Tree Planting Opportunity Mapping

For Nechells Ward and Alum Rock Ward

Birmingham City Council

National Trust

Treeco₂nomics

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Executive Summary

Tree planting and establishment is rightly recognised as one of the most important tools we have in the ongoing drive to integrate green infrastructure within our urban spaces. They provide a wealth of ecosystem services and benefits to human health and wellbeing. However, with limited resources, it is vital that new tree sites are located in areas where they will have the greatest impact.

This pilot study focuses on Nechells and Alum Rock, two centrally located wards in Birmingham City with particularly low Tree Equity Scores. This mapping moves the answer to the question: "where should we plant trees ?", from neighbourhood to street and even individual site level. This is done by answering the related question: "where could we physically plant trees if we wanted to ?".

Nechells Ward, with 10.1% canopy cover and Alum Rock Ward with 8.4% canopy cover are 575ha and 282ha in area respectively. Together, they have some 48ha of linear roadside areas potentially capable of taking a new tree pit. This represents almost half - 46% - of all roadside space or just over 5% of all land across the two wards.

		Nechells	Alum Rock
Tree Equity Scores		47 to 97	60 to 97
Roadside area with potential for a tree (prior to ground truthing)		30ha	18ha
Number of nominal tree planting sites across all neighbourhoods	Hard	4500	3442
	Soft	967	205
	Total	5,467	3,647
Number of nominal tree planting sites within residential zones with high priority tree equity scores (i.e. <70).	Hard	1414	843
	Soft	251	17
	Total	1,665	860
Number of nominal tree planting sites assuming kerb buildouts on narrowly paved roads		232	118

Table 1. High Level figures for potential tree pit locations

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Treeco₂nomics

1. Introduction

This report considers the wards of Nechells and Alum Rock in Central Birmingham in three ways: 1) A basic canopy cover assessment, 2) Tree Equity Scores and 3) tree planting opportunities.

This is part of a long term approach to tree planting. The canopy cover assessment gives an indication of the extent of the urban forest and how it varies across the wards. The Tree Equity Score is a valuable tool in prioritising which areas have the greatest need for increased tree canopy cover, and the opportunity mapping section of this report covers the 'where to plant' aspect of the challenge.

The wards have been mapped using Geographical Information Systems (GIS) software taking into account key practical constraints to site selection, such as the width of pavements, the need for driver visibility at junctions and the pre-existence of trees already in both public and private spaces.

There exist many other constraints which can affect individual sites, such as the presence of underground services, or the need for residents to access their property by car across the pavement. Thus this report helps direct resources to locations worthy of ground-truthing, but does not remove the need to do so. The report includes upper level estimates of nominal locations on a street by street basis to give a sense of scale for the potential for new trees.
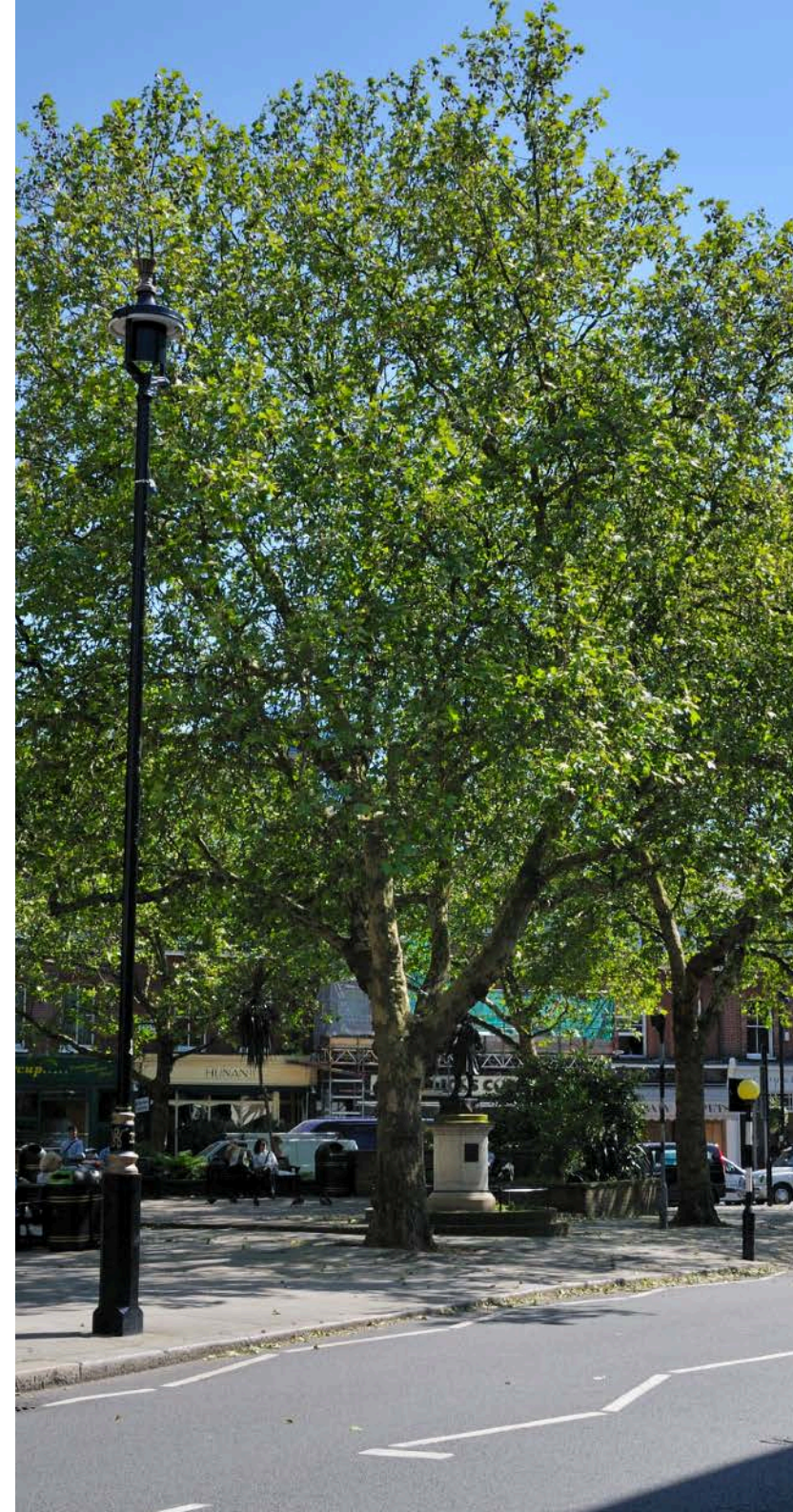
2. Tree Canopy Cover

Canopy cover has been calculated at LSOA level for the two wards.

Overall, Nechells has 10.1% tree canopy cover, whilst Alum Rock has 8.4% tree canopy cover. The tree canopy is fairly evenly spread across Nechells. In Alum Rock, it is more varied, with some areas having less than 5% and some more than 20%.

Bringing the less green neighbourhoods up to the same level as the rest of the ward should be a priority, to ensure that all residents have equal access to a greener environment.
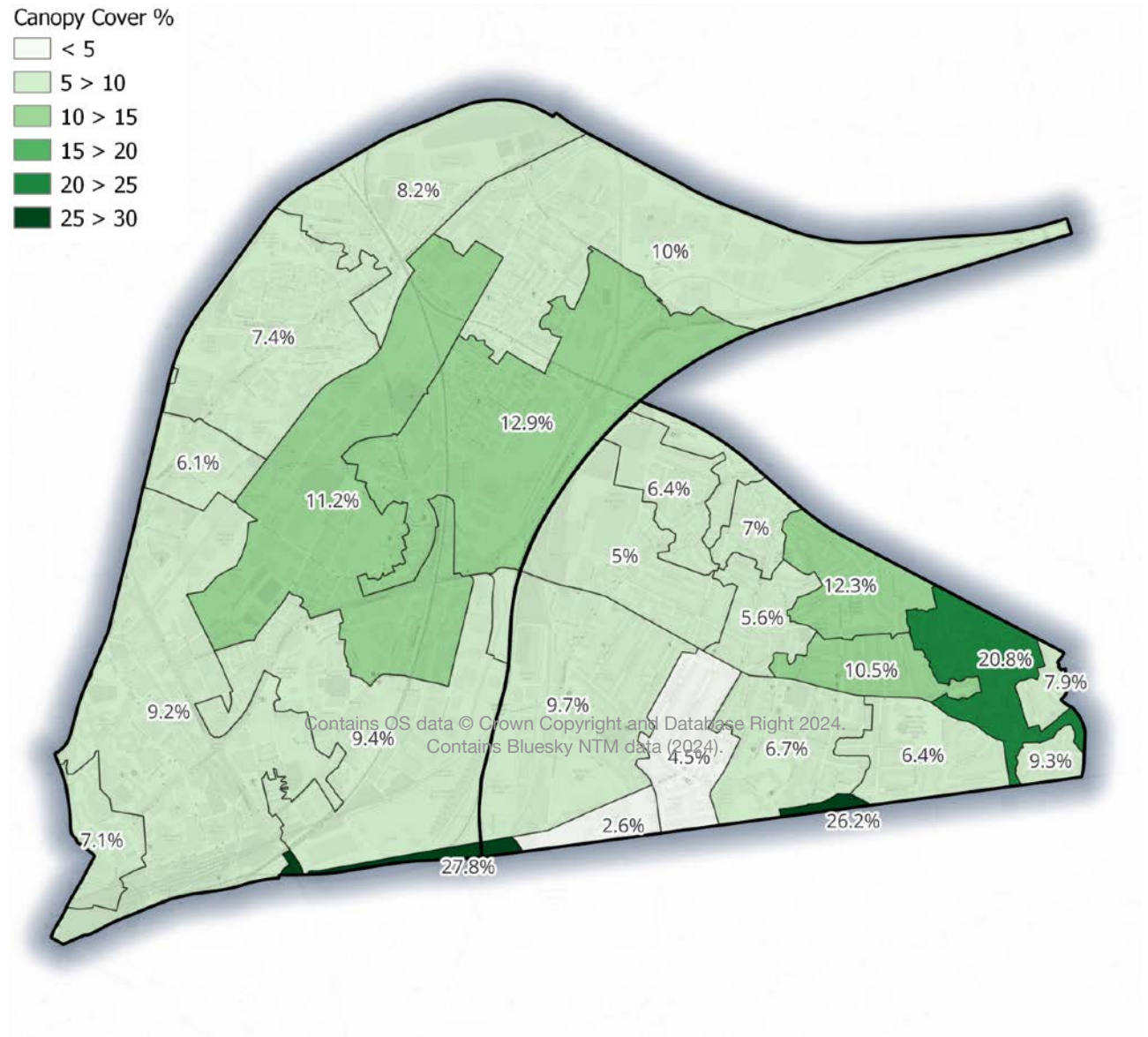

Canopy Cover %
- < 5
- 5 > 10
- 10 > 15
- 15 > 20
- 20 > 25
- 25 > 30

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Contains Bluesky NTM data (2024).

Figure 1. Map of Canopy Cover of LSOA's in Nechells and Alum Rock.

3. Tree Equity

3.1 Tree Equity Mapping

Assigning a Tree Equity Score is a critical tool to help prioritise tree planting, particularly in urban areas. This score is calculated at the Lower Super Output Area (LSOA) level each LSOA receiving a score specific to its urban challenges.

The Tree Equity Score identifies areas where tree planting should be prioritised based on the combined urban challenges to aid decision-making. However, when considering any type of tree planting, location and site suitability are a priority. This helps to ensure that the trees can survive and thrive within hard landscapes.

As seen in Figure 2, interestingly Nechells contains neighbourhoods with lower tree equity scores than any within Alum Rock, despite it having more tree cover (see section 3.1). This indicates that urban challenges may be greater in Nechells than Alum Rock.
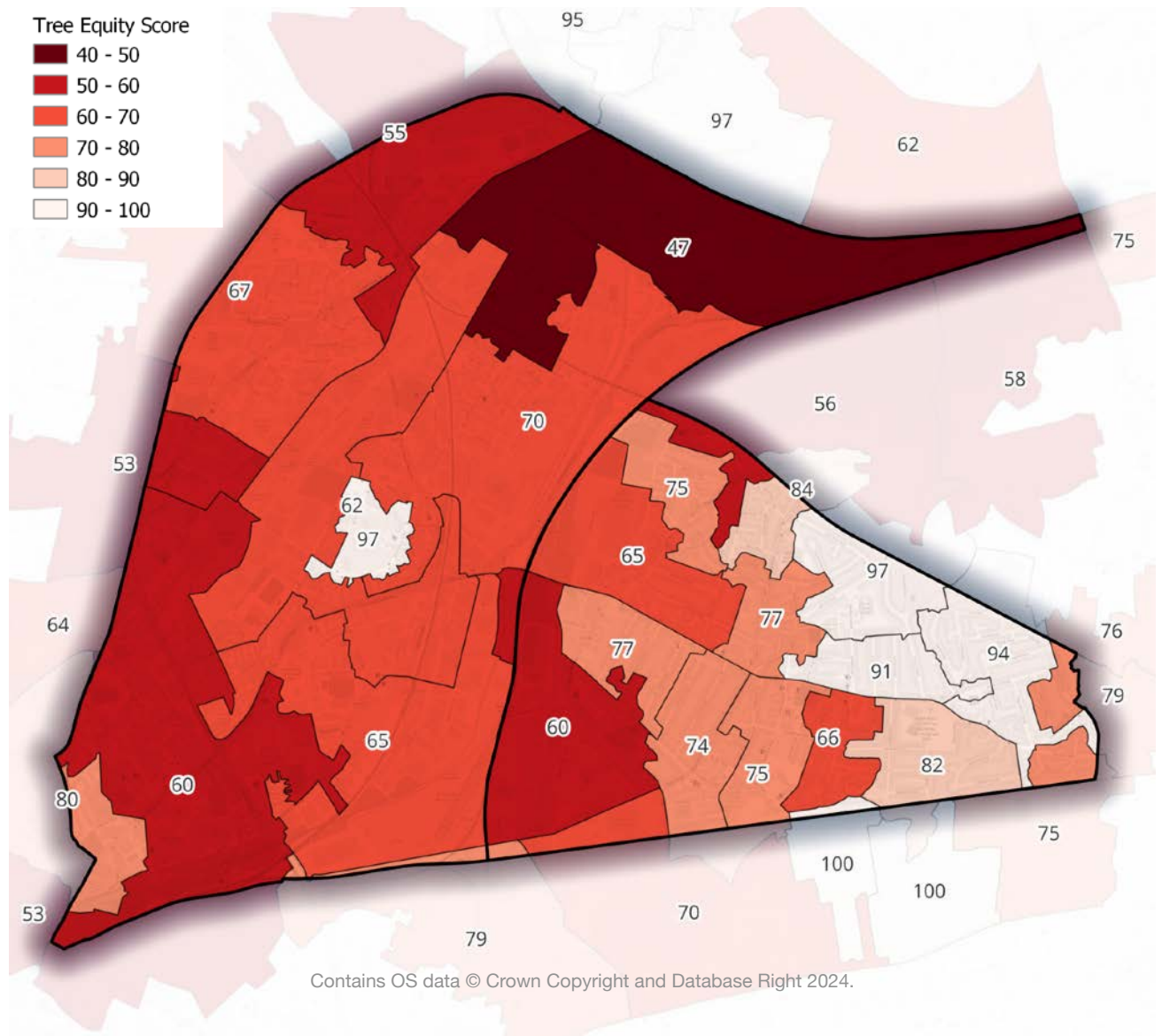

Figure 2. Tree Equity Score by LSOA

4. Land Usage Zones

It is possible to prioritise zones for tree planting based on more factors than just existing tree cover and Tree Equity score and this mapping considers…… Figure 3 indicates land use across the wards. By focussing on particular land use types, it is possible to bring green infrastructure into areas where they can be of most benefit.
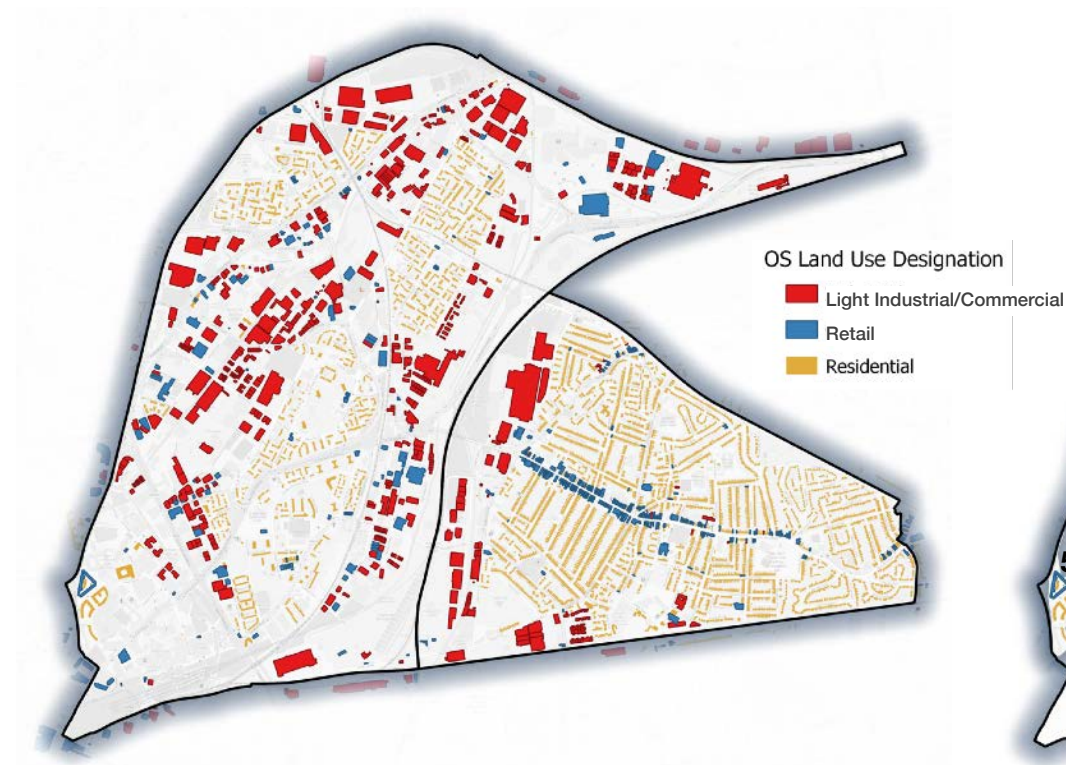
predominantly residential. Targeting these areas with tree planting could have considerably larger impact on the daily lives of residents in these wards. Referencing these areas with the Tree Equity Score would reduce the numberof places to prioritise planting.

Figure 3. Land use across the wards

Figure 4. Residential zones

Figure 4 shows the areas which are

5. Tree Planting Options

5.1 Soft Landscape Opportunities

This includes verges and other areas of open space which may be suitable for tree planting without the need for engineering solutions. These are usually the easiest places to plant, but may be more difficult to come by in urban spaces where hard surfaces tend to prevail.

5.2 Hard Landscape Opportunities

Hard landscape planting opportunities are places where hard surfaces could be adjusted to make space for a tree. This mostly encompass areas of pavement which may be suitable for a tree pit. These planting opportunities may be limited by pavement widths, dropped curbs, street furniture, and underground services. In heavily urbanised areas they often outnumber the soft landscape opportunities, and are more likely to be found in areas with low canopy cover and high deprivation levels, which would make them high priority planting locations.

5.3 Re-engineering Opportunities

Where pavements are too narrow for tree pits, other solutions should be considered. Re-engineering pavements and roads can be an option to create enough space for trees. Kerb buildouts are an example of this, and can double as traffic calming measures.

Soft Landscape

Hard Landscape

Re-engineered
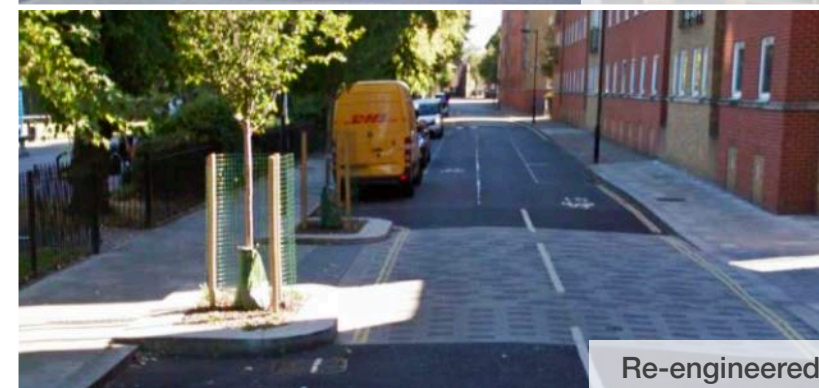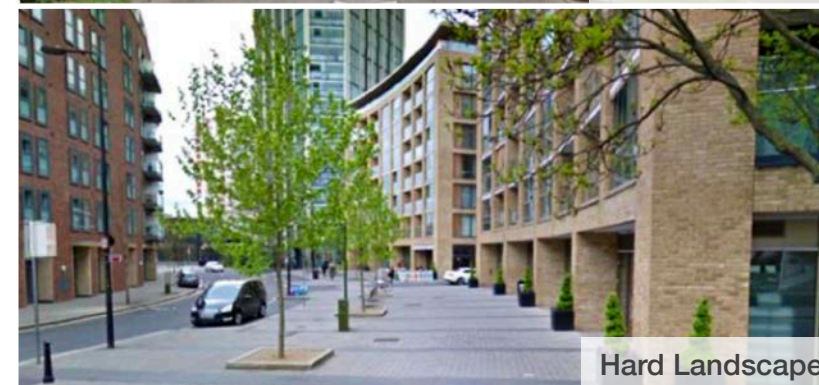
Images sourced from Southwark Streetscape Design Manual (2020)

6. Exclusion Criteria

The potential plantable area is reduced based on exclusion criteria, based on pavement width, driver visibility splays and existing canopy.

6.1 Existing Tree Canopy

Existing tree canopy cover has been assessed using Bluesky National Tree Map data. Figure 5 shows the extent of tree canopies across the wards. These canopy extents were removed from the potential planting locations, as planting under existing canopies in urban areas is not recommended. It should be noted that this dataset registers trees over 3m tall, and therefore may not recognise newly planted trees until several years after planting.

6.2 Visibility Splays

This refers to the areas around road junctions which are required for a safe line of sight for drivers. Tree planting is not recommended in these areas, and they have therefore been eliminated as potential planting locations.

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Contains Bluesky NTM data (2024).

Figure 5. Tree Canopy Cover showing detail

7. Surface Categorisation

Figure 6 shows how a residential area of Nechells Ward has been categorised by exclusion criteria and surface cover.

Only locations where a tree could theoretically be planted have been classified.

The potential planting locations have been classified by the exclusion criteria first, and then the remaining areas have been categorised by surface type (soft or hard).

Landscape Classifications
Non-plantable
- Pavement Under 2m Wide
- Within Visibility Exclusion Zone
- Within 5m of Trees
Plantable
- Hard Surface
- Soft Surface

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Figure 6. Example of surface classifications for potential tree planting locations

8. Planting Potential

8.1 Linear Plantable Space

By removing the exclusion areas, potential locations become more clear. Estimates of potential plantable opportunities can be made for these areas.

Across Nechells, there is an estimated 216,200 m² of linear planting space available; for Alum Rock an estimated 116,000 m².

Note that the true realisable figure will be lower than this due to constraints on the ground, such as bus stops, lampposts and car access as shown in section 9.

Landscape Classifications

Plantable
- Hard Surface
- Soft Surface
- Potential Planting Location

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Figure 7. Example of potential tree locations in soft and hard landscapes.

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8.2 Nominal Tree Numbers & Canopy Projections

For the purposes of establishing indicative numbers on a street by street basis, it is assumed that a tree could be planted every 10m within the linear plantable space identified. This allows good canopy development without overlapping with adjacent trees. Table 2 shows the potential tree planting numbers on this basis.

It is possible to estimate the impact upon canopy of tree planting by assuming a future canopy size. The current average across all tree in Birmingham is 36m², which gives one answer. However, for tree in the public domain with ongoing management, greater average canopy sizes, are easily attainable. The 80m² used in table 3 is quite conservative in comparison to the 250m² of a mature oak or London plane.

		Nechells	Alum Rock
Tree Equity Scores		47 to 97	60 to 97
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	Soft	967	205
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Number of nominal tree planting sites within residential zones with high priority tree equity scores (i.e. <70).	Hard	1414	843
	Soft	251	17
	Total	1,665	860

Table 2. High level figures for potential tree pit locations. Such sites must be ground truthed to verity numbers

		Nechells	Alum Rock
Tree Equity Scores		47 to 97	60 to 97
Roadside area with potential for a tree (prior to ground truthing)		30ha	18ha
Canopy gain if all trees match Birmingham average @36m²	ha	16.2	12.4
	%	3%	4%
Canopy gain if all trees reach maturity with average at 80m²	ha	43.7	29.2
	%	8%	10%

Table 3. High Level figures for potential tree pit locations. This assumes a 50% realisation of GIS forecast sites

The high level canopy perspective can be mirrored by a detailed output on a street by street level to enable the impact to more easily understood by those who know the area and for ease of ground truthing. See Table 4.

Tree Equity Score	Street Name	Hard	Soft	Total
up to 60	Adderley Road	108		108
	Aston Church Road	55	3	58
	Ash Road	50		50
61 to 70	Havelock Road	66		66
	Anthony Road	63		63
	Washwood Heath Road	49	4	53

Table 4. Example of potential tree numbers generated at street level to enable ground truthing

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8.3 Constraints

This digital exercise provides a starting point for strategically approaching tree planting opportunities in Nechells and Alum Rock. It is a modelling exercise based on available data, and therefore may not be reflective of the actual situation on the ground.

Existing trees may not be captured by the tree canopy dataset, particularly if they are newly planted, as they may be too small to be picked up by the imaging.

Street furniture (benches, signposts, lamp posts etc) is not accounted for in placing the potential tree location points, and may obstruct tree planting.

Underground and overhead services may also impact where trees can be planted, or the approach to planting, by limiting the maximum height of the tree selected or compromising root space.

Dropped curbs and parking also limit plantable locations. Trees planted in areas where cars are frequently parked on verges or pavements will likely suffer more damage and vandalism, thereby requiring more protections in the form of tree guards.

These issues must be assessed through manual means, for example digital walkthroughs using tools such as Google Street View, and physical site checks.

Model planting opportunities with land classifications.

Google satellite view with view direction.
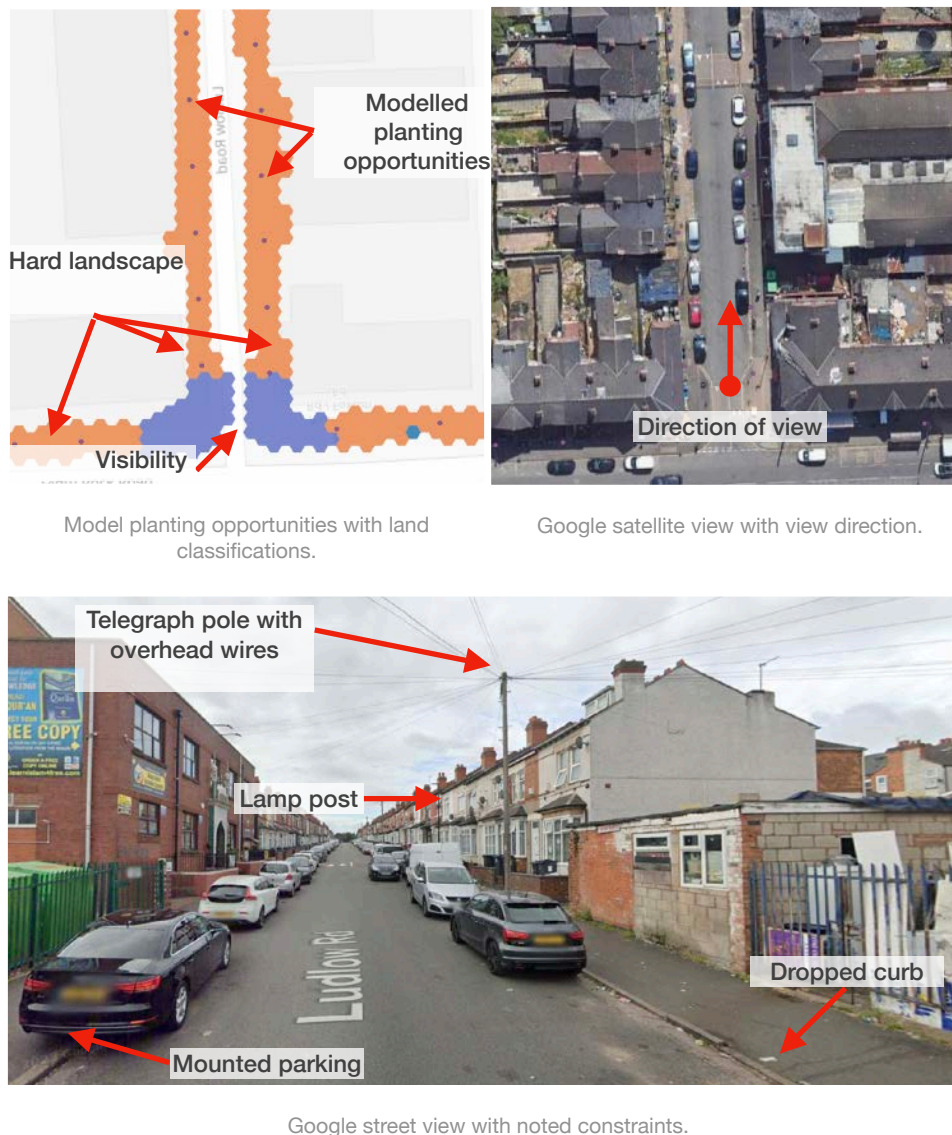

Google street view with noted constraints.

Figure 11. Images comparing model potential planting locations with street images showing constraints.

9. Re-engineering Target Zones

Areas where pavements are too narrow for tree pits will require re-engineering solutions. These efforts can not only increase tree cover, but reduce traffic speeds, make areas more pedestrian friendly, deter unwanted parking, and improve general amenity.

Re-engineering the streets provides the opportunity to bring in other features such as Sustainable Drainage Systems (SuDS) or for active travel solutions.

Careful re-apportionment of space can generate room for trees with only limited impact for on street parking capacity. Potential planting numbers if a quarter of opportunities are realised are shown in Table 5.
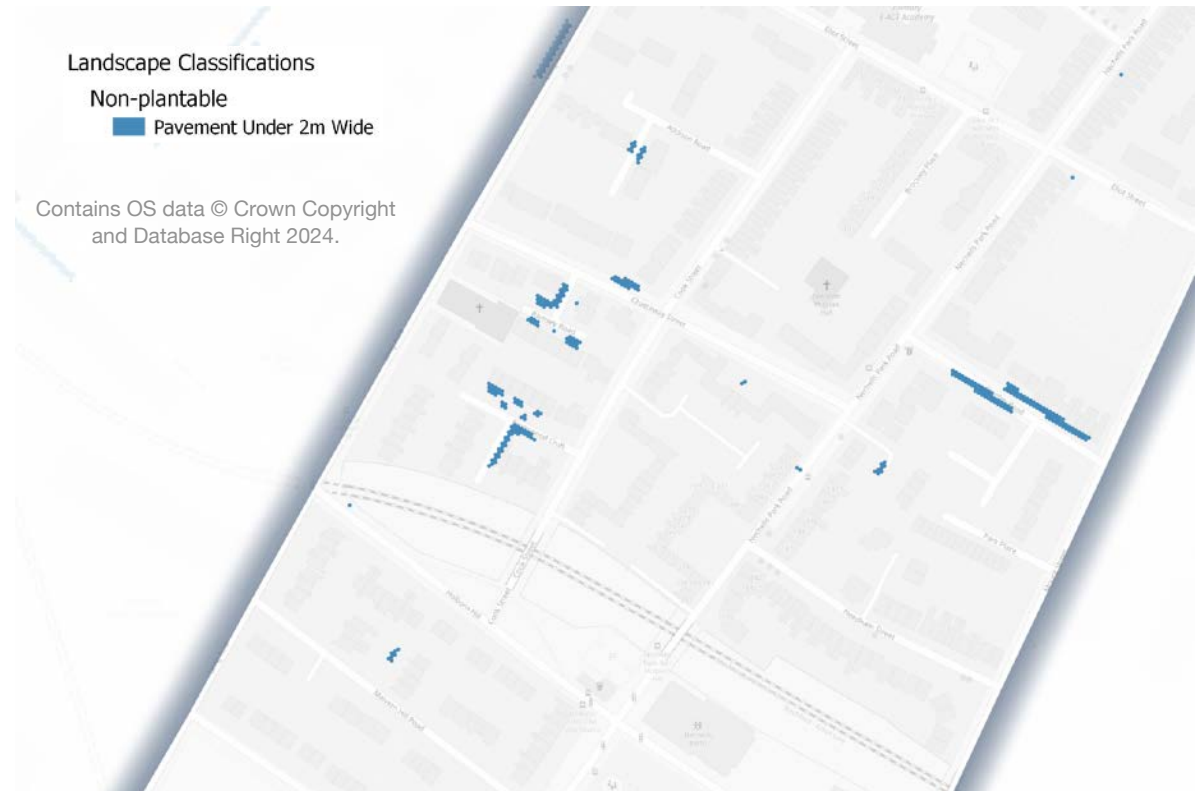

Landscape Classifications
Non-plantable
■ Pavement Under 2m Wide

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Figure 9. Example of zones with pavements too narrow for tree planting which may be considered for reengineering.

Images sourced from Southwark Streetscape Design Manual (2020)

	Nechells	Alum Rock
Tree Equity Scores	47 to 97	60 to 97
Roadside area <2m wide and thus too narrow for a standard tree pit	1.7ha	0.8ha
Number of nominal tree planting sites with kerb buildouts	232	118

Table 5. High Level figures for potential tree pit locations assuming 25% realisation

9.1 Major Infrastructure Programmes

Planting in hard landscapes is a relatively expensive process, especially where the ideal solution requires the roadways to be re-engineered. Parallel programmes driven primarily for other purposes can provide the opportunity to plant trees in some of these places far more cost effectively than otherwise. Birmingham City has programmes related to its active travel strategy, some of which will require relaying out the roadway. There is also a drive for such cycleways to be 'green corridors'. Early involvement within active travel programmes and city renewal programmes can help ensure trees form part of the early dialogue and that physical ground preparation work encompasses the needs of the trees (e.g. sufficient rooting volume) as well as people.
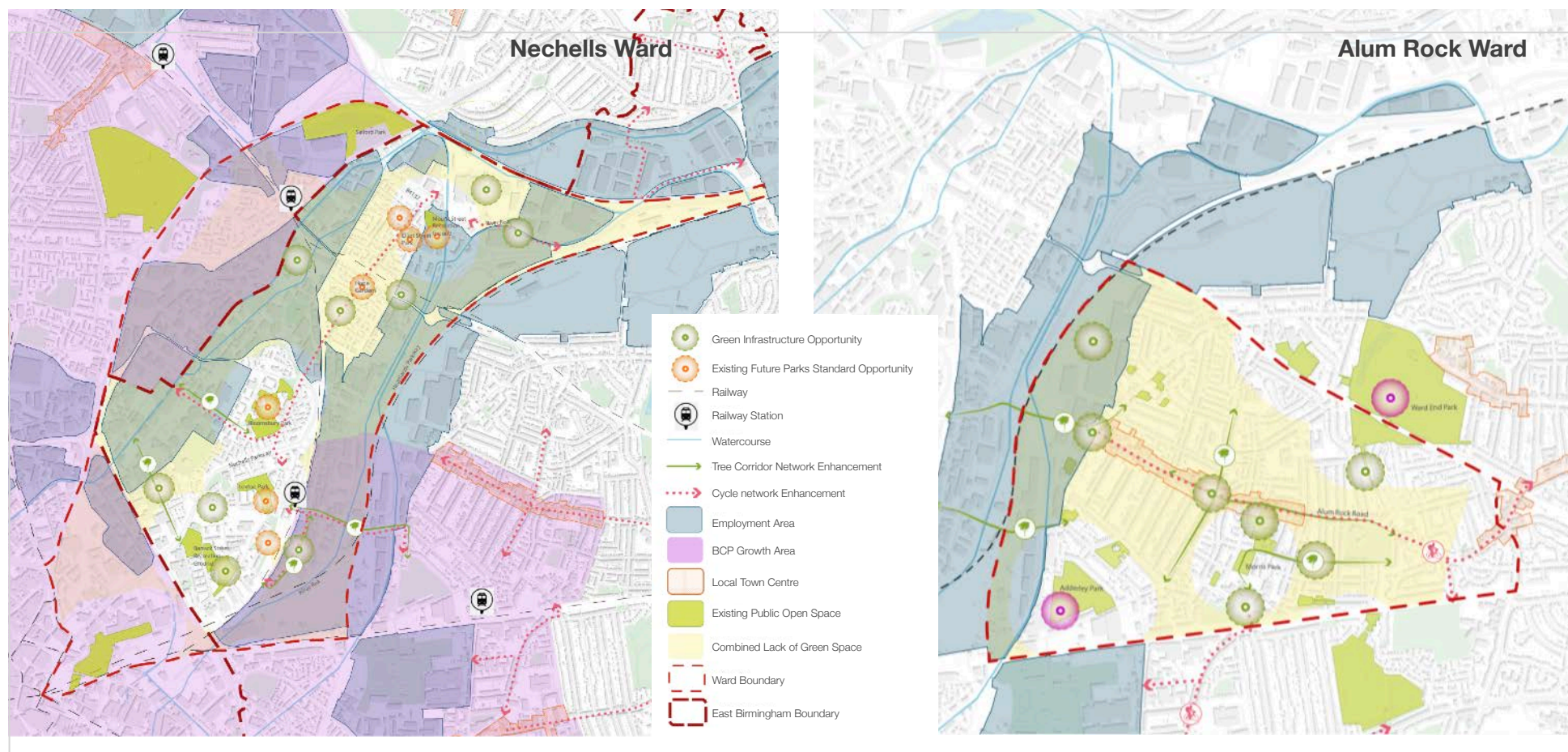

Figure 10. Nechells and Alum Rock - opportunities for enhancements related to active travel (Birmingham CC)

10. Prioritisation

10.1 Priority areas

Combining the tree equity scores with landuse zones and potential planting locations allows much greater focus of resources. Translating this to give a highly pragmatic tool for use in ground truthing. Table 2 shows tree planting figures for each ward by

Ward	Tree Equity Score Band		Hard	Soft	Total
Alum Rock	High priority	up to 60	332	4	336
		61 to 70	511	13	524
		71 to 80	1,352	41	1,393
		81 to 90	429	49	478
	Low priority	91 to 99	519	73	592
		100	2	0	2
Nechells	High priority	up to 60	596	59	655
		61 to 70	818	192	1,010
		71 to 80	21	2	23
	Low priority	91 to 99	69	5	74
Grand Total			**4,649**	**438**	**5,087**

Table 2. Indicative tree planting potential ahead of ground truthing. These figures do not take account of above or below ground constraints
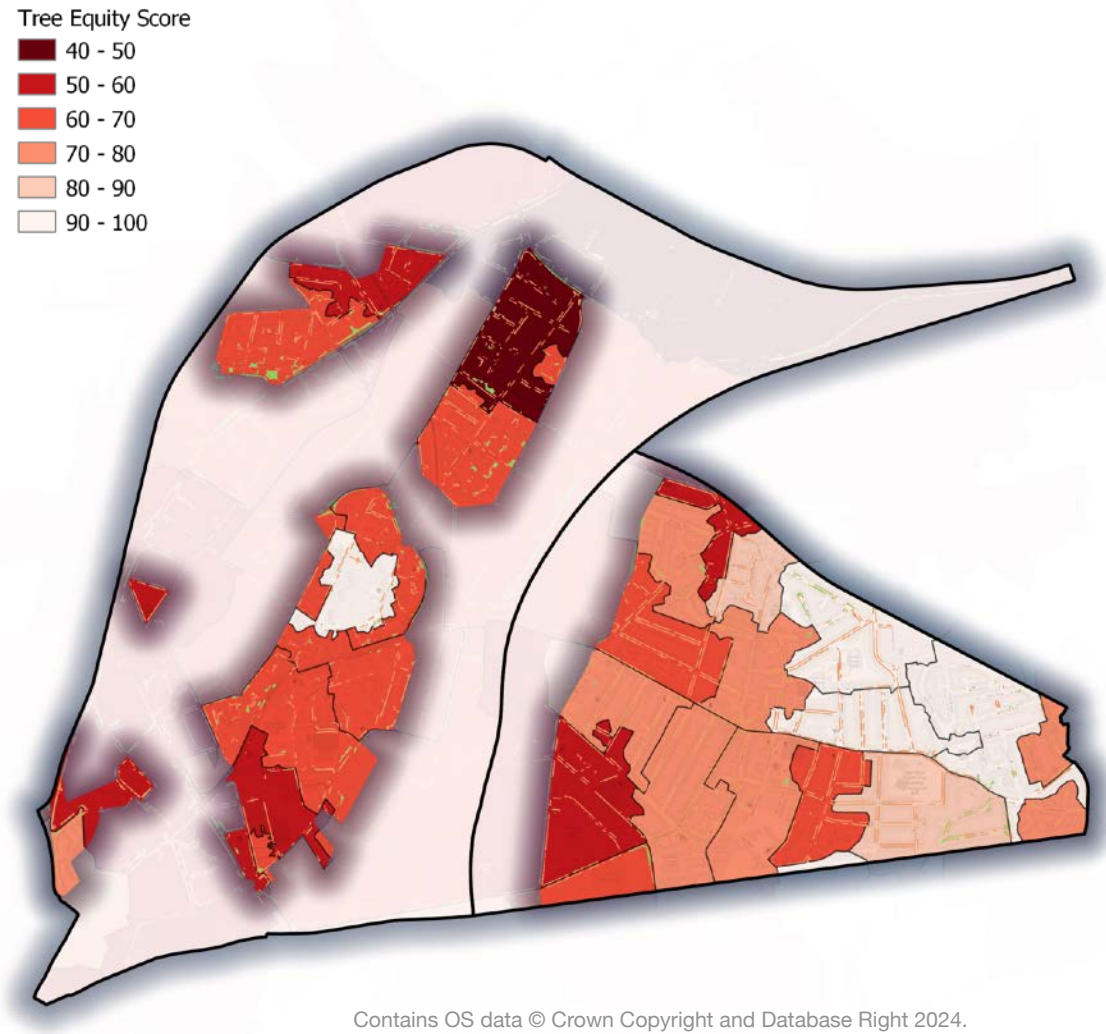

Figure 8. Potential plantable areas classified by surface type, within residential zones with LSOA Tree Equity Score Indicated

11. Conclusions

Significant opportunities to plant

There are significant opportunities to plant trees within the wards of Nechells and Alum Rock, subject to ground truthing. The pavements are wide enough in almost all roads so tree planting becomes a question of balancing the priority with other usages.

Hard landscapes sites dominate

The vast majority of potential planting locations are hard landscapes, with consequential additional costs to plant and maintain vs those in soft landscapes.

Landuse zones a useful refinement

Limited resources need to be focused to achieve greatest effect. Highlighting the landuse zones, for example residential, allows the context and thus impact from a particular planting location to be better understood ahead of any ground-truthing. The overlap between residential zones and tree equity score thus allows an even more targeted approach.

Active Travel Programmes provide tree planting opportunities

Identifying and engaging with other programmes provides opportunities for tree planting in places which would otherwise be too difficult or at a scale which would otherwise prove too costly.

12. Recommendations

1. Prioritise high impact locations

The greatest value for money from planting trees will be achieved in such locations, since trees' ecosystem services directly address the issues by which the high impact locations are selected. This is the logic underpinning the Tree Equity Score used in this study.

2. Utilise landuse zones to focus within LSOAs

LSOAs give a much more granular approach to prioritisation that wards. However, they still cover all landuse types and the scale of potential for meaningful intervention can be refined by mapping the landuses. The Residential vs Retail vs Light industrial used here is just one example.

3. Conduct digital checks, then ground truth

The hotspots produced in this report have been generated using GIS datasets. The suitability of these potential tree planting areas are subject to a further checks, both online using tools such as Google Street View and, more importantly, physically on site to determine whether a location has any restrictions or services which would prevent tree planting.

4. Use street based results for implementation

Results are provided on a street by street basis, with the landuse along both sides of a street categorised in terms of opportunity to plant. This structure allows results to be quickly made available for aligned activities: linkages to community engagement programmes or briefing of a ground truthing team.

5. Utilise all council data - identify holders, request it early

Many of the street-level items that constitute constraints to tree planting (bus shelters, lampposts, e-charging points, pedestrian crossings) are map are mapped for other purposes by the council. If made available, such data can help provide a more refined result, and more focus for time-consuming ground-truthing work. Identifying data owners and requesting such data early is recommended.

6. Identify and share the 'difficult' locations

There are a limited number of locations within the two wards where the pavements are simply too narrow to accommodate a tree pit without compromising accessibility requirements. Standard solutions will not work. Nonetheless, the need for trees persists, meaning other solutions are required, which typically require the highway to be altered. These are more involved decisions, with longer timeframes and more stakeholders. Identifying and sharing such sites can be an effective first step.

13. Appendix

13.1 Methodology

Canopy Cover

Tree canopy cover within the wards and LSOA's was assessed using the Bluesky National Tree Map data.

Opportunity Mapping

GIS (Geographical Information System) project boundaries of the wards and LSOA's were accessed using the Ordnance Survey. Most beneficial areas for planting were identified by using a Tree Equity Score to identify the areas which would have a greater benefit for the local area by planting.

Hard Landscapes

The hard landscapes opportunity mapping exercise identifies the surfaces where there is space to plant trees - the most common example of this is pavement on roadsides. Space is determined by a series of constraints such as minimum widths for accessibility requirements and kerb placements.

Tree Equity

Tree Equity Score UK identifies areas where tree planting should be prioritised based on the combined urban challenges to aid decision-making. Tree equity is an important consideration that can be understood as the extent to which there are enough trees in an area so that everyone can experience the health, climate and economic benefits[1].

Tree Equity Score UK defines areas with low tree equity as those with low tree canopy cover that also exhibit high risks to excess heat, air pollution and age dependency, alongside a low score on the index of multiple deprivation.

These factors can be understood as 'urban challenges' which tree planting can help address. The Tree Equity Score UK combines information from a variety of sources (Table 3) to create a single measure from 0 to 100—the lower that the score is, the greater priority for tree planting. The score is calculated at the neighbourhood level using Lower Super Output Areas (LSOA).

Factor	Data Source
Air Quality	DEFRA emissions of air pollutants
Age Dependency	England and Wales Census 2021
Employment Indicators	English Indices of Multiple Deprivation 2019
Health Indicators	English Indices of Multiple Deprivation 2019
Income Indicators	English Indices of Multiple Deprivation 2019
Heat Severity	USGS Earth Explorer - Landsat 8 Collection 2 Level 2 Surface Temperature 2020-2023

Table 1. Factors that make up the Tree Equity Score and their sources

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[1] American Forests

13.2 Bibliography

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