Making the case for investment in Green Infrastructure in Oxfordshire

Policymaker summary

❖ *Tackling sustainability challenges with natural solutions*
❖ *Generating social, economic and environmental benefits*
❖ *Recommendations for further development and delivery*

A report commissioned by Oxfordshire County Council

Brillianto

OXFORDSHIRE COUNTY COUNCIL

Contents

1. Introduction

1.1 Purpose of this document

Planning for, and enhancing, Oxfordshire's Green Infrastructure is an essential part of realising the county's long-term ambitions and economic aspirations, as expressed in the emerging Oxfordshire Plan 2050, the Oxfordshire Infrastructure Strategy and other policy documents.

This report sets out the strategic case for investment in Green Infrastructure. It provides robust evidence on the significant contribution Green Infrastructure can make to the County's sustainability challenges. Green Infrastructure can also contribute to economic development, sustainable housing provision and social wellbeing.

The majority of the original evidence and statistics for this document were collated in 2017. Since then, this document has been subject to internal consultation and further development within the county council and with specialist partners. A final update in June 2020 reviewed the evidence base and brought the document in line with key policy documents, in particular the Oxfordshire Plan 2050.

This is a policymaker's summary. The background evidence contained in the full evidence document and its annexe will be of use to a wide range of audiences to feed into policy and decision making.

Who is this document for and what does it aim to achieve?

This document is for all organisations, businesses and stakeholders in Oxfordshire who have an interest in the long-term sustainable development of the County, facilitated by investment in Green Infrastructure.

Oxfordshire authorities have committed to building 100,000 new homes across Oxfordshire between 2011 and 2031 as part of the Oxfordshire Housing and Growth Deal funding from central government announced in autumn 2017. The Oxfordshire authorities have also committed to the preparation of a Joint Statutory Spatial Plan (The Oxfordshire Plan) to guide development in the county to 2050.

This study:

❖ Highlights key sustainability issues at the county level.

❖ Promotes the contribution of Green Infrastructure to "placemaking" and urban development.

❖ Provides robust evidence that Green Infrastructure adds many benefits to the value of plans and projects.

❖ Sets out evidence that these benefits can be achieved cost-effectively.

❖ Makes the case for a significant, strategic and co-ordinated investment in Green Infrastructure.

❖ Facilitates a coordinated and consistent approach to Green Infrastructure strategy development and implementation.

This study aims to establish the case for investment in Green Infrastructure within Oxfordshire. Only with such investment in Green Infrastructure will future growth be truly sustainable, achieving positive social, economic and environmental outcomes.

1.2 Definition of Green Infrastructure

This document uses the following definition of Green Infrastructure:

"Green Infrastructure is a network of multi-functional green space, urban and rural, which is capable of delivering a wide range of environmental and quality of life benefits for local communities."

National Planning Policy Framework, MHCLG, February 2019.

1.3 Key Green Infrastructure principles

The following important principles follow from the definition of Green Infrastructure:

More than Green Spaces

Green Infrastructure is "a network of green spaces". The Green Infrastructure approach goes beyond the traditional "green space and open space" agenda. It includes non-accessible green spaces, public rights of way and many other natural features.

Connectivity

Green Infrastructure assets must connect to form a network.

Environment-led

Green infrastructure is about more than the environment. The concept has the environmental asset as a starting point. It aims to create a high Quality of Life standard and to achieve the best possible sustainable development.

Integration of Service Delivery

Green Infrastructure goes beyond the immediate environmental sector. It looks at environmental assets in a holistic and integrated way. Green Infrastructure assets have many functions that generate a broad range of benefits. These benefits will be relevant to aspects such as health, housing, tourism, transport and many others.

A tailored approach to rural and urban areas

Green Infrastructure knows no political nor town planning boundaries. It is important to tailor the approach to the situation. Green Infrastructure assets in rural areas will offer different functions and benefits than in urban areas. They will need a different approach to reap the maximum benefits.

Benefits orientated – multi-functional

The Green Infrastructure approach is positive. It looks at opportunities. It aims to optimise the planning, maintenance and development of green spaces. This helps to secure the greatest possible benefits from them and to meet the various needs of communities. This means the environment is an asset that can secure long-term economic and social benefits. Green Infrastructure has many different features and characteristics. These provide many functions. This will lead to benefit realisation through appropriate design, management and enhancement of Green Infrastructure assets.

Community-led & community-led solutions

The benefits of Green Infrastructure are directed at people. Oxfordshire will need significant resources to create a better Quality of Life and to create future resilience. Residents need to have a say in what, where and how we implement Green Infrastructure. This will support community ownership and community management of Green Infrastructure assets.

Resilience and climate change adaptation

Green Infrastructure can make a very significant contribution to climate change mitigation and adaptation. A healthy natural environment will be more resilient to climate change. Places with more Green Infrastructure will make people and essential infrastructure more resilient to climate change.

2. Vision, aims, objectives and benefits

2.1 Vision

Investment in Green Infrastructure will play a key role in transforming Oxfordshire into a county with a more sustainable and resilient future. Green Infrastructure will be well maintained and valued. It will provide the right social, economic and environmental benefits in the right locations. Benefits will include better air quality, noise reduction, safer and more encouraging environments for cycling and walking and creating conditions that encourage active lifestyles and promoting mental wellbeing.

2.2 Aims and Objectives

Establish the case for investment in Green Infrastructure within Oxfordshire. Only with such investment in Green Infrastructure will future growth be truly sustainable and achieve positive social, economic and environmental outcomes.

The study focusses on the role that Green Infrastructure can play in seven positive outcomes:

1. Supporting housing development

Embedding Green Infrastructure in new and existing housing will ensure that Oxfordshire can keep its high levels of quality of life and quality of place.

2. Sustainable transport

Integration of green and grey transport infrastructure will be an essential element to facilitate truly sustainable growth in Oxfordshire.

3. Better health & wellbeing

The people of Oxfordshire will enjoy access to natural green spaces for recreation, leisure, relaxation, inspiration and improved health and wellbeing.

4. Ensuring climate change adaptation and mitigation

Green Infrastructure will be part of Oxfordshire's contribution to global efforts to reduce carbon emissions towards a zero-carbon future. This will include tree planting, habitat restoration and people walking and cycling instead of using fossil-fuel-based modes of transport

There is a clear scientific consensus that climate change is already happening. We are 'locked into' a changing climate. Oxfordshire needs to prepare for this changing future. Green Infrastructure will help us to adapt to climate change. This will include cooling, moderating temperatures and reducing the effects of droughts and floods.

5. Reducing flood risk in Oxfordshire

Green Infrastructure will help to reduce the risk of both river and surface water flooding..

6. Improving air quality

Green Infrastructure will provide a cost-effective, adaptable and small-scale solution to improving air quality. This will improve people's health and overall quality of life.

7. Thriving biodiversity

Networks of Green Infrastructure will provide great spaces for wildlife. They will contribute to a healthy natural environment.

3. Policy context

3.1 National policy context

Green Infrastructure is by definition multi-functional. That means the many benefits it generates can positively shape and contribute to many policy areas.

The full document sets out in detail how

❖ Green Infrastructure relates to a broad range of national policy documents

❖ National Policy supports investment in Green Infrastructure

The full document sets out in detail how Green Infrastructure relates to

❖ Natural Environment White Paper 2011

❖ 25-Year Environment Plan 2018

❖ The Governments 'Green Recovery' agenda

❖ Biodiversity Net Gain (as proposed in the Environment Bill 2020

❖ Nature Recovery Networks (as proposed in the Environment Bill 2020)

❖ A new Green Infrastructure standard (to launch in 2022).

This will bring existing standards on green space together in a coherent way and align requirements for Green Infrastructure with the new proposed requirements for Biodiversity Net Gain and Local Nature Recovery Strategies.

❖ Other national strategies and legislation on Housing, Planning, Air Quality, Flooding, Climate Change and Economic Growth.

3.2 Natural Capital – Green Infrastructure – what is the difference?

Both concepts are in the statutory National Planning Policy Framework (NPPF).

Green Infrastructure is more practitioner and solutions-orientated. It often focuses on housing and planning in urban areas. Natural Capital is still more of a conceptual approach, especially the associated concept of 'Ecosystem Services'.

Natural Capital is more all-encompassing than Green Infrastructure. It includes soils, minerals, groundwater and the oceans. Green Infrastructure assets are a sub-set of Natural Capital.

Both share that they

❖ Put an (economic) value on the natural environment

❖ Promote the natural environment as a solution to a problem.

❖ Start with a detailed (spatial) analysis of the assets.

Many activities currently deplete Natural Capital stocks. This reduces the number of benefits or so-called "ecosystem services" that can flow from Natural Capital. The main 'service' groups are:

❖ Provisioning, such as the production of food and water;

❖ Regulating, such as the control of climate and disease;

❖ Supporting, such as nutrient cycles and crop pollination;

❖ Cultural, such as spiritual and recreational benefits.

3.3 County Policy Context

In the same way, Green Infrastructure relates to many local policy areas and has the potential to deliver on objectives across many different policy priorities.

Green Infrastructure can and needs to be embedded across many local policy areas to achieve the aspiration of truly sustainable growth in Oxfordshire in the long term.

The full document shows how Green Infrastructure connects and contributes to the following policies and strategies:

❖ Oxfordshire Local Transport Plan
❖ Oxfordshire Infrastructure Strategy (OXIS)
❖ Oxfordshire Local Industrial Strategy
❖ Minerals & Waste Core Strategy
❖ Oxfordshire's Joint Health & Wellbeing Strategy
❖ Oxfordshire Local Flood Risk Management Strategy
❖ Housing and Growth Deal
❖ Oxfordshire Plan
❖ Strategies in the context of the Cambridge-Milton Keynes-Oxford Arc

3.4 Conclusion

National and local policy change all the time. The above can only be a snapshot.

Future strategies, policies, action and investment plans need climate-proofing so that Oxfordshire can meet its aspiration to be zero-carbon before 2040 (as declared by most Oxfordshire Local Authorities).

In the same way, strategies, policies and investment and action plans need to be Green Infrastructure-proofed to ensure sustainable growth in the long term.

The full document discusses several tools to embed, integrate and mainstream Green Infrastructure across a broad range of policy areas.

The diagram below shows the priority policy areas we need to embed Green Infrastructure.
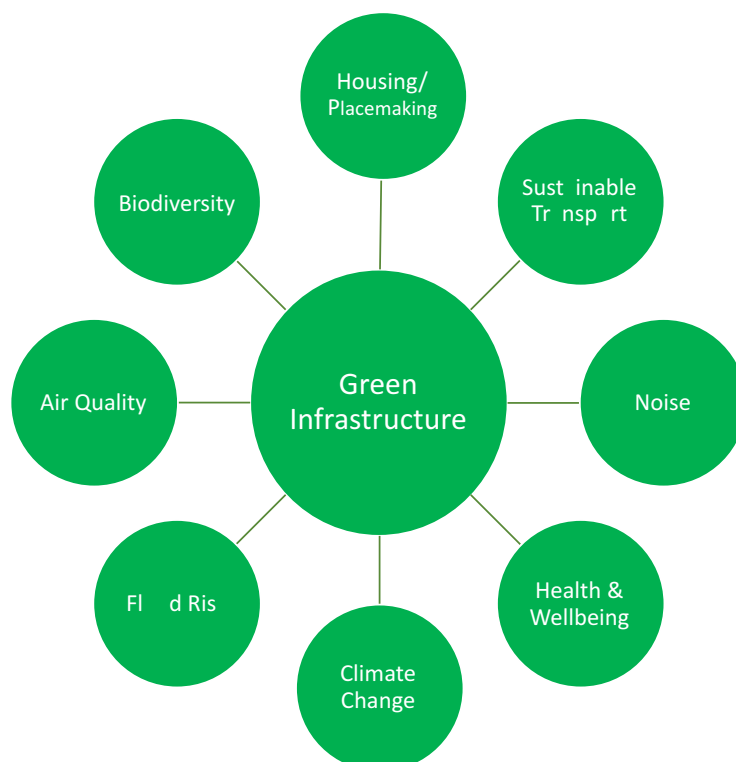
4. Green Infrastructure – contribution to sustainability challenges

4. 1 The Sustainability Challenge

The economic cost of the sustainability challenges

Table 1 below lists the top seven sustainability problems that the county faces. Green Infrastructure has the potential to make a significant contribution to addressing and mitigating these sustainability problems. There is robust evidence on the cost of the top seven issues. Evidence allows us to quantify and monetise the problem, including the annual cost for Oxfordshire.

Problem	Symptoms in Oxfordshire	Annual cost
Mental Health	55 suicides p.a., people with anxiety and depression, eating disorders, lost productivity	£ 1,300,000,000
Obesity	200,000 overweight adults and 100,000 obese adults (costs are in addition to those for inactive lifestyles)	£ 427,000,000
Air pollution	Heart disease, c53,000 people receiving treatment for Asthma; c400 air pollution related deaths; loss in productive years	£ 207,000,000
Transport	Congestion: fuel & time wasted & increased cost of doing business	£ 170,000,000
Transport	31 fatal and 242 serious and 1240 minor accidents - of these: 7 fatal casualties and 74 serious accidents amongst pedestrians and cyclists.	£ 135,000,000
Inactive lifestyles	65,000 people leading inactive lifestyles	£ 120,000,000
Noise	Urban road noise - nuisance & illnesses (avg. of range £98m-£140m)	£ 119,000,000
TOTAL	**Cost of top seven sustainability problems in Oxfordshire**	**£2,496,000,000**

Table 1: Summary table of the top seven sustainability challenges in Oxfordshire and their annual cost to Oxfordshire GVA.

The above figure is £2.5bn every year. The top seven sustainability challenges in Oxfordshire incur a cost of over 10% of Oxfordshire GVA (£23.3bn in 2017/18). They are a 10% brake on Oxfordshire GVA.

How have we arrived at these costs?

For each of the seven areas, we used national or local statistics from reliable and reputable sources. Where we used national data, the cost to Oxfordshire was extrapolated based on the pro-rata amount of population. We used correction factors (e.g., the level of obesity in Oxfordshire is lower than the national average, so we reduced the pro-rata cost accordingly).

The respective sections in Chapter 4 in the full evidence report present the above figures in more detail and the context of other evidence.

Table 1 above excludes other sustainability challenges. This is for one of more of the following three reasons:

❖ No reliable economic data is available.
❖ The cost of that particular issue is much lower in scale.
❖ The evidence linking cause and effect between Green Infrastructure investment and tackling the issue is not robust or less tangible.

However, that does not mean such problems do not exist or they do not have a financial cost.

4.2 Green Infrastructure – contribution to the sustainability challenge

Chapter 4 of the full study contains many detailed examples of the qualitative and financial benefits of Green Infrastructure investment. The presented evidence sets out the scale of both the challenge and the opportunities.

The box below sets out headline figures on the benefits of investment in Green Infrastructure.

Headline benefits of investment in Green Infrastructure

✔ *A 1% increase in the amount of green space in a ward generates a 1% increase in the value of residential property in England*

✔ *Vegetation may reduce noise by as much as 50%.*

✔ *A noise reduction of just 1 decibel for every property in the county would be worth £8m p.a. to the Oxfordshire Economy.*

✔ *Investment in cycling infrastructure could take one car off the road for as little as 80 pence per day.*

✔ *Reducing speed limits in residential areas could reduce traffic accidents by half.*

✔ *People with good access to green space are 24% more likely to be physically active.*

✔ *A 10% increase in physical activity in adults would be worth over £6m to the Oxfordshire Economy.*

✔ *Oxfordshire's woodlands remove 175,000 tonnes of carbon dioxide (CO_2) per year from the atmosphere with an estimated value of £6 million each year.*

✔ *Green roof energy savings are 30 kWh/m^2 or 14 kg CO_2/m^2 or £5-6 m2 per year for heating and air conditioning.*

✔ *River woodland is worth £6000 per year per hectare for its flood regulation benefits. Sustainable drainage systems (SuDS) are half the cost of traditional drainage over a 60-year life span.*

✔ *During an extreme rainfall event, green roofs can retain up to 90% of rainfall.*

✔ *One square meter of a green roof can offset the annual particulate matter emissions of one car.*

✔ *Planting vegetation in streets can reduce street-level pollution by up to 60%.*

✔ *Oxfordshire's rural woodlands remove 400 tonnes of air pollutants and thereby save £6.5 million in healthcare cost per year.*

✔ *Converting intensive agriculture to a mixture of woodland and pasture near cities can generate benefits of £1,300 per hectare per year.*

Green Infrastructure can contribute to the aim and outcomes set out in this document. It can contribute to the aims and targets of other key policy documents, such as the Oxfordshire Infrastructure Strategy or the new Oxfordshire Plan 2050. The evidence draws upon reliable sources of research and data. These include statistics and publications from local governments and other public sector bodies and peer-reviewed scientific papers. Evidence, case studies and reports from the voluntary sector and a selected number of international studies complement the above.

The evidence shows that Green Infrastructure can make a significant contribution to tackling the sustainability challenges we face.

All evidence was assessed using the following structure:

1. A brief description of the UK situation and context.

2. Key strategic issues.

3. Baseline evidence on challenges and existing assets, including quantification and financial scale of a problem where possible.

4. Opportunities.

5. Evidence on the value of investing in the Green Infrastructure asset.

6. Examples of good practice in policy and implementation, both within and outside the county.

7. Implications for Strategy and Policy.

8. Practical actions in Oxfordshire to achieve the aims set out in this study.

Changes in policy and strategy, as well as practical actions on the ground, will facilitate achieving the aims and outcomes set out in this study.

The **evidence on the value of investing in the Green Infrastructure asset** in the full evidence report covers aspects such as:

❖ Green Infrastructure contribution to providing a solution to the problem (how?)

❖ A quantitative description of benefits (how much?)

❖ An economic value of the benefits (value in ££?)

❖ Benefit-Cost Ratios (how effective in economic terms?)

❖ Comparative cost analysis with traditional or technical solutions (how competitive in economic terms?)

5. The case for investment in Green Infrastructure

The cost of doing nothing

The annual cost of the top seven sustainability challenges alone in Oxfordshire is £2.5bn, more than 10% of Oxfordshire GVA. Over the 30-year period envisaged for a Green Infrastructure investment cycle, this would be £75 billion economic damage.

The Benefit-Cost-Ratio of investing in Green Infrastructure

The evidence that Green Infrastructure can make a cost-effective and significant contribution to tackling these issues is robust and well established. Such investment will enable the county's economy to continue to grow sustainably.

❖ Many studies are showing that Green Infrastructure has a Benefit-Cost-Ratio (BCR) of better than 1:1. Some of these studies are for specific interventions. They look at one type of benefit only.

❖ Many Green Infrastructure interventions achieve many benefits at the same time. The summary of recommended practical actions in Section 6.2 in the full evidence report illustrates this. Investment in Green Infrastructure will generate £X for flood mitigation, £Y for health, £Z for air quality and so on.

❖ We achieve the highest BCR when we design investment to achieve many benefits. We need to take many benefits of Green Infrastructure into account for the BCR calculation.

❖ A very high 10:1 BCR figure is suggested by the Natural Economy Northwest study (with robust environmental economics). The most recent study on the topic suggests that the Benefit-Cost ratio could be as large as 36:1 (Vivid Economics & Barton Willmore, June 2020).

Existing economic studies on the value of Green Infrastructure suggest that a 4:1 Benefit-Cost Ratio (BCR) is a conservative/reasonable assumption (see more detail in Annexe 4 of the full report).

That means for £1 invested £4 of benefit are generated.

There is also robust evidence that Green Infrastructure can be a more cost-effective solution than alternative approaches to achieving a more sustainable economy.

Achieving the aims set out in this study will meet significant aims and targets of other key policy documents, such as OXIS and the Oxfordshire Plan 2050 and address the Climate and Biodiversity Emergency.

Investment proposal

In the face of these figures, there is a strong case for further investment in Green Infrastructure.

To make a substantial difference a substantial amount of investment is required.

The investment proposal is to:

❖ Invest over a period of 30 years (until 2050) initially.

❖ Invest £50 million in strategic and targeted Green Infrastructure interventions every year.

❖ At a Benefit: Cost Ratio of 4:1 this will generate an economic benefit of £200 million.

❖ The economic benefit over the investment period of 30 years is £6bn to enable the Oxfordshire Economy to continue to grow sustainably.

Investment		Benefit : Cost		Economic Benefit (cost avoided)	
Total	p.a.	Ratio	for period (yrs)	Total	per investment year
£1,500,000,000	£50,000,000	4:1	30	£6,000,000,000	£200,000,000

Table 2: Main figures for the investment proposal, showing investment and return on investment.

What will £50 million annual investment achieve over 30 years?

Each annual £50m investment in Green Infrastructure will generate at least £200m benefits. This could be the costs of damaging effects avoided, cost savings (e.g., compared to other technical solutions) or new income generated. Someone who moves from being on incapacity benefits due to obesity into work will save NHS costs, unemployment/incapacity benefits and generate tax revenue from employment and increased consumption and may contribute as a volunteer to their community. The £50m annual investment figure is a challenging, yet feasible investment target. It will need strong political will, leadership and vision.

Achieving that level of investment will make a real difference. This will generate a noticeable change in the county, further promoting Oxfordshire's credentials as a great place to live and work in now and in the future. It needs a step-change in practice and investment.

Funding needs to come from the public, private and voluntary sector investments as well as national government funding (for detail on funding sources and models see section 6.5 Funding mechanism in the full report).

Investment plan

The following are some key principles for developing a Green Infrastructure investment plan:

❖ The county needs future plans to actively consider the negative cost of the sustainability issues.

❖ Developing a Green Infrastructure investment plan is one mechanism to achieve this. Given the complexity of the issues and the solutions, it would be beneficial to establish a dedicated management group to develop and deliver the investment plan.

❖ To reach this scale of change, we need to invest on a greater scale than before, not just a few economically modest projects.

The Green Infrastructure investment plan should prioritise investment under the following criteria:

1) Thematic prioritisation (see Chapter 2 and Local Plans' objectives in the full report).

2) Prioritisation where Benefit: Cost Ratio is highest, i.e., where we achieve multi-functionality. That means to build on already available evidence on many quantifiable and monetizable benefits (see throughout Chapter 4 and Annexe 4 focussing on the financial quantification) and to close gaps where evidence is missing.

3) Spatial prioritisation (see Annexe 5 of the full report for methodologies).

4) The Green Infrastructure plan also needs to cover how to maintain new or enhanced assets and their benefits.

A Green Infrastructure investment plan should include input from an environmental economist to undertake a thorough calculation of BCR as part of ongoing monitoring and evaluation.

6. Implementation

To achieve the aims of the study we need to fully understand the Green Infrastructure assets, what and where they are and what condition they are in. We need to analyse the assets, e.g., what benefits they already provide and what benefits they may provide in the future, as well as their spatial distribution relative to target audiences and beneficiaries (Section 6.1, Annexe 2, Annexe 3 and Annexe 5 in the full report).

Investment in Green Infrastructure is scalable. Scaling up delivery will bring efficiency savings. Strategic impact and efficiency will increase as the investment scale moves on from on the ground delivery to projects to programmes.

This study aims to set out a framework how the implementation of a substantial £1.5bn Green Infrastructure investment programme may be approached:

To do this well and to spend the money effectively, the following need to be in place or developed:

❖ A comprehensive understanding of all Green Infrastructure assets, the quantity, quality and location.

❖ A spatial analysis of the social, economic and environmental needs of the people, businesses and organisations of Oxfordshire that GI has potential to address.

❖ A spatial analysis of how assets can be matched with areas of greatest need.

❖ A fully costed business case following government 'Green Book' rules.

❖ An in-principle investment decision by the political leaders, e.g., the Oxfordshire Growth Board.

❖ An investment plan based on a stakeholder vision and consensus.

❖ Identification of funding mechanisms and funding sources across the public, private and voluntary sector.

❖ Dedicated management of the Green Infrastructure investment programme.

❖ The document identifies a broad range of funding mechanisms and funding sources, where this investment may come from (see Section 6.5).

6.1. Analysing the assets for optimum benefits

Oxfordshire has substantial social, environmental, economic and intellectual assets.

We need to tap into all these assets to secure a more sustainable future.

Annexe 3 of the full report lists the environmental assets. There are about 135,000 ha of Green Infrastructure assets in the country and 5,500 km of access routes. This information is an important part of initiating a full **Green Infrastructure audit**.

There are gaps in our knowledge and understanding of assets. This includes:

♦ Total area and the overall number of certain types of assets.
♦ The proportion of assets being publicly/privately owned.
♦ The proportion of assets being accessible.
♦ Quality and condition of the asset.
♦ Current management of the asset.
♦ Features on sites.

Annexe 2 of the full report provides detailed examples of what extra evidence we need and what kind of analysis needs to be undertaken. This is essential to make sound economic decisions about where to invest and in what kind of Green Infrastructure. To be able to make strategic decisions, the county needs comprehensive **spatial mapping of all Green Infrastructure assets**. Recent mapping of natural capital and ecosystem services by the University of Oxford's Environmental Change Institute is a good starting point.

Green Infrastructure has the potential to be a major part of the solution to a problem. **Investment decisions need mapped (spatial) data for the solution (Green Infrastructure asset) and the environmental, social or economic problem.**

6.2 Summary of delivery on the ground actions

Table 3 below describes examples of actions on the ground, where to target each and the benefits and contribution towards the overall vision.

	Targeted Location & how they will contribute to aims								
Measure	**Sustainable Transport**	**Climate Change Mitigation**	**Climate Change Adaptation**	**Air Quality**	**Noise Mitigation**	**Sustainable Housing**	**Flood risk Mitigation**	**Thriving Biodiversity**	**Access & Health**
Where	Along Access corridors, e.g. to schools; towards transport hubs	Anywhere, near Biomass facilities	Urban Heat Island areas/ sensitive receptors	AQMA/ sensitive receptors sites	Noise map/ sensitive receptors	Any areas within or near residential housing	Flood Zone 1,2,3 or upstream rivers	see below	High IMD/ pollution/ noise; low ANGSt provision
Urban tree planting, green roofs, green facades	Shading & better microclimate	Carbon sequestration	Temperature mitigation, wildlife corridors	Air quality/ pollution filtration	Noise reduction→ health benefits	Energy savings, health, SuDS & biodiversity benefits	Water storage & retention	"Fingers" connecting urban fringe to City Centre – habitat, migration corridors foraging area	Stress relief, relaxation, physical exercise, less antisocial behaviour
Enhanced functionality of existing urban (fringe) greenspaces	Noise & pollution mitigation	Higher carbon sequestration rates	Temperature moderation/ cooling/ wildlife corridors (connect CTA & other sites)	Denser vegetation for more pollution filtration	Denser vegetation for better noise reduction	As above	As above	Stepping stones, buffers or Wildlife corridors & habitat	More accessible, better features (benches/way markers)
Creation of new urban (fringe) greenspaces	green/wildlife corridors	Carbon sequestration	Temperature mitigation, wildlife corridors	Additional pollution filtration	Additional more tranquil places	As above	As above	Stepping stones, buffers or SANG to existing sites	Increasing ANGSt provision

		Targeted Location & how they will contribute to aims							
Measure	**Sustainable Transport**	**Climate Change Mitigation**	**Climate Change Adaptation**	**Air Quality**	**Noise Mitigation**	**Sustainable Housing**	**Flood risk Mitigation**	**Thriving Biodiversity**	**Access & Health**
Road verge management	Reduced erosion risk, more pleasant journeys, at Accident hotspots for cyclist/ pedestrian safety	Biomass production; at Accident hotspots for speed reduction	Enhanced wildlife corridors	Better pollution filtration	Better noise reduction	Energy savings, health, SuDS & biodiversity benefits	Water storage & retention	Meadow habitat creation	Road verge = safer route
Woodland Creation	Avoiding soil erosion/earth slides onto infrastructure	Carbon sequestration, woodfuel	Temperature mitigation/ area of cooler temperatures during heat waves	Air Quality/ significant oxygen source & pollutant sink	Tree belts for noise mitigation	As above and Woodfuel source	As above	Habitat for woodland species, safe refuge areas	Stress relief, relaxation, physical exercise
More bicycle racks and cycle paths	At stations – Encourage a modal shift	Reduced CO_2 emissions	N/A	Reduced car emissions	Reduced noise from transport	Health benefits	N/A	N/A	Physical exercise
Promoting walking & Cycling	Along busy roads/to & from employment areas/residential areas/points of interest	Reduced CO_2 emissions	N/A	Reduced car emissions	Reduced noise from transport	Health benefits	N/A	N/A	Physical exercise
Change in agricultural practice	N/A	Increased carbon storage	Soil fertility, draught resistance, erosion control, wildlife corridors	Reduced agricultural machinery emissions	Reduced noise from agric. machinery	Local food	Grass margins & tree planting for flood risk mitigation	CTA, Stepping stones, buffers or corridors Habitat creation	More attractive ROW

Table 3: Summary of the on-the-ground practical actions and how they will generate multiple benefits across the seven desired outcomes.

Chapter 4 in the full report covers good practice and case studies in each of the seven sections on how to deliver the above. Specialist consultants, professional bodies and literature provide further detail. For example, the Green Infrastructure Resource Library and the green roofs and green walls projects database are valuable online resources.

Following good practice will ensure the intended outcomes and that measures do not result in unintended negative consequences.

6.3 Strategic projects

Table 3 in this report presents a menu of specific actions that can happen in any appropriate location as a route to direct delivery on the ground. More strategic projects and activities will support the above and will need a greater level of planning, coordination, project design and partnership working.

There will be opportunities for projects supporting the delivery of specific interventions in multiple locations; for example, projects on promoting and delivering green roofs or SuDS Schemes, tree planting and road verge management. Pilot projects would establish a proof of concept, establish lessons learned and good practice as well as more robust, local economic cost-benefit ratios. The pilots would then lead to larger-scale implementation.

There would also be pilots on new approaches such as incentive schemes, retrofitting and payment for ecosystem services. These would draw on experience elsewhere in the country.

Other types of projects would be more revenue orientated, e.g., promotion of behaviour change, community engagement or green gyms.

6.4 Partnership working towards investment plans

Strategic work with partners would support and complement the types of "on the ground" implementation activities listed in Table 3. above. Key partners include:

- ❖ Charities and communities
  - ◆ Many charities use cost-effective ways to achieve outcomes and can access funding streams other types of organisations are not eligible for.
- ❖ Cross-sectoral and cross-departmental partnerships that will bring new insights.
- ❖ Sectors include: health, transport, housing, regeneration, conservation, planning and many more

It is critical to get all beneficiaries cooperating to develop an ambitious investment plan that attracts funding. Partnerships need adequate coordination resources to keep them together and working effectively. This will ensure every partner benefits from the collaboration.

6.5 Funding mechanism

There are many funding sources and funding mechanisms. Funding sources change all the time. Existing schemes will be replaced by future schemes that may be similar or focus on different priorities. Pro-active engagement with the topic and funding institutions will reap benefits. A specialist environmental fundraiser facilitating grant bids would be a useful addition to the county's economic and environmental development capacity.

Further types of funding sources or principal approaches are:

- ❖ Green Infrastructure bonds and business investment
- ❖ Payment for Ecosystem Services
- ❖ Public money for public goods
- ❖ The planning system
- ❖ Natural Capital investment plans
- ❖ Foundations and government grants

6.6 County & district plans and strategies with the potential to deliver Green Infrastructure

There are many strategy, policy and Action Plan documents that have the potential to contribute directly to Green Infrastructure implementation.

These include the Oxfordshire Infrastructure Strategy, the county's Climate Action Framework, Local Transport and Connectivity Plan, Joint Health and Wellbeing Strategy, Local Flood Risk Management Strategy, Oxfordshire's Biodiversity Action Plan and any future Nature Recovery Strategy, AONB Management Plans and the Local Plans of the districts and Oxford City. Other county-level documents are currently under development or consideration. The following plans and initiatives also have the potential for Green Infrastructure delivery: Oxfordshire Plan 2050, Energy Strategy, Countryside Economy Strategy, Oxfordshire Industrial Strategy, One Planet Oxfordshire, the Oxford-Cambridge Arc.

An assessment of all these documents is important to understand:

❖ The potential of these documents to contribute to Green Infrastructure delivery

❖ Their financial scale

❖ Policy and strategy hooks (how is Green Infrastructure relevant and beneficial to other policy aims)

7. Overall recommendations

To achieve the aims set out in this study, the following need to be considered:

1. **Develop a summary business case based on Government green book rules. It needs to include the cost and consequences of not taking any action.**

    Chapter 4 of the full report presents robust evidence on the current cost of unsustainable practice. It also lists robust evidence of the possible solutions and their cost-effectiveness.

2. **Develop a vision for Oxfordshire's Green Infrastructure that inspires and co-ordinates action.**

    How can Green Infrastructure be an integral part of achieving a more sustainable future? A partnership vision developed via a consensus-based approach will establish common ground.

3. **Build partnerships able to deal with the scale and complexity of the challenge.**

    This needs a partnership of all relevant organisations. It will need both those holding physical and intellectual assets and resources and those who represent the users and beneficiaries of Green Infrastructure assets. This includes:
    ♦ Decision makers
    ♦ Political leaders
    ♦ Businesses
    ♦ NHS & other health organisations
    ♦ Highways Agency & other transport organisations
    ♦ Planners
    ♦ Nature Conservation Charities
    ♦ Education sector
    ♦ Communities

4. **Invest in filling data and other evidence gaps to ensure good decision making.**

    Section 6.1 and Annexe 2 of the full report highlight gaps in evidence.

5. **Invest in a robust analysis of assets and data to ensure targeted and effective delivery.**

    How to match the asset as a solution to a problem? Establish where exactly, how and to what benefit investment in Green Infrastructure can make a positive contribution.

6. **The scale of investment recommended is £50m p.a. for 30 years.**

    This investment will come from a broad range of local organisations and stakeholders as well as national grants and other funding sources. This will bring a step-change in the level of benefits that Green Infrastructure brings to Oxfordshire residents and make a meaningful contribution to addressing the key sustainability challenges.

    This will need a strategic decision by key decision-makers, including the Councils, OxLEP and the Growth Board and a clearer idea as to sources of potential funding.

7. **Manage the Green Infrastructure investment program well.**

    This level of investment will require an appropriate level of programme management to deliver it.

8. **Build on previous work and existing strategies to embed Green Infrastructure at the heart of the Oxfordshire Plan 2050.**

    Partners need to develop more robust principles and project assessment criteria. These need to relate to aims stated in this study, OXIS, Oxfordshire Plan 2050 and other key county and local documents and consider an economic return on investment. Assess the Green Infrastructure potential of the spatial options for growth that will be the focus of future Oxfordshire Plan 2050.

9. **Apply good practice in Green Infrastructure delivery.**

    The Approach to Green Infrastructure delivery needs to be:
    ♦ Strategic, prioritised and targeted (based on spatial analysis of assets).
    ♦ Wholehearted and supported by political decision-makers.
    ♦ Integrated across departments and sectors.
    ♦ Co-ordinated.
    ♦ Adequately funded.
    ♦ Using all available levers and mechanisms.

10. **Identify funders, potential investors, funding mechanisms and specific funding sources.**

    Build on the material presented in section 6.5 (of this and the main report) and other good practice.

11. **Link at policy and delivery level.**

    Consider how to amend or improve other strategic documents, in particular OXIS and how to use Green Infrastructure evidence to influence spatial options and other aspects of the Oxfordshire Plan 2050, as well as Local Plan policy. Policymakers and academics have developed conceptual frameworks for analysing the integration of a topic into policy (see Annexe 6 of the full report). This will create a coherent and integrated plan for investment in Green Infrastructure that will also maximise the potential from synergies between different policy areas.

Photos

Front Page: wild flower strip included as part of tow-path improvements, River Thames, Oxford. 2019.

Back Page: mixed planting to support pollinators as part of a community-led planting project, Chipping Norton Health Centre. 2018.

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