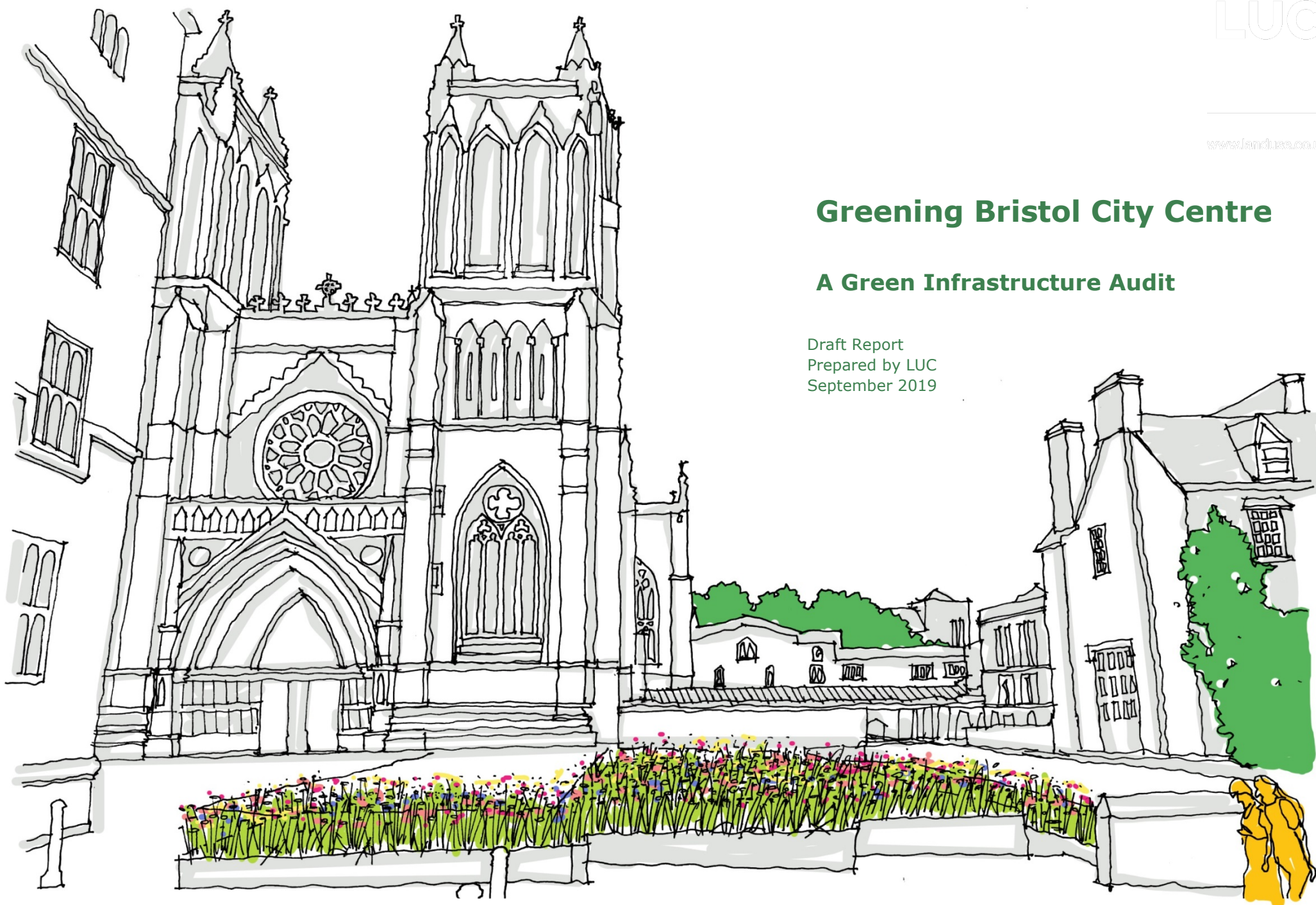


# Greening Bristol City Centre

## A Green Infrastructure Audit

Draft Report  
Prepared by LUC  
September 2019



**Project Title:** Greening Bristol City Centre: A Green Infrastructure Audit

**Client:** Bristol City Centre Business Improvement District

Version	Date	Version Details	Prepared by	Checked by	Approved by
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# 1 Introduction

- 1.1 This report summarises the findings of an audit of green infrastructure (GI) in the Bristol City Centre Business Improvement District (BID). The BID area (and the area of focus for this audit) is shown in **Figure 1**.
- 1.2 LUC was commissioned to carry out the audit by the Bristol City Centre BID. The overall aim of the study was to support the BID in delivering environmental enhancements, making Bristol City Centre a better place to do business, through reducing air pollution, reducing flood risk and creating a more pleasant and attractive streetscape for visitors, employees and residents.
- 1.3 The GI opportunities considered through this audit include interventions at a wide range of scales including:
- Improvements in existing parks and public green spaces and creation of pocket parks
  - Public realm
  - Street trees and hedges
  - SuDS and rain gardens
  - Refreshed planting proposals
  - Green walls and roofs

## Purpose of this report

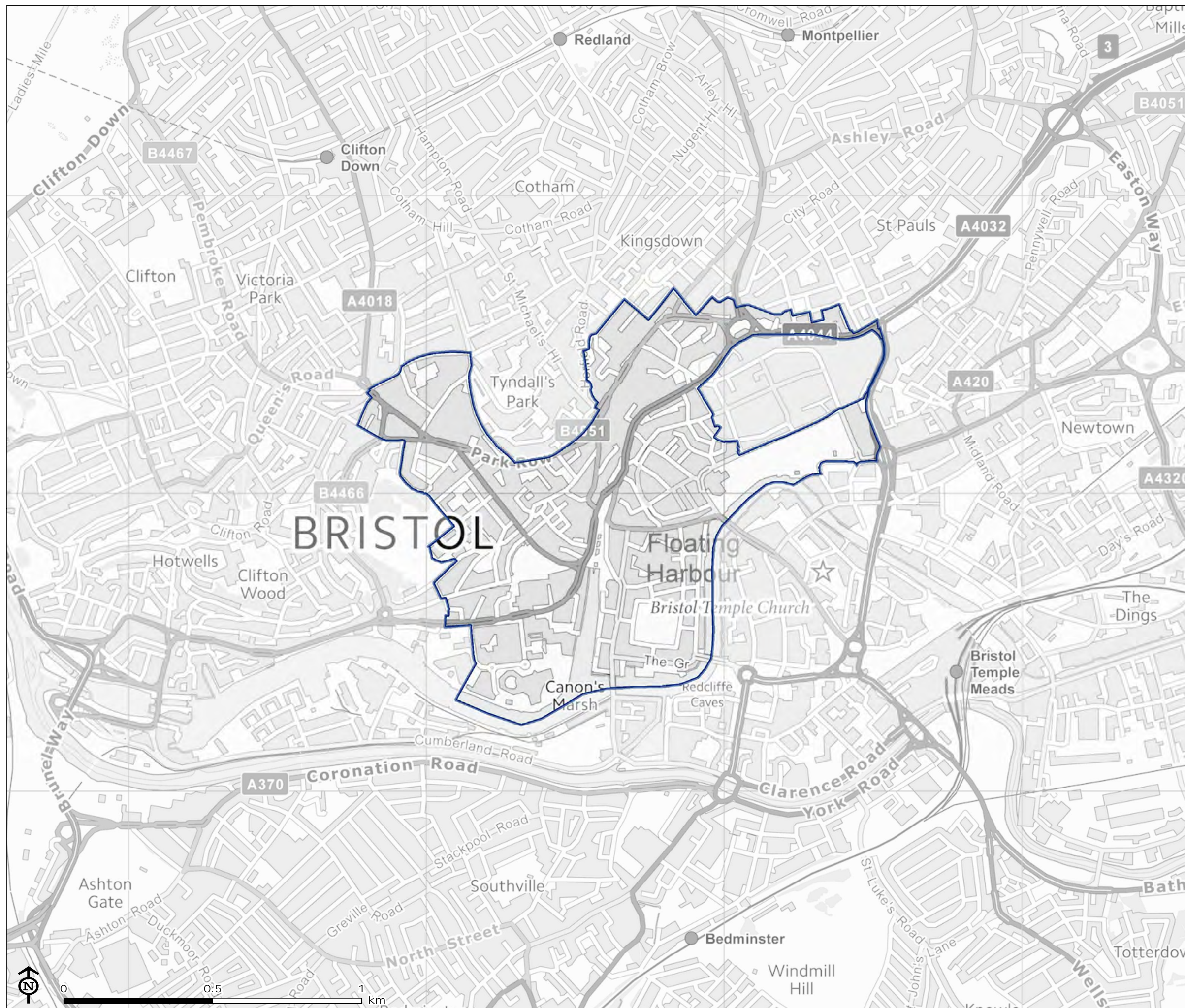
- 1.4 The overarching aim of the audit is to identify and prioritise opportunities to increase green cover across the BID area. Alongside the identification of new greening opportunities, this report also provides a brief evaluation of the functions and benefits of the existing green infrastructure in the area.

- 1.5 Within the Bristol City Centre BID, there is a particular interest in opportunities to enhance or increase the GI provision in the area to reduce the impacts of air pollution.
- 1.6 This report also provides some high level guidance on the potential funding for priority projects, identifying which could be 'quick wins' and highlighting those with the best cost/benefit ratio.




Castle Park







# Greening Bristol City Centre BID

Figure 1: Bristol City Centre BID area

 Bristol City Centre BID Boundary

Map Scale @A3: 1:12,500



## Why Green infrastructure?

- 1.7 As set out in the West of England Green Infrastructure Framework, "Green infrastructure is a planned network of green (and blue) spaces and corridors within, around and between towns and cities, which can be designed, maintained and improved to meet the needs of local communities, wildlife and the environment."
- 1.8 A network of GI offers multiple benefits, which are essential to the sustainable growth of communities and the economy. These include:
- Promoting economic growth, employment and skills improvement;
  - Supporting resilient ecosystems and biodiversity;
  - Mitigating and adapting the natural and built environment to climate change;
  - Recognising and enhancing a legible network of physical green spaces and corridors;
  - Reducing and managing flood risk;
  - Improving mental and physical health, and the cohesion of local communities;
  - Increasing sustainable food production;
  - Maintaining and enhancing cultural heritage, landscapes and natural resources.
- 1.9 In a densely urban area, green infrastructure may take the form of parks and open spaces, street trees, green walls, green roofs, smaller areas of planting, rain gardens and smaller interventions such as planters.
- 1.10 Of particular relevance in the Bristol City Centre BID is the effectiveness of green infrastructure in influencing air quality. Green infrastructure can influence air quality through increasing pollutant deposition, absorbing gaseous pollutants, but most beneficially through influencing air flow. GI can create a physical barrier between sensitive receptors and pollution sources.

- 1.11 Removing polluters is the most effective way to positively influence air quality, and Bristol City Council is currently developing a Clean Air Strategy looking at ways to reduce pollutants at source. GI can play a more modest, but beneficial role alongside this.

## Why GI in the Bristol City Centre BID?

- 1.12 The Bristol City Centre BID exists solely to introduce significant improvements for the benefits of levy payers. Its aim is to ensure Bristol city centre is increasingly known for its safe, attractive and welcoming look and feel by all those who come to work, study, visit and spend their leisure time.
- 1.13 The Bristol City Centre BID prospectus focuses on five key themes:
- Improving safety
  - Improving the 'look and feel'
  - Improving the welcome
  - Promoting the area's success
  - Acting in the best interest of levy payers.
- 1.14 The delivery of green infrastructure improvements in Bristol City Centre will help deliver the five core visions set out in the BID's prospectus:
- **Acting in the best interests of levy payers** - by providing a healthier, more vibrant workplace for the thousands of employees within the centre. Delivery of GI could also increase businesses engagement by encouraging them to take an active role in improving the neighbourhood within which their business is based, and provide opportunities for engagement with the wider community.
  - **Improve the 'look and feel'** – greening will undoubtedly increase the visual appeal of the area; creating a more attractive environment for both people and wildlife.

- **Improve the welcome** – helping to create a unique and welcoming city centre; improving the gateways to, and pedestrian/vehicle routes through the area, and creating a greener, more leafy streetscape.
- Successfully delivering greening initiatives can be used to **promote the areas success**, and position Bristol City Centre as leader in addressing environmental concerns alongside promoting commercial activity. Greening will enhance the image and marketing potential of Bristol City Centre.
- Creating a **safer** and cleaner City Centre through improvements to air quality associated with increased green cover and street trees, and a range of street level and building mounted green features.



Rupert Street car park wall



Green Wall in Paddington, London



Consultation cards used to generate interest in the project and gather ideas from the public

## 2 Context

- 2.1 The environmental and social context of the BID area, as well as the national, regional and local policy context, are important considerations which should influence the function, location and design of GI features. This section sets out these considerations to inform the identification and prioritisation of GI opportunities for delivery.

### National Context

- 2.2 The concept of Green Infrastructure is firmly embedded in national planning policy guidance. Similarly the 25 Year Environment Plan sets out the government's ambitions for increasing the green infrastructure (quantity and quality) within towns and cities, including an ambition to plant one million urban trees.

### West of England context

- 2.3 The emerging *West of England Joint Spatial Plan* includes the provision of high quality, multi-functional green infrastructure as a strategic priority.
- 2.4 Further detail on the region's existing environmental assets and the delivery of GI assets will be provided with the publication of the emerging *Green Infrastructure Plan* for the West of England. This will replace the 2011 *West of England Strategic Green Infrastructure Framework*, which sets out high level principles for

provision and indicates a number of strategic GI corridors which pass through Bristol city centre.<sup>1</sup>

- 2.5 The West of England Nature Partnership has also produced a series of ecosystem maps to illustrate a 'nature recovery network' across the region, highlighting priorities and opportunities for 'joining the dots' between existing habitats. Within the BID area, the waterways in particular form a key part of the wider wetland strategic network.<sup>2</sup>

### Bristol context

- 2.6 GI is a core aspect in the emerging Bristol Local Plan<sup>3</sup> and a suite of policies (GI1 to GI4) safeguard open spaces, encourage net gains for biodiversity and highlight a new approach to food systems. Policy BCAP25 requires city centre developments to integrate GI.
- 2.7 The three-stage *Bristol Clean Air Plan* is currently undergoing consultation, and is being produced based on the recognition that air quality measurements in the city break legal standards for NO<sub>2</sub>, particularly in central areas.<sup>4</sup>
- 2.8 The 2008 *Parks and Open Spaces Strategy*<sup>5</sup> highlights the valuable role of city centre spaces - in particular the key sites of College Green, Queen Square, Brandon Hill and Castle Park, as well as

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<sup>1</sup> West of England Green Infrastructure Group (2011) West of England Strategic Green Infrastructure Framework [Online] Available at: <https://www.westofengland.org/media/216918/gi%20framework%20020611.pdf>

<sup>2</sup> West of England Nature Partnership (n.d) Joining up the dots for nature [Online] Available at: <http://www.wenp.org.uk/maps/>

<sup>3</sup> Bristol City Council (2019) Bristol Local Plan Review: Draft Policies and Development Allocations [Online] Available at: <https://www.bristol.gov.uk/documents/20182/34536/Local+Plan+Review+-+Draft+Policies+and+Development+Allocations+-+Web.pdf/2077eef6-c9ae-3582-e921-b5d846762645>

<sup>4</sup> Bristol City Council (n.d) Clean Air for Bristol [Online] Available at: <https://www.cleanairforbristol.org/bristols-clean-air-plan/>

<sup>5</sup> Bristol City Council (2008) Bristol's Parks and Green Space Strategy [Online] Available at: [https://www.bristol.gov.uk/documents/20182/34780/Parks%20and%20Green%20Space%20Strategy%20-%20adopted%20Feb%202008\\_0\\_0\\_0\\_0\\_0\\_0.pdf/6bb2635a-ac11-4f22-b6fd-5b708b329940](https://www.bristol.gov.uk/documents/20182/34780/Parks%20and%20Green%20Space%20Strategy%20-%20adopted%20Feb%202008_0_0_0_0_0_0.pdf/6bb2635a-ac11-4f22-b6fd-5b708b329940)

hard surface areas such as the dockside and Millennium Square due to their recreational role. These should be enhanced and maintained to fit with Bristol's status as a major city (Policy LM1).

- 2.9 Bristol's *City Centre Public Realm and Movement Framework* (2012) encourages urban greening - including street trees - to provide benefits including quality of life, wellbeing, linking green spaces, improving air quality and absorbing traffic noise.<sup>6</sup>
- 2.10 A Bristol Tree Strategy is currently being jointly developed by the Woodland Trust, the Bristol Tree Forum, the Forest of Avon Trust and Bristol City Council. The goals are to provide an approach for improving the management of existing trees, the planting of new trees, and increasing community engagement in tree management.<sup>7</sup>
- 2.11 The Bristol Green Capital Partnership was founded in 2007 and is a local network formed of over 850 member organisations. Its 2019 report *Our Future: A Vision for an Environmentally Sustainable Bristol*<sup>8</sup> contains a call to 'design in' nature to the everyday experience of residents and sets goals to double the abundance of wildlife by 2050 and to double the city's tree canopy by 2050.

## Bristol City Centre BID

- 2.12 The Bristol City Centre BID area supports a wide range of commercial, retail and other activity. In 2017, in terms of rateable value, the largest sector was offices (48%), followed by leisure (22%), public sector (including hospitals, police, council) (14%), retail (8%), universities and language schools (5%) and another 3% within other sectors.

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<sup>6</sup> Bristol City Design Group (2012) *Public Realm and Movement Framework: Bristol City Centre* [Online] Available at: <https://www.bristol.gov.uk/documents/20182/33167/Draft+City+Centre+Public+Realm+and+Movement+Framework/980f8c3a-c04e-4dff-a2a4-2d3051d70203>

<sup>7</sup> <https://bristoltreeforum.org/2018/03/06/towards-a-bristol-tree-strategy/>

<sup>8</sup> Bristol Green Capital Partnership (2019) *Our Future: A Vision for an Environmentally Sustainable Bristol* [Online] Available at: [https://bristolgreencapital.org/wp-content/uploads/2019/01/BGCP\\_Our-Future\\_2019-2.pdf](https://bristolgreencapital.org/wp-content/uploads/2019/01/BGCP_Our-Future_2019-2.pdf)

- 2.13 At a glance, there is a large amount of hardstanding (roads, buildings), but also some key public open spaces including Queen Square, Castle Park, College Green, St James's Park and Millennium Square. Existing green space and areas of vegetation are shown on **Figure 2**.
- 2.14 The BID area currently faces several environmental challenges, and addressing these would contribute significantly to enhancing its image and appeal to a greater range of businesses and visitors.

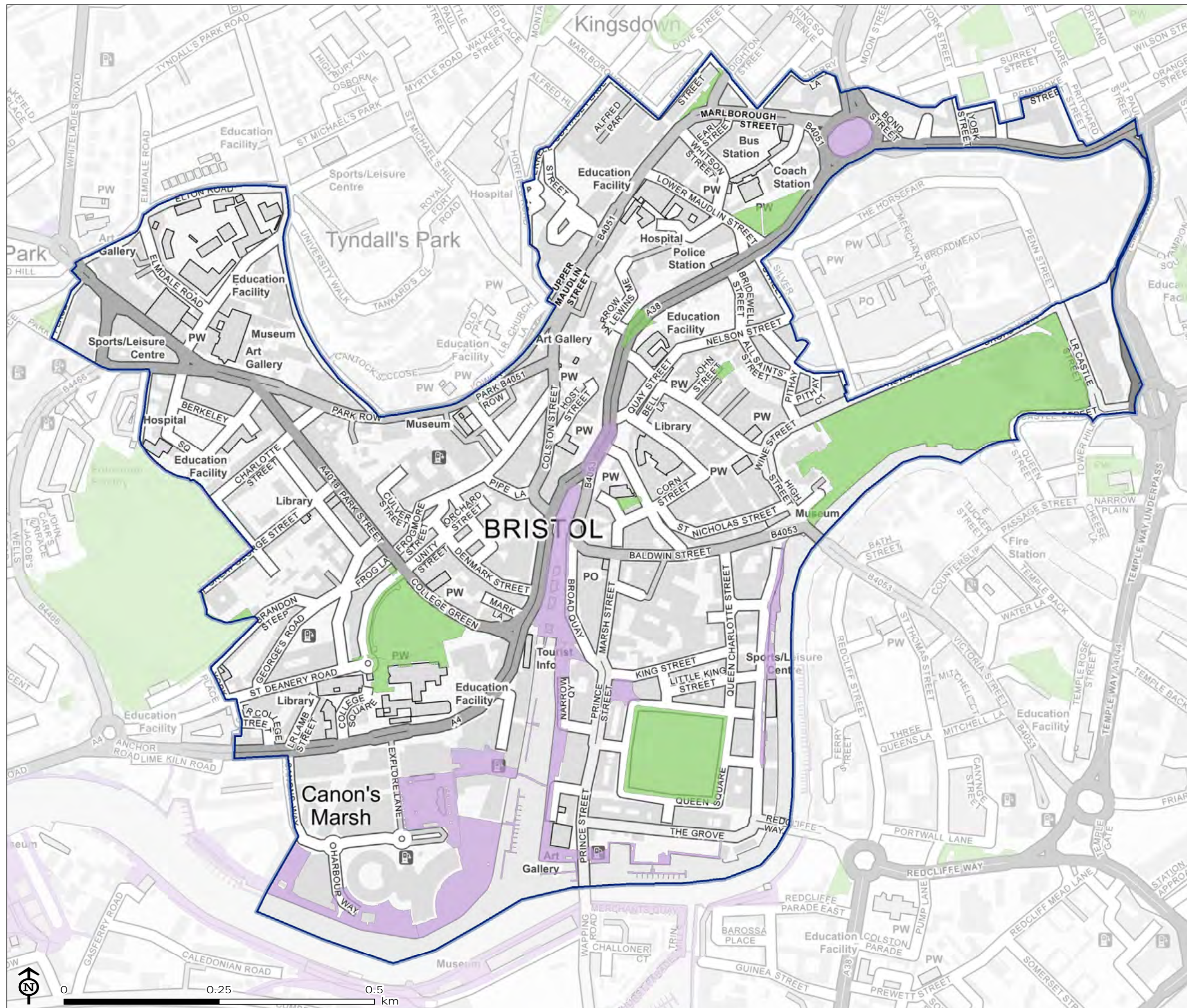
### Poor air quality

- 2.15 The whole of the BID area is a designated Air Quality Management Area (AQMA) as shown in **Figure 3**. Like all major cities in the UK and Europe, air quality in Bristol breaches annual mean objectives for nitrogen dioxide.
- 2.16 There are legal limits set for air pollution. Annual mean objectives for nitrogen dioxide are set at 40µg/m<sup>3</sup> (microgrammes per metre cubed) and hourly 200µg/m<sup>3</sup> with a permissible 18 hours per year above the 200µg/m<sup>3</sup> limit allowed respectively. Bristol regularly breaks the annual mean air quality objective for NO<sub>2</sub><sup>9</sup>.
- 2.17 The main pollutants of concern within Bristol are nitrogen dioxide and particulate matter. There are a number of monitoring stations within the BID area providing continuous live data which is uploaded to the website: <https://opendata.bristol.gov.uk/pages/aqdashboard/about-air-quality>
- 2.18 The area frequently suffers from heavy congestion which may lead to a build-up of harmful pollutants. There is considerable evidence of the damaging effects this pollution can have on children's mental and physical development, as well as the life expectancy of all, but particularly the elderly and those with respiratory problems.

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<sup>9</sup> <https://www.cleanairforbristol.org/what-is-air-pollution/what-is-air-quality-like-in-bristol/>





## Greening Bristol City Centre BID

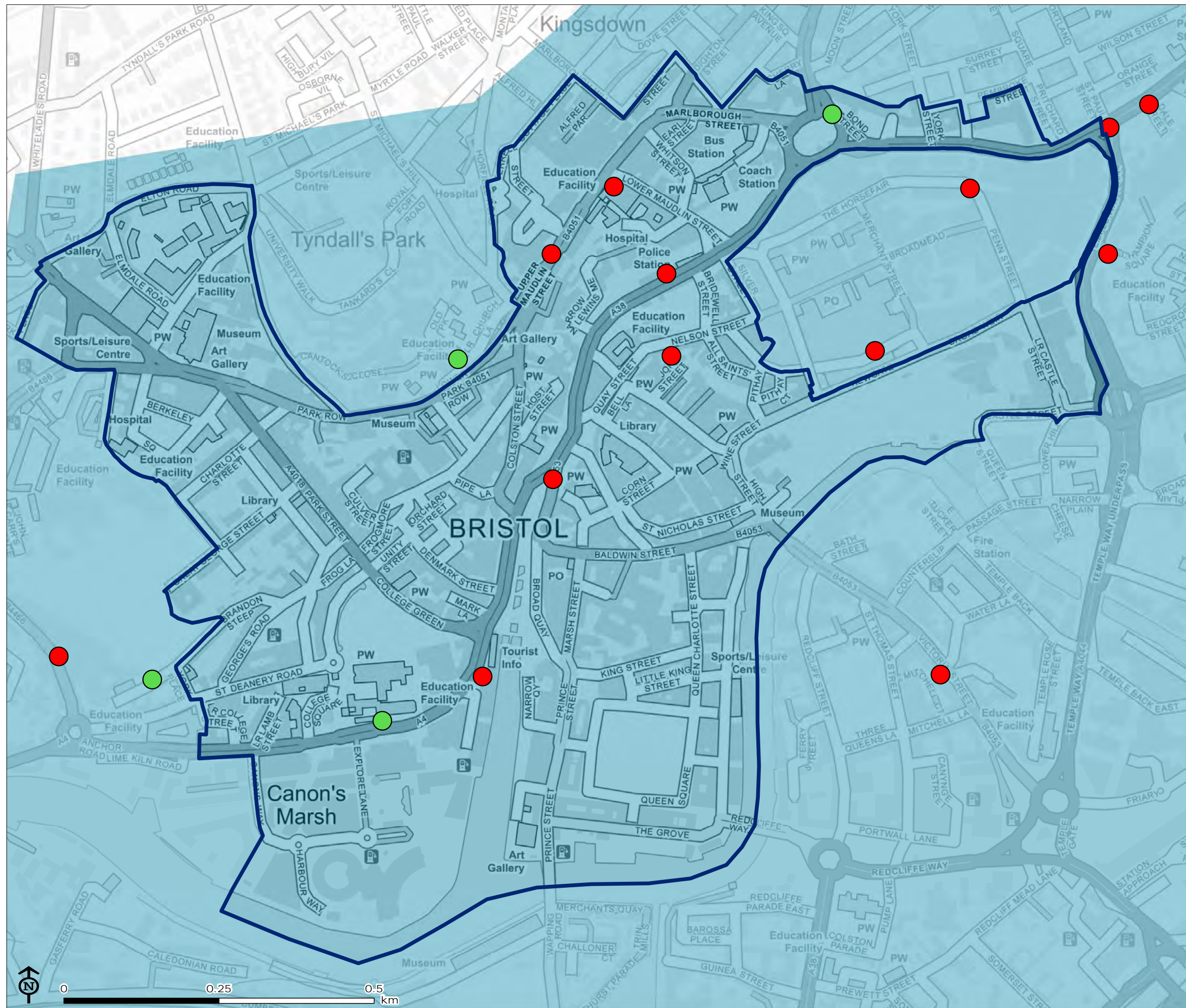
Figure 2: Open Space

- Bristol City Centre BID Boundary
- Green space
- Open space

Map Scale @A3: 1:6,000







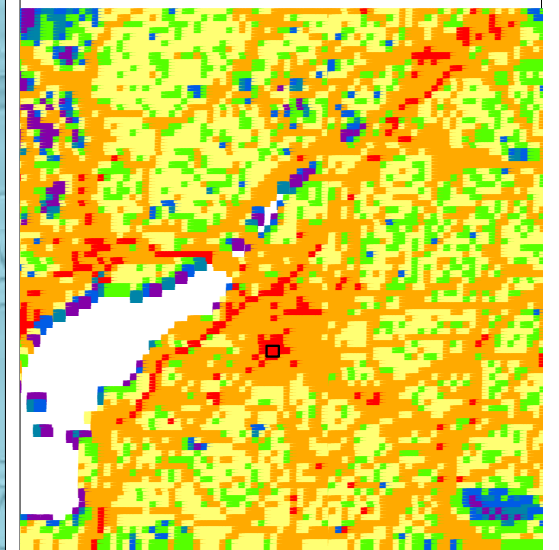











## Greening Bristol City Centre BID

Figure 3: Air quality (NO2)

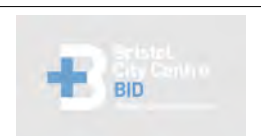
-  Bristol City Centre BID Boundary
-  Air Quality Management Area
- NO2 Diffusion tubes
  -  Annual mean NO2 is below 40  $\mu\text{g}\cdot\text{m}^{-3}$  (compliant)
  -  Annual mean NO2 is above 40  $\mu\text{g}\cdot\text{m}^{-3}$  (non-compliant)



Nitrogen Oxides as NO2  
t/1x1km

-  < 0.01
-  0.02 - 0.03
-  0.04 - 0.10
-  0.11 - 0.30
-  0.31 - 1.00
-  1.01 - 25.00
-  >25

Map Scale @A3: 1:6,000





### Flood risk

- 2.19 Flood risk and surface water management is an issue for the BID area. Areas with low permeability tend to be overwhelmed with water when it rains. Large areas of the BID are within an area of medium to high flood risk as shown in **Figure 4**; an issue which will be exacerbated by climate change. In addition to flooding from rivers/sea, there are pockets of land that are at risk from surface water flooding throughout the BID area. The existing green features do not currently appear to fulfil their potential in terms of helping addressing this challenge.

### Biodiversity and access to nature

- 2.20 Increasing green cover is beneficial for wildlife and increases peoples' access to nature, providing known benefits to physical and mental health. The existing open spaces are a valuable nature resource, but there is potential to increase biodiversity in the surrounding areas, bringing wildlife to users of the area, possibly through the creation of rain gardens, green walls, street tree planting and roof gardens.

### Overheating

- 2.21 Urban greening plays an important role in providing cool areas for people to congregate on hot days as well as absorbing some of the heat produced within the city. Recent research predicts that, under the worst case scenario for carbon emissions, 25% of global cities could warm by more than 7°C by 2100, but that local policies including green roofs and changing pavement materials can have a significant impact on reducing warming.<sup>10</sup> In particular, shading street trees have been found to have a significant cooling and relieving effect.<sup>11</sup> As shown in **Figure 5**, there are currently few street trees outside of established existing parks and regenerated

central areas. The study should particularly seek to identify opportunities to increase green features in these areas of the BID.

### Green space for people

- 2.22 Greening is good for business as well as playing a critical role in improving the health and well-being of local residents, works and visitors to the area. The Natural Capital Committee estimates that the improvements to mental and physical health offered by green infrastructure in urban areas would reduce the associated health treatment costs to the NHS by £2.1 billion<sup>12</sup>. Opportunities should be considered to increase the green cover within the city centre, and create better links to the existing public open spaces in the BID.

### Rich cultural heritage

- 2.23 Bristol city centre has a rich cultural heritage and this is reflected in part in the number of Listed Buildings, Scheduled Monuments and other designated assets found in the BID area. Almost the entire BID area is within a Conservation Area. Designated assets are shown on **Figure 6**. There are many more locally listed and locally important heritage features.

## Key issues and opportunities identified through consultation

- 2.24 Alongside the audit, a range of stakeholders have been consulted to gain a better understanding of views on key weaknesses and opportunities in the BID area, ongoing initiatives and barriers to delivery of GI. The key issues raised by local stakeholders were:
- The important role of GI in the local mental health agenda;
  - The need to make the best use of small spaces and balancing priorities with other land uses (bike lanes, bike parking, outdoor

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<sup>10</sup> Estrada et al (2017) A global economic assessment of city policies to reduce climate change impacts, *Nature Climate Change* (7) Available at: [https://www.nature.com/articles/nclimate3301?utm\\_source=commission\\_junction&utm\\_medium=affiliate](https://www.nature.com/articles/nclimate3301?utm_source=commission_junction&utm_medium=affiliate)

<sup>11</sup> Saaroni et al (2018) Urban Green Infrastructure as a tool for urban heat mitigation: Survey of research methodologies and findings across different climatic regions, *Urban Climate* (24).

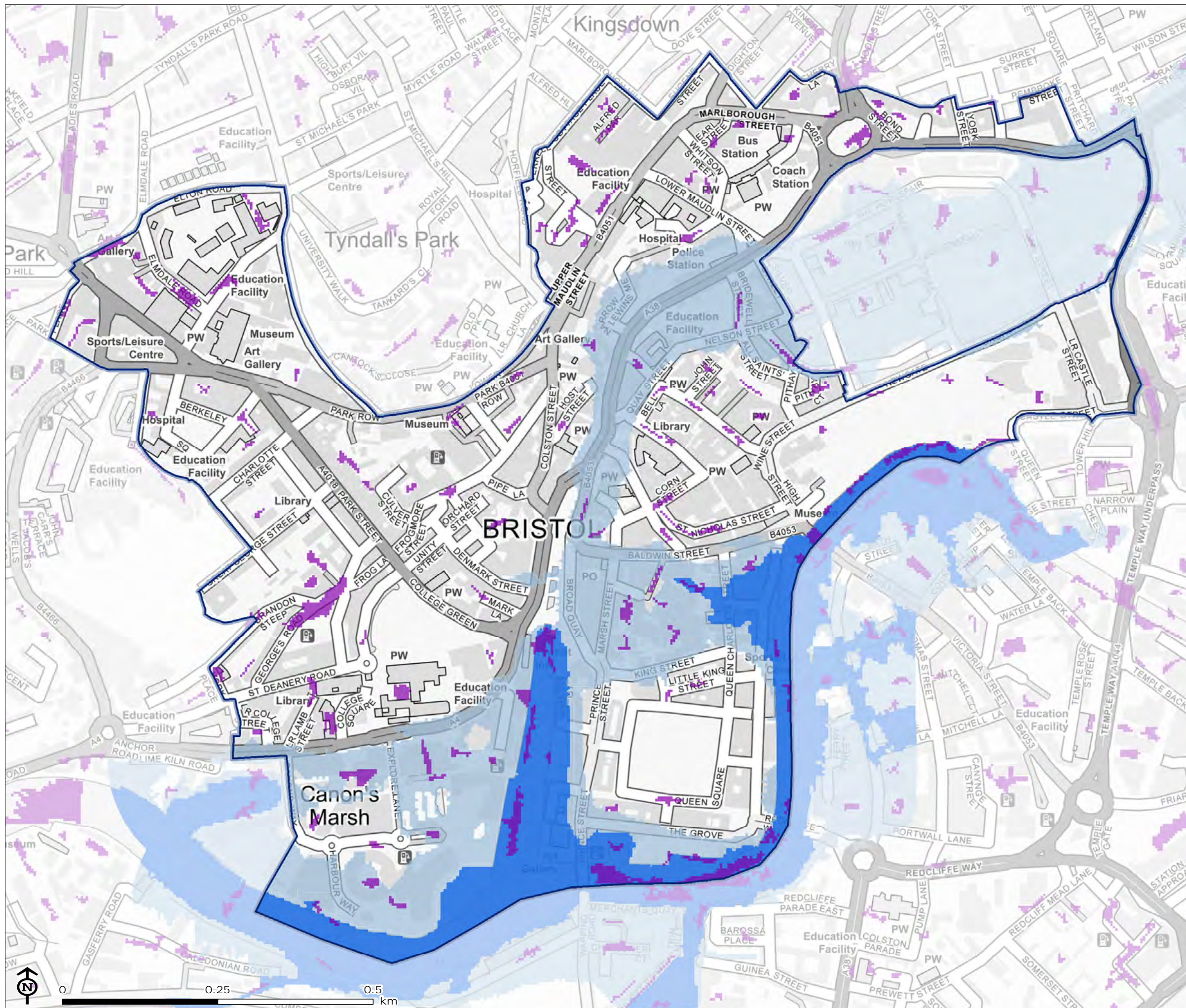
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<sup>12</sup> Natural Capital Investing in a Green Infrastructure for a Future London - Green Infrastructure Task Force Report (2015)

seating etc, as well as the need to use cathedral grounds for graduation ceremonies);

- The need for a more diverse, nectar-rich planting palette across the city centre, potentially delivered through green walls or green roofs;
- In the case of development, the danger of GI becoming 'overshadowed' by other sustainability agendas eg. sustainable construction;
- The significant challenge of working within tightening budget constraints, for capital investment but particularly for ongoing maintenance;
- The need to take a multi-actor approach to delivery that engages local businesses and better communicates the role and benefits of GI;
- The need to better 'harness' the energy of local community groups;
- Opportunities arising for integrating GI as part of the upcoming development at the Royal Infirmary site, particular given the location on a particularly poor air quality 'corridor'; and
- The complex 'spaghetti' of underground utilities as a potential barrier to delivery of new planting.





## Greening Bristol City Centre BID

Figure 4: Flood risk

- Bristol City Centre BID Boundary
- Flood zone 2
- Flood zone 3
- Risk of flooding from surface water 1 in 30 years

Map Scale @A3: 1:6,000





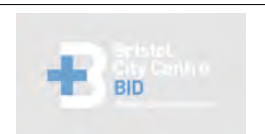


## Greening Bristol City Centre BID

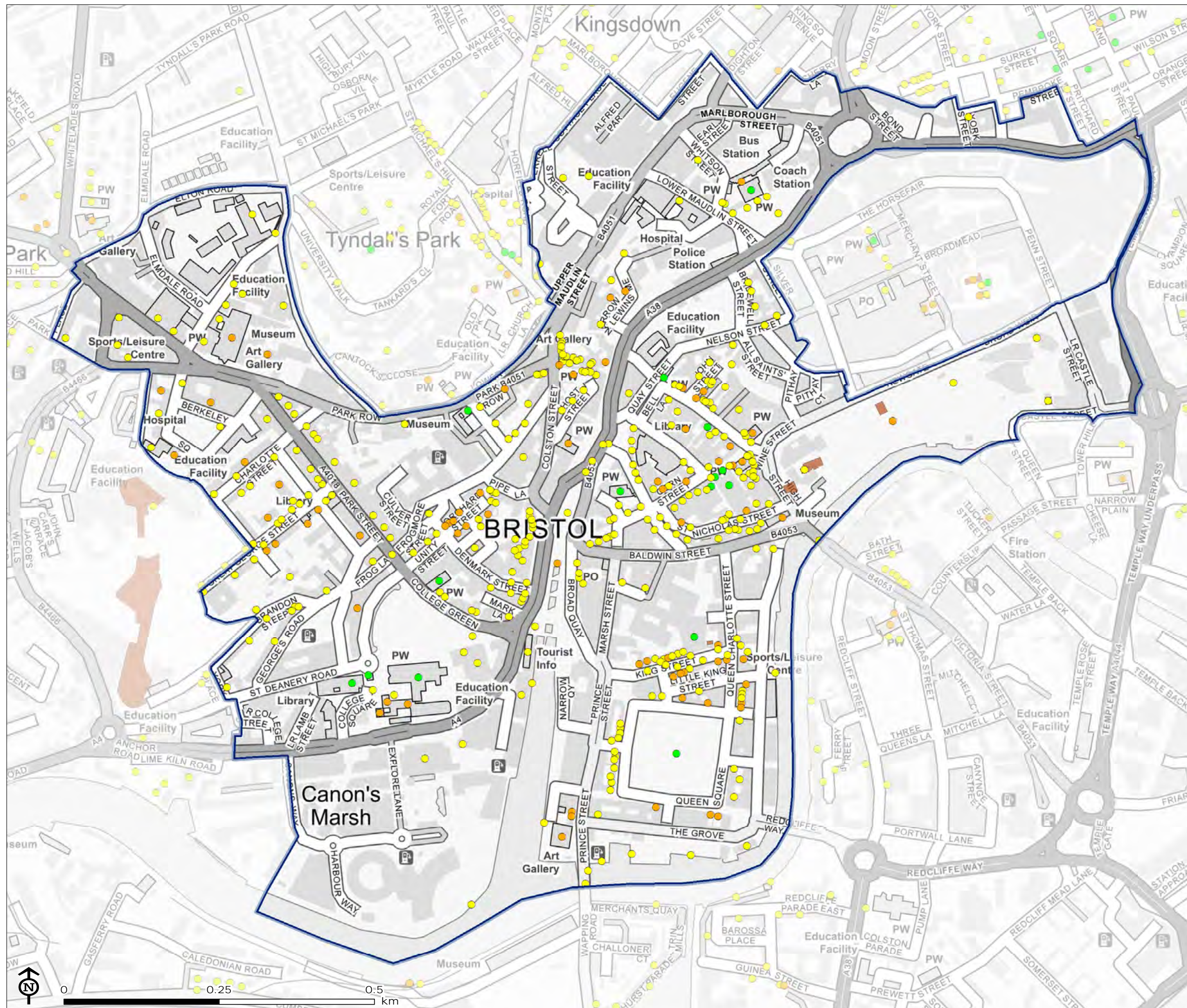
Figure X: Ecology

- Bristol City Centre BID Boundary
- Trees

Map Scale @A3: 1:6,000







## Greening Bristol City Centre BID

Figure 6: Cultural Heritage

- Bristol City Centre BID Boundary
- Scheduled Monument
- Listed Building
  - Grade I
  - Grade II
  - Grade II\*

Map Scale @A3: 1:6,000





### 3 Results of the audit

- 3.1 The audit of the BID area identified over 300 opportunities either to enhance existing green infrastructure features (**Figure 7**) or create new (**Figure 8**) at different scales of ambition and cost.
- 3.2 These include improvements to existing green spaces, new pocket parks, planters and shrub planting, planting of additional street trees and hedges, and the creation of rain gardens, green walls and green roofs.
- 3.3 When identifying opportunities for greening, key issues considered were the current usage of spaces, including areas of high footfall and activity, security and the nature of sub-surface constraints e.g. services and wayleaves.
- 3.4 Audits were undertaken by Landscape Architects, and alongside the description of each opportunity, each one was categorised in terms of its likely ease of delivery and potential cost bracket. These are indicative, but allow the organisation of opportunities into groups ranging from those that are easy/quick wins with a cost range of £0-5k and those that are more challenging to deliver and would potentially cost in excess of £20k. Each opportunity has been assigned a reference number and where specific opportunities are referenced in this section, the identifier has been provided in brackets (e.g. P1) and can be used to identify the features on the maps provided.
- 3.5 This section provides an overview of the range of opportunities identified through the audit (field survey and desk-based).

#### Green spaces

- 3.6 The BID area is home to a number of highly valued parks and green spaces. Prominent among them are: Castle Park, Queen Square, College Green and Berkeley Square. The focus of this audit has been to identify opportunities for these successful larger

spaces to be complemented by smaller areas of green space which would create a green network that would weave through the BID area and better connect existing sites.

- 3.7 Within existing green spaces, in general, there are opportunities to:
- Reduce areas of hardstanding in favour of 'soft' treatments (grass, planting etc);
  - Relax mowing regimes to create areas of long grass/ meadow to provide increased opportunities for wildlife and seasonal interest;
  - Increase shrub and hedge planting for biodiversity and to provide a perimeter buffer to traffic pollution;
  - Add more trees (into soft areas);
  - Reduce use of bedding/ annual planting in favour of hardy perennials/ evergreens to provide long season coverage without the need for replacing;
  - Addition of bird, bat and insect boxes;
  - Grow edibles (fruit, vegetables and herbs) either in raised planters or beds.
- 3.8 Seven areas were identified within the BID area with potential for the creation of a small 'pocket park'. These are shown on **Figure 9**. These are essentially scaled-down versions of traditional parks, with trees and greenery, providing places to sit and relax and can also act as important spaces of encounter. As such, they are designed to complement larger-scale public parks and act as 'urban oases' amid built up areas, as well as providing havens for nature to flourish and for managing storm water amid a high density area currently dominated by paved and hard surfaces.
- 3.9 The design of pocket parks can range from simple schemes to more unusual ones – in Greater London, the Pocket Parks scheme has seen projects range from community orchards to 'edible bus stops'.<sup>13</sup> Typically such pocket parks involve the active

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<sup>13</sup> <https://www.london.gov.uk/what-we-do/environment/parks-green-spaces-and-biodiversity/pocket-parks-map>

participation of local community groups, which can 'adopt' and care for the spaces.

- 3.10 Two examples of areas for pocket parks within the BID area have been identified as:
- Anchor Square (near Tikka Flame) (P68): opportunity to replace hardstanding with soft. Being a heavily trafficked area, planting needs to be robust and protected. Could include trees and hedge surround to create a small seating area.
  - The area currently used for informal car parking on the corner of St George's Road and Brandon Steep (P171): a typically unloved and neglected urban space: south facing with potential for small scale pocket park with planting, seating opportunities and possibly a green wall/climber against adjacent south facing wall (up Brandon Steep) and the building elevation.
- 3.11 A small number of areas have been identified as having potential for wildflower meadows and wildflower planting as shown on **Figure 9**. These areas have been selected as they are of a sufficient size to make an impact (and look deliberate), not too vulnerable to pedestrian traffic and in locations where there may be loading issues due to structures below (e.g. the Cathedral).



Anchor Square (near Tikka Flame) (P68)



Informal car parking by corner of St Georges Road and Brandon Steep (P171)

- 3.12 In addition, there are a number of areas where wildflowers could enhance existing green spaces and provide havens for wildlife. These areas play an important biodiversity role in tackling the decline in bees and other pollinators, as well as providing attractive routes and 'softening' of the streetscape through the city centre. The walkover identified two areas with good potential as wildflower meadows near the Cathedral (P88) and near Harvey Nichols (E111).



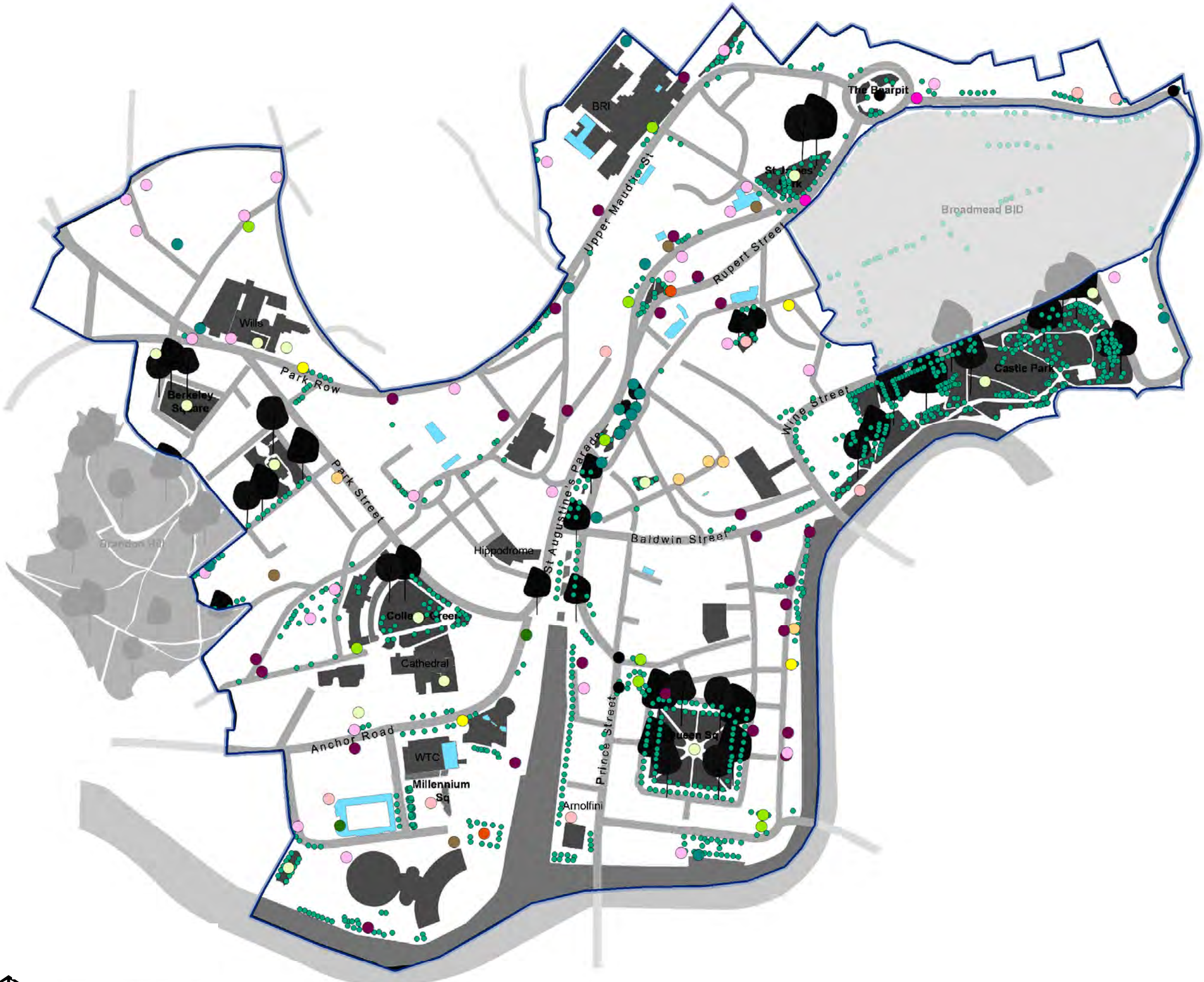
Cathedral: Addition of shallow depth, lightweight growing medium to existing flat gravel areas to allow for creation of wildflower meadow. Species-mix to consist of annuals and perennials to create long season of interest. Maintenance access to be retained and wildflowers to be kept clear of area used for university graduations. Potential to create modular removable wildflower 'trays' for positioning in area if full access is required at certain times through the year (P88).



Large triangular expanse of grass opposite Harvey Nichols which could be planted as wildflower meadow with a mown trim surround (E111).



Figure 7: Existing GI



- Bristol City Centre BID Boundary
- Existing GI identified during audit
- Empty tree pit
  - Grass verge
  - Green wall/ climber planting
  - Hedge
  - Missing tree avenue
  - Other
  - Part park/ green space
  - Planters or beds
  - Shrub planting
  - Traffic infrastructure (traffic island)
  - Tree planting
  - Wildflower meadow
  - Window boxes or hanging baskets
  - Green roofs
  - Trees\*

\* Tree data supplied by Bristol City Council

Map Scale @A3: 1:6,000

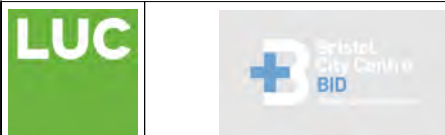
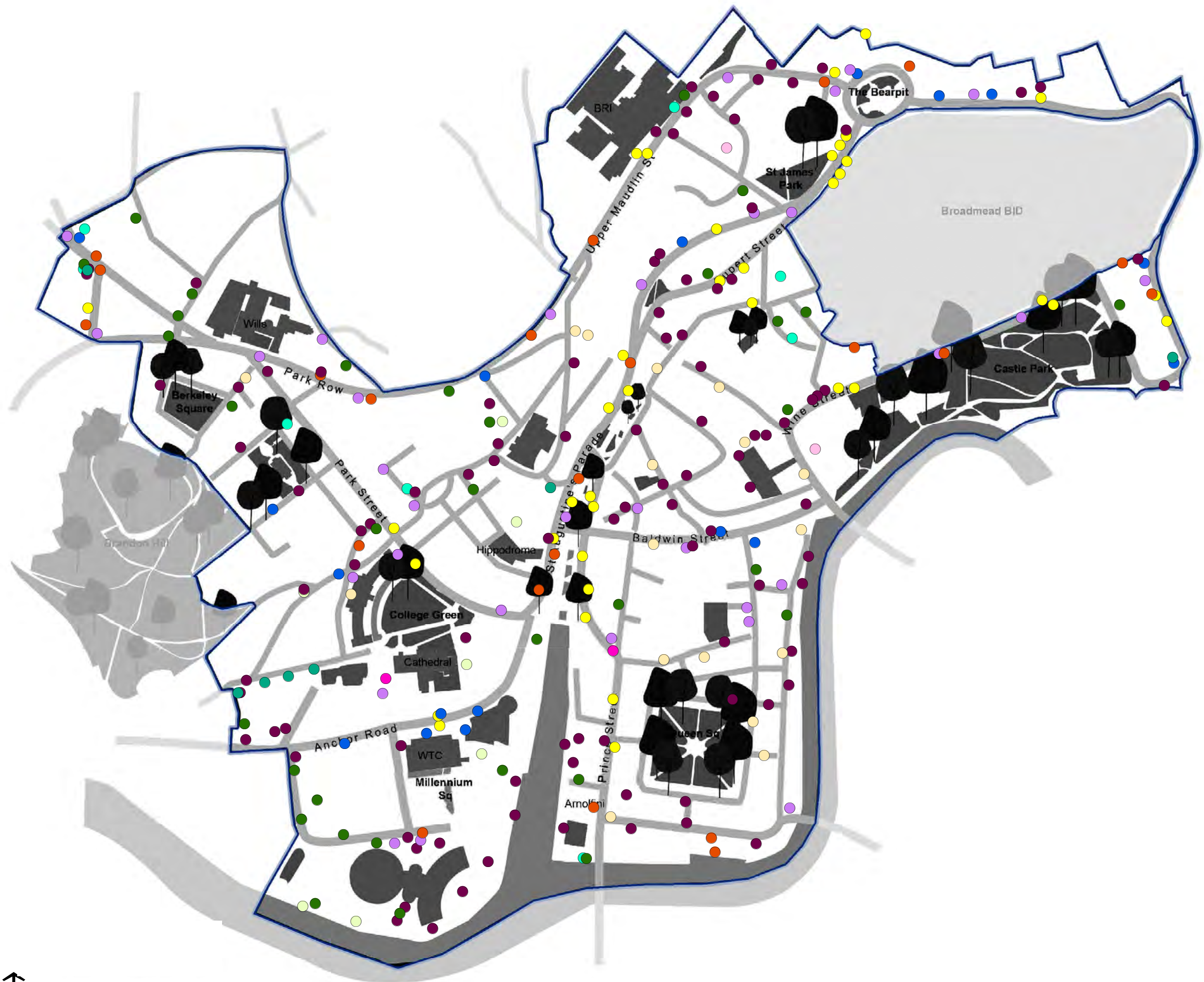




Figure 8: Potential GI



Bristol City Centre BID Boundary

Potential GI opportunities

- Green roof\*
- Green wall/ climber planting
- Hedge
- Other
- Planters or beds
- Pocket park
- SUDS or rain garden
- Shrub planting
- Substantial window boxes or hanging baskets
- Tree planting
- Wildflower meadow
- Bust stop green roof

\* Identified through field audit. See Figure 15 for desk-based audit of flat roofs)

Map Scale @A3: 1:6,000



0 0.25 0.5 km



Figure 9: Pocket parks and  
wildflower meadows/planting



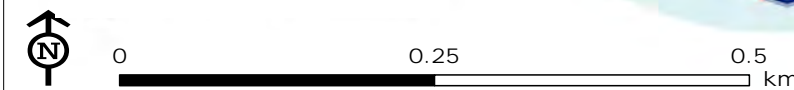
Bristol City Centre BID  
Boundary

**Potential GI opportunities (including  
enhancements to existing)**

- Pocket park
- Wildflower meadow/ planting



Map Scale @A3: 1:6,000



### From bus stops to 'buzz stops'

- 3.13 Existing bus stops in the BID area are concentrated in a linear pattern along the major artery of the A38 (Rupert Street/Anchor Road), from the St James Barton Roundabout to the harbourside, in addition to several further stops on Park Street.
- 3.14 The desk audit identified that 38 of the 87<sup>14</sup> bus stops in the BID area were equipped with some form of shelter benefitting from a flat roof that could provide a suitable setting for green roofs as shown in **Figure 10**. These locations have been identified as potential 'buzz stops'. Drawing on precedent from other European cities,<sup>15</sup> it is proposed that the 'buzz stops' could provide benefits including biodiversity and air quality mitigation. Indirectly, these features could build on recent media coverage of initiatives elsewhere to provide an engaging 'talking point' about urban greening and biodiversity losses.



Example of a green bus stop in Utrecht © Clear Channel






To be replaced by sketch of St Ms bus stop

<sup>14</sup> This figure may not be 100% accurate as it has been taken from an open dataset of bus stops.

<sup>15</sup> <https://www.independent.co.uk/news/world/europe/bus-stop-plants-green-roof-bees-holland-utrecht-a8997581.html>



Figure 10: Buzz stops

-  Bristol City Centre BID Boundary
-  Bus Stops\*
-  Potential buzz stops

\*Based on open data



Map Scale @A3: 1:6,000

## Street trees and hedges

- 3.15 Street trees can be particularly valuable in providing greening where space is limited, provided appropriately designed tree pits can be installed. Consideration should be given to spaces and the growing habits, and selected species should be adaptable to urban situations e.g. potential for pollarding/ smaller cutting cycles to reduce crown extent, root ball sizes and therefore water demand. Further guidance on selecting appropriate street trees can be found here<sup>16</sup>. The selection of trees should also reflect the character of the surrounding area, and to help create a sense of place and contribute to the BID 'brand'. It may therefore be appropriate to prepare a Tree Strategy for the Bristol City Centre BID area, to ensure a coordinated approach to the selection and planting of street trees. Such a strategy should also include a specification for appropriate grades of tree and tree protection (guards, underground guying etc.) to withstand wear and tear associated with the public realm and provision for maintenance.
- 3.16 The planting density of trees is wholly dependent on species selection as well as environmental factors e.g. the proposed location's microclimate and soil condition. Guidance should therefore be sought from specialist nurseries before selecting trees as well as reviewing guidance produced by organisations such as the Arboricultural Association. Likewise the cost of planting trees can also vary depending on species, planting specification and site conditions. Priority should be given to replacing all trees lost from existing tree pits and wherever possible, planting into 'soft' areas. £500-£1000 will get a good tree and associated (underground) guying, aeration pipes etc. Creating new tree pits in hard surfacing is more complicated and a larger budget will be required, potentially pushing into the medium (£5-20k) cost category.
- 3.17 Large canopy trees provide the greatest benefits in terms of alleviating the heat island effect through the provision of shading. These mature trees also contribute significant flood alleviation functions. This can be particularly valuable in busy urban areas, providing shade and cooler environment, as well as visually enhancing an area. In addition, trees filter air pollution which can be particularly useful along busy streets such as the A38 and Upper Maudlin Street. They also intercept and funnel rainwater, assisting the infiltration of water to substrates at their base and providing important habitats for wildlife.
- 3.18 Existing tree cover within the BID area is limited to the dense clusters within the major parks and green spaces (Castle Park, Queens Square and College Green), as well as rows along the harbourside and within the recently regenerated pedestrianised area leading to the harbour. However elsewhere tree cover is sparse as shown in **Figure 5**.
- 3.19 Even though some of the streets have little potential to increase planting due to the likely presence of underground services and narrow pavements, a number of locations that could be suitable for planting have been identified as shown in **Figure 11**. The majority of these are located along St Deanery Road (P270, P271, P272, P274), with other isolated opportunities behind the Marriott along Temple Way (P266), and next to the bike racks outside commercial premises at the top of Park Street (P264). These would help to buffer pedestrians, office workers and residents from the existing high levels of air and noise pollution. Trees also deliver associated benefits of cooling, water capture, biodiversity gain and nesting opportunities.
- 3.20 For all of these, the locations will need to be selected carefully with consideration given to underground services, footfall, sightlines and CCTV.
- 3.21 Aside from street trees, hedges can also fulfil a number of important GI functions in urban areas. This is due to the increasingly recognised role of their tight-knit foliage as a natural filter for air pollution, with some research suggesting they are more effective than trees in trapping harmful pollutants at exhaust height, particularly in 'street canyon' environments like those found in much of central Bristol.<sup>17</sup> The walkover identified a number of opportunities where increased hedging could be introduced, including:

<sup>16</sup> [https://www.london.gov.uk/sites/default/files/tdag\\_canopyweb.pdf](https://www.london.gov.uk/sites/default/files/tdag_canopyweb.pdf)

<sup>17</sup> Kumar et al (2017), Air pollution abatement performances of green infrastructure in open road and built-up street canyon environments – A review, *Atmospheric Environment* 162, pp. 71-86.



- St Augustine's Parade (P232): a long thin island with the trees running down the centre of the road. It is currently not hard surfaced and with minimal preparation/amelioration etc it could take new hedge planting. Paved gaps would be kept to allow for people to move across the road at locations not confined to formal crossings. The hedge would need to be protected with a central temporary post and wire fence to allow it to establish. Potential hedge species include hornbeam, yew and holly. One potential constraint highlighted during the walking workshop is maintenance and the potential need to close a busy road for maintenance.
- Opposite the White Harte (University Gate Building)(P103): here a hedge would effectively take up the position currently paved in smaller unit blocks and would create a green barrier for pollutants between the road and people walking up Park Row.



St Augustine's Parade (P232)



Opposite the White Harte (University Gate Building) (P103)



Figure 11: Trees and hedges



Bristol City Centre BID Boundary

Potential GI opportunities

- Hedge
- Tree planting
- Empty tree pit

Map Scale @A3: 1:6,000





## SuDS and Rain gardens

- 3.22 A 'rain garden' is an area of green space which is designed to collect and absorb rainwater runoff from buildings and urban areas. These features can reduce flood risk and soil erosion in periods of heavy rainfall and collect and store water which could be used for irrigation of other features.
- 3.23 In addition to providing a water management function in urban areas, rain gardens are also attractive to people and wildlife, and can be designed to trap and filter waterborne pollutants.
- 3.24 Rain gardens tend to be 50 or 100mm deep and will have substrate depth of 200-300mm. They are planted with low maintenance vegetation that can withstand both waterlogging or drought for short periods. The soils are specifically designed to take pollutants out of the water and to be very porous. Once at capacity, excess water is able to leave the feature and return to the wider drainage system. The water that is retained eventually infiltrates deep into the soils or is evaporated into the atmosphere. This process can also help to reduce local air temperatures.
- 3.25 Although the exact volume that rain gardens are able to remove from the drainage system is unknown, gardens are able to be designed to capture the first 15mm of rainfall falling on the features, which in most events forms 95% of rainfall.<sup>18</sup> This significantly decreases the pressure placed on the surface water drainage systems, particularly during intense summer storms when surface flooding can be severe.
- 3.26 There are a number of barriers to retrofitting such features into the urban realm.
- Presence of underground services and street furniture, which can restrict the area available for rain gardens. Locations where this is less likely to be an issue have been identified, although further survey/ investigation would be required.
- Rain gardens are a landscape feature that would need to be managed. Maintenance operations would include vegetation management/ replacement and litter picking.
  - Features need to be integrated with existing drainage systems to enable them to intercept surface flow, as well as discharge excess water. Such features could also form part of a wider streetscape scheme such as integrating with areas of permeable paving. It may be appropriate to link these features to provide a chain of complementary interventions.
  - Space is required to create these features and therefore these may not be appropriate in areas of high footfall.
  - The features are sunken to enable the retention of water. However the depth of such features (typically 50-100mm) is relatively minor and the edges can be sensitively defined through use of planting and edge detailing.
- 3.27 Due to the various constraints associated with creating SuDS/ rain gardens, the audit has focussed on suggesting locations where there is ample space; particularly in areas with higher flood risk. In all cases they will be moderate/ challenging to deliver. Several sites with potential for rain garden installation were identified within the BID area as shown in **Figure 12**. The most significant area of potential is a group of sites to the rear of 'We the Curious' (P71) and adjacent office buildings along Anchor Road.
- 3.28 Other opportunities are shown in the following images.

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<sup>18</sup> Dunnett N. and Clayden A (2007) Rain gardens: Managing water sustainably in the garden and designed landscape



We The Curious (P71)– Broad existing expanse of paving could be reduced in size (whilst still accommodating pedestrian and cycle routes) in order to provide an opportunity for a flagship SuDS/ rain garden capturing surface water run-off and water from WTC roof. Rain garden could have provide opportunities for trees and wetland planting and have boardwalk pathways to add interest and increase accessibility. Also would have educational value to WTC and could include interpretation signage etc.



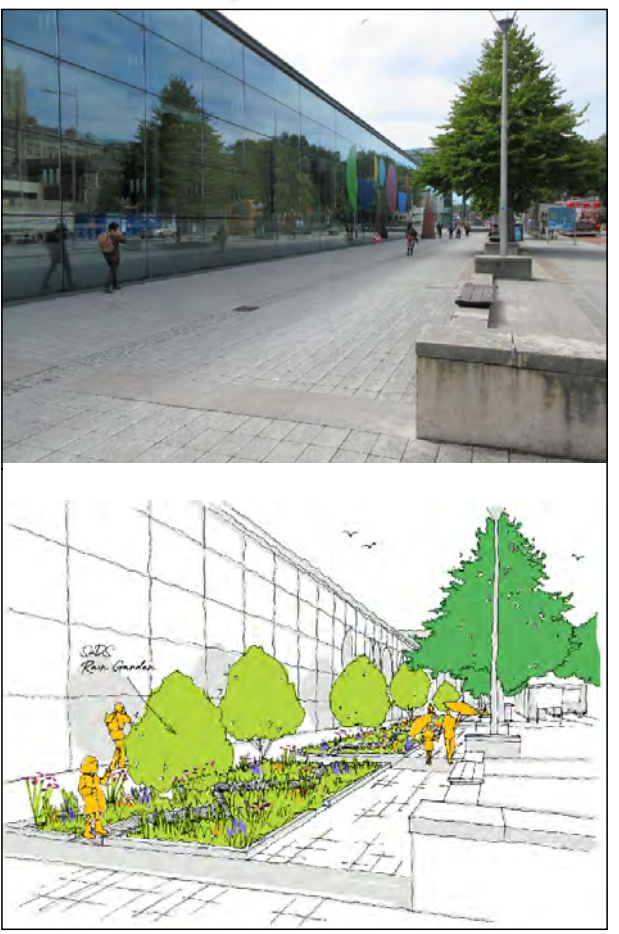
St James Barton roundabout (P55)

Overly large area of paving could be significantly reduced in size to provide location for SuDS/ rain garden. This would bring significant benefits to what is a very 'hard' and 'grey' area including, rain/ surface water capture, provision for biodiversity/ wildlife and buffer to the adjacent dual carriageway.

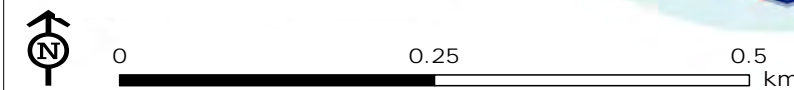


Figure 12: SuDS and rain gardens

- Bristol City Centre BID  
Boundary
- Potential GI opportunities
- SuDS or rain garden



Map Scale @A3: 1:6,000





### Planters, beds, window boxes and hanging baskets

- 3.29 The introduction of planters and window boxes in urban spaces can be an easier 'quick win' that causes fewer complications related to constraints such as underground utilities and the costs of breaking ground. The BID area already hosts a number of planters recently installed by local community organisation Incredible Edible, however a wealth of further opportunities exist to use these spaces to weave urban greening more densely through the city centre.
- 3.30 As small-scale features, these interventions will not provide the flood alleviation functions that larger features deliver, however cumulatively they can help to manage surface water, particularly if designed to be fed by downpipes.
- 3.31 The walkover identified 100 sites across the BID area with potential for the installation of planters or beds as shown on **Figure 13**. A number of other areas could be enhanced by window boxes or hanging baskets. These small-scale interventions present the opportunity to transform small areas of pavement or other hard surface to enhance an area visually and to provide habitats for urban wildlife.



Guildhall frontage (P31) – potential location for planters to be located on raised hard surfaced area.



Berkeley Square (P115) – Alcoves and leftover spaces could accommodate planters to provide 'greening' enhancements



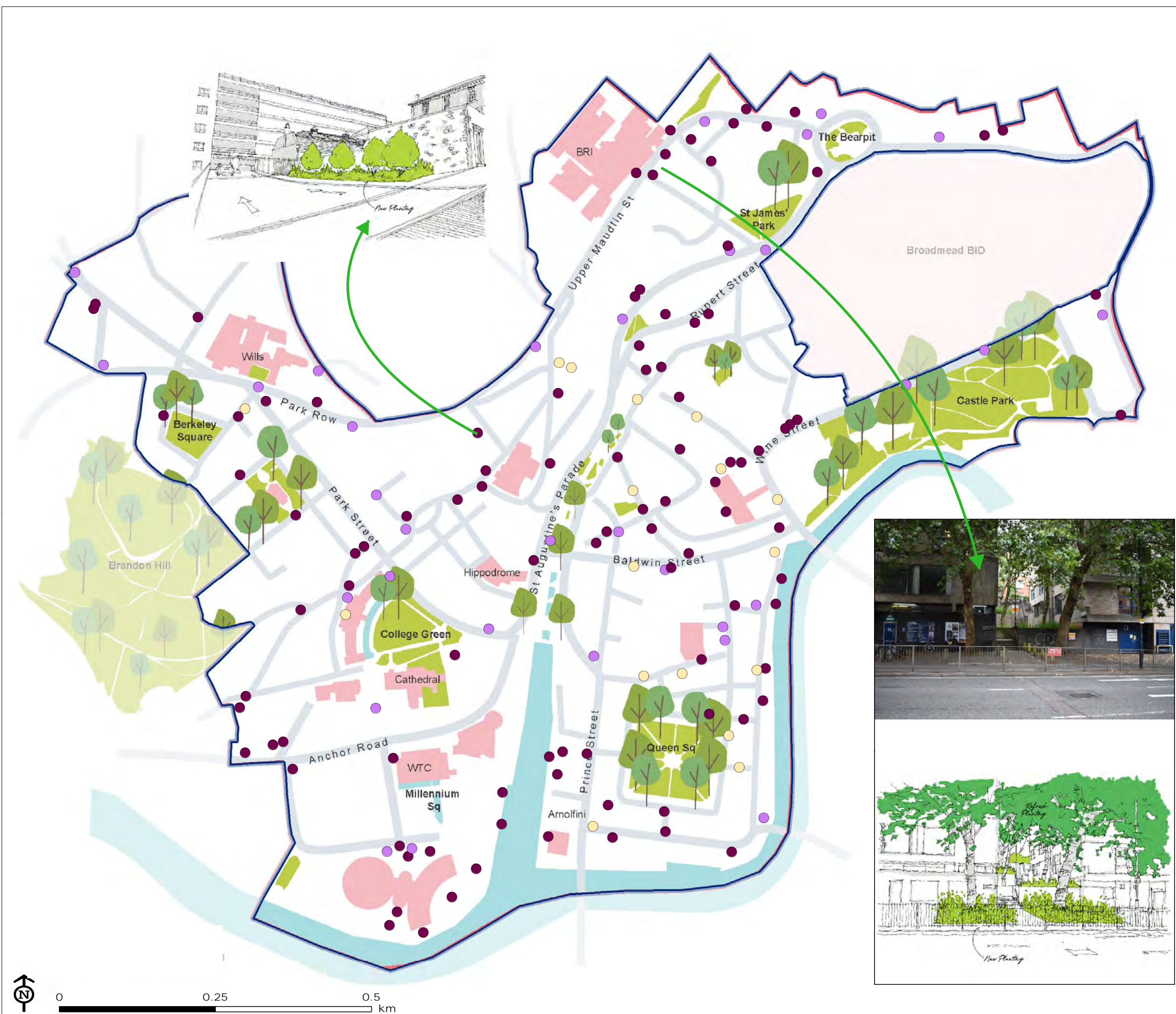
Corner of Lower Maudlin Street (P64) – Widened sections of pavements provide potential locations for planters to enhance the streetscape and provide opportunities for urban wildlife.



# Greening Bristol City Centre BID

Figure 13: Planters, beds, substantial window boxes and hanging baskets

- Bristol City Centre BID Boundary
- Potential GI opportunities
- Planters or beds
- Shrub planting
- Substantial window boxes or hanging baskets





### Green walls and climbing plants

- 3.32 Green walls can have a dramatic and visible greening effect, and have the added advantage of breaking-up large blank building elevations and providing habitats for wildlife.
- 3.33 The most economical way of achieving a green wall is with climbing plants growing from beds or planters at the base of a wall. The alternative to this is a modular green wall system where plug plants are established within a vertical growing system. The latter is considerably more expensive and requires more intensive management. For a green wall to be a sustainable greening feature however, it is also important that a watering system is in place that does not rely on mains water, for example using rainfall runoff or grey water.
- 3.34 Green walls do not normally require planning permission unless the affected building is listed or is within a Conservation Area. In the case of listed buildings, 'assessments of significance' and 'assessments of impact' are likely to be required, and the viability will depend on the significance of the individual buildings. In any case the local planning authority should be consulted.
- 3.35 Important considerations when planning green walls are the aspect, with north facing walls needing less maintenance and using less water; however there are potentially fewer plant species which can tolerate deep shade. It is also important to consider if there is a nearby water source. For modular systems it is important to confirm with a structural engineer that the wall can support the weight and take any necessary fixings, it might be necessary for the green wall to be constructed on a separate structure and make use of a waterproof barrier. For a small to medium sized modular green wall the costs would likely be in the region of £850/ m<sup>2</sup> with an additional 10% of the total cost required for yearly maintenance.
- 3.36 Two existing green walls/climber planting were identified during the audit – behind the Watershed and above the Britannia carpark entrance.
- 3.37 As shown on **Figure 14**, the audit identified 33 opportunities for green walls or introducing climbers, which would require varying approaches to installing and varying associated costs. The

deliverability of the green walls proposed here will be greatly dependent on the support from the property owner and tenants. A sample of opportunities ranging from challenging to easy/quick wins is illustrated below. A number of 'big ticket' opportunities for green walls have been identified on facades of buildings owned/occupied by major national chains/companies (e.g. Travelodge (P240), Natwest (P248), NCP (P184 and P235)), where delivering an intervention would help boost their sustainability credentials and could be exemplars for rolling out GI interventions elsewhere in the country.



Back of Travelodge Façade (P240) – large expansive blank wall elevation provides a potential opportunity for a green wall.



Façade of Natwest (P248): A potential statement piece at the gateway to Clifton Triangle. Being a busy road for pedestrians, cyclists and cars, this opportunity has the potential to deliver air quality benefits, whilst promoting the building occupier's green credentials.





Rupert Street Car Park (P235): Here an already open bed at the base of concrete wall provides a 'quick win' opportunity for a green wall. With the addition of a simple support structure fixed to the concrete wall, climbers could be planted to provide a green/ living wall on the building elevation.

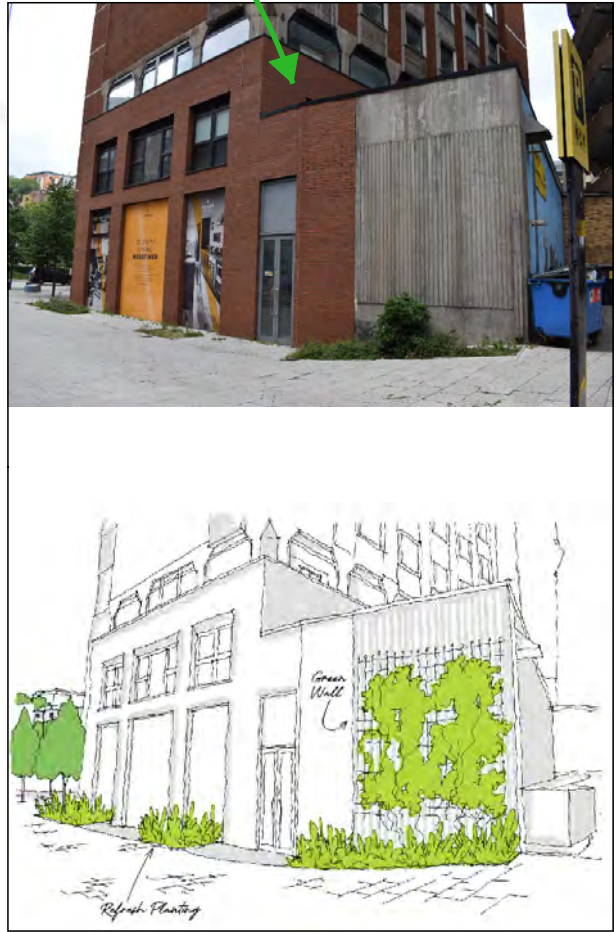


Challenging: Part of the church and Reed Building (P198). Whilst this opportunity has been identified in the audit there will likely be substantial challenges in delivering a green wall in this location as a result of the church being Listed. These challenges could potentially be addressed with the addition of an engineered structure offset from the existing wall.



Figure 14: Green walls and climbers

-  Bristol City Centre BID Boundary
- Potential GI opportunities
-  Green wall/ climber planting



Map Scale @A3: 1:6,000



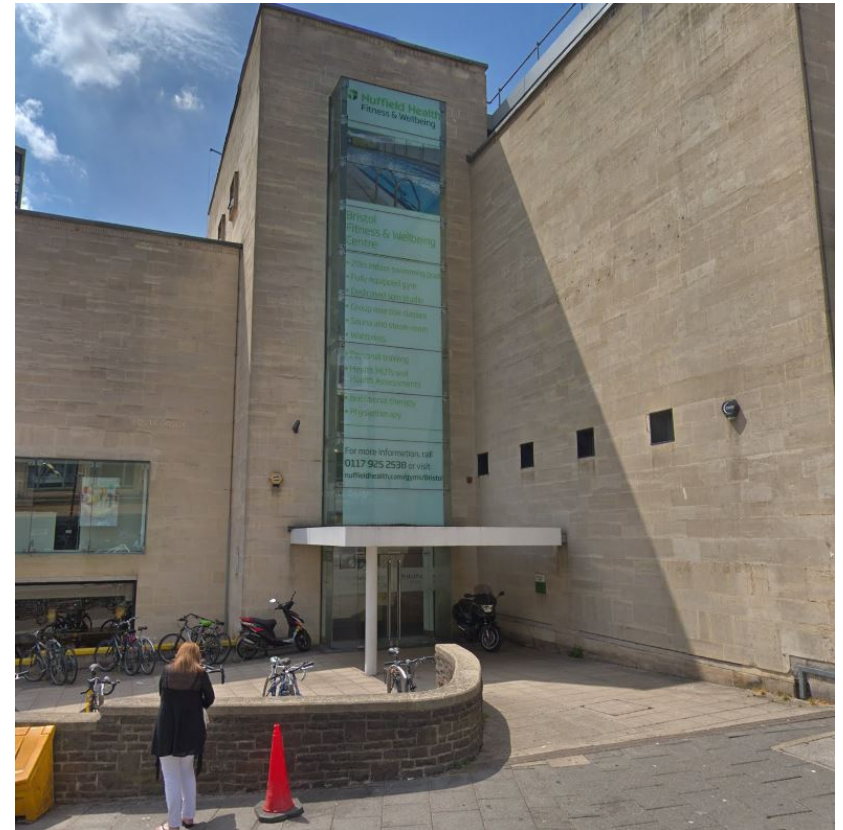
### Flat roofs with potential for green roof installation

- 3.38 Green roofs help to better utilise the often neglected areas of a city's roofscape. Covered with plants and vegetation, they bring a number of benefits.
- 3.39 The type of green roof which can be installed at a building depends on the following:
- Structural loading of the roof
  - Amount of substrate which can be supported
  - Potential for public access
- 3.40 The Green Roof Code identifies three main types of green roof:
- Extensive: lightweight, low maintenance system with a substrate of between 80-100mm
  - Semi-intensive: deeper substrate typically of 100-200mm and therefore able to support a greater range of vegetation.
  - Intensive: a roof garden or small urban park with public access. Requires maintenance and irrigation.
- 3.41 Dependent on the roof type, a range of benefits can be provided such as:
- Water attenuation
  - Improved thermal efficiency of buildings
  - Air pollution control
  - Provision of wildlife habitats
  - Provision of open space
  - Energy savings in relation to the heating and cooling of buildings
- 3.42 There are a range of factors which influence the amount of rainwater a green roof is able to absorb. These include the season, climate, depth of substrate, design of the green roof and the type of plant material. However, as an average, the different types of attenuating approximately the following amount of rainfall:
- Extensive/ biodiverse roof: between 45-55% of annual rainfall
  - Semi-intensive roof: between 60-65% of annual rainfall
  - Intensive roof: between 9—100% of annual rainfall
- 3.43 An initial desk-based assessment of roofs in the Bristol City Centre BID area was completed using aerial photography and the findings are presented in **Figure 15**. In total, 17 existing green roofs were identified totalling approximately 8,500m<sup>2</sup>; the largest of which are found on the We the Curious building, the Bristol Heart Institute and the Lewins Mead Premier Inn.
- 3.44 In addition, a further 11 hectares of flat roof space was identified, across 255 roofs. This figure is indicative and no site surveys have been undertaken, but demonstrates the scale of opportunity at roof level. Of these, some of the most ambitious opportunities include:
- Two car parks - the Rupert Street NCP Car Park and the Trenchard Street Car Park.
  - The arc-shaped building facing the Lloyds Amphitheatres;
  - The large harbourside building on Hannover Quay
- 3.45 However several smaller-scale, more easily deliverable, opportunities exist across the BID area, including the wooden clad outside store outside of the Arnolfini which has the name on the harbour side(P180).



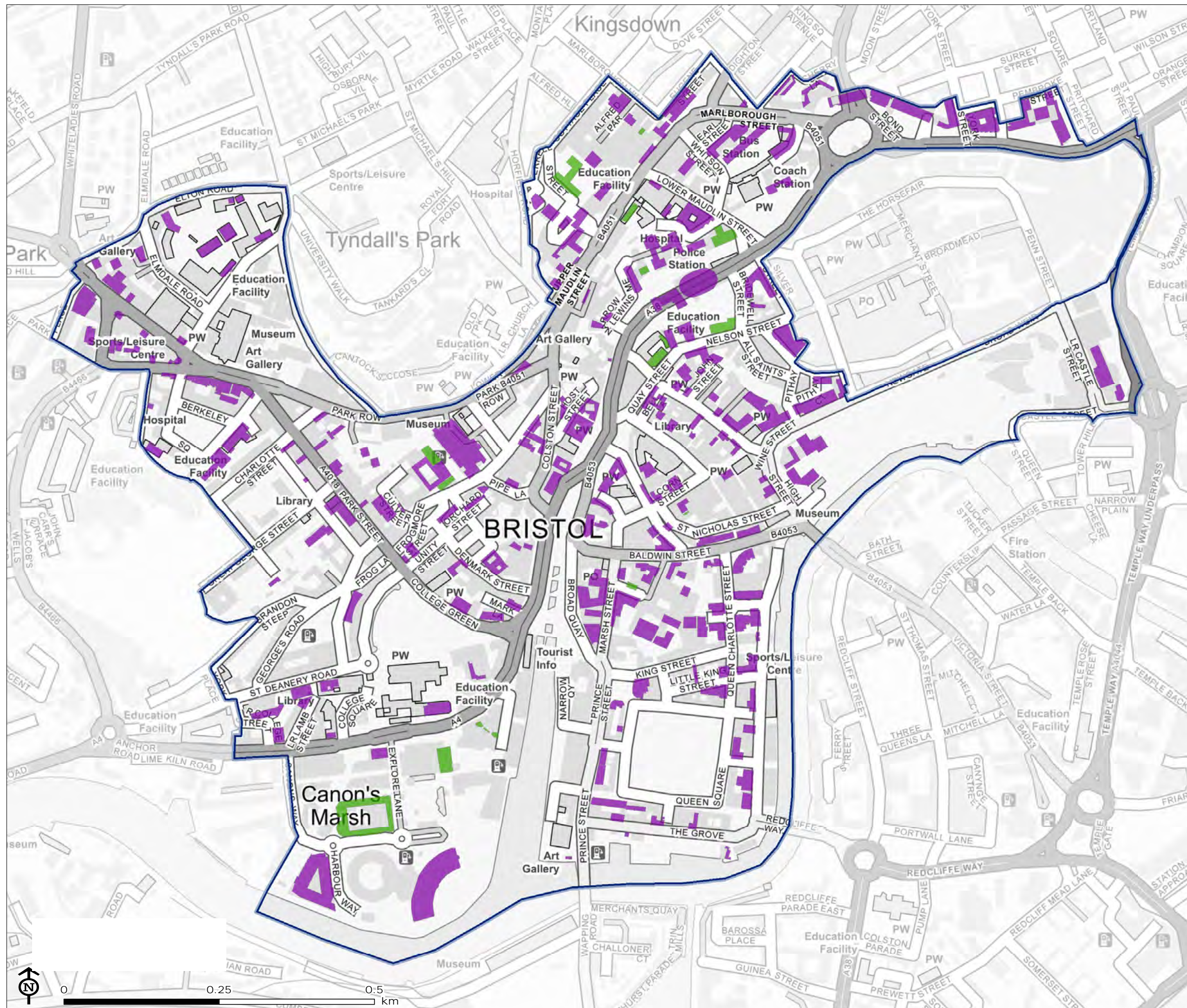


Arnolfini (P180 and P260) – potential to wrap the existing timber structure with green roof and walls.



Nuffield Area (P107) – Entrance canopy provides opportunity for small extensive green roof which would be low maintenance and capture run-off.



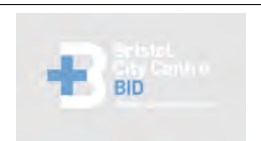


## Greening Bristol City Centre BID

Figure 15: Rooftop potential

- Bristol City Centre BID Boundary
- Existing green roof
- Flat roof

Map Scale @A3: 1:6,000





## 4 Prioritising opportunities

4.1 This audit has identified a large number of opportunities and has sought to highlight the potential for 'terrestrial' GI, green walls and green roofs. This section seeks to organise the opportunities in a range of ways to allow for prioritisation. Each opportunity has been categorised in terms of the potential cost of delivery and the ease of delivery. This allows us to display the range of opportunities in a range of ways.

4.2 **Table 1** shows the number of opportunities per type.

Potential new GI feature	Number of opportunities
Green roof	8
Green wall/ climber planting	33
Hedge	22
Planters or beds	100
Pocket park	7
Shrub planting	32
Substantial window boxes or hanging baskets	17
SUDS or rain garden	17
Tree planting	7
Wildflower meadow	2
Other	2

**Table 1: Summary of opportunities by type**

4.3 These can be further categorised into the ease or challenge of delivering them as shown in **Table 2**.

Potential new GI feature	Easy/quick win	Moderate	Challenging
Green roof	2	4	2
Green wall/ climber planting	2	21	10
Hedge	4	17	1
Planters or beds	47	45	8
Pocket park		7	
Shrub planting	9	20	3
Substantial window boxes or hanging baskets	15	2	
SUDS or rain garden		8	9
Tree planting	1	5	1
Wildflower meadow	1	1	
Other		1	1

**Table 2: Summary of opportunities by ease of delivery**

4.4 Furthermore, it is possible to organise the opportunities according to cost as shown in **Table 3**.

Potential new GI feature	£0-5k	£5-20k	£20k+
Green roof	2	4	2
Green wall/ climber planting	8	17	8
Hedge	11	11	
Planters or beds	47	52	1
Pocket park	1	6	
Shrub planting	11	21	



Potential new GI feature	£0-5k	£5-20k	£20k+
Substantial window boxes or hanging baskets	15	2	
SUDS or rain garden		12	5
Tree planting	1	6	
Wildflower meadow	1	1	
Other			2

**Table 3: Summary of opportunities by cost of delivery**

- 4.5 And finally, it is possible to organise them in a cost vs ease of delivery matrix to identify those opportunities that are low cost and relatively easy to deliver versus those that will be challenging and costly to deliver as shown in **Table 4**.

Cost of delivery	0-5k	5-20k	20k+
Easy of delivery			
Easy/ quick win	62	19	
Moderate	35	93	3
Challenging		20	15

**Table 4: Summary of opportunities by cost vs ease of delivery**



- 4.6 **Figure 16** and **Figure 17** show the opportunities according to these categories. **Figure 18** shows the opportunities coloured by cost of delivery and ease of delivery.
- 4.7 **Figure 19** shows the opportunities that are within close proximity to busy roads and of a type that could deliver air quality benefits. **Figure 20** shows the opportunities that are within areas at risk of

surface water flooding and of a type that would provide water management function.



Figure 16: Potential GI by ease of delivery



-  Bristol City Centre BID Boundary
- Ease of delivery
-  Easy/ quick win
  -  Moderate
  -  Challenging

Map Scale @A3: 1:6,000





Figure 17: Potential GI by cost



- Bristol City Centre BID Boundary
- Delivery cost (£)
  - 0-5k
  - 20k+
  - 5-20k

Map Scale @A3: 1:6,000

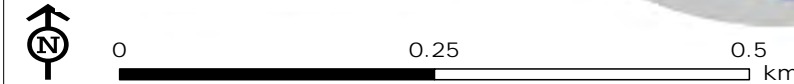
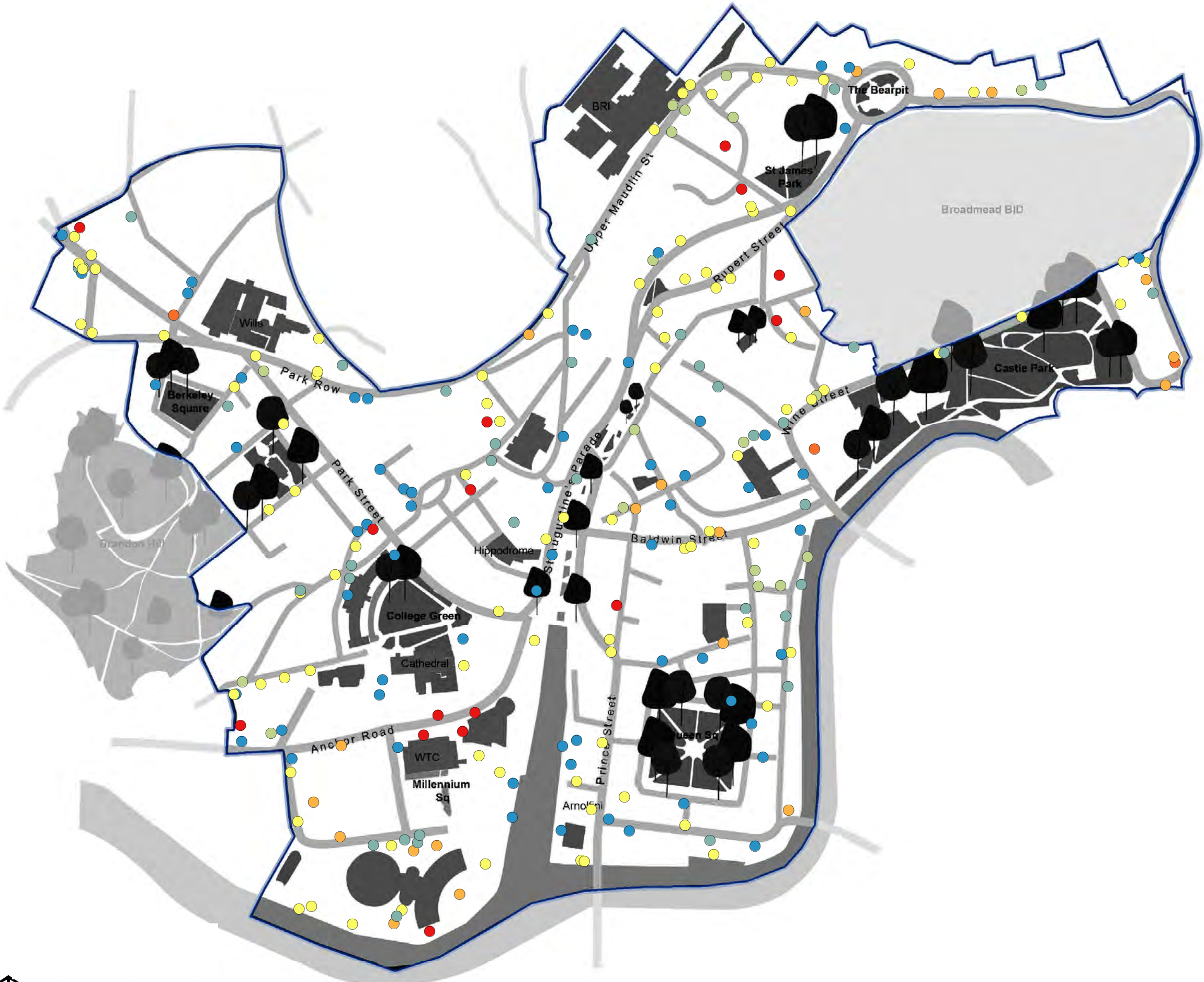


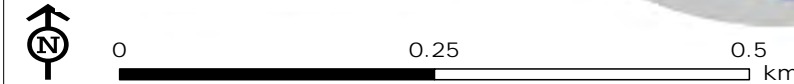


Figure 16: Potential GI by cost

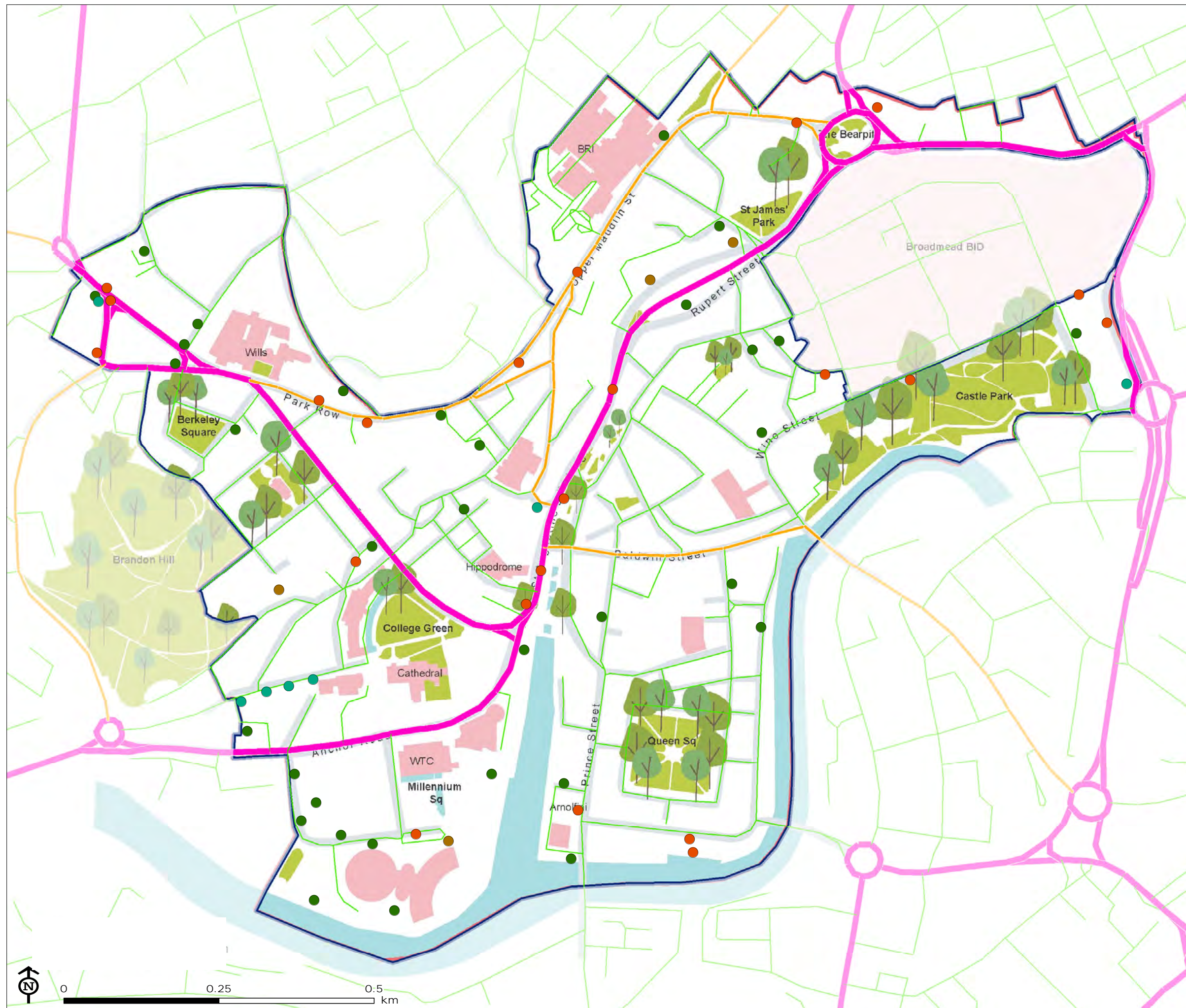


- Bristol City Centre BID Boundary
- Cost vs easy of delivery
- £0-5k, Easy/ quick win
  - £0-5k, Moderate
  - £5-20k, Easy/ quick win
  - £5-20k, Moderate
  - £5-20k, Challenging
  - £20k+, Moderate
  - £20k+, Challenging

Map Scale @A3: 1:6,000







## Greening Bristol City Centre BID

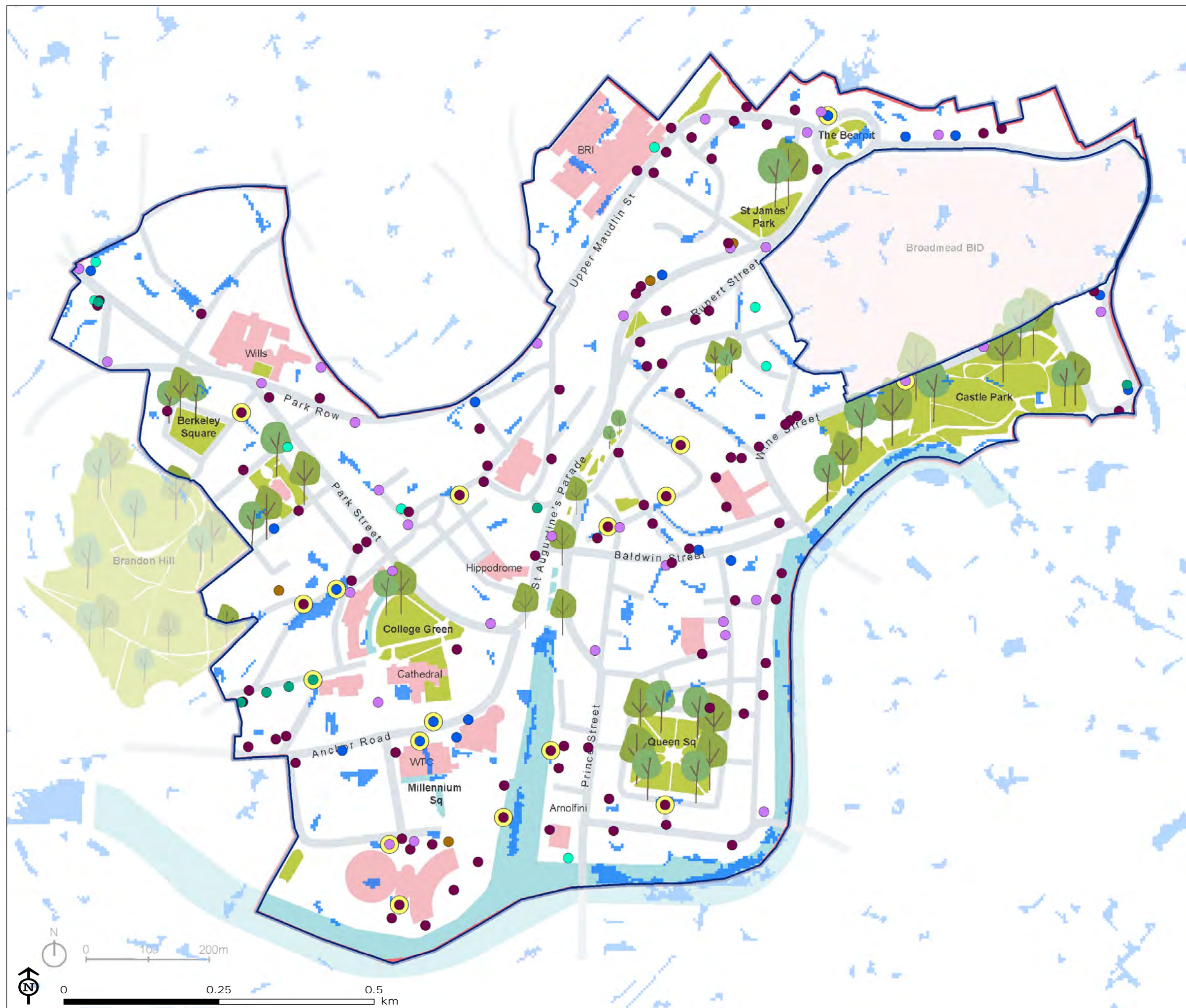
Figure 16: Addressing air quality

- Bristol City Centre BID Boundary
- A Road
- B Road
- Other Roads
- Potential GI opportunities
  - Hedge
  - Tree planting
  - Green wall/ climber planting
  - Empty tree pit

Map Scale @A3: 1:6,000







## Greening Bristol City Centre BID

Figure 17: Surface water management

- Bristol City Centre BID Boundary
- Risk of flooding from surface water 1 in 30 years
- Potential GI opportunities
  - Green roof\*
  - Planters or beds
  - SUDS or rain garden
  - Shrub planting
  - Tree planting
  - Empty tree pit
- Potential GI opportunities
  - Opportunities located within an area prone to surface water flooding

\* Identified through field audit. See Figure 15 for desk-based audit of flat roofs)

Map Scale @A3: 1:6,000





## 5 Implementation and management

### Consultation

- 5.1 Consultation with landowners, local groups and community representatives will be essential to the effective delivery and long term maintenance of the GI features. Key groups to involve would include Bristol Green Capital, local community groups, the Wildlife Trust, neighbourhood forum representatives, developers, the highways authority and statutory consultees. We suggest that a short period of consultation with partners of the Bristol City Centre BID should take place. Consultation should seek to achieve the following:
- Allow interested parties to comment on opportunities which have been identified on their property, or related to sites and infrastructure in which they have an interest.
  - Provide an opportunity to raise any concerns about the proposals, identify constraints, and comment on potential design.
  - Enable the partnership to refine its priorities and deliver GI enhancements with the support of the wider business and residential communities.
- 5.2 Consultation could take the form of one to one sessions or a roundtable workshop type meeting, where complementary objectives could be matched as a basis for future partnership working, and any conflicts identified and addressed. This could be supported by a follow up session as proposals are worked up.
- 5.3 The involvement of Bristol City Council will be integral to the delivery of many of the opportunities identified, particularly those within the public realm, the management of which is the responsibility of the local authority. Highways consent will need to be granted where proposals are within public highways (streets

and pavements) in accordance with the Highways Act 1980. Planning permission may also be required for green roofs and green walls if a building is listed or within a Conservation Area. The Council should be consulted for advice in this process and should be a key partner in delivery.

### Sources of funding

- 5.4 Sources of funding will be a key consideration when prioritising GI opportunities for delivery. As was reflected during the consultation process, any specific strategy will rely not on one partner but on engaging a wide range of delivery partners, including the public sector, small businesses and community groups. A series of options for funding GI delivery are outlined below.

### Environmental funding

- 5.5 In the current economic climate, there is limited government funding available for environmental enhancement projects, and BIDs need to be innovative and flexible in seeking partners to support project delivery and maintenance.
- 5.6 One funding stream which is available for tree planting in particular is the Woodland Trust, which provides free 'urban tree packs', containing saplings, to a range of formal and informal groups, along with guidelines for responsible planting practices.<sup>19</sup>
- The 'Tesco – Bags of Help' program provides small-scale funding for community-led projects that can include developing outdoor space, woodland and wildlife areas.<sup>20</sup>
  - The National Lottery Community Fund provides some opportunities for grants for creating and enhancing green space.
  - Some GI options could potentially be crowdfunded eg. by offering the chance for groups or individuals to 'adopt a buzz stop'.
- 5.7 The city centre BID may also be interested in experimenting with further innovative funding models for GI interventions, and may take inspiration from the 'Rethinking Parks' program.

<sup>19</sup> <https://www.woodlandtrust.org.uk/plant-trees/free-trees/>

<sup>20</sup> <https://www.groundwork.org.uk/Sites/tescocommunityscheme>



### Partnering with specific businesses

- 5.8 Where enhancements will deliver direct benefits to specific companies, it may be appropriate for Bristol City Centre BID to negotiate for the enhancement to be partly or wholly funded by these business partners. This will maximise the enhancements that can be delivered with other funding sources. This approach has been successfully applied by a number of other BIDs, for example the John Lewis Rain Garden in Victoria, and the Grosvenor Casino Green Wall in Edgware Road.
- 5.9 These businesses may also be interested in sponsoring or adopting a 'buzz stop' in the vicinity of their operations as part of CSR activities.

### Section 106 and Community Infrastructure Levy

- 5.10 Section 106 Agreements are drafted between an applicant for planning permission and the planning authority, in order to make a development acceptable in planning terms. Section 106 Agreements must be directly related to the proposed development, so are only applicable if a development is taking place in the immediate vicinity of the BID. Where this is the case, funding can be secured for the provision of open space or green infrastructure to alleviate the predicted effects of the proposed development. The BID could work with the local authority to ensure such an agreement delivers new GI features within the area.
- 5.11 The Community Infrastructure Levy is a charge on all developments that are above a set size threshold within a local authority. The funds secured through the Levy can be pooled and spent on an agreed range of social and environmental improvements within a local area.
- 5.12 15% of CIL funds and 33% of S106 funds are made available for local decision making by councillors for local priority projects, such as improving community centres or parks. The BID should explore where this funding is channelled to in Bristol City Centre, and in particular engage with councillors forming part of Area Committee 4, in order to engage them in discussion on the multiple benefits of delivering GI in the area.

### Other partnerships

- 5.13 'The Frome Reconnected' initiative is a partnership between South Gloucestershire Council, Bristol City Council, Wessex Water, the Environment Agency and the Bristol Avon Catchment Partnership (BACP), which aims to improve the health and resilience of the River Frome and its catchment. Major themes are relevant to this audit and include: responding to and managing flood risk; reconnecting people and communities; and resilient landscapes/sustainable land management.<sup>21</sup> Given that the BID area falls within the Frome Reconnected project area (with the river mostly culverted in this area), the BID may find it useful to engage with the project team to explore where joint projects might be taken forward.

### Additional surveys

- 5.14 For some of the opportunities identified, further survey work will be required to ensure that the site or building is suitable for the proposed feature. This is particularly true of the green roof opportunities, and all buildings will require a structural survey to ensure the building can safely take the additional weight that the installation of a green roof generates. Any future modular green walls should also have a structural assessment, to ensure the wall can support the additional weight of the green wall system.
- 5.15 For all street tree proposals (and those involving large/specimen shrubs with large root systems), a detailed assessment should be made of the presence and vicinity of underground services and associated way leaves, plus overground services/power lines/cables/street lighting. Sight lines and visibility splays in relation to highways and site accesses should also be considered, in liaison with the adopting authority/highway authority. **Section 3** (above) provides more information on key considerations for planting street trees.

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<sup>21</sup> <https://www.southglos.gov.uk/environment/frome-reconnected-project/>



## Design

- 5.16 For most of opportunities design advice should be sought. Appropriate types of design guidance include:
- Planting advice, including species which are beneficial to wildlife (RHS pollinators list).
  - Horticultural, landscape architectural and landscape management expertise will be important for most features, in order to ensure that an appropriate palette of plant species is identified for the conditions.
  - Townscape assessment and design plans to ensure continuity with existing streetscape enhancement proposals, and with established character of the place.
- 5.17 Independent environmental consultants (as opposed to contractors and suppliers) should be consulted prior to installing green roofs and walls, as they can advise on the creation and design based on the roof style and a range of environmental factors.
- 5.18 For the larger opportunities - roof gardens, the incorporation of green walls and the creation of new green spaces - it is also possible that planning permission may be required. This should be scoped with the local authority at the earliest stage.

## Maintenance

- 5.19 Maintenance of the new GI features will be essential to maintain both the provision of functions such as alleviation of surface water flooding, and their visual appearance. Maintenance concerns were also among the most prominent concerns raised during consultation with local stakeholders. The options for maintenance need to be considered by the partnership at the outset, as this is likely to influence prioritisation of opportunities to be delivered.
- 5.20 There should be a clear plan in place for maintenance prior to delivery, and the key partner organisations which will be responsible for maintaining the features should be agreed. As the identified opportunities are within the public realm, the local authority will have a key role to play in agreeing responsibility for management and maintenance.

- 5.21 There may be a need to consider creating an independent body which will oversee GI maintenance, for example a green infrastructure Trust, or a partnership approach could be followed with delivery of various aspects shared between the Council and BID, and therefore partly funded by the BID levy (this model has been used, for example, to deliver environmental maintenance within the Heart of London BID). This might involve engagement with local initiatives such as ParkWork Bristol<sup>22</sup> or GoodGym Bristol,<sup>23</sup> which can harness community energy to help maintain and enhance local green spaces
- 5.22 An 'adopt a feature' scheme could also be implemented, with local businesses and community groups encouraged to adopt and look after greening features installed within the vicinity, as these features will provide local benefits. This could include, for example, watering street trees and planters, litter picking, and reporting any damage or vandalism.
- 5.23 There may also be scope for consideration of community based implementation and management schemes, along the lines of models being pursued in a number of American cities, such as San Francisco's 'Friends of the Urban Forest' a street tree and sidewalk garden planting project.

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<sup>22</sup> <http://www.bristolparksforum.org.uk/parkwork/>

<sup>23</sup> <https://www.goodgym.org/areas/bristol>