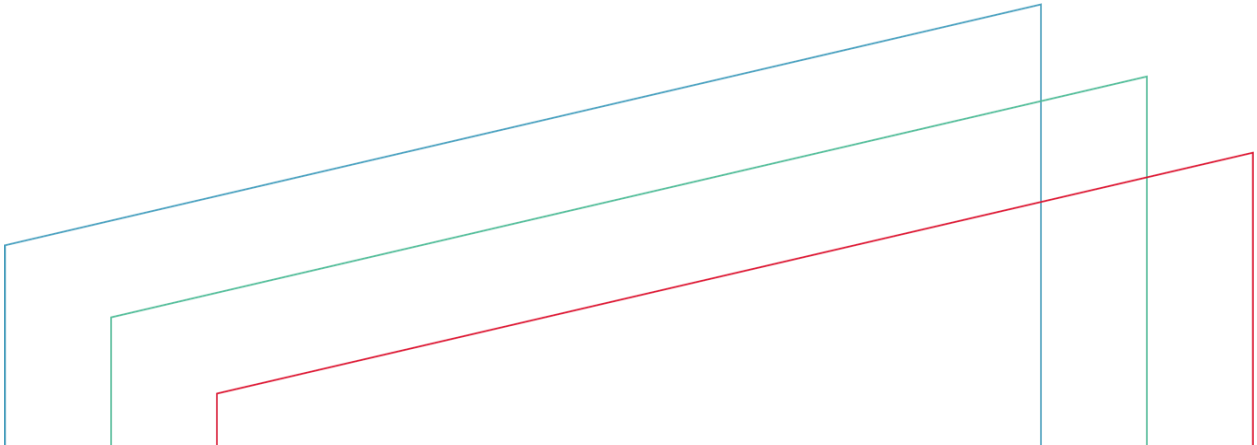
LEVELLING UP THROUGH GREEN INFRASTRUCTURE INVESTMENT

An intersectional analysis in West Midlands Combined Authority

New Economics Foundation



Title: Levelling up through green infrastructure investment

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CONTENTS

EXECUTIVE SUMMARY

There is a renewed focus on green space enhancement, not only to restore nature and mitigate climate change, but to improve our wellbeing. The collection of national and international research is growing and we are now beginning to understand how engaging with green space enhances different components that make up our wellbeing. Through the Covid-19 crisis there has been growing recognition of inequities in access to green space. Five key indicators broadly control the extent of the wellbeing benefit an individual derives from green space: greenness, proximity, quality, accessibility, and frequency of use. West Midlands Combined Authority (WMCA) has ambitions to support its constituent local authorities (LAs) to make targeted interventions which improve green space provision and simultaneously mitigate climate change and tackle wellbeing inequalities exposed by the Covid-19 pandemic.

NEF Consulting was commissioned by WMCA to investigate the intersection between green space access and social inequity, and to develop an approach to targeting interventions. Exploratory analysis focused on physical barriers (population pressure on green space and proximity to green space) and social/demographic characteristics (socioeconomic deprivation, age and ethnicity). Maps were developed to visualise the location of 'hotspots' of socioeconomic characteristics and poor green space access. Generally, the exploratory analysis found:

- Walsall and Birmingham rank relatively high for absolute park space when compared with other LAs in the UK. However, all seven LAs in WMCA rank very low in terms of relative park space per person in the UK (population per m^2 of green space).
- A strong correlation between population pressure and socioeconomic deprivation was identified. With the exception of Solihull, across all LAs a high level of deprivation correlated with greater population pressure on green space. However, communities with high levels of deprivation were typically closer to green space.
- Black, Asian and Minority Ethnic (BAME) populations in Birmingham, Coventry and Walsall showed greater population pressure on green space than non-BAME populations. Many BAME populations are also experiencing high rates of deprivation.
- Broadly, older populations experience less population pressure on green space in comparison to younger populations, but are also often further away from green space.

Each LA has a different context, local issues, priorities and demographics. While headline findings present a common trend across the West Midlands, the purpose of the analysis was to identify particular 'hotspot' areas with poor access to green space. Through our mapping approach we identify many areas where the above issues and inequities are particularly acute. We also identify areas which buck the above trends and where issues present which might be hidden by the aggregate analysis, for example locations where a large young population is also particularly far away from green space.

Exploring *why* the barriers exist is out of the scope of this research. To understand in more detail any deficits in green space provision we would need to go into more detail on the types and functions of the green spaces available, i.e. analysing amenity and quality. The data only tells part of the story, which is why it is important to engage with local communities to a) further explore their green space usage, the barriers faced and why, and b) understand what they want out of their local green space.

A literature review of relevant interventions implemented outside of the West Midlands region was undertaken to offer ideas and inspiration for tackling the challenges and barriers of access to green space in 'hotspot' areas. Broadly, intervention ideas were categorised into the following typology:

a) **Re-purposing space / creating new spaces.** Ideas include regenerating brownfield sites, creating pocket parks and accessible rooftops.
b) **Infrastructure for travel and connectivity.** Consideration of *how* people would get to green spaces (examples include green corridors, cycling networks, public transport and walking routes).
c) **Enhancing existing space.** Actively management green spaces, improving biodiversity, preserving heritage and inclusion of facilities or multi-functional uses.
d) **Greening space.** The wellbeing generated by an urban space goes beyond just parks, and can be enhanced through the broader 'greenness' of the area. Examples of greening include tree planting and creation of "living" walls on facades and roofs.

There are a range of interventions that could be delivered, at a range of scales. From the creation of a new park through to a community vegetable patch. A combination of ideas drawn from WMCA, the exploratory analysis and case study examples for implementing interventions for 'hotspot' areas are detailed below:

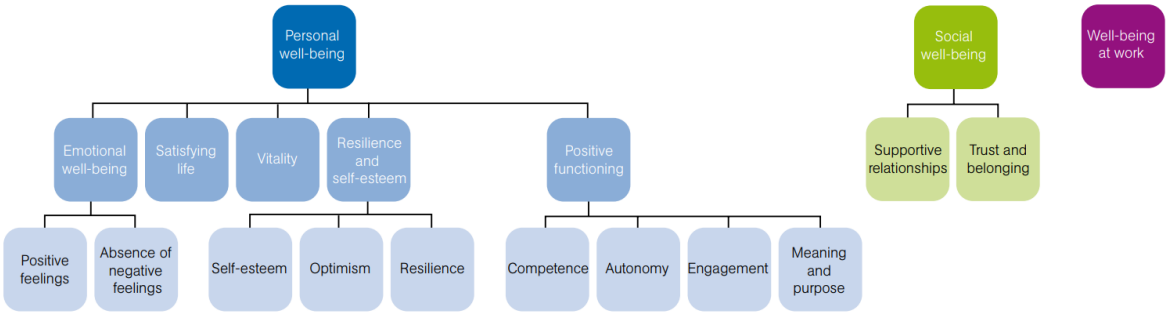
1. **Creating a West Midlands Green Spaces Taskforce.** It is important that a strategic approach is taken and co-ordinated by a group of representatives from the LAs involved. The group should ensure the involvement of individuals from a variety of departments such as public health, transport, and cultural services to enable a holistic approach to improving green spaces and should administer the recommendations below.
2. **Building on the evidence base to prioritise 'hotspot' areas.** Further research should be carried out to identify the relationship between green space, socioeconomic characteristics and physical barriers to accessing green space.
3. **Involving residents.** Whilst the exploratory analysis has identified certain 'hotspots', qualitative evidence gathered from residents will enable WMCA to dig deeper into the issues highlighted by the data, and confirm where the highest need is and *why*. It is important that residents are consulted at each stage of the process, from planning and design through to implementation, to ensure the interventions are fit for purpose.
4. **Data sharing platform or designated data officers.** A platform or designated data officers from LAs would ensure consistent data collection, and the sharing and monitoring of data. This would inform the evidence base as well as ensuring that data provided from LAs is of the same standard and level of detail.
5. **Capacity building and sharing best practice.** LAs should be encouraged to share best practice and build on the learnings shared from other LAs. They should set out key ways of working to enable greater collaboration as well as effectiveness and efficiency. This has been done in Greater Manchester as part of the Bee Network.
6. **A Community Green Grant Fund targeting 'hotspot' areas.** This would enable WMCA to support LAs to improve access to green space and tailor interventions to local context. Ambition and funding should be set as high as is feasibly possible, commensurate with the scale of both the climate and ecological crisis, and the deficit in green space provision highlighted across the WMCA area.

INTRODUCTION

The climate crisis, ecological breakdown, deepening social and spatial inequality and the Covid-19 pandemic; all have brought issues of provision, access, and quality of green space into sharp relief. This report focuses on the intersection between green space provision, well-being, and social inequity.

It is over ten years since NEF deconstructed the different components of well-being in the National Accounts of Well-being.[1] There is now a significant amount of national and international evidence on the well-being benefits to individuals from green spaces, and how engaging with nature and green space supports different components of well-being (Figure 1). The research distinguishes between impacts on meaning and purpose in life (eudaimonic well-being), resilience (hedonic well-being), emotional well-being and life satisfaction (detailed as "satisfying life" in the National Accounts of Wellbeing).

Figure 1: Subcomponents of well-being, from the National Accounts of Well-being (NEF, 2009)



At the headline level, living in generally 'greener' urban areas is associated with reduced mental stress and increased life satisfaction.[2] As data quality and our understanding of the human-green space connection improves we are able to break down the nuance in this relationship. Five key indicators broadly control the extent of the wellbeing benefit an individual derives from green space: greenness, proximity, quality, accessibility, and frequency of use.

Greenness. Evidence from a UK study has shown that both life satisfaction and emotional well-being[i] improve as the amount of green space in an urban area increases.[3] However, perceptions of 'greenness' stretch beyond just parks and into the broader urban environment. Studies in the UK have shown that simply the act of seeing nature in an individual's day-to-day life can enhance wellbeing.[4] An Austrian study found further positive associations between perceived greenness and well-being.[5]

Proximity. Evidence from London illustrates that life satisfaction is greater when green space is within 300 metres of a household.[6] Similarly for coastal communities, living less than 5 km from the coast is associated with better mental health (on the General Health Questionnaire composite indicator) than living between 5km and 50km away.[7]

[i] Described as "psychological health" as a proxy

Quality. Happiness[ii] is always found to be greater in natural compared to built-up environments, including across ecosystems ranging from semi-natural grassland, woodland, moors and heathland.[8] An individual's perceived quality of the green space matters. Higher satisfaction with the quality of green space has been proven to be significantly associated with higher mental well-being.[9] Broadly, the more 'restorative' the environment is perceived to be, the more well-being will be derived,[10] and perceived 'restorativeness' is strongly linked to the biodiversity of an area.[11, 12]

Amenity. The presence of good quality green space does not necessarily precipitate use. Green space takes many forms, ranging through sports pitches and playgrounds, cemeteries, blue spaces (leisure lakes), and nature reserves. Different spaces meet the needs of different groups and provide different sorts of wellbeing benefits. For instance, an elderly individual may derive less benefit from a children's play park, and a young family may derive less from a bird watching reserve. This has been explored in studies which measure what characteristics of a green space precipitate more exercise benefits for elderly people.[13]

The linked issues of **accessibility** and **frequency** of visits to green spaces also play an important role in supporting well-being. Individuals who visit green spaces daily are almost twice more likely to report greater meaning and purpose in life than those who never visit them.[14] Accessibility is closely linked to proximity, the likelihood of being a frequent visitor is higher for those who live in greener areas, and those living with 5km of the coast. However, frequency is also typically lower in areas with greater levels of deprivation.[15] This points to the key moderators of accessibility and frequency of visits to green spaces: deprivation, inequality, and the intersection with social and demographic factors.

Covid-19 has exposed inequities in access to green space. Households located closer to green spaces command a higher price,[16] implying that people who are wealthier have greater access to green space. It is also widely understood that wealthier households tend to have larger garden space, and many poorer households have no garden space at all. The number of households across the UK without a garden has also been on the increase.[17]

Where green space is not in immediate proximity, factors such as time constraint come into play. Issues such as care giving and long working hours, which are typically not evenly distributed across societal groups, can restrict access to green space. NEF together with What Works Wellbeing has explored the relationship between green space activities and health inequalities – finding that the provision of access to high quality green space can be a 'levelling' factor, which reduces wellbeing inequality.[18]

Gendered and racial dimensions of access to green space is less well understood. From the limited research body, we do know that deprived areas are most in need of transport connectivity as local green space is most stretched and prone to overcrowding. A study in Sheffield illustrated that population pressure on green space could be approximately one third higher in low income areas compared to high income areas.[19] A study in Bradford identified that areas with higher accessibility to green space typically had more white residents than those areas with lower accessibility.[20] Both of these factors could be critically important to the wellbeing of groups in the UK population through the Covid-19 crisis.

[ii] While happiness is not detailed as a sub-component in the National Accounts of Well-Being, it is linked to "positive feelings".

The barriers to access and Covid-19

Official government guidance on staying well during the lockdown advises us to enjoy nature and exercise outside once a day.[21] During the peak of the crisis households were advised to "stay local and use open spaces near to your home where possible" while keeping "at least 2 metres apart from anyone outside your household at all times".[22] Guidance from the police, at the peak of the pandemic, clarified that households could drive to reach the countryside, as long as "far more time is spent walking than driving".

These restrictions were necessary, but their impacts were unequal. Not all households have green spaces near to their homes, for example, in the city of Bradford just two thirds of households (65.6%) are within 300 metres of green space.[23] Approximately 24% of households do not own a car and for many public transport was not an option due to safety risks. Those households are concentrated in the lowest income quintile, where 46% of households are without a car.[24]

NEF research, tracking use of green spaces across the UK's local authorities through the peak of the Covid-19 crisis highlighted these barriers in action. Over the analysed period in April 2020 the poorest 20 local authorities reported an average 28% reduction in the use of parks compared to the baseline period, meanwhile the wealthiest 20 local authorities reported no change in park use.

Through the Covid-19 crisis there has been growing recognition that deficient access to green space has the potential to amplify the UK's mental health crisis. In particular, a public debate took place about the opening up of private golf courses,[25] and in some areas saw creation of new traffic-free active travel routes. While many local areas have led the way both in and out of times of crisis in pioneering new approaches to increasing access to green space there remains an urgent need to address public green space provision which now sits at the nexus of multiple social and environmental crises.

Purpose of the research

WMCA has ambitions to support its constituent local authorities to make targeted interventions which improve green space access and simultaneously mitigate climate change and tackle wellbeing inequalities exposed by the Covid-19 pandemic. NEF Consulting was commissioned by the West Midlands Combined Authority (WMCA) to scope out a method for investigating the intersection between green space access and social inequity, and targeting appropriate interventions.

METHODS

Intersectional framework

In order to guide the research a simple framework was developed from the literature review to understand how the different parameters which affect green space access interact with different indicators of disadvantage and/or social characteristics which modify the way an individual/community interacts with green space (Table 1). Frequency of use is treated as a variable which, in the absence of any physical barriers, is modulated by social and demographic factors. These social and demographic factors are not independent of each other. Table 1 details what has been analysed in this report, and highlights that the extent of analysis to-date represents a relatively limited look at the range of potential 'intersections' which could give rise to inequalities in green space access.

Table 1: A potential framework for developing an intersectional understanding of barriers to benefiting from green space

		Physical barriers				
	Social/ demographic characteristics	Population pressure	Proximity/ access route	Perceived quality	Amenity	Greenness
Frequency of use	Socioeconomic deprivation	*Analysed*	*Analysed*			
	Health deprivation					
	Educational attainment					
	Caring responsibilities					
	Age	*Analysed*	*Analysed*			
	Gender					
	Ethnicity	*Analysed*	*Analysed*			

Cells highlighted in green in Table 1 are parameters that have not been explored due to limited data availability and resource limitations. Data on the physical barriers (perceived quality, amenity and greenness) is not available for the majority of local authorities and primary data collection is outside the scope of this research. Data on social characteristics are not publicly available at a granular level, for example indicators of health deprivation (e.g. diabetes and childhood obesity). This paper explores the interaction between the following social/demographic characteristics (a) deprivation, (b) age and (c) ethnicity and both (1) population pressure and (2) proximity to green space.

Data sources

A wide variety of data sources were compiled in order to scope the potential for intersectional analysis. The aim was to analyse data at the most localised level possible, this meant using the Lower Super Output Area (LSOA) administrative boundary wherever possible, and the Middle Super Output Area (MSOA) where LSOA data was not available. The Office for National Statistics (ONS) dataset released in May 2020 provides a range of different estimates of green space provision across the UK calculated from the Ordnance Survey (OS) UK Green Space map.[26] Socioeconomic parameters were collated from ONS official labour market statistics (nomis) released in the 2011 census[27] for data on ethnicity and the ONS population estimates for Mid-2019 estimates for Lower Layer Super Output Areas in England and Wales by Single Year of Age and Sex[iii] for data on age.

Statistical analysis

Distance from green space

The core metric for distance from green space is a variable contained within the ONS/OS dataset which estimates the percentage of postcodes within a local area which are within 300m of a park, public garden, or playing field. Using this metric to make comparisons between local areas means accepting a core assumption that the number of people living within each postcode within a local area remains reasonably consistent. This assumption was deemed acceptable as the LSOA area unit is very localised, and postcode-based populations would not be expected to vary significantly over such scales.

Population pressure on green space

The second core metric relates to population pressure on green space. To develop this metric some transformation of ONS/OS data was required. ONS/OS provide data on the average combined area (m^2) of green space within a 1,000m radius of a household. However, this metric lacks any recognition of the population density within that same area. To account for this we calculated average population density in the local area, and scaled the resulting figure to work out the approximate number of people likely to be living within a 1,000m radius.

There is a key deficiency with this approach. Local population density was calculated using the area and population size of the relevant MSOA – contexts where one MSOA is next to another MSOA with a very different population density has its limitations. For instance, if a green space sits at the boundary of two MSOAs with very different population densities, our method will not detect the influence of the neighbouring high-density MSOA on the experience of the population living in the neighbouring low-density MSOA with regard to their shared green space. This issue only arises in the case of shared green space, i.e. green space within 1,000m of multiple MSOAs, and where those areas have significantly different densities. As the method aggregates over wide areas, and most urban areas contain a large number of green spaces, this issue is not expected to undermine the general usefulness of

[iii] ONS (2020) Lower Super Output Are population estimates. https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/lowersuperoutputareamidyearpopulationestimates [accessed 28/08/2020]

the data. Its biggest likely impact will be to understate the population pressure experienced by communities at the urban periphery when they travel to use inner city green spaces. This highlights the importance of understanding the local context when targeting interventions at areas this method identifies as 'hotspots' of concern.

Summary statistics

While the focus of this report was on the identification of localised hotspots, a summary statistical analysis was conducted on the dataset at the local authority level. Our aim in doing so was to check for common trends across the key parameters of green space access, distance and population pressure, in the way they relate to socioeconomic parameters. The findings of this analysis are detailed in Table 2. Green cells indicate stronger statistical correlations based on standard indicators (correlation co-efficient and p-value). The strength of any statistical correlation found varied strongly across local authorities.

Some of the strongest correlations were seen in combination 1, population pressure and Socioeconomic deprivation. With the exception of Solihull, across all local authorities a high level of deprivation (i.e. a lower decile) correlated with greater population pressure on green space (although the relationship was found to be very weak in Wolverhampton). An opposing trend was measured in Solihull, but this finding should be treated with caution as Solihull contains very few areas with proportionately high deprivation. This finding goes some way to explaining why more deprived areas may have seen a greater decline in green space usage during the peak of the Covid-19 crisis. Population pressure on green space being a particularly strong deterrent to green space use when social distancing is required. Communities with high levels of deprivation however, were typically closer to green space (combination 6).

Other correlations tested were found to be generally weak. Broadly speaking, older populations experienced less population pressure on green space than younger populations (combinations 4 and 5), but the reverse relationship was evident in distance from green space (combinations 7 and 8). These two trends can be explained primarily by the tendency of a higher density of older populations in rural areas. Correlations were found in relation to ethnicity, but were strong in only a minority of Local Authorities. BAME populations in Birmingham, Coventry and Walsall in particular showed greater population pressure on green space (combinations 2 and 3).

Table 2: Summary of statistical correlations between parameters across all constituent local authorities. Green cells indicate combinations with a stronger and/or more robust statistical correlation, versus white cells indicating little or no correlation between variables.

		Birmingham	Coventry	Dudley	Sandwell	Solihull	Walsall	Wolverhampton
1	**Green space per person & IMD rank**	Cor: 0.329 [0.26, 0.39] P-value: <2.2e-16 T: 8.77	Cor: 0.263 [0.13, 0.39] P-value: 0.0002049 T: 3.78	Cor: 0.138 [0, 0.27] P-value: 0.05135 T: 1.96	Cor: 0.206 [0.06, 0.34] P-value: 0.004745 T: 2.86	Cor: -0.255 [-0.41, -0.09] P-value: 0.002878 T: -3.04	Cor: 0.321 [0.18, 0.45 P-value: 2.346e-05 T: 4.35	Cor: 0.08 [-0.07, 0.23] P-value: 0.3161 T: 1.0058
2	**Green space per person & white pop decile**	Cor: 0.191 [0.12, 0.265] P-value: 1.166e-06 T: 4.9087	Cor: 0.249 [0.11, 0.38] P-value: 0.0004311 T: 3.5823	Cor: -0.067 [-0.2,0.07] P-value: 0.3451 T: -0.94	Cor: -0.12 [-0.26,0.025] P-value: 0.1042 T: -1.63	Cor: 0.12 [-0.05,0.28] P-value: 0.1633 T: 1.402	Cor: 0.176 [0.02,0.32] P-value: 0.0229 T: 2.296	Cor: -0.084 [-0.24,0.07] P-value: 0.296 T: -1.0485
3	**Green space per person & non-white pop decile**	Cor: -0.191 [-0.26, -0.11] P-value: 1.166e-06 T: -4.91	Cor: -0.25 [-0.38, -0.11] P-value: 0.0004101 T: -3.5962	Cor: 0.066 [0.07, 0.2] P-value: 0.3534 T: 0.9301	Cor: 0.12 [-0.02,0.25] P-value: 0.1043 T: 1.6325	Cor: -0.12 [-0.28, 0.05] P-value: 0.1748 T: -1.3642	Cor: -0.178 [-0.32, -0.03] P-value: 0.0223 T: -2.3096	Cor: 0.084 [-0.07, 0.23] P-value: 0.295 T: 1.0508
4	**Green space per person & age under 18**	Cor: -0.111 [-0.18,-0.03] P-value: 0.005086 T: -2.8113	Cor: -0.098 [-0.23,0.04] P-value: 0.1712 T: -1.3736	Cor: -0.056 [-0.19,0.08] P-value: 0.4292 T: -0.792	Cor: -0.134 [-0.32,-0.05] P-value: 0.008101 T: -2.6769	Cor: -0.011 [-0.18,0.15] P-value: 0.8992 T: -0.127	Cor: -0.236 [-0.37,-0.087] P-value: 0.002179 T: -3.1137	Cor: -0.112 [-0.26,0..04] P-value: 0.1619 T: -1.4055
5	**Green space per person & age 65 plus**	Cor: 0.294 [0.22,0.36] P-value: 3.351e-14 T: 7.7616	Cor: 0.288 [0.15, 0.41] P-value: 3.351e-14 T: 7.7616	Cor: 0.106 [-0.3,0.24] P-value:0.1325 T: 1.5104	Cor: 0.175 [0.03,0.31] P-value:0.01694 T:2.41	Cor: -0.057 [-0.22,0.11] P-value:0.5113 T:-0.6586	Cor: 0.269 [0.12,0.4] P-value: 0.0004329 T: 3.5919	Cor:0.122 [-0.03,0.27] P-value:0.1265 T:1.5364
6	**% postcodes within 300m & IMD rank**	Cor: -0.189 [-0.29, -0.11] P-value: 1.365e-06 T: -4.8765	Cor: -0.193 [-0.32,-0.05] P-value: 0.00691 T: -2.73	Cor: -0.133 [-0.27,0.005] P-value:0.05974 T: -1.894	Cor: -0.091 [-0.23,0.05] P-value: 0.2175 T:-1.2375	Cor: -0.047 [-0.21,0.12] P-value:0.59 T: -0.54	Cor: -0.115 [-0.26,0.04] P-value: 0.1371 T: -1.4941	Cor: -0.194 [-0.33,-0.04] P-value:0.01469 T:-2.4675
7	**% postcodes within 300m & % age under 18**	Cor: 0.162 [0.09, 0.24] P-value: 3.554e-05 T: 4.1642	Cor: 0.055 [-0.08, 0.19] P-value: 0.4443 T: 0.76657	Cor: 0.085 [-0.05,0.22] P-value: 0.23 T: 1.2039	Cor: -0.137 [-0.16,0.13] P-value:0.8525 T:-0.1862	Cor: -0.013 [-0.18,0.15] P-value: 0.8812 T: -0.14976	Cor: 0.12 [-0.03,0.26] P-value: 0.1305 T: 1.5195	Cor: 0.159 [0.002,0.3] P-value:0.04611 T: 2.0105
8	**% postcodes within 300m & % age 65 plus**	Cor: -0.105 [-0.18, -0.027] P-value: 0.008099 T: -2.6563	Cor: -0.22 [-0.35,-0.09] P-value: 0.001657 T: -3.1907	Cor: -0.14 [-0.27, -0.003] P-value: 0.04504 T: -2.017	Cor: -0.04 [-0.18, 0.1] P-value: 0.5845 T: -0.54	Cor: 0.019 [-0.15, 0.19] P-value: 0.8266 T: 0.219	Cor: -0.11 [-0.25,0.04] P-value:0.1693 T:-1.9807	Cor: -0.14 [-0.29,0.01] P-value: 0.07959 T:-1.7646

Indexed ranking system

A simple index-based ranking system was developed to identify location 'hotspots' where socioeconomic parameters intersect with indicators of poor access to green space. LSOAs in the study area were separated into deciles across all socioeconomic and green space parameters, i.e. given a ranking of 1-10. For example where 1 would represent high population pressure and 10 would represent low population pressure. To explore the intersection between one socioeconomic and one green space parameters the deciles corresponding to the variables of interest were summed together. This created a new ranking on a scale of 2-20. An LSOA with a score of 2 would have both very high population pressure per m^2 of green space, and a strong socioeconomic characteristic identified in the

intersectional analysis framework (Table 1), such as high deprivation levels or a prevalence of BAME population.

Mapping

Maps were developed to visualise the location of ‘hotspots’ of socioeconomic characteristics identified in the intersectional analysis framework and poor green space access. Mapping was conducted in QGIS, and the Open Street Map was used as the base layer. Administrative boundary Shapefiles were collected from Government datasets, and the OS Green Space layer was accessed from Ordnance Survey’s Open Data collection. Additional analysis of general ‘greenness’ (i.e. green space not officially designated a park) was conducted using the Open Street Map QGIS plugin.

FINDINGS

Green space use in West Midlands Combined Authority

Data tracking community use of green space is extremely limited. With the exception of some ad hoc monitoring conducted by councils there is no data at levels below Local authority regions. At the Local authority level limited time series data is provided by Natural England's Monitor of Engagement with the Natural Environment Survey (MENE). The average number of visits made by residents across WMCA to the natural environment is typically well below the national local authority average (Table 3). While densely populated urban areas usually report lower rates of visits, the comparator areas listed in Table 3 highlight that this is not always the case.

Green space use since the onset of the Covid-19 pandemic has been in flux. An initial extended period of extremely depressed green space usage was followed by a sharp rise once the tightest lockdown measures were lifted. However, in many areas green space usage patterns remain altered, and it is likely that some communities remain reluctant to visit spaces due to the residual risk of Covid-19 transmission.

Two key themes emerge from a review of the trends in green space use across WMCA through the Covid-19 crisis (Figure 1). First, the significant reduction of green space use in the months of February to May. The recorded levels are often significantly below their level in January (mid-winter) which is clearly unusual given the seasonality of green space use and expected levels in spring. Second, green space in WMCA largely reflected national trends until July 2020, at which point green space use in the West Midlands dropped well below the UK average (typically around 33 percentage points lower).

Sandwell recorded higher relative levels of green space use between March 2020 and July 2020 in comparison to the other local authorities across WMCA (Figure 2). Broadly, green space use in Sandwell was in line with or above the national trend. Dudley, Birmingham and Wolverhampton saw the lowest use of green space in WMCA (Figure 2 and Figure 3). It is not clear what has driven the trends from the data, but this may relate to localised prevalence of Covid-19 cases. The local authority level data should be approached with caution as it is not clear how accurate the Google Mobility dataset is at this scale, and the approach utilised is highly sensitive to the baseline (reference) level of green space use set in January 2020.

Table 3: Average estimated weekly visits to the natural environment by local authority, small sample sizes are highlighted with an asterisk[28]

Region	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
National average	69	59	65	67	68	73	73	78	86	90
Birmingham	36	38	50	46	46	46	39	51	53	60
Coventry	17	18	71	57	43	55	71	55	51	57
Dudley	62	48	53	48	55	62	59	44	53	66
Sandwell	42	24*	50	44*	34*	56	39*	35*	36	61
Solihull	59*	26*	77*	48*	69*	45*	50*	50*	72*	70*
Walsall	35	26	20	41	34	59	60	64	57	68
Wolverhampton	63	25*	50	43	59	74*	69*	48*	44*	70
Staffordshire	62	61	71	73	77	74	78	84	103	101
Stoke-on-Trent	21	40	48	66	77	67	59*	73*	75	97*
Milton Keynes	121	82	106	83	94	126	78	80	104	86
Peterborough	89	50	103	80	60*	No data*	52	77	94	82*
Manchester	39	41	54	65	60	47	51	76	58	60*
Leeds	81	61	66	67	55	72	60	76	57	203

Figure 1: Google mobility data indicating the change in public movement in West Midland's green spaces (compared to a baseline of the 5-week period Jan 3 – Feb 6, 2020)

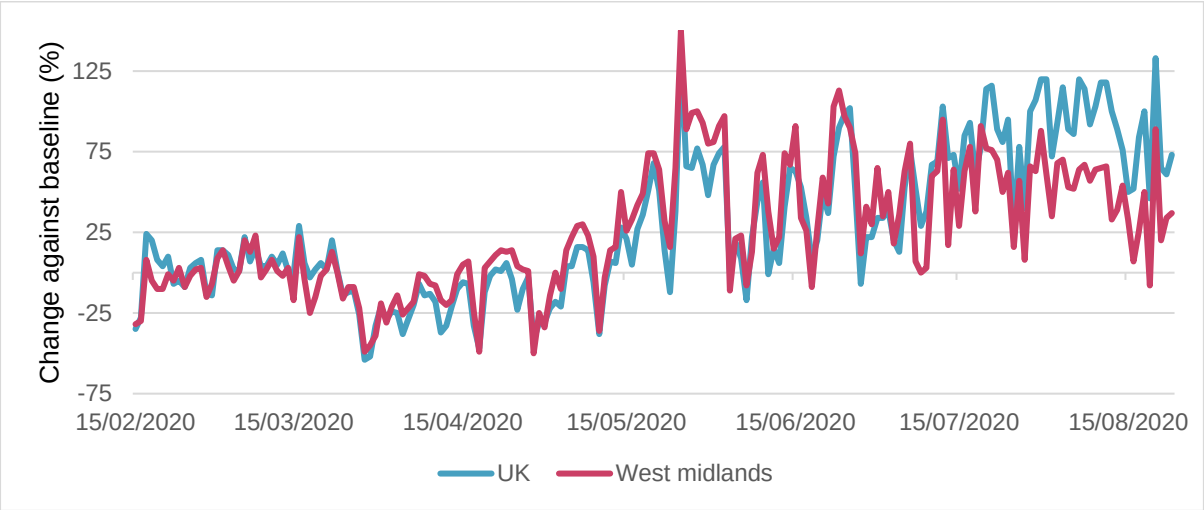


Figure 2: Google mobility data indicating the change in public movement in green spaces in four local authorities (compared to a baseline of the 5-week period Jan 3 – Feb 6, 2020)

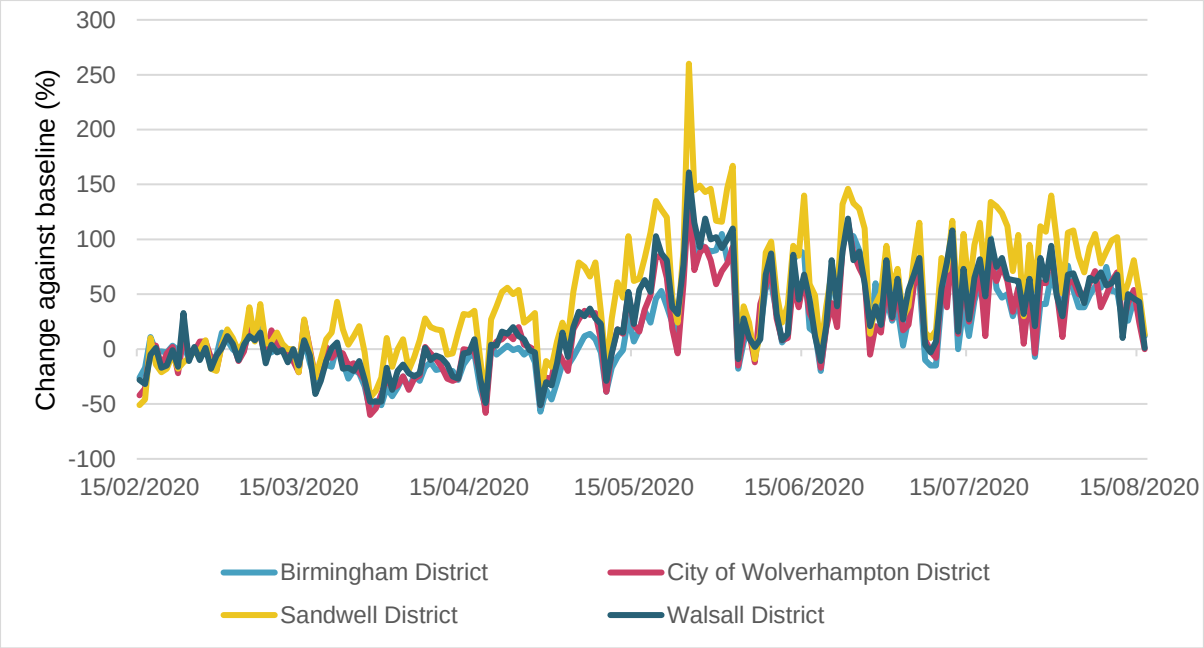
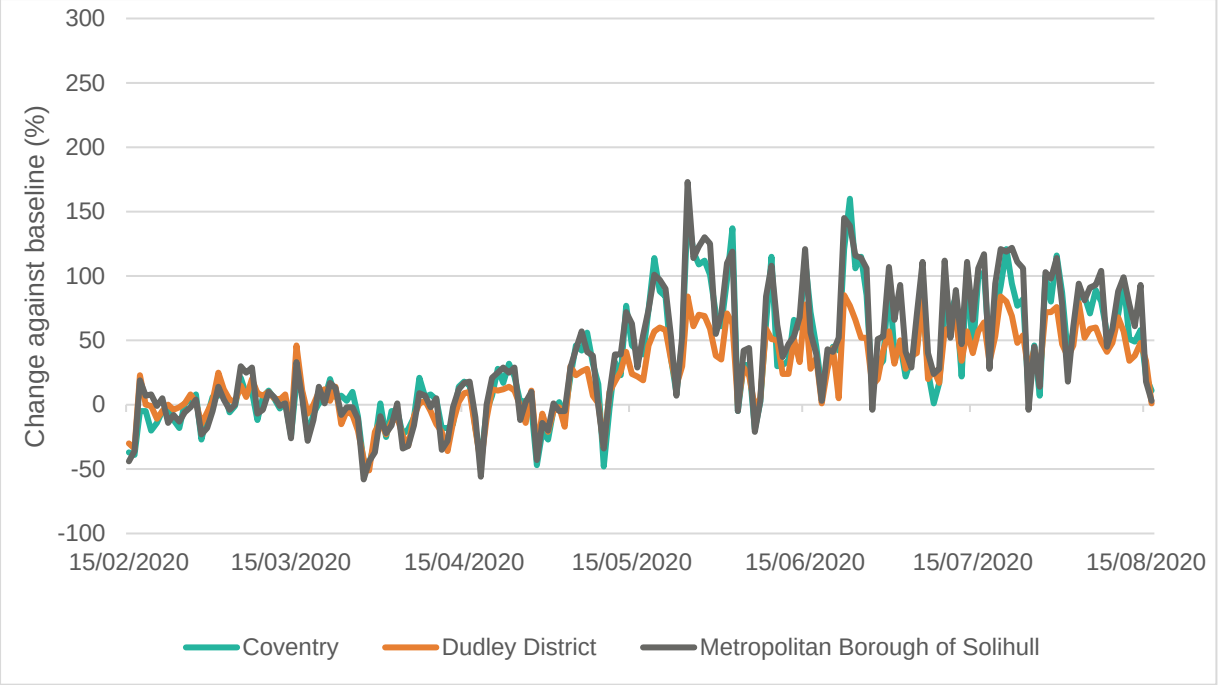


Figure 3: Google mobility data indicating the change in public movement in green spaces across three local authorities (compared to a baseline of the 5-week period Jan 3 – Feb 6, 2020)



Systematic data collection on public green space use trends among sub-populations is severely lacking across most of the UK. The Monitor of Engagement with the Natural Environment (MENE) survey is the only high quality national dataset explicitly addressing green space use, but does not provide data at geographic scales below the Local authority level.

Greenness of West Midlands Combined Authority

There are many different types of green space, and many different features of urban areas which can contribute to the perceived 'greenness' of an area. While issues such as vegetation cover, connectivity and size of green space matter for the biodiversity of an area, perceived greenness also has a role to play in determining the wellbeing people derive from their environment.

The ONS/OS parks dataset helps us understand the extent of officially designated park space in an area. As a general rule, urban areas typically have high absolute areas of officially designated park space (when compared to rural areas), but lower levels of area relative to their population size. This is true for all seven local authorities in WMCA. Walsall and Birmingham rank relatively high across the UK for absolute park space. All seven local authorities rank very low in terms of relative park space. Dudley and Coventry perform poorly across both metrics (Table 4). The rankings of WMCA Local Authorities are similar to comparable areas such as Leeds and Manchester, but trends in Peterborough and Milton Keynes highlight that poor performance on these indicators is not inevitable in a populous urban area, but question of design.

Table 4: National rankings of local authority (out of 373 local authorities across England, Wales and Scotland) by official provision of green space with and without consideration of population density

	Rank of "average combined size of parks, public gardens, or playing fields within 1,000m radius (m2)"	Rank "average combined size of parks, public gardens, or playing fields within 1,000m radius (m2)/population density" (decile shown in brackets)
Birmingham	19	267 (3)
Coventry	141	340 (1)
Dudley	187	348 (1)
Sandwell	115	333 (2)
Solihull	45	171 (6)
Walsall	22	237 (4)
Wolverhampton	231	362 (1)
Lichfield	40	36
South Staffordshire	333	219
Stoke-on-Trent	16	196
Milton Keynes	28	96
Peterborough	10	27
Manchester	136	350
Leeds	144	263

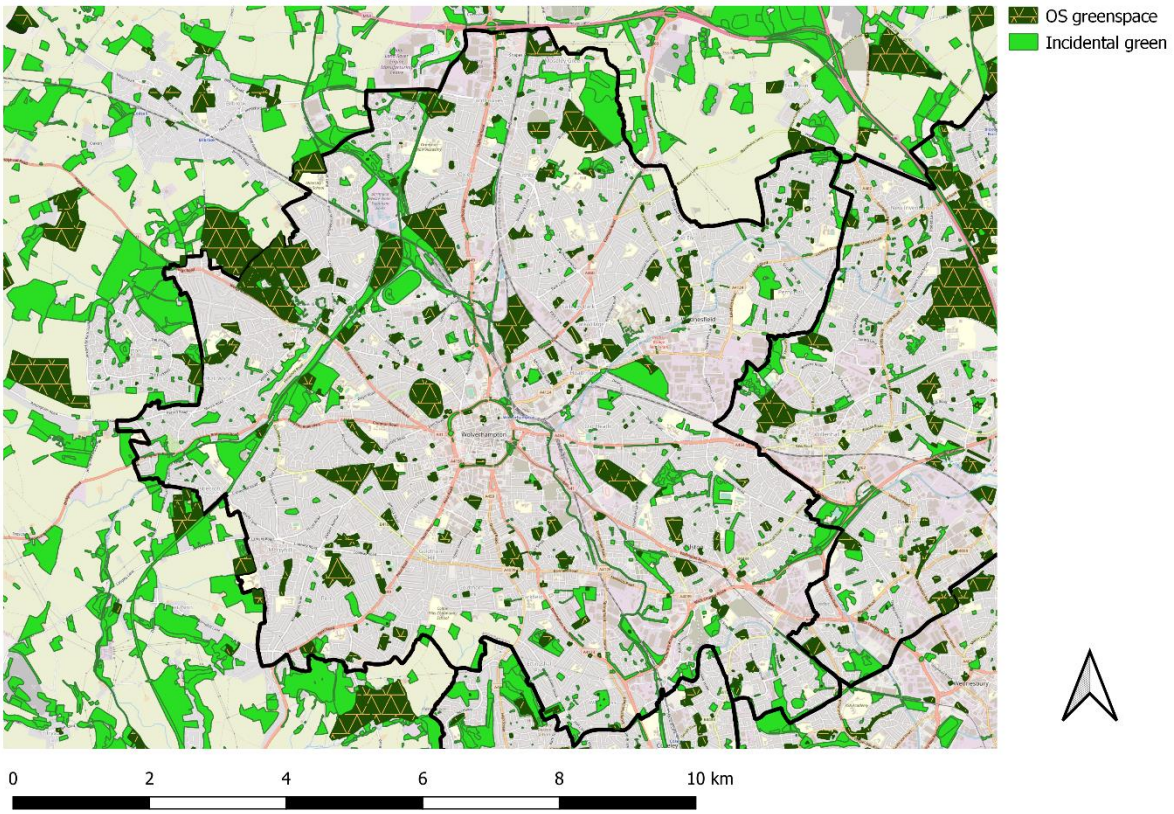
To understand in more detail any deficits in green space provision we would need to go into more detail on the types and functions of the green spaces available, i.e. analysing amenity as discussed above. This is possible within current datasets but was outside the scope of this research. Such an exercise is sometimes undertaken by councils in their green space strategies (see for example Coventry's Green Space Strategy, 2019) and has been undertaken for Birmingham's Future Parks Accelerator, but no consistent approach is applied across the region. A potential system would rate types of green space by the social services they provide and then map the provision of those services across communities.

Conversations were held with representatives from some local authorities, to sense check map based analysis and initial findings. The analysis suggests that WMCA contains many areas which will be perceived as 'green' which are not officially designated as park space. Indeed some of these areas are likely utilised as parks, however isolating and categorising these spaces in the data is extremely difficult. Figure 4 shows a map of officially designated OS greenspace[iv] in Wolverhampton and our categorisation of 'incidental greenspace'. The

[iv] In this case the officially designated green space mapped includes local golf courses, however these are not included as parks in our quantitative analysis.

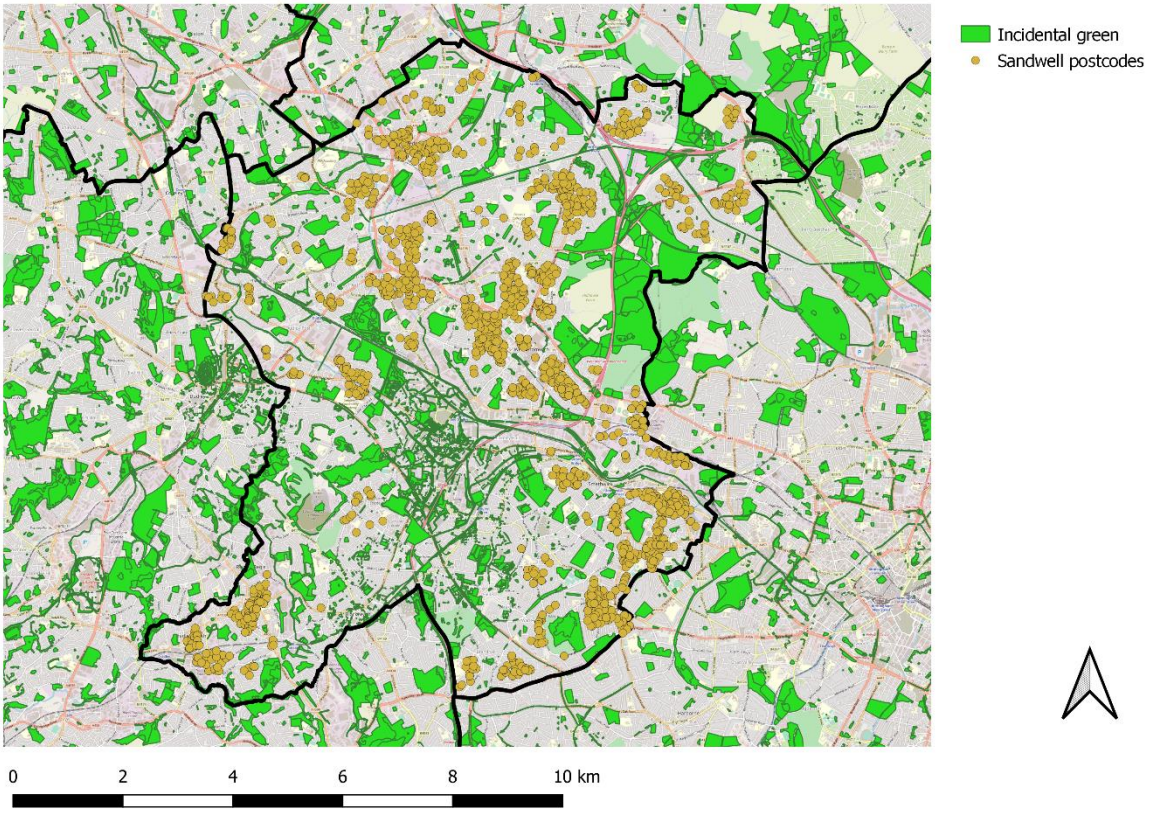
types of spaces which have been picked up by our analysis technique includes areas which are not easily accessible to the public, such as the centre of Wolverhampton race course and inaccessible water courses, and areas which are highly accessible to public such as the greenery lining walking and cycling routes, and accessible water courses. Our technique also identifies green spaces which may technically be accessible but are not designed for public use, and a small number of spaces which appear to be derelict or under-utilised. Areas which are clearly under agricultural management are excluded.

Figure 4: Officially recognised green space (dark green hatched) and 'incidental' (light green) green space in Wolverhampton



There are many ways the incidental green space provision could be analysed, each with strengths and weaknesses. Figure 5 illustrates an analysis performed on Sandwell, which highlights postcodes which are more than 5 minutes' walk from any incidental greenspace. This is one way of highlighting areas where residents may have a less 'green experience' of daily life in their community. This measure is imperfect as it does not include urban trees unless they are attached to a green area, it also does not consider (front facing) private gardens which may contribute to an area feeling more green. The fact that the method does not consider private gardens does, however, give it an advantage over methods which use satellite imagery to measure greenness and hence struggle to exclude private gardens. Testing suggests the method is typically successful in identifying housing estates without incidental green space, a feature which seems particularly common where older terraced housing is present.

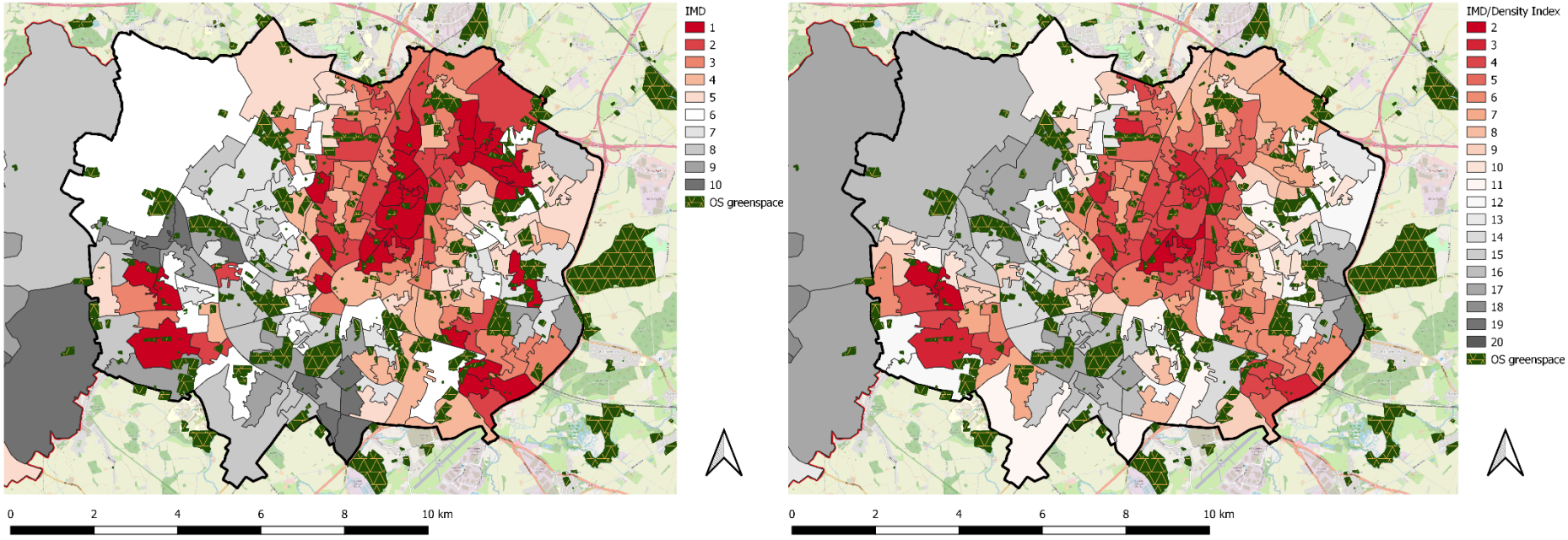
Figure 5: Sandwell postcodes more than 5 minutes' walk from any incidental green space (excluding golf courses)



Deprivation and access to green space in WMCA

Figure 6 presents a map of deprivation (left) and a map of deprivation scaled by population pressure on green space (right). There are large clusters of highly deprived areas in WMCA, of which many have a high population density per m^2 of green space. The red areas in the two maps are not dissimilar, indicating that the majority of areas with higher levels of deprivation in WMCA have higher population density per m^2 of green space. Areas with lower levels of deprivation do not in general present high population density, suggesting that there is a particular need to focus on those deprived areas for improving green space access.

Figure 6: Index of Multiple Deprivation (IMD) Deciles (left) and an index of IMD scaled by population pressure on green space (right) in Coventry



Age and access to green space in WMCA

Two indexes were created to explore age and proximity to green spaces. Figure 7 presents the proportion of postcodes in each LSOA that are within 300m of green space scaled by the proportion of population aged under 18 years, and Figure 8 presents the proportion of postcodes in each LSOA that are within 300m of green space scaled by the proportion of population aged 65 and over.

Across WMCA there are many areas that have a high proportion of young people under 18 years of age with greater average travel distances from green spaces (i.e. lower proportions of postcodes that are within 300m of a green space). In comparison, we see that those aged 65 and over are typically located closer to green spaces with very few LSOAs scoring low in the index. Both indices indicate hotspots of poor green space proximity, but these hotspots are typically in very different locations, and indeed different solutions will be appropriate.

Figure 7: Index of proximity to green space (300m) scaled by population aged under 18 in Sandwell

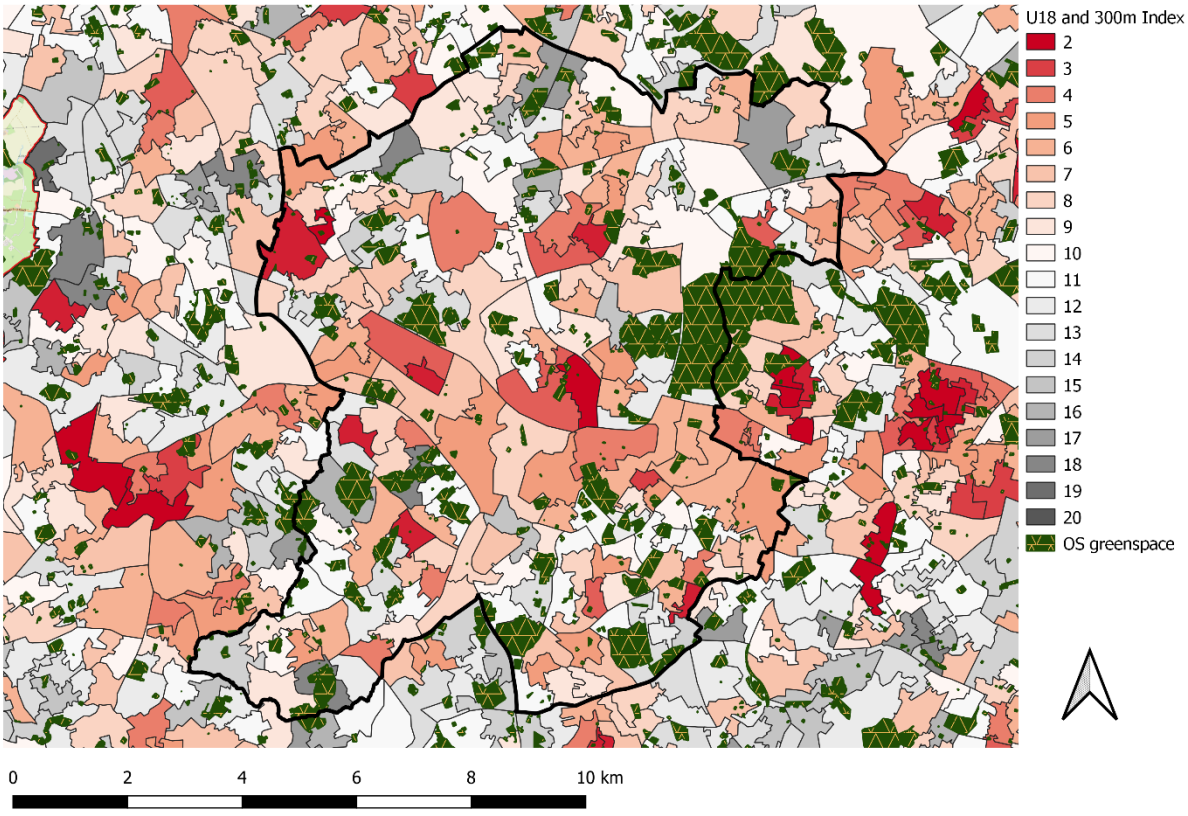
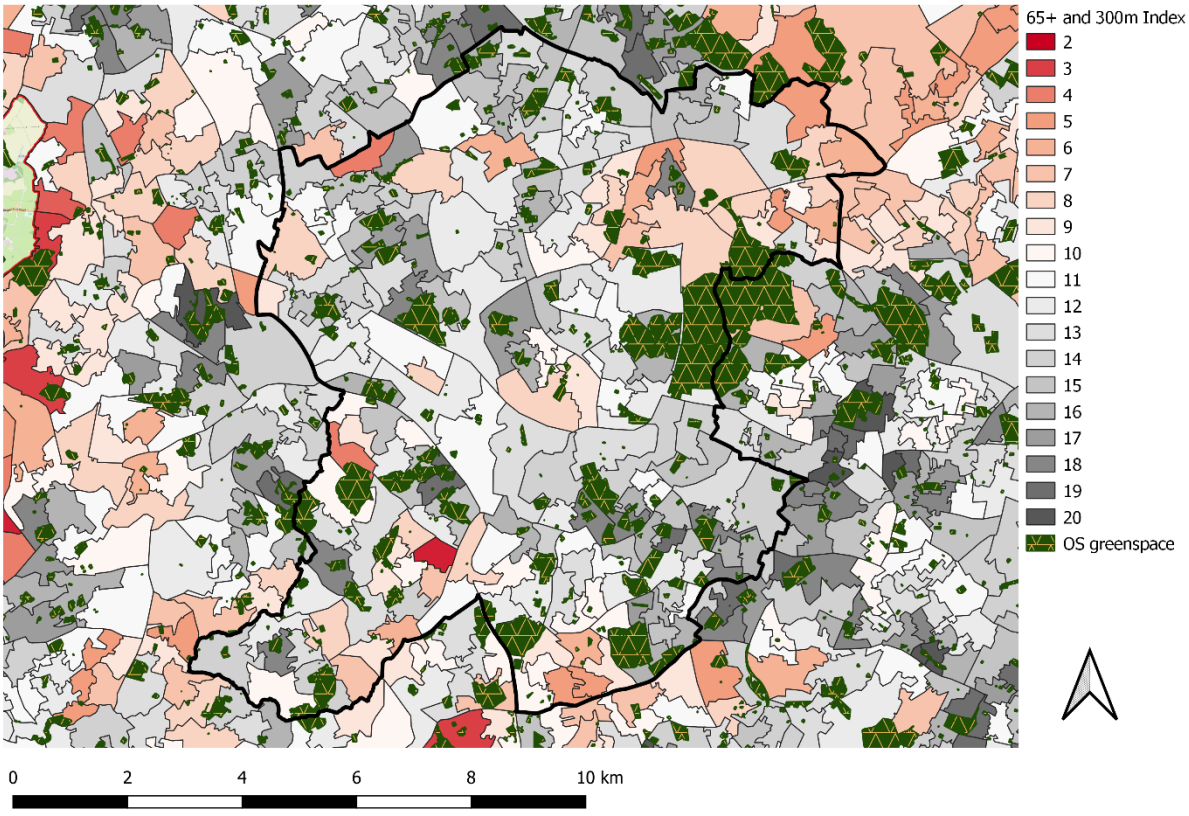


Figure 8: Index of proximity to green space (300m) scaled by population aged over 65 in Sandwell



Ethnicity and access to green space in WMCA

The relationship between ethnicity and access to green space has not been explored in depth in UK literature. The following figures highlight the proportion of Black and Minority Ethnic population against population pressure on green space (Figure 9) and proximity to green space (Figure 10). WMCA has a very significant population of ethnic minorities. Many of these communities are also experiencing high rates of deprivation. This analysis also highlights that many of these communities experience both high population pressure on green space, and in some cases (but to a lesser extent) poor proximity to green space. For a better understanding of these issues, the quality and amenity value of green spaces available to ethnic minorities, and the barriers (social, economic, and cultural), which may prevent communities utilising these spaces would need to be explored.

Figure 9: Index of BAME population scaled by population pressure on green space in Walsall

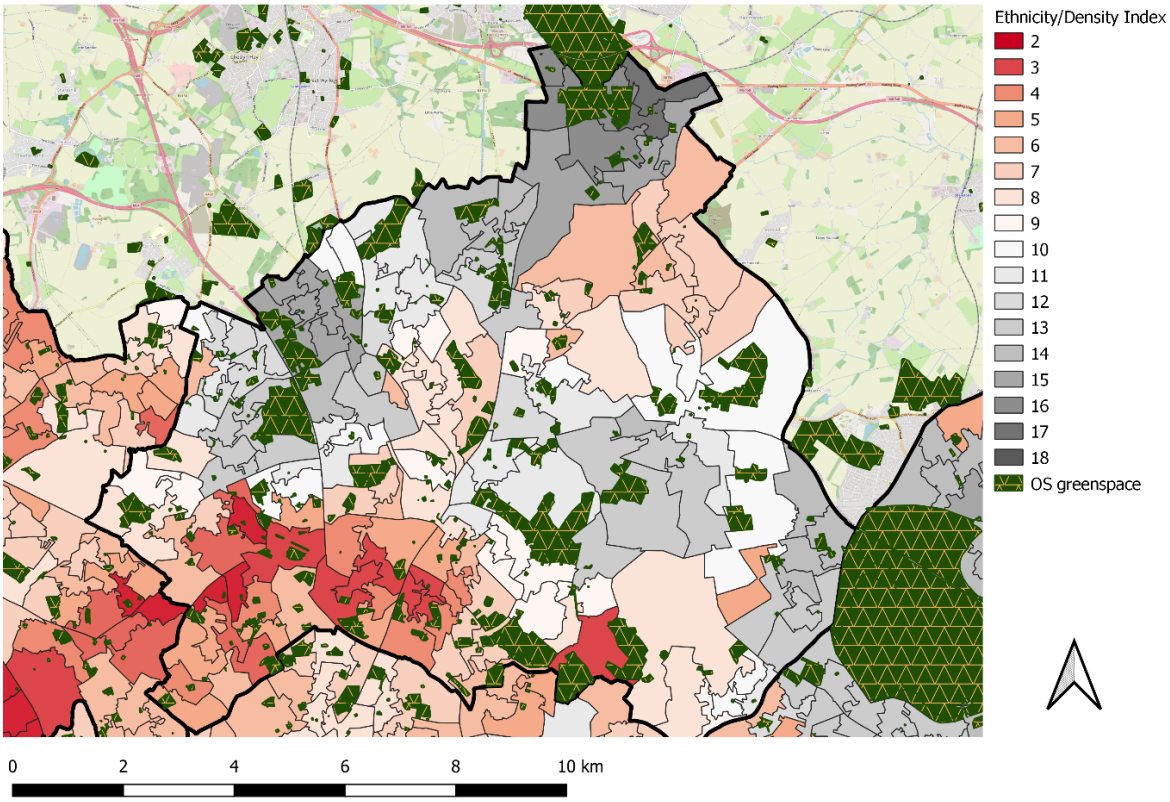
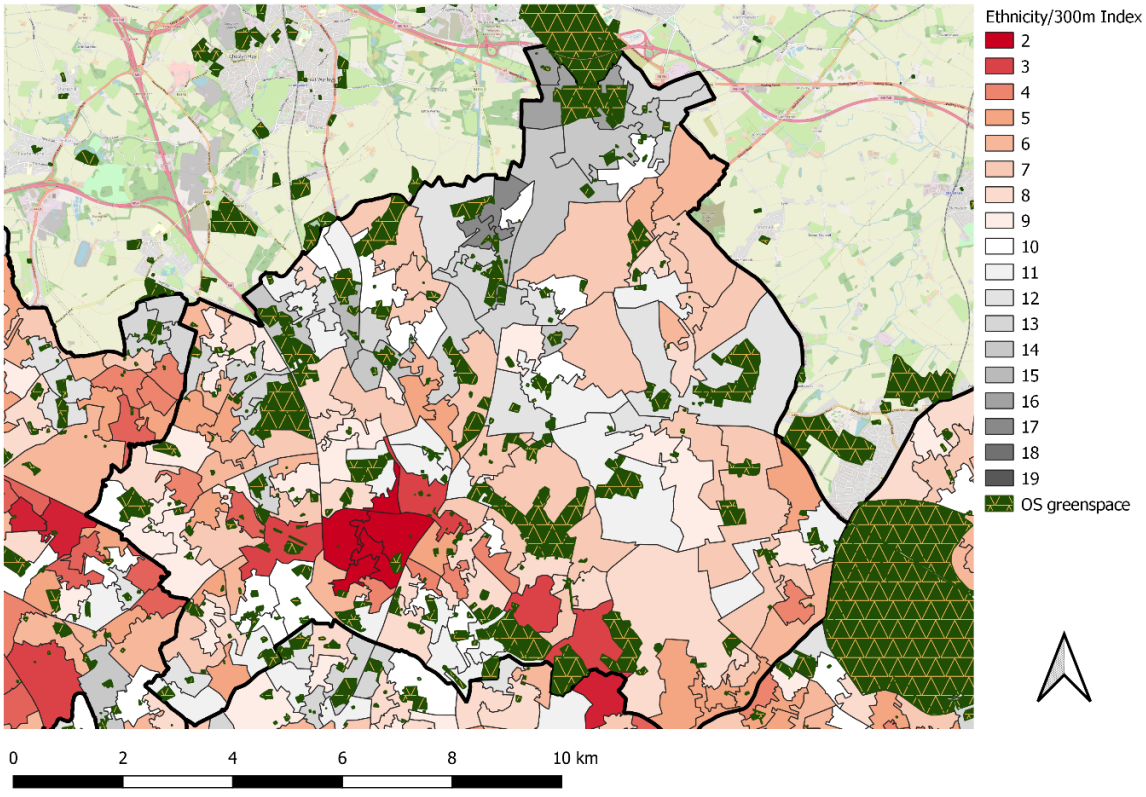


Figure 10: Index of BAME population scaled by proximity to green space (within 300m) in Walsall



INTERVENTIONS

In our consultation with the WMCA constituent authorities, officers reported a wide range of interventions which have, and are currently being applied in the area. These ranged through restoration of small local parks, creation of new spaces as part of new developments, and repurposing spaces such as golf courses. There was however, widespread concern that authorities are working within a highly restrictive environment in terms of capacity, funding, and planning powers. Exploring these barriers in-depth was outside the scope of this research, but they are one of the focus areas of the Birmingham Future Parks Accelerator which has ongoing work looking at effective green space governance and cross sector/theme collaboration.

A literature review of relevant interventions implemented outside the West Midlands region which might offer ideas and inspiration for tackling the challenges and barriers of access to green space in the identified 'hotspot' areas was undertaken as part of this research. There is a large evidence base on successful interventions that encourage the use of green spaces – with a particular focus on improving health and well-being. While there is a rich literature on improving health and well-being through nature-based interventions, there are fewer examples of interventions that focus on improving access to green space in UK literature. The dearth of literature in this area largely echoes the challenging planning environment in the UK over the past two decades, which has limited authorities' abilities to proactively create new green spaces. The recent announcement of Mayfield Park in Manchester, a new park in an already heavily urbanised space, represented a rare exception, as did the Olympic Park when it re-opened in 2014.

Table 5 illustrates a typology of interventions using the intersectional framework. We recognise that many socioeconomics characteristics are not independent of each other therefore fewer examples of cohort specific interventions are included. Table 5 provides an overview of examples found in the literature that could address particular socio-economic issues as well as physical barriers. If further developed this typology could be used as a guide for WMCA when targeting 'hotspot' areas and engaging with communities.

Table 5: Intervention typology

	Population pressure	Proximity / Access	Perceived quality	Amenity	Perceived Greenness
Socio-economic deprivation ***Health deprivation*** ***Age*** ***Gender*** ***Ethnicity*** ***Educational attainment***	**Re-purposing space / creating new green spaces:** Pocket Parks Regenerating brownfield sites Accessible green roofs	**Infrastructure for travel and connectivity:** Green corridors Cycling networks Canal paths and walking routes Public transport	**Enhancing existing spaces:** Active management of spaces Preserving heritage Improving biodiversity	**Re-purposing space & enhancing existing spaces:** Multi-functional green spaces Inclusion of facilities for target cohorts	**Greening space:** Urban tree planting Green buildings Eco-restoration

The following sections provide more detail on examples from Europe and the UK that address the barriers and challenges to accessing green space.

Creating, repurposing, and regenerating spaces

Creating new spaces where possible or re-purposing existing spaces can address barriers of both proximity and population pressure on green space. The following examples show the importance of design when creating inclusive green spaces.

Superkilen, Copenhagen[29]

The Superkilen is an urban park that cuts through one of the most multi-cultural neighbourhoods in Copenhagen. The City Council of Copenhagen introduced a programme for urban renewal that promotes social integration through the design of the public space. The project was designed by architectural firms with the aim of creating an inclusive space. As part of the design, elements and objects from different countries were integrated into the design to represent the different cultures of the local residents, such as palm trees from China, Armenian picnic tables, benches from Brazil and swings from Iraq. The park is made up of three zones: green park (for children and play), red square and black market. The park is part of a network of bike paths and green spaces that connect two districts with one another, facilitating cycling into the area and integrating with a wider cycling and walking network. While the SuperKilen is strongly driven by contemporary architecture practice and promoting integration across communities, it provides an example of an inclusive space created for all ethnicities, cultures and religions.

Derbyshire Street Pocket Park, London Borough of Tower Hamlets[30]

Pocket parks are locally identified, smaller areas of green space that can help individuals escape the busyness of the city. In London, 100 pocket parks have been created for all people to enjoy. Each pocket park is unique and should be designed taking into account the needs and constraints in a particular area.

Pocket parks could address many of the barriers / challenges to green space access if planned well. The Pocket Park programme[31] was used to create sustainable drainage systems (ensuring surface water naturally drains away) and demonstrate how they can be implemented in the urban environment as well as creating a useable, accessible green space. The Derbyshire Street pocket park addressed a few of the core components in our intersectional framework:

- **Accessibility.** The pocket park is located at the end of Derbyshire street in east London, primarily used for parking but with motorists avoiding the space due to being a 'dead end'. A new path and cycle lane was put in place to link the back of the street to another – with the aim of making a connected path. Cycle storage facilities were also built-in, to enable people to park their bikes. Raised kerbs around the garden were built-in to help with accessibility for partially sighted users.
- **Amenity.** This is a multi-functional space that includes a seating area and space for community events and activities. Sustainable drainage systems were put in place, mitigating local flood risk. In the summer, the planted areas are maintained by local volunteers. Bins were also integrated into the design to avoid littering. The space was well lit at night enabling use at any time of the day.
- **Quality.** While there is no evidence around perceived quality for local residents, it is clear that the space aimed to enhance biodiversity. Green roof bike and bin shelters were created with habitat panels that provide nesting sites for bees, insects and birds. The area itself was near tall trees and native plant species were planted.

Other potential additional benefits from a space like this could be reduced fly-tipping (if highlighted as a hot spot for it) and reduced anti-social behaviour. However, it is not clear to what extent the pocket park achieved this.

Infrastructure for travel and connectivity

In order to enable greater access to green spaces, places have to be well-connected. While connectivity is typically context specific, there are some examples of large scale projects to improve usability of transport infrastructures and encouraging use of more sustainable methods of travel.

Bee Network, Greater Manchester[32]

The Bee Network is the longest planned walking and cycling network in the UK, connecting every neighbourhood in Manchester. In order to encourage more walking and cycling in the city, the network aims to have safer streets and junctions as well as create more innovative designs. For example, improving road surfaces and planting trees. The Bee Network is based on a set of design standards, such as ensuring two pushchairs can fit on a walking

path and people of any age would choose to use cycling paths. The new standards and ways of working involved a training programme for ten local authorities and community engagement. Neighbourhood Network Planning sessions were held and Greater Manchester has built on best practice to increase the speed of development of the network. Transport for Greater Manchester has produced a best practice consultation guide.

A framework called “Streets for All”, with several indicators and factors is used to check the standards of the Bee Network design and plans, and are used to provide an overall score of quality. Factors include; inclusivity, integration, health, environmentally responsible, safe and secure, reliable and well maintained and resilient. Indicators that sit under these are components relating to movement and place such as ‘attractiveness’ and ‘diversity / mix of uses’.

Green Corridor (Passeig de Sant Joan), Barcelona

Green corridors are green infrastructure, such as trees and flowers, that link green spaces to one another. The networks provide connectivity for wildlife as well as the public. Passeig de Sant Joan is an urban green corridor aimed at increasing ecological and social connectivity in Barcelona. The key aims were to prioritise pedestrian use of the corridor as well as create a ‘green zone’ extending up to Ciutadella Park.[33] The project involved development of a larger pedestrian path, planting new trees and preservation of existing trees. A new two way bicycle lane was also put in. The intervention created greater ecological and physical connectivity across urban and green sites whilst increasing the amount of green open spaces for residents.[34]

Greening space

The wellbeing generated by an urban space can be enhanced through attention to the ‘greenness’ of the urban experience’. Around the world, the creation of “living” walls on facades and roofs is growing in popularity.

South Lambeth Road, Vauxhall[35]

The aim of the “living wall” was to create a safer space that improve air quality as well as improving visual aesthetic of the space. Local businesses came together in order to create a cleaner and greener space in the area.

Gold Lane, Edgeware[36]

The project on Gold Lane in Edgeware was the first of its type in London. Notting Hill Housing Group aimed to generate environmental benefits from their social housing by introducing green roofs. The project improved building aesthetics as well as reducing surface water run-off. Residents of the green roofed housing noted that they don’t often turn their heating on and their children enjoy the insects attracted to the area such as butterflies and bees.

Enhancing existing spaces

In addition to creating new spaces for people to use, there is benefit in improving existing spaces. The two examples below provide projects of different scale aiming to improve access to green space – changes can be as little as removing litter and putting up signage to inclusion of new facilities such as outdoor gyms and toilets.

Woods In and Around Town programme, Scotland[37]

The Woods In and Around Town (WIAT) programme aims to tackle challenges from accessing urban woodlands and promotes them as safe and accessible spaces in Scotland through a Forestry Grant Scheme. The programme focuses on areas of high social deprivation that are within 1km of the woods and have a population of over 2,000 people. Its objectives are to:

1. Bring Urban Woodlands into active management to benefit communities
2. Create new urban woodlands to benefit communities
3. Support programme and activities that encourage people to use the woods

The WIAT programme clears rubbish and signs of vandalism as well as improving foot paths, signage and entrance gateways. It's not clear what specific intervention activities were carried out in this case however, there were significant changes as a result. The level of funding and intervention is dependent on context and need in local areas. The WIAT programme addresses the component **quality** and **accessibility.** A delivery framework was created and WIAT was delivered through a range of approaches including, public engagement plans and monitoring and evaluation, promoting quality standards and collaborating with partners to achieve objectives. An evaluation of the programme in a deprived community in North Glasgow found a highly significant change in satisfaction of physical environment in the neighbourhood in comparison to a similar area with no intervention as well as increased visits to the local woodlands in the intervention community.[38]

Saughton Park restoration project, Scotland[39]

The Saughton Park restoration project secured grant funding in 2013 to develop master plan proposals for the restoration with input from local residents using public consultation and engagement. The project was awarded further funding and is now in its construction phase.

The purpose of the restoration project is to improve the use of the park by the public and enhance and preserve the historic nature and value of the site. The project sets out to restore the park and addresses core indicators for accessing green space:

- **Accessibility.** An objective of the restoration project is to create a welcoming park for all. The design aims to improve access and physical connections to and within the park. New paths and routes for cyclists and pedestrians have been planned. The plan also aims to improve disabled parking facilities and restore/install benches and signage. The project specifically hopes to appeal to specific target groups such as; younger children and family groups & carers, over 60's and visitors with disabilities. More about what is planned to encourage these cohorts is detailed in the following point.

- **Amenity.** Plans are in place to create new facilities for the public such as a new café and public toilets. For children, the design sets out to provide a dog free area of a play park for children run around in. Other additions include outdoor gym equipment, a band stand and restoring and preserving heritage sights as community venues. Sustainable energy use has also been considered in design plans, such as installing low carbon systems (e.g. ground source heating system and solar panels).
- **Quality.** There are plans to improve layout, promote horticulture by actively managing trees, woodlands, hedges and flower beds. Biodiversity will be enhanced by planting new fruit and trees, and installing bee hives to help pollination.

There were several stages to implementation and a lot of work put in at the planning and design stage. A survey of both visitors and local residents was undertaken to inform the proposed development of the park. These were undertaken both face-to-face at the park and local community centres, and online.

Challenges to consider

While there are many UK and European examples of re-purposing and enhancing green spaces, the case studies suggest that addressing local context and engaging with local residents is a key component of design. It is important that inclusivity is a priority when considering the design of green spaces and the possible implications and trade-offs. For instance, a potential implication of enhancing or creating a new green space is gentrification. Green spaces may increase house prices which could cause displacement in lower income groups by those with higher income.[40] Another implication of a new green space is increased tourism and therefore greater population density in the green space.[41]

Prior to the design stage, the development, regeneration, and management of green space in the UK faces a myriad of political, funding, governance and regulatory challenges. Budget and capacity constraints across local authorities often lead to local authorities taking, or being forced to accept, short-term approaches.[42] A product of this environment has been the rise in recent years of the so-called ‘fleecehold’ approach to management, in which developers set up private management companies which charge a levy on local residents (above and beyond their council tax) for the management of their local parkland.[43] The loss of stewardship of green spaces represents a threat to local authorities’ ability to deliver green space enhancement in the public interest.

The same challenging planning environment often limits the opportunity for creation of new public green spaces as green space is pitted against other social goods in competition for an all-too-small pot of funds. With pressure on local authority finances ramped up further by the Covid-19 crisis and the Government’s response, and an economic crisis under way, the challenges local authorities face are only growing.

Nonetheless as Coronavirus exposes the inequity in access to good quality green space, and the climate and ecological crisis escalates, a significant opportunity arises. WMCA is in an ideal position to support local authorities to seize this moment, and indeed to capitalise on renewed central government interest in green investment.

Organisational structures vary across local authorities, introduction or improvement of green infrastructure may sit across many departments in a council and the management of spaces could also include a number of bodies (e.g. partnerships across councils, with charities or

with contractors). Co-ordinated and concerted action is needed. Local authorities require support to ensure they have strategic oversight as well as democratic influence or control over the management of green spaces.[44] Support in the evidencing of the diverse social, environmental and economic benefits of green space investment can also be useful, and a catalyst for cross-departmental and thematic integration. Finally, local authorities must be adequately financed to scale-up delivery of new and improved green space and nature.

RECOMMENDATIONS

This report has explored accessibility and provision of green space across WMCA and provided examples of ways that local authorities can consider improving their green spaces. The analysis carried out focuses primarily on the relationship between physical and socioeconomic barriers to accessing green spaces such as proximity, population density and deprivation. While the spatial analysis at this stage is exploratory, there are several suggestions for moving to delivery of new and improved green spaces. A combination of ideas drawn from WMCA, the exploratory analysis and case study examples for implementing interventions for hotspot areas are detailed below:

1. **Creating a West Midlands Green Spaces Taskforce.** It is important that a strategic approach is taken and co-ordinated by a group of representatives from the local authorities involved. The group should include or ensure the involvement of individuals from a variety of departments such as public health, transport, and cultural services to enable a holistic approach to improving green spaces. It would act as a facilitator for the recommendations below.

2. **Building on the evidence base to prioritise 'hotspot' areas.** The WMCA area appears to contain significant intersectional inequality in green space provision. Further research should be carried out to identify the relationship between green space, socioeconomic characteristics and physical barriers to accessing green space.

3. **Involving residents.** Whilst the exploratory analysis has identified certain 'hotspots', qualitative evidence gathered from residents will enable WMCA to dig deeper into the issues highlighted by the data, and confirm where the highest need is and *why*. It is important that residents are consulted at each stage of the process, from planning and design through to implementation, to ensure the interventions are fit for purpose.

4. **Data sharing platform and/or designated data officers.** A platform or designated data officers from local authorities would ensure consistent data collection, and the sharing and monitoring of data. This would inform the evidence base as well as ensuring that data provided from local authorities is of the same standard and level of detail.

5. **Capacity building and sharing best practice.** Local authorities should share best practice with one another and build on the learnings shared from other local authorities. They should set out key ways of working to enable greater collaboration as well as effectiveness and efficiency. This has been done in Greater Manchester as part of the Bee Network.

6. **A Community Green Grant Fund targeting 'hotspot' areas.** After building on the evidence, an immediate solution for specific neighbourhoods is the delivery of a community green grant fund programme. This would enable WMCA to improve access to green space and tailor interventions to local context. Ambition and funding should be set as high as is feasibly possible, commensurate with the scale of both the climate and ecological crisis, and the deficit in green space provision highlighted across the WMCA area.

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