

# Australian Hydrological Geospatial Fabric (Geofabric) Data Product Specification

Surface Cartography

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**Australian Government**  
**Bureau of Meteorology**



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## Contents

Preface .....	6
1 Overview .....	7
1.1 Data product specification title .....	7
1.2 Reference date .....	7
1.3 Responsible party .....	7
1.4 Data product specification language .....	7
1.5 Terms and definitions .....	7
1.6 Abbreviations and acronyms .....	7
1.7 Informal description of data product .....	8
2 Specification scope .....	9
2.1 Scope identification .....	9
2.2 Level .....	9
2.3 Level name .....	9
2.4 Level description .....	9
2.5 Extent .....	9
2.5.1 Description .....	9
2.5.2 Geographic extent .....	9
2.5.3 Temporal extent .....	10
3 Data product identification .....	11
3.1 Title .....	11
3.2 Alternate title .....	11
3.3 Product ID .....	11
3.4 Abstract .....	11
3.5 Purpose .....	11
3.5.1 Use case .....	12
3.6 Topic category .....	12
3.7 Spatial representation .....	12
3.8 Spatial resolution .....	12
3.8.1 Spatial denominator .....	12
3.8.2 Resolution distance .....	12
3.9 Geographic bounding box .....	12
3.9.1 West bound longitude .....	12
3.9.2 East bound longitude .....	12
3.9.3 South bound latitude .....	12
3.9.4 North bound latitude .....	12
3.10 Geographic identifier .....	13
3.10.1 Identifier authority .....	13
3.10.2 Identifier code .....	13
3.10.3 Code space (register URL) .....	13
3.11 Reference to specification scope .....	13
4 Data content and structure .....	14
4.1 Description .....	14
4.2 Feature information .....	15

## Australian Hydrological Geospatial Fabric (Geofabric) Data Product Specification - Surface Cartography

4.2.1	Application schema.....	15
4.2.2	Feature catalogue.....	15
4.3	Reference to specification scope.....	16
5	Reference systems .....	17
5.1	Spatial reference system.....	17
5.1.1	Name .....	17
5.1.2	Code.....	17
5.1.3	Code space .....	17
5.2	Temporal reference system.....	17
5.3	Vertical reference system.....	17
5.4	Reference system scope .....	17
6	Data quality .....	18
6.1	Data quality scope.....	18
6.1.1	Scope code .....	18
6.1.2	Extent.....	18
6.1.3	Scope description .....	18
6.2	Data quality lineage.....	18
6.2.1	Lineage statement.....	18
6.3	Quality scope .....	19
7	Data capture.....	20
7.1	Data capture statement .....	20
7.2	Data capture scope .....	20
8	Data maintenance .....	21
8.1	Maintenance and update frequency .....	21
8.2	Other maintenance information .....	21
8.3	Maintenance scope.....	21
9	Portrayal information .....	22
9.1	Portrayal information .....	22
9.2	Portrayal scope .....	22
10	Data Product Delivery.....	23
10.1	Delivery format .....	23
10.1.1	Format name .....	23
10.1.2	Format version.....	23
10.1.3	Language used within the dataset .....	23
10.1.4	Character set coding.....	23
10.2	Delivery medium .....	23
10.2.1	Units of delivery .....	23
10.2.2	Estimated size of a unit in the specified format.....	23
10.2.3	Medium name .....	23
10.2.4	Online delivery URL .....	23
10.3	Other delivery information .....	23
10.4	Delivery scope.....	24
11	Additional information.....	25

Australian Hydrological Geospatial Fabric (Geofabric) Data Product Specification -  
Surface Cartography

11.1 Additional information.....25  
11.2 Additional information scope .....25  
12 Metadata .....26

**List of Tables**

Table 1 - Product Feature Type Registry for Geofabric Surface Cartography .....15

## Preface

This document is based upon the AS/NZS ISO 19131:2008 Geographic information - Data product specifications standard<sup>1</sup>. The document provides a framework for the completion of a Data Product Specification (DPS) for geographic data product produced as part of the Geofabric project.

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<sup>1</sup> AS/NZS, "AS/NZS ISO 19131:2008 Geographic information - Data product specifications" (AS/NZS, July 21, 2008), [www.saiglobal.com/online/](http://www.saiglobal.com/online/).

## 1 Overview

### 1.1 Data product specification title

Geofabric Surface Cartography

### 1.2 Reference date

2011-08-30

### 1.3 Responsible party

Contact organisation: Bureau of Meteorology

Contact position: Geospatial Data Unit

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Locality: Canberra

State: ACT

Country: Australia

Postcode: 2601

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### 1.4 Data product specification language

English

### 1.5 Terms and definitions

Please refer to the Glossary in the Geofabric Product Guide.

### 1.6 Abbreviations and acronyms

AHGF	Australian Hydrological Geospatial Fabric
ANU	Australian National University
ANUDEM	Australian National University Digital Elevation Model
ANZLIC	Australian and New Zealand Land Information Council
Bureau	Australian Government: Bureau of Meteorology
DEM	Digital Elevation Model
DEM-9S	GEODATA 9 Digital Elevation Model
DPS	Data Product Specification
ESRI	Environmental Systems Research Institute Inc.

## Australian Hydrological Geospatial Fabric (Geofabric) Data Product Specification - Surface Cartography

FGDC	Federal Geographic Data Committee
GA	Geoscience Australia
GDA94	Geodetic Datum of Australia 1994
GEODATA 1	GEODATA TOPO-250K Series 1
GEODATA 3	GEODATA TOPO 250K Series 3
GIS	Geographic Information System
ISO	International Organization for Standardization
SDE	Spatial Database Engine
NCB	National Catchments Boundaries

### 1.7 Informal description of data product

The Geofabric Surface Cartography product is largely based on feature classes extracted from AusHydro Version 1.7.2 as supplied by Geoscience Australia (GA). The GA supplied data products were integrated into the Geofabric Maintenance Geodatabase using a series of scripted procedures that created additional features and unique IDs – HydroIDs – that are created during the data post-processing load procedures carried out by the Bureau. The data product is delivered as a series of related feature classes as an ESRI File Geodatabase.

This product is intended for cartographic map production at a variety of scales. Specifically, the product is intended for production of maps to present hydrological features within a defined area that are used in hydrological modelling and analysis.

Phenomena represented in the product were captured at a variety of spatial scales ranging from 1:250,000 to 1:50,000. They should only be relied upon at the lowest common scale (1:250,000). The product is intended for map production at scales smaller than or equal to 1:250,000.

The data product extent is Geographic Australia (as defined by *Acts Interpretation Act 1901*).

## 2 Specification scope

### 2.1 Scope identification

Global

### 2.2 Level

Dataset

### 2.3 Level name

Global scope

### 2.4 Level description

This is the default root level global scope used by this data product and relates to all data within the product.

### 2.5 Extent

#### 2.5.1 Description

Data for this scope relates to Australia, excluding external territories - Geographic Australia (as defined by *Acts Interpretation Act 1901*).

#### 2.5.2 Geographic extent

##### West bound longitude

112.8 °

##### East bound longitude

154.1 °

##### South bound latitude

-44.0 °

##### North bound latitude

-8.9 °

### 2.5.3 Temporal extent

**Start date**

1992-01-01

**End date**

Now

### **3 Data product identification**

#### **3.1 Title**

Geofabric Surface Cartography

#### **3.2 Alternate title**

Geofabric Surface Hydrology Cartography 1:250,000 scale 2011

#### **3.3 Product ID**

ANZCW0503900103

#### **3.4 Abstract**

The Geofabric Surface Cartography product provides a set of related feature classes to be used as the basis for the production of consistent hydrological cartographic maps. This product contains a geometric representation of the (major) surface water features of Australia (excluding external Territories). Primarily, these are natural surface hydrology features, but the product also contains some man-made features (notably reservoirs, canals and other hydrographic features).

The product is fully topologically correct which means that all the stream segments flow in the correct direction.

This product contains fifteen feature types including: Waterbody, Mapped Stream, Mapped Node, Mapped Connectivity (Upstream), Mapped Connectivity (Downstream), Sea, Estuary, Dam, Structure, Canal Line, Water Pipeline, Terrain Break Line, Hydro Point, Hydro Line and Hydro Area.

#### **3.5 Purpose**

This product contains a geometric representation of the (major) surface water features of geographic Australia excluding external territories. It is intended to be used as the basis for the production of consistent hydrological cartographic map products, as well as the visualisation of surface hydrology within a GIS to support the selection of features for inclusion in cartographic map production.

This product can also be used for stream tracing operations both upstream and downstream however, as this is a mapped representation, streams may be represented as interrupted or intermittent features. In contrast, the Geofabric Surface Network product represents the same stream as a continuous connected feature, that is, the path that stream would take (according to the terrain model), if sufficient water were available for flow. Therefore, for stream tracing operations where full stream connectivity is required, the Geofabric Surface Network product should be used.

## Australian Hydrological Geospatial Fabric (Geofabric) Data Product Specification - Surface Cartography

### 3.5.1 Use case

Cartographic map production, surface hydrologic analyses, visualisation and stream tracing operations.

### 3.6 Topic category

007 - environment

012 – inland water

013 - location

017 - structure

### 3.7 Spatial representation

vector

### 3.8 Spatial resolution

#### 3.8.1 Spatial denominator

250,000

#### 3.8.2 Resolution distance

250 metres

### 3.9 Geographic bounding box

#### 3.9.1 West bound longitude

112.8 °

#### 3.9.2 East bound longitude

154.1 °

#### 3.9.3 South bound latitude

-44 °

#### 3.9.4 North bound latitude

-8.9 °

### **3.10 Geographic identifier**

#### **3.10.1 Identifier authority**

ANZLIC – the Spatial Information Council

#### **3.10.2 Identifier code**

AUS

#### **3.10.3 Code space (register URL)**

ANZLIC Australia

<http://asdd.ga.gov.au/asdd/profileinfo/anzlic-allgens.xml>

### **3.11 Reference to specification scope**

Global

## 4 Data content and structure

### 4.1 Description

The product consists of the following components which combine to give a complete data product:

#### Vector data

The data is available as an ESRI File Geodatabase: Geofabric Surface Cartography. The ESRI File Geodatabase reflects the stored environment of the data in a spatial database engine (SDE) export format. In its native File Geodatabase format, Geofabric Surface Cartography consists of a single feature dataset/theme – SH\_Cartography – containing 15 feature classes. The geodatabase structure provides greater efficiencies in the management and revision of source topographic data which are now reflected in a more sophisticated data product suitable for a range of hydrological applications.

#### Geofabric Product Guide

This Geofabric Product Guide describes the Geofabric Surface Cartography, particularly the geodatabase format, with the aim of describing:

- important and common geospatial data characteristics
- geodatabase components and data concepts
- hierarchy of feature structure and attributes
- accuracy of the data.

#### Licence agreement Creative Commons

The licence agreement details the conditions of use for the data including any referencing requirements.

## 4.2 Feature information

### 4.2.1 Application schema

Refer to Geofabric Surface Cartography – Geodatabase Product Schema V2.0 2011 available from [www.bom.gov.au/water/geofabric/documentation.shtml](http://www.bom.gov.au/water/geofabric/documentation.shtml)

### 4.2.2 Feature catalogue

The following table lists the feature classes, their geometry and AHGF feature type number for Geofabric Surface Cartography.

**Table 1 - Product Feature Type Registry for Geofabric Surface Cartography**

<b>SH_Cartography - Feature Class/TableName.Subtype(Type)</b>	<b>Feature Class Geometry</b>	<b>AHGF Feature Type Number</b>
AHGFMappedStream.MappedFlowSegment	line	11
AHGFMappedStream.MappedArtificialSegment	line	12
AHGFMappedStream.MappedWaterAreaSegment	line	13
AHGFMappedNode.MappedJunctionNode	points	14
AHGFMappedNode.MappedTerminusNode	points	15
AHGFMappedNode.MappedArtificialNode	points	16
AHGFMappedNode.MappedWaterAreaNode	points	17
AHGFMappedNode.MappedGhostNode	points	18
AHGFMappedNode.MappedHeadNode	points	19
AHGFMappedNode.MappedCliffNode	points	20
AHGFWaterbody.Reservoir	polygon	25
AHGFWaterbody.Lake	polygon	26
AHGFWaterbody.Swamp	polygon	27
AHGFTerrainBreakline	line	28
AHGFPipeline	line	29
AHGFCanalLine	line	30
AHGFDam	points	31
AHGFSea	polygon	32
AHGFStructure.Lock	points	33
AHGFStructure.Waterfall	points	34
AHGFStructure.Bridge	points	35
AHGFStructure.Ford	points	36
AHGFHydroPoint.Spring	points	37
AHGFHydroPoint.GnammaHole	points	38
AHGFHydroPoint.NativeWell	points	39
AHGFHydroPoint.Pool	points	40
AHGFHydroPoint.Rockhole	points	41
AHGFHydroPoint.Soak	points	42
AHGFHydroPoint.WaterTank	points	43

## Australian Hydrological Geospatial Fabric (Geofabric) Data Product Specification - Surface Cartography

AHGFHydroPoint.Bay	points	44
AHGFHydroPoint.Waterhole	points	45
AHGFHydroLine.RapidLine	line	46
AHGFHydroLine.Spillway	line	47
AHGFHydroLine.DamWall	line	48
AHGFHydroLine.CliffLine	line	49
AHGFHydroLine.Levee	lines	50
AHGFHydroLine.Shoreline	line	51
AHGFHydroLine.ShorelineJunction	line	52
AHGFHydroLine.Tunnel	line	53
AHGFHydroArea.WatercourseArea	polygon	54
AHGFHydroArea.CanalArea	polygon	55
AHGFHydroArea.Flat	polygon	56
AHGFHydroArea.PondageArea	polygon	57
AHGFHydroArea.RapidArea	polygon	58
AHGFHydroArea.ForeshoreFlat	polygon	59
AHGFMappedStream_FS	na	table
MappedConnectivityUp	na	table
MappedConnectivityDown	na	table
AHGFEstuary	polygon	72

Highlighted text indicates a Bureau created feature.

### 4.3 Reference to specification scope

Global

## **5 Reference systems**

### **5.1 Spatial reference system**

#### **5.1.1 Name**

GDA94

#### **5.1.2 Code**

4283

#### **5.1.3 Code space**

EPSG\_v65

### **5.2 Temporal reference system**

Gregorian calendar

### **5.3 Vertical reference system**

Not applicable

### **5.4 Reference system scope**

Global

## 6 Data quality

### 6.1 Data quality scope

#### 6.1.1 Scope code

Dataset

#### 6.1.2 Extent

Australia (excluding external Territories)

#### 6.1.3 Scope description

The data quality metadata relates to the entire dataset comprising this data product.

### 6.2 Data quality lineage

#### 6.2.1 Lineage statement

##### Data sources

The source data input for the Geofabric Surface Cartography product is the AusHydro V1.7.2 (AusHydro) surface hydrology dataset. The AusHydro database provides a seamless surface hydrology layer for Australia at a nominal scale of 1:250,000. It consists of lines, points and polygons representing natural and man-made features such as watercourses, lakes, dams and other water bodies. The natural watercourse layer consists of a linear network with a consistent topology of links and nodes that provide directional flow paths through the network for hydrological analysis.

This network was used to produce the GEODATA 9 Second Digital Elevation Model (DEM-9S) Version 3 of Australia ([www.ga.gov.au/products/servlet/controller?event=GEOCAT\\_DETAILS&catno=66006](http://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=66006)).

Geofabric Surface Cartography is an amalgamation of two primary datasets. The first is the hydrographic component of the GEODATA TOPO 250K Series 3 (GEODATA 3) product released by GA in 2006. The GEODATA 3 dataset contains the following hydrographic features: canal lines, locks, rapid lines, spillways, waterfall points, bores, canal areas, flats, lakes, pondage areas, rapid areas, reservoirs, springs, watercourse areas, waterholes, water points, marine hazard areas, marine hazard points and foreshore flats.

It also provides information on naming, hierarchy and perenniality. The dataset contains cultural and transport features that may intersect with hydrographic features. These include: railway tunnels, rail crossings, railway bridges, road tunnels, road bridges, road crossings and water pipelines.

## Australian Hydrological Geospatial Fabric (Geofabric) Data Product Specification - Surface Cartography

Refer to the GEODATA 3 User Guide [www.ga.gov.au/meta/ANZCW0703008969.html](http://www.ga.gov.au/meta/ANZCW0703008969.html) for additional information.

The second primary dataset is based on the GEODATA TOPO-250K Series 1 (GEODATA 1) watercourse lines completed by GA in 1994, which was supplemented by additional line work captured by ANU during the production of the DEM-9S to improve the representation of surface water flow. This natural watercourse dataset consists of directional flow paths and provides a direct link to the flow paths derived from the DEM. There are approximately 700,000 more line segments in this version of the data.

AusHydro uses the natural watercourse geometry from ANU enhanced GEODATA 1 data, and the attributes (names, perenniality and hierarchy) associated with GEODATA 3 to produce a fully attributed dataset with topologically correct flow paths. The attributes from GEODATA 3 were attached using spatial queries to identify common features between the two datasets. Additional semi-automated and manual editing was undertaken to ensure consistent attribution along the entire network.

AusHydro dataset includes a unique identifier for each line, point and polygon. AusHydro-ID will be used to maintain the dataset and to incorporate higher resolution datasets in the future. The AusHydro-ID will be linked to the ANUDEM streams through a common segment identifier and ultimately to a set of National Catchments Boundaries (NCB).

### Processing steps:

1. AusHydro Surface Hydrology dataset is received and loaded into the Geofabric development GIS environment.
2. Feature classes from AusHydro are recomposed into composited Geofabric hydrography dataset feature classes in the Geofabric Maintenance Geodatabase.
3. Re-composited feature classes in the Geofabric Maintenance Geodatabase Hydrography Dataset are assigned unique Hydro-IDs using ESRI ArcHydro for Surface Water (ArcHydro: 1.4.0.180 and ApFramework: 3.1.0.84).
4. Feature classes from the Geofabric Maintenance Geodatabase hydrography dataset are extracted and reassigned to the Geofabric Surface Cartography Feature Dataset within the Geofabric Surface Cartography Geodatabase.

A complete set of data mappings, from input source data to Geofabric Products, is included in the Geofabric Product Guide, Appendices, which is available at [www.bom.gov.au/water/geofabric/documentation.shtml](http://www.bom.gov.au/water/geofabric/documentation.shtml)

## 6.3 Quality scope

Global

## 7 Data capture

### 7.1 Data capture statement

This is primarily a derived data product from AusHydro: however, specific features were created by the Bureau during the data-loading process. Refer to the AusHydro data lineage in the Geofabric Product Guide for information about data capture and processing of source data used to create this product.

The Geofabric Product Guide is available at  
[www.bom.gov.au/water/geofabric/documentation.shtml](http://www.bom.gov.au/water/geofabric/documentation.shtml)

The following features are created during the data-loading process into the Geofabric Maintenance Geodatabase:

- AHGFMappedNodes
- AHGFMappedSegment\_FS
- AHGFEstuary
- AHGFMappedConnectivityUp
- AHGFMappedConnectivityDown.

### 7.2 Data capture scope

Global

## **8 Data maintenance**

### **8.1 Maintenance and update frequency**

Irregular

### **8.2 Other maintenance information**

The product will be updated periodically, as deemed necessary, to reflect changed attribution and new data sources.

### **8.3 Maintenance scope**

Global

## **9 Portrayal information**

### **9.1 Portrayal information**

Not applicable.

### **9.2 Portrayal scope**

Global

## 10 Data Product Delivery

### 10.1 Delivery format

#### 10.1.1 Format name

ESRI ArcGIS File Geodatabase

#### 10.1.2 Format version

ArcGIS v9.3

#### 10.1.3 Language used within the dataset

English

#### 10.1.4 Character set coding

Utf8

### 10.2 Delivery medium

#### 10.2.1 Units of delivery

National dataset

#### 10.2.2 Estimated size of a unit in the specified format

SH\_Cartography.gdb = 1.2 GB

#### 10.2.3 Medium name

onLine

#### 10.2.4 Online delivery URL

<http://www.bom.gov.au/water/geofabric/download.shtml>

### 10.3 Other delivery information

Also supplied as ESRI Shapefiles (requires written request to [ahgf@bom.gov.au](mailto:ahgf@bom.gov.au))

ESRI File Geodatabase and ESRI Shapefiles are also available on DVD from the Bureau.

#### **10.4 Delivery scope**

Global

## 11 Additional information

### 11.1 Additional information

#### Licensing and access constraints

Licensed for use under [Creative Commons Australia Attribution.](#)

We request attribution as © Commonwealth of Australia (Bureau of Meteorology) 2011.

#### Special features of the supplied data product or its component parts

Spatial data in the ESRI File Geodatabase, Geofabric Product Guide, and Geofabric Data Product Specifications

#### Limitation or constraints on product use

As per [Creative Commons Australia Attribution licence.](#)

#### Layer files or queries that operate on the data product

Geofabric\_Surface\_Cartography.lyr

#### Related data products

- Geofabric Surface Network
- Geofabric Surface Catchments
- Geofabric Groundwater Cartography
- Geofabric Hydrology Reporting Catchments
- Geofabric Hydrology Reporting Regions

### 11.2 Additional information scope

Global

## 12 Metadata

### Metadata format requirements

Metadata compliant with ANZLIC Metadata Profile Version 1.1 of AS/NZS ISO 19115 was produced for this data product. The metadata profile is available at dataset level. Feature level metadata is provided within the ArcGIS ArcCatalog's FGDC Stylesheet for all feature types included within this product and describes the lineage of features.

### Metadata encoding requirements

ArcGIS FGDC and ANZLIC compliant feature Metadata.

### References to Metadata for data product and component parts

An ISO 19115 compliant XML file of the Geofabric Surface Cartography metadata statement accompanies the Product (SH\_Cartography.xml), and is viewable using either the ArcGIS ISO 19139 ArcCatalog metadata style sheet or the ANZMet Lite version 1.0 metadata creation tool available from:

[www.osdm.gov.au/Metadata/ANZLIC+metadata+resources/ANZMet+Toolkit+%28final+draft+-+07.2009%29/default.aspx](http://www.osdm.gov.au/Metadata/ANZLIC+metadata+resources/ANZMet+Toolkit+%28final+draft+-+07.2009%29/default.aspx)

Through the *Water Act 2007*, the Australian Government has given the Bureau of Meteorology responsibility for compiling and delivering comprehensive water information across Australia.

**For more information**

Visit our website at [www.bom.gov.au/water](http://www.bom.gov.au/water)

Send an email request to [waterinfo@bom.gov.au](mailto:waterinfo@bom.gov.au)



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