

# Indicator specification:

## GroundsWell collection of geographical and population health indicators

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Unique Property Reference Number (UPRN) indicator:  
Greenspace distances [Accessibility] (UPRN\_2\_1)



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## Overview

### Indicator title

Unique Property Reference Number (UPRN) indicator: Greenspace distances [Accessibility] (UPRN\_2\_1)

### Indicator family name

Unique Property Reference Number

### Descriptor Plain English description

This indicator covers seven definitions of green spaces, based on Natural England's 2023 Green Infrastructure Framework definitions (see p33 of their [Green infrastructure standards report](#)).

### Technical description

This indicator is the result of estimating the road network distance (in meters) between households and various definitions of green spaces. The following definitions were used to estimate the road network distances between each TOID (TOpographic Identifier, as defined by the Ordnance Survey: <https://www.ordnancesurvey.co.uk/products/os-open-toid>), then mapped to UPRNs.

1. **Doorstop green space** - minimum size 0.5 ha, maximum distance 200 m, maximum journey time 5 minutes (walk).
2. **Local green space** - minimum size 2 ha, maximum distance 300 m, maximum journey time 5 minutes (walk).
3. **Neighbourhood green space** - minimum size 10 ha, maximum distance 1 km, maximum journey time 15 minutes (walk).
4. **Wider green space** - minimum size 20 ha, maximum distance 2 km, maximum journey time 35 minutes (walk).
5. **District green space** - minimum size 100 ha, maximum distance 5 km, maximum journey time 15-20 minutes (cycle).
6. **Sub-regional green space** - minimum size 500 ha, maximum distance 10 km, maximum journey time 30-40 minutes (cycle).
7. **All green space** - consider all green space of any size

Note that the outputs include values for which the distance was above the threshold established by Natural England (e.g., 300m for *local greenspaces*). Therefore, users of the metric who would like to *enforce* the full definition will have to add an additional filter to make sure the values for each metric are within the limits set above.

## Unique Identifier

UPRN\_2\_1

## Construction

### Data sources

The following open data sources were used as inputs in the creation of these methods:

- **Road network:**

The [Ordnance Survey Open Roads](#) resource was used to act as the network to estimate the accessibility between origins and destinations (data downloaded on 4th June 2024). The resource is a vector file containing the entire road network for Great Britain, including information about the nature of a road (e.g., speed limit, type of road). The resource is set up to represent lines and nodes (connections between different lines, such as junctions). While we could have used Open Street Map data here, we have found that this resource has more accurate road speed networks.

The resource does not include routes available via ferries which can be an important transport network when living on a remote island (especially for Scotland, although less relevant for Cheshire and Merseyside here). Ferry routes were accessed from [Open Street Map](#).

- **Origins:**

The origin locations are our inputs for which we want to estimate the nearest distance/time to an object of interest. In our code here, the interest is on households which we define using the Unique Property Reference Number (UPRN). UPRNs are unique identifiers for all unique properties across Great Britain. Data were downloaded on 4th June 2024 using the [Ordnance Survey Open UPRN product](#).

The population of interest for our metric is Cheshire and Merseyside. An additional [ONS lookup table](#) linked to each UPRN was used to subset only UPRNs that fall within the Local Authorities of Cheshire and Merseyside (Chester and Cheshire East, Cheshire West, Halton, Knowsley, Liverpool, Sefton, St. Helens, Warrington and Wirral). If you wanted to recreate our indicators for a different region, one would have to change this step in the code.

The methods used are computationally intensive and the density of UPRNs bring their own challenges (especially compared to postcodes). To improve the time spent processing UPRNs, we initially compute the metrics for [Topographic Identifiers](#) (TOIDs) rather than UPRNs. UPRNs are nested within TOIDs, since UPRNs will give each unique property and TOIDs give the unique building. For example, a

tower block or student halls accommodation will have many UPRNs for the same TOID/building (e.g., Crown Place student halls at the University of Liverpool (UK) has ~1200 UPRNs for a single TOID). Through using TOIDs, we reduce the number of computations on the assumption that they will be similar for all UPRNs (note: there will be some small differences where TOIDs have multiple entrances, but the differences should be negligible here). The result is that using TOIDs gives us a dataset which is 23% smaller than if we use UPRNs only. In the workflow described below, we first estimate each indicator for TOIDs within Cheshire and Merseyside (using the datasets described above), then link the TOID values back to UPRNs using an [Ordnance Survey lookup table](#). If you are using the code for smaller regions of UPRNs, then you may not need to do this.

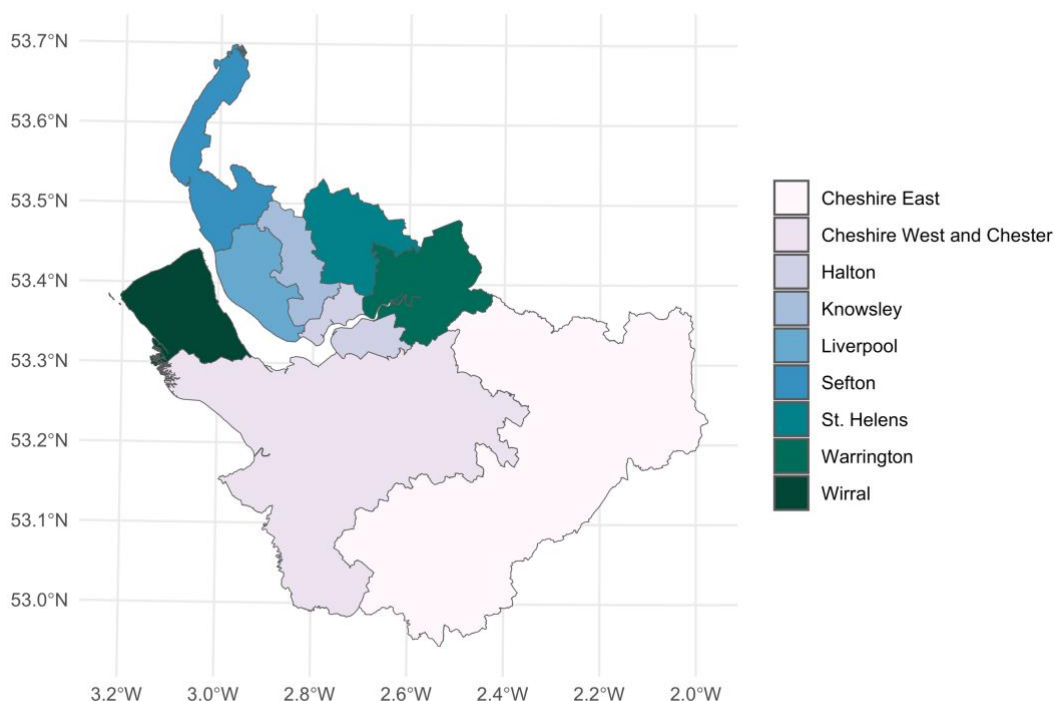


Figure 1. NHS Cheshire and Merseyside ICB region

- **Destinations:**

Destinations refers to the specific features of interest that we are interested in estimating the nearest distance/time to for each origin. The data described here are therefore flexible to the specific indicator one wants to create.

Greenspaces:

[Ordnance Survey’s Open Green Space Layer](#) resource was used to capture the locations of green spaces. The resource covers Great Britain, although we subset only green spaces for Cheshire and Merseyside in our analysis here.

The routing algorithm described below expects point locations. We therefore use the access points of each green space when estimating accessibility. Access points are the specific locations in which individuals can enter a green space (e.g., gate, road

entry point). The resource also includes polygons of the spatial extent of each green space. Using these polygons, the size of each green space is calculated. We follow Geary et al. (2023) definitions of green space types for inclusion of the functional types of green space.

While the Ordnance Survey includes access points for each green space vector, they can be of mixed quality (e.g., missing access points or lack of informal routes that people may also use). To counter this, we follow the methodology outlined in Geary et al. (2023). Here we process the access points to select the north, south, east and west extents of the spatial boundaries of each green space. These are then added to the Ordnance Survey’s access points to supplement them.

The open green space layer does not include open access land which are found in rural areas (i.e., field and farmland with right of ways through them). We accessed their spatial extents via [Natural England’s open data resource](#). This follows the methodology set out by Natural England in their Green Infrastructure project. Since the files only include the spatial extent and do not include the specific access points, we process each row to estimate the north, south, east and west points to mimic this (using the same approach as described above).

**References:**

Geary, R.S., Thompson, D.A., Garrett, J.K., Mizen, A., Rowney, F.M., Song, J., White, M.P., Lovell, R., Watkins, A., Lyons, R.A., Williams, S., Stratton, G., Akbari, A., Parker, S.C., Nieuwenhuijsen, M.J., White, J., Wheeler, B.W., Fry, R., Tsimpida, D., Rodgers, S.E., 2023. [Green–blue space exposure changes and impact on individual-level well-being and mental health: A population-wide dynamic longitudinal panel study with linked survey data](#). Public Health Research 1–176.

**Presentation**

**Breakdowns**

Time period

Cross sectional based on the Ordnance Survey Open UPRN product v2024.04.

Demographic

Not applicable

Geographic

Unique Property Reference Number (UPRN) level

Disclosure control

Not applicable. Whilst UPRNs can be used to identify unique properties, on their own they cannot be used to identify a particular individual.

## Outputs:

### UPRN\_2\_1\_greenpace\_distances.csv

Column name	Description
UPRN	Unique Property Reference Number as per the Ordnance Survey Open UPRN product v2024.04.
distance_any_greenpace	Road network distance (in metres) from the UPRN to 'any' green space – considers all green spaces of any size.
distance_doorstep_greenpace	Road network distance (in metres) from the UPRN to a 'doorstep' green space – minimum size of 0.5 ha (hectares).
distance_local_greenpace	Road network distance (in metres) from the UPRN to a 'local' green space – minimum size of 2 ha (hectares)
distance_neighbourhood_greenpace	Road network distance (in metres) from the UPRN to a 'neighbourhood' green space – minimum size of 10 ha (hectares).
distance_wider_greenpace	Road network distance (in metres) from the UPRN to a 'wider' green space – minimum size of 20 ha (hectares).
distance_district_greenpace	Road network distance (in metres) from the UPRN to a 'district' green space – minimum size of 100 ha (hectares).
distance_subregional_greenpace	Road network distance (in metres) from the UPRN to a 'sub-regional' green space – minimum size of 500 ha (hectares).

### UPRN\_2\_1\_greenpace\_distances\_with\_coords.csv

Column name	Description
UPRN	Unique Property Reference Number as per the Ordnance Survey Open UPRN product v2024.04.
distance_any_greenpace	Road network distance (in metres) from the UPRN to 'any' green space – considers all green spaces of any size.
distance_doorstep_greenpace	Road network distance (in metres) from the UPRN to a 'doorstep' green space – minimum size of 0.5 ha (hectares).

distance_local_greenpace	Road network distance (in metres) from the UPRN to a 'local' green space – minimum size of 2 ha (hectares)
distance_neighbourhood_greenpace	Road network distance (in metres) from the UPRN to a 'neighbourhood' green space – minimum size of 10 ha (hectares).
distance_wider_greenpace	Road network distance (in metres) from the UPRN to a 'wider' green space – minimum size of 20 ha (hectares).
distance_district_greenpace	Road network distance (in metres) from the UPRN to a 'district' green space – minimum size of 100 ha (hectares).
distance_subregional_greenpace	Road network distance (in metres) from the UPRN to a 'sub-regional' green space – minimum size of 500 ha (hectares).
latitude	latitude of the UPRN, given in decimal degrees, where N is positive and S is negative.
longitude	longitude of the UPRN, given in decimal degrees, where E is positive and W is negative.

## Revision history

Version	Date	Summary of changes
1.00		First release