St Mary le Port, Bristol: Health Impact Appraisal of Redevelopment Proposals

SEPTEMBER 2025

TRUUD

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About this Report

This report summarises the approaches, data, results and recommendations in relation to health impact based on the appraisal of the development proposals for St Mary le Port, Bristol, as proposed by the investor, Federated Hermes, put forward in 2024. It is distinct from a formalised Health Impact Assessment (HIA) used for example by planning authorities, though it covers much of the same area of interest. Significantly, it provides additional monetised (quantitative) data not typically provided in a traditional HIA which our research has found to be required to allow investment actors to engage ambitiously with management strategies leading to positive urban population health outcomes. It explores how health outcomes such as cancers, diabetes, respiratory illness and mental ill health might be affected under the plans, compared to alternative development scenarios for the area.

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Source: Adobe Stock (SoniaBonet)

1.0 **Introduction**

There is broad real estate industry agreement that environmental, social and governance (ESG) measures of the ethical and sustainable impact of an investment is the foundation for future effective real estate action to address pressing sustainable development challenges. Building upon previous real estate research at the University of Reading, interviews conducted in the UKPRP funded 'Tackling Root Causes Upstream of Unhealthy Urban Development' (TRUUD) consortium project found that while the industry wants to adopt ESG practices in everyday investment decision-making and reporting, quantification is a barrier.

Social impacts of investment activity are less easily quantified than environmental impacts, such as carbon emissions from the building process and property use, a lack of reliable data is preventing the industry from advancing. There is a significant gap in social impact data when it comes to human health and well-being. These factors are essential for society to lead active and productive lives and to reduce the increasing social and health costs that businesses and governments face.

Collaboration with Federated Hermes Ltd, the UK business of Federated Hermes Inc., a global leader in active, responsible investment management, with US$839.8 Billion in assets under management as of March 31, 2025, in the TRUUD project, demonstrates for the first time, that monetised health evidence offers a means to measure the association between responsible real estate asset management and social value-added. Uniquely, the collaboration focuses on urban sites suffering from obsolescence in densely populated cities with societal health and well-being spatial disparities. Applying innovative modelling developed by economists at the University of Bath, shows how sustainable development concerns and financial performance can be aligned.

This report begins to identify the monetary value that the real estate and investment industry can bring to aligning relationships between urban community health and wellness and investor and public sector sustainable development priorities. This evidence has the potential to inform investment appraisal not only, as in this collaboration, at a granular city level but strategy to mitigate risks and leverage opportunities to add value across diversified UK and international asset portfolios. It demonstrates that the real estate sector not only attracts international investment capital to cities but, through responsible management, can also direct capital flows to provide the urban settings for healthy, productive human lives and urban economic and cultural vibrancy to address spatial inequity.

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1.2 About St Mary le Port (SMLP)

St Mary le Port (SMLP) is a 0.8 Ha historic site located in the centre of Bristol (Key Transport Consultants Ltd., 2021) lying north of the Floating Harbour, east of St Nicholas Market, west of Castle Park and to the south of Wine Street. There are three buildings on the site, namely Norwich Union House, the Bank of England offices, and Bank House facing Wine Street and the High Street. The buildings, two of which were architecturally undistinguished (Historic England, 2022), are now disused and in a state of disrepair. The Ancient Monument of the St Mary le Port Church ruins, which was bombed in World War II, the trees and Castle Park are key sensitive assets in and around the site which are of interest to residents and tourists. Despite its strategic location and the amount of green infrastructure it has, the disrepair of the buildings around the SMLP site made it unfit for the status of Bristol as a thriving city (Key Transport Consultants Ltd., 2021).

The proposed redevelopment of SMLP by Federated Hermes (FH) aims to strategically transform the site into a mixed-use commercial hub that creates an attractive location for the public realm, offices and shopping experience. The approach to this includes the development of 28,012 sq.m NIA of office space, and 3,071 sq.m NIA of other commercial floorspace. It also seeks to create 1,034 sq.m of rooftop terraces with 1,300 sq.m of biodiverse green roofs, photovoltaic panels and a sustainable public realm that comprises 5,780 sq.m of enhanced hard and soft landscaping (Savills, 2021c).

1.3 A Need for City Centre Regeneration

> **"Bristol city centre, focused on the area around Broadmead and Castle Park, faces multiple challenges. Like all city centres in the post pandemic landscape, it needs to change and evolve so it can continue to be at the heart of our city. The redevelopment of our city must provide decent jobs and varied retail and contribute to tackling the challenge of Bristol's housing crisis, all against a background of climate and ecological emergency."**
>
> **Marvin Rees, Mayor of Bristol, 2023**

The United Nations (UN) estimates that 68% of the world's population will live in urban areas by 2050 (UN-Habitat, 2022). This is currently higher for higher-income countries (more than 80%) than for middle and lower-income countries (Henderson, 2003). The UK is one of the most urbanised higher income countries, with about 84.64% of its population living in urban areas as of 2023 (Environment Agency, 2021). This means 8 out of 10 people in the UK currently reside in cities or towns. Though well-functioning cities present such benefits as good transport and better employment, poor and unstable housing, high population density, air pollution and crime tend to be persistent urbanisation issues. The Bristol Quality of Life Survey 2023/24 findings show mixed outcomes in health and

wellbeing, as well sustainability and environment, and marked dissatisfaction in crime and safety, culture and leisure, and transport. Though there is stable satisfaction with the quality of parks and green spaces (71%), there seem to be moderate visits (at least once per week) to the same (57%). Other key highlights are poor mental wellbeing (21% compared to 15% in 2019), fear of crime (increased to 21% from 16%), and active travel (down to 35% from 38%). Concerns about climate change, loss of wildlife, and air pollution preventing venturing outdoors are as high as 84%. From the survey, residents indicated the priority action areas to include transport, cycling, and clean air among others (Bristol City Council, 2024).

To keep up with global trends and move the city towards a more sustainable future, Bristol City is pursuing a broader vision to revolutionise the way residents shop, work, study, gather and play. The Bristol City Centre (BCC) Development Plan (2023) has identified three parts of the city centre, namely Broadmead, Castle Park and the Old City, as going through decline (Bristol City Council, 2023d). These areas have significantly high vacant shop units due to, inter alia, the loss of high-profile national retailers and poor-quality public realm. Antisocial behaviours, a disconnection in walking and cycling infrastructure and poor green spaces have contributed to dismal activity outside shopping hours and safety concerns (Natural England, 2021). The BCC vision is to revive the city centre through the creation of attractive, mixed-use spaces that enhance employment and the public realm. The regeneration of the SMLP site offers the opportunity to bring long-lasting improvement in the economic, physical, social and environmental conditions of Bristol (Carter and Roberts, 2017).

1.4 Research Questions

This research aims to provide insights on health for the St Mary Le Port, Bristol scheme by modelling the health impacts of the environment of the site. To achieve this, the following research questions arise:

- How is the environment at St Mary le Port affecting health today, and who might be affected?
- How will environmental changes at St Mary le Port affect the health of residents and users of the site in the future under proposals put forward by Federated Hermes, compared to the present day?
- What is the additional value-added of the proposals compared to minimum standards achieved under the Local Plan?
- What other measures could be taken to improve health at this site under an ideal scenario?

2.0 **Methods**

2.1 Overview of the TRUUD Project

2.1.1 Project Goal and Rationale

TRUUD is a 5-Year UK Prevention Research Partnership-funded project that intends to change the way urban decisions are made to prevent non-communicable diseases. The project aims to understand how prevention of non-communicable diseases such as cancers, diabetes, respiratory illness and mental ill-health might be more fully considered in decision-making for new urban environments. It brings together researchers across five universities, with expertise in public health, urban development, economics, policy studies, management and business studies, systems engineering, and public engagement (Black et al., 2022).

2.1.2 The HAUS Model

The Health Appraisal of Urban Systems Model (HAUS) seeks to quantify and value the health impacts of different features of the urban environment to help stakeholders such as planners, investors and developers understand the health impacts of urban development.

The model covers internal building conditions, the natural environment, transport, socio-economic factors, climate change and community infrastructure (Eaton, Hunt and Black, 2023). To model the impacts, the tool considers the environmental features of a site and its boundaries, the demographics and health of the local population, and applies evidence from medical and economic studies to estimate attributable changes in disease cases, premature deaths and life years lost. It then models the value of the societal cost of illness. Values are aggregated and presented in categories of the environment consistent with the HUDU framework, a commonly used rapid health impact assessment tool (NHS London Healthy Urban Development Unit, 2017).

2.2 Scenario Development

We developed a series of scenarios in consultation with the team at Federated Hermes. We have developed these separate scenarios to explore:

A: Baseline: Present day

B: Minimum policy-compliant

C: Federated Hermes' plans

D: Ideal

We assume that in all scenarios no residential units will be provided on site. Instead, any health benefits will accrue to 3,000 residents living within a 300 metres boundary of the site, and potentially 1,400 users of the site for work use. We assume a static population over the timeline. We model for a project time of 25 years, with Net Present Value calculated at a discount rate of 1.5% (HM Treasury, 2022). We assume that all conditions around the site boundary remain as at present day.

Scenario A: Present-day conditions

The baseline in this study is a reflection of the condition of the site (Figure 1 below) for the present day, as a comparator for all other scenarios; it is not intended to be a worst-case scenario. We assume in this scenario that there are no changes to the current condition of the public realm, such as the quality of green spaces, quality of paths, and current walking and cycling infrastructure. Data on current conditions are taken from a variety of sources, including the Environmental Statement, the Travel Assessment for the site, Bristol Census 2021 and databases on noise and air pollution (Bristol City Council, 2023b, 2023e, 2024; Bristol City Council., 2020, 2023; Environment Agency, 2021; Bristol City Council, 2019; DEFRA, 2019). Present-day health, activity and perceptions of the area are taken from the 2023/24 Bristol Quality of Life Survey for Central Ward, which covers a large geographic area including Redcliffe, Temple Meads and Tyndalls Park as well as Castle Park (Bristol City Council, 2024)

Figure 1: The site today

Source: Federated Hermes/MEPC, (2021)

Scenario B: Minimum policy-compliant

This scenario forms a comparator scenario to understand the effects of the current environmental conditions, and to help understand the difference between a minimum standard of development compliant with Local Plan ambitions for the site and the strategic approach which FH plans for the area. It is based on the Policy DS1A: Bristol City Centre – Broadmead, Castle Park and the Old City policy text and place principles set out in the Bristol Local Plan (Bristol City Council, 2023). The scenario assumes that the site will be developed as a mixed-use development, with improvements to the public realm, permeability and biodiversity.

Based on this scenario, the design and development of the site is expected to comply with the local plan for the site by:

- Creating liveable residential environments in accordance with the relevant policies in the plan and with any local design guidance or codes.
- Ensuring the enhancement of the public realm by making it welcome, animated, of a human scale and provides pedestrian priority.
- Creating new routes through urban blocks and restoring the historic street patterns.

- Delivering better connections between Broadmead, Castle Park and the surrounding communities.
- Incorporating and enhancing the area's built and cultural heritage.
- Ensuring that tall buildings in the right setting and of the right design may be appropriate as part of the overall approach to development, in accordance with Policy DC2 'Tall buildings.

Castle Park

Castle Park is part of the Bristol City Centre Regeneration project aimed at, among other things. an integrated approach to the enhancement of heritage assets and public open spaces (Bristol City Council, 2023c, 2023d). The site has unique historical and archaeological importance comprising four listed buildings – St. Peter's Church (Grade II*), The Vaulted Chamber (Grade II), Remains of Bristol Castle Keep (Grade II), and St. Mary's Le Port (Grade II). The regeneration strategy for Castle Park includes Heritage Re-Use, Park Gateways, Lighting and Safety, Play, Pedestrian, and Cycle Movement, Facilities and Events, and Green Infrastructure. St. Mary's Le Port is part of the heritage re-use strategy intended to deliver new public realm with the Church ruins, and connectivity to adjacent and wider active travel networks (Bristol City Council, 2023d).

Scenario C: Federated Hermes' plans

Scenario C replicates as a minimum the standards set out in Scenario B. It shows how Federated Hermes' objectives could guide site ambitions beyond basic policy goals. This includes the demolition of Bank of England House, Bank House, and Norwich Union House, site clearance, and the construction of three new office buildings (*Class E*) with flexible basement and ground floor uses (*Class E* - commercial, business, and service uses - and/or as a launderette, public house, wine bar, drinking establishment, or drinking establishment with expanded uses). Redevelopment of the facility will enhance its attractiveness and safety. The master planning and building design aim to favourably respond to heritage assets by creating a new public realm that will become a popular transition into Castle Park. The Proposed Development (Figure 2 below) connects walking and cycling paths clearly. Multiple access points and signs to Castle Park and back will be outside. The Site's primary entrance will be opposite St. Nicholas Market, connecting the City Centre. The outdoors will be welcoming and accessible. Office personnel will have access to 1,034 sq.m of green rooftop terraces, Photovoltaic panels and 1,300 sq.m of biodiverse green roofs (Federated Hermes/MEPC, 2021a). Permeable and beautiful public realm enhancements with 5,780 sq.m of increased hard and soft landscaping will increase site traffic. The intention is to restore and rehabilitate the site's medieval streets.

Figure 2: Cut away to ground floor

Source: Federated Hermes/MEPC, (2021b)

The MEPC proposal is to deliver around 31,590 sq.m of new premium office space across three buildings. Employment associated with construction of the site is expected to be about 600 net additional jobs per annum, with an extra 2,450 and 2,570 net additional jobs for residents (Federated Hermes Ltd., 2022). There will also be 4,645 sq.m of new public realm comprising new space around St Mary le Port Tower with landscaped terraces leading down to the Floating Harbour. Soft landscaping on site is expected to rise by over 200% and generate a major on-site biodiversity uplift of over 85% (Ecological Planning & Research Ltd, 2021; Savills, 2021b).

Scenario D: Ideal

Scenario D examines what the health impacts might be if other changes are made which are currently outside the scope of the project. This includes additional biodiversity measures, further improvements to security, and improvement of other environmental changes to the highest possible standard. This is an academic exercise to understand the interventions which could have the most effect which are not already in plan: this is not commenting on the viability of such schemes, and it is not intended to suggest that any of these are options which are being considered by the landowner.

2.3 Data

The data used for modelling the health impact of the SMLP site were obtained from multiple sources, shown in Table 1 below.

Table 1: Data Types and Sources

Data type	Sources
Population and demographics	ONS, Bristol Census and Quality of Life Data, Local JSNA
Baseline environmental conditions	Site visits, map tools including FEAT and NE Green Infrastructure map tool, Bristol City Local Plan, Air Quality maps, Noise maps
Local Planning documents	Local plan, Landscape and Biodiversity plan
Federated Hermes' plans	Team meetings with FH team, Economic and social benefits report

Sources: OHID, (2024); Bristol City Council, (2022, 2023a, 2023b); Federated Hermes Ltd., (2022); Ecological Planning & Research Ltd, (2021); Federated Hermes/MEPC, (2021a)

Source: Ehsan Madadi on Unsplash

3.0 **Results**

Summary headlines: Baseline conditions affecting health

- Air pollution is expected to have the largest impact on health for residents living near to the site – over 25 years health costs related to air pollution could be in the region of £32.5 million
- Deprivation and fear of crime may result in poor general health and psychological wellbeing, which could cost at least £1.17 million over 25 years
- Heat risk is expected to contribute to an increase in risk of premature mortality in adults over 50. Over 25 years this is expected to result in 16 life years lost at a cost of £1.06 million
- Access to Castle Park helps improve health risks: Green space can encourage people to be more active, reducing obesity and diabetes risk, and improving life satisfaction. Together, these are significant effects – in total £33 million of benefit could be provided through averted health costs
- The combined Net Present Value (NPV) of all health impacts over 25 years is estimated at -£305,191 (range £0.94m to -£19.8m), representing an overall benefit through averted health costs.

3.1 Baseline Conditions Affecting Health Today

There are no homes within the site boundary, but around 3,000 people live within 300 metres of the site. 2.9% had bad or very bad health, compared to 5% for Bristol and 5.2% for the UK. 83% of residents live in rented accommodation, compared to 45% for Bristol and 37.5% for England and Wales. Bristol has a relatively young population compared to the rest of the UK. The Central Ward, in which the site is located, has a very young population: around half of all residents are aged 18 to 25 years. In 2020, 52% of residents of Bristol City Centre were aged 16 to 24 years, compared to 10.5% for England and 15.8% for Bristol as a whole. This relatively young population has less susceptibility to air pollution and walkability improvements but is more susceptible to food environment and fear of crime (Bristol City Council, 2023f).

Air Quality

As typical of an urban centre site, the site is in an area of high air pollution. 75% of residents of Castle Ward perceive air pollution to be a problem locally, compared to 70.1% for Bristol. Although particulate matter is expected to be just within target levels, nitrogen oxide (NO2) levels are of concern. Air pollution is expected to have the largest impact on health. Over 25 years, health costs related to air pollution could be in the region of £32.5 million. This affects serious long-term health conditions in adults such as cancers, diabetes, Parkinson's disease, and premature mortality (premature deaths may be increased by around a third due to air pollution). One of the largest impacts on adult health in this area is potential increased risk of developing diabetes. Air pollution also affects children, resulting in increased risk of asthma and other respiratory outcomes, and increased mortality risk. The largest cost for children in this scenario is regular ear infections in infants (Bristol City Council, 2022).

Sense of Safety

While there are main roads throughout the area, which are likely to make the area relatively noisy, traffic noise is not expected to exceed levels of 50 dB (where noise would start to have a serious impact on health). Deprivation and fear of crime also impact resident's health, and particularly after dark (Bristol City Council, 2019). The site is blighted by derelict buildings and may be a focus for anti-social behaviour. This impacts on perceived safety for the area. For Central Ward 53.8% of respondents said they feel safe after dark, compared to 57.5% Bristol average. 94.5% of respondents said they feel safe during the day, compared to 90.1% Bristol average. 14.2% of respondents said that fear of crime prevented them from leaving the home compared to 9.3% Bristol average (Bristol City Council, 2023e). In terms of health impact, this may result in poor general health and psychological wellbeing, increased risk of functional loss, obesity and reduced walking behaviour as people reduce their activity levels. Together, the sum of these health impacts could be around £1.17 million at least over 25 years, although this is likely to be more as we have not valued impacts on wellbeing and functional loss.

Environmental Quality

Heat risk is expected to contribute to an increase in risk of premature mortality in adults over 50 years. Whilst this is only a 1% increase in risk, over 25 years this is expected to result in 16 life years lost at a cost of £1.06 million. Although we have not adjusted for this, climate change is expected to exacerbate risk of heatwaves significantly. However, there are many positive aspects of the site which help to mitigate these environmental risks:

Access to park and green spaces: The SMLP site is within Castle Park, which as a large, attractive green space over 5ha. in size is a major asset for people living locally. Access to this green space brings a range of benefits: encouraging people to be more active, reducing obesity and diabetes risk, and improving life satisfaction. Together, these are significant effects; in total £33 million of benefit is provided through averted health costs.

Access to healthy food: The site also has good access to healthy food, with four supermarkets and a food market as well as numerous other restaurants and food outlets in the area. Although there are fast food outlets, these do not outweigh the otherwise healthy food environment. Compared to areas with poor food environments, having a range of healthy food options locally can reduce the risk of obesity and diabetes.

Active travel: The walking and cycling infrastructure in the area is generally good, with opportunities to walk and cycle away from the main road and many amenities within walking distance. 61.3% of people in Central Ward feel it is convenient and pleasant to walk in their neighbourhood, compared to 68.2% in Bristol. Although there are problems with the permeability and quality of footpaths, as well as conflicts between cyclists and pedestrians, the existing infrastructure is already positively influencing activity, in particular encouraging regular cycling (Bristol City Council, 2023f).

If we compare the positive and negative aspects of environmental conditions within the area, we find that the positive aspects of the area mitigate the underlying health risks: the NPV of all health impacts over 25 years is estimated at -£305,191 (range £942,834 to -£19,838,098). The negative number here refers to health savings (Table 2 below). The leading drivers for health benefits and costs in the baseline environmental condition are access to parks and green spaces, and air quality, noise and neighbourhood amenities.

Table 2: Value of health impacts - baseline with low and high ranges

Environmental Category	Midpoint	Low	High
Access to open space and nature	-33.04	-16.50	-112.53
Air quality, noise and neighbourhood amenity	32.54	17.72	90.11
Accessibility and active travel	-0.49	-0.16	-2.51
Crime reduction and community safety	1.17	0.77	1.22
Access to healthy food	-1.62	-1.20	-2.15
Climate change	1.06	0.51	1.76
TOTAL	-0.37	1.15	-24.10
NPV of TOTAL	**-0.31**	**0.94**	**-19.84**

Benefits estimated over 25 years, population 3000
(Negative values indicate reductions in health costs, positive values indicate potential additional health costs)
Values in £2024 Million, NPV (Net present value of health changes) adjusted for 1.5% discount rate

Source: Adobe Stock (ex_flow)

3.2 Future Scenarios

Summary headlines: Changes under the Local Plan

- Improvement to walking and cycling infrastructure could lead to the highest expected changes to health
- Walking in adults could almost double, and risk of diabetes and depression could reduce by around 12% and 68% respectively for men over 65
- We estimate the NPV of all changes under the Local Plan scenario to be around £-12m at least over 25 years (range £-7m to £-36m) (Negative values refer to averted health costs of illness)

3.2.1 Minimum policy compliant Scenario: Changes under the Bristol City Council Local Plan

Our first future scenario relates to what would have happened under the BCC Local Plan recommendations. The aspirations for Castle Park are set out very clearly in the Local Plan, and together, planned changes are expected to bring significant health benefits.

The largest expected changes to health occur due to improvements to the infrastructure for walking and cycling, including improvements to paths and improved permeability of the area. The Local Plan requires that walking and cycling (active travel) improvements are delivered *"comprehensively and cohesively"*. Health benefits of improvements to the walkability of the area are thus expected to be significant, with walking almost doubling in adults, the risk of diabetes reducing by around 12% compared to areas with poor walkability, and risk of depression reducing by around 68% for men over 65 years. Cycling activity also increases (Key Transport Consultants Ltd., 2021).

The Local Plan scenario also assumes that the quality of the green space on the SMLP site will be improved through the transformation of derelict, unsafe spaces and poor-quality paths and planting into a pleasant area of green space. This, too, adds health benefits through encouraging park use, activity and life satisfaction. These improvements also impact on crime perceptions for the area, which reduces existing risk of functional loss and improves mental health and general health.

Together, the value of the health benefits is significant: We estimate the net NPV of all changes under the Local Plan scenario to be around £12 million in averted health costs at least over 25 years (range £7million to £36 million) compared to £305,190 under baseline conditions.

3.2.2 Federated Hermes Scenario: Benefits of additional proposals

Summary headlines: Changes under Federated Hermes' proposals

- Improvements to perceived safety, especially through 24-hour use of the site, may bring additional benefits to local residents through improved activity and reduced risk of obesity.
- Additional biodiversity measures may improve the greenness of the area, which could mitigate the risk of some cancers.
- The additional benefit of these proposals could bring £0.8m in averted health costs on top of the measures set out in the Local Plan over 25 years.
- In total, compared to the baseline scenario, the proposals are expected to result in health improvements of around £12.8 m over 25 years

The proposals put forward by FH deliver all the health benefits identified in the Local Plan Scenario above, but also bring additional benefits through two key factors: improved biodiversity and safety interventions. These go beyond the aspirations of the Local Plan. The proposals improve the NDVI of the area, by adding green roofs and improvements to biodiversity through targeted planting schemes (Ecological Planning & Research Ltd, 2021). This is expected to bring health benefits, through reductions in the risk of cancer. Additional night-time safety measures help to encourage activity and reduce obesity as well. The total net NPV of health improvements because of these additional proposals is estimated at £800,000 over 25 years (range £0.5 million to £2.13 million) on top of those measures provided in the Local Plan. The total NPV of all changes under these proposals is estimated as -£12.8 million (range -£7.19 million to -£38.55 million) in averted health costs, around £800,000 above the Local Plan scenario.

3.3 Ideal Scenario

Summary headlines: Changes to health under the ideal scenario

- Changing the NDVI of the area drastically equivalent to almost covering the entire area in forest could have the largest potential health impact, through reduced risk of premature mortality.
- The value of this could be £24 million over 25 years, representing a 5% reduction in premature mortality
- However, this finding is highly uncertain, given concerns about the applicability of findings in this context

We tested for what the maximum benefits could be, given any additional changes not already considered under the current plans. This scenario includes assumptions around improvements to NDVI, heat risk through tree planting, and further security measures. We did not test for changes to air pollution, as this was not within the scope of influence for the SMLP site. We found that changing the NDVI of the area dramatically would have the largest potential impact on health: if a sufficient change is made to NDVI, similar in scope to covering the whole area in forest, this could result in reduced mortality. In our testing, the value of this intervention could be £24 million, representing a saving in 0.43 premature deaths each year or a 5% reduction in premature mortality. This outcome is, however highly uncertain: the original study tested this effect in much larger land use contexts, so it might not be robust to assume the same effect would occur with a change in the NDVI of a relatively small piece of land. However, this indicates the extent to which biodiversity might have the potential to influence health.

3.4 Scenario Outcomes

These results are summarised in Table 3 below which shows values of attributable health changes for each characteristic of the urban environment separately.

Table 3: Baseline impacts and future scenarios compared (£ Million)

Environmental Category	Baseline	Comparator	FH Plan	Ideal
Access to open space and nature	-33.04	-33.25	-33.75	-51.06
Air quality, noise and neighbourhood amenity	32.54	32.54	32.54	32.54
Accessibility and active travel	-0.49	-13.98	-13.98	-13.98
Crime reduction and community safety	1.17	0.32	-0.18	-0.58
Access to healthy food	-1.62	-1.62	-1.62	-1.62
Climate change	1.06	1.06	1.06	0.96
TOTAL	-0.37	-14.92	-15.91	-33.73
NPV of TOTAL	**-0.31**	**-12.28**	**-13.10**	**-27.76**

Benefits estimated over 25 years, population 3,000 residents within 300 metres of site boundary
Values in £2024 Million, NPV (Net present value of health changes) adjusted for 1.5% discount rate
(Negative values refer to health savings, positive values refer to increased health costs)

Value of health impact - Access to open space, and air quality

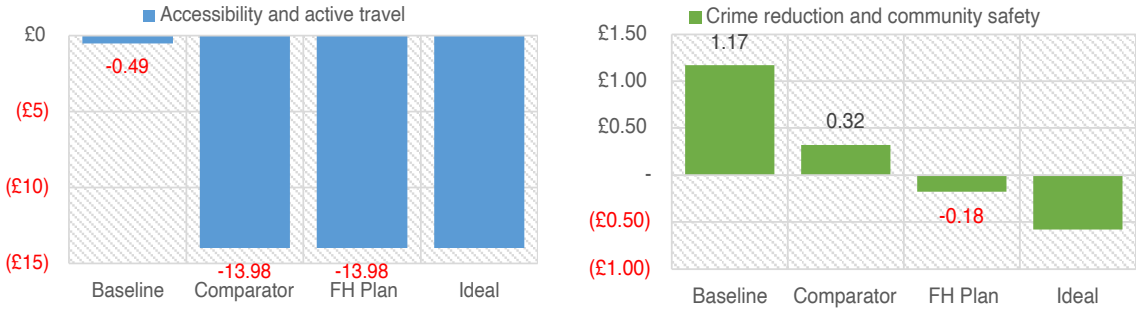
Baseline demonstrates net health benefits amounting to £33 million, and local plans slightly enhance the benefits to £33.25 million (Figure 3 below). FH plans deliver £33.75 million in health benefits through providing access to open spaces and nature in line with baseline and local plans. Health costs associated with air quality, noise and neighbourhood amenities at £32.5 million remain at the same level as the baseline and local plans largely because the interventions are outside the scope of SMLP plans.

Figure 3: Value of health impact - Access to open space, and air quality - all scenarios (£ million)

Value of health impact - Active travel, and crime reduction

With the baseline providing just under £500,000 in health benefits, the Local Plans, consistent with the motive to enhance active travel through the site, provide an additional £13.5 million, the level which Federated Hermes Plans achieve by delivering just under £14 million in health benefits. Local plans intend to reduce the health costs associated with the fear of crime and concerns about community safety just under £1.2 million at baseline conditions to around £320,000. Federated Hermes plans not only reduce health costs, but in fact deliver £180,000 in health benefits.

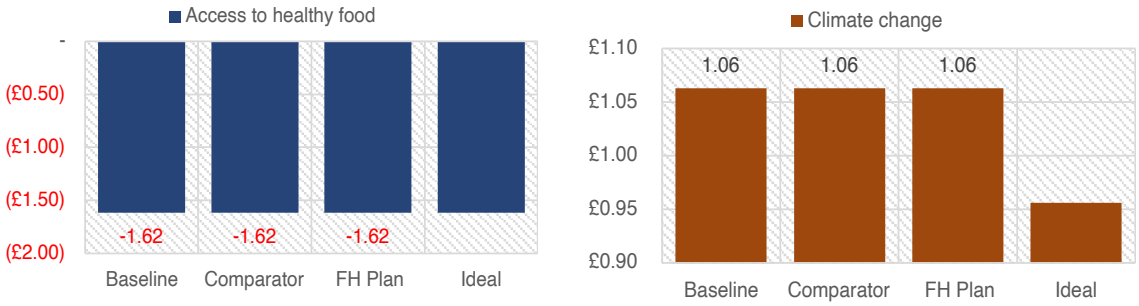
Figure 4: Value of health impact - Active travel, and crime reduction - all scenarios (£ million)



Value of health impact - Access to healthy food, and Climate change

Baseline conditions at the site already provide slightly over £1.6 million in health benefits associated with access to healthy food, the level which local plans retain, and FH plans deliver. Health costs associated with climate change such as heat risk, though not measured, could be around £1.06 million under baseline, planned and proposed conditions.

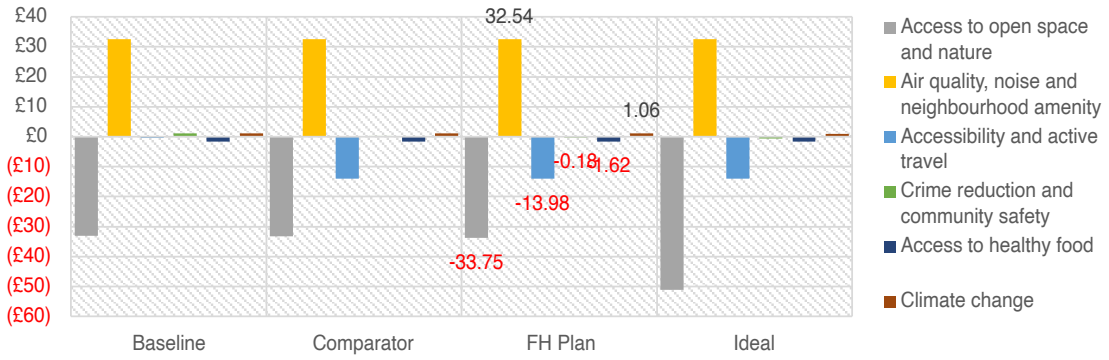
Figure 5: Value of health impact - Access to healthy food, and Climate change - all scenarios (£ million)



Value of health impact - all scenarios

Overall, the health benefits improve from £370,000 at baseline conditions, through £14.9 million at local plans to £15.9 million under the Federated Hermes development of SMLP (Figure 6). Baseline conditions already deliver health benefits through access to healthy food, and health costs associated with air quality cannot be addressed in the development of the site. That said, Federated Hermes delivers Local Plan targets for air quality, access to healthy food, climate change as well as active travel, and exceeds Local Plans in access to open space, and crime reduction and community safety.

Figure 6: Value of health impact - all scenarios compared (£ million)



Benefits estimated over 25 years, population 3,000 residents within 300 metres of site boundary
Values in £2024 Million, NPV (Net present value of health changes) adjusted for 1.5% discount rate
(Negative values refer to health savings, positive values refer to increased health costs)

Net value of attributable health impacts compared to baseline

Table 4 above shows estimated net health benefits over the baseline if the site were developed to Local Plan (Comparator) or to proposed Federated Hermes' SMLP plans. As acknowledged above, health costs, and benefits for air quality and access to healthy food, respectively remain unchanged at all stages. The net values of these categories over the baseline conditions are nil even under ideal conditions.

Table 4: Net value of attributable health impacts compared to baseline (£ million)

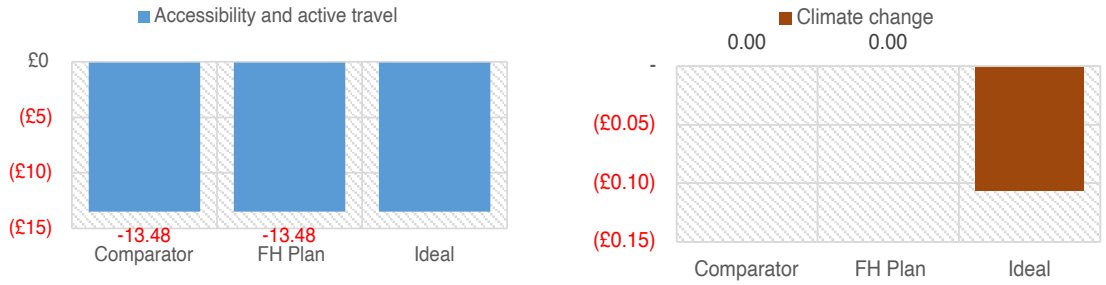
Environmental Category	Comparator	FH Plans	Ideal
Access to open space and nature	-0.21	-0.72	-18.02
Air quality, noise and neighbourhood amenity	0.00	0.00	0.00
Accessibility and active travel	-13.48	-13.48	-13.48
Crime reduction and community safety	-0.85	-1.34	-1.74
Access to healthy food	0.00	0.00	0.00
Climate change	0.00	0.00	-0.11
TOTAL	-14.55	-15.54	-33.36
NPV of TOTAL	**-11.97**	**-12.79**	**-27.46**

Benefits estimated over 25 years, population 3,000 residents within 300 metres of site boundary
Values in £2024 Million, NPV (Net present value of health changes) adjusted for 1.5% discount rate
(Negative values refer to health savings, positive values refer to increased health costs)

Net Value of health impact – Active travel, and Climate change over baseline

Figure 7 below shows that local plans deliver enhanced health benefits over baseline conditions for accessibility and active travel, and Federated Hermes' plans match these benefits. Improvements under climate change, due to potential reductions in heat risk due to further greening of the park, are only projected to change in the ideal scenario.

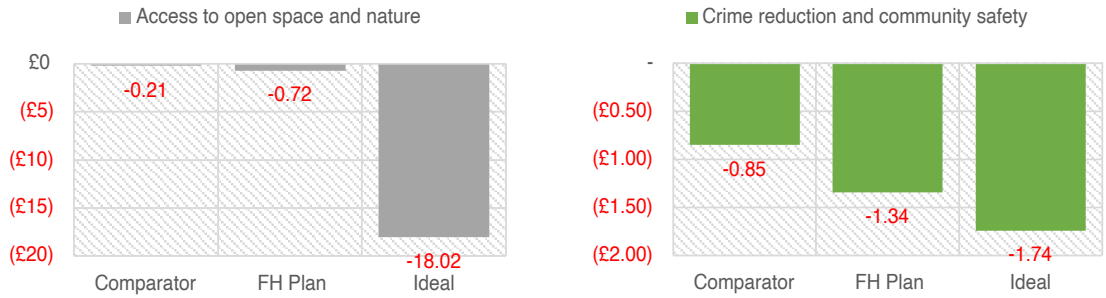
Figure 7: Net Value of health impact – Active travel, and Climate change over baseline matching local plans (£ million)



Net value of health impact – Access to open space, and Crime reduction over baseline

Figure 8 below shows environmental categories for which Federated Hermes plans deliver enhanced health benefits over local plans and have scope for further enhancement. These include the categories of Access to Open Space and Nature, and Community Safety.

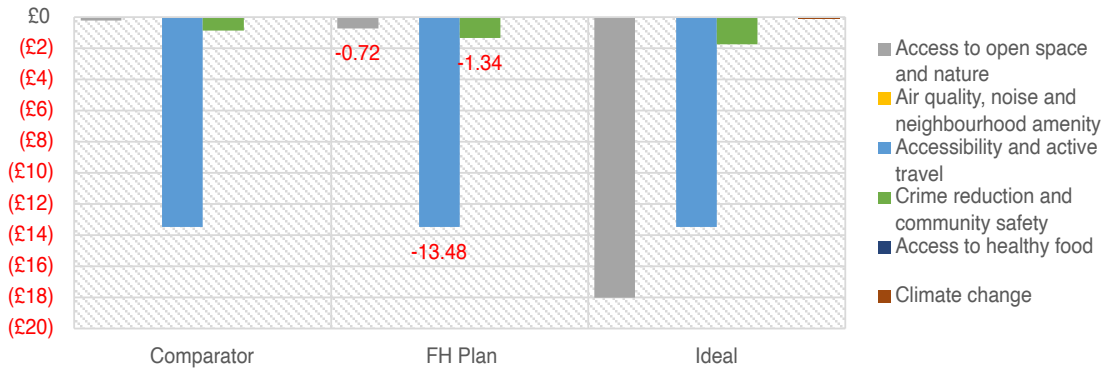
Figure 8: Net value of health impact – Access to open space, and Crime reduction over baseline exceeding local plans (£ million)



Net health impact over baseline - all scenarios

Figure 9 compares all net changes to health for each scenario compared to the baseline. The combined net health benefits to residents within 300 metres of the site derived from the development of SMLP at present value are around £12.8 million over the baseline conditions, compared to £11.9 million under the local plans over 25 years.

Figure 9: Net health impact over baseline - all scenarios (£ million)



Benefits estimated over 25 years, population 3000 residents within 300 metres of site boundary
Values in £2024 Million, NPV (Net present value of health changes) adjusted for 1.5% discount rate
(Negative values refer to health savings, positive values refer to increased health costs)

Source: Adobe Stock (Alexey Fedorenko)

Estimation of health impact for non-residential users

Federated Hermes' proposals indicate that around 2,570 jobs will be provided on site in the new buildings (Savills, 2021a). The travel assessment estimates net increases in inward and outward trips to the site from 8 am to 9 am and 5 pm to 6 pm are shown in Table 5 below.

Table 5: Net Change in Commuter trips to and from SMLP Site

Time	Trip	Car	Walk	Cycle	Sub-Total	Total
Morning	Inward	174	869	196	1,239	
8am – 9am	Outward	13	66	15	94	
	Two-Way	**187**	**935**	**210**		**1,332**
Evening	Inward	21	103	23	147	
5pm – 6pm	Outward	177	883	199	1,259	
	Two-Way	**198**	**986**	**222**		**1,406**

Source: Key Transport Consultants Ltd., (2021)

Therefore, we would expect total regular commuters to be around 1,400. This is less than the total expected number of jobs (2,570), as these could be part-time or not directly hosted on site.

To find the expected health benefits of improvements to walking and cycling infrastructure, we tested this population (1,400) as if they experienced changes from present day conditions to those in the scenarios as before. We do not test for other environmental conditions as it may not be robust to assume that changes in air, green space or noise could influence health for commuters in the same way as for residents, bearing in mind their experience of the site may be partial.

Value of improvements to walking and cycling infrastructure

If 1,400 people will be regularly commuting to the SMLP site, we estimate that improvements to walking and cycling infrastructure could bring around £5.2 million net in reduced health costs through encouraging walking and cycling behaviour and associated illnesses such as diabetes, obesity and depression (range £2.85 million to £16.34 million). The changes remain the same across all future scenarios. In the baseline scenario, the benefits from existing infrastructure are estimated at £190,000. These are uncertain values, as we do not know how other factors within the city, such as conditions outside the SMLP site, might influence active travel behaviour. Thus, it may be prudent to refer to the bottom of the range for this item as a conservative estimate.

Leisure users of Castle Park

Although Castle Park is observed as an important asset for the city, it has not been possible to identify how many people visit the park each year. Therefore, we are unable to calculate any health benefits related to regular users of the park who do not fall under the categories of user identified above. Improvements to parks may have a range of benefits: improvements may increase odds of using parks by 8%, and regular park use has been associated with reductions in risk of diabetes and weight gain. Although the St Mary le Port site only forms a small part of Castle Park, poor conditions in the baseline/ present day may deter regular users (Bristol City Council., 2023). Just one person becoming active (going from inactive to meeting the WHO activity recommendations for regular physical activity) could save £13,174 in averted health costs every year. Therefore, we expect that there may be significant additional benefits for leisure users which have not been monetised so far in our calculations due to missing data.

Value of Heritage improvements

The proposed conservation of the historic St Mary le Port church could have a positive benefit for the wellbeing of local residents. However, this could not be monetised in our estimation. (Lawson, 2020) argues that very little economic valuation has been undertaken for religious buildings, although some values have been derived for improvements to historic towns and cities, yet there seems to be some willingness to pay for conservation of historic towns and cathedrals both for users and non-users. However, the range was wide. Respondents indicated they were willing to pay, on average, £9.63 to conserve a historic city, and £7.42 to conserve a cathedral that they used regularly. Non-users were willing to pay on average £3.75.

The values here for a city refer to the conservation of the whole city's heritage stock, not an individual small building. The values for cathedrals relate to iconic buildings, which may not be applicable to this context, although the built heritage of this site is of national importance.

Source: Adobe Stock (Mark Loveridge)

4.0 **Discussion**

4.1 Robustness and sensitivity of results

We have modelled for the population demographic of Castle Ward, which has a very much younger population than that of the UK average. This has a significant effect on results. Modelling indicates that in a population with an older demographic more like that of the UK profile would be more susceptible to air pollution, and in turn benefit more from improvements to walkability. We assume that commuters and park users (non-residents) have the same profile, but this might not be the case. Modelling for this demographic reveals that underlying air pollution would have a much larger effect (around £73 million), which would outweigh all the health benefits of positive measures such as green space (-£30 million) and walking/cycling infrastructure (-£420,000) and food environment (-£900,000) in the baseline scenario and continue to counter these in all future scenarios except an ideal scenario.

There are considerable uncertainties within the modelling – changes to health and valuation of these changes are both uncertain in the underlying literature. The range of values therefore can be very large: see Table 5 and Figure 1 above for estimates of ranges in the baseline values. The HAUS model assumes that health outcomes from changes to the environment may be equivalent to those observed in published medical studies. However, although impact-pathways have been selected to be as robust as possible for

transfer, actual changes to health may be different as the environmental and social context may differ from the original study. HAUS is not an epidemiological model but instead tries to quantify the value of expected changes to health.

Air pollution remains a significant hazard to health in all scenarios in this study. The SMLP site may not have the scope to make a material change to air pollution levels for residents outside the site boundary. However, this is on the assumption that there is no material increase in air pollution from the site itself, even as the buildings come back into active use. It should be noted that the travel assessment does indicate a small increase in vehicle movements on site, however, this should be weighed against benefits of the scheme.

4.2 Additionality and scope of influence

Our modelling assumes that all residents within 300 metres of the site are likely to be affected by changes to the development site. For some aspects of the site, such as green space, this is robust as the site represents part of the most significant parcel of green space within the 300 metres radius. However, other environmental characteristics such as fear of crime or food environment, may be affected by a range of factors outside the control of the study site. For example, perceptions of crime may be affected by the conditions of all streets within the 300 metres radius.

Modelling also assumes that conditions outside the site are static. However, there are several large regeneration or redevelopment schemes planned, such as other planned improvements to Castle Park itself, and the redevelopment of Broadmead and Frome Gateway, which are also likely to affect residents living nearby.

The extent to which changes to health may be additional to what would have happened to the area anyway without the redevelopment may affect the overall value of the SMLP scheme. This should be taken into consideration when applying the values estimated here for any future decision making. As a conservative estimate, the bottom of the range may be used as the most robust indication of the minimum value of health changes. Relative to the health benefits of the Local Plan over the baseline environmental conditions, benchmarked at 1.0, the Federated Hermes proposal **may** outperform the minimum policy compliant scenario **by 3.4 times** in access to open spaces and nature, and **1.6 times** in crime reduction and community safety (See Table 6 below). Overall, the estimated value of changes to health in the proposals represents around a 7% improvement compared to those measures under the Local Plan.

Table 6: SMLP Net Value (£ million) and Impact factor over Baseline

External to Boundary	Net Value over Baseline			Multiple over Local Plans		
Environmental Category	Comparator	FH Plan	Ideal	Comparator	FH Plan	Ideal
Access to open space and nature	-0.21	-0.72	-18.02	1.00	3.37	84.80
Air quality, noise and neighbourhood amenity	0.00	0.00	0.00	-	-	-
Accessibility and active travel	-13.48	-13.48	-13.48	1.00	1.00	1.00
Crime reduction and community safety	-0.85	-1.34	-1.74	1.00	1.58	2.05
Access to healthy food	0.00	0.00	0.00	-	-	-
Climate change	0.00	0.00	-0.11	-	-	-0.11*
TOTAL	-14.55	-15.54	-33.36	1.00	1.07	2.29

where 1 is Comparator Base Multiple
* £m NV where base value is 0

As shown in the ideal scenario, there may be scope for further improvements to health through additional biodiversity measures, subject to their compatibility with the designation of this site in the Local Plan for redevelopment.

4.3 Conclusion

The SMLP site is relatively important compared to its size, as its location in a highly visible urban park means it can influence health for residents and non-residents alike. The current poor condition of the buildings on site, poor perceptions of safety within the park, and the quality of walking and cycling infrastructure all prevent this area from being a positive asset for health. Under the current environment, there is an estimated £33 million equivalent in health benefits associated with access to green spaces and nature, and over £1.17 million in health costs related to crime and community safety concerns. The net health benefits are just over £305,000 NPV over 25 years.

Redevelopment plans set out in the Local Plan may bring around £12 million of benefit to residents and a further £5 million to commuters over 25 years, mainly through enhanced active travel, and crime reduction and community safely interventions. We also expect significant benefits to leisure users of the park, although we have not monetised these.

The Federated Hermes plans set out to achieve or exceed all the expected benefits in the Local Plan, bringing around £0.8 million (7%) in additional value of health benefits over the Local Plans through additional biodiversity (3.4 times expected in the Local Plan) and security features (1.6 times expected in the Local Plan). This brings the total expected benefit of the changes to almost £13 million in averted health costs. These measures achieve almost all the ideal conditions we could model for the site. Our ideal scenario indicates that some improvements planned by Federated Hermes could have larger health benefits by reducing mortality through increases to biodiversity (NDVI). Tree planting could also help to reduce heat risk for the area. These effects are more uncertain, however, and may be outside the scope of the designation for the site as a development area.

Contributors

We thank and acknowledge the support of the Federated Hermes team for their invaluable input, feedback and support during the development of alternative scenarios and in the data collection task for this case study.

Disclaimer

This health impact modelling has only been able to monetise some benefits of the proposals to some users of the area; it may be that these proposals will improve conditions for a much wider group of people within the City of Bristol.

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