THE ENVIRONMENT PARTNERSHIP

GREEN INFRASTRUCTURE, BIODIVERSITY AND OPEN SPACE STUDY

LONDON BOROUGH OF MERTON

GREEN AND BLUE INFRASTRUCTURE TECHNICAL REPORT

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Document Title	Green and Blue Infrastructure Technical Report
Prepared for	London Borough of Merton
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Document Ref	7118.025

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Date	June 2019
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Amendment History					
Version	Date	Modified by	Check / Approved by	Reason(s) issue	Status
1.0	29/01/19	JO	LS	Original	Draft
2.0	22/03/19	JO	LS	Updated following client comments	Draft
3.0	18/06/19	JO	LS	Updated following client comments	Final Draft
4.0	30/06/19	LS	LS	Updated following client comments	Final

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1.0 Context

1.1 Green and Blue Infrastructure (GBI) provides a number of ecosystem services for Merton such as carbon storage, recreational space and the removal of air pollutants, which are beneficial to humans, the economy and the environment.

1.2 GBI has been defined as *'a strategically planned and delivered network comprising the broadest range of high quality green spaces and other environmental features'* (Natural England, 2009[1]). It includes a variety of land cover types such as parks, rivers and private gardens which can be assessed for their provision of ecosystem services.

1.3 Given the pressures on land use, it is important that GBI is assessed as part of the Merton Green Infrastructure, Biodiversity and Open Space Study and strategically managed to maximise the potential benefits for the borough.

Purpose and Scope

1.4 The purpose of the Green and Blue Infrastructure Technical Report is to assess the quantity and quality of the existing provision of GBI in Merton and to assess the current provision within the context of Merton's priorities.

1.5 The Green and Blue Infrastructure Technical Report forms part of a set of Technical Reports which will provide for the Merton Local Plan, and inform the overall Merton Green Infrastructure, Biodiversity and Open Space Study as shown in Figure 1.

1.6 This Technical Report utilises the environmental designations within Merton's Local Plan within the assessment of GBI, but does not make any recommendations to change any designations as this is covered in a separate Technical Report.

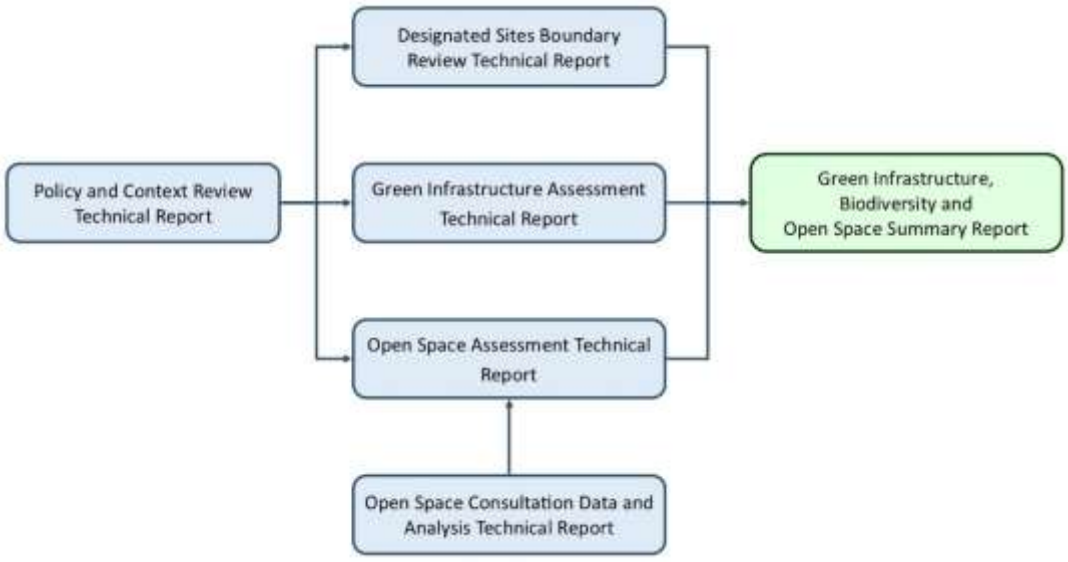

Figure 1: Structure for Green and Blue Infrastructure, Biodiversity and Open Space Study

[1] http://publications.naturalengland.org.uk/publication/35033

2.0 Methodology

2.1 The following methodology was used to assess the London borough of Merton's Green and Blue Infrastructure (GBI).

Typology Mapping

2.2 Typology mapping identifies the land cover of Merton as GBI land cover categories (Typologies). Descriptions of the typologies can be found in Appendix A. This is done to provide a baseline estimate of the quantity of GBI in Merton and its distribution across the borough. This stage is necessary for the subsequent stages of the GBI assessment.

2.3 Figure 2 is an extract from the typology mapping. All maps can be found in Appendix B.

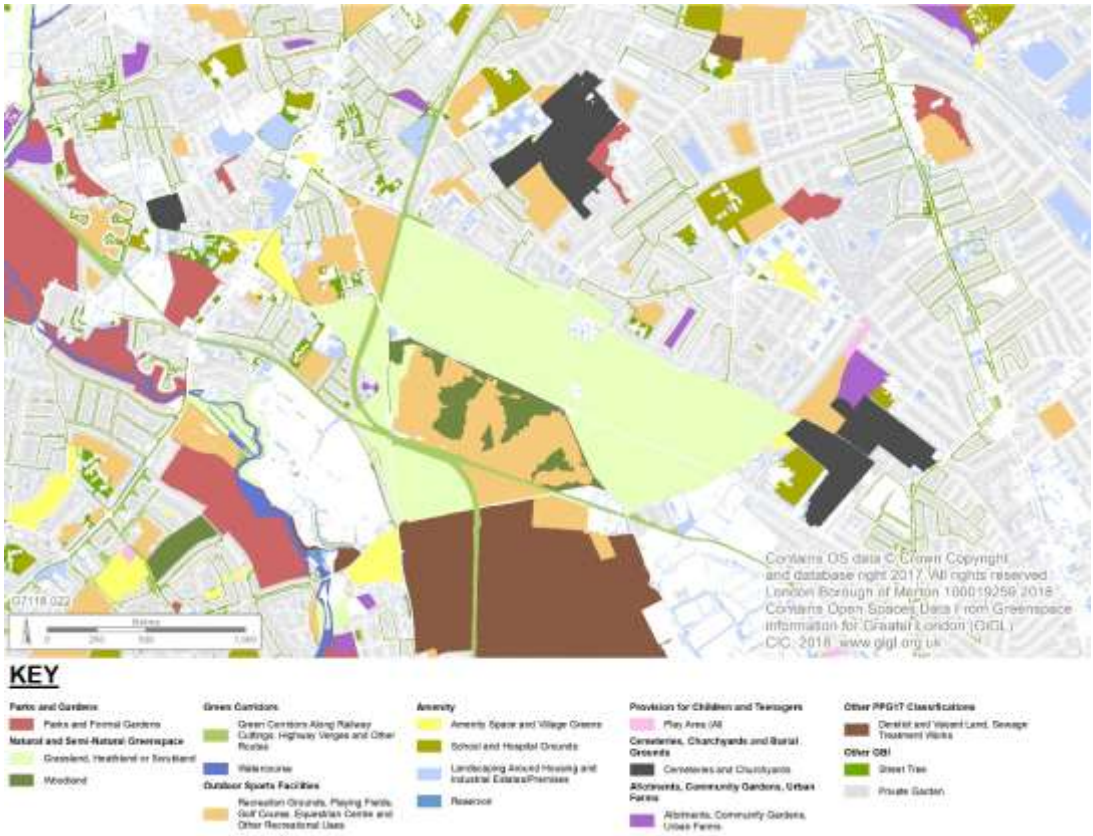

Figure 2: Typology Mapping Extract

2.4 All of the land within the London borough of Merton (LBM) was identified as one of 19 GBI Typologies. To identify potential opportunities for collaboration, all features within 2km of the LBM were assigned a typology and assessed on its functionality. The typologies were primarily derived from Planning Policy Guidance 17[2] (PPG17, 2002) and Greenspace Information for Greater London (GiGL) open space typologies[3] (Table 1). Additional typologies were added to identify additional elements of GBI which are not open space, such as green roofs.

2.5 Although the PPG17 has been superseded by the National Planning Policy Framework (NPPF) (2019[4]), an updated list of open space typologies has not yet been released, and those identified in PPG17 is regarded as the best categorisation of open space.

2.6 The open space typologies proposed by GiGL were used because they are also based upon the PPG17, and supply a greater level of detail regarding the use of the open spaces.

2.7 Additional typologies were added because LBM has components of GBI which are not incorporated into the PPG17 or GiGL classifications, and it is important that these typologies are quantified and assessed.

Table 1: Green and Blue Infrastructure Typologies

Open Space Category (PPG17)	GBI Typology
Parks and Gardens	Parks and Formal Gardens
Natural and Semi-Natural Greenspace	Woodland
	Grassland, Heathland and Scrubland
Green Corridors	Watercourse
	Green Corridors Along Railways, Highways and Other Routes
Recreation and Outdoor Sports Facilities	Playing Fields, Golf Courses, Equestrian Centre and Other Recreational Grounds
Amenity Green Space and Education	Amenity Green Spaces and Village Greens
	School and Hospital Grounds
	Landscaping Around Housing and Industrial Estates/Premises

[2] https://webarchive.nationalarchives.gov.uk/20120920042539/http://www.communities.gov.uk/documents/planningandbuilding/pdf/ppg17.pdf
[3] https://www.gigl.org.uk/open-spaces/open-space-categories/
[4] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779764/NPPF_Feb_2019_web.pdf

Open Space Category (PPG17)	GBI Typology
	Reservoir
Play Space Provision for Children and Teenagers	Play Area (All Types)
Allotments, Community Gardens and City Farms	Allotment, Community Garden or Urban Farm
Cemeteries and Churchyards	Cemeteries and Churchyards
Urban Fringe	Agricultural Land and Horticulture
Other	Derelict and Vacant Land, Sewage Treatment Works
Non-PPG17 Classifications	Green Roof
	Street Trees
	Private Domestic Garden
	Not Green and Blue Infrastructure

Note: No civic spaces were identified within LBM.

2.8 GBI Typologies were assigned to Ordnance Survey Topography MasterMap features. Features within a site in the GiGL Open Spaces Dataset were assigned a GBI typology based on the site's 'Primary Use' (details can be found in the below Table 2). Additional datasets were used to identify other GBI typologies:

- Ordnance Survey Topography MasterMap[5]
- GiGL Urban Greening[6]
- GiGL Private Gardens
- GLA Local Authority Maintained Trees[7]

2.9 A visual inspection of the typology mapping was also completed to identify any anomalous typologies.

2.10 The following methods were used to assign typologies:

Table 2: Green and Blue Infrastructure Typology Method & Data

GBI Typology	Source Dataset	Method
Parks and Formal Gardens	GiGL_OpenSpace_Sites	Primary Use = Park, Formal Garden

[5] https://www.ordnancesurvey.co.uk/business-and-government/products/topography-layer.html
[6] https://www.gigl.org.uk/urban-greening/
[7] https://data.london.gov.uk/dataset/local-authority-maintained-trees

GBI Typology	Source Dataset	Method
Woodland	GiGL_OpenSpace_Sites	Primary Use = Private/Public Woodland
Grassland, Heathland or Scrubland	GiGL_OpenSpace_Sites,	Primary Use = Nature reserve, Common
Watercourse	GiGL_OpenSpace_Sites	Primary Use = River
Green Corridors Along Railways, Highways and Other Routes	GiGL_OpenSpace_Sites	Primary Use = Railway Cutting and Railway Embankment, Disused Railway Trackbed, Road Island/Verge, Walking/cycling route
Playing Fields, Golf Courses, Equestrian Centre and Other Recreational Grounds	GiGL_OpenSpace_Sites	Primary Use = Playing Field, Golf Course, Recreation Ground, Other Recreational, Equestrian Centre.
Amenity Green Spaces and Village Greens	GiGL_OpenSpace_Sites	Primary Use = Amenity Green Space, Village Green
School and Hospital Grounds	GiGL_OpenSpace_Sites	Primary use = Educational, Hospital
Landscaping Around Housing and Industrial Estates/Premises	GiGL_OpenSpace_Sites, OS Topography Mastermap	GiGL Primary use = Landscaping around Premises; OS Legend = '0000 Natural surface'
Reservoir	GiGL_OpenSpace_Sites	Primary Use = Reservoir
Play Area (All Types)	GiGL_OpenSpace_Sites	Primary Use = Play space, Adventure Playground, Youth Area
Allotment, Community Garden or Urban Farm	GiGL_OpenSpace_Sites	Primary Use = Allotments, Community Garden, City Farm
Cemeteries and Churchyards	GiGL_OpenSpace_Sites	Primary Use = Cemetery/Churchyards
Agricultural Land and Horticulture	GiGL_OpenSpace_Sites	Primary Use = Agriculture, Nursery/Horticulture

GBI Typology	Source Dataset	Method
Derelict and Vacant Land, Sewage Treatment Works	GiGL_OpenSpace_Sites	Primary Use = Vacant Land, Land Reclamation, Sewage/Water works
Green Roof	GiGL_Urban_Greening_Point, OS Topography Mastermap	Points (adjusted for accuracy) used to select feature from OS Topography Mastermap
Street Trees	London_street_trees_gla_20180214, OS Topography Mastermap	Points used to select feature from OS Topography Mastermap
Private Domestic Gardens	GiGL – OSMMGardens_region; OS Topography Mastermap	Taken from source dataset; OS Legend = '0000 Multiple surface (garden)'
Not Green and Blue Infrastructure		Everything remaining following GBI typology identification

Functionality Mapping

2.11 Functionality mapping uses the results of the typology mapping to provide a baseline estimate of the quality of GBI across the borough.

2.12 Figure 3 shows an extract of the functionality mapping.

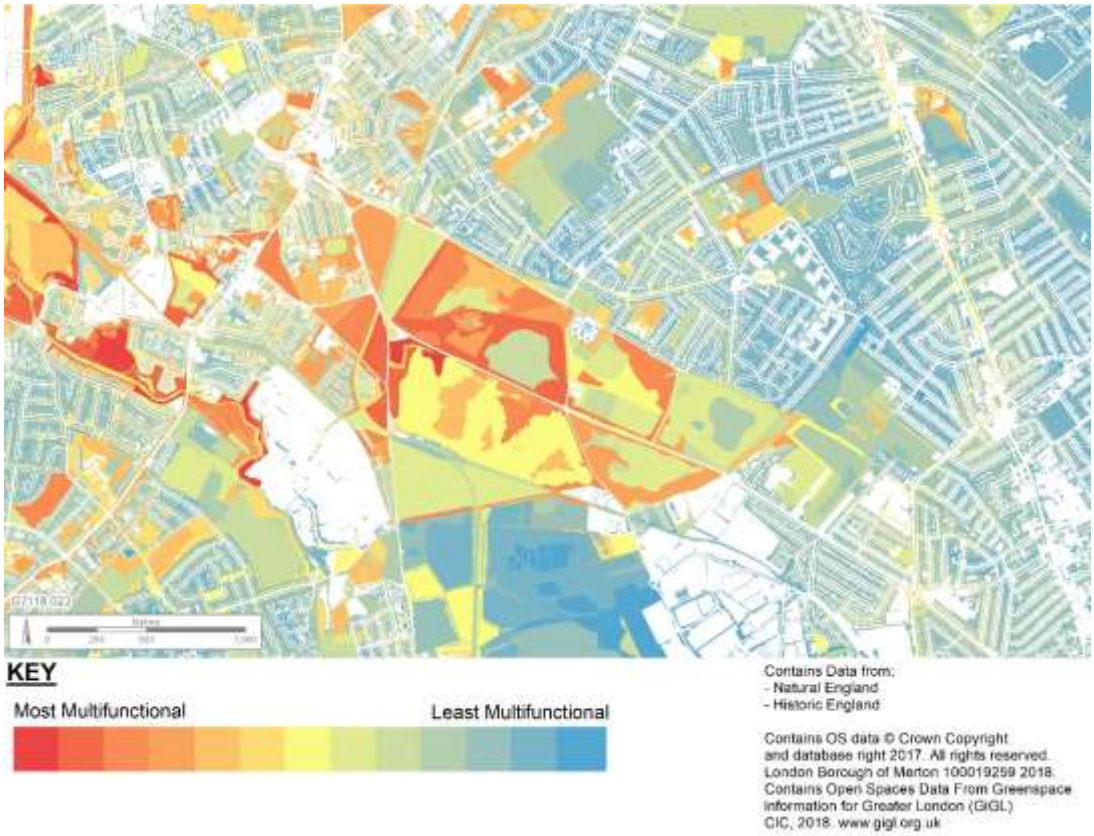

Figure 3: Functionality Mapping Extract

2.13 A Typology Vs Function Matrix was used to determine what GBI functions each of the typologies performs (Figure 4). Within the matrix, there was unconditional functionality, when typology performs a function regardless of the situation; for example school grounds will always contribute to learning. There was also conditional functionality, as the provision of a function was dependent on its location; for example, GBI may only perform the education function if it is near to a school. Many typologies were multifunctional, for example a park may provide a source of recreation, but can also provide a habitat for wildlife and water infiltration (descriptions of each function can be found in Table 3). This is represented in the maps with a higher functionality score.

Table 3: Green and Blue Infrastructure Functions

GBI Function	Description
Recreation – Public	Areas that can be freely used by members of the public for recreation purposes without any restrictions to access.
Recreation – Private	Areas that can only be used for recreation by the landowner or those invited by the landowner.
Recreation – Public with Restrictions	Areas that can be used by members of the public for recreational purposes, but the access or use of the space is restricted. This could be because the space is only accessible on a membership basis, or is only open at selected times.
Green Travel Route	Areas that can act as off-road routes for pedestrians and cyclists.
Aesthetic	Areas which improve the image of an area, which can make the area a more attractive place to live, work and visit.
Shading from Sun	Areas which protect people or surfaces from solar radiation. This can reduce surface temperatures and increase comfort levels. This function is key in the adaptation to climate change.
Evaporative Cooling	Areas where vegetation transpires water from their surfaces, which cools their immediate surroundings.
Trapping/Removal of Pollutants	Pollutants such as Ozone, Nitrogen Dioxide and Particulates can be removed from the air by vegetation through their leaf stoma or through interception. Vegetation can also act as a filter to remove pollutants from water.
Noise Absorption	Areas which are able to intercept and reduce the impact of noise on the surrounding area.
Habitat for Wildlife	Areas which are able to provide a habitat, or act as a food source for local wildlife.
Corridor for Wildlife	Areas which act as routes for species to move between habitat areas.
Heritage	Areas which contribute to the historic links in the landscape, such as designated monuments.
Culture	Areas used for cultural purposes, such as public art or events.

GBI Function	Description
Carbon Storage	Areas which make a notable contribution to the sequestration and storage of carbon from the atmosphere. All vegetation is able to remove carbon, however trees are thought to be particularly valuable.
Food Production	Areas used for growing crops or grazing animals.
Learning	Areas which contribute to the knowledge of individuals about the environment.
Water Storage	Areas which are able to store water for use by humans.
Water Interception	Areas which are able to intercept rainfall and slow the water's flow into the ground. This can reduce the risk of flooding.
Water Infiltration	Areas which assist the movement of water or rain into the ground. This can reduce surface flow and the risk of flooding.

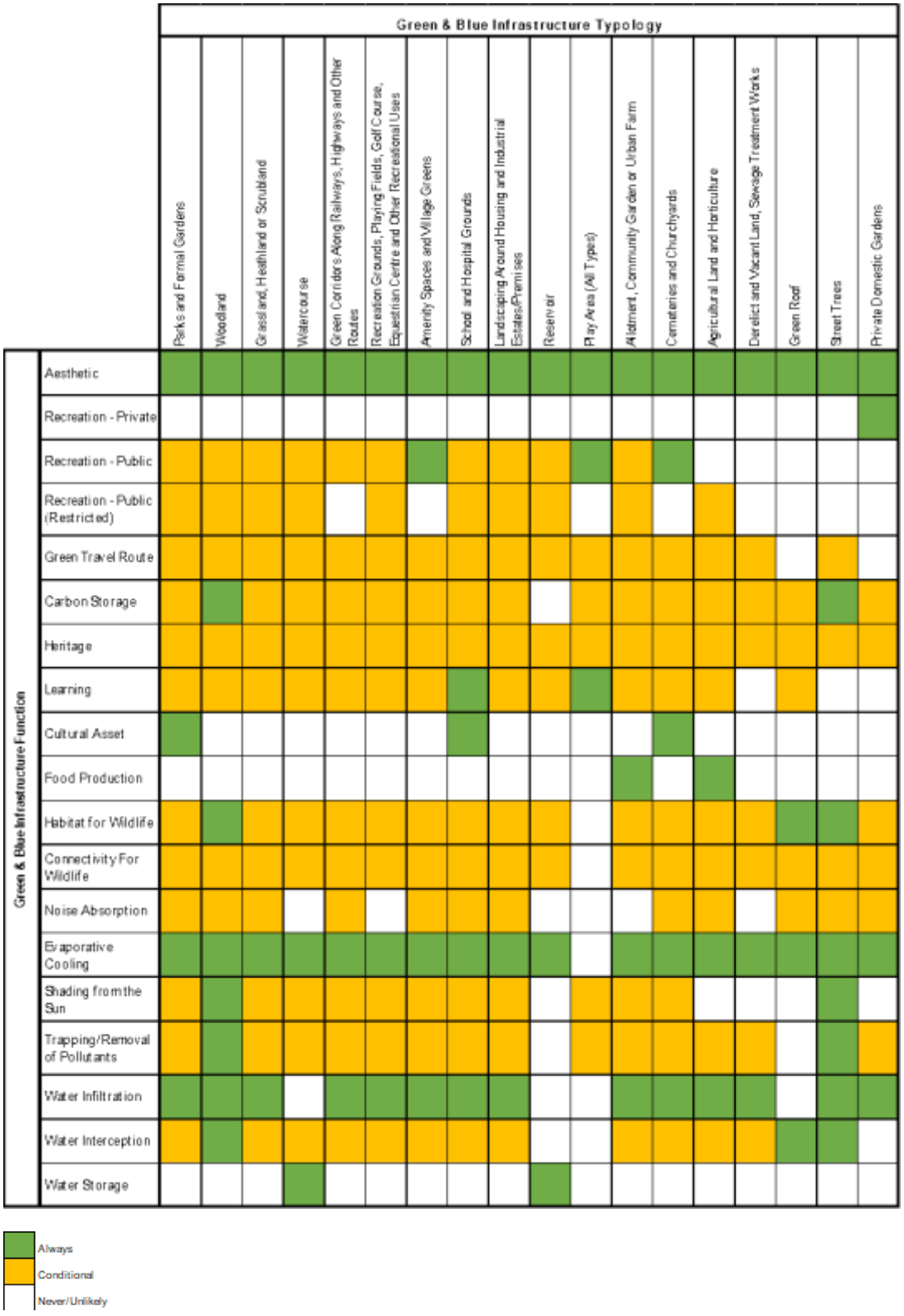

Figure 4: Typology vs Functionality Matrix

2.14 The following datasets and rules were used to determine conditional functionality (Table 4).

Table 4: Green and Blue Infrastructure Functions Method & Data

GBI Function	Method/Rule	Datasets used
Recreation – Public	If there are no restrictions on access	GiGL Open Spaces Dataset (Access = 'Free' or 'De facto')
Recreation - Public Restricted	If there are some restrictions on access	GiGL Open Spaces Dataset (Access = 'Restricted')
Green Travel Route	If within 20m of Public Right of Way (PRoW) or Cycle Network	LBM PRoW and Existing Cycle Ways
Carbon Storage	If it contains tree cover	OS Topology MasterMap (stated as coniferous/nonconiferous trees); GLA Local Authority Maintained Trees (within 2m of point)
Heritage	If within area of historical importance	Historic England Designations (Scheduled Ancient Monument, Registered Park and Garden, within 50m of listed building); LBM Policy (Conservation Areas, Local Historic Parks and Gardens)
Learning	If within 500m of an education centre	LBM Education Centres
Habitat For Wildlife	If it intersects a Core Biodiversity Area (SSSI, SPA, SAC, SINC) or Priority Habitat	Natural England Designations (SSSIs, SACs, SPAs, Priority Habitats); LBM Policy (SINCs)
Connectivity for Wildlife	If within 50m of Habitat Functionality	GBI dataset produced for this study

GBI Function	Method/Rule	Datasets used
Noise Absorption	If within 250m of A Roads, Motorways or Railways	OS Open Data - Vector Map District (Class = 'A Road' or 'Motorway')
Shading from the Sun	If it contains tree cover	OS Topology MasterMap (stated as coniferous/nonconiferous trees); GLA Local Authority Maintained Trees (within 2m of point)
Trapping/Removal of Pollutants	If it contains tree cover	OS Topology MasterMap (stated as coniferous/nonconiferous trees); GLA Local Authority Maintained Trees (within 2m of point)
Water Interception	If it contains tree cover	OS Topology MasterMap (stated as coniferous/nonconiferous trees); GLA Local Authority Maintained Trees (within 2m of point)

Priority Assessment

2.15 GBI benefits should be provided wherever possible, however the Priority Assessment identified areas which are most in need for each of the priorities identified.

2.16 Figure 5 below shows an extract from the priority mapping.

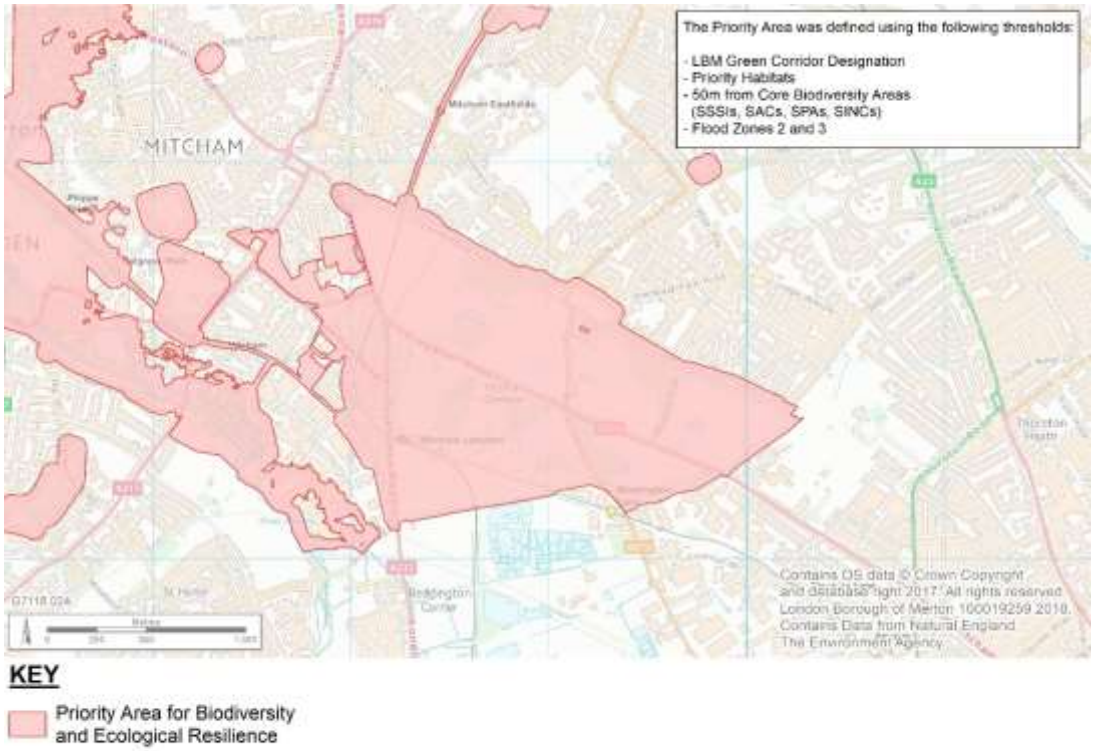

Figure 5: Priority Mapping Extract

2.17 Priorities were identified from the London Plan (2018[8]), The London Environment Strategy (LES, 2018[9]), the All London Green Grid (ALGG, 2012[10]); and consultation with LBM. The priorities were located spatially through the selection of thresholds of socioeconomic or environmental data (Table 5).

[8] https://www.london.gov.uk/sites/default/files/draft_london_plan_-showing_minor_suggested_changes_july_2018.pdf
[9] https://www.london.gov.uk/sites/default/files/london_environment_strategy_0.pdf
[10] https://www.london.gov.uk/sites/default/files/algg_spg_mar2012.pdf

Table 5: Green and Blue Infrastructure Priories Method & Data

Priority	Objectives of the London Plan, LES or ALGG	Threshold	Datasets/Methods
Promoting Physical and Mental Health and Wellbeing	London Plan: Promote Mental and Physical Health and Wellbeing Play, Sport and Recreation LES: Promote Healthy Living ALGG: Promote Healthy Living Increase Access to Nature Access to Open Space/Urban Fringe	Poor Health	ONS 2015 2011 Census >15% LSOA has Long-term health problem or disability or >5% LSOA has Bad or Very Bad Health
		100m from Hospitals	LBM Hospitals
		Access to Nature	GiGL Areas of Deficiency for access to Sites of Importance for Nature Conservation
		Open Space Deficiency	GiGL Areas of Deficiency for access to Open Spaces Data Required
Supporting Learning about the Environment	London Plan: Learn about the Environment	100m from Education Centres	LBM Education Centres: Adult Education Centres Children Centres Primary Schools Secondary Schools Sixth Form Centres Youth Centres Special Needs Centres Pupil Referral Units
		Access to Nature	GiGL Areas of Deficiency for access to Sites of Importance for Nature Conservation

Priority	Objectives of the London Plan, LES or ALGG	Threshold	Datasets/Methods
Supporting Landscape and Heritage Conservation	London Plan: Support of Heritage Conservation ALGG: Conserve and Enhance Heritage Features	Conservation Areas	Merton Core Planning Strategy (2011) and Merton Sites and Policies Plan (2014) *Conservation Areas, Local Historic Parks and Gardens* Historic England Designations *Scheduled Monuments, Registered Park and Gardens*
		Metropolitan Open Land	London Plan Metropolitan Open Land Policy
Encouraging Walking and Cycling	London Plan: Encourage Walking and Cycling LES: Encourage Walking and Cycling ALGG: Improve Sustainable Travel Connections Access to Urban Fringe	10m from PROW	LBM Public Right of Way
		10m from Existing and Proposed Cycle Routes	LBM Policy, Existing Cycle Routes, Cycle Routes 22TN
Supporting Housing Growth and Quality of Life	London Plan: Recognise Economic and Social Value	Wards with Major Housing Growth	LBM Housing Trajectory and SHLAA (2017) Wards with over 800 additional homes between 2017-2041
		Areas of High Deprivation	ONS (2015) LSOAs with Indices of Multiple Deprivation (IMD) rank in lowest 20% in London

Priority	Objectives of the London Plan, LES or ALGG	Threshold	Datasets/Methods
Supporting Economic Growth and Investment	London Plan: Recognise Economic and Social Value	Areas within 50m of Economically Valuable Areas	Merton Core Planning Strategy (2011) and Merton Sites and Policies Plan (2014)Strategic Industrial Location, Locally Significant Industrial Area, Wimbledon Central Shopping Frontage, Core Shopping Frontages, Secondary Shopping Frontages
Improving Air and Water Quality	London Plan: Improve Air and Water Quality LES: Improve Air and Water Quality ALGG: Improve Air Quality and Soundscapes	100m from A Roads, Motorways, Railways	OS Open Data - Vector Map District
		Wards with Tree Canopy Cover <21%	Calculated using the i-Tree Canopy Coverage Tool[11].
		Air Quality Focus Areas	GLA London Atmospheric Emissions Inventory 2013: Air Quality Focus Areas
Adapting to Climate Change and the Urban Heat Island Effect	London Plan: Adapt to Climate Change and the Urban Heat-Island Effect	Flood Zones 2 and 3	Environment Agency: Flood Zones 2 and 3
		Sealed Surface Coverage for LSOA >50%	Typology mapping results to calculate the percentage of Non-GBI

[11] https://canopy.itreetools.org/

Priority	Objectives of the London Plan, LES or ALGG	Threshold	Datasets/Methods
	Conserve and Enhance Biodiversity and Ecological Resilience LES: Lessen the Impacts of Climate Change Store Carbon Improve Biodiversity and Ecological Resilience	Wards with Tree Canopy Cover <21%	Calculated using the i-Tree Canopy Coverage Tool[12].
Conserving and Enhancing Biodiversity and Ecological Resilience	London Plan: Conserve and Enhance Biodiversity and Ecological Resilience LES: Improve Biodiversity and Ecological Resilience	Green Corridors	Merton Core Planning Strategy (2011) and Merton Sites and Policies Plan (2014)Green Corridor
		Priority Habitats	Natural England Designations
		50m from Core Biodiversity Areas (SSSIs, SACs, SPAs, SINCs)	Natural England Designations
		Flood Zones 2 and 3	Environment Agency

[12] https://canopy.itreetools.org/

Overlay Stage

2.18 This stage compared the results of the Functionality Mapping with the Priority Assessment to assess if GBI benefits are provided in the areas where they are needed the most.

2.19 Figure 6 shows an extract from the overlay stage.

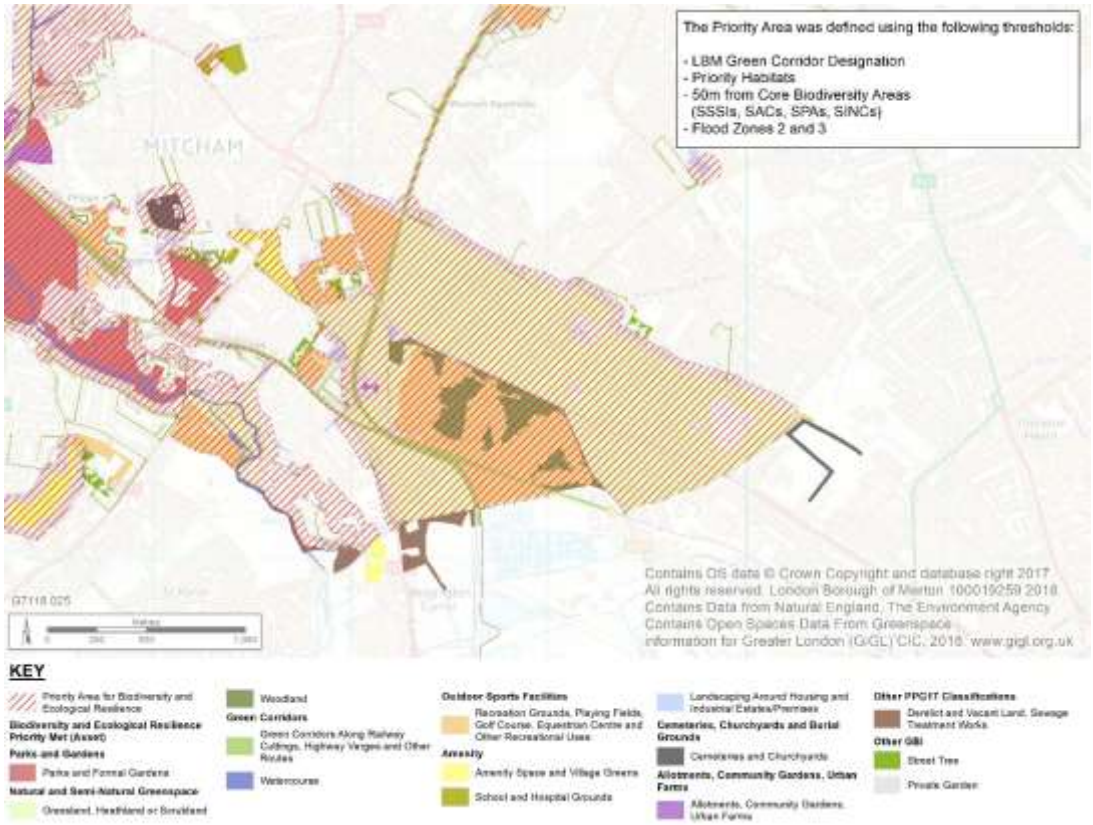

Figure 6: Overlay Stage Extract

2.20 This stage identified Assets - features which performed a relevant function in a Priority Area; such as the removal of pollutants in the Air and Water Quality Priority Area. The Functions Vs Priorities Matrix (Figure 7) was used to identify which functions contributed to each of the priorities. The Overlay Stage identified:

- Features which provided a function within the Priority Area – Assets
- Features which provided a function outside the Priority Area
- Locations within the Priority Area which have no provision of functions

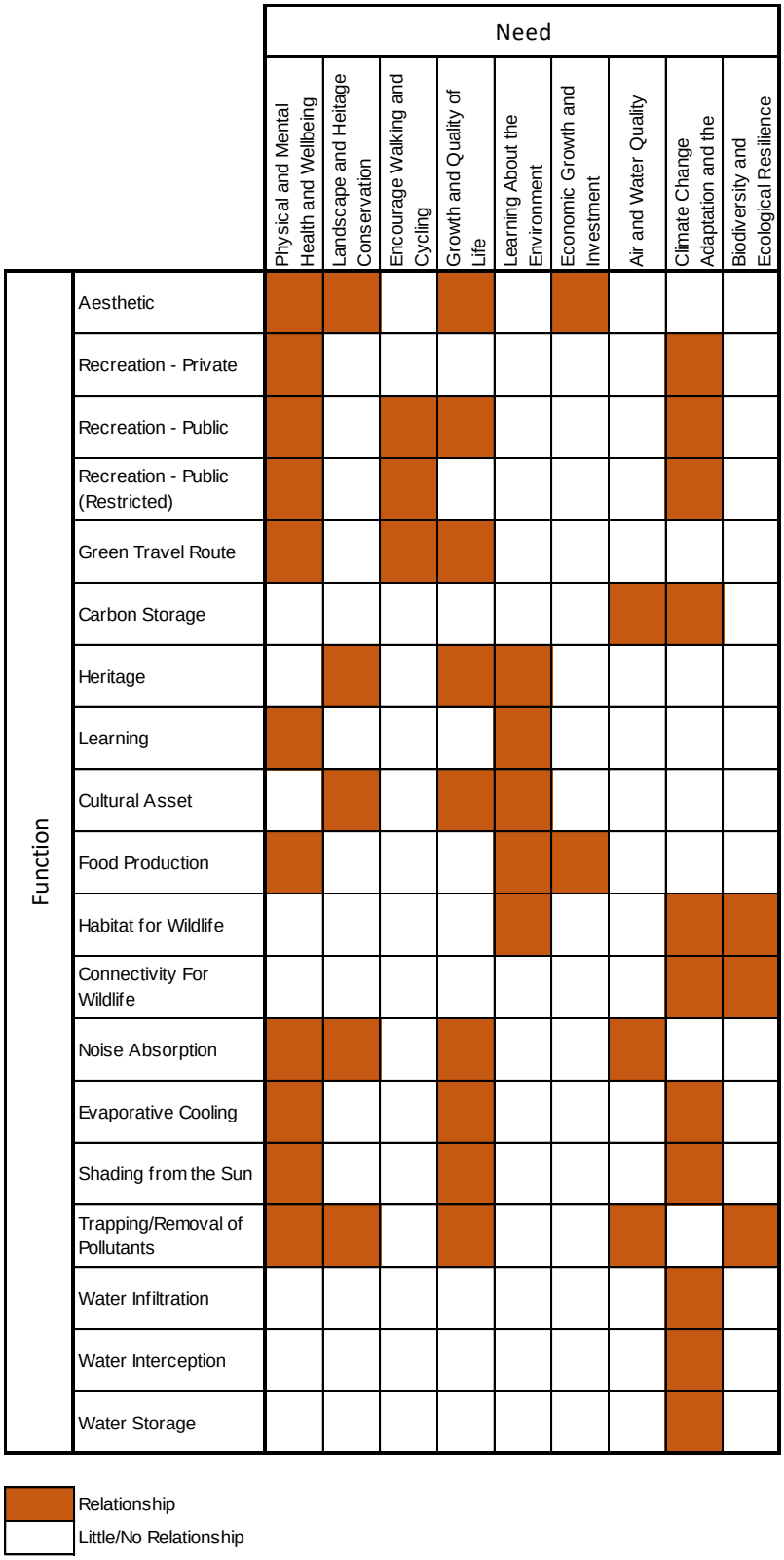

Figure 7: Functionality vs Priority Matrix

Key Asset Identification

2.21 Key Asset Identification summarises the results of the Overlay Stage to identify areas of GBI which provide the most benefit to Merton, and also those areas where GBI may need to be enhanced or created.

2.22 Figure 8 shows an extract of key asset identification.

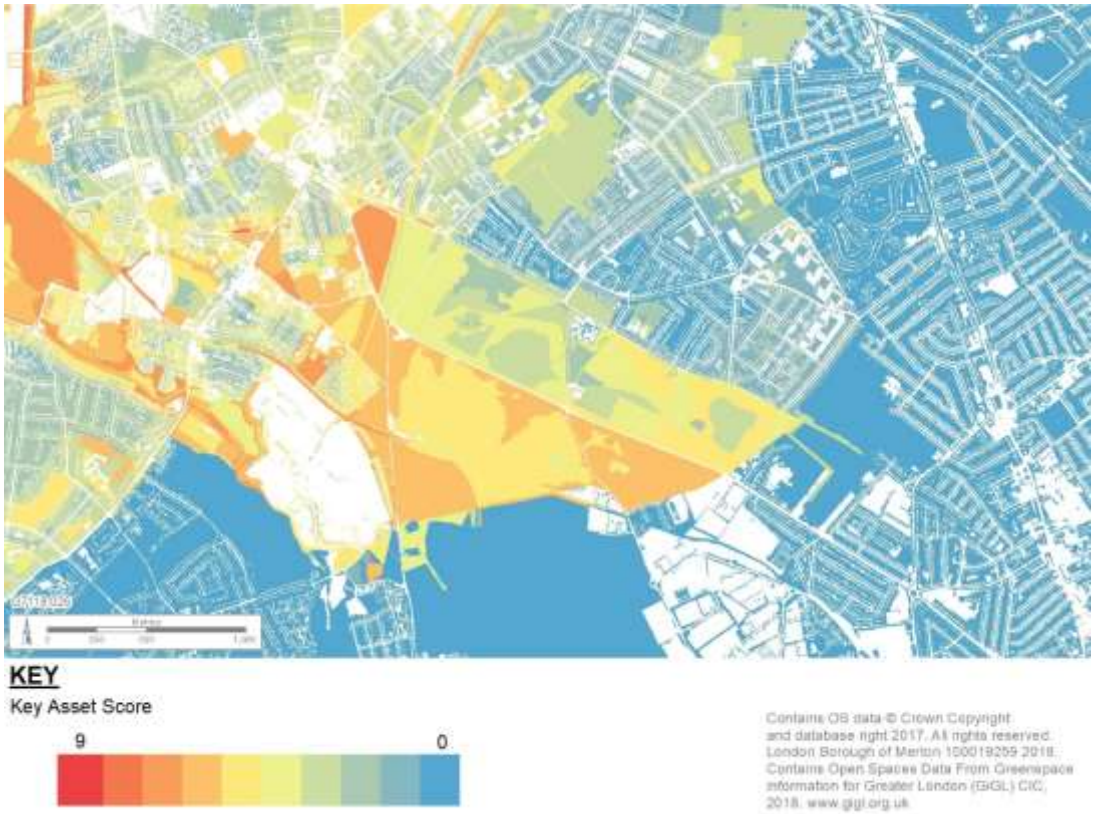

Figure 8: Key Asset Identification Extract

2.23 Key assets are features which act as assets for multiple priorities. Following the overlay stage, the number of priorities each feature fulfils was totalled to give to give a Key Asset Score. This score was used to identify the most important GBI features within the borough, as the higher the score, the more priorities the feature contributes to. For example in Figure 8, elements with a higher Key Asset Score (i.e. closer to 9) are among the most important features of GBI in the borough.

Data Limitations

2.24 The accuracy and value of this study is dependent on the source datasets used. Limitations of the GBI dataset are identified below, which are a result of the source datasets used.

GLA Local Authority Maintained Trees

2.25 This dataset was created by the GLA in 2015 and updated in March 2018, however it was derived from surveys earlier than 2015. The age of the dataset will have had an impact on the identification of street trees which are currently found in the borough.

Tree Canopy Coverage

2.26 The i-Tree Canopy tool[13] was used to calculate tree canopy coverage for each ward, however the accuracy of this tool relies upon the aerial imagery provided, and the number of points measured. The Curio Canopy dataset (2018) was considered as an alternative, however it was not used due to licence restrictions.

Ordnance Survey Topography MasterMap

2.27 The OS MasterMap was used as a source dataset for the study and represented the LBM at the finest detail possible. Unfortunately, the scale of data capture was not able to distinguish between the components of private gardens, such as the vegetated and non-vegetated areas.

2.28 This finer level of detail may also result in minor different area measurements for open spaces in the borough, as the source datasets used to locate open spaces were captured at a larger scale than the OS MasterMap.

[13] https://canopy.itreetools.org/

3.0 Results

3.1 GIS maps referred to in the report as ('G7118') can be found in Appendix B to this report.

Typology Mapping (G7118.020)

Table 6: Green and Blue Infrastructure Land Cover by Typology

GBI Typology	Area (Ha)	Proportion of borough (%)	Proportion of GBI (%)
Private Domestic Garden	969.25	25.76	38.82
Playing Fields, Golf Courses, Equestrian Centre and Other Recreational Grounds	416.46	11.07	16.68
Grassland, Heathland and Scrubland	362.72	9.64	14.53
Parks and Formal Gardens	190.91	5.07	7.65
Street Tree	121.11	3.22	4.85
Landscaping Around Housing and Industrial Estates/Premises	93.54	2.49	3.75
School and Hospital Grounds	82.86	2.20	3.32
Cemeteries and Churchyards	81.68	2.17	3.27
Green Corridors Along Railways, Highways and Other Routes	72.31	1.92	2.90
Allotment, Community Garden or Urban Farm	31.85	0.85	1.28
Watercourse	25.08	0.67	1.00

GBI Typology	Area (Ha)	Proportion of borough (%)	Proportion of GBI (%)
Amenity Green Spaces and Village Greens	23.39	0.62	0.94
Woodland	15.82	0.42	0.63
Play Area (All Types)	4.98	0.13	0.20
Agricultural Land and Horticulture	2.91	0.08	0.12
Green Roof	1.71	0.05	0.07
Derelict and Vacant Land, Sewage Treatment Works	0.02	<0.001	<0.001
Not GI	1265.87	33.64	
Total	3762.47	100.00	100.00

3.2 The most prominent typology of GBI in LBM was found to be private domestic gardens which accounted for over 25% of the borough (Table 6). When private gardens are excluded, the most prominent GBI typology was found to be outdoor sports facilities and grassland, heathland or scrubland, which together account for over 20% of the borough.

3.3 Wimbledon Common, Morden Hall Park, Morden Park and Mitcham Common are prominent features within the borough, and a range of other typologies were also identified within close proximity to the River Wandle. A network of street trees and green corridors was also found throughout the borough. The following paragraphs describe the distributions of the GBI Typologies:

Parks and Formal Gardens

3.4 Parks and formal gardens were found throughout the borough. Morden Hall Park, Morden Park and Wimbledon Park were prominent Parks within the borough. Other smaller parks were identified in Colliers Wood and Mitcham. Holland Gardens was the only park identified in Raynes Park.

Woodland

3.5 Fourteen major woodlands were identified in LBM, including Mitcham Common Golf Course, Sycamore Woodland Block (Cricket Green), Seymour Road Park (Wimbledon Park), Atkinson Morley's Hospital Woodland and the woodland surrounding the River Wandle. There may have been woodland areas within other typologies such as cemeteries, however these woodlands represent open space sites which are predominantly woodland with few other uses.

Grassland, Heathland or Scrubland

3.6 The typology mapping found grassland, heathland and scrubland dispersed across the borough, the largest of which located on Wimbledon Common and Mitcham Common. Other areas were located on Cannon Hill Common and surrounding the River Wandle.

Watercourse

3.7 Three major watercourses were identified in LBM: the River Wandle, Beverley Brook and Pyl Brook. The River Wandle runs North-South in the centre of the borough, and Pyl Brook runs in a South-West direction to join Beverley Brook and flow North along the western boundary of the borough.

Green Corridors Along Railways, Highways and Other Routes

3.8 Green corridors were identified along most major railways through the borough. Notable green corridors were also identified in the area surrounding the Kingston Bypass. Many major roads in LBM did not have surrounding green corridors, including the A236, Merton High Street and London Road.

Playing Fields, Golf Courses, Equestrian Centre and Other Recreational Grounds

3.9 This typology was found dispersed throughout the borough. The golf courses in Mitcham Common, Wimbledon Common and Wimbledon Park are prominent features, and there are notable recreation grounds in Morden and Raynes Park.

Amenity Green Spaces and Village Greens

3.10 Amenity green spaces were identified throughout the borough. The most notable spaces include St Helier Avenue, Cherry Tree Estate Open Space, Donnelly Green, Pyl Brook Open Space and Brenley Park.

School and Hospital Grounds

3.11 The distribution of this typology was associated with the distribution of education and medical centres within LBM.

Landscaping Around Housing Estates and Industrial Estates/Premises

3.12 Clusters of larger landscaped sites were identified in Morden, surrounding Epsom Road and in Mitcham, North-West of Mitcham Common. A number of additional smaller parcels were identified throughout the borough which were mainly road verges or small landscaped areas associated with industrial units.

Reservoir

3.13 No reservoirs were identified within LBM. One reservoir was identified to the south of the borough adjacent to the River Wandle (Watermead Lane Covered Reservoir).

Play Area (All Types)

3.14 Six play areas were identified in the borough, which were clustered in the area North of Mitcham Common. Other play areas may be identified within other typologies, such as within Morden Park, however these sites were identified as open spaces which are used primarily as a play area.

Allotment, Community Garden or Urban Farm

3.15 Allotments, community gardens and urban farms were found throughout the borough. Clusters of sites were identified in the East of the borough, North of Morden Hall Park; and in the West of the borough surrounding Cannon Hill Common. Allotments were also identified in the North of the borough, in the area surrounding the River Wandle.

Cemeteries and Churchyards

3.16 The most prominent cemeteries are located towards the periphery of the borough: Gap Road Cemetery (Wimbledon), London Road Cemetery (Mitcham), Streatham Park and Rowan Road Cemeteries (Mitcham) and Merton and Sutton Cemetery and Morden Cemetery (Morden). Additional smaller cemeteries are located in the inner area of the borough. There are also a number of other cemeteries in neighbouring boroughs.

Agricultural Land and Horticulture

3.17 Thompsons Nursery (Motspur Park) was the only site which was identified as agricultural land and horticulture in the borough.

Derelict and Vacant Land, Sewage Treatment Works

3.18 A small amount of this typology was identified in Merton, located along the southern boundary. The areas were largely associated with sites in the neighbouring borough.

Green Roofs

3.19 Green roofs were identified in Wimbledon, Colliers Wood and Raynes Park, primarily in the area surrounding Wimbledon Common and Wimbledon Park. The roofs were primarily associated with domestic dwellings, however the largest of which was located on the retail unit on the B282. No green roofs were identified in Morden or Mitcham.

Street Trees

3.20 A network of street trees can be located in the borough. However, there was an absence of street trees in the industrial estate surrounding Jubilee Way (Colliers Wood); in Wimbledon, east of Wimbledon Common; in Mitcham surrounding Lavender Park, east of Mitcham Common and in the Willow Lane Industrial Estate.

Private Domestic Gardens

3.21 This typology is the dominant GBI typology and can be found throughout LBM.

Functionality Mapping (G7118.021)

3.22 A total of 19 functions were assessed in this study (Table 3 and Figure 3), and the number of functions in LBM was found to vary between 15 and 3, with an average of 6.

3.23 Areas of GBI with the highest multi-functionality were found within Morden Park, Mitcham Common, Wimbledon Common, Wimbledon Park and the areas surrounding the River Wandle (Table 7). The high multi-functionality of these areas was probably caused by the presence of trees and woodland in these open spaces, which perform a number of GBI functions.

Table 7: Functions provided with the highest multi-functional features in open spaces

Function	Morden Park	Mitcham Common	Wimbledon Common	River Wandle, Morden Hall Park and surrounding area
Aesthetic	✓	✓	✓	✓
Recreation - Private				
Recreation - Public	✓	✓	✓	✓
Recreation - Public (Restricted)		✓	✓	
Green Travel Route	✓	✓	✓	✓
Carbon Storage	✓	✓	✓	✓
Heritage	✓	✓	✓	✓
Learning	✓	✓	✓	✓

Function	Morden Park	Mitcham Common	Wimbledon Common	River Wandle, Morden Hall Park and surrounding area
Culture	✓			✓
Food Production				
Habitat for Wildlife	✓	✓	✓	✓
Connectivity for Wildlife	✓	✓	✓	✓
Noise Absorption	✓	✓		✓
Evaporative Cooling	✓	✓	✓	✓
Shading from the Sun	✓	✓	✓	✓
Trapping/Removal of Pollutants	✓	✓	✓	✓
Water Infiltration	✓	✓	✓	✓
Water Interception	✓	✓	✓	✓
Water Storage				
Total Number of Functions	15	15	14	15

3.24 Street trees and woodlands were found to perform a number of GBI functions including the removal of pollutants, shading from the sun and carbon storage. Multi-functionality within these typologies was found to vary between 15 and 9, with an average of 10, which suggests that areas which contain trees are among the most multifunctional components of GBI.

3.25 Private domestic gardens were found to perform between 12 and 4 functions, however the average functionality was found to be 5, which suggests they are among the least multifunctional typologies.

Priority Mapping and Overlay Stage

3.26 The results from the priority mapping and overlay stage are discussed together below.

Promoting Physical and Mental Health and Wellbeing (G7118.036 & G7118.041)

3.27 The priority area for physical and mental health and wellbeing was found in many parts of the Borough. Large areas of need were identified in Raynes Park, Morden and Mitcham. Additional need was identified in Colliers Wood.

3.28 Assets were identified in the West, South and North-East of the Borough. A number of assets were identified in the area surrounding the railway lines, and in many of the open spaces in the Borough.

3.29 A number of open spaces were identified as assets in Merton, including Mitcham Common, Morden Park, Morden Hall Park and Prince George's Playing Fields.

3.30 Lack of provision was found in many industrial estates in the Borough, including those South of Merantun Way and West of Mitcham Common, Wier Road. Where the priority was met in these areas, the GBI was largely composed of the landscaping around housing and industrial estates/premises typology.

Supporting Learning about the Environment (G7118.037 & G7118.042)

3.31 The priority area for learning about the environment was found to be in locations surrounding the railway lines and Streatham Road. Other clusters of need surrounding education centres were also identified throughout the borough, in particular in West Mitcham.

3.32 Assets were identified in the South, East and North-West of the borough. A considerable number of assets were identified in the area surrounding the railway lines throughout the borough and Streatham Road. Many typologies, including street trees and school grounds, were identified as assets surrounding education centres in the borough.

3.33 A number of open spaces were also identified as assets, including Morden Park, Morden Recreation Ground, Wimbledon Park and Royal Wimbledon Golf Course.

3.34 Some of the priority areas for learning about the environment did not have any provision of the relevant functions. Lack of provision was found in the East of Mitcham, surrounding Stanford Way; in the South Morden, surrounding Kingsbridge Road; and in the North of Wimbledon, surrounding Vineyard Hill Road and Wier Road.

Supporting Landscape and Heritage Conservation (G7118.038 & G7118.043)

3.35 The main priority areas for landscape and heritage conservation were found to be in the surroundings of the major open spaces of the borough. This includes the areas surrounding the River Wandle, Wimbledon Park, Wimbledon Common, Morden Park and Mitcham Common. No need was identified in the north or east of Mitcham.

3.36 Assets were identified in the South and West of LBM. A number of open spaces were identified as assets for this priority: Wimbledon Common, Wimbledon Park, Raynes Park, Cannon Hill Common, Morden Cemetery, Morden Park, Morden Hall Park and Mitcham Common. Many assets were also identified in the area surrounding the River Wandle.

3.37 A notable proportion of the priority area within Wimbledon was found to contain only private domestic garden assets, surrounding Ridgeway and Calonne Road. Few assets were found in the industrial park adjacent to Merantun Way in Colliers Wood.

Encouraging Walking and Cycling (G7118.039 & G7118.044)

3.38 The priority areas for walking and cycling were identified along the major transport routes for vehicles, pedestrians and cyclists in the borough. This included Croydon Road Mitcham, Streatham Road Mitcham, Western Road Mitcham and Merton High Street. Need was also identified along other smaller roads and within open spaces such as Wimbledon Common, Morden Park and Mitcham Common. No areas were identified in the East of Mitcham and in some areas of Lower Morden and Wimbledon Park.

3.39 Assets were identified along most primary transport routes throughout the borough, including Merton High Street, Kingston Road and Croydon Road. Assets were also identified in Mitcham Common, Wimbledon Common, Morden Park and Morden Hall Park.

3.40 A small number of assets were found along Streatham Road, Durnsford Road, Western Road, Ernle Road and Wimbledon Hill Road.

Supporting Housing Growth and Quality of Life (G7118.030 & G7118.045)

3.41 The priority area for housing growth and quality of life was identified in the North, South and centre of the borough, largely in the periphery of the River Wandle. Additional need was also identified in the centre of the borough, to the East of Wimbledon Chase Railway Station and in the South of Mitcham. No need was identified in the East or the West of the borough.

3.42 Assets within this priority area included open spaces such as Wimbledon Park, Morden Hall Park and Mitcham Common.

3.43 The industrial estates south of Merantun Way and west of Mitcham Common were both found to have a small number of assets.

Supporting Economic Growth and Investment (G7118.040 & G7118.046)

3.44 The priority area for economic growth and investment was identified in clusters across the borough. Areas of need are located around the town centres of the borough within Wimbledon, Morden and Mitcham. This priority is also located in the industrial and retail estates in the North, West and South of the borough.

3.45 Assets for this priority were identified in the North, South and centre of the borough. Open spaces surrounding the River Wandle were found to contribute to this priority, including Bennett's Hole, Durnsford Road Recreation Ground and London Road Playing Fields.

3.46 A lack of provision was found in many industrial estates in the borough, including those South of Merantun Way, West of Mitcham Common, Wier Road and South of Streatham Road. Where the priority was met in these areas, the GBI was largely composed of the landscaping around housing and industrial estates/premises typology.

Improving Air and Water Quality (G7118.032 & G7118.047)

3.47 The largest priority area for air and water quality was identified in the North and North-East of the borough, encompassing Wimbledon Park and Mitcham Eastfields Stations. Smaller areas of need were also identified in West Barnes and Morden town centre. The priority area was also identified along the major transport routes through the borough, including the railway lines, Croydon Road, Western Road and Parkside.

3.48 Clusters of assets were identified in the North-East and South-East of the borough, and they were also identified along the primary transport routes. Many open spaces were found to contain assets which contribute to this priority including: Wimbledon Common, Wimbledon Park, Raynes Park, Sir Joseph Hood Memorial Playing Fields, Morden Park, Morden Hall Park, Mitcham Common and Figgie's Marsh. Many street trees within Colliers Wood and East Wimbledon were also identified as assets.

3.49 Areas with a lack of provision were identified in many of the industrial estates throughout the borough, in the South of Raynes Park and in the East of Mitcham.

Adapting to Climate Change and the Urban Heat Island Effect (G7118.033 & G7118.048)

3.50 The largest priority area for climate change and the urban heat island effect was identified in the north and North-East of the borough, from Wimbledon Park through Wimbledon and Colliers Wood through to north Mitcham. Additional areas of need were identified in the South-West of the borough in West Barnes, and in the periphery of the River Wandle and Pyl Brook. Little need was identified in the North-West of the borough.

3.51 Assets were identified in the South-West and North-East of the borough. Assets were identified in many open spaces in the borough, including Wimbledon Park, Morden Park, Morden Cemetery, Mostyn Gardens, Morden Hall Park, South London Crematorium and Streatham Park Cemetery. Many street trees in Raynes Park, Colliers Wood and South Wimbledon were identified as assets for this priority.

3.52 There were some areas which lacked provision, including the industrial and retail estates surrounding of Merantun Way, surrounding Weir Road; and surrounding the Kingston Bypass.

Conserving and Enhancing Biodiversity and Ecological Resilience (G7118.034 & G7118.049)

3.53 The priority area for biodiversity and ecological resilience was found to be in most of the major open spaces throughout the borough, including Mitcham Common, Morden Park, Wimbledon Common and Wimbledon Park. A corridor of need was also identified along the railway corridors and along the River Wandle, including Morden Hall Park.

3.54 Most assets for this priority were found to be within the open spaces of the ward. The open spaces included: Wimbledon Park, Wimbledon Common, Raynes Park Sports Ground, Cannon Hill Common, Morden Cemetery, Morden Park, Morden Hall Park, Morton Green, London Road Playing Fields and Mitcham Common. Many green corridors and street trees were also identified as assets surrounding the railways lines.

3.55 Many open spaces surrounding the River Wandle were found to contain assets, however there were notable areas with a lack of provision around Plough Lane in Wimbledon and Wates Way in Mitcham.

Summary

3.56 The Priority Mapping and Overlay Stage identified areas which require GBI benefits and assess the provision of the relevant functions in those areas.

3.57 Many of the open spaces contribute to Merton's priorities, including Morden Hall Park, the River Wandle, and Wimbledon Common.

3.58 Street trees throughout the borough were also found to contribute to many of Merton's priorities.

3.59 The retail and industrial estates throughout the borough were frequently identified as priority areas, and many times there was also found to be a lack of GBI functions.

Key Asset Identification (G7118.050)

3.60 The Key Asset Identification summarises the results of the Overlay Stage to identify the most important assets in Merton.

3.61 The Key Asset Score varied across the borough, the highest of which were located in Wimbledon Park, Morden Hall Park, Morden Park and Mitcham Common, and the lowest scores located in Pollards Hill, Cannon Hill, Lower Morden, Raynes Park and Wimbledon Village. The Key Asset Score was found to range between zero and nine, with an average score of 2.4.

3.62 The features which fulfilled all nine priorities were found in the North of the borough adjacent to the River Wandle to the West of Weir Road. Other areas surrounding the River Wandle were also found to have a high Key Asset Score, such as Ravensbury Park and Wandle Meadow Nature Park. Many open spaces in the borough were found to contain features which had a high score, including Wimbledon Park, Prince George's Field, Morden Hall Park and Mitcham Common.

3.63 Clusters of features were identified with a score of zero. These were located in Cannon Hill, in Pollards Hill and some areas surrounding Wimbledon Common. This score implies that these features do not fulfil the necessary GBI functions to contribute to the priorities for the borough or are not within a priority area.

3.64 Parks and Formal Gardens, Woodlands and Watercourses were the typologies found to have the highest Key Asset Scores, which were all found to have average scores of over 4. By contrast, the lowest scoring typologies were found to be Private Domestic Gardens and Outdoor Sports Facilities, which were found to have average scores of 2.

Summary

3.65 The Key Asset Analysis assessed the current provision of GBI to identify areas which should be protected and areas in which GBI can be enhanced.

3.66 The River Wandle, Ravensbury Park and Wandle Valley Nature Reserve were identified as the most important GBI assets to Merton. Many open spaces were also addressed multiple priorities for Merton.

APPENDIX A: Green and Blue Infrastructure Glossary

Asset

A GBI Asset is identified where there is a need for GBI being met by a Type/Typology of GBI.

Benefits

Whereas GBI functions refer to the specific use of land, benefits refer to the wider, potentially less tangible contributions to people and nature arising out of GBI. The graphic opposite demonstrates the link between specific GBI functions and the wider benefits. For example, the green travel route function can deliver a number of wider benefits, such as health and wellbeing for people who choose to walk or cycle, recreation benefits and a reduction in motorised traffic leading to less emissions into the atmosphere and reduced climate change risk.

Ecosystem Services

Humankind benefits from a multitude of natural resources and processes that are sustained by ecosystems. These 'ecosystems services' include the provision of food, clean water, resources for energy and industry, flood alleviation, crop pollination and recreation opportunities. Ecosystem services are grouped into four broad categories: provisioning, such as the production of food and water; regulating, such as managing the climate; supporting, such as nutrient cycles and crop pollination; cultural, such as recreational benefits.

Functions

One of the principal drivers of GBI planning is to manage land in a more sustainable way. While most GBI assets will have a primary purpose or function it is also possible for functions to co-exist, leading to multifunctional GBI and the ability to use land more effectively and efficiently. For example street trees add aesthetic quality to an urban area but can also support wildlife and improve environmental health by reducing airborne pollution and provide shade for people and wildlife. The functions used in this framework are defined below:

Aesthetic

GBI can improve the image of an area and this can make the surrounding area a more attractive place to live, work and visit, and also result in higher property values.

Carbon Storage

Carbon storage (or sequestration) is the removal of carbon from the atmosphere and the storage in plants, trees and soils. Trees and peat soils are particularly important for the storage of carbon. Different types of GBI will sequester carbon at different rates depending on the growth speed of vegetation.

Coastal Flood Protection

GBI can protect infrastructure and agriculture close to the shore. It can protect against winds and sea spray through the reduction of the speed of the waves and the impact of tidal surges.

Connectivity for Wildlife

Areas that wildlife can disperse through between habitat spaces. This function will become more important in the future, as species' ranges increase northwards with the climate changes. Different types of GBI provide connectivity for a variety of species. However the range of species is also dependent on other factors such as climate or disturbance.

Culture

Space used for cultural purposes, the hosting of public art, events and festivals provide the function of culture.

Evaporative Cooling

Evaporative cooling is the process by which plants transpire water which is evaporated from their surfaces cooling their immediate locality. All types of vegetation can provide this function, including open water. Plants with a larger leaf area are likely to be better than those with a smaller leaf area.

During periods of drought, irrigation is likely to be necessary to maximise this function in plants, whilst open water will continue to be valuable in its own right.

Food Production

Land used for growing crops or the grazing of animals.

Green Travel Route

Green travel routes are off-road routes for pedestrians and cyclists (for recreational purposes as well as moving between places) through greenery and includes the area surrounding the green travel route. These include PRoWs.

Habitat for Wildlife

The provision of a place for wildlife to live, including a source of food. The variety of types of GBI will provide habitats for a range of species. However the range of species is also dependent on other factors such as climate or disturbance.

Heritage

Historic links in the landscape (including ancient woodlands, canals, designated sites and monuments). Heritage is defined as that which is inherited.

Learning

GBI can provide a backdrop for outdoor classrooms and learning outside of the indoor school environment. It can also be used as a setting for learning new skills which may help adults develop skills for the workplace.

Noise Absorption

Screening of noise, especially from major transport routes can improve quality of environment. However this requires GBI elements that are tall enough to intercept and absorb sound waves. This function is usually associated with urban areas, especially close to travel routes.

Private Recreation

Land which is used for recreation but only by the landowners or those invited by the landowners to use. This primarily consists of private domestic gardens.

Public Recreation

Areas that can be freely used for recreational purposes (formal/informal and active/passive), without any restrictions to access (such as payment or membership). This can include areas closed at night, on specific days or seasonally but this was assessed on an individual basis.

Restricted Public Recreation

Areas that can be used by the public for recreational purposes (formal/informal and active/passive), but is restricted (usually via payment or membership). This usually includes outdoor sports facilities and formal parks and gardens.

Shading from the Sun

Shading of people and surfaces from solar radiation can reduce temperatures and increase comfort levels and is usually provided by trees and taller plants. Shading from the sun is also important to protect agricultural land and other species from solar radiation. This function will become more critical when adapting to climate change.

Trapping Air Pollutants

Removal of pollutants, including ozone, nitrogen dioxide and particles from the air, through uptake via leaf stoma and deposition on leaf surfaces. Once inside the leaf, gases diffuse into intercellular spaces and may be absorbed by water films to form acids or react with inner leaf surfaces. This function is usually associated with urban areas, especially close to travel routes.

Water Infiltration

Vegetation and roots can aid the movement of water into the ground. Includes both surface infiltration and deep infiltration, which can reduce the risk of flooding.

Water Interception

The interception of rainwater before it reaches the ground, by the leaves of trees and plants will slow the flow of water to the ground. This can reduce the risk of flooding. All vegetated types of GBI will intercept water in some way, although this varies with leaf area.

Water Storage

Water storage in ponds, lakes, rivers and some wetlands. This water is accessible for human use and for irrigation if it is required.

Wind Shelter

GBI can provide shelter from winds by slowing or diverting currents.

Geographic Information System (GIS)

GIS is a system designed to capture, analyse, manage and present all types of geographical data. In the context of the Blackpool GBI Framework, GIS is used to map all GBI assets and

identify the existing functions of those assets. GIS also provides the analysis for the needs assessment.

Index of Multiple Deprivation (IMD)

This is a measure of relative deprivation for Lower Super Output Areas. It is made up of 37 indicators reflecting different aspects of deprivation experience by those living in an area.

Lower Super Output Area

The Lower Super Output Area is a geographic area used by the Office for National Statistics for many of its statistical outputs.

Natural Capital Accounting

Natural capital is *'the stock of our physical natural assets (such as soil, forests, water and biodiversity) which provide flows of services that benefit people (such as pollinating crops, natural hazard protection, climate regulation or the mental health benefits of a walk in the park). Natural capital is valuable to our economy. Some marketable products such as timber have a financial value that has been known for centuries. In other cases (e.g. the role of bees in pollinating crops), we are only just beginning to understand their financial value.'*[14]

Natural capital accounting is the process of calculating the stocks and flows described above and attributing them a financial value.

Needs

The essence of sustainable development is providing for people's and nature's needs, now and in the future. So it is important to take people and nature as the starting point for GBI planning in the context of the built and natural environment. People and wildlife have many needs: for example people have needs to use greenspace for recreation and leisure and health and wellbeing; wildlife species have needs to move across land to find sources of food and places to shelter.

Typologies

This is the primary use or description of GBI. The typologies used within this technical report are outlined below:

Agricultural Land and Horticulture

Agricultural land used for crop production and grazing.

Allotment, Community Garden or Urban Farm

These are open spaces primarily utilised by members of the public for the cultivation of fruit, vegetables and flowers. They usually consist of cultivation beds and boundary vegetation, and access can sometimes be restricted.

Amenity Green Spaces and Village Greens

This typology includes sites which are primarily for public recreation, and consist of grassed surface and associated vegetation. They are usually publically owned and managed.

[14] Department for the Environment, Food and Rural Affairs, 2011. p.11.

Cemeteries and Churchyards

These are areas which are associated with churchyards or burial grounds. They primarily consist of grass with occasional shrubs or trees.

Derelict and Vacant Land, Sewage Treatment Works

Derelict and vacant land is land which has no formal use. It can include 'urban commons' which are used for informal recreation and brownfield land which has not yet been redeveloped. Sewage treatment works are large areas of private land which contain sludge drying areas, filter beds and other features associated with sewage treatment.

Grassland, Heathland and Scrubland

This typology includes sites which consist primarily of grassland and scrubland which are not agriculturally improved, but are also not part of a formal recreation space such as a village green.

Green Corridors along Railways, Highways and Other Routes

These are linear open spaces associated with transport routes such as cycle paths, roads and railways. They can consist of a mixture of grass, shrubs and trees.

Green Roof

The roofs of buildings which have been covered in vegetation with the intention to reduce water surface runoff. A variety of vegetation can be present, including mosses, sedges and other low level vegetation.

Landscaping Around Housing and Industrial Estates/Premises

These are areas which are associated with housing and industrial estates or premises. The areas usually consist of amenity grass, shrubs and trees.

Parks and Formal Gardens

This typology includes parks and formal gardens designed for public use and contain a variety of landscape and horticulture elements. Extraneous facilities such as a toilet block or visitor centre may also be present on site.

Play Area (All Types)

This typology includes open spaces designated for use by young people for recreation. It typically consists of grassed areas, trees and shrubs, with additional play equipment.

Playing Fields, Golf Courses, Equestrian Centre and Other Recreational Grounds

This typology includes sites designated for sports recreation. They typically include vegetated sports surface and associated vegetation. The sites can be publically or privately owned.

Private Domestic Garden

These areas are privately owned open space within the curtilage of individual dwellings, and are generally inaccessible to members of the public. They can include a variety of hard and soft landscape features.

Reservoir

This typology consists of sites which are primarily large expanse of open water which do not form part of another open space site (such as a park). As stated in the data limitations, it was not possible to identify smaller waterbodies such as ponds from the source datasets.

School and Hospital Grounds

These are open spaces associated with the grounds of educational and health facilities, and typically includes grassland with scattered trees, hedgerows and shrubs.

Street Trees

Street trees are composed of a row or collection of individual trees along the side of a road in tree pits or on grass verges.

Watercourse

This includes large areas of running water, such as rivers and canals. As stated in the data limitations, it was not possible to identify smaller watercourses such as streams or brooks from the source datasets.

Woodland

This typology includes sites which are identified as woodland by the GiGL open spaces dataset. The woodland can include both deciduous and coniferous trees, and can be privately owned or publically accessible. Woodland within other open space typologies, such as parks and formal gardens, may not be included within this typology.

APPENDIX B: GIS Green and Blue Infrastructure Maps

Index of Maps

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