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National Aquifer Framework

Data Product Specification

April 2024



Australian Government
Geoscience Australia

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Revision history

Date	Version	Description
May 2023	V1.0	Created and drafted document
Feb~Apr 2024	V2.0	Updated Data Product Specification following NAF December 2023 update (version 5.0)



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Disclaimer

Please note the [Disclaimer](#) statement relating to use of the material.

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1. Overview

1.1. Data product specification title

National Aquifer Framework

1.2. Reference date

2023-12

1.3. Responsible party

Contact organisation: Bureau of Meteorology

Contact position: Water Information Manager

Mail address: GPO Box 1289

Locality: Melbourne

State: VIC

Country: Australia

Postcode: 3001

Electronic mail address: water@bom.gov.au (for general queries)
gw_cat3_5_7@bom.gov.au (for NAF specific queries)

1.4. Terms and definitions

National Aquifer Framework Dictionary

Terms	Definitions
Aquifer	An underground layer of saturated rock, sand or gravel that absorbs water and allows it to pass freely through pore spaces.
Aquitard	A geological formation that may contain groundwater but is not capable of transmitting significant quantities of it under normal hydraulic gradients. May function as a confining bed.
Geologic unit (GU)	One of the tiers (Tier 1) in the National Aquifer Framework. Smallest mapped or defined geological entity consistent at a national scale.
Hydrogeologic complex (HGC)	One of the tiers (Tier 3) in the National Aquifer Framework. Aggregation and classification of hydrogeologic units according to their age, depositional environment, rock type and whether they behave as an aquifer or aquitard.



Hydrogeologic unit (HGU)	One of the tiers (Tier 2) in the National Aquifer Framework. One or more geologic units which have similar hydrogeological characteristics and behaviour.
National Aquifer Framework (NAF)	A foundational national dataset developed by the Bureau and jurisdictions for naming and grouping hydrogeological units across Australia.

1.5. Abbreviations and acronyms

National Aquifer Framework Abbreviations and Acronyms

Abbreviations / Acronyms	Definitions
ANZLIC	Australian and New Zealand Land Information Council
ASUD	Australian Stratigraphic Units Database
Bureau	Australian Government Bureau of Meteorology
CC	Creative Commons
WaterNSW	WaterNSW, NSW
GA	Geoscience Australia
GAB	Great Artesian Basin
GU	Geological Unit
HGC	Hydrogeologic Complex
HGU	Hydrogeologic Unit
NAF	National Aquifer Framework
NGIS	National Groundwater Information System

1.6. Informal description of data product

The National Aquifer Framework (NAF) is a nationally agreed common language and terminology for hydrogeologic units. It is a Bureau of Meteorology initiative which allows for consistent national reporting and analysis of groundwater and aquifer data. The NAF is a framework that aggregates state-level information on geologic units (GUs), hydrogeologic units (HGUs), and hydrogeologic complexes (HGCs) to the equivalent national terminology. The framework is designed to enable the user to analyse groundwater information at scales from local, to regional, and to national. Refer to the [NAF information sheet](#) for further information.



1.7. Level description

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

1.8. Extent Description

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

2. Data product identification

2.1. Abstract

The NAF is a three-tiered system for nationally consistent terminology for identifying and grouping hydrogeologic units in Australia. It consists of:

- Tier 1 – GUs, the most detailed level of units. GUs are the smallest mapped or defined geological entity consistent at a national scale. There are 7,146 GUs in the NAF.
- Tier 2 – HGUs are one or more NAF geological units which have similar hydrogeological characteristics and behaviour. For example, different units of similar lithology and/or provenance in similar geographic areas would be lumped together to form a single HGU. HGUs consist of aggregated Tier 1 units. There are 1,024 HGUs in the NAF.
- Tier 3 – HGCs are One or more HGUs which can be conceptualised as being part of the same aquifer/ aquitard. The intention is not for a single HGC to be hydraulically uniform, but rather to possess similar overarching hydrogeological characteristics and behaviours, and to be conceptualised and/or managed as a unified aquifer or aquitard. HGCs consist of aggregated Tier 2 units. There are 54 HGCs in the NAF.

The naming convention for HGCs is as follows:

<Age> <Rock type> (Aquifer | Aquitard) (Depositional environment)

e.g. Cretaceous Sediments, Jurassic Limestone Aquifer

Where:

<> = Mandatory

() = Optional

<Age> = most appropriate geological age e.g. Tertiary, Mesozoic, Jurassic

<Rock type> = e.g. Sediments, Volcanics, Limestone

(Depositional environment) = e.g. Marine, Alluvial

There is a one to one, or a many to one relationship between the Tier 1 and Tier 2 units and between the Tier 2 and Tier 3 units. There is a one to one, or a many to one relationship between the national and State/Territory aquifer frameworks, where the NAF allows translation between the two.

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The Tier 2 and/or Tier 3 units include units which are currently being used or will be used by the Bureau for the National Water Account, water reporting and the NGIS.

2.2. Purpose

The NAF can be used to standardise State/Territory hydrostratigraphy terminology. This allows for consistency in multi-jurisdictional groundwater assessments. The NAF can also be used to generalise hydrostratigraphy for broad scale analysis.

The objective of the NAF is to allow consistent national reporting and analysis of groundwater and aquifer data, including the Bureau's National Water Account and water reporting. The NAF is also used within the NGIS so that a single consistent dataset is created that eliminates cross-border differences in aquifer definition and nomenclature.

2.3. Topic category

Geoscientific Information, inland waters

2.4. Geographic identifier

2.4.1. Identifier authority

ANZLIC – the Spatial Information Council

2.4.2. Identifier code

AUS

2.4.3. Code space (register URL)

ANZLIC Australia

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

3. Data content and structure

The NAF is available as an Excel spreadsheet. The spreadsheet contains the following worksheets:

- Full NAF
- NAF HGUs
- NAF HGCs
- State & Territory HGUs to NAF
- Release notes

Full NAF

The Full NAF worksheet contains a full listing of the NAF including:

- GUs (highlighted in red)
- HGUs (yellow)



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- HGCs (blue)

Each unit is defined by a name and a unique number. There is additional information for the GUs including:

- "Naf1MMapSymbol", "Naf1MPlotSymbol": GU symbol from 1:1 million scale surface geology mapping
- "Naf250kSymbol (Tas only)": GU symbol from 1:250K scale surface geology mapping (for Tasmanian units only)
- "ASUD_Strat_No.": Stratigraphic unit number
- "Naf1MSurfaceGeol": Whether the unit is included in 1:1 million scale surface geology mapping
- Stratigraphic hierarchy, age and other information for 1:1 million scale units
- "ASUD_URL": URL to ASUD units
- "Groundwater Province/s": Groundwater province derived from Geoscience Australia Province database and linked to the National Hydrogeological Inventory (Lewis et al, 2023; <https://portal.ga.gov.au/persona/groundwater>)

The description of NAF fields in the spreadsheet is contained in Appendix A. The field names in this spreadsheet are consistent with the equivalent fields in the National Groundwater Information System (NGIS).

The Full NAF worksheet also contains State/Territory HGU and HGC names corresponding to the NAF GUs. Note that the same GUs can occur in two or more Jurisdictions with a common NAF HGU and HGC name.

NAF HGUs

The NAF HGUs worksheet contains a list of the unique NAF HGU names and numbers, and their corresponding NAF HGC names and numbers.

NAF HGCs

Similarly, the NAF HGCs worksheet contains a list of the unique NAF HGC names and numbers.

Release Notes

The "Release_Notes" worksheet lists each release of the NAF and summarises the changes that occurred in each release.

4. Data quality

4.1. Data quality scope

Australia (excluding external Territories)



4.2. Data quality lineage

4.2.1. Lineage statement

The NAF was created in several phases:

- Initial NAF development (2011-2016, version 1.0): Sinclair Knight Merz and the Bureau developed the framework by first collating and reviewing existing hydrogeologic unit information from States and Territories, GA and other information such as the GAB Water Resources Assessment. Extensive consultation was then undertaken, including stakeholder workshops in each jurisdiction. The resulting draft framework was reviewed extensively by the Bureau, GA and lead water agencies in each jurisdiction before the framework's release. The NAF v 1.0 was released in 2016.
- Bureau ad hoc update (Aug-Oct 2019, version 2.0): information on geological provinces were added to the NAF database, along with the mapping of all the HGUs to their respective state/territory equivalents.
- Bureau ad hoc update (Nov 2019-Oct 2022, version 3.0): corrections were made for several fields and across all jurisdictions. The columns AquiferName and AquiferType were added.
- Bureau-Geoscience Australia collaboration (Nov 2022-Feb 2023, version 4.0): as part of the Australian Government funded Exploring for the Future Program, GA is delivering the National Groundwater Systems (NGS) Project. In this update, GUs and all their associated fields were reviewed and updated to remove duplicates, corrections applied based on ASUD, and to add the hyperlinks to the units in ASUD. This version was released in May 2023.
- Bureau-Geoscience Australia collaboration (Feb-Dec 2023, version 5.0): it's also part of Geoscience Australia led Exploring for the Future initiative. This update incorporates the latest state and territory classifications, a review of the Bureau's NGIS tables and the Groundwater Data Quality application. It also includes recent updates to the hydrogeological framework for the Great Artesian Basin undertaken by Geoscience Australia in partnership with states and territories. The need to maintain links to the legacy nomenclature to conform with operational requirements in each jurisdiction was also recognised by keeping the previous nomenclature and linking it to the updated one as defined in ASUD.

4.2.2. Data sources

The data sources for the NAF are:

- 1:1 million scale surface geology mapping
- Australian Stratigraphic Units Database (ASUD)
- State and Territory aquifer frameworks.

5. Data capture statement

Data was manually or automatically (Python scripting) extracted from the data sources listed in Section 4.2.2.



6. Data maintenance and update frequency

The NAF is updated on an *ad hoc* basis.

7. Data product delivery

7.1. Delivery format

Microsoft Excel, Microsoft Office 365, English, UTF8


7.2. Delivery medium

Estimated size of a unit in the specified format: 9.3 MB

Direct web download from [Downloads: National Aquifer Framework: Water Information: Bureau of Meteorology \(bom.gov.au\)](https://www.bom.gov.au/downloads/national-aquifer-framework/water-information/)

8. Additional information

The NAF is covered by the Creative Commons (CC) Attribution license. Click on the CC-BY logo below to obtain the terms of that licence, and include the specified attribution when using the NAF:

Data custodian	License	Attribution
Bureau of Meteorology		© Bureau of Meteorology

9. Metadata

Not available for this release.

10. References

SKM (2012) National Aquifer Framework Version 1.0

ftp://ftp.bom.gov.au/anon/home/water/naf/NAF_draft_methods_report.pdf

Bureau of Meteorology (2016) National Aquifer Framework User Guide

ftp://ftp.bom.gov.au/anon/home/water/naf/NAF_user_guide.pdf

Lewis, S. 2023. National Hydrogeological Inventory. Record 31st July 2023. Geoscience Australia, Canberra. <https://dx.doi.org/10.26186/148884>



Appendix A – Description of fields in NAF spreadsheet

Table 1 - Description of NAF GU fields in the NAF spreadsheet

Field Name	Mandatory	Data Type	Description
ID	Yes	integer	
Naf_GU_Name	Yes	text	Name of Geological Unit (e.g. Formation name)
ASUD_Strat_No.	No	integer	Stratigraphic number in the Australian Stratigraphic Units Database (managed by Geosciences Australia)
ASUD_URL	No	text	Australian Stratigraphic Units Database, Geoscience Australia (ga.gov.au)
Superseded ASUD Strat Name	No	text	Superseded stratigraphic name (in reference to Geoscience Australia's Australian Stratigraphic Units Database)
Superseded ASUD Strat No.	No	integer	Superseded stratigraphic number (in reference to Geoscience Australia's Australian Stratigraphic Units Database)
Naf1MMapSymbol, Naf1MPlotSymbol	No	text	Map and plot symbol used in the Geoscience Australia 1:1 million scale surface geology dataset
Naf250kSymbol (Tas only)	No	text	Map symbol used in Tasmania's 1:250,000 scale surface geology dataset. Only valid for Tasmanian units.
Naf1MSurfaceGeol	Yes	Yes/No	Whether the unit appears on the Geoscience Australia 1:1 million scale surface geology dataset
State/Territory	Yes	text	State(s) and/or territory(ies) where the unit occurs
Geological Province/s	No	text	Geological Province name sourced from the State/Territory aquifer frameworks
Groundwater Province/s	No	text	National Hydrogeological Inventory, Geoscience Australia (ga.gov.au)
SUPERGROUP*, GROUPNAME*, SUBGROUP*, FORMATION*, MEMBER, BED, SUPERSUITE, SUITE, STATUS, USAGE_, MIN_GEOAGE_ASUD, MAX_GEOAGE_ASUD, MIN_GEOAGE / TOPMINAGENAME, MAX_GEOAGE / BASEMAXAGENAME, TIME_SCALE, MIN_NUMAGE, MINAGEMETH, MAX_NUMAGE, MAXAGEMETH, FORM_TYPE, LITHGROUP1, LITHGROUP2, LITH_DESC*, SRC_DATA, CAPT_SCALE, CAPT_DATE, MOD_DATE, INT_METHOD, CONFIDENCE, LOC_QUAL, LOC_ACC	No	Text; integer	Refer to Surface Geology of Australia data package for metadata for these fields: https://ecat.ga.gov.au/geonetwork/srv/eng/catalog.search#/metadata/74855 *These fields when defined for a Tasmanian unit have metadata from Mineral Resources Tasmania: http://www.mrt.tas.gov.au/portal/page?_pageid=35,832323&_dad=portal&_schema=PORTAL



Table 2 - Description of NAF HGU fields in the NAF spreadsheet

Field Name	Mandatory	Data Type	Description
NafHGUNumber	Yes	integer	National Aquifer Framework Hydrogeological Unit Number
NafHGUName	Yes	text	National Aquifer Framework Hydrogeological Unit Name

Table 3 - Description of NAF HGC fields in the NAF spreadsheet

Field Name	Mandatory	Data Type	Description
NafHGCNumber	Yes	integer	National Aquifer Framework Hydrogeological Complex Number
NafHGCName	Yes	text	National Aquifer Framework Hydrogeological Complex Name

Table 4 - Description of State/Territory HGU fields in the NAF spreadsheet

Field Name	Mandatory	Data Type	Description
HGUNumber	Yes	integer	State/Territory Hydrogeological Unit Number
HGUName	Yes	text	State/Territory Hydrogeological Unit Name
HGUCode	No	text	State/Territory Hydrogeological Unit Code

Table 5 - Description of State/Territory HGC fields in the NAF spreadsheet

Field Name	Mandatory	Data Type	Description
HGCNumber	No	integer	State/Territory Hydrogeological Complex Number
HGCName	Yes	text	State/Territory Hydrogeological Complex Name
HGCCode	No	text	State/Territory Hydrogeological Complex Code