Quantifying Green Infrastructure
Communicating the benefits of the emerging New Cut Greenway

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green infrastructure
value explained
uk tool

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Green Infrastructure Valuation | **Methodology**

CONTEXT

- Opportunity to pilot Arup's **Green Infrastructure Valuation Estimation** tool
- A **one stop estimate** of monetarised wider benefits of green infrastructure in the UK
- Allows the rapid **comparison** of the wider benefits of different green infrastructure options
- Intended to provide information about **typical benefits** of green infrastructure to assist early scheme scoping

PROCESS

- **Stated Preference (willingness to pay)** for Green Infrastructure
- **Damage Cost Avoided** due to presence of Green Infrastructure
- **Revealed Preference (hedonic pricing)** analysis of impact of Green Infrastructure
- **Net Present Value** calculation over 30 years, using 3.5% discount rate (ref HM Treasury Green Book)

OUTPUT

- Value of **amenity** improvements to the local community
- Value of **pollutant** sequestration
- Value of **carbon dioxide** sequestration
- **Energy savings** due to removal of surface water from combined sewerage network
- Value of surface water **flood risk reduction**
- **Health** benefits for local residents and visitors
- Value of **long term employment** created

Bristol New Cut Greenway | **Context**

The pressing need for flood defences creates the opportunity for transport & public realm improvements to:

- reshape, repair and reconnect the city with the river
- maximise development potential
- promote walking and cycling
- connect communities

Increasing costs / increasing benefits

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Bristol New Cut Greenway | **Context**

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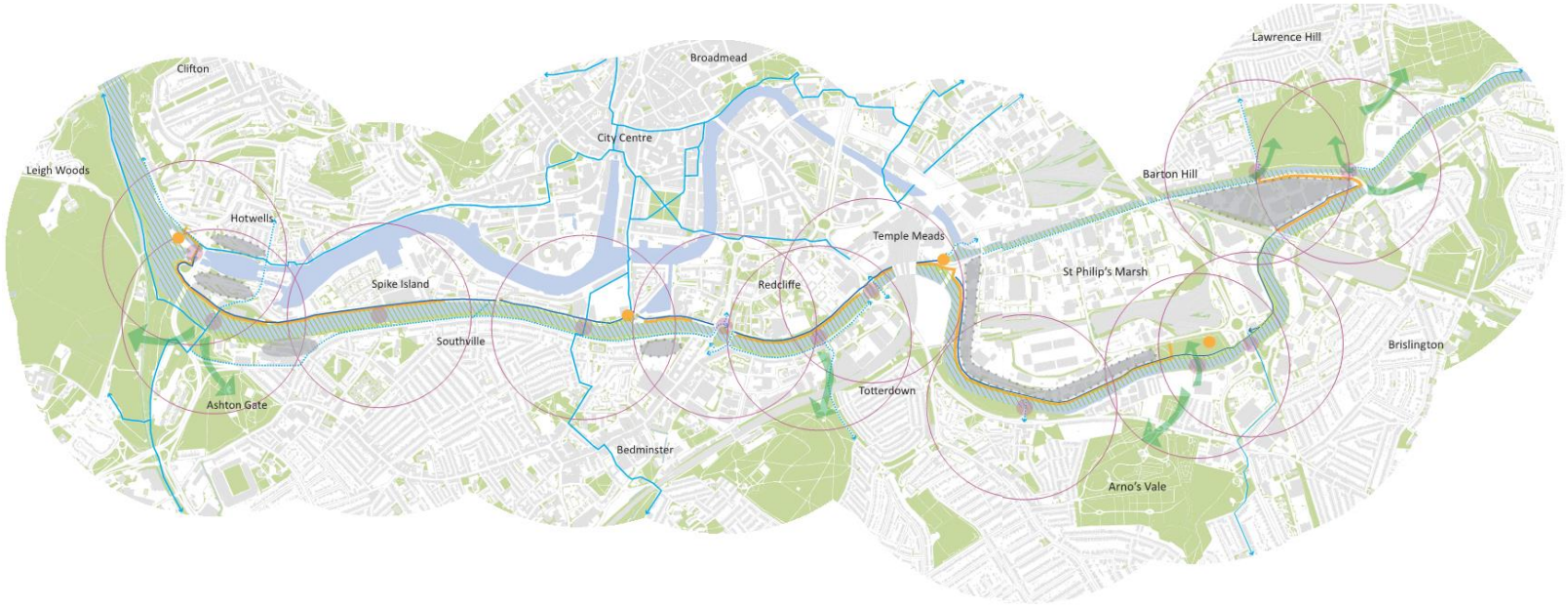

Credit: Bristol City Council

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Green Infrastructure Valuation | **Data sources**

Bristol City Council's emerging New Cut Greenway Place Vision will establish a whole place vision from Netham Lock to Entrance Lock on both sides of the River Avon. The scoping document outlines the sense of ambition and opportunity. No design has been completed.

The Green Infrastructure Valuation Estimate is based on **key assumptions** provided by Bristol City Council as *'targets using professional judgement for achievable quantities. The assessment is challenging considering the New Cut Greenway, as a narrow green-space enhancement within an existing wider green corridor, meets criteria.'*

HM Treasury and DEFRA published **carbon and other pollutant pricing**. The tool combines these values to quantify the value of pollutant sequestration provided by trees and green spaces in urban areas.

UK National Ecosystems Assessment 2010

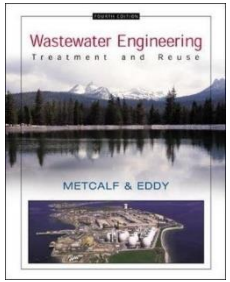
Quantifies a wide range of ecosystems services across the UK. In particular, uses **hedonic pricing** to value green infrastructure, and **stated preferences** to assess the change in quality of life associated with access to green infrastructure.

The tool assesses the impact of green spaces, water features and trees on house price values at ward level.

Academic Research

Research on the impact of trees and vegetation on **air quality**, both localised pollutants (such as Nitrogen Dioxide) and global pollutants (such as Carbon Dioxide). Sequestration data from *The Western Washington and Oregon Community Tree Guide* was chosen for the tool, as it uses data from a climate most similar to that experienced in the UK, as well as the *Centre for Neighborhood Technology*.

The Institute of Fiscal Studies assesses the cost of unemployment to the government.



Flagship literature by *Metcalf and Eddy* was used to value the impact of surface water removal on the sewerage network.

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Bristol New Cut Greenway | **Estimated Annual Benefits**

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Opportunities **for inclusive informal recreation**, such as walking and cycling, offer significant long-term health benefits for all local residents. This is based on meta-analysis from a wide range of studies, including Willingness to Pay methodologies.

Health and Recreation, £3,600,000

Long term **employment** opportunities provide value for government through the avoided cost of unemployment.

Social, £7,000

The scheme will sequest local pollutants such as **nitrogen dioxide** and **particulates** as well as carbon dioxide. This valuation is based on **damage cost avoided** to local people.

Air Quality, £2,300

By far the largest boost is to the **local amenity**. It will make South Bristol and the harbourside a more attractive area to live in, benefitting the livelihoods of local residents.

This could correspond to an annual value of around **£170** per household.

Carbon sequestration will contribute to climate change mitigation. This valuation is based on **damage cost avoided** of carbon emissions.

Climate Change Mitigation, £850

Energy, £53

Surface water flood risk management benefits have not been quantified to avoid overlap with flood risk management benefits quantified elsewhere

The scheme will save energy by **reducing the need to treat surface water runoff** in the long term.

Amenity, £8,400,000

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Bristol's New Cut Greenway | **Arup Green Infrastructure Case Studies**

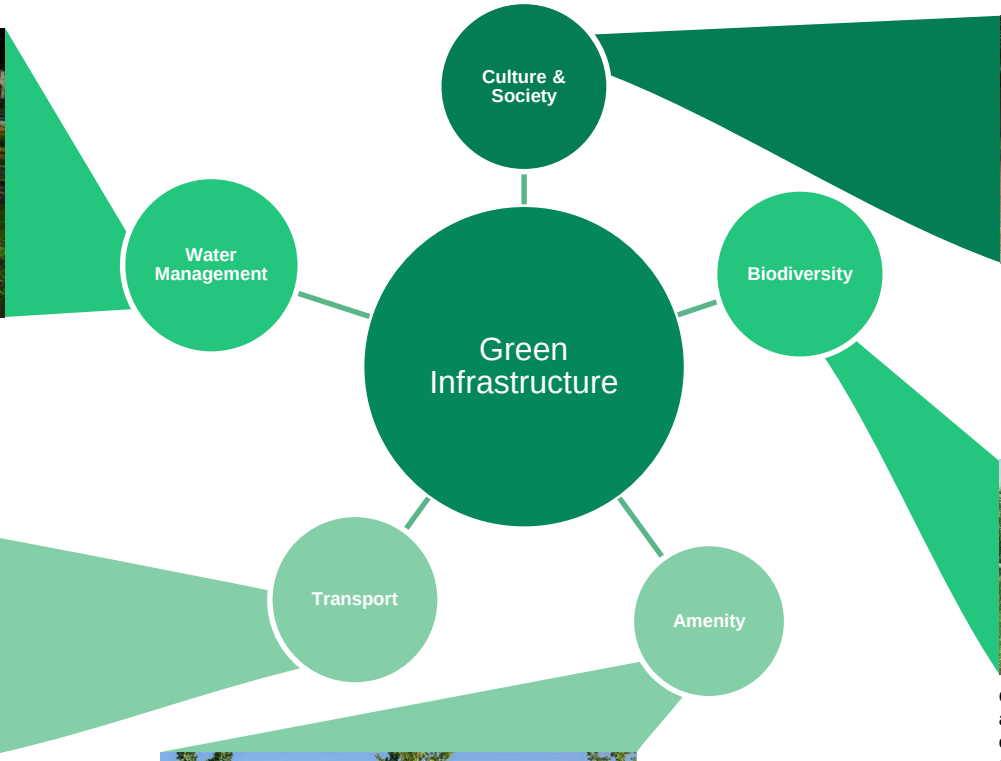
By attenuating flows and allowing for infiltration, green infrastructure can be used to improve water quality, prevent surface water flooding and recharge groundwater, as demonstrated by **RainScape Llanelli**. Bristol City Council could use green infrastructure along the New Cut to improve water quality whilst supporting Wessex Water outcomes by removing combined sewer loading.

Green Infrastructure can be used to provide improved active transport routes. At **Greener Grangetown** in Cardiff new bike paths are improving the Taff Trail Sustrans cycle route improving connectivity between the north and south of the city for commuting and recreational trips. The New Cut Greenway could link cycle and walking routes along a central east and west axis.

Green infrastructure can provide amenity for local residents. At **Hunter's Point South** in New York, new jogging and cycling paths and adult exercise areas promote active recreation. Recreation space is used for community events, including outdoor cinema.

Six new tourism, heritage and eco trails with public art and industrial heritage sites have been established telling the stories of Connwater's Industrial Heritage, C.S. Lewis and other famous local people on the **Connswater Community Greenway Trail**. Bristol could introduce a similar creative heritage trails on the New Cut Greenway.

Green Infrastructure brings the natural world, and all the benefits it can provide, into the urban environment. For example, **wildflower planting along green 'corridors' and woody bug habitats** in cities is helping to preserve and promote our **bee and invertebrate populations**, and **constructed wetlands** in urban watercourses to increase the biodiversity of our rivers. Both biodiversity promoters were used at **Hunter's Point South** in New York and could be used to encourage biodiversity along the New Cut.



Bristol's New Cut Greenway | **Estimated Benefits**

Transport

Improved walking and cycling along the New Cut

Averting loss of Chocolate Path and St Phillips River Path

Bristol City Council estimate **£30-50 million** worth of transport benefits* opportunity to improve walking and cycling along the New Cut over the next **30 years**.

Averting connectivity loss of Chocolate Path and St Phillips River Path will avoid a **£20-30 million** worth of transport* **losses** over the same period.

*includes noise, air quality, CO_2, journey quality, accidents, decongestion, taxation, and physical activity

BRISTOL CITY COUNCIL

Bristol's New Cut Greenway | **Summary, Limitations and Next Steps**

SUMMARY

- The New Cut Greenway presents **a once in a generation opportunity** to deliver improved air quality, reduce pollution, improve both physical and mental health and wellbeing as well as mitigating climate change.
- **Impacts of Green Infrastructure proposals have been estimated** using the pilot tool. Air quality, carbon sequestration, surface water management, and health (access/view green space and informal recreation) could provide up to **£127 million worth of benefits over the next 30 years**.
- Transport benefits, estimated by Bristol City Council, could total **£30-50 million** over the same period.

LIMITATIONS

- Assessment is based on **concept** of the scale of opportunity
- Assessment performed using national or global data that may not be **context specific**
- Assumes that flora (trees, green spaces and vegetative SuDS) are all **fully established** from the outset.
- The tool attempts to **quantify non-traded goods**, and therefore the assessment provides an estimate for decision making purposes.

NEXT STEPS

- Development of New Cut Greenway spatial framework.
- Work to **prioritise and define interventions** including concept design and budget estimating.
- **Justification of interventions** to include refined benefits estimation, supported by site-specific data (air quality, existing sewerage network, existing access to green space, surveys of residents on frequency of use of green space and willingness to pay).

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