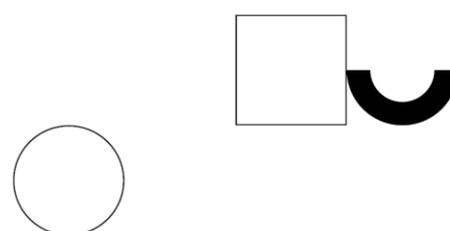
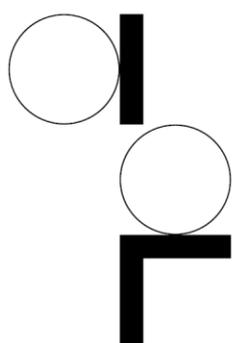
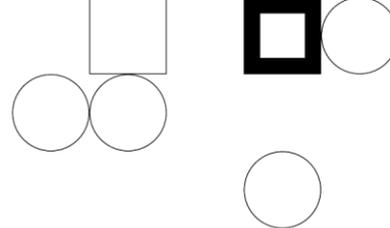
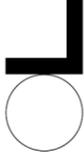


# Surface Cover

**Product Description**  
Version 1.6





## **Standard**

This document is based on the AS/NZS ISO 19131:2008 Geographic information – Data product specifications standard. For more information, refer to [www.saiglobal.com/online/](http://www.saiglobal.com/online/).

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# 1. 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

Surface Cover Product Description

## 1.3 Data Scope

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 Surface Cover.

## 1.4 Reference Date

December 2020

## **1.5 Responsible Party**

**PSMA Australia Limited, trading as Geoscape Australia**

ABN: 23 089 912 710

Unit 6, 113 Canberra Avenue, GRIFFITH ACT 2603 Australia

T: +61 2 6260 9000

E: info@geoscape.com.au

URL: www.geoscape.com.au

## **1.6 Language**

English

## **1.7 Topic Category**

Boundaries for Surface Cover and related characteristics within Australia.

## **1.8 Informal Description of the Data Product**

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 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
<b>Building</b>	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.
<b>CE90</b>	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.
<b>Contours</b>	A line connecting points of equal elevation/height used to display a 3D surface on a 2D map or image.
<b>Digital Elevation Model (DEM) (Bare earth model on a regular grid)</b>	<p>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.</p> <p>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.</p>
<b>Digital Surface Model (DSM) - Irregular Grid (Surface model irregular grid)</b>	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.
<b>Digital Surface Model (DSM) - Regular Grid (Surface model on a regular grid)</b>	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.
<b>Digital Terrain Model (DTM) (Bare earth model on the irregular grid)</b>	<p>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.</p> <p>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.</p>
<b>Elevation</b>	This is a measure of vertical position relative to a known vertical datum.
<b>Height</b>	This is a measure of the relative vertical difference between two known points on the same vertical datum.
<b>LE90</b>	Abbreviation for linear error at 90% confidence, which is the location error in the vertical plane. It is the absolute value error

Term	Definition
	distance from zero within which 90% of the vertical data points fall.
<b>Minimum resolution</b>	The lowest detail/most coarse representation of a building outline acceptable to Geoscape.
<b>Raster Resolution</b>	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.
<b>Resolution</b>	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.
<b>Sensor</b>	A device/machine that measures/records 1 or more physical properties.
<b>Visible</b>	Observable by someone with reasonable skill and expertise.

## 2. Specification Scope

### 2.1 Scope Identification

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

#### Identification of Surface Cover Dataset as Theme And Layer.

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

### 2.2 Extent

Spatial coverage of 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.

# 3. Data Product Identification

## 3.1 Title

Surface Cover

## 3.2 Alternate Titles

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

## 3.3 Abstract

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

## 3.4 Description

The 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 pixel resolution: Urban Surface Cover represents ground cover within areas classified as urban at a two-metre resolution, and National Surface Cover represents ground cover at a thirty-metre resolution, nationally.

Accompanying the Urban Surface Cover product are two 'index' shapefiles, RASTER\_INDEX and CAPTURE\_DATE\_INDEX, that aim to assist in the use and application of the raster data. The RASTER\_INDEX is a layer that represents the boundaries of the pre-defined urban areas - also known as 'Areas of Interest' (AOIs). The CAPTURE\_DATE\_INDEX layer provides further detail as to the capture date (dd-mm-yyyy) of pixels across these AOIs.

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

- **Urban** - areas with a population greater than 200, or with significant industrial/commercial activity in a visual assessment
- **Rural** - all other areas

### 3.5 Purpose

The purpose of the Surface Cover product is to spatially 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 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	Character Code
New South Wales	NSW	1 (or 01)
Victoria	VIC	2 (or 02)
Queensland	QLD	3 (or 03)
South Australia	SA	4 (or 04)
Western Australia	WA	5 (or 05)
Tasmania	TAS	6 (or 06)
Northern Territory	NT	7 (or 07)
Australian Capital Territory	ACT	8 (or 08)
Other Territories	OT	9 (or 09)

---

**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 more recently the inclusion of Norfolk Island. OT does not include any other external Territory.**

---

## **4. Data Content and Structure**

### **4.1 Data Model**

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

### **4.2 Data Dictionary**

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

# 5. 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 Surface Cover dataset.

## 6. 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 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 Urban Surface Cover layer was classified from remotely sensed satellite imagery at a 2-metre grid resolution. The horizontal positional accuracy of source imagery varies across collected strips and ranges from +/-0.5m CE90 to +/-2.5m CE90. The positional accuracy of the Urban Surface Cover layer pixels will reflect the accuracy of the source imagery from which it was classified as well as the classification process.

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 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 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 Surface Cover includes Dataset, Theme, and Layer Coverage and coverage will be 100% complete across the areas captured to date. The Surface Cover product contains a complete population of Surface Cover layer.

### *Attribute Completeness*

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

### *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 Surface Cover Dataset.

# 7. Data Updates and Maintenance

Geoscape completed 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

Updates to Surface Cover are applied and released on a quarterly schedule.

## 7.2 Update Scope

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 Surface Cover received from third-party partners.
2. Corrections and/or improvements to production processes in generating Surface Cover.

# 8. Delivery Format

## 8.1 Components

The 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 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 Shape

#### *Format name*

Shape – ESRI™

#### *Specification*

This format includes files with the following extensions: \*.shp, \*.shx, \*.dbf, \*.prj  
ESRI Shapefile Technical Description, an ESRI White Paper, July 1998. Follow this link: [www.esri.com/library/whitepapers/pdfs/shapefile.pdf](http://www.esri.com/library/whitepapers/pdfs/shapefile.pdf)

#### *Language*

English

## 9. Geoscape Partner Network

The value of Geoscape's products is in the richness of the partner networks who have specialist skills and knowledge to provide business-ready solutions. Our network includes traditional geospatial specialists, data engineers, software developers, marketing service providers, system integrator, independent software vendors, research organisations and consultancies.

Contact us to provide feedback on the Surface Cover product or for further information on accessing Geoscape Data:

### **Geoscape Australia**

Unit 6, 113 Canberra Avenue, Griffith ACT 2603

T: 02 6260 9000

E: [support@geoscape.com.au](mailto:support@geoscape.com.au)

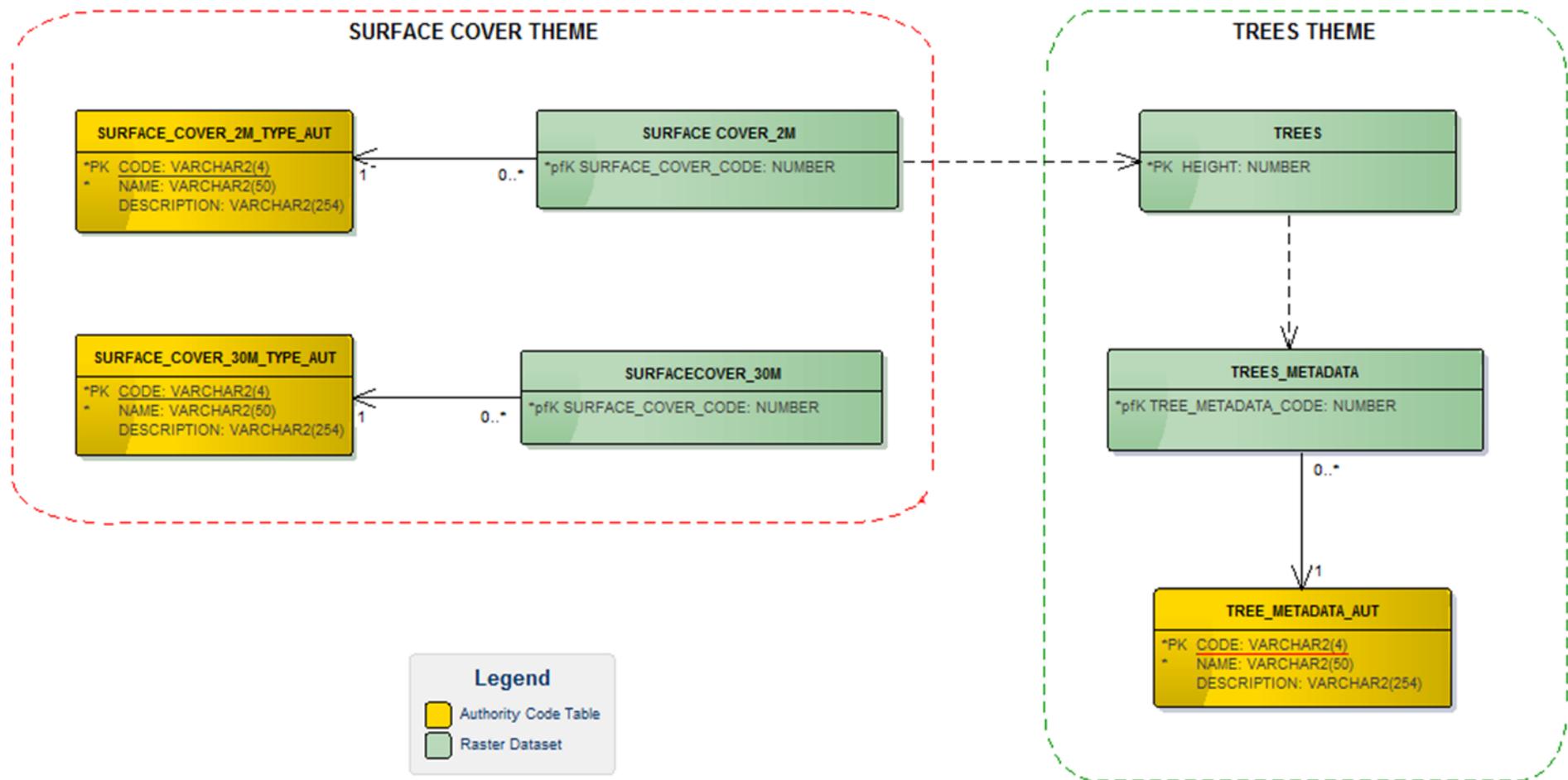
W: [www.geoscape.com.au](http://www.geoscape.com.au)

# 10. Geoscape data Products

DATASET	ACCESS	THEME	LAYER
<b>Administrative Boundaries</b>	Open Data ( <a href="http://www.data.gov.au">www.data.gov.au</a> ) Geoscape Partner Network	ABS Boundaries 2011	2011 ABS Mesh Blocks
			Indigenous Location (ILOC)
			Indigenous Areas (IARE)
			Indigenous Region (IREG)
			Remoteness Areas (RA)
			Socio-Economic Indexes for Areas (SEIFA)
			Urban Centre Localities /Section of State
		ABS Boundaries 2016	Significant Urban Areas (SUA)
			2016 ABS Mesh Blocks and Statistical Areas
			2016 ABS Indigenous Regions, Areas and Locations
			2016 Urban Centre and Locality - Section of State - Significant Urban Area
			2016 Remoteness Areas (RA)
			2016 Socio-Economic Indexes for Areas (SEIFA)
			Electoral Boundaries
State Electoral Boundaries			
Local Government Areas (LGAs)			
Suburbs/Localities			
State Boundaries			
Town Points			
<b>CadLite</b>	Geoscape Partner Network	Cadastre	
		Property	
<b>Surface Cover</b>	Geoscape Partner Network	Surface Cover	Urban
			National
<b>Buildings</b>	Geoscape Partner Network	Buildings	
<b>Trees</b>	Geoscape Partner Network	Trees	
<b>G-NAF</b>	Open Data ( <a href="http://www.data.gov.au">www.data.gov.au</a> )	Geocoded physical addresses	

<b>DATASET</b>	<b>ACCESS</b>	<b>THEME</b>	<b>LAYER</b>
	Geoscape Partner Network		
<b>Land Tenure</b>	Geoscape Partner Network	Land Tenure	
<b>Features of Interest</b>	Geoscape Partner Network	Features of Interest	
<b>Postcodes</b>	Geoscape Partner Network	Postcode Boundaries	
<b>Transport Topography</b>	<b>&amp;</b> Geoscape Partner Network	Transport	Roads
			Rail
			Rail Stations
			Airports
			Hydrology
		Greenspace	

# Appendix A – Surface Cover Data Model



Note: Oracle data types used in data model

## Surface Cover Data Model

# Appendix B – Data Dictionary

The following table refers to the columns used in all tables that form part of the data dictionary, with the exception of tables for the authority code tables.

**Table 1: SURFACE\_COVER\_TYPE\_AUT**

Name	Data Type	Description	Prim Key	Man	F K TABLE	F K Col	10 Char Alias
CODE	CharacterString (4)	Code identifying unique SURFACE_COVER_TYPE_CODE.	Y	Y	-	-	CODE
NAME	CharacterString (50)	Name of the surface cover type.	N	Y	-	-	NAME
DESCRIPTION	CharacterString (254)	Description of the surface cover type.	N	N	-	-	DESCRIPTN

**Table 2: SURFACE\_COVER\_2M\_TYPE\_AUT 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
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

CODE	NAME	DESCRIPTION	Red*	Green*	Blue*
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

**Table 3: SURFACE\_COVER\_30M\_TYPE\_AUT 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/ Grass	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

\* Geoscape has assigned red (R), green (G) and blue (B) values to the surface cover classes. The RGB values are provided for applications that may not support the colourmap.

*Table 4: RASTER INDEX table*

Attribute name	Data Type	Description	Example
<b>id</b>	CharacterString (10)	The persistent identifier unique to an Area of Interest (AOI).	16702
<b>state</b>	CharacterString (10)	The state and/or territory the LAOI is positioned within.	WA
<b>one</b>	CharacterString (5)	The UTM Zone the AOI is associated with.	50

*Table 5: CAPTURE DATE INDEX table*

Attribute name	Data Type	Description	Example
<b>id</b>	CharacterString (10)	The persistent identifier unique to an Area of Interest (AOI).	16702
<b>capt_date</b>	date (dd-mm-yyyy)	The date the source data was taken.	08-07-2017
<b>state</b>	CharacterString (10)	The state and/or territory the LAOI is positioned within.	WA
<b>zone</b>	CharacterString (5)	The UTM Zone the AOI is associated with.	50