User guide for OEH urban heat and green cover datasets

Guidance and data description for use for multi-scale analysis

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Intent of this user guide

This document contains detailed guiding information on the use conditions and descriptions for the NSW Office of Environment and Heritage (OEH) urban heat and vegetation cover datasets. This guide is intended to support a better understanding of the datasets and offer information on how to maximise the use and value of the information in them. Users should find the datasets to be relevant, reliable and consistent information for multi-scale analysis of vegetation cover and tree canopy, urban greening plans and strategies and assessing urban heat and heat vulnerability. It is the intent of OEH that this dataset is of value to NSW public.

Dataset source project

The datasets are products delivered through the OEH Urban Heat and Green Cover Research and Evaluation project. The project aims to provide a baseline for green cover strategy program evaluation and effectiveness monitoring and a repeatable science-based methodology to generate consistent and reliable information in the future. The information and data developed from this project are meant to assist multi-scale planning, policy and decision making. The data provides supporting evidence for assessing opportunities to adapt urban areas to create more liveable cities and for understanding and monitoring vegetation cover changes toward meeting urban greening targets.

The project's key objectives include:

- Define a multi-scale urban vegetation cover baseline for Sydney Greater
- Monitor changes by comparing vegetation cover between 2014-2016 in select areas
- Evaluate the impact on surface temperatures caused by vegetation cover changes
- Evaluate the relationship between vegetation cover and land use in Greater Sydney

This project is led by the OEH Climate Research Team in the Climate and Atmospheric of the OEH Science Division. It forms a key piece of work under the Clean Air and Landscape Hub (CAUL Hub) research plan, which is funded by the Australian Government's National Environmental Science Program.

Use conditions and disclaimer

The datasets referenced in this document have been approved by OEH Science Division and endorsed by OEH Public Affairs for release. The datasets were co-designed and consulted on to be fit for purpose for a range of uses and objectives. The datasets are publicly available and discoverable through a SEED (Sharing and Enabling Environmental Data) public open data portal (https://www.seed.nsw.gov.au/).

The urban heat and green cover datasets focus on urban areas of Sydney and Eastern New South Wales. They are provided as is and reflect the accuracy and quality of the source datasets at the date of acquisition and for the time periods for which they are relevant. The datasets are most relevant for the Significant Urban Area (SUA), a designation by the Australian Bureau of Statistics (ABS), within the Sydney Greater Metropolitan Area (GMA). This covers urban, major urban, peri-urban and other urban areas. It does **not** provide complete wall-to-wall cover of the full extent of Greater Sydney Region, in particularly the non-urban areas of larger LGAs with more rural components, such as Hawkesbury, Wollondilly and Blue Mountains, nor does it provide full coverage of the Illawarra, Central Coast or Lower Hunter Regions. A visual inspection of the data will reveal the full extent.

Quality assurance has been conducted to ensure sound data management processes and appropriate analysis methodologies have been followed. Data inspection and validation have been conducted to address clear and obvious errors in data consistency and completeness where possible. Users should be referred to the metadata for listed source datasets for more information on source data quality.

Overview of the datasets

Geographic extent

The geographic extent of the project is the Significant Urban Area of the Sydney Greater Metropolitan Area. This means:

- It includes ABS-designated major urban, other urban and peri-urban areas of the Greater Sydney Region
- It excludes many rural areas in the periphery of LGAs furthest from Sydney CBD.
- For more information on the SUA, visit the ABS webpage at: http://www.abs.gov.au/websitedbs/D3310114.nsf/home/Australian+Statistical+Geography+Standard+(ASGS)
- The urban vegetation cover data is provided at both the Greater Sydney Region and full extent of the SUA

Attributes most relevant to analysis of urban vegetation, tree canopy, urban heat and heat vulnerability are included below and highlighted in **bold**.

Urban vegetation cover to modified Mesh Block 2016

Vegetation cover dataset for Greater Sydney Region and the SUA is a polygon dataset generated from analysis of high resolution (0.3m) vegetation imagery and digital aerial photography from 2016. It has been integrated with polygon data from the ABS Mesh Block for a primary location reference and with the NSW Digital Cadastral Database (extracted 1 Nov 2016) for transportation and infrastructure areas.

- ABS Mesh Block category (i.e., residential, infrastructure, parklands) (field name = **MB_Reclass**)
- Area (sqm) and percent of vegetation cover classes - grass (0 to 0.5m), shrub (0.5 to 3m), trees in three height classes (3 to 10m, 10 to 15m, greater than 15m), and non-vegetated area. *These are key mapping fields for canopy.* (for example, **AreaAnyVeg**, **AreaAnyTree**, **PerAnyVeg**, **PerAnyTree**). The dataset does not distinguish tree species, type or condition
- Administrative boundaries – LGA, District, Region, Metropolitan Urban Area (MUA)
- Mesh Block identifier (ID) fields to link to related data (**MB_Code16**)
- Data Coverage – ensures that the original imagery covers the full mesh block polygon. Select polygons with **DataCover** = Y for more accurate mapping.

Urban Heat Island to modified Mesh Block 2016

This polygon dataset has been produced to monitor areas of urban heat island effect (UHI) in the Significant Urban Area and Greater Sydney Region for the summer season of 2015-2016. UHI for the Summer 2015-2016 measures the deviation of temperature to a non-urban

vegetated reference within the study area. For example, the reference temperature may be the average temperature of heavily wooded areas of national parks around Sydney. UHI data has been derived from the analysis of land surface temperature (LST) data from Landsat 8 satellite imagery and the thermal and infrared bands with a 30m resolution. This has been integrated with ABS Mesh Block polygons to assist the user to perform spatial analysis. Attributes provide information on:

- Mean UHI temperature difference to non-urban vegetated reference land surface temperature (in Celsius) (field name = **UHI_16_m**). *This is the key mapping field.*
- Mesh Block land zone category (i.e., Residential, Industrial, Parkland) (**MB_CAT16**)
- Administrative boundaries – LGA, District, Region
- Mesh Block identifier field to link to related data (**MB_Code_16**)

Heat Vulnerability Index to Statistical Area Level 1 2016

This polygon dataset has been produced to identify areas of heat vulnerability (HVI) in the Significant Urban Area and Greater Sydney Region for the summer season of 2015-2016. HVI addresses indicators of exposure, sensitivity and adaptive capacity to calculate overall HVI score. Vulnerable areas tend to have higher concentrations of populations who are more sensitive, less adaptive and more exposed to the adverse effects of heat. HVI has been derived from the analysis of Land Surface Temperature data from Landsat 8 with vegetation cover data, integrated with socio-economic data from the 2016 ABS Census and mapped to the ABS Statistical Area Level 1 (SA1). Attributes provide information on:

- Heat Vulnerability Index (HVI) – representing exposure, sensitivity or adaptive capacity to urban heat on a scale of 1 to 5 based on quintiles, with 1 representing low exposure, low sensitivity or high adaptive capacity and 5 representing high exposure, high sensitivity or low adaptive capacity (field name = **HVI**). *This is the key mapping field.*
- Administrative boundaries – LGA, District, Region
- SA1 identifier fields to link to related data
- Note that ABS SEIFA (Socio-economic indexes for areas) and census data are **not** provided with this dataset.

Data quality statement

The following information is draft and will be included in the official NSW Government Data Quality Statement upon formal public-release of the datasets. To find out more about the quality assurance processes from the NSW Government Standard for Data Quality Reporting, please visit https://www.finance.nsw.gov.au/ict/resources/data-quality-standard.

INSTITUTIONAL ENVIRONMENT Very Good ★

✔ Does the information have the potential to enhance services or service delivery?

✔ The data aligns with the Data Quality Framework, including:

- Legislation
- Policies
- Information Asset Governance
- Standards
- Data Management Plans

✔ The following governance roles and responsibilities for this asset are clearly assigned:

- Information Asset Owner
- Information Asset Custodian
- Information Steward

✔ The Custodial agency has no commercial interest or conflict of interest in the data

✗ Data collection is not authorised by law, regulation or agreement.

ACCURACY Excellent ★

✔ Data has been subject to a data assurance process (e.g., Checking for errors at each stage of data collection and processing or verifying data entry and making corrections.)

✔ Data is revised and the revision is published if errors are identified

✔ There are no known gaps in the data or if there are gaps (for example: data not collected), they have been identified in caveats attached to the dataset.

✔ No changes have been made or other factors identified (for example: weighting, rounding, de-identification of data, changes or flaws in data collection or verification methods) that could affect the validity of the data; or any changes/factors have been identified in caveats attached to the asset.

✔ The data collection met the objectives of the primary user. The data correctly represents what it was designed to measure, monitor or report.

COHERENCE Excellent ★

✔ Standard definitions, common concepts, classifications and data recording practices have been used.

✔ Elements within the data can be meaningfully compared.

✔ This data is generally consistent with similar or related sources from the same discipline

✔ The data can be analysed over time (for example, there have not been any significant changes in the way items are defined, classified or counted over time).

✔ The data does not form part of a collection or, if it is the latest in a series of data releases, there have not been any changes in methodology or external impacts since the last data release.

INTERPRETABILITY Excellent ★

✔ A data dictionary is available to explain the meaning of data elements, their origin, format and relationships

✔ Information is available about the primary data sources and methods of data collection (e.g. instruments, forms, instructions).

✔ Information is available to help users evaluate accuracy of the data and any level of error

✔ Information is available to explain concepts, help users correctly interpret the data and understand how it can be used

✔ Information is available to explain ambiguous or technical terms used in the data.

ACCESSIBILITY Very Good ★

✔ Data is available online with an open licence

✔ Data is available in machine-processable, structured form (e.g. CSV format instead of an image scan of a table)

✔ Data is available in a non-proprietary format (e.g. CSV, XML)

✔ Data is linked to other data, to provide context (e.g. employee ID is linked to employee name or species name is linked to genus)

✗ Data are not necessarily described using open standards (e.g. RDF, SPARQL) and persistent identifiers (URIs or DOIs).

Data disclaimer

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For more information

For more information about this dataset, the originating project or the data sources, please contact the NSW Office of Environment and Heritage Climate Research Team, at the email address: Climate.Research@environment.nsw.gov.au