Contents
1. Acknowledgements ........................................................................................................ 4
2. Overview ......................................................................................................................... 4
3. Minimum Requirements ................................................................................................. 4
4. 3D Aquifer Visualisation Tools ....................................................................................... 5
   4.1. 3D Aquifer Visualisation Layout ............................................................................. 5
   4.2. 3D Toolbar .............................................................................................................. 5
   4.3. Layers ..................................................................................................................... 6
   4.4. Cross-Section ......................................................................................................... 7
   4.5. Vertical Exaggeration ............................................................................................... 7
   4.6. Location map ......................................................................................................... 7
   4.7. Legend ..................................................................................................................... 7
   4.8. Help Guide ............................................................................................................. 7
   4.9. 3D Copyright .......................................................................................................... 8
Appendix 1: Legend ............................................................................................................. 9
1. Acknowledgements

The Bureau of Meteorology (the Bureau) would like to acknowledge that the improved 3D aquifer visualisation functionalities were facilitated by the sharing of knowledge from the Department for Environment and Water (DEW) in South Australia. Therefore, this guide is based on the Help Guide 'Simplified Hydro-stratigraphic 3D Groundwater Model Fact Sheet' developed by DEW.

The Bureau would also like to acknowledge the following State and Commonwealth Agencies who provided us with data:

- The Department of Environment, Land, Water and Planning, VIC - Otway Basin and Murray Basin
- WaterNSW, NSW – Murray Basin and Namoi
- Crown Lands & Water Division, Department of Industry, NSW – Murray Basin and Namoi
- Department of Natural Resources, Mines and Energy, QLD – Galilee Basin
- Department of Environment and Natural Resources, NT – Daly Basin
- Department of Water and Environmental Regulation, WA – Gungahlin & Gnowangerup
- Department for Environment and Water, SA – St Vincent Basin and Northern & Yorke NRM Region
- Department of Primary Industries, Parks, Water and Environment, TAS – Ringarooma
- Geoscience Australia – Great Artesian Basin
- Environment, Planning and Sustainable Development Directorate, ACT - ACT

2. Overview

The 3D visualisations are intended to provide users with a convenient and interactive way of visualising the hydrogeology of different regions. The modelled hydrostratigraphic units and accompanying contextual information can be used as a guide of regional conditions and as an educational tool, but the user should note that the visualisation is a simplified representation only.

The Bureau has collaborated with various state agencies to obtain aquifer geometry datasets which were used to develop the 3D visualisations. Whilst some Quality Assurance and Quality Control measures have been undertaken, and some modifications made for visualisation purposes, the Bureau cannot guarantee the accuracy of these datasets.

3. Minimum Requirements

The 3D visualisations are provided in 3D PDF format ensuring easy accessibility. They can be viewed in:

- Adobe Reader 10.0 or later
- Adobe Acrobat 10.0 or later
4. 3D Aquifer Visualisation Tools

4.1. 3D Aquifer Visualisation Layout

4.2. 3D Toolbar

1. **Rotate**: (default) Applies Rotate mode to the pointer in the visualisation view. Drag the pointer in the direction that you want, the visualisation rotates and tilts on the central axis.

2. **Spin**: Applies Spin mode to the pointer in the visualisation view.

3. **Pan**: Applies Pan to the pointer in visualisation view.

4. **Zoom**: Applies Zoom mode to the pointer in visualisation view. In the visualisation view, click and drag the pointer up (zoom in) or down (zoom out).

5. **Fly**: Activates fly over mode. Best used when viewing the visualisation horizontally. Click the visualisation and move the mouse forward to start the ‘fly over’ animation. Release the mouse button to stop.

6. **Camera Properties**: Adjust camera view properties – camera presets, alignment, position target, parameters. Allows the user to input precise camera view angles and positioning.
7. **3D Measure Tool**: Enables you to measure the scene in metres. The point switches to a cross-hair and a red dot appears. On the visualisation, click the starting point, then double-click at the end point.

8. **Add 3D Comment**: Add a comment to a selected location on the visualisation.

9. **Home View**: Return to the default view, i.e. scale and orientation of the visualisation when first opened. Useful for clearing comments or measurements.

10. **View Selection**: Select a view of the visualisation, e.g. top or bottom. If you have used the measure tool, each measurement is added to the selection.

11. **Toggle Model Tree**: Opens the Model Tree panel showing the list of layers that make up the visualisation. Enables you to refine layer selections.

12. **Pause Animation**: Not applicable for these visualisations.

13. **Use Perspective Projection**: Switch between perspective projection (realistic view of the 3D image) and orthographic projection (unrealistic view that enhances 3D image depth. The scale is only true at the centre of the 3D image).

14. **Model Render Mode**: Enables you to apply different renders to the visualisation.

15. **Enable Extra Lighting**: Enables you to apply different light effects to the visualisation.

16. **Background Colour**: Enables you to select a different background colour.

17. **Toggle Cross Section**: Enables you to select cross section properties.

### 4.3. Layers

All map layers can be turned on or off by the user. At any given time you can turn all layers back on using the 'View all layers' button.

**Contextual Layers**

These are surface layers, added to the map to help the user orientate their map and highlight important features that are present in the 3D visualisation region.

- **Water Bodies**: Any water features located at the surface, including rivers, lakes and oceans. The lakes and rivers were derived from the Bureau's Geofabric Surface Cartography Version 2. The ocean layer was created by generating a polygon layer that spans the distance of the coastline to the geovolume extents in instances where they extend offshore.

- **Land Use**: The land use layer was derived from ABARES Land Use of Australia 2010-11 and represents national scale land use as nine broad classes relevant to water use and management in Australia. The legend for this layer can be accessed by selecting the Legend button in the 3D visualisation.

- **Surface Geology**: Depicts broad groupings of Geoscience Australia's 1 million and 2.5 million scale surface geology of Australia. The groupings are based on the age of the geologic unit. The legend for this can be accessed by selecting the Legend button in the 3D visualisation.

- **Towns**: A layer highlighting the location of towns and cities to help the user orientate themselves on the 3D visualisation. The towns layer was derived from Geoscience Australia's topographic mapping product, Geodata Topo Series 3.

- **Bores**: A layer showing the location of bores in the visualisation. This layer has been derived from the National Groundwater Information System (NGIS).

- **Bore Lines**: Shows the sub-surface hydrostratigraphy recorded in the bores. This information has been extracted from the NGIS. The bore lines are symbolised to visualise the construction details e.g. pipe lining and screen interval. The legend for
this can be accessed by selecting the Legend button in the 3D visualisation. In instances where subsurface layers are not shown, the bore lines are symbolised based on hydrostratigraphy that has been standardised using the National Aquifer Framework. To view local hydrogeological terminology for these units please download a copy of the National Aquifer Framework. The legend for bore lines that are symbolized based on hydrostratigraphy can be found within the relevant 3D visualisation.

- **Roads**: A layer showing the location of major roads. The data are sourced from Geoscience Australia's topographic mapping products including 'Geodata Topo 10M 2002, Geodata Topo 5M 2004, Geodata Topo 2.5M 2003, Global Map 1M 2001 and Geodata Topo Series 3.

- **Groundwater Management Areas**: Each State and Territory have groundwater management areas. These areas are identified by lead water agencies in each State and Territory for management and reporting purposes. The areas are a collation of jurisdictional groundwater management areas into a national dataset by the Bureau for use in groundwater products and are symbolised based on the number of overlapping groundwater management areas. The legend for this can be accessed by selecting the Legend button in the 3D visualisation. For more detailed information about the areas visit the Bureau's Groundwater Explorer web portal.

**Hydrostratigraphic Layers**

Each layer represents a hydrostratigraphic unit in sequence from the surface down to the basal layer. The buttons are colour-coded to their corresponding 3D visualisation in the map. Aquifers are shown in shades of blue, with the darkest shades representing fresher aquifers. Limestone aquifers are represented in shades of green and aquitards are shown in shades of brown. Volcanics are shown in shades of red, with Quaternary sediments shown in yellow and the bedrock in grey. For more information on the symbology please select the legend button at the bottom of the 3D visualisation.

4.4. **Cross-Section**

The user can generate cross-sections along the X, Y and Z plane. Simply select the cutting plane you wish to visualise and a cutting plane will be generated through the middle of the scene. Use the << and >> symbols to move the cutting plane to the area of interest. To remove the cross-section, select the 'Clear Cross Section' button.

4.5. **Vertical Exaggeration**

The user can adjust the Vertical Exaggeration of the 3D Visualisation. This can be done by toggling between the different buttons to enhance or decrease the level of Vertical Exaggeration by a pre-set ratio.

4.6. **Location map**

The location map provides information on where the visualisation is located in a regional context.

4.7. **Legend**

Provides an overview of all the symbology of the contextual and hydrostratigraphic layers shown in the 3D visualisation. This can be accessed by selecting the 'Legend' button at the base of the 3D visualisation.

4.8. **Help Guide**

The user guide, which is this document, provides an overview of how to use the features in the 3D visualisation. This document can be accessed by selecting the 'Help Guide' at the
bottom of the 3D visualisation.

4.9. 3D Copyright

Most 3D visualisations are licensed under the Creative Commons Attribution 4.0 International License. To view specific visualisation licence attributions for each region please visit our copyright page.

To view a copy of the Creative Commons license, visit https://creativecommons.org/licenses/by/4.0/.
Appendix 1: Legend

**Contextual Layers**

**Surface Features**
- Bores
- Bores (ACT and NT)
- Roads
- Rivers
- Lakes
- Ocean

**Groundwater Management Areas**
- 1 Area Present
- 2 Areas Present
- 3 or more Areas Present

**Land Use**
- Conservation and natural environment
- Dryland agriculture
- Forestry
- Grazing
- Irrigated agriculture
- Mining
- Other intensive uses
- Urban
- Water

**Bore Lines**
- Screened Interval
- Unscreened Interval

**Surface Geology**
- Quaternary
- Cainozoic
- Mesozoic
- Cretaceous
- Jurassic
- Triassic
- Permian
- Carboniferous
- Devonian
- Silurian
- Ordovician
- Cambrian
- Proterozoic
- Archean
### Hydrostratigraphic Layers

#### Aquifers
- Aquifer 1
- Aquifer 2
- Aquifer 3
- Aquifer 4
- Aquifer 5
- Aquifer 6

#### Aquitards
- Aquitard 1
- Aquitard 2
- Aquitard 3
- Aquitard 4
- Aquitard 5

#### Other
- Quaternary / Surficial Sediment
- Limestone Aquifer 1
- Limestone Aquifer 2
- Volcanics 1
- Volcanics 2
- Coal
- Bedrock