GLAINTELLIGENCE

Briefing 1

Green Infrastructure Focus Map

GLA GIS Team

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Executive summary

Green infrastructure is the network of parks, green spaces, gardens, woodlands, rivers and wetlands (as well as features such as street trees and green roofs). All areas of London need good quality green infrastructure.

The Green Infrastructure Focus Map is an interactive web application that was commissioned by GLA Environment to provide a tool that helps decision makers understand where best to make interventions and investments in green infrastructure. The application was developed in-house by the City Intelligence Unit.

The Green Infrastructure Focus Map presents a curated selection of pan-London environmental and socioeconomic variables modelled to a hexagon grid.

A selection of additional context datasets are also featured, as well as custom functionality that allows users to interrogate areas of London at varying scales.

This report provides the background behind the methodological and technical aspects of the Green Infrastructure Focus Map project, as well as detailed metadata for each dataset.

Introduction

Green infrastructure is the network of parks, green spaces, gardens, woodlands, rivers and wetlands (as well as features such as street trees and green roofs) that is planned, designed and managed to:

- promote healthier living
- lessen the impacts of climate change
- mitigate flooding
- improve air quality and water quality
- cool the urban environment
- encourage walking and cycling
- store carbon
- improve biodiversity and ecological resilience

All areas of London need good quality green infrastructure. But when targeting investment, it is helpful to know which areas are particularly in need of green infrastructure interventions and which issues have greatest need for intervention.

This map uses data for social and environmental issues that green infrastructure is known to help improve. It shows where those areas are across London and how the different issues overlap. An initial attempt to create a Green Infrastructure Focus Map was first completed in 2017, known as 'Phase 1'.

Phase 1 scoped the initial project and developed an initial interactive web application to both determine key stakeholder interest in the project and identify improvements in functionality and usability that would increase the map's usage by decision-makers. The Phase 1 map was reviewed by key stakeholders, including the Environment Agency, TfL, Greenspace Information for Greater London CIC, London borough officers and NGOs between October and December 2017.

Following stakeholder and user feedback, a variety of improvements to use of data, user experience and interface as well as functionality were added to a shortlist for a Phase 2 delivery.

The main changes introduced for Phase 2 were:

- changing the minimum geography from Lower Super Output Area to hexagon
- improving the design of the webmap to be more intuitive and user friendly
- including additional datasets, such as population projections and noise levels

Phase 2 was reviewed by stakeholders throughout the development phase, resulting in several amendments to the web application design. Working in an agile way meant that changes could be introduced at various stages of development. Continual and ongoing feedback is encouraged to meet user requirements and ensure usability.

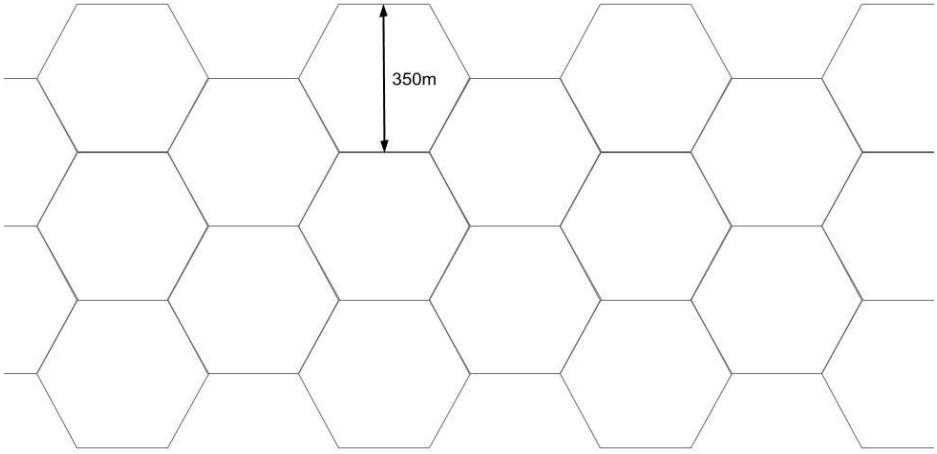
Methodology

Geography

Feedback from Phase 1, where a Lower Super Output Area geography was used, suggested that this geography made it difficult for users to identify patterns and easily compare areas due to the variation in sizes and shapes of component areas.

Therefore, it was decided to adopt a single uniform geography. Transport for London (TfL) have developed a hexagonal grid, containing 15,042 hexagons that cover the extent of the GLA surface area. Each hexagon measures 350m across and is oriented so that the flat sides at top and bottom are horizontal, as presented in Figure 1.

Figure 1: Hexagon grid used as main geography for Green Infrastructure Focus Map.



There are advantages to using a hexagon grid, rather than one based on irregular polygons, such as administrative wards or statistical Super Output Areas. The main benefit of a hexagon grid is that each zone is represented as an equal area on the map, so there is no spatial bias towards larger geographic polygons. It is easier to compare neighbourhoods and identify patterns, such as paths of movement and natural curves in the underlying data. This is useful for representing transport and river network data. Finally, by aligning to this existing TfL geography, output datasets from the green infrastructure project can easily be integrated to with other TfL datasets.

The terms ‘hexagon’ and ‘hexagon grid’ will abbreviated to ‘hex’ and ‘hex grid’ respectively in the remainder of this document.

The Variable - Overview and Metadata section of this document contains descriptions of how each issue dataset (variable) was modelled to the hex grid. Where available, links to processing scripts have also been included.

Data Sources

The main environmental and social issues that green infrastructure can help alleviate were identified using scientific publications and grey literature.

For each relevant issue, pan-London datasets were identified that either measured the issue directly or could be used as a reasonable proxy.

In many cases, several datasets were available which would be suitable representations for an issue. Each option was assessed and rated in terms of accuracy, temporal resolution, reliability and usability (e.g. checking spatial resolution was of a suitable granularity). For example, datasets based on surveys with small numbers of respondents per hex were excluded from the map.

For each variable, the chosen data source, including rationale for selection, is discussed in detail in the Variable - Overview and Metadata section of this document.

Feedback

A feedback button is available on the map. Please use this to suggest alternative or additional datasets. When suggesting datasets please consider the following:

- Is the data being suggested available for all areas within London?
- Can the data be modelled to the hex grid? For example, a dataset with a borough geography may not be suitable for modelling to the hex grid. However, a dataset with Lower Super Output Area geography might be feasible.
- Is the data permitted for use in a publicly accessible web application, either in its raw form or modelled to a new geography?
- Does the data refer to a recent time period? e.g. data collected within the last 5 years?

We also encourage users to explore the features available in this tool and feedback any comments they may have.

Data Preparation, Processing and Visualisation

Technology

The intention with this project was to utilise open source technologies where possible. Most datasets were processed and modelled to the hex grid using Python scripting language, but occasional use of proprietary software such as ESRI ArcGIS and FME was required.

Data processing scripts will be made available in GitHub.

Final output datasets are consumed by the mapping application from a PostgreSQL database (open source software) as web services. These services are published using ArcGIS for Server v10.5, with ESRI ArcGIS JavaScript API and d3 libraries utilised to build the front-end functionality.

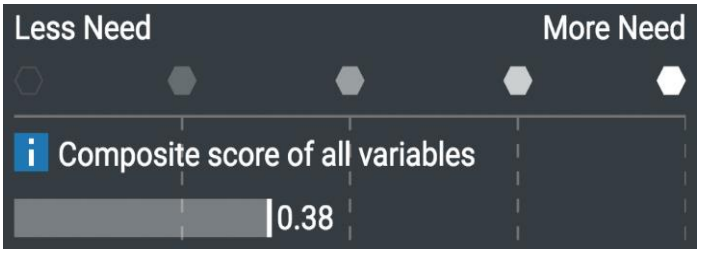
This project has been delivered using an agile (kanban) approach, with weekly sprints and assignment of Product Owner and Scrum Master roles.

Colour scale

Each hex within the hex grid is assigned the same colour: white. Depending on the level of need, the hex opacity is adjusted. For a hex demonstrating a high level of need (and green infrastructure intervention), the opacity is high, so the hex appears 'brighter'. For a hex requiring less or no need, then the opacity is set lower, so the hex appears 'darker'. See Figure 2 for a visual representation of this scale.

The advantage of using opacity allows users to continue to view map detail beneath the hex grid.

Figure 2: Changing opacity of a hexagon to demonstrate less or more need.



GLA: Green Infrastructure Focus Map

Composite score

When first loaded, the map shows a composite score for each hex. This composite score counts the number of variables that exceed a given threshold. Please consult the individual variable descriptions in the Variable - Overview and Metadata section of this document for more information on threshold values.

Users can search or browse to an area of interest and view the composite score in more detail.

Individual variables

Users can view individual or different variables by making a different selection in the 'Map Variable' drop down list located in the left map panel.

Individual hexagons

Individual hexes can also be selected. By selecting an individual hex, a bar chart will be presented within the left map panel, showing the 'score' for each variable within that hex. Additional custom functionality also shows the relationship between the variable and the threshold value. If a variable score exceeds the threshold score for the variable, the threshold bar changes from white to red.

Each bar on the bar chart can also be selected to switch the hex grid over to display that specific variable.

Select by area

The 'Select by area' drop down list on the right map panel allows users to switch to an alternative geography.

It is possible to then select multiple hexes by selecting an area of interest on the map. For example, by using the 'Select by area' tool to switch to ward geography, users can then select a specific ward to gain a score. Any multi-selection of hexes undertaken via the 'Select by area' tool will result in the calculation of the mean values for all variables, for the specific area of interest. Therefore it is recommended that this tool is used with caution, as areas containing outlier values may produce unexpected results.

Context data

Additional datasets have been included to provide additional context and to further understand areas of interest. These can be accessed via the right map panel. More information on these datasets can be found in the Context data – Overview and Metadata section of this document.

Generalisation

Several layers within the Green Infrastructure Focus Map feature complex geometry. To speed up rendering and improve user experience, a simplification algorithm is applied via the ArcGIS JavaScript API to reduce down geometry. This may result in polygons appearing less detailed than expected, due to selective removal of vertices.

Data updates

As far as possible, the most recent data available will be used. When a new dataset for a variable becomes available, then this will be processed and integrated into the live application. Therefore, values at a hex level may change, as well as any averages or composite scores calculated. Any data updates will be recorded within this metadata document.

Limitations

The Green Infrastructure Focus Map assumes a simplified view of the issues of need. Issues are complex, many overlap, and green infrastructure alone may not be sufficient to tackle the issues but will help towards alleviating them. In some cases, non-green infrastructure interventions may be the most effective.

Dataset limitations

The robustness of the data and level of need are not the same across the different issues.

Each of the datasets has its own limitations. For example:

- survey datasets are often weighted to be representative of the area
- modelled datasets rely on the accuracy of their underlying assumptions and data

Geography

Using a single geography (hex grid) for the map meant that all datasets had to be transformed into this geography. This reduces the accuracy of the map for some datasets.

Poor availability of datasets

For some challenges we lack accurate and reliable spatial datasets for the whole of London. For example, crime that takes place in green spaces is often recorded to the nearest postcode, and so won't appear in the green space on a map. In addition, crime survey data typically has low numbers of respondents and so is not reliable enough to be included in the map.

We also found that the resolution of most physical and mental health datasets was at Borough or MSOA level, which meant they were not useful for the map.

Composite score

The composite score uses an equal weighting across every variable. This simple approach was taken to avoid biases due to:

- green infrastructure affects different issues in different ways
- some green infrastructure types may be more effective in addressing one issue to the detriment of other issues
- not all green infrastructure benefits are equally supported by evidence and may not apply to all green infrastructure types
- some issues may be a greater priority for different locations and organisations at different times
- some datasets or variables are less robust as a proxy for a specific issue than others

Variables – Overview and Metadata

Variable overview

This table presents the broad themes of the data included within the Green Infrastructure Focus Map.

BROAD THEME: ENVIRONMENTAL HEALTH			
Subgroup	**Variable**	**Description**	**Variable Code**
Water	Water Quality	Water quality status as defined by the Environment Agency of the river catchments draining to water bodies designated under the Water Framework Directive (WFD).	wq_max
	Surface Water Flood Risk	Proportion of the hex with a medium or high risk of surface water flooding (equivalent to flooding in a 1 in 100-year storm event or less) based on Environment Agency flood risk modelling.	swfr
Climate	Urban Heat Island	Modelled mean night-time temperature differential between the rural low of 13.06 degrees and urban areas for an average summer (based on 2011 summer), as modelled by VITO using the UrbClim model.	uhi_max
Air Quality	Air Quality (NO_2)	Modelled annual mean concentrations of nitrogen dioxide (NO_2) (LAEI 2013).	no2_mean
	Air Quality ($PM_{2.5}$)	Modelled annual mean concentrations of particulate matter ($PM_{2.5}$) (LAEI 2013).	p25_mean
Biodiversity	Sites of Importance for Nature Conservation (SINCs)	Proportion of the hex not within a designated Site of Importance for Nature Conservation (SINC), based on data from Greenspace Information for Greater London CIC.	sinc
BROAD THEME: SOCIAL WELLBEING			
Active Transport	Pedestrian Activity	Distance walked per hex area per day, as derived by Transport for London	peddist

		using 2005-16 London Travel Demand Survey data.	
	Cycling Flow	Total cyclists per km per hex area. Sum of the cycle flows (number of people) multiplied by the road length, based on Transport for London's Cynemon P1 Model	cycleflow
Noise	Rail Noise	Proportion of hex area above 55 db of noise from major rail sources	rail
	Road Noise	Proportion of hex area above 55 db of noise from major road sources	road
Health	Access to Public Open Space	Proportion of hex households in an Area of Deficiency in Access to both Local and District Public Open Space	aod
	Health Deprivation (mood and anxiety)	Composite index measuring levels of mental ill health (includes: mood, neurotic, stress-related and somatoform disorders) of residents in a hex.	imdhealth
	Early Years	Proportion of children in a hex not achieving a good level of development at age five.	ey
COMPOSITE			
Composite	Composite score of all variables	Composite indicator for all variables in the GI Focus Map. The composite counts the number of variables that exceed the identified threshold in a hex (or London average when no threshold is available).	composite_score

Guide to Metadata

More detail on each of the variables used in the Green Infrastructure Focus Map is provided in the format below.

VARIABLE CREATION	
Objective / issue category	*The broad grouping e.g. social health, environmental health*
What it measures	*Describe the variable*
Rationale for inclusion	*Why should the variable be included within the map and composite*
Unit of measurement	*e.g. % area*
Method / description	*Outline processing steps undertaken to model the original data to the hex grid*
Threshold	*Benchmark or threshold applied to the data; a metric exceeding the threshold will contribute to the composite score for a hex*
Threshold Source	*Who sets the threshold, e.g. regulatory agency*
DATA SOURCES	
Source	*Where data retrieved from*
URL	*e.g. http://environment.data.gov.uk/ds/catalogue/index.jsp#/catalogue*
Citation	*Specific citation*
Variable / units	*e.g. µg/m^3, °C*
Methodology overview	*Overview of how the dataset was created. Data provider/owner should be consulted for full methodology*
Geographic resolution	*Spatial extent of data source (e.g. London, UK) and resolution (e.g. 1km^2)*
Year of publication	*Year the dataset was published*
Temporal resolution	*What time period the dataset covers (e.g. 1995-2000)*
Update frequency	*Frequency of data update*
Data type	*e.g. vector, tabular*
License	*Terms of data use/reuse E.g. UK Open Government Licence (OGL v2)*

Variable: Water Quality (wq_max)

VARIABLE CREATION	
Objective / issue category	Environmental Health | Water | Water Quality
What it measures	Water quality measures the predominant water quality status assigned to a waterbody catchment according to the Water Framework Directive. Each hex is assigned to a waterbody catchment, determined by where most of its surface area intersects.
Rationale for inclusion	Green infrastructure (e.g. via sustainable drainage systems) is known to significantly improve water quality. See Chapter 4m, Natural England (2014) Microeconomic Evidence for the Benefits of Investment in the Environment 2. Accessed from: http://publications.naturalengland.org.uk/publication/6692039286587392
Unit of measurement	Water quality status for each waterbody applied to the corresponding water catchment. Waterbodies are rated as: 'good', 'moderate', 'poor' or 'bad' status.
Method / description	• Select river waterbody catchments from 'WFD River Waterbody catchments cycle 2' that intersect with the GLA hex grid. • For areas in central London that are not associated with a river waterbody (drain directly to the coastal or estuarine waters) notably the Thames Middle and Thames Upper 'Transitional and Coastal waters' (TraC) were also selected (on advice from Environment Agency). • To ensure the Thames river area was also included, the relevant polygon was selected from the river waterbodies dataset. • River waterbody classification status was assigned to each river waterbody catchment; for Thames Middle and Thames Upper TraCs, 'moderate' status was assigned. • A resulting GLA 'waterbody catchment' polygon dataset was produced. • Each hex was intersected with the 'waterbody catchment' polygon dataset and the area overlap was calculated. • Since hexes on the boundary between two different waterbodies could be assigned multiple statuses, the hex area was used to determine which waterbody it would represent, based on the maximum surface area overlap.

	• Each hex was therefore assigned a categorical value of 'good', 'moderate', 'poor' or 'bad' status. • Hexes that did not intersect with a waterbody catchment were not assigned a classification status value and labelled as 'no data' (-999).
Threshold	The Water Framework Directive requires waterbodies to reach a certain standard of water quality. The second management cycle (2015-2021) includes higher standards, with the final deadline for meeting objectives in 2027 (http://ec.europa.eu/environment/water/water-framework/info/timetable_en.htm). The threshold assigned was 'poor'. Therefore, hexes with a status of 'poor' or 'bad' would exceed the threshold for this metric.
Threshold source	European Union
DATA SOURCES	
Source	Environment Agency WFD River Waterbody Catchments Cycle 2 (polygon) WFD River Waterbody Catchments Cycle 2 - Overall classification 2016 WFD River, Canal and Surface Water Transfer Waterbodies Cycle 2
URL	About catchment planning: http://environment.data.gov.uk/catchment-planning/help River waterbody catchments: https://data.gov.uk/dataset/298258ee-c4a0-4505-a3b5-0e6585ecfdb2/wfd-river-waterbody-catchments-cycle-2 River waterbodies: https://data.gov.uk/dataset/c5a3e877-12c3-4e81-8603-d2d205d52d7a/wfd-river-canal-and-surface-water-transfer-waterbodies-cycle-2
Citation	© Environment Agency copyright and/or database right 2016. All rights reserved. Contains Ordnance Survey data © Crown copyright and database right 2013.
Variable / units	Waterbody classification status system (Bad, Poor, Moderate, Good)
Methodology overview	See URL above
Geographic resolution	Greater London

Year of publication	2013
Temporal resolution	WFD River Waterbody Catchments Cycle 2 (polygon): 01/09/2013 to 30/10/2014 Classifications: 2016
Update frequency	Annual
Data type	Vector (polygon)
License	UK Open Government Licence (OGL v3.0)

Variable: Surface Water Flood Risk (swfr)

VARIABLE CREATION	
Objective / issue category	Environmental Health | Water | Surface Water Flood Risk
What it measures	The proportion of the surface area of a hex which has a high (1 in 30 year) or medium (1 in 100 year) risk of surface water flooding.
Rationale for inclusion	Green infrastructure is known to help capture surface water where it falls, reducing the risk of surface water ponding and flooding, e.g. through infiltration into the soil and evapotranspiration. It also reduces the rate at which surface water reaches the drainage network, giving the network time to empty and reducing the risk of flooding.
Unit of measurement	Scale between 0 and 100%, with 100% meaning the entire hex area has a high or medium risk of flooding.
Method / description	• A 10m resolution point grid was created for GLA hex grid extent. Each point was intersected with the hex grid, in order to assign a single hex id. This was required to avoid geometry issues when attempting to intersect hex grid geography with surface water flood risk polygons. • Each point was intersected with each flood risk layer; • if a point intersected with either flood risk layer this was recorded in the relevant 'risk' column with a value of 'Y'. • A new column was created that checked if either flood risk columns had a value of 'Y' • For each hex, the number of points with a value of 'Y' was summed and compared with the total sum of points to derive a percentage of points within a high or medium flood risk area. • This percentage is used to represent percentage of a hex that is at risk of surface water flooding. • Hexes that did not intersect with points that were at risk of flooding were labelled as 'no data' (-999).
Threshold	The London Plan requires new developments to achieve greenfield runoff rates (i.e. the rate at which rainfall would leave the site if it was not developed and fully permeable). A threshold of > 0% surface area of a hex was assigned, so a hex that has any part of its area at risk of surface water flooding is deemed to exceed the threshold.
Threshold source	GLA (The London Plan)

DATA SOURCES	
Source	Environment Agency Risk of Flooding Surface Water Extent (November 2013)
URL	About flood risk: https://flood-warning-information.service.gov.uk/long-term-flood-risk/risk-types Spatial data: http://environment.data.gov.uk/ds/catalogue/index.jsp#/catalogue
Citation	© Environment Agency copyright and/or database right 2015. All rights reserved. Some features of this map are based on digital spatial data from the Centre for Ecology & Hydrology, © NERC (CEH). Soils Data © Cranfield University (NSRI) and for the Controller of HMSO 2013.
Variable / units	Extent of area that has: 1% chance of flooding in any given year (1 in 100-year event; medium risk) 3.3% chance of flooding in any given year (1 in 30-year event; high risk)
Methodology overview	See data source URL for full methodology.
Geographic resolution	Spatial extent of data source
Year of publication	November 2013
Temporal resolution	November 2013
Update frequency	As needed
Data type	Vector (polygon)
License	Conditional license: https://www.gov.uk/government/publications/environment-agency-conditional-licence/environment-agency-conditional-licence

Variable: Urban Heat Island (uhi_max)

VARIABLE CREATION	
Objective / issue category	Environmental Health | Climate | Urban Heat Island
What it measures	The difference in degrees Celsius above rural temperature for each hex.
Rationale for inclusion	Urban areas can be up to ten degrees Celsius warmer than the surrounding rural areas, due to the high proportion of man-made surfaces that store heat during the day and release it slowly at night. Green infrastructure helps provide shade during hot, sunny days, as well as helping to reduce local temperatures.
Unit of measurement	Difference in degrees Celsius between urban and rural temperatures during the same time period. Temperature range is between +0.73°C and +4.16°C.
Method / description	• Minimum temperature value was derived from Urban Heat Island (UHI) point grid, generated from raster dataset. This dataset extends intro rural areas beyond London boundary; this was assigned as the 'rural' temperature benchmark. • UHI 250m point grid was clipped to GLA hex grid, and spatially intersected to the hex grid so that each point was assigned to a hex. • All UHI point values were compared against the rural temperature, to derive a 'difference' value for each point (degrees Celsius). • For all points within each hex, the maximum temperature difference was extracted, which represents how much the hex temperature varies from the rural temperature.
Threshold	2°C or more differential temperature threshold (above rural temperature) is based on forthcoming research by WSP commissioned by the GLA showing medium and high risk areas for UHI.
Threshold source	WSP research commissioned by GLA
DATA SOURCES	
Source	Mean night-time temperature during the summer of 2011, VITO
URL	https://data.london.gov.uk/dataset/london-s-urban-heat-island---average-summer
Citation	Produced by VITO as part of the RAMSES project, UK Open Government Licence (OGL v3)

Variable / units	Modelled mean night-time temperature differential between the rural low of 13.06°C and urban areas for an average summer (based on 2011 summer) as modelled by VITO using the UrbClim model.
Methodology overview	See URL above
Geographic resolution	250m
Year of publication	February 2017
Temporal resolution	May to September 2011
Update Frequency	Ad hoc
Data type	Raster
License	UK Open Government Licence (OGL v3.0)

Variable: Air Quality NO_2 (no2_mean)

VARIABLE CREATION	
Objective / issue category	Environmental Health | Water | Air Quality
What it measures	The mean nitrogen dioxide (NO_2) value for each hex
Rationale for inclusion	Green infrastructure can help reduce nitrogen dioxide concentrations and can also act as a barrier between emission sources and people.
Unit of measurement	µg/m^3 (Scale between 19.26 µg/m^3 and 80.55µg/m^3)
Method / description	• Pollutant data provided as raster at a 20m x 20m grid square resolution. • Raster was converted to XY point grid. • NO_2 point grid clipped to GLA hex grid extent, and spatially intersected to the hex grid so that each point was assigned to a hex. • For each hex, the mean NO_2 value was calculated.
Target	Legal concentration limit for nitrogen dioxide is 40 µg/m^3
Target source	European Union
DATA SOURCES	
Source	London Atmospheric Emissions Inventory
URL	https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory-2013
Citation	King's College London, UK Open Government Licence (OGL v2)
Variable / units	µg/m^3
Methodology overview	https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory-2013
Geographic resolution	20m x 20m grid square
Year of publication	2016
Temporal resolution	2013
Update Frequency	Ad hoc
Data type	Raster

License	UK Open Government Licence (OGL v2.0)

Variable: Air Quality $PM_{2.5}$ (pm25_mean)

VARIABLE CREATION	
Objective / issue category	Environmental Health | Water | Air Quality
What it measures	The mean $PM_{2.5}$ (fine particulate matter) value for each hex
Rationale for inclusion	Green infrastructure can help reduce particulate matter concentrations and can also act as a barrier between emission sources and people.
Unit of measurement	µg/m^3 (Scale between 14.05µg/m^3 and 19.74µg/m^3)
Method / description	• Pollutant data provided as raster at a 20m x 20m grid square resolution. • Raster was converted to XY point grid. • $PM_{2.5}$ point grid clipped to GLA hex grid extent, and spatially intersected to the hex grid so that each point was assigned to a hex. • For each hex, the mean $PM_{2.5}$ value was calculated.
Threshold	World Health Organisation guidelines advise a limit for $PM_{2.5}$ of 10 µg/m^3
Threshold source	World Health Organisation
DATA SOURCES	
Source	London Atmospheric Emissions Inventory
URL	https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory-2013
Citation	King's College London, UK Open Government Licence (OGL v2)
Variable / units	µg/m^3
Methodology overview	https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory-2013
Geographic resolution	20m x 20m grid square
Year of publication	2016
Temporal resolution	2013

Update Frequency	Ad hoc
Data type	Raster
License	UK Open Government Licence (OGL v2.0)

Variable: Sites of Importance for Nature Conservation (sinc)

VARIABLE CREATION	
Objective / issue category	Environmental Health | Biodiversity | Sites of Importance for Nature Conservation (SINCs)
What it measures	Proportion of a hex area not within a designated SINC.
Rationale for inclusion	Green infrastructure helps provide habitats for wildlife. SINCs are the best available proxy for biodiversity.
Unit of measurement	Percent of hex area not covered by a SINC
Method / description	• SINC layer was dissolved to create a single polygon layer. • For each hex, the percentage overlap with the SINC layer was calculated. • The value was then inverted by subtracting the score from 100% and identify the hex area not classified as a SINC
Threshold	Threshold indicates hexes where 80% of the area is not designated as a SINC. The EU and UK have committed to halting the loss of biodiversity by 2020: (http://ec.europa.eu/environment/nature/biodiversity/strategy/index_en.htm and https://www.gov.uk/government/publications/biodiversity-2020-a-strategy-for-england-s-wildlife-and-ecosystem-services).
Threshold source	GLA
DATA SOURCES	
Source	Sites of Importance for Nature Conservation (SINCs) (Greenspace Information for Greater London GiGL CIC)
URL	SINCs: http://www.gigl.org.uk/access-our-data/ (licensed dataset)
Citation	© 2017 Greenspace Information for Greater London CIC © Crown Copyright and database right 2017. Ordnance Survey 100032216
Variable / units	Percentage of area not identified as a SINC
Methodology overview	http://www.gigl.org.uk/designated-sites/non-statutory-sincs/
Geographic resolution	London
Year of publication	2016

Temporal resolution	Ad hoc
Update frequency	Ad hoc
Data type	Vector (polygon)
License	Licensed by Greenspace Information for Greater London CIC 2018

Variable: Pedestrian Activity (peddist)

VARIABLE CREATION	
Objective / issue category	Social Wellbeing | Active Transport | Pedestrian Activity
What it measures	Distance walked per hex area per day. Pedestrian activity is derived from the London Travel Demand Survey (LTDS). The data represents the distance walked per hex per day. LTDS collects travel patterns of approximately 17,000 persons per year. Pedestrian stages from survey years 2005 to 2016 have been included. The data is created by summing the stage lengths per cell and dividing this by the area of a hex.
Rationale for inclusion	High quality green infrastructure can encourage people to walk more and help people to walk in areas of higher air quality. This can improve physical health and mental wellbeing, as well as reducing road congestion and overcrowding on public transport.
Unit of measurement	Distance walked per hex per day ($m/m^2/day$)
Method / description	• The distance walked value for each hex was rescaled between zero and 1 by normalising ($x_n = (x - x_{min}) / (x_{max} - x_{min})$). • Hexes with the lowest distance walked demonstrate most need, so the value was inverted by subtracting the score from 1. This is consistent with other variables in the map. • The final value is between zero and 1, where 1 represents the shortest distance walked (low pedestrian activity) and the most need.
Threshold	Threshold is based on pedestrian activity less than the London average hex of 10.35 $m/m^2/day$.
Threshold source	GLA
DATA SOURCES	
Source	Transport for London, London Travel Demand Survey (LTDS 2005 - 2016)
URL	https://tfl.gov.uk/corporate/about-tfl/how-we-work/planning-for-the-future/consultations-and-surveys#on-this-page-1
Citation	Transport for London
Variable / units	Individual journey lengths

Methodology overview	Annual survey of 8,000 households.
Geographic resolution	London
Year of publication	2018
Temporal resolution	2005 - 2016 (rolling survey)
Update frequency	Annual
Data type	Tabular
License	UK Open Government Licence (OGL v2.0)

Variable: Cycle Flow (cycleflow)

VARIABLE CREATION	
Objective / issue category	Social Wellbeing | Travel | Cycling Flow
What it measures	Total people km per hex. Modelled cycle flow data from the TfL Cynemon P1 model (2014 base year and 2041 future year). Cynemon estimates the number of cyclists and journey times across London on an average weekday, at AM Peak (08:00-09:00). Modelled flow data has been aggregated by summing the cycle flow (number of people) multiplied by the road length to calculate total people km or hex area.
Rationale for inclusion	High quality green infrastructure can encourage people to cycle more and help people to cycle in areas of higher air quality. This can improve physical health and mental wellbeing, as well as reducing road congestion and overcrowding on public transport.
Unit of measurement	Total people km per hex (cycle flow)
Method / description	• The distance cycled value for each hex was rescaled between zero and 1 by normalising this value ($x_n = (x - x_{min}) / (x_{max} - x_{min})$). • Hexes with the lowest distance cycled demonstrate most need, so the value was inverted by subtracting the score from 1. This is consistent with other variables in the map. • The final value is between zero and 1, where 1 represents the shortest distance cycled (low cycling flow) and the most need.
Threshold	Threshold is based on cycle flow less than the London average of 23.98 people km cycled per hex.
Threshold source	GLA
DATA SOURCES	
Source	Transport for London, Cynemon P1 Model
URL	https://tfl.gov.uk/corporate/publications-and-reports/strategic-transport-and-land-use-models
Citation	Transport for London
Variable / units	Individual cycle flows

Methodology overview	TfL count and travel diary data sources combined with mobile phone app data and bespoke research.
Geographic resolution	London
Year of publication	2018
Temporal resolution	2014
Update frequency	Ad hoc
Data type	Tabular
License	UK Open Government Licence (OGL v2.0

Variable: Rail Noise (rail)

VARIABLE CREATION	
Objective / issue category	Social Wellbeing | Health | Noise
What it measures	Percentage of a hex that is exposed to rail noise exceeding 55db (scale 0 to 100%)
Rationale for inclusion	To avoid serious annoyance, outdoor sound levels should not exceed 55dB from steady continuous noise sources. To avoid sleep disturbance and insomnia, noise less than 40dB for annual average night exposure is recommended. Green infrastructure can help reduce the impact of noise by creating a barrier between rail lines and developments.
Unit of measurement	decibels (dB)
Method / description	• Rail noise polygons (areas exceeding 55dB) were dissolved and clipped to extent of the GLA hex grid. • For each hex, the area overlap with the rail polygon dataset was calculated. • This was then compared with the full hex area to produce a percentage area of hex affected.
Target	55db or more threshold is based on the World Health Organisation recommendation.
Target source	World Health Organisation
DATA SOURCES	
Source	Rail Noise - Lden - England Round 2, Department for Environment Food and Rural Affairs
URL	Strategic noise mapping guidance, DEFRA: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/453620/noise-mapping-source-guidance.pdf Open data: strategic noise mapping Explaining which noise sources were included in the 2012 strategic noise mapping dataset: https://www.gov.uk/government/publications/open-data-strategic-noise-mapping Rail Noise - Lden - England Round 2 (GIS data): https://data.gov.uk/dataset/8032d067-8719-49da-8d93-c2399d2f88e8/rail-noise-lden-england-round-2
Citation	Department for Environment Food and Rural Affairs, Open Government Licence v3.0

Variable / units	decibels (dB)
Methodology overview	See URL
Geographic resolution	National
Year of publication	12/08/2015
Temporal resolution	2012
Update frequency	Not planned
Data type	Vector (polygon)
License	UK Open Government Licence (OGL v3.0)

Variable: Road Noise (road)

VARIABLE CREATION	
Objective / issue category	Social Wellbeing | Health | Noise
What it measures	Percentage of a hex that is exposed to major road noise exceeding 55db (scale 0 to 100%)
Rationale for inclusion	To avoid serious annoyance, outdoor sound levels should not exceed 55dB from steady continuous noise sources. To avoid sleep disturbance and insomnia noise less than 40dB for annual average night exposure is recommended. Green infrastructure can help reduce the impact of noise by creating a barrier between roads and developments.
Unit of measurement	Decibels (dB)
Method / description	• Road noise polygons (areas exceeding 55dB) were dissolved and clipped to extent of the GLA hex grid. • For each hex, the area overlap with the road polygon dataset was calculated. • This was then compared with the full hex area to produce a percentage area of hex affected.
Threshold	55db or more threshold is based on the World Health Organisation recommendation.
Threshold source	World Health Organisation
DATA SOURCES	
Source	Road Noise - Lden - England Round 2, Department for Environment Food and Rural Affairs
URL	Strategic noise mapping guidance, DEFRA: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/453620/noise-mapping-source-guidance.pdf Open data: strategic noise mapping Explaining which noise sources were included in the 2012 strategic noise mapping dataset: https://www.gov.uk/government/publications/open-data-strategic-noise-mapping Road Noise - Lden - England Round 2 (GIS data): https://data.gov.uk/dataset/f7ecba67-e651-4fe2-9623-5bcc2ccaa42e/road-noise-lden-england-round-2

Citation	Department for Environment Food and Rural Affairs, Open Government Licence
Variable / units	decibels
Methodology overview	See URL
Geographic resolution	National
Year of publication	12/08/2015
Temporal resolution	2012
Update frequency	Not planned
Data type	Vector (polygon)
License	UK Open Government Licence (OGL v3.0)

Variable: Access to Public Open Space (aod)

VARIABLE CREATION	
Objective / issue category	Social Wellbeing | Health | Access to Public Open Space
What it measures	Proportion of households in a hex within an Area of Deficiency (AoD) in Access to Local and District Public Open Space
Rationale for inclusion	Green infrastructure can help improve people's physical and mental health and wellbeing, by providing places to play, relax, socialise and walk/cycle through.
Unit of measurement	Percent of households in an Area of Deficiency (AoD)
Method / description	• Sum how many residential household points fall within each hex (using Ordnance Survey AddressBase Plus). • Sum how many of these points intersect with the GiGL CIC AoD polygon layer. • Calculate the percentage of household points in each hex that intersect with the AoD layer. • A hex containing no address points is allocated no value and treated as 'no data'. • The map value is between zero and 1, where 1 represents 100 percent of hex households falling within the AoD.
Threshold	Threshold is based on the average number of households in an AoD per hex for London, this is 25.17 percent.
Target source	GLA
DATA SOURCES	
Sources	GIGL CIC Area of Deficiency (AoD) in Access to Local and District Public Open Space and Ordnance Survey AddressBase Plus
URLs	GIGL CIC AoD data: https://www.gigl.org.uk/open-spaces/areas-of-deficiency-in-access-to-public-open-space/ OS AddressBase Plus data: https://www.ordnancesurvey.co.uk/business-and-government/products/addressbase-plus.html
Citation	Greenspace Information for Greater London CIC Crown Copyright and database right 2018. Ordnance Survey 100032216 GLA.

Variable / units	Percent of households within a AoD in Access to Local and District Public Open Space
Methodology overview	See URLs
Geographic resolution	London
Year of publication	GiGL CIC Area of Deficiency (AoD) in Access to Local and District Public Open Space: 2016 OS AddressBase Plus: 2018
Temporal resolution	2016
Update frequency	GiGL CIC Area of Deficiency (AoD) in Access to Local and District Public Open Space: ad hoc OS AddressBase Plus: six-weekly
Data type	GiGL CIC Area of Deficiency (AoD) in Access to Local and District Public Open Space: Vector (polygon) Ordnance Survey AddressBase Plus: Vector (point)
License	Licensed by Greenspace Information for Greater London CIC and Ordnance Survey

Variable: Health Deprivation (imd_health)

VARIABLE CREATION	
Objective / issue category	Social Wellbeing | Health |Mood and Anxiety disorders
What it measures	A broad measure of levels of mental ill health (includes: mood, neurotic, stress-related and somatoform disorders)
Rationale for inclusion	Green infrastructure is known to help improve mental health and wellbeing.
Unit of measurement	Scale between 0 and 1 (1 represents most need)
Method / description	• The mood and anxiety score/rank is provided for Lower Super Output Areas from the Index of Multiple Deprivation (IMD) Health subdomain. • Select residential address points from OS AddressBase Plus within GLA boundary and add LSOA code. • For each hex sum the total number of address points that intersect and group by LSOA code. • The hex is then assigned the LSOA IMD score/rank based on the largest number of address points • A hex with no intersecting address points is allocated no score and treated as 'no data'. • The score for each hex was rescaled between zero and 1 by rebasing and normalising this value ($x_n = (x - x_{min}) / (x_{max} - x_{min})$). • The final value is between zero and 1, where 1 represents the most deprived and the most need.
Threshold	Threshold is based on the average LSOA score for London which is 2476.
Threshold source	GLA
DATA SOURCES	
Source	Department for Communities and Local Government
URL	https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015
Citation	Indices of Deprivation, 2015, DCLG
Variable / units	Mood and Anxiety Disorders score
Methodology overview	Measure is taken from the Department for Communities and Local Government English Indices of Deprivation. The index contains 7

	subdomains (e.g. Income, Crime) produced from a series of underlying indicators, one of which is the "Mood and anxiety disorders indicator" and forms part of the Health Deprivation and Disability Domain. This measure is a composite indicator score based on: prescribing data, Hospital Episode Statistics, suicide mortality and health benefits data.
Geographic resolution	Lower Layer Super Output Area (LSOA)
Year of publication	2015
Temporal resolution	2008 - 2013
Update frequency	Ad hoc
Data type	Tabular
License	UK Open Government Licence (OGL v3.0)

Variable: Early Years Attainment (ey)

VARIABLE CREATION	
Objective / issue category	Social Wellbeing | Health | Early Years
What it measures	The percentage of pupils not achieving a 'Good' level of development in 12 of the 17 Early Learning Goals (ELGs)
Rationale for inclusion	Green infrastructure is known to improve physical and mental health and wellbeing, as well as play an important role in improving / maintaining social cohesion and provide opportunities for childhood learning.
Unit of measurement	Percentage of Early Years pupils in a hex not achieving a 'Good' level of development
Method / description	• The Department for Education provide the percentage of pupils achieving a 'Good' level of development in Early Years based on the pupil's residence at Lower Layer Super Output Areas (LSOAs). • Select residential address points from OS AddressBase Plus within GLA boundary and add LSOA code. • For each hex sum the total number of address points that intersect and group by LSOA code. • The hex is then assigned the LSOA Early Years score based on the largest number of address points. • A hex with no intersecting address points is not allocated a score and treated as 'no data'. Where there are fewer than 10 eligible pupils in an LSOA, the data was suppressed. • The map value was inverted by subtracting the score from 1 to give a final value between 0 and 1, where 1 represents the poorest performing pupils and the most need.
Threshold	Threshold is based on the average London pupils Early Years performance of 27%.
Threshold source	GLA
DATA SOURCES	
Source	Department for Education, Early Years Foundation Stage Profile (EYFSP) by Gender in England (Referenced by Location of Pupil Residence)
URL	Local Authority level data available at: https://www.gov.uk/government/statistics/early-years-foundation-stage-profile-results-2016-to-2017

	LSOA data available from DfE on request.
Citation	Department for Education, Early Years Foundation Stage Profile by Gender in England (Referenced by Location of Pupil Residence), 2016/17
Variable / units	Percentage of pupils not achieving a good level of development at LSOA level
Methodology overview	Maintained, private, voluntary and independent early years providers are statutorily required to report to their Local Authority the EYFSP results for all children in receipt of government funding at the end of the EYFS.
Geographic resolution	Lower Layer Super Output Area (LSOA)
Year of publication	2018
Temporal resolution	2016 - 2017
Update frequency	Ad hoc
Data type	Tabular
License	UK Open Government Licence

Context Data – Overview and Metadata

Guide to Context Data

More detail on each of the context layers used in the Green Infrastructure Focus Map is provided in the format below.

CONTEXT LAYER [example]	
Theme	*The broad grouping e.g. social health, environmental health*
What it measures	*Outline the variable*
Rationale for inclusion	*Why should the variable be included as a context layer within the map*
Unit of measurement	*e.g. % area*
Methodology overview	*Outline processing steps*
Source	*Where data retrieved from*
URL	*e.g. http://environment.data.gov.uk/ds/catalogue/index.jsp#/catalogue*
Citation	*Specific citation*
Geographic resolution	*Spatial extent of data source (e.g. London, UK) and resolution (e.g. 1km^2)*
Year of publication	*Year the dataset was published*
Data type	*e.g. vector, tabular*
License	*UK Open Government Licence (OGL v3.0)*

Context: London Boroughs

CONTEXT LAYER	
Theme	Admin / Statistical Boundaries
What it measures	Public administrative boundaries within London
Rationale for inclusion	To provide administrative context
Unit of measurement	Administrative area within London
Methodology overview	See User Guide at https://www.ordnancesurvey.co.uk/business-and-government/products/boundaryline.html
Source	Ordnance Survey
URL	OS BoundaryLine: https://www.ordnancesurvey.co.uk/business-and-government/products/boundaryline.html
Citation	Contains OS data © Crown copyright and database right 2018
Geographic resolution	Greater London
Year of publication	2018
Data type	Vector (polygon)
License	Open Government Licence (OGL)

Context: London Wards

CONTEXT LAYER	
Theme	Admin / Statistical Boundaries
What it measures	Electoral Ward boundaries within London
Rationale for inclusion	To provide electoral Ward boundary context
Unit of measurement	Electoral Ward area within London
Methodology overview	See User Guide at https://www.ordnancesurvey.co.uk/business-and-government/products/boundaryline.html
Source	Ordnance Survey
URL	OS BoundaryLine: https://www.ordnancesurvey.co.uk/business-and-government/products/boundaryline.html
Citation	Contains OS data © Crown copyright and database right 2018
Geographic resolution	Greater London
Year of publication	2018
Data type	Vector (polygon)
License	Open Government Licence (OGL)

Context: Lower Super Output Areas in London

CONTEXT LAYER	
Theme	Admin / Statistical Boundaries
What it measures	Statistical boundaries within London
Rationale for inclusion	To provide statistical boundary context
Unit of measurement	Lower Super Output Areas within London
Methodology overview	See https://www.ons.gov.uk/
Source	Office for National Statistics
URL	http://geoportal.statistics.gov.uk/datasets/lower-layer-super-output-areas-december-2011-full-clipped-boundaries-in-england-and-wales
Citation	Contains both Ordnance Survey and ONS Intellectual Property Rights.
Geographic resolution	Greater London
Year of publication	31 December 2011
Data type	Vector (polygon)
License	Open Government Licence: https://www.ons.gov.uk/methodology/geography/licences

Context: Air Quality Focus Areas

CONTEXT LAYER	
Theme	Environment
What it measures	Locations with high human exposure that exceed the EU annual mean limit value for NO_2
Rationale for inclusion	To highlight areas that are 'hotspots' for high NO_2 levels as well as population
Unit of measurement	Administrative area within London
Methodology overview	See 'Supporting Information' at: https://data.london.gov.uk/dataset/laei-2013-london-focus-areas
Source	Air Quality Team (GLA)
URL	https://data.london.gov.uk/dataset/laei-2013-london-focus-areas
Citation	UK Open Government Licence (OGL v2.0)
Geographic resolution	Greater London
Year of publication	2016
Data type	Vector (polygon)
License	UK Open Government Licence (OGL v2.0)

Context: Public Open Space

CONTEXT LAYER	
Theme	Environment
What it measures	Areas of Public Open Space within London
Rationale for inclusion	Show areas of public open space across London (this planning designation can include grey or green spaces)
Unit of measurement	n/a
Methodology overview	See http://www.gigl.org.uk/open-spaces/public-open-space-categories/
Source	Greenspace Information for Greater London CIC
URL	http://www.gigl.org.uk/open-spaces/public-open-space-categories/
Citation	© 2018 Greenspace Information for Greater London CIC
Geographic resolution	Greater London
Year of publication	2018
Data type	Vector (polygon)
License	Licensed by Greenspace Information for Greater London CIC

Context: Green and Blue Cover

CONTEXT LAYER	
Theme	Environment
What it measures	Green and Blue cover across London
Rationale for inclusion	To show detailed areas of green and blue (water) cover across London. This dataset also includes gardens, grass versions and other minor areas of green cover that might not be included in an open space dataset.
Unit of measurement	n/a
Methodology overview	Layer shown in the map relates to the NDVI threshold of 0.05, please see the methodology document for more details. https://data.london.gov.uk/dataset/green-and-blue-cover
Source	Greater London Authority (2018)
URL	https://data.london.gov.uk/dataset/green-and-blue-cover
Citation	Greater London Authority (2018)
Geographic resolution	Greater London
Year of publication	2018
Data type	Vector (polygon)
License	UK Open Government Licence (OGL v3.0)

Context: Opportunity Areas

CONTEXT LAYER	
Theme	Planning Boundaries
What it measures	The geographic extent of the Mayor's Opportunity Areas
Rationale for inclusion	To provide planning context
Unit of measurement	Administrative area within London
Methodology	https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/opportunity-areas/what-are-opportunity-areas
Source	Greater London Authority
URL	https://data.london.gov.uk/dataset/london-plan-opportunity-areas
Citation	Contains OS data © Crown copyright and database right 2018
Geographic resolution	Greater London
Year of publication	2017
Data type	Vector (polygon)
License	UK Open Government Licence (OGL v2.0)

Context: Housing Zones

CONTEXT LAYER	
Theme	Planning Boundaries
What it measures	The geographic extent of the Mayor's Housing Zones
Rationale for inclusion	To provide planning context
Unit of measurement	Planning areas within London
Methodology	https://www.london.gov.uk/what-we-do/housing-and-land/increasing-housing-supply/housing-zones
Source	Greater London Authority
URL	https://data.london.gov.uk/dataset/housing-zones
Citation	Contains OS data © Crown copyright and database rights 2016
Geographic resolution	Greater London
Year of publication	2016
Data type	Vector (polygon)
License	UK Open Government Licence (OGL v2.0)

Context: Loneliness

CONTEXT LAYER	
Theme	Socio - Economic Boundary
What it measures	The prevalence of loneliness in residents aged 65+
Rationale for inclusion	Used as a proxy for social isolation.
Unit of measurement	Score
Methodology	https://www.ageuk.org.uk/globalassets/age-uk/documents/reports-and-publications/reports-and-briefings/health--wellbeing/predicting_the_prevalence_of_loneliness_at_older_ages.pdf
Source	Office for National Statistics
URL	http://webarchive.nationalarchives.gov.uk/20160110200012/http://www.ons.gov.uk/ons/about-ons/business-transparency/freedom-of-information/what-can-i-request/published-ad-hoc-data/census/demography/ct0467-2011-census.zip
Citation	Office for National Statistics. © Crown Copyright 2015
Geographic resolution	Greater London
Year of publication	2015
Data type	Tabular data in csv format
License	Office for National Statistics. © Crown Copyright 2015

Context: Current Population

CONTEXT LAYER	
Theme	Socio - Economic Boundary
What it measures	Estimated 2016 population for London wards as in 2012
Rationale for inclusion	To provide an indication of the current population spatial distribution across London
Unit of measurement	Estimated population per km^2 in 2016
Methodology	https://data.london.gov.uk/dataset/projections-documentation
Source	Greater London Authority
URL	https://data.london.gov.uk/dataset/projections/
Citation	© Greater London Authority 2016-based projections
Geographic resolution	Greater London
Year of publication	2017
Data type	Tabular data in csv format
License	Creative Commons Attribution License: http://opendefinition.org/licenses/cc-by/

Context: Future Population

CONTEXT LAYER	
Theme	Socio - Economic Boundary
What it measures	Projected change in population for London wards (2012) between 2016 and 2041.
Rationale for inclusion	To provide an indication of the future population growth spatially across London
Unit of measurement	Absolute change in population between 2016 and 2041
Methodology	https://data.london.gov.uk/dataset/projections-documentation
Source	Greater London Authority
URL	https://data.london.gov.uk/dataset/projections/
Citation	© Greater London Authority 2016-based projections
Geographic resolution	Greater London
Year of publication	2017
Data type	Tabular data in csv format
License	Creative Commons Attribution License: http://opendefinition.org/licenses/cc-by/

Context: Indices of Multiple Deprivation

CONTEXT LAYER	
Theme	Socio - Economic Boundary
What it measures	The proportion of the population experiencing deprivation relating to low income
Rationale for inclusion	Provides an indication of deprivation.
Unit of measurement	Rank
Methodology	See User Guide at https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015
Source	Ministry of Housing, Communities and Local Government
URL	https://data.london.gov.uk/dataset/indices-of-deprivation-2015
Citation	Department for Communities and Local Government
Geographic resolution	Greater London
Year of publication	2015
Data type	Tabular data in csv format
License	UK Open Government Licence (OGL v3.0)

Context Layer: Aerial Imagery

CONTEXT LAYER	
Theme	Aerial Imagery
What it measures	n/a
Rationale for inclusion	For use as an alternative basemap
Unit of measurement	n/a
Methodology	Original aerial imagery ECW resampled to 25cm resolution. Reprojected to web mercator (WKID: 3867). Exported to 2 x 2km GeoTIFF tiles. Cached as tiled map service.
Source	Verisk Geoinformation 2016
URL	http://www.geoinformationgroup.co.uk/uksurvey
Citation	Verisk Geoinformation 2016
Geographic resolution	25cm
Year of publication	2018
Data type	Raster
License	Licensed by Verisk Geoinformation 2016

Context Layer: Canopy Cover

CONTEXT LAYER	
Theme	Canopy cover
What it measures	n/a
Rationale for inclusion	To provide tree canopy cover context and location.
Unit of measurement	n/a
Methodology	See methodology document at https://data.london.gov.uk/canopy-cover
Source	Breadboard Labs Ltd 2018
URL	http://www.geoinformationgroup.co.uk/uksurvey
Citation	Breadboard Labs Ltd
Geographic resolution	25cm x 25cm
Year of publication	2018
Data type	KML
License	Creative Commons Attribution Share-Alike licence

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