

National Surface Cover

1.8

Geoscape

23 December 25

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i Standard

This document is based on the AS/NZS ISO 19131:2008 Geographic information – Data product specifications standard. For more information, refer to <https://www.saiglobal.com/online/> .

i Disclaimer

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Overview

1.1 Delivery Organisation - Geoscape Australia

Geoscape is the digital Australia – a comprehensive representation of our built environment. It is consistently formatted spatial data that describes the addresses, land, buildings and transport networks across Australia’s complex cities, regional centres and rural communities.

Geoscape Australia is the trading name of PSMA Australia Limited, a self-funded public company owned by the governments of Australia. The organisation’s first major initiative was to support the 1996 Census through the provision of Australia’s first national digital basemap at street-level.

We were incorporated in 2001 and tasked with collating, transforming and delivering national spatial datasets. Our establishment reflected the desire of Australian governments to work together to establish national, location information infrastructure to advance the emerging information economy. Geoscape Australia is now a trusted source of essential national location data, with a diverse ecosystem of data partners.

The value of Geoscape data is in its richness. It enables a range of innovations and applications. To support broad use of the data, it is available through online subscription services in business-ready formats, as well as customised enterprise plans. Geoscape Australia has a network of solution partners that integrate Geoscape data into other products and services. The partner network includes traditional geospatial specialists and data engineers, as well as software developers, marketing service providers, systems integrators and consultancies.

1.2 Data Product Specification Title

National Surface Cover Product Description

1.3 Data Scope

National Surface Cover is a digital dataset of land cover categories across Australia. There will be a Release Report provided with each update which will detail the specific update areas and any issues contained within National Surface Cover.

1.4 Reference Date

December 2022

1.5 Responsible Party

PSMA Australia Limited, trading as Geoscape Australia

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1.6 Language

English

1.7 Topic Category

Boundaries for National Surface Cover and related characteristics within Australia.

1.8 Informal Description of the Data Product

National Surface Cover is a national digital dataset representing land cover categories across each State and Territory in Australia.

Data quality and potential capture timelines will vary across Australia.

Geoscape welcomes your feedback on the National Surface Cover Dataset. We also publish regular updates on the development of our products on the Geoscape website.

1.9 Distribution Format

This document is available in PDF format. For other formats and use of this document, contact Geoscape Support (support@geoscape.com.au).

1.10 Copyright and disclaimer

Please see <https://geoscape.com.au/legal/data-copyright-and-disclaimer/>

1.11 Privacy

Geoscape products and services should not contain any personal or business names or other sensitive information. Geoscape undertakes reasonable data cleansing steps as part of its production processes to ensure that is the case. If you think that personal information may have inadvertently been included in Geoscape products or services, please contact support@geoscape.com.au.

1.12 Definitions, Acronyms and Abbreviations

Term	Definition
Building	A structure generally permanent in nature which has been constructed to meet a specific objective (e.g. housing, storage, and workplace) and less permanent structures such as caravans and other portable housing may also be represented. All buildings are represented spatially both as polygons and points.
CE90	Abbreviation for circular error at 90% confidence, which is the location error in the horizontal plane. It is the radial error distance centred at zero within which 90% of the data points fall.
Contours	A line connecting points of equal elevation/height used to display a 3D surface on a 2D map or image.
Digital Elevation Model (DEM) (Bare earth model on a regular grid)	The representation of continuous elevation values over a topographic surface by a regular array of sampled z-values, referenced to a common datum and expressed on a regular grid spacing or raster dataset. The DEM is a ground only representation and excludes vegetation such as trees and shrubs and human-constructed features such as sheds, houses and bridges. Note: Some organisations refer to a bare earth model in a regular grid as a DTM. In this context, refer to the alternate DTM definition in this document.
Digital Surface Model (DSM) - Irregular Grid (Surface model irregular grid)	A topographic model of the earth's surface in digital format represented by mass points of variable density and may include break lines. The DSM represents surfaces including ground, vegetation, buildings and other constructed features.
Digital Surface Model (DSM) - Regular Grid (Surface model on a regular grid)	The representation of continuous elevation or height values over a topographic surface by a regular array of sampled z-values, referenced to a known datum and expressed on a regular grid spacing or raster dataset. The DSM represents surfaces including ground, vegetation, buildings and other constructed features.
Digital Terrain Model (DTM) (Bare earth model on the irregular grid)	A topographic model of the earth's ground surface in digital format represented by mass points of variable density and may include break lines. The DTM representation of ground includes works such as levees, banks and roads, but excludes vegetation such as trees and shrubs and human-constructed features such as sheds, houses and bridges. Note: Some organisations refer to a bare earth model in a regular grid as a DTM. In this context, refer to the specific DEM definition in this document.
Elevation	This is a measure of vertical position relative to a known vertical datum.
Height	This is a measure of the relative vertical difference between two known points on the same vertical datum.
LE90	Abbreviation for linear error at 90% confidence, which is the location error in the vertical plane. It is the absolute value error distance from zero within which 90% of the vertical data points fall.
Minimum resolution	The lowest detail/most coarse representation of a building outline acceptable to Geoscape.
Raster Resolution	This is a measure of image pixel/cell dimension, providing information on the level of detail of features it represents. The smaller the value the higher the level of detail represented.
Resolution	This is a measure of the geometric fidelity of each building represented. It is a combination of the minimum area of a polygon and minimum vertex separation.
Rural	Any area not defined as 'Urban'
Sensor	A device/machine that measures/records 1 or more physical properties.
Visible	Observable by someone with reasonable skill and expertise.
Urban	Areas with a population greater than 200, or with significant industrial/commercial activity in a visual assessment.

Specification Scope

2.1 Scope Identification

The National Surface Cover dataset consists of one (1) theme and two (2) layers. The themes and layer have a defined extent and scope.

Table 1: Identification of National Surface Cover Dataset as Theme and Layer.

Dataset	Theme	Layer
National Surface Cover	Surface Cover	Urban Surface Cover National Surface Cover

2.2 Extent

Spatial coverage of National Surface Cover includes Australia's land mass. The dataset has areas classified that meet certain criteria based on the occurrence of natural events (e.g. flooding), population distribution and industrial/commercial activities.

Data Product Identification

3.1 Title

National Surface Cover

3.2 Alternate Titles

- Formerly known as 'Geoscape'.
- Surface Cover 2m
- Surface Cover 30m

3.3 Abstract

National Surface Cover is a raster dataset representing land cover categories across Australia. Urban Surface Cover has coverage in pre-defined urban locations across Australia at 2 metre resolution, while the National Surface Cover has complete national coverage at 30 metre resolution.

3.4 Description

The National Surface Cover theme consists of two layers: (1) Urban Surface Cover and (2) National Surface Cover. The theme consists of a digital pixel representation of the different types of ground cover of Australia. Each layer represents a different pixel resolution and coverage: Urban Surface Cover is a two-metre resolution covering pre-defined areas classified as "urban", while National Surface Cover is a complete national coverage at a thirty-metre resolution.



Data quality and potential capture timelines will vary across Australia based on three categories. Each category has been developed based on several factors defined by the population distribution (categorised based on population size), industrial/commercial activities, the probability of natural events (e.g. flooding) and the image source.

- Urban (satellite source) - areas with a population greater than 200, or with significant industrial/commercial activity in a visual assessment, digitised from satellite imagery
- Urban (aerial source) - areas with a population greater than 200, or with significant industrial/commercial activity in a visual assessment, digitised from aerial imagery
- Rural – all other areas

3.5 Purpose

The purpose of the National Surface Cover product is to represent different types of land cover for use by industry and government in geographic information systems and/or other information systems.

3.6 Topic Category

Raster spatial data.

3.7 Geographic Description

The spatial coverage of National Surface Cover includes Australia's land mass. The Bounding Box for this data is as follows:

- North bounding latitude: -9°
- South bounding latitude: -44°
- East bounding longitude: 160°
- West bounding longitude: 100°



3.8 Geographic Extent Name

The States and Territories within Australia are represented by the following:

State or Territory Name	Abbreviation
New South Wales	NSW
Victoria	VIC
Queensland	QLD
South Australia	SA
Western Australia	WA
Tasmania	TAS
Northern Territory	NT
Australian Capital Territory	ACT

i Note

Geoscape has adopted the Australian Bureau of Statistics (ABS) definition of 'Other Territories' (OT). It includes the Territory of Christmas Island, Territory of Cocos (Keeling) Islands, Jervis Bay Territory and Norfolk Island. OT does not include any other external Territory.

Data Content and Structure

4.1 Data Model

The National Surface Cover Dataset Data Model Diagram is set out in Appendix A.

4.2 Data Dictionary

The National Surface Cover Dataset Data Dictionary is set out in Appendix B.

Reference System

5.1 Spatial Reference System

5.1.1 Raster Data

GDA94

Datum: The Geocentric Datum of Australia 1994 (GDA94)

Projection: Transverse Mercator

Zones: 49, 50, 51, 52, 53, 54, 55, 56 and 57

Zone Width: 6 degrees

Longitude of Origin: Central Meridian of each zone

Latitude of Origin: Equator (zero degrees)

False Easting: 500 000

False Northing: 10 000 000

Central Scale Factor: 0.9996

Units: Metre

Ellipsoid: Geodetic Reference System 1980 (GRS80)

GDA2020

Datum: The Geocentric Datum of Australia 2020 (GDA2020)

Projection: Transverse Mercator

Zones: 49, 50, 51, 52, 53, 54, 55, 56 and 57

Zone Width: 6 degrees

Longitude of Origin: Central Meridian of each zone

Latitude of Origin: Equator (zero degrees)

False Easting: 500 000

False Northing: 10 000 000

Central Scale Factor: 0.9996

Units: Metre

Ellipsoid: Geodetic Reference System 1980 (GRS80)

5.2 Temporal Reference System

Gregorian calendar

5.3 Reference System Scope

The spatial objects and temporal collection periods for the National Surface Cover dataset.

Data Quality

6.1 Positional Accuracy

Positional accuracy is an assessment of the closeness of the location of the spatial objects in relation to their true positions on the earth's surface. In this product positional accuracy refers to horizontal accuracy. The horizontal positional accuracy is the assessed accuracy after all transformations have been carried out.

6.1.1 Horizontal Accuracy

The horizontal positional accuracy of National Surface Cover data reflects the positional accuracy of source sensors utilised in data collection, and the reliability of feature classification and associated orthogonalisation processes. The horizontal positional accuracy of source imagery varies across collected strips and ranges from +/-0.5m CE90 to +/-2.5m CE90.

The National Surface Cover layer was classified from remotely sensed satellite imagery at a 30-metre grid resolution. The horizontal positional accuracy of source imagery used for the classification of surface cover pixels is +/-12m CE90. The positional accuracy of the National Surface Cover layer pixels will reflect the accuracy of the source imagery from which it was classified as well as the classification process.

6.2 Thematic Quality

Thematic accuracy is defined as the accuracy of quantitative attributes, the correctness of non-quantitative attributes, and of the classification of features and their relationships.

6.2.1 Classification Correctness

Classification correctness is an assessment of the reliability of values assigned to features in the dataset in relation to their true 'real world' values.

The rate of classification correctness of the Urban Surface Cover dataset has been measured at above 90%.

The rate of classification correctness of the National Surface Cover dataset has been measured at above 85%.

6.3 Logical Consistency

Logical consistency is a measure of the degree to which data complies to a technical specification. The test procedures are a mixture of software scripts and manual visual analysis. The data structure of

National Surface Cover has been tested for conformance to the data model. The following have been tested and confirmed to conform:

- File names
- Attribute names
- Attribute types
- Attribute domains
- Object type

6.4 Topological Consistency

Topological consistency is the measure of how features spatially relate to other features within and across the National Surface Cover theme. Topological inconsistencies are identified using a combination of automated rules, and visual analysis. Where topological inconsistencies are identified, they are notified back to the supplier for remediation. Some minor topological inconsistencies are corrected during product processing. The level of topological consistency is dependent on the data supplied to Geoscape.

6.5 Temporal Accuracy

Temporal accuracy is an assessment of both temporal consistency (how well-ordered lifecycle events are) and temporal validity (validity of data with respect to time).

6.6 Completeness

Completeness is an assessment of the extent and range of the dataset with regard to completeness of coverage, completeness of classification and completeness of verification. Components that makeup National Surface Cover includes Dataset, Theme, and Layer Coverage and coverage will be 100% complete across the areas captured to date. The National Surface Cover product contains a complete population of the Surface Cover layer.

6.6.1 Attribute Completeness

The layers within the National Surface Cover have a full population of attributes in accordance with the data model.

6.6.2 Feature Completeness

The omission rate of Trees is directly related to the classification correctness of the Urban Surface Cover and the vertical accuracies of the DSM and DTM.

6.7 Data Quality Scope

All spatial features including their attributes in the current time period for the National Surface Cover Dataset.

Data Updates and Maintenance

Geoscape completed capture and delivery of the National Surface Cover product in October 2018 and has since commenced the update, maintenance and improvement program. More information on the proposed update schedule is available from the Geoscape website.

7.1 Update Frequency

Urban Surface Cover updates are applied and released on a quarterly schedule.

National Surface Cover achieved complete coverage of Australia for the October 2018 release. There are currently no plans to update this layer from new capture. The source data capture dates range between 2014 and 2017.

7.2 Update Source

The initial capture of the Urban Surface Cover layer was classified from remotely sensed satellite imagery at a 2-metre grid resolution.

From the November 2021 product release, updates to Urban Surface Cover have been classified from aerial captured imagery.

7.3 Update Scope

National Surface Cover updates occurs for all existing objects with changed geometry, attributes and/or metadata, as well as data for new objects supplied prior to the release time period. Updates to the product include:

1. The inclusion of any new capture of National Surface Cover received from third-party partners.
2. Corrections and/or improvements to production processes in generating National Surface Cover.

Delivery Format

8.1 Components

The National Surface Cover product will include raster components. The data is separated into each State and Territory, with the exception that ACT and NSW are combined. Also, ACT/NSW includes Jervis Bay Territory raster data. OT includes a subset of the raster data used for ACT/NSW but only for the Jervis Bay Territory area.

Raster data will be made available using only the Tagged Image File Format described below with the AUT tables made available in DBF.

Accompanying the National Surface Cover product are two shapefiles, RASTER_INDEX and CAPTURE_DATE_INDEX, that assist in using and navigating the Urban Surface Cover theme. The RASTER_INDEX is comprised of simple polygons that represent the boundaries of Areas of Interest (AOIs). The CAPTURE_DATE_INDEX is comprised of complex polygons grouped by id, state, zone and capture_date attributes.

8.2 Supplied Formats

8.2.1 GeoTiff

Format name

Tagged Image File Format

Specification

This format includes files with the following extensions: *.tif

A popular image format for storing and manipulating raster graphics images. The latest specification 6.0 was published in 1992 and maintained by Adobe Systems.

Language

English

8.2.2 ESRI Shapefile

Format name

Shape – ESRI™

Specification

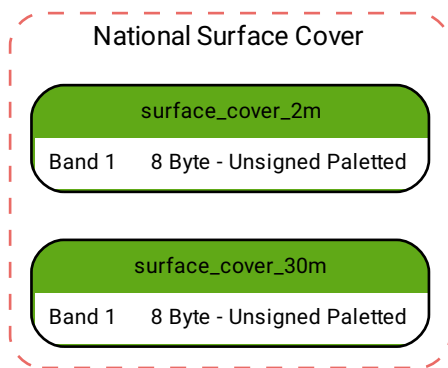
This format includes files with the following extensions: *.shp, *.shx, *.dbf

ESRI Shapefile Technical Description, an ESRI White Paper, July 1998. Follow this link:
www.esri.com/library/whitepapers/pdfs/shapefile.pdf

Language

English

Appendix A – Data Model



Appendix B – Data Dictionary

Table 1: SURFACE_COVER_2M Codes

Code	Name	Description	RED*	GREEN	BLUE*
2	Bare Earth	Includes sand dunes, desert, rock outcrops, bare soil other than bare agricultural land, and sparsely vegetated areas of grass and shrub. Non-vegetated strip mines and quarries except where covered by development or water.	215	194	158
3	Road and Path	Roads and other surfaces covered in a man-made material excluding hard packed dirt trails.	156	156	156
4	Grass	Grass and herbaceous areas. The category may include herbaceous wetlands if images are collected during dry season or periods of drought.	152	230	0
5	Trees	All trees including deciduous and evergreen woody vegetation.	38	115	0
6	Unspecified Vegetation	Any other vegetative material not included within the Grass or Tree class. This may include, but is not limited to, shrub, scrub, agriculture, and aquatic plants.	114	137	68
7	Built-up Areas	Any areas of man-made environments and infrastructure excluding road and paths and buildings.	255	190	190
8	Water	Depending on the resolution quality of the imagery used, natural water will include streams, canals, ponds, lakes, reservoirs, estuaries and bays.	158	170	215
9	Buildings	Where the majority of a pixel intersects a Building, vector building polygon representation.	137	90	68
10	Cloud	The area covered with cloud on Date of collection.	225	225	225
11	Shadow	The area covered with shadow on Date/time of collection.	78	78	78
12	Swimming Pool	An area identified as a swimming pool.	0	77	168
13	Car Park	An area representing a parking lot and roadside car parks.	121	122	122

Table 2: SURFACE_COVER_30M Codes

Code	Name	Description	RED*	GREEN	BLUE*
2	Bare Earth	Includes sand dunes, desert, rock outcrops, bare soil other than bare agricultural land, and sparsely vegetated areas of grass and shrub. Non-vegetated strip mines and quarries except where covered by development or water.	215	194	158
3	Road and Path	Roads and parking lots covered in a man-made material excluding hard packed dirt trails.	156	156	156
5	Trees	All trees including deciduous and evergreen woody vegetation.	38	115	0
6	Unspecified Vegetation	Any other vegetative material not included within the Tree class. This may include but is not limited to grasses, shrub, scrub, agriculture, aquatic plants and herbaceous wetlands.	114	137	68
7	Built-up Areas	Any areas of man-made environments and infrastructure excluding road and paths and buildings.	255	190	190
8	Water	Depending on the resolution quality of the imagery used, natural water will include streams, canals, ponds, lakes, reservoirs, estuaries and bays.	158	170	215
10	Cloud	The area covered with cloud on Date of collection.	225	225	225
11	Shadow	The area covered with shadow on Date/time of collection.	78	78	78

Table 3: RASTER INDEX table

Name	Data Type	Description	Example	10 Character Alias
id	CharacterString (10)	The persistent identifier unique to an Area of Interest (AOI).	16702	ID
state	CharacterString (10)	The state and/or territory the LAOI is positioned within.	WA	STATE
zone	CharacterString (5)	The UTM Zone the AOI is associated with.	50	ZONE

Table 4: CAPTURE DATE INDEX table

Name	Data Type	Description	Example	10 Character Alias
id	CharacterString (10)	The persistent identifier unique to an Area of Interest (AOI).	16870	ID
capture_dt	date (dd-mm-yyyy)	The date the source data was taken.	NSW	STATE
state	CharacterString (10)	The state and/or territory the LAOI is positioned within.	56	ZONE
zone	CharacterString (5)	The UTM Zone the AOI is associated with.	27/10/2019	CAPTURE_DT
source	Character String (50)	The methodology of capture	Aerial	SOURCE