

Green and Blue



link to nature

Overview



Indicator name **Impervious surface**

Indicator number 21

Indicator type Supplementary

Objective To measure the imperviousness of a given area, which is an important factor when considering drainage of water, particularly within urban areas

Application guidance Impervious surfaces impede the filtration of water into the soil and are mainly artificial structures such as pavements, roads and buildings. Pervious surfaces, on the other hand, are any porous and permeable area able to allow water to percolate into the soil and recharge the water table. Having a higher percentage of pervious areas have many environmental benefits such as delaying runoff peaks, increasing groundwater discharge, improving runoff quality, and reducing peak discharge volumes. The mapping of impervious surfaces is increasingly sought by land use managers to assess options for protecting waterways and other water dependent ecosystems.

This indicator will support practitioners to understand the level of imperviousness in suburbs across the state. Based on the outcome of the assessment, practitioners can determine the drainage capacity of each suburb and measure the environmental impacts of current developments and support the implementation of Water Sensitive Urban Design (WSUD) and low impact development technologies.

Practitioners can use the *percentage of impervious surface* metric to measure how much of a suburb is comprised of impervious surface materials.

Metric



Percentage of impervious surface

Recommendation



To enrich the analysis of imperviousness, consideration for varying catchment characteristics of terrain, soil type, geology, vegetation and rainfall patterns could be included

Related indicators



Green and Blue

- 19 Tree canopy
- 20 Biodiversity
- 22 Waterways



Comfort and Safety

- 28 Urban heat



Metric – Percentage of impervious surface

Metric unit	Percentage (%)
Description	To measure the imperviousness of surfaces at the suburb level, expressed as a percentage
Spatial coverage	Applicable to all NSW
Spatial application	This metric is most suitable for area-based analysis based on suburb boundaries
Calculation methodology	<p>Define impervious surface categories</p> <p>1. This dataset covers NSW with the land area classified according to the Australian Land Use and Management ALUM Classification Version 8, which is used to define impervious infrastructure such as roads, railways, airports and aerodromes, and stormwater infrastructure. Refer to Table 1 below for the nominal impervious surface types, which includes three categories of surface types: pervious, impervious and partially pervious.</p> <p>2. Building footprint is categorised as impervious surface</p> <p>3. Overlay land use and building footprint into one dataset</p> <p><i>Note: If there is a building footprint overlapped with pervious or partially impervious surface, building footprint will be kept</i></p> <p>Calculate impervious surface area</p> <p>4. Combine impervious areas with partially pervious surfaces (weighted 50%, as identified in Table 1) and summarise based on suburb boundary. The total area of impervious and partially pervious surfaces should then be divided by suburb area to get the percentage of impervious surface area.</p> <div>$\text{Percentage of impervious surface} = \frac{\text{Impervious area} + \text{Partially impervious area} \times 0.5}{\text{Suburb area}}$</div> <p>Data representation</p> <p>5. Assign colour based on the classification below</p> <ul style="list-style-type: none">• <10% = largely pervious surface, permeable to water drainage• >75% = largely impervious surface, impermeable to water drainage <p>Unit: Percentage (%)</p> <div><div></div><div>< 10</div><div>11 – 25</div><div>26 – 50</div><div>51 – 75</div><div>> 75</div></div>
Assumption	<ul style="list-style-type: none">• Partially pervious types identified in Table 1 are considered as 50% impervious• Mapping at the suburb level is more descriptive of local geography, with patterns of imperviousness correlating with the routes of significant waterways, including for example the Georges River in the South of Sydney, the Parramatta River in Central Sydney, and the Hawkesbury River in Western Sydney.• Rural areas are generally more pervious than urban areas due to lower levels of urban development. However, their level of imperviousness is often more complex to analyse due to varying catchment characteristics of terrain, soil type, geology, vegetation and rainfall patterns.



Metric – Percentage of impervious surface (Cont.)

- Limitation**
- New developments post-2018 are not captured in Geoscape® Buildings Theme 2018
 - Land use changes post-2017 are not reflected in the NSW Land Use 2017 map
 - Only the large-scale land use is considered, therefore excluding features such as driveways and pools
 - Any category with a likely significant impervious portion has been labelled as “Partially pervious”, which may range between +25% and +75% pervious
 - Varying catchment characteristics of terrain, soil type, geology, vegetation and rainfall patterns have not been considered
 - Consideration should be given to completing a data accuracy assessment, where mapping is checked against NearMap or other aerial imagery via random locations

- Data source**
- Geoscape® Buildings: geoscape.com.au/
 - NSW Land Use 2017: agriculture.gov.au/abares/aclump/land-use/data-download
 - SIX Maps suburb boundaries: maps.six.nsw.gov.au/clipnship.html

Table 1: Nominal impervious surface types, categorised by secondary attribute

Pervious	Elements of the built and natural environment that allow for the penetration/passage of water (excluded from analysis)	1.1.0 Nature conservation 1.2.0 Managed resource protection 1.3.0 Other minimal use 2.1.0 Grazing native vegetation 2.2.0 Production native forests 3.1.0 Plantation forests 3.2.0 Grazing modified pastures 3.3.0 Cropping 3.4.0 Perennial horticulture	3.5.0 Seasonal horticulture 3.6.0 Land in transition 4.1.0 Irrigated plantation forestry 4.2.0 Grazing irrigated modified pastures 4.3.0 Irrigated cropping 4.4.0 Irrigated perennial horticulture 4.6.0 Irrigated land in transition 5.9.0 Waste treatment and disposal
Impervious	Elements of the built and natural environment covered with materials such as concrete, metal, glass, tarmac, and plastic, including buildings, roads and other forms of impervious infrastructure	5.3.0 Manufacturing and industrial 5.5.0 Services 5.6.0 Utilities 5.7.0 Transport and communication 6.4.0 Channel/aqueduct	
Partially Pervious	Elements of the built and natural environment that may have both impervious and pervious characteristics	5.1.0 Intensive horticulture 5.2.0 Intensive animal production 5.4.0 Residential and farm infrastructure 5.8.0 Mining	
Other	Excluded from analysis	6.1.0 Lake 6.2.0 Reservoir/dam 6.3.0 River 6.5.0 Marsh/wetland 6.6.0 Estuary/coastal waters	

Reference

Department of Planning, Industry and Environment, Nominal impervious surfaces (2020)

