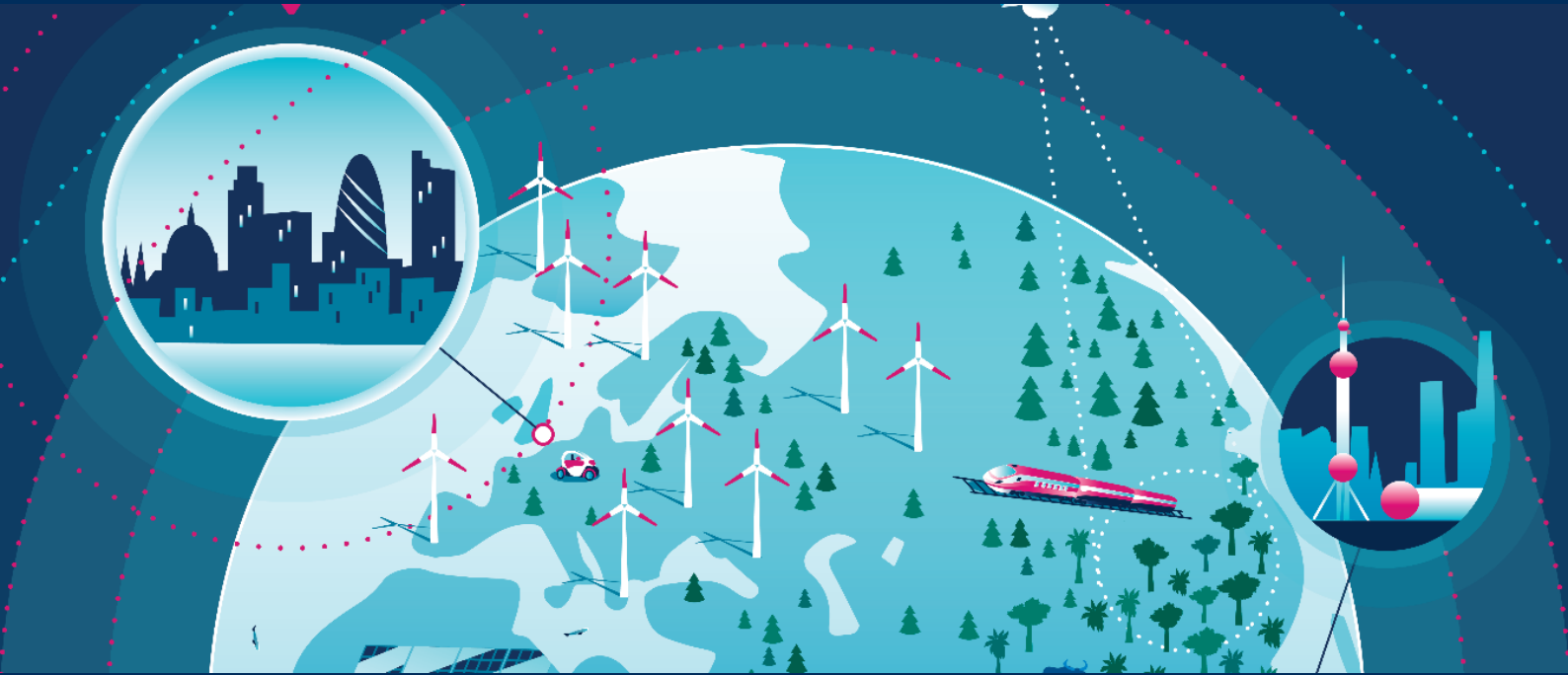


# ● Greening Streets within London

Report prepared for the Greater London Authority



Final Draft

June 2021

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## Disclaimer

This study was commissioned by the Greater London Authority (GLA) as part of an evidence gathering process to understand the potential economic benefits of street greening. Its findings have helped to inform the GLA but have not been part of the criteria for any funding awards made by the GLA, nor any funding awards to be made by the GLA in future programmes.

# 1 Introduction

This work supports the Greater London Authority's (GLA) work to make the business case for investment in green infrastructure and the benefits it provides to Londoners. It also supports London boroughs in developing green infrastructure strategies, as well as proposals for specific interventions. This includes consideration of greening streets in the context of Low Traffic Neighbourhoods (LTNs), which are groups of residential streets, surrounded by main or distributor roads, in which motor traffic access has been restricted or removed. LTNs and green streets increase physical activity, improve air quality, enhance climate resilience, and create new public green spaces improving mental wellbeing. Recent support for and implementation of LTNs varies across London boroughs, with some introducing substantial temporary programmes during the COVID-10 pandemic. Given the multiple ways to improve urban streets, we use Greenkeeper, our proprietary tool, to conduct the scenario analysis, to help the GLA and individual boroughs better understand and visualise the potential benefits alongside the costs of LTNs and street parks. The analysis demonstrates that potential benefits from the proposed interventions significantly outweigh the costs of greening the streets, hence making a strong case for these interventions before the costs or benefits of reducing motor traffic highway capacity is taken into account.

**Evidence from the study suggests that green streets are likely to offer very good value for money.** Green streets provide numerous benefits for individuals and the community, demonstrating positive effects on health, mental wellbeing, carbon sequestration, and amenity value. The largest capital spending on selected scenarios derives from the infrastructure costs, which we assume to occur in the first year of the scheme. Maintenance costs of green streets are inexpensive compared to maintaining the equivalent area as a highway. Overall, there is a high benefit-cost ratio across all three scenarios. When looking at the effect of varying scheme designs, it is clear that once the infrastructure has been modified, the marginal cost of planting and of additional amenities is small, while they can significantly increase value. It thus makes sense to equip the schemes to a high standard of greening and amenities (such as toilets, play and refreshment facilities).

**We take account of each borough's individual circumstances and objectives, producing ambitious but feasible street greening scenarios.** In this project, the GLA commissioned Vivid Economics and Barton Willmore to produce scenarios for specific sites in the boroughs of Brent, Hackney, and the City of Westminster. The boroughs vary in their approach to street greening and are at different stages of street greening implementation plans. The City of Westminster chose its existing Green Spine Project plan; Hackney has carried out work mapping suitable sites for LTNs, while Brent is beginning to explore the potential of street greening. We held separate inception meetings with each borough, discussing their objectives and goals, after which we followed up with and agreed on detailed scenarios, the designs, costings and benefit estimates which emerged give relevant and feasible ideas for the boroughs to consider implementing, while also supporting the wider objectives of the GLA by demonstrating the benefits of green streets. In addition, the work sets an example for other London boroughs.

**The results of the study are summarised in this report, allowing for easier dissemination to stakeholders and interested parties.** This report presents the key findings by borough, introducing headline benefits and costs of the chosen interventions. Additional details about the intervention and methodology can be found in the annex.

## Study methodology

**The methodology to estimate benefits employs natural capital accounting techniques.** It employs Greenkeeper, a tool which uses national visit data to estimate visit patterns in response to greenspace characteristics and then calculates visit estimates and the value of benefits. The value of green streets applies the same techniques that the Greenkeeper methodology uses for public greenspaces (parks) (Vivid Economics and Barton Willmore 2019). Greenkeeper is the best-in-class model developed by Vivid Economics, Barton

Willmore (now known as Barton Willmore now Stantec, following a recent acquisition), and the University of Exeter that was awarded funding by Innovate UK. The Greenkeeper tool measures the value of urban greenspaces across England, Scotland, and Wales. This value is estimated in terms of physical health, mental wellbeing, amenity value methodology and carbon sequestration.

**The headline visit calculation methodology assumes that a greened street would attract visitors in a similar manner to a park.** Several studies have explored social and environmental benefits by analysing green streets and urban parks jointly. Local parks and walkable street neighbourhoods have been found to have a positive effect on opportunities for physical activities (Cutts et al. 2009). In Hong Kong, both green streets and neighbourhood parks were associated with higher walking time, suggesting a positive effect on physical health (Lu, Sarkar, and Xiao 2018). Finally, research exploring specifically green streets has proved the hypothesis that green streets have higher walking rates than other streets and encourage outdoor activities (Dill et al. 2010).

**Data available on greenspaces was extrapolated to green streets.** The Greenkeeper methodology is based on the Monitor Engagement with the Natural Environment (MENE) survey which investigates recreational use of urban (and non-urban) green spaces in the UK. This is a unique dataset globally. While individual studies have attempted to use travel surveys to explore the effect on walking activity of green streets (Lu et al. 2018), the research on dwell time and associated benefits of visiting a green street were not identified. Visit numbers to parks reflect factors such as demographics of visitors, their choice of visiting a specific greenspace as opposed to other greenspaces in the neighbourhood and travel time. Visits tend to increase in quantity and duration with the introduction of park features that are likely to increase dwelling time, such as cafes or sports grounds. Neighbourhood plans provided by the boroughs include similar types of amenities that are typically modelled in the Greenkeeper parks scenarios. Not all of these features will apply to green streets, but one would expect some would.

**Limitations related to travel time calculations mean that visits resulting from modelling do not account for the distinction between dwell time and travel time.** Importantly, the MENE survey excludes active transport: an individual walking from one end of a park to the other on their way to work would not be counted in the survey and is therefore not modelled in the analysis. This creates a ceiling value estimates for the value that would be attained from the selected greenspace if visitors purposefully chose to spend their time in selected areas as if they were parks. We make a simple assumption that visits commence, and visitors enjoy the full benefits from the first year following tree planting and completion of capital works.

**The conceptual illustrative designs give visual support to the street greening scenarios.** Costs are estimated on the per square metre basis and are based on Barton Willmore's experience. Capital expenditure is assumed to occur in year zero, while maintenance and operations expenditure occur every year. For the cost-benefit analysis, we calculate net present values with the Green Book 3.5% social discount rate and an assessment horizon of 30 years. All costs are budget figures only which provide an idea of the required expenditure by either borough or the investors. While the benefits may not be directly monetizable by boroughs, they would be experienced as benefits by the local community and individual residents.

## Results interpretation and Recommendations

**The study shows that street greening has a positive effect on communities and are worthwhile public investments, with the three example interventions resulting in a total of £11.4m annual benefits.** Expected health benefits including physical health and mental wellbeing account for over 50% of total benefits in each scenario. Annual mental wellbeing benefits are estimated at over £5.7m across the three interventions sites, demonstrating good value for residents. A follow-up study to monitor the effects of street greening, post implementation, would provide insights into how the streets are being used by pedestrians, whether the measurable benefits are being provided and how to improve decisions relating to future street greening investment.

**The model results indicate higher visitor numbers in scenarios with more amenities in the design.** For instance, the café, toilets, and playgrounds mapped in the Westminster scenario contribute to particularly high benefit numbers, as such features tend to increase dwelling time. Such amenities should be considered in the design of future street greening projects. Furthermore, evidence shows that active recreation among visitors boosts health. Outdoor gyms and other mini sports facilities are potential amenities which were not included in these scenarios but could be considered in the designs.

**Locations that are situated further away from existing parks ought to be a priority.** They might deliver higher benefits and a higher return on investment. A green space is likely to receive a higher visit number from residents if there is no alternative provided in close proximity.

**A further area for investigation is the incorporation of green streets into active travel routes.** The questions to be answered include whether street greening would encourage modal shift to active transport and the extent to which persons passing through green streets receive a mental wellbeing boost from their contact with a more tranquil and greened environment. The MENE survey data does not currently provide a distinction between 'dwelling' and 'passing through' time. However, further research into travel routes is necessary to account for this distinction.

## 2 Key findings by borough

**The scenarios analysed in the investment represent possible interventions.** The purpose of the study is to provide the boroughs and the GLA with an idea of the potential benefits to both individual residents and boroughs received from the interventions in the context of the LTNs programme. Any subsequent plans to implement these concepts will be subject to individual boroughs decision-making and consultation.

**While all modelled interventions have a strong investment case, absolute benefits vary due to their different contexts.** The Westminster intervention is projected to bring £7.4m in annual benefits, while Brent and Hackney bring £1.9m and £1.7m respectively. Neither these numbers, nor the cost-benefit ratios should be used to prioritise or rank investment. Each designed park street is unique to the location and will have different amenities. For instance, Westminster is located centrally with higher population density, hence attracting more visitors. The added café and public toilet are also expected to boost visit numbers compared to the other scenarios. However, the Brent intervention is located in a deprived area, hence the estimated benefits may make more of a difference for the people living there.

**There are also several additional benefits we do not model.** For instance, street trees are expected to help with pollution removal and sound isolation. Urban green spaces increase flood resilience and can contribute significantly to biodiversity benefits. Parks also play a role in building community and acting as a place for social interactions – the value of which has especially been felt during the current pandemic. While all these areas are important for consideration, they are outside of our scope. This gives further reason for not ranking the interventions based on the below presented numbers only.

**The scenarios modelled show potential for intervention but will not necessarily lead to implementation.** This study has been commissioned to demonstrate the potential of street greening, but any plans of implementation will be subject to borough decisions and consultation.

## 2.1 City of Westminster

### 2.1.1 Background of the selected site

Westminster City Council already has ongoing street greening work in the Church Street area<sup>1</sup>. A Green spine zone has been designed and partially completed, incorporating pedestrian zones, playgrounds, public toilets and connecting existing green spaces. This scenario analysis evaluates the benefits of the entire planned Green Spine, demonstrating how the completed project's benefits far outweigh the costs. These numbers may be used in public consultations to help make the case for the second phase of the project.

Figure 1 Westminster Church Street Green Spine Zone



Source: Barton Willmore

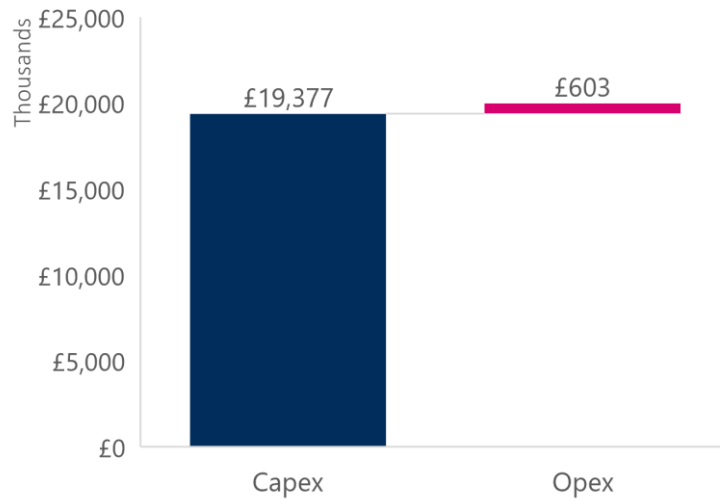
### 2.1.2 Key results

Infrastructure investment accounts for most expenses, while maintenance is low. Above 70% of the investment required is in form of capital expenditure on infrastructure, such as road modifications and lighting. Operating expenditure, that is maintenance of the completed zone, is comparably low at only £603k for a 30-year interval.

<sup>1</sup> <https://churchstreet.org/projects/places/green-spine/>



Figure 2 Costing estimates for the Westminster Green Spine Zone

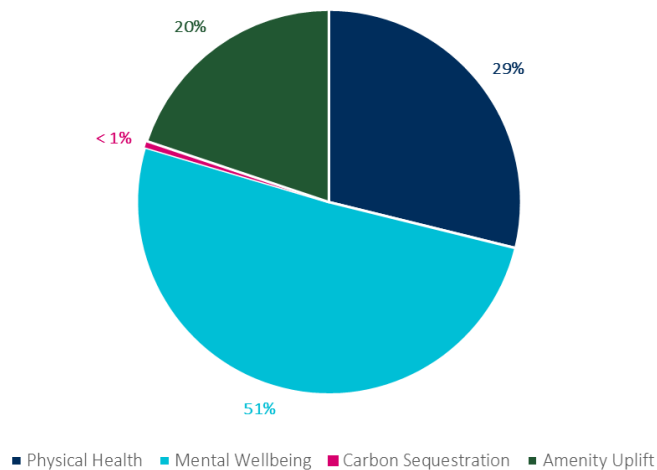


Note: Maintenance refers to a 30-year period following construction

Source: Barton Willmore, Vivid Economics

Over 50% of the total value from greenspaces is estimated to derive from mental wellbeing improvements. Physical health and amenity uplift are also significant, at £2.2m and £1.5m annual benefits, respectively. Carbon sequestration does not account for substantial benefits in itself, but trees and other green cover are essential in creating green space and attracting visitors.

Figure 3 Distribution of annual benefits estimated for the Westminster Green Spine Zone over a 10-year period



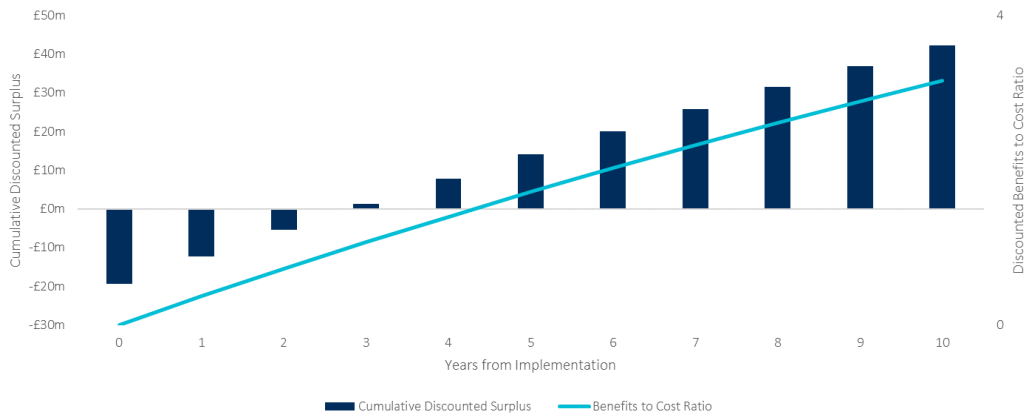
Note: Total annual benefits estimated at £7.4m

Source: Vivid Economics

The Westminster Green Spine zone is calculated to have a Benefit-Cost Ratio (BCR) of 6.9 over a 30-year period. The modified rate of return over a 30-year period might reach 8%, assuming a financing rate of 5% and no reinvestments. The potential benefits of the greened zone may cover the initial capital expenditure within the first year of operation, making a strong case for investment.



Figure 4 Cost benefit analysis of the Westminster Green Spine Zone



Note: The discount rate used is 3.5% and while the graph is truncated at 10 years, analysis is carried out over a 30-year timeframe, in accordance with Green Book principles.

Source: Barton Willmore, Vivid Economics

## 2.2 Borough of Brent

### 2.2.1 Background of the selected site

The borough of Brent is at the early stage of exploring LTNs; we suggest an ambitious scenario of street greening. This greening project reduces the number of traffic lanes on Church Road and creates a park street. The main street connects to the small triangle park, while the shopping street is transformed into a park street. The Church Road area was chosen due to its high crime rates and the ambition to combat this by creating a pleasant social space. This scenario analysis evaluates the benefits of the intervention, demonstrating how the completed project's benefits far outweigh the costs with time.

Figure 5 Brent Church Road area green intervention plan



Source: Barton Willmore

### 2.2.2 Key results

Infrastructure investment accounts for the majority of expenses, while maintenance is low. Almost 85% of the investment required is in form of capital expenditure on infrastructure, such as road modifications and planting of trees. If plans are made less ambitious, costs are likely to decrease. Operating expenditure, that is maintenance of the completed zone, is comparably low at only £40k per year over a 30-year interval.

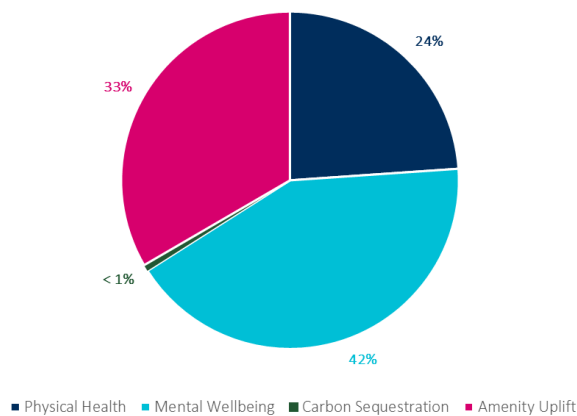
Figure 6 Costing Estimates for the Brent Church Road green street intervention



Note: Maintenance is calculated for a 30-year period following construction  
 Source: Barton Willmore, Vivid Economics

About 42%, that is £810k of the total value from greenspaces is estimated to derive from mental wellbeing improvements. Physical health and amenity uplift are also significant, at £460k and £640k annual benefits, respectively. Carbon sequestration does not account for substantial benefits in itself, but tree cover is essential in creating green space, cleaning air and attracting visitors.

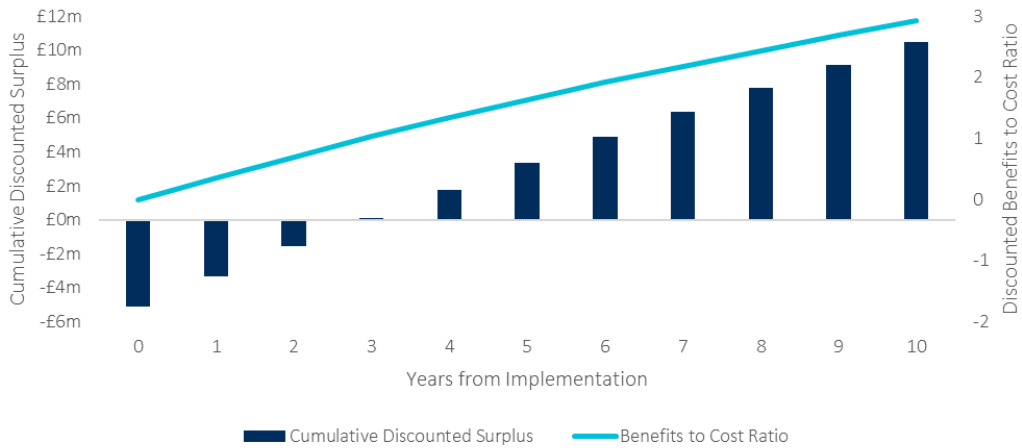
Figure 7 Distribution of annual benefits estimated for the Brent Church Road green street intervention.



Note: Total benefits can reach up to £1.9  
 Source: Vivid Economics

The benefits from the intervention are likely to exceed the costs, breaking even at the end of the third year. The Church Road intervention is calculated to have a BCR of 5.9 over a 30-year period. The modified rate of return over a 30-year period is 8%, assuming a financing rate of 5% and no reinvestments. The potential benefits of the greened zone may cover the initial capital expenditure within the first three of operation and continue bringing benefits for much longer, making a strong case for investment.

Figure 8 Cost-Benefit analysis of the Brent Church Road green street intervention



Note: The discount rate used is 3.5% and while the graph is truncated at 10 years, analysis is carried out over a 30-year timeframe, in accordance with Green Book principles.

Source: Barton Willmore, Vivid Economics

## 2.3 Borough of Hackney

### 2.3.1 Background of the selected site

The borough of Hackney has an established programme of street repurposing; we suggest an ambitious scenario pulling together multiple potential plans to demonstrate the full extent of benefits from street greening. Hackney has ongoing development plans in the Chart Street area and adjacent greenspaces. Currently, this is a transition zone between the commercial high street and residential neighbourhoods. We appraise the potential of greening and traffic filtering on Chart street, with the following elements: linking Aske Gardens, additional trees along East Road, connecting Chart Street to Charles Square with a pedestrian pathway and building a playground.

Figure 9 Hackney Chart Street area intervention plan



Source: Barton Willmore

### 2.3.2 Key results

**Infrastructure investments account for most expenses, while maintenance is low.** About 70% of the investment required is in form of capital expenditure on infrastructure, such as road modifications and pedestrian surfaces. Operating expenditure, that is maintenance of the completed zone, is comparably low at only £450k for a period of 30 years.

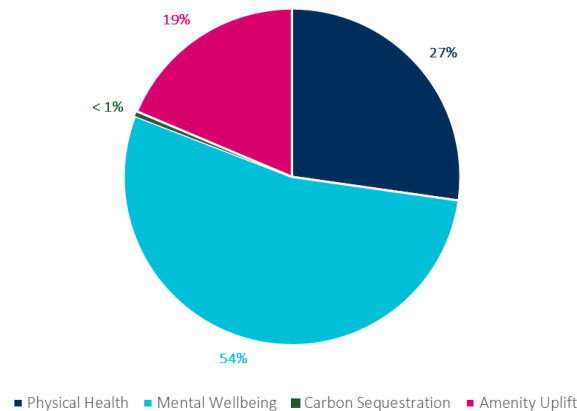
Figure 10 Costing estimates for the Hackney Chart Street green intervention



Note: Maintenance refers to a 10-year period following construction  
 Source: Barton Willmore, Vivid Economics

About 54%, that is £1.1m, of the total value from greenspaces is estimated to derive from mental wellbeing improvements. Physical health and amenity uplift are also significant, at £570k and £390k annual benefits respectively. Carbon sequestration does not account for substantial benefits in itself, but tree cover is essential in creating green space, cleaning air and attracting visitors.

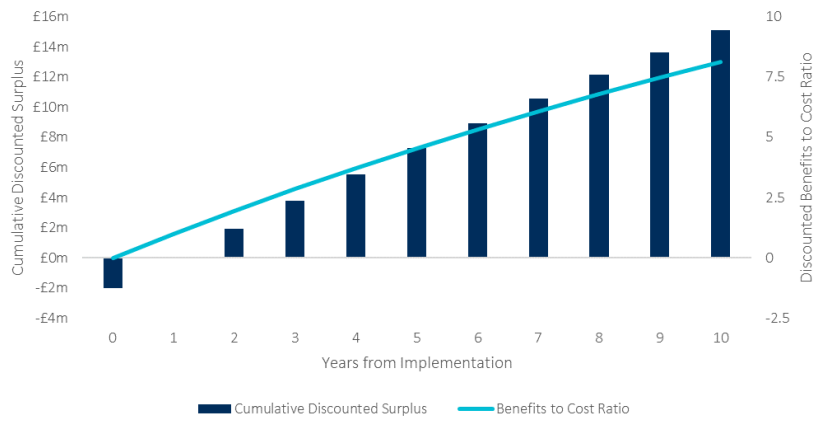
Figure 11 Distribution of annual benefits estimated for the Hackney Chart Street green intervention



Note: Total benefits are estimated at £2.1m  
 Source: Vivid Economics

The Chart Street Intervention is calculated to have a BRC of 5.6 over a 30-year period. The modified rate of return over a 30-year period is 8%, assuming a financing rate of 5% and no reinvestments. The potential benefits of the greened zone may cover the initial capital expenditure within the first three of operation and continue bringing benefits for much longer, making a strong case for investment.

Figure 12 Cost-Benefit Analysis of the Hackney Chart Street green scenario



Note: The discount rate used is 3.5% and while the graph is truncated at 10 years, analysis is carried out over a 30-year timeframe, in accordance with Green Book principles

Source: Barton Willmore, Vivid Economics



### 3 Bibliography

- Cutts, B. B., K. J. Darby, C. G. Boone, and A. Brewis. 2009. "City Structure, Obesity, and Environmental Justice: An Integrated Analysis of Physical and Social Barriers to Walkable Streets and Park Access." *Social Science and Medicine* 69(9):1314–22. doi: 10.1016/j.socscimed.2009.08.020.
- Dill, Jennifer, Margaret Neal, Vivek Shandas, Gretchen Luhr, and Arlie Adkins. 2010. "Demonstrating the Benefits of Green Streets for Active Aging: Final Report to EPA." *Urban Studies and Planning Faculty Publications and Presentations*. Paper 110.
- Lu, Yi, Chinmoy Sarkar, and Yang Xiao. 2018. "The Effect of Street-Level Greenery on Walking Behavior: Evidence from Hong Kong." *Social Science and Medicine* 208(May):41–49. doi: 10.1016/j.socscimed.2018.05.022.
- Vivid Economics and Barton Willmore. 2019. "Greenkeeper: Methodology." Retrieved (<http://www.greenkeeperuk.co.uk/the-tool/#methodologies>).

## Company profile

Vivid Economics is a leading strategic economics consultancy with global reach. We strive to create lasting value for our clients, both in government and the private sector, and for society at large.

We are a premier consultant in the policy-commerce interface and resource- and environment-intensive sectors, where we advise on the most critical and complex policy and commercial questions facing clients around the world. The success we bring to our clients reflects a strong partnership culture, solid foundation of skills and analytical assets, and close cooperation with a large network of contacts across key organisations.

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