vehicles; reducing emissions from domestic heating, industry, and services; and reduce the need to travel, explore opportunities.

Zero Carbon Action Plan[15]

Oxford City Council declared a climate emergency in January 2019, this led to a Zero Carbon Oxford Summit being held in February 2021 where an ambition was set to deliver a net zero carbon Oxford by 2040. The Zero Carbon Action Plan 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.

Urban Forest Strategy[16]

The Urban Forest Strategy 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.

A series of objectives for planting for the next 30-year period are set within the strategy and include:

- Manage existing tree and vegetation resource.
- Improve biosecurity and manage ash die back and other pests.

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[14]
https://www.oxford.gov.uk/info/20216/air_quality_management/206/air_quality_management_in_oxford/2#:~:text=Air%20Quality%20Action%20Plan%202021&text=It%20outlines%20the%20actions%20we,compliance%20as%20soon%20as%20possible.
[15] https://www.oxford.gov.uk/downloads/download/1221/zero_carbon_action_plan
[16] https://www.oxford.gov.uk/downloads/file/7722/urban_forest_strategy_september_2021

- Increase urban forest canopy cover.
- Increase resilience through greater diversity.
- Prioritise areas where new tree and other vegetation planting benefits can be maximised.
- Improve biodiversity and contribute to nature recovery areas.
- Conserve and enhance landscape character.
- Engage with communities and key stakeholders.
- Understand the value of our urban forest and create opportunities to recap economic benefits from it.

The Strategy estimates that the urban forest in Oxford contains approximately 248,000 trees which equates to a total canopy cover of **22.3%**[17]. This is above the 20% minimum recommended by Forest Research for urban areas.

The percentage canopy cover breakdown by ward is shown below.
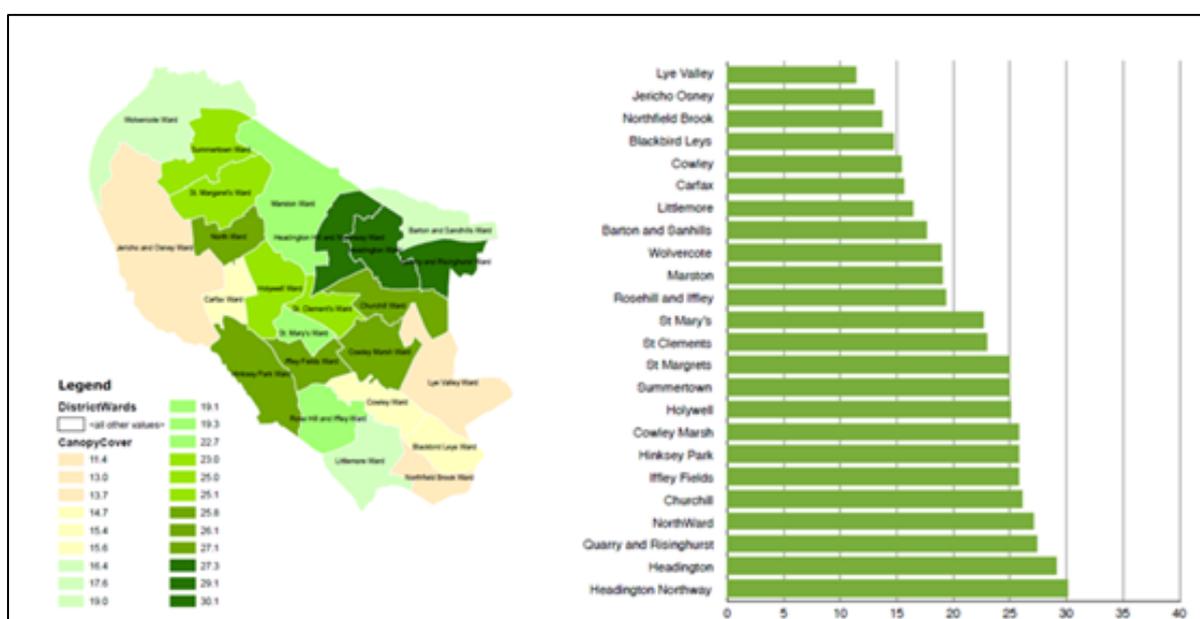
Figure 2 Percentage Tree Canopy Cover by Ward (Extract from Oxford Urban Forest Strategy)

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

2.0   Environmental socio- economic and health context

Population

Oxford has a population of **151,584**[18]. 51% of the population are male and 49% female. 64% of Oxford population is white ethnicity with 12% other white, 3% multiple ethnicities, 11% Asian, 3% Black/African/Caribbean/Black British and 4% other ethnicities[19].

The figure below shows the population density in Oxford. The red areas show the most densely populated areas of the city which are Jericho, Woodfarm, south of Northfield Brook, south Iffley and east St. Marys.
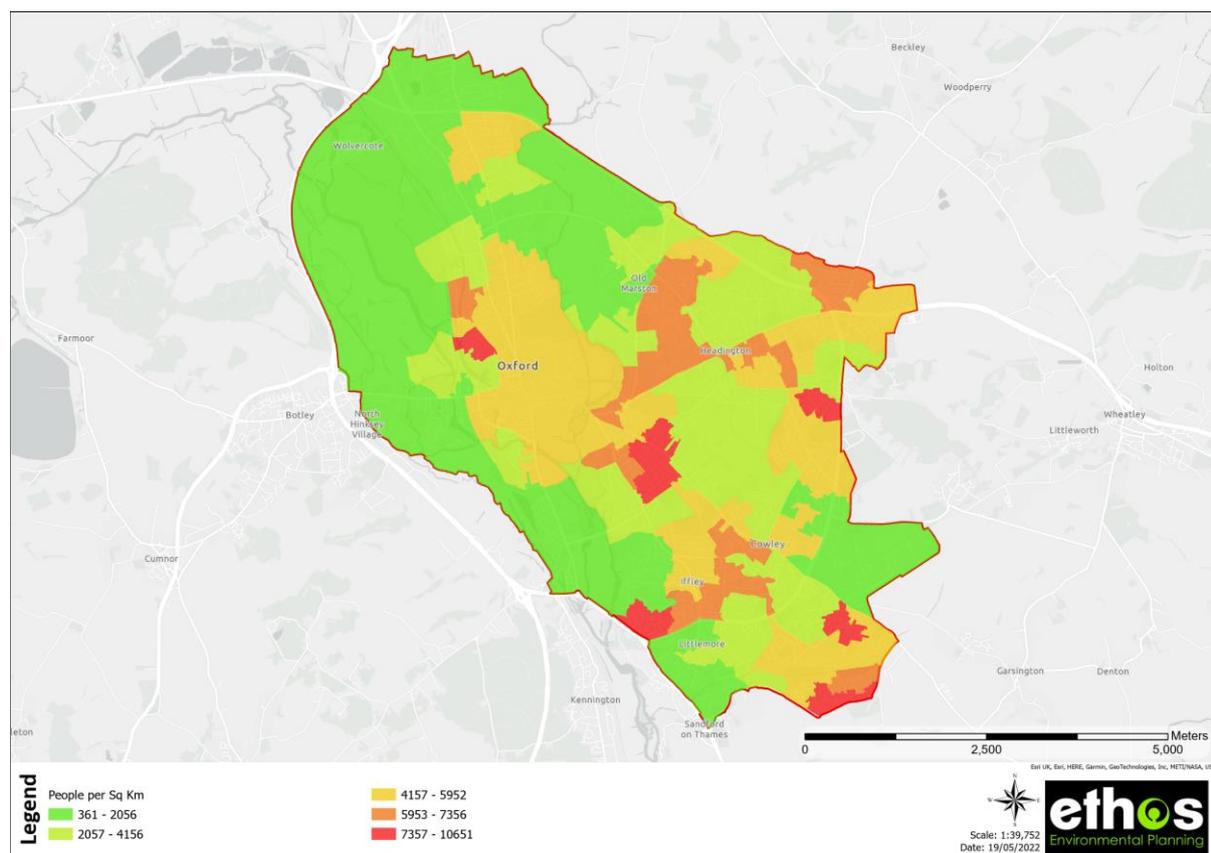
Figure 3 Population density in Oxford

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[18] ONS mid-year estimates 2020
[19] Population Estimates by Ethnic Group ONS 2019

Health and wellbeing

Although the health of the population within Oxford is generally better compared to the England average across a number of indicators (as shown below), there are large health inequalities within the city which are linked to levels of socio- economic deprivation[20].
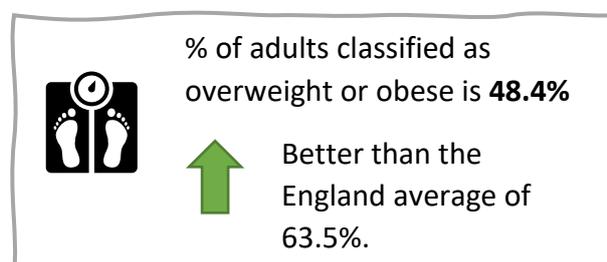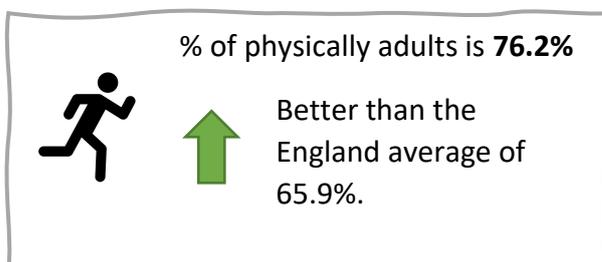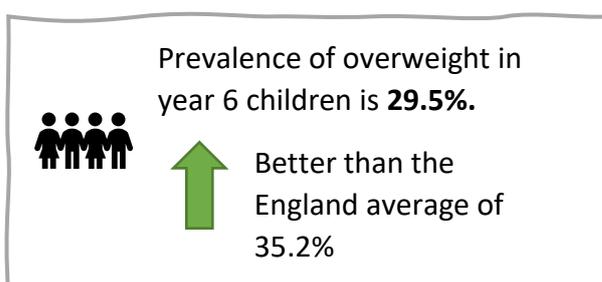
Life Expectancy[21]

Male life expectancy is **80.1**

Better than the England average of 79.4

Female life expectancy is **84.5**

Better than the England average of 83.1

Healthy Life Expectancy[22]

Male life expectancy is **68**

Better than the England average of 63.1

Female life expectancy is **84.5**

Better than the England average of 83.1

Adult Obesity[23]

% of adults classified as overweight or obese is **48.4%**

Better than the England average of 63.5%.
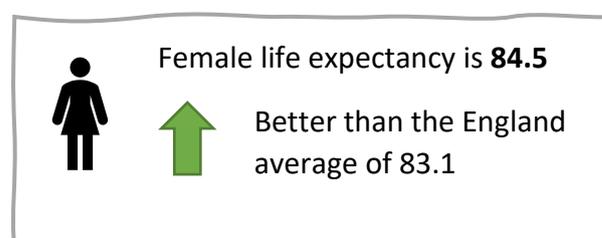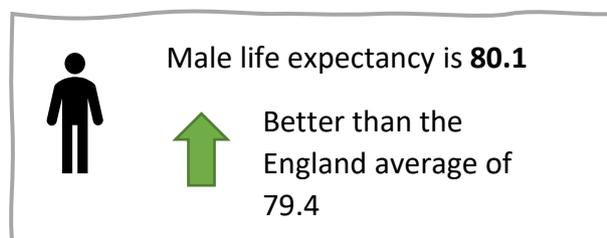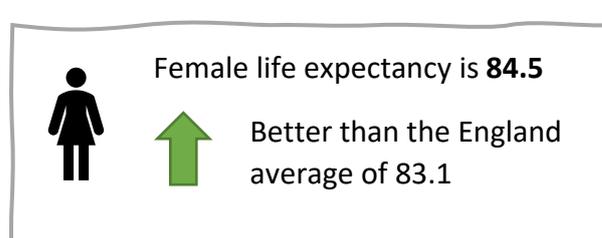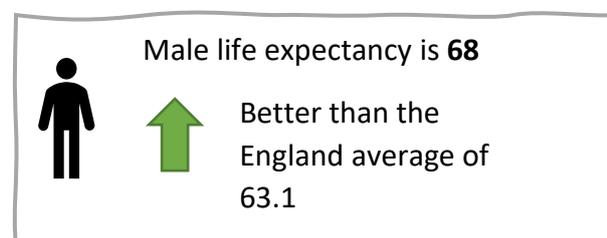
Adult Physical Activity[24]

% of physically adults is **76.2%**

Better than the England average of 65.9%.

Child Obesity[25]

Prevalence of overweight in reception children is **19.4%.**

Better than the England average of 23%.

Prevalence of overweight in year 6 children is **29.5%.**

Better than the England average of 35.2%
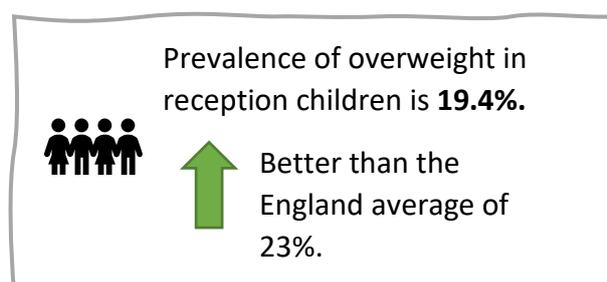
[20] https://www.oxford.gov.uk/downloads/file/7644/7_health_and_wellbeing
[21] PHE life expectancy at birth 3-year range (2018 - 20)
[22] PHE healthy life expectancy at birth 3-year range for Oxfordshire (2018 - 20)
[23] PHE percentage of adults (18+) classified as overweight or obese (2020/21)
[24] PHE percentage of physically active adults (2020/21)
[25] PHE prevalence of overweight (including obesity) (2019/20)

Indices of Multiple Deprivation (IMD)

The Indices of Deprivation (IMD) 2019 provide a set of relative measure of deprivation for small areas (Lower-layer Super Output Areas) across England, based on seven different domains of deprivation which are appropriately weighted:

- Income (22.5%)
- Employment (22.5%)
- Health Deprivation and Disability (13.5%)
- Education, Skills Training (13.5%)
- Crime (9.3%)
- Barriers to Housing and Services (9.3%)
- Living Environment (9.3%)

Each of these domains is based on a basket of indicators. As far as is possible, each indicator is based on data from the most recent time point available; in practice most indicators in the Indices of Deprivation 2019 relate to the tax year 2015/16. The Index of Multiple Deprivation combines information from the seven domains to produce an overall relative measure of deprivation.

The figure below shows the IMD rank for each LSOA with Oxford, where 1 is most deprived and 10 is least deprived.

The figure below shows IMD in Oxford with the red areas showing the most deprived (1). This includes the City Centre, Barton, Blackbird Leys, Northfield Brook, Rose Hill & Iffley and the east of Churchill.
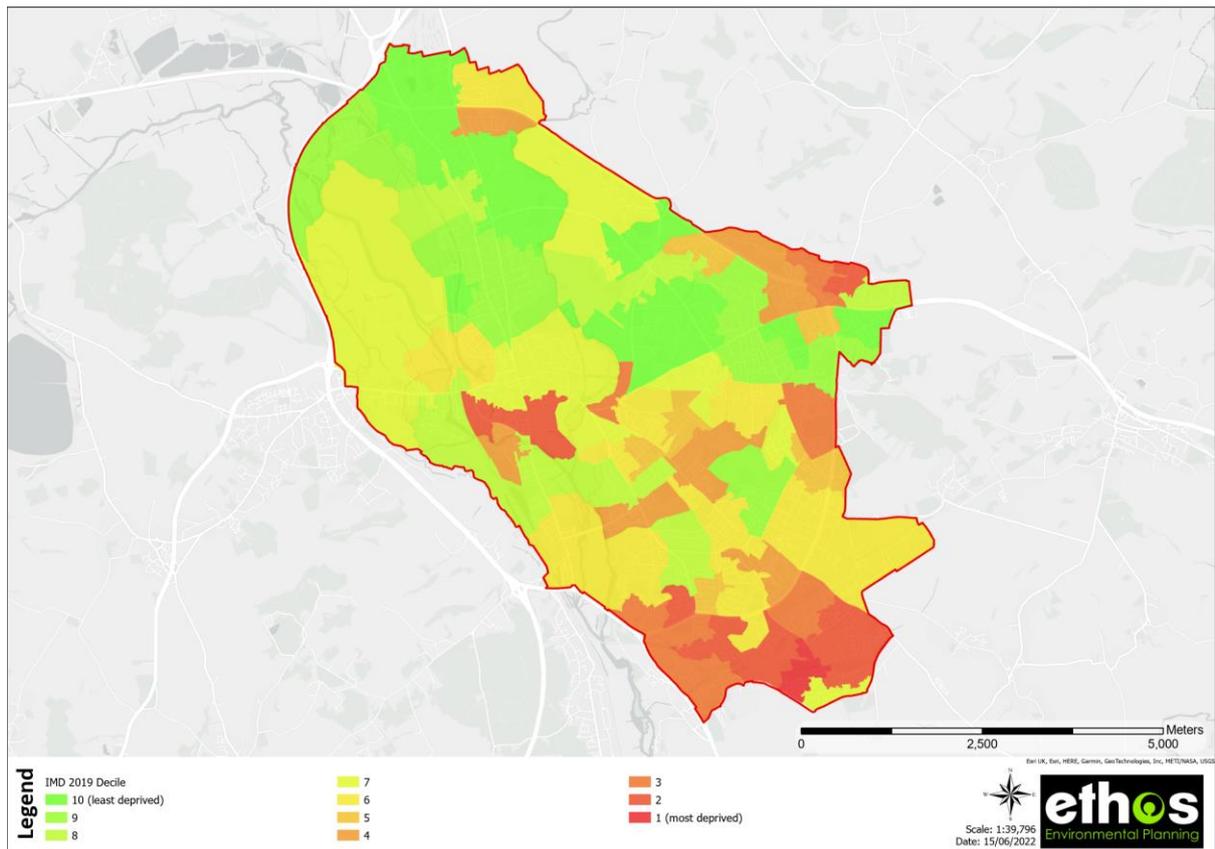
Figure 4 IMD deciles (2019)

Access to private gardens

There is increasing evidence showing how important gardens and gardening are for physical mental and social wellbeing. Gardens can also be important for wildlife, including pollinators, alongside helping to reduce flood risk and improve water quality through attenuating rainwater.

As can be seen from the figure below, the areas with the lowest percentage of homes with gardens is in the city centre and around the Headington area (red areas). Access to good quality open space within these areas is therefore particularly important.
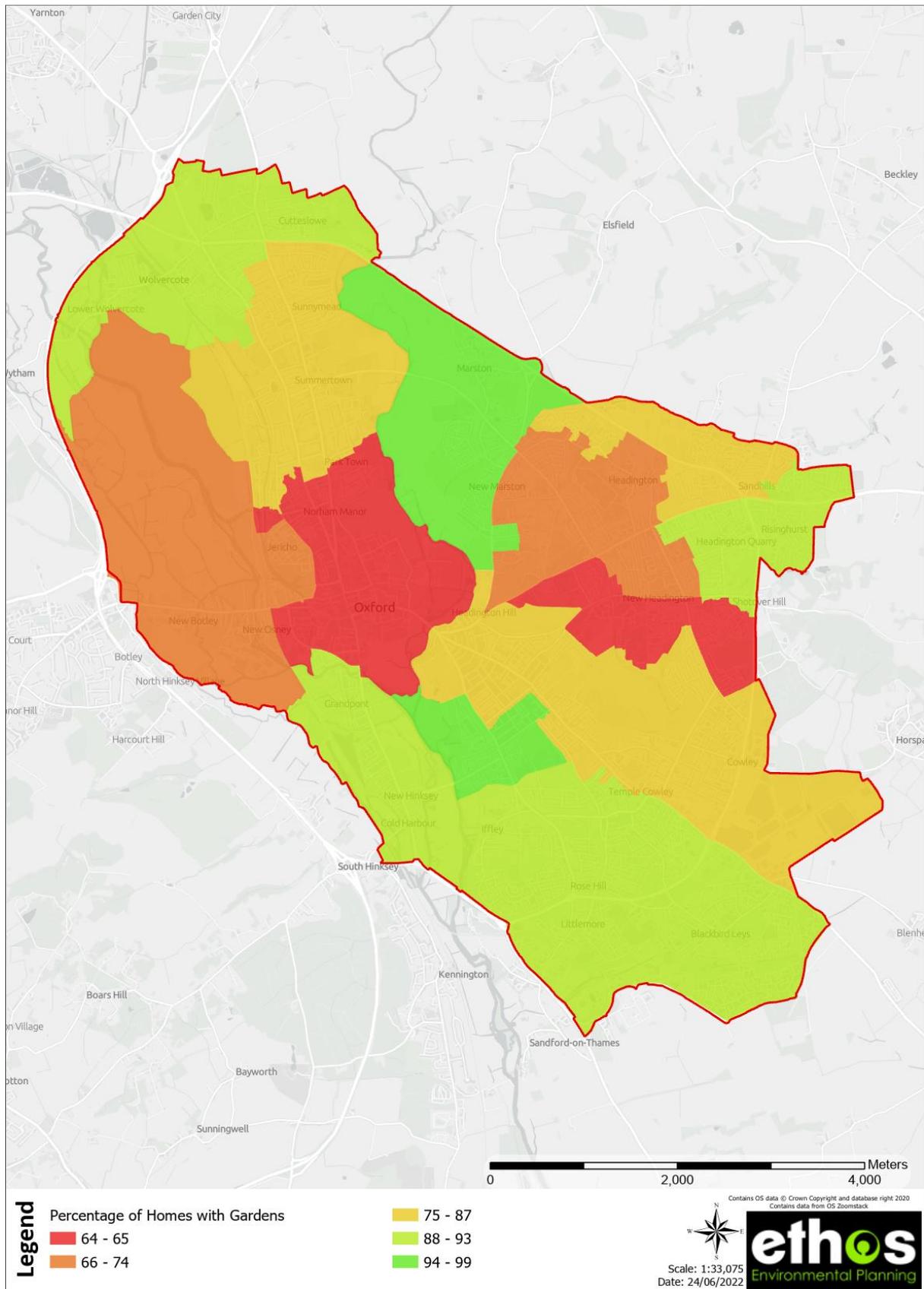
Figure 5 Percentage of homes with gardens

Air Quality

Poor air quality is the largest environmental risk to public health in the UK, as long-term exposure to air pollution can cause chronic conditions such as cardiovascular and respiratory diseases as well as lung cancer, leading to reduced life expectancy. Air pollution is a complex mix of particles and gases of both natural and human origin. Particulate matter (PM) and nitrogen dioxide (NO_2) are both major components of urban air pollution.

The map below shows the most recent 2019 NO_2 emissions data from the National Atmospheric Emissions Inventory overlain with the data from Oxford's NO2 monitoring stations (2021 mean concentrations).

As can be seen from the figure below, the highest levels of NO_2 emissions and concentrations are around the city centre, Blackbird Leys and Headington; the first two of which have issues with deprivation.
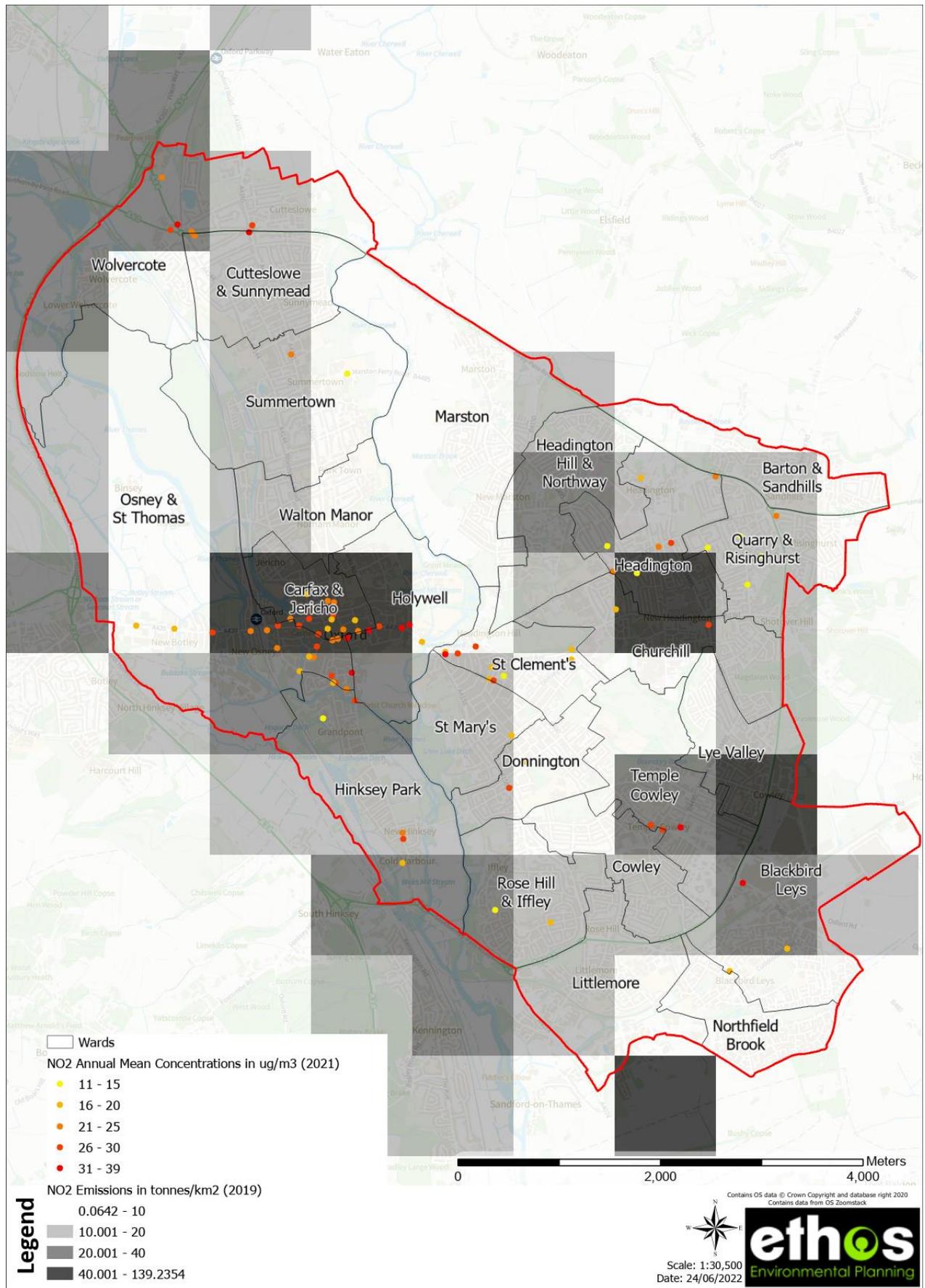
Figure 6 Air quality - NO2 emissions and concentrations

Urban heat

In the UK, the projections are that climate change is, and will continue to result in hotter and drier summers. The Committee for Climate Change reports that the chances of hot summers have doubled in recent years and could rise to a 50% likelihood by 2050.

In densely developed and urban areas like Oxford, warmer and drier summers are exacerbated due to the Urban Heat Island effect, which is broadly characterised by the difference in average temperature within the urban area compared with the surrounding countryside. It is 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. These will therefore be important areas to focus greening measures such as street tree planting, to provide shade and help cool the air.

As shown in the figure below, the maximum annual average air temperatures[26] are generally highest within the urban areas of the city, with the exception of the Headington area. When considering this alongside the tree canopy cover dataset (Ethos, 3m+) it appears that the coolest areas are in close proximity to large areas of woodland which fall outside of the Oxford City boundary.
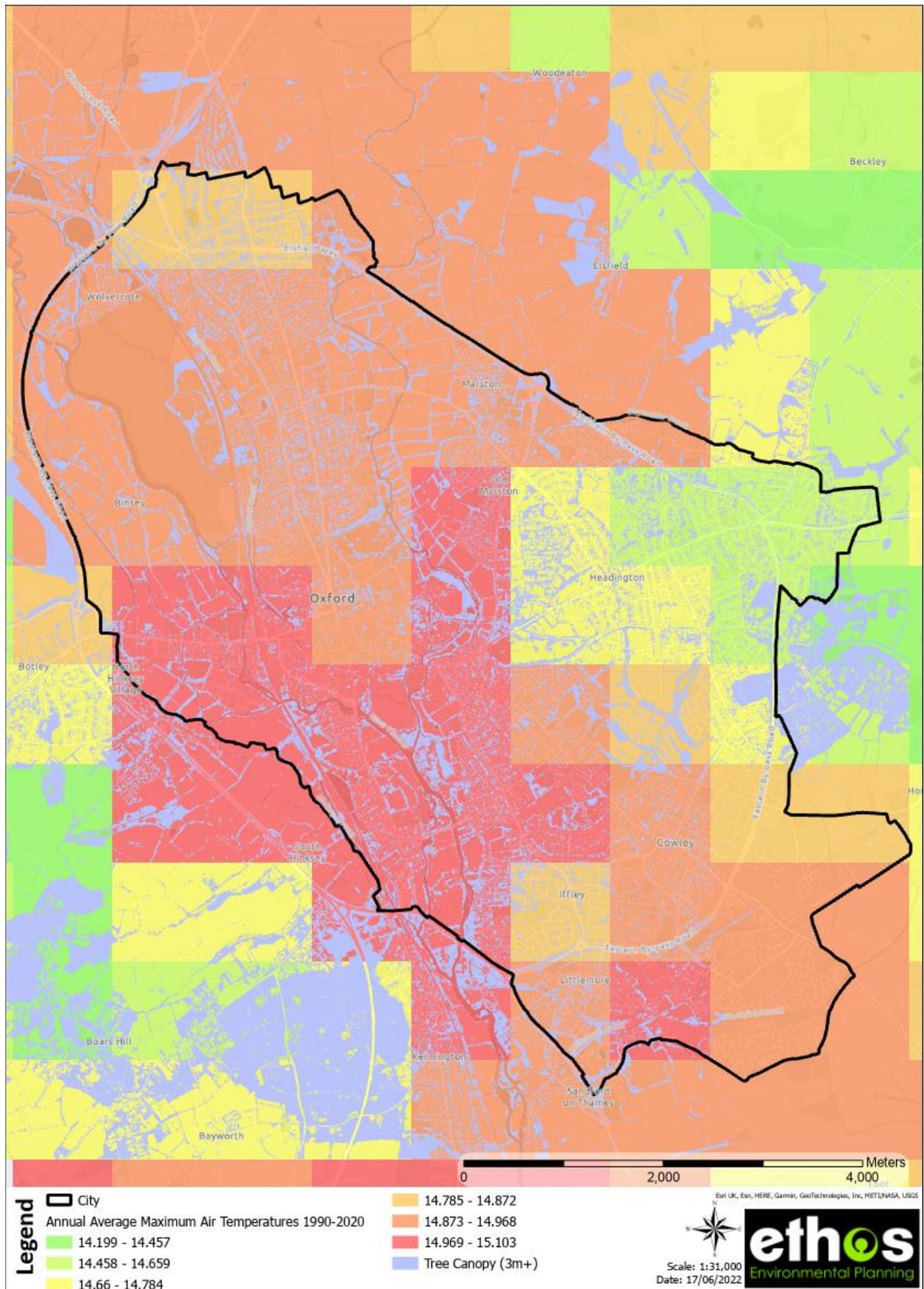
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[26] Data from Met Office HadUK-Grid

Figure 7 Air temperature data overlain with Ethos tree canopy cover map

Flood Risk (Flood zone 2 and 3 and surface water flooding)

The Environment Agency (EA) provide data on flooding. Flood zones 2 and 3 are the areas at risk of fluvial (river flooding). Surface water flooding is the flooding that takes place from the 'surface runoff' generated by rainwater and ordinary watercourses.

Climate change is resulting in wetter winters, and increased incidences of heavy rainfall events which increases the risk of flooding when the ground becomes over saturated, and the risk of flooding is exacerbated when rain falls on top of already impermeable surfaces within many urban areas. GI and nature-based solutions, including Sustainable Drainage Systems (SuDS) play a key role in adapting and mitigating to increased rainfall.

Flood risk plays a fundamental role in the spatial planning process and will determine where it is appropriate to locate new development, and how the development should be designed. Oxford City Council have produced a Strategic Flood Risk Assessment (SFRA) in accordance with the NPPF and associated guidance from the EA.
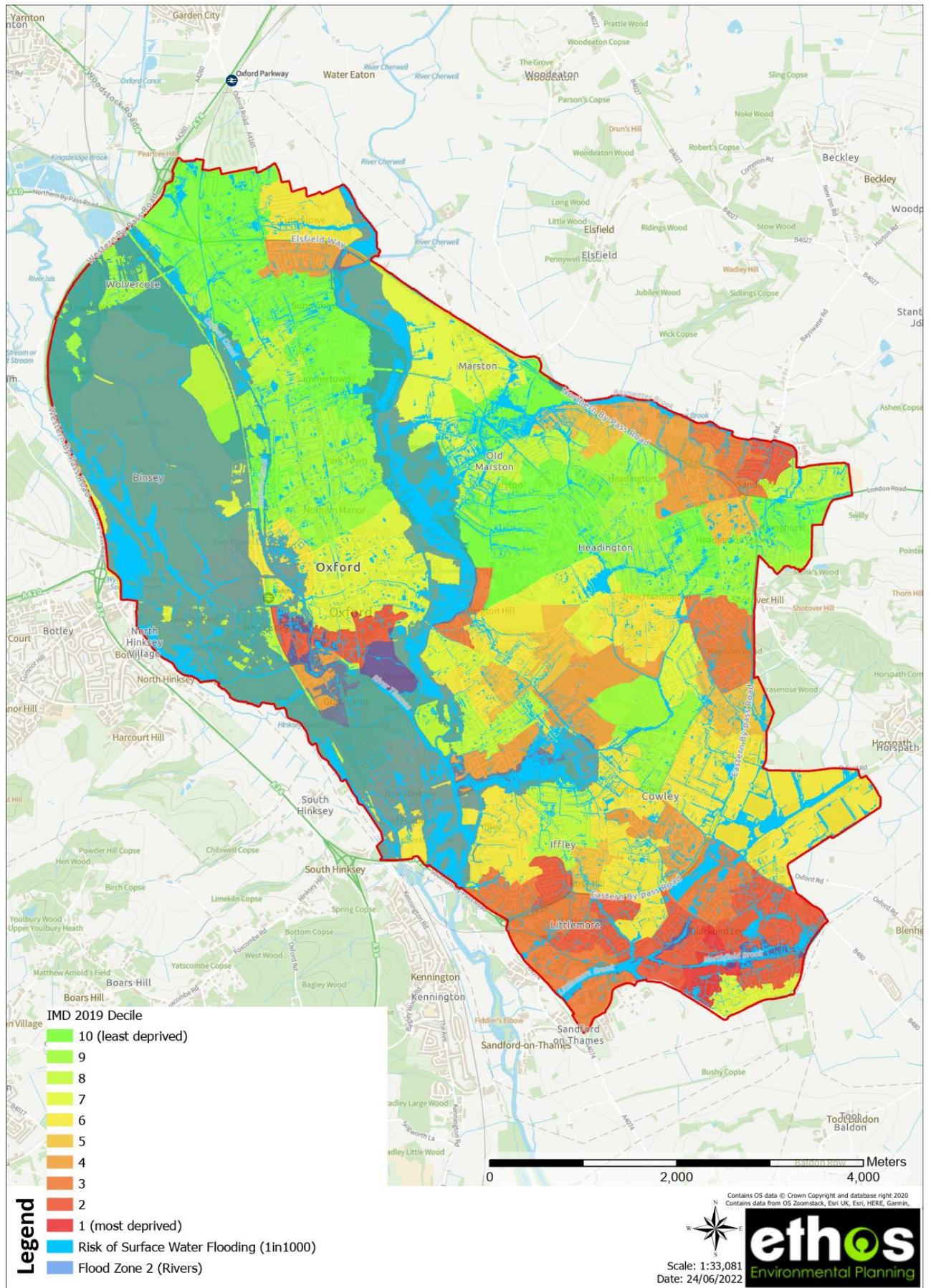
Figure 8 Flood zone and surface water flooding overlain with IMD deciles

Water quality

Water quality issues have been brought to the forefront of planning since the introduction of the Water Environment Regulations, which seek to ensure that the biological and chemical quality of watercourses in England and Wales reach a "good standard". The Environment Agency has responsibility for ensuring that relevant watercourses reach an appropriate standard.

Poor water quality can have serious impacts on biodiversity (the biodiversity of the watercourse itself, but also impacts on sensitive ecological sites/habitats) and health and wellbeing/recreation. The latest Environment Agency WFD water quality data shows that ground water quality is good, however the River Cherwell is poor quality, and the River Thames is moderate quality.

Oxford Rivers Project is a partnership between the End Sewage Pollution Mid-Thames campaign group, Oxford City Council, the Rivers Trust, Thames Water, and Thames21. It aims to have a 'designated bathing water area' in Oxford, regular testing for bacteria, alerts of raw sewage spills, and improvements to the wastewater system. It is a citizen science-led water quality monitoring project in the Oxford catchment: volunteers will take water samples which will be analysed by Thames Water labs for bacteria and other pollutants.

By 2022, the aim is for a designated bathing water area in Oxford with weekly water quality testing, and better understanding of pollution and its prevention in the upper Thames. It is hoped that the project will continue over several years, bringing together the local community, scientists, Thames Water, local authorities, sports clubs and charities in order to end sewage pollution and protect, champion and enjoy their river.

The vision is for a clean and healthy River Thames fit to swim, paddle and play in, teeming with freshwater wildlife.
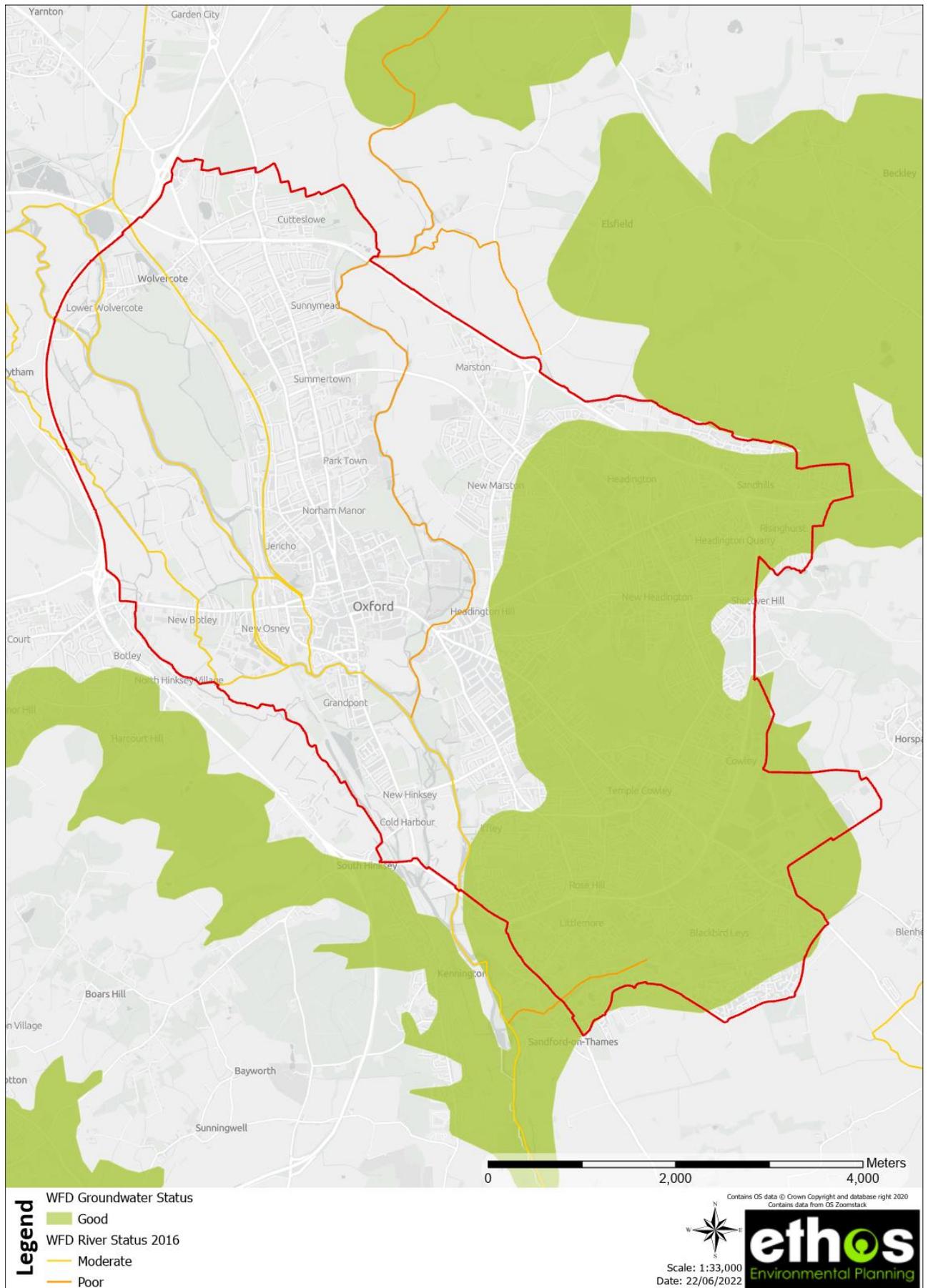
Figure 9 Water quality

Landscape and heritage

Oxford has a rich natural and built heritage. The figure below shows some of the key heritage designations. GI can positively contribute to landscape character[27], the setting of listed buildings, conservation areas and historic views.
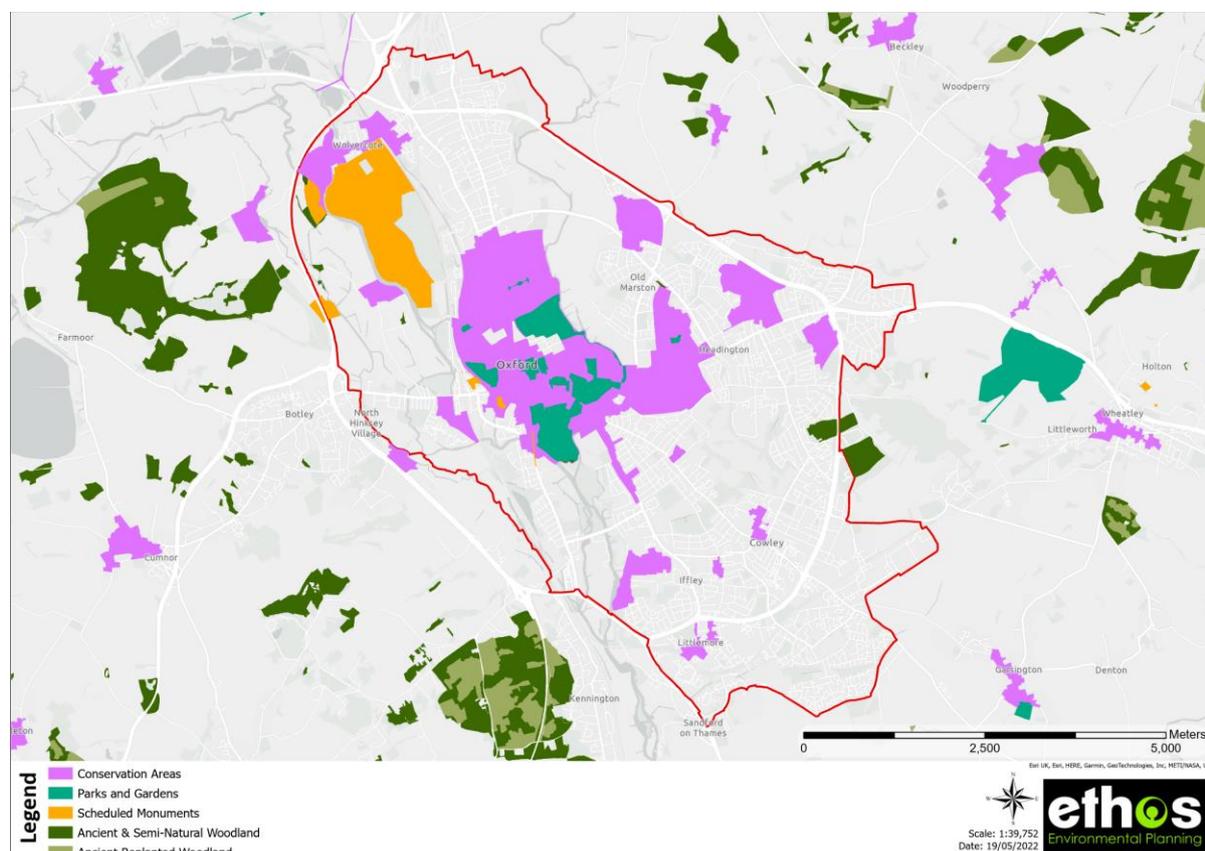

Figure 10 Heritage designations

Biodiversity

Biodiversity – the variety of life on Earth (the living component of natural capital[28]) - is made up of several levels, starting with genes, then individual species, then communities, and finally ecosystems – a community of living organisms that interact with each other and their physical environment. 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).

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[27] Oxford City's Landscape Character Assessment (2002) identifies 52 discrete landscape/townscape character areas: https://www.oxford.gov.uk/downloads/download/972/landscape_character_assessment

[28] Natural Capital is the world's stocks of natural assets which include geology, soil, air, water and all living things

Designated sites and priority habitats

Oxford City contains a variety of designated sites for wildlife. Nationally and internationally designated sites of biodiversity interest include a Special Area of Conservation (SAC) (Oxford Meadows, which is one of the best examples of floodplain meadow in Britain) and 12 SSSIs (this includes the only remaining 20ha of good condition fenland habitat at Lye Valley SSSI and holds two of the best sites for snakes-head fritillary in Iffley Meadows SSSI and Magdalen College). Sites of local nature conservation interest include three Local Nature Reserves (LNRs), as well as a number of Local Wildlife Sites and Oxford City Wildlife Sites.

Important semi-natural habitats include grazing marsh and neutral grassland; broadleaved and wet woodland, wood pasture, parkland and veteran trees, canals, rivers and ditches and urban habitats. The city also supports a number of protected species including great crested newts, water voles, swifts, and bats.

GI is fundamental to protecting and improving biodiversity, through habitat provision and providing stepping stones and corridors for wildlife.
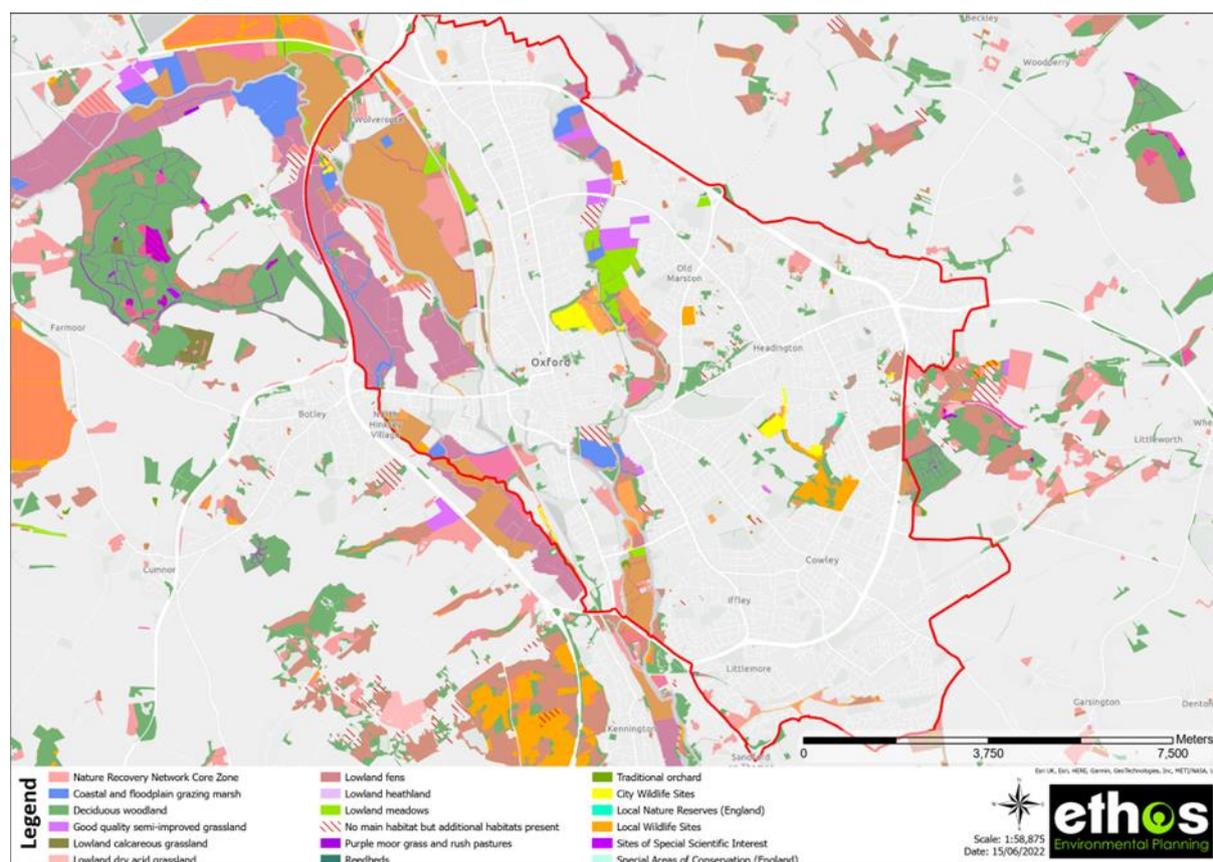

Figure 11 Designated Sites and Priority Habitats

Quality of designated sites

Oxford Meadows SAC

SACs are internationally important sites for nature conservation. Natural England have produced Site Improvement Plans for all Natura 2000 sites (the combined term for sites designated as Special Areas of Conservation (SACs) and Special Protected Areas (SPAs)) in England. The Site Improvement Plan for the Oxford Meadows SAC 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.

SSSI's

Natural England provide condition information related to Sites of Special Scientific Interest (SSSIs), these are nationally important sites for nature conservation and/or geological interest. There are 12 SSSIs in Oxford. The latest condition assessments show that the majority of SSSI habitat within the city is in favourable condition (see table below). Restoring those areas/sites that are in unfavourable condition offers opportunity for improving biodiversity.

Condition of SSSI's within Oxford	Hectarage
Favourable	283.12
Unfavourable Declining	0.5
Unfavourable No Change	3.85
Unfavourable Recovering	28.67

Dates of condition assessments

| SSSI Name	Condition Survey Date
Brasenose Wood and Shotover Hill	10/07/2009
Hook Meadow and The Trap Grounds	10/03/2010
Iffley Meadows	21/04/2009
Littlemore Railway Cutting	26/06/2012
Lye Valley	10/12/2019
Magdalen Grove	23/09/2011
Magdalen Quarry	16/11/2021
New Marston Meadows	24/06/2010
Pixey and Yarnton Meads	20/12/2012
Port Meadow with Wolvercote Common & Green	06/07/2010
Rock Edge	06/12/2011
Wolvercote Meadows	05/08/2010
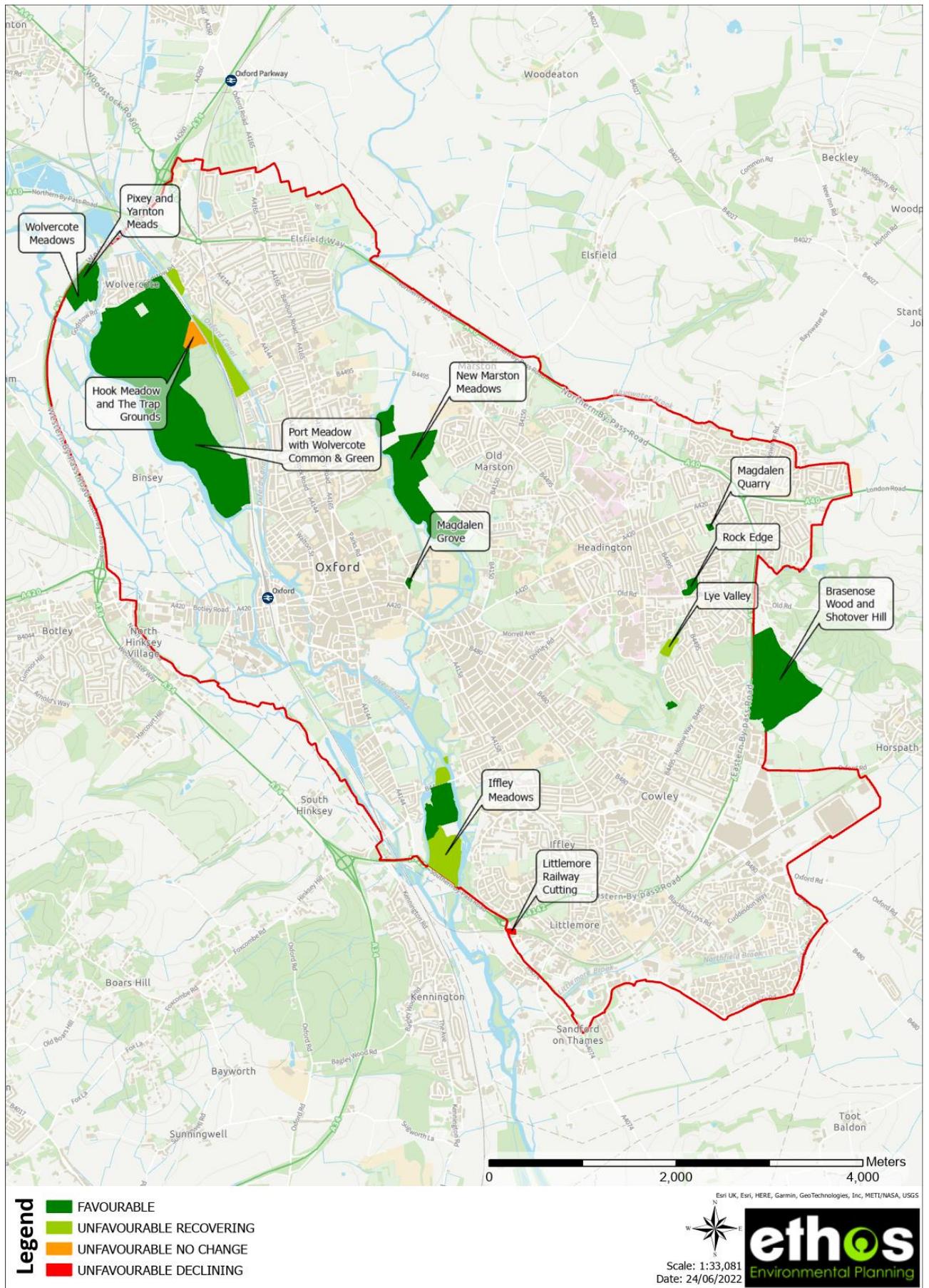
Figure 12 SSSI condition assessment data

The Oxfordshire Emerging Nature Recovery Network

The draft network map sets out three zones:

1. Core Zone – the most important sites for biodiversity (nationally and locally designated sites, nature reserves, priority habitats and ancient woodland).
2. Recovery Zone – comprising of conservation target areas, important freshwater areas and areas identified to provide better habitat connectivity.
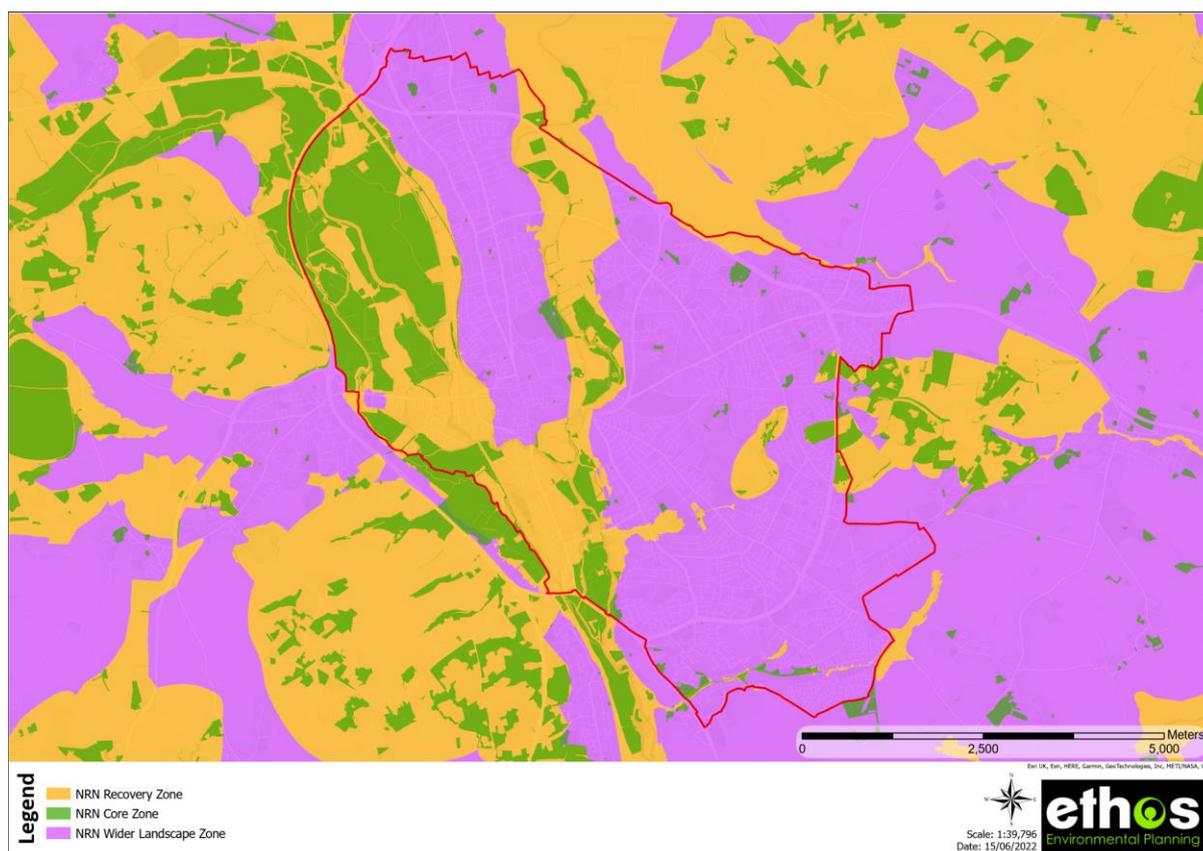**3. Wider Landscape Zone** – covering the rest of Oxfordshire.

Figure 13 Oxfordshire Draft Nature Recovery Network

Natural England Habitat Network Mapping

This is a spatial dataset that describes the geographic extent and location of Habitat Networks for 18 priority habitats based primarily on the priority habitat inventory with additional data added in relation to habitat restoration-creation, restorable habitat, plus fragmentation action, and network enhancement and expansion zones. The maps are created following a standardised process that incorporates a range of data layers and identifies specific locations for a range of actions to help improve the ecological resilience for each of the habitats/habitat networks.

Network Enhancement Zone 1 (Dark brown areas): Land within close proximity to the existing habitat components that are more likely to be suitable for habitat re-creation for the particular habitat. These areas are primarily based on soils but in many cases has been refined by also using other data such as hydrology, altitude and proximity to the coast.

Network Enhancement Zone 2 (Brown hashed areas): Land within close proximity to the existing habitat components that are unlikely to be suitable for habitat re-creation but where other types of habitat may be created or land management may be enhanced including delivery of suitable Green Infrastructure.

Fragmentation Action Zone (Salmon coloured areas): Land immediately adjoining existing habitat patches that are small or have excessive edge to area ratio where habitat creation is likely to help reduce the effects of habitat fragmentation.

Network Expansion Zone (light brown areas): Land within relatively close proximity to the Network Enhancement Zones 1 & 2 that are more likely to be suitable for habitat creation for the particular habitat and identifying possible locations for connecting and linking up networks across a landscape.
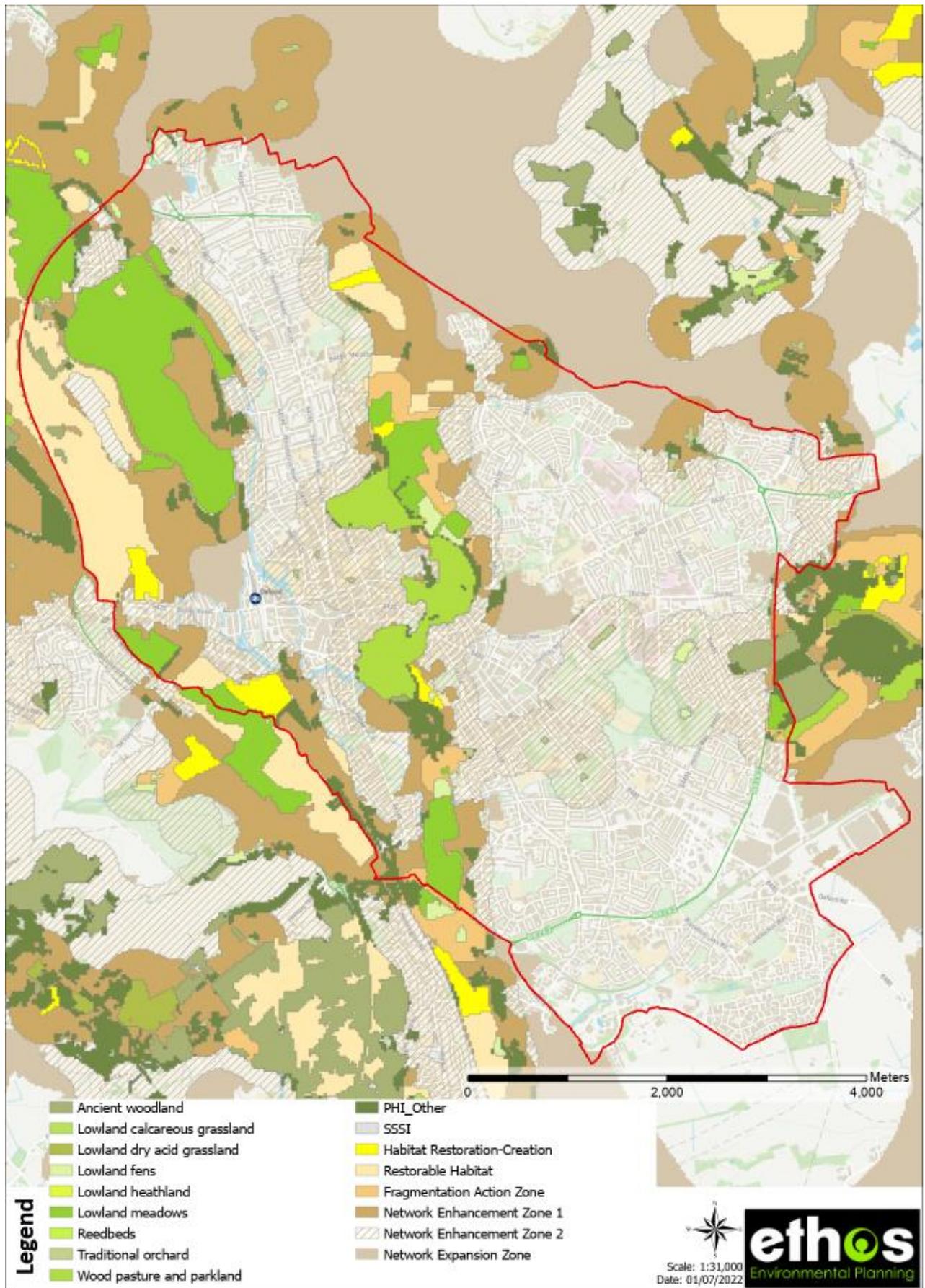
Figure 14 Natural England Habitat Network Mapping

Other key areas for protecting and enhancing biodiversity are:

- Natural England (NE) **National Priority Focus Area** (Wolvercote to North Hinksey) – These focus areas are the best picture NE have about where they need to concentrate effort in order to achieve their biodiversity, landscape, access, engagement and other land management objectives. They show where they currently focus more effort. The focus areas are also the best overview they have of future priorities, but this is not yet a perfect picture.
- Local Nature Partnership **environmental opportunity areas** (areas of high environmental value and opportunity and large-scale investment potential) have also been identified. Those that fall within/link to Oxford are Upper Thames, Wytham and Cothill; River Thames and Cycleway Corridor; Cherwell Valley; and Bernwood Forest, Otmoor and River Ray Complex.
- **Conservation Target Areas (CTAs)** identify some of the most important areas for wildlife conservation, where targeted conservation action will have the greatest benefit. They provide a focus for coordinated delivery of biodiversity work, agri-environment schemes and biodiversity enhancements through the planning system. There are 4 conservation target areas in Oxford: Oxford Meadows and Farmoor CTA, Shotover CTA, Thames & Cherwell CTA and Oxford Heights CTA.

Public Rights of Way (PROW), cycleways and promoted routes

The public rights of way (PROW) and cycle network form part of the GI network and also connect open spaces and service centres. A key priority for the council is to support modal shift towards walking and cycling (and public transport), in order to help reduce carbon emissions, improve air quality and encourage active lifestyles. This will be achieved through infrastructure and connectivity improvements, but importantly through 'greening' measures such as tree planting, and low traffic neighbourhoods, making routes safer and more pleasant.

Key promoted routes within the city are the Thames Path and the Oxford Canal Path.

The Oxford Local Cycling and Walking Infrastructure Plan (LCWIP, 2020) aims to encourage and increase walking and cycling. This is core to the Council's approach to transport solutions, in helping to tackle the challenges of climate change, air pollution and physical inactivity. Measures to improve active travel within the city include infrastructure improvements to active travel routes and supportive measures such as Low Traffic Neighbourhoods. Improving connectivity between the city, district centres and villages is a key policy area.

The Oxfordshire Rights of Way Improvement Plan (ROWIP) (2015-2025) identifies the importance of PROW in contributing to GI. Research undertaken to inform the production of the ROWIP found that overall, there was strong and encouraging support for all aspects of the County Council's work on PROW. The top suggestions for better maintenance and improvements included: more vegetation cutting; increasing path surfacing and drainage; path protection and access to information.
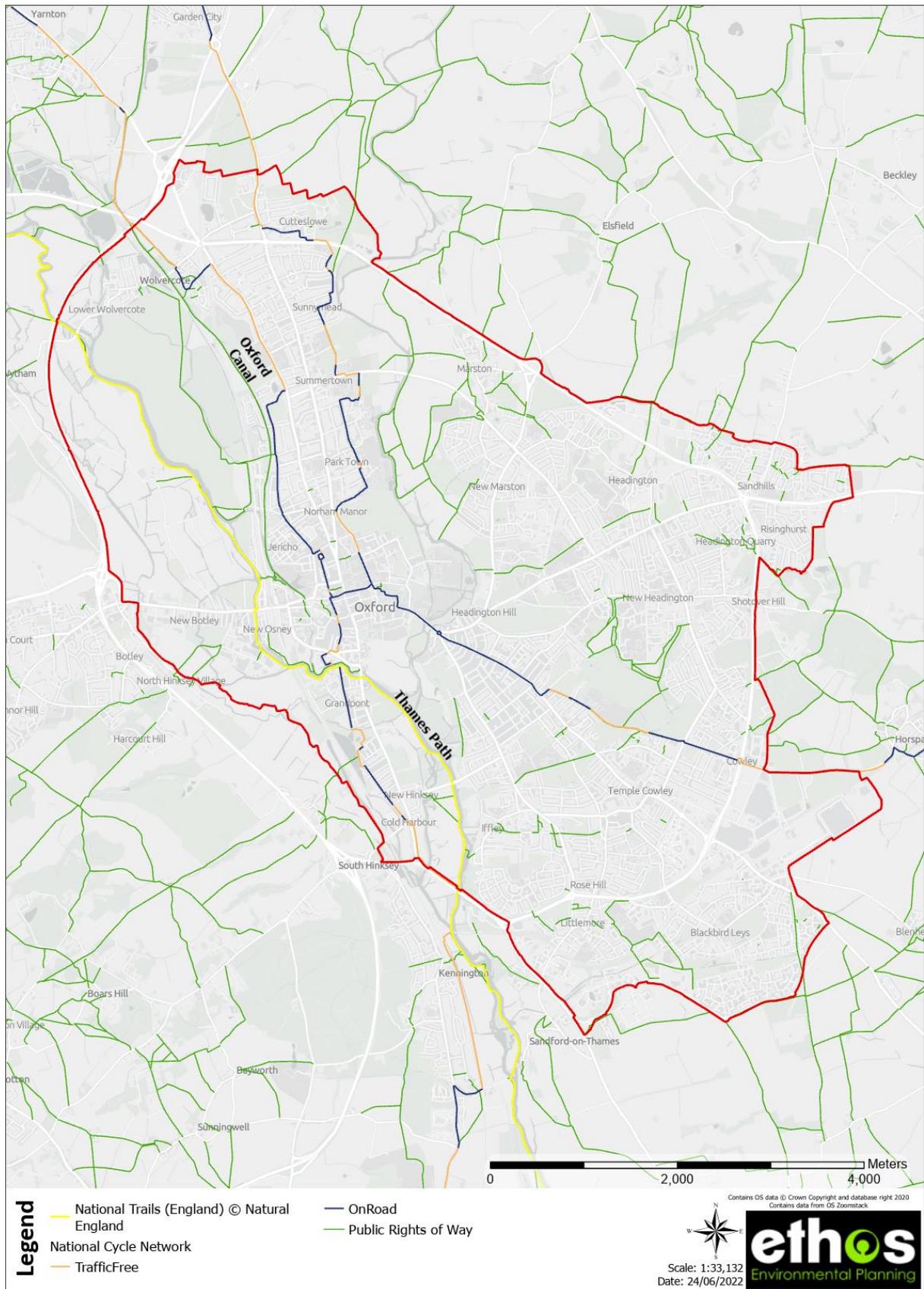
Figure 15 PROW and cycle network