



Australian Government



BIOREGIONAL  
ASSESSMENTS

PROVIDING SCIENTIFIC WATER RESOURCE  
INFORMATION ASSOCIATED WITH COAL  
SEAM GAS AND LARGE COAL MINES

# Product standards for bioregional assessments

2018



A scientific collaboration between the Department of the Environment and Energy,  
Bureau of Meteorology, CSIRO and Geoscience Australia

## The Bioregional Assessment Programme

The Bioregional Assessment Programme is a transparent and accessible programme of baseline assessments that increase the available science for decision making associated with coal seam gas and large coal mines. A bioregional assessment is a scientific analysis of the ecology, hydrology, geology and hydrogeology of a bioregion with explicit assessment of the potential impacts of coal seam gas and large coal mining development on water resources. This Programme draws on the best available scientific information and knowledge from many sources, including government, industry and regional communities, to produce bioregional assessments that are independent, scientifically robust, and relevant and meaningful at a regional scale.

The Programme is funded by the Australian Government Department of the Environment and Energy. The Department of the Environment and Energy, Bureau of Meteorology, CSIRO and Geoscience Australia are collaborating to undertake bioregional assessments. For more information, visit <http://www.bioregionalassessments.gov.au>.

## Department of the Environment and Energy

The Australian Government Department of the Environment and Energy is strengthening the regulation of coal seam gas and large coal mining development by ensuring that future decisions are informed by substantially improved science and independent expert advice about the potential water-related impacts of those developments. For more information, visit <https://www.environment.gov.au/water/coal-and-coal-seam-gas/office-of-water-science>.

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## CSIRO

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## Cover photograph

Gwydir River near Bingara, NSW, 2008

Credit: Neil Foster, NSW Department of Water and Energy



Australian Government  
Department of the Environment and Energy  
Bureau of Meteorology  
Geoscience Australia



# Executive summary

The Australian Government, through the Department of the Environment and Energy, has undertaken a series of bioregional assessments (BAs) looking at the impacts of coal seam gas (CSG) and large coal mining development on water resources.

The Bioregional Assessment Programme is a collaboration between the Department of the Environment and Energy, Bureau of Meteorology, CSIRO and Geoscience Australia. This document summarises the standards that guided all technical products delivered by the Programme. These general style choices were agreed as of 12 August 2015. This document does not record all details of subsequent language and mapping decisions.

This document brings together:

- language standards (developed by editors in conjunction with authors, Project Leaders and Discipline Leaders)
- chart standards (developed by graphic designers and Products team)
- mapping standards (developed by map-makers)
- Microsoft Word template (developed by graphic designers)
- instructions pertaining to copyright, attribution and dataset citations.

Clarity, brevity, precision and consistency (in that order) are the key to good reporting. This document was used by BA authors to foster consistency across the suite of BA products.

Reading this document cover to cover is not encouraged. It is a reference document that can be used consultatively on an issue-by-issue basis. Many of the hyperlinks contained in this document point to internal document directories that will not be accessible by the public; they are included here to illustrate the processes that were followed by the project team.

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# Introduction

The Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC) was established to provide advice to the federal Minister for the Environment on potential water-related impacts of coal seam gas (CSG) and large coal mining developments (IESC, 2015).

Bioregional assessments (BAs) are one of the key mechanisms to assist the IESC in developing this advice so that it is based on best available science and independent expert knowledge. Importantly, technical products from BAs are also expected to be made available to the public, providing the opportunity for all other interested parties, including government regulators, industry, community and the general public, to draw from a single set of accessible information. A BA is a scientific analysis, providing a baseline level of information on the ecology, hydrology, geology and hydrogeology of a bioregion with explicit assessment of the potential impacts of CSG and coal mining development on water resources.

The IESC has been involved in the development of *Methodology for bioregional assessments of the impacts of coal seam gas and coal mining development on water resources* (the BA methodology; Barrett et al., 2013) and has endorsed it. The BA methodology specifies how BAs should be undertaken. Broadly, a BA comprises five components of activity, as illustrated in Figure 1. Each BA is different, due in part to regional differences, but also in response to the availability of data, information and fit-for-purpose models. Where differences occur, these are recorded, judgments exercised on what can be achieved, and an explicit record is made of the confidence in the scientific advice produced from the BA.

## The Bioregional Assessment Programme

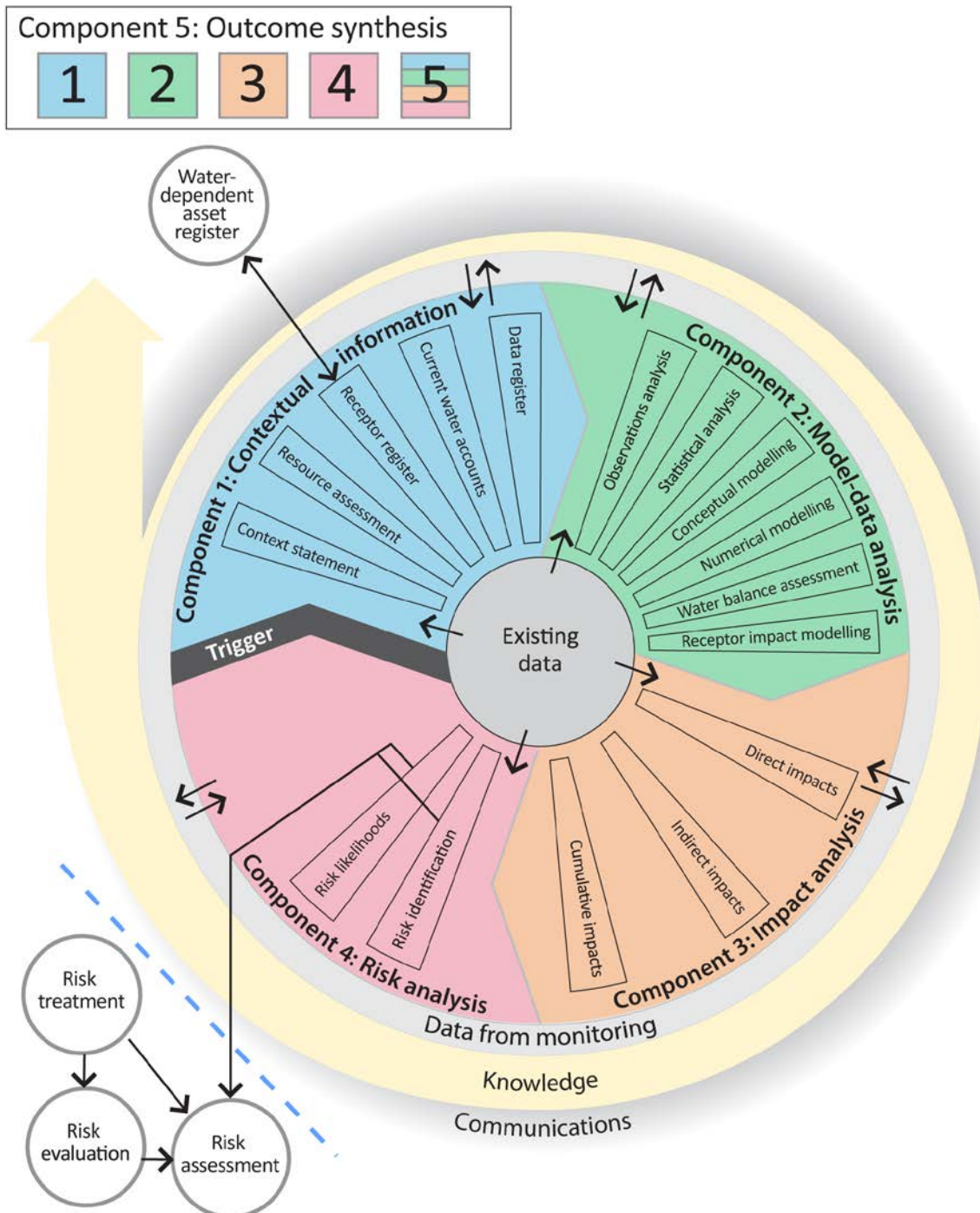
The Bioregional Assessment Programme is a collaboration between the Department of the Environment and Energy, the Bureau of Meteorology, CSIRO and Geoscience Australia. Other technical expertise, such as from state governments or universities, is also drawn on as required. For example, natural resource management groups and catchment management authorities identify assets that the community values by providing the list of water-dependent assets, a key input.

The Technical Programme, part of the Bioregional Assessment Programme, has undertaken BAs for the following bioregions and subregions (see <http://www.bioregionalassessments.gov.au/assessments> for a map and further information):

- the Galilee, Cooper, Pedirka and Arckaringa subregions, within the Lake Eyre Basin bioregion
- the Maranoa-Balonne-Condamine, Gwydir, Namoi and Central West subregions, within the Northern Inland Catchments bioregion
- the Clarence-Moreton bioregion
- the Hunter and Gloucester subregions, within the Northern Sydney Basin bioregion

- the Sydney Basin bioregion
- the Gippsland Basin bioregion.

Technical products (described in a later section) will progressively be delivered throughout the Programme.



**Figure 1 Schematic diagram of the bioregional assessment methodology**

The methodology comprises five components, each delivering information into the bioregional assessment and building on prior components, thereby contributing to the accumulation of scientific knowledge. The small grey circles indicate activities external to the bioregional assessment. Risk identification and risk likelihoods are conducted within a bioregional assessment (as part of Component 4) and may contribute activities undertaken externally, such as risk evaluation, risk assessment and risk treatment. Source: Figure 1 in Barrett et al. (2013), © Commonwealth of Australia



## Methodologies

The overall scientific and intellectual basis of the BAs is provided in the BA methodology (Barrett et al., 2013). Additional guidance is required, however, about how to apply the BA methodology to a range of subregions and bioregions. To this end, the teams undertaking the BAs have developed and documented detailed scientific submethodologies (Table 1), in the first instance, to support the consistency of their work across the BAs and, secondly, to open the approach to scrutiny, criticism and improvement through review and publication. In some instances, methodologies applied in a particular BA may differ from what is documented in the submethodologies.

The relationship of the submethodologies to BA components and technical products is illustrated in Figure 2. While much scientific attention is given to assembling and transforming information, particularly through the development of the numerical, conceptual and receptor impact models, integration of the overall assessment is critical to achieving the aim of the BAs. To this end, each submethodology explains how it is related to other submethodologies and what inputs and outputs are required. They also define the technical products and provide guidance on the content to be included. When this full suite of submethodologies is implemented, a BA will result in a substantial body of collated and integrated information for a subregion or bioregion, including new information about the potential impacts of coal resource development on water and water-dependent assets.

**Table 1 Methodologies**

Each submethodology is available online at <http://data.bioregionalassessments.gov.au/submethodology/XXX>, where 'XXX' is replaced by the code in the first column. For example, the BA methodology is available at <http://data.bioregionalassessments.gov.au/submethodology/bioregional-assessment-methodology> and submethodology M02 is available at <http://data.bioregionalassessments.gov.au/submethodology/M02>. Submethodologies might be added in the future.

Code	Proposed title	Summary of content
bioregional-assessment-methodology	<i>Methodology for bioregional assessments of the impacts of coal seam gas and coal mining development on water resources</i>	A high-level description of the scientific and intellectual basis for a consistent approach to all bioregional assessments
M02	<i>Compiling water-dependent assets</i>	Describes the approach for determining water-dependent assets
M03	<i>Assigning receptors to water-dependent assets</i>	Describes the approach for determining receptors associated with water-dependent assets
M04	<i>Developing a coal resource development pathway</i>	Specifies the information that needs to be collected and reported about known coal and coal seam gas resources as well as current and potential resource developments
M05	<i>Developing the conceptual model of causal pathways</i>	Describes the development of the conceptual model of causal pathways, which summarises how the 'system' operates and articulates the potential links between coal resource development and changes to surface water or groundwater
M06	<i>Surface water modelling</i>	Describes the approach taken for surface water modelling
M07	<i>Groundwater modelling</i>	Describes the approach taken for groundwater modelling
M08	<i>Receptor impact modelling</i>	Describes how to develop receptor impact models for assessing potential impact to assets due to hydrological changes that might arise from coal resource development
M09	<i>Propagating uncertainty through models</i>	Describes the approach to sensitivity analysis and quantification of uncertainty in the modelled hydrological changes that might occur in response to coal resource development
M10	<i>Impacts and risks</i>	Describes the logical basis for analysing impact and risk
M11	<i>Systematic analysis of water-related hazards associated with coal resource development</i>	Describes the process to identify potential water-related hazards from coal resource development

## Technical products

The outputs of the BAs include a suite of technical products presenting information about the ecology, hydrology, hydrogeology and geology of a bioregion and the potential impacts of CSG and coal mining developments on water resources, both above and below ground. Importantly, these technical products are available to the public, providing the opportunity for all interested parties, including community, industry and government regulators, to draw from a single set of accessible information when considering CSG and large coal mining developments in a particular area.

The information included in the technical products is specified in the BA methodology. Figure 2 shows the relationship of the technical products to BA components and submethodologies. Table 2 lists the content provided in the technical products (using the Galilee subregion as an example), with cross-references to the part of the BA methodology that specifies it.

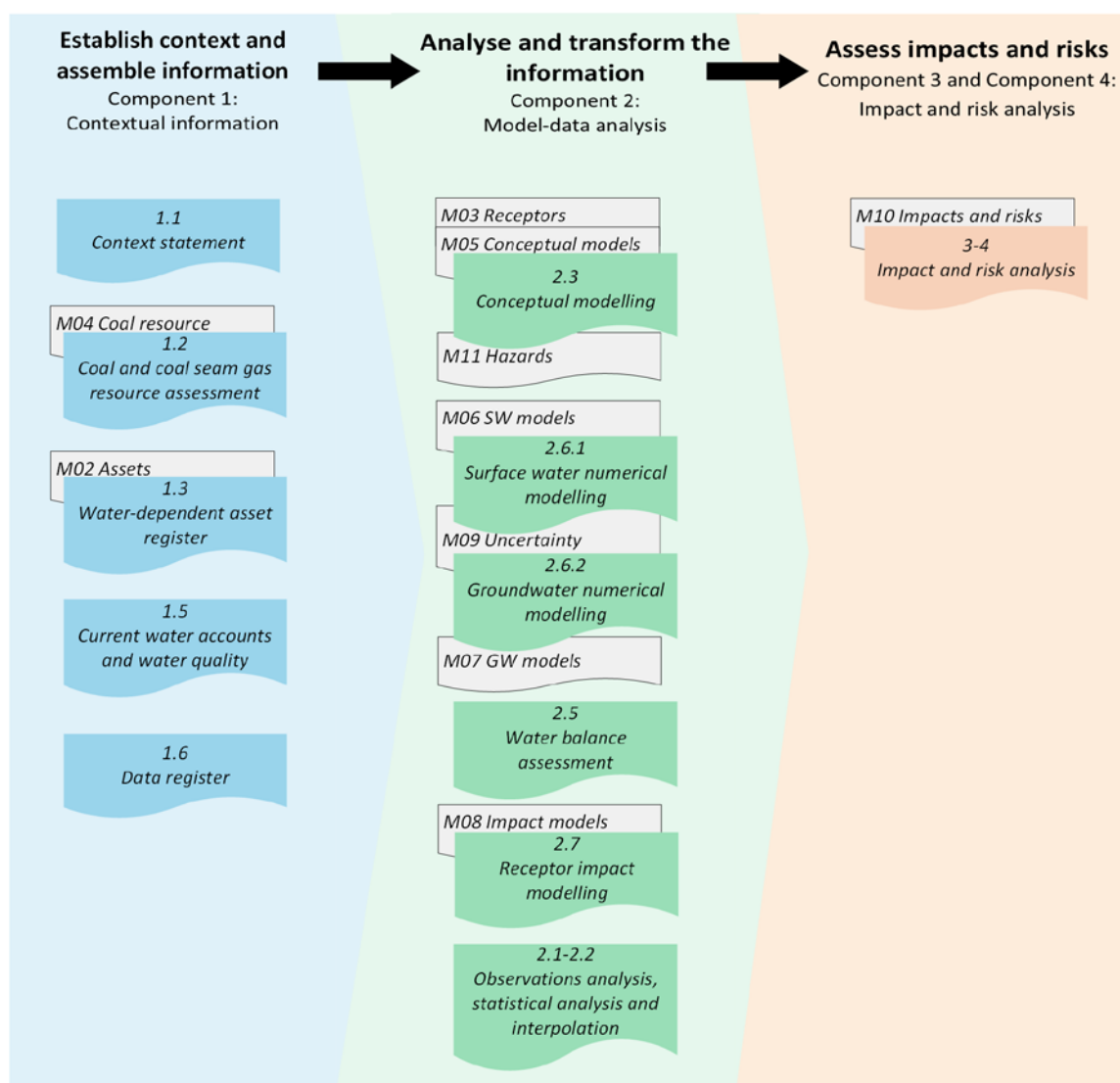
Technical products are delivered as reports (PDFs). Additional material is also provided, as specified by the BA methodology:

- unencumbered data syntheses and databases
- unencumbered tools, model code, procedures, routines and algorithms
- unencumbered forcing, boundary condition, parameter and initial condition datasets
- lineage of datasets (the origin of datasets and how they are changed as the BA progresses)
- gaps in data and modelling capability.

In this context, unencumbered material is material that can be published according to conditions in the licences or any applicable legislation. All reasonable efforts were made to provide all material under a Creative Commons Attribution 3.0 Australia Licence.

Technical products, and the additional material, are available online at <http://www.bioregionalassessments.gov.au>.

The Bureau of Meteorology archives a copy of all datasets used in the BAs. This archive includes datasets that are too large to be stored online and datasets that are encumbered. The community can request a copy of these archived data at <http://www.bioregionalassessments.gov.au>.



**Figure 2 Technical products and submethodologies associated with each component of a bioregional assessment**

In each component (Figure 1) of a bioregional assessment, a number of technical products (coloured boxes, see also Table 2) are potentially created, depending on the availability of data and models. The light grey boxes indicate submethodologies (Table 1) that specify the approach used for each technical product. The red outline indicates this technical product. The BA methodology (Barrett et al., 2013) specifies the overall approach.



**Table 2 Technical products delivered for the Galilee subregion**

For each subregion in the Lake Eyre Basin Bioregional Assessment, technical products are delivered online at <http://www.bioregionalassessments.gov.au>, as indicated in the 'Type' column<sup>a</sup>. Other products – such as datasets, metadata, data visualisation and factsheets – are provided online. There is no product 1.4. Originally this product was going to describe the receptor register and application of landscape classes as per Section 3.5 of the BA methodology, but this information is now included in product 2.3 (conceptual modelling) and used in product 2.6.1 (surface water numerical modelling) and product 2.6.2 (groundwater numerical modelling). There is no product 2.4. Originally this product was going to include two- and three-dimensional representations as per Section 4.2 of the BA methodology, but these are instead included in products such as product 2.3 (conceptual modelling), product 2.6.1 (surface water numerical modelling) and product 2.6.2 (groundwater numerical modelling).

Component	Product code	Title	Section in the BA methodology <sup>b</sup>	Type <sup>a</sup>
<b>Component 1: Contextual information for the Galilee subregion</b>	1.1	Context statement	2.5.1.1, 3.2	PDF, HTML
	1.2	Coal and coal seam gas resource assessment	2.5.1.2, 3.3	PDF, HTML
	1.3	Description of the water-dependent asset register	2.5.1.3, 3.4	PDF, HTML, register
	1.5	Current water accounts and water quality	2.5.1.5	PDF, HTML
	1.6	Data register	2.5.1.6	Register
<b>Component 2: Model-data analysis for the Galilee subregion</b>	2.1-2.2	Observations analysis, statistical analysis and interpolation	2.5.2.1, 2.5.2.2	PDF, HTML
	2.3	Conceptual modelling	2.5.2.3, 4.3	PDF, HTML
	2.5	Water balance assessment	2.5.2.4	PDF, HTML
	2.6.1	Surface water numerical modelling	4.4	PDF, HTML
	2.6.2	Groundwater numerical modelling	4.4	PDF, HTML
	2.7	Receptor impact modelling	2.5.2.6, 4.5	PDF, HTML
<b>Component 3 and Component 4: Impact and risk analysis for the Galilee subregion</b>	3-4	Impact and risk analysis	5.2.1, 2.5.4, 5.3	PDF, HTML
<b>Component 5: Outcome synthesis for the Galilee subregion</b>	5	Outcome synthesis	2.5.5	PDF, HTML

<sup>a</sup>The types of products are as follows:

- 'PDF' indicates a PDF document that is developed by the Lake Eyre Basin Bioregional Assessment using the structure, standards and format specified by the Programme.
- 'HTML' indicates the same content as in the PDF document, but delivered as webpages.
- 'Register' indicates controlled lists that are delivered using a variety of formats as appropriate.

<sup>b</sup>*Methodology for bioregional assessments of the impacts of coal seam gas and coal mining development on water resources* (Barrett et al., 2013)

## About this technical product

The following notes are relevant only for this technical product.

- All reasonable efforts were made to provide all material under a Creative Commons Attribution 3.0 Australia Licence.
- All maps created as part of this BA for inclusion in this product used the Albers equal area projection with a central meridian of 140.0° East for the Lake Eyre Basin bioregion and two standard parallels of –18.0° and –36.0°.
- Visit <http://www.bioregionalassessments.gov.au> to access metadata (including copyright, attribution and licensing information) for datasets cited or used to make figures in this product.
- In addition, the datasets are published online if they are unencumbered (able to be published according to conditions in the licence or any applicable legislation). The Bureau of Meteorology archives a copy of all datasets used in the BAs. This archive includes datasets that are too large to be stored online and datasets that are encumbered. The community can request a copy of these archived data at <http://www.bioregionalassessments.gov.au>.
- The citation details of datasets are correct to the best of the knowledge of the Bioregional Assessment Programme at the publication date of this product. Readers should use the hyperlinks provided to access the most up-to-date information about these data; where there are discrepancies, the information provided online should be considered correct. The dates used to identify Bioregional Assessment Source Datasets are the dataset's published date. Where the published date is not available, the last updated date or created date is used. For Bioregional Assessment Derived Datasets, the created date is used.

## References

- Barrett DJ, Couch CA, Metcalfe DJ, Lytton L, Adhikary DP and Schmidt RK (2013) Methodology for bioregional assessments of the impacts of coal seam gas and coal mining development on water resources. A report prepared for the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development through the Department of the Environment. Department of the Environment, Australia. Viewed 11 December 2018, <http://data.bioregionalassessments.gov.au/submethodology/bioregional-assessment-methodology>.
- IESC (2015) Information guidelines for the Independent Expert Scientific Committee advice on coal seam gas and large coal mining development proposals. Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development, Australia. Viewed 11 December 2018, <http://www.iesc.environment.gov.au/publications/information-guidelines-independent-expert-scientific-committee-advice-coal-seam-gas>.

# 1 Introduction to the product standards

The overarching authority for terminology in the bioregional assessments (BAs) is the *Methodology for bioregional assessments of the impacts of coal seam gas and coal mining development on water resources* (the BA methodology; Barrett et al., 2013).

In addition to the BA methodology, the standards in this document are also based on the *Australian Government's Style manual for authors, editors and printers* (Snooks & Co., 2002) and the *Australian Oxford dictionary* (Moore, 2004). Many specialist terms are not found in these resources, however, and so the additional language conventions in Chapter 4 have been developed in consultation with authors and Discipline Leaders. Note that when no clear guidance is given in the BA methodology or Snooks & Co. (2002) the overarching aim is consistency.

This document covers:

- the processes to be followed in the BAs
- instructions about formatting, Microsoft Word styles, tables and figures
- detailed conventions for and style choices for language and terminology
- instructions for citation, attribution and copyright
- conventions for charts
- conventions for maps.

## References

- Barrett DJ, Couch CA, Metcalfe DJ, Lytton L, Adhikary DP and Schmidt RK (2013) *Methodology for bioregional assessments of the impacts of coal seam gas and coal mining development on water resources*. A report prepared for the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development through the Department of the Environment. Department of the Environment, Australia. Viewed 11 December 2018, <http://www.iesc.environment.gov.au/publications/methodology-bioregional-assessments-impacts-coal-seam-gas-and-coal-mining-development-water>.
- Snooks & Co. (2002) *Style manual for authors, editors and printers*. Sixth edition. John Wiley & Sons, Canberra.
- Moore B (ed.) (2004) *Australian Oxford dictionary* (Second edition) Oxford University Press. Viewed 11 December 2018, <http://www.oxfordreference.com/view/10.1093/acref/9780195517965.001.0001/acref-9780195517965>.



## 2 Processes

The Products team consists of Editors, Product Coordinators and Production Assistants. The team works closely with Map-makers and Data Coordinators.

There is a Product Coordinator embedded within each bioregional assessment (BA) in order to achieve cross-cutting consistency. Product Coordinators are responsible for communicating the needs of each BA back to the Products team and for ensuring that BAs are able to comply with the product standards.

The Products team is using previously developed processes to assist authors to collaborate and write multi-authored documents efficiently. An overview of the processes is provided in this chapter.

### 2.1 Review and approvals

The review and approvals process is applied to every technical product and submethodology published by the Technical Programme. Authors should ensure that products and submethodologies have been reviewed by the respective discipline leaders and edited by an editor prior to entering the review and approvals process.

The product review library is available on SharePoint

<https://teams.csiro.au/sites/BA/ProductReviews/Forms/AllItems.aspx> as is the product index <https://teams.csiro.au/sites/BA/Lists/ProductStatus/Programme.aspx>.

### 2.2 SharePoint

SharePoint is used by Bureau of Meteorology, Geoscience Australia and CSIRO authors to write drafts before providing them to the Department of the Environment and Energy via govdex.

All products are written using Microsoft Word 2007, 2010 or 2013 and the format of the files should be DOCX (not DOC). Document bases are provided on SharePoint that use the BA Microsoft Word template. Authors should use document bases. When writing first drafts, authors do not need to track changes. After the first drafts are submitted to the review and approvals process, however, changes should be subsequently tracked. The Products team accepts changes at certain stages (for example, before submitting the reports for review), but authors should not accept any tracked changes.

The following protocol is used for naming word documents and excel spreadsheets, where shortened forms of the bioregion and subregion are used:

- **BA-BIOREGION-SUBREGION-[section number]-NAMEOFSECTION-v[version number].docx**
- **BA-BIOREGION-SUBREGION-[section number]-NAMEOFSECTION-v[version number].xlsx**

Hence, the first version of the geography section (Section 1.1.2) for the Northern Inland Catchments bioregion and the Namoi subregion is named: **‘BA-NIC-NAM-112-Geography-v01.docx’**. See Table 3 for a complete list of standard shortened forms to be used in file naming. It is suggested that a short version of the name of the section be included, so for example, rather than using **‘BA-NIC-NAM-115-Surface-water-hydrology-and-water-quality-v02.docx’**, use **‘BA-NIC-NAM-115-Hydrology-v02.docx’**.

**Table 3 Standard shortened forms to use for bioregions and subregions in file naming**

Name of subregion or bioregion	Shortened form to be used for file naming
Lake Eyre Basin bioregion	LEB
• Galilee subregion	GAL
• Cooper subregion	COO
• Pedirka subregion	PED
• Arckaringa subregion	ARC
Northern Inland Catchments bioregion	NIC
• Maranoa-Balonne-Condamine subregion	MBC
• Gwydir subregion	GWY
• Namoi subregion	NAM
• Central West subregion	CEN
Clarence-Moreton bioregion	CLM
Northern Sydney Basin bioregion	NSB
• Hunter subregion	HUN
• Gloucester subregion	GLO
Sydney Basin bioregion	SSB
Gippsland Basin bioregion	GIP

The check out facility of SharePoint is used for version control. If a document is ‘checked in’ on SharePoint, then it is available for an author to edit or to revise. The following protocol should be followed, using the filename ‘BA-example-v01.docx’ as an example:

1. Check out ‘BA-example-v01.docx’ on SharePoint. While it is checked out, only the person who has checked it out can work on it.
2. Save as ‘BA-example-v02.docx’ to a local hard drive (e.g. your desktop).
3. Enter information in the table ‘History of this document’ in ‘BA-example-v02.docx’: date, name and nature of changes.
4. Revise and edit ‘BA-example-v02.docx’.
5. Note issues in the table ‘Log of issues and comments’ in ‘BA-example-v02.docx’.
6. Refresh fields (by selecting all of the text in the document (ctrl + A) and pressing F9) and then save the document as ‘BA-example-v02.docx’.
7. Upload ‘BA-example-v02.docx’ to SharePoint and update the ‘notes’ field in SharePoint.

8. Discard check out of 'BA-example-v01.docx'. (Later, the Products team will move this document to an archive folder. Note that 'discard check out' is different from 'check in'. Authors should always use 'discard check out' instead of 'check in'.)

## 2.3 Charts

Charts are most simply drawn using Microsoft Excel. Chart templates are available on SharePoint <https://teams.csiro.au/sites/BA/Products/ProductStandards/BA-Excel-examples-v04.xlsx>. Other programs (R, CorelDraw) can be used as long as the result adheres to the standards defined in this document and illustrated in the templates. See Chapter 6 for details.

## 2.4 Maps

Maps are created using ArcGIS. Map templates are available on the BA working space for CSIRO [\\OSM-07-CDC.it.csiro.au\OSM\\_CBR\\_LW\\_BA\\_working\BA\\_ALL\map\\_templates](https://teams.csiro.au/sites/BA/Products/ProductStandards/BA-Excel-examples-v04.xlsx) and for GA [\\nas\eg\ba\BA\\_ALL\Maps\Templates](https://teams.csiro.au/sites/BA/Products/ProductStandards/BA-Excel-examples-v04.xlsx). See Chapter 7 for details.

## 2.5 Workbooks

Microsoft Excel workbooks are used to hold all non-text elements (tables, figures, maps, plots and diagrams) and their captions. Note that this means that when tables or captions are edited in Microsoft Word documents, those changes need to be reflected back in workbooks. Workbooks are stored on SharePoint and include links to the source data. Each non-text element is assigned a unique 'element number' which is noted in both the Microsoft Word document and the Microsoft Excel workbook. This forms an essential link to the audit trail.

The creation and maintenance of the workbook is the responsibility of the author. Ensuring that workbooks are complete and correct is the responsibility of the relevant Data Coordinator and Product Coordinator. Authors and Data Coordinators work together to ensure that workbooks are up to date. As part of preparing a product for review and approvals, Product Coordinators will check workbooks, compare them against the Microsoft Word documents, and prompt authors if there are any errors or omissions. Data Coordinators can assist the authors to resolve these issues, but the primary responsibility rests with the author.

## 2.6 ISBNs

Each technical product will be allocated an ISBN (specific to PDF format). BA technical products do not use an ISSN.

When the author list for a technical product is finalised, Product Coordinators are responsible for updating the details on SharePoint <http://teams.csiro.au/sites/BA/Products/Lists/List%20of%20products%20and%20methodologies/AllItems.aspx> and alerting the ISBN Officer. The ISBN Officer then applies for an ISBN number, updates the list and emails the Product Coordinator.



## 2.7 Creating PDFs

The process used by the Products team to create PDF files from Microsoft Word documents can be found on SharePoint

<https://teams.csiro.au/sites/BA/Products/WorkingWithProducts/ManualPDF.aspx>.

## 2.8 Product list and blurbs

Technical products, as listed in Table 2, follow a consistent heading structure across all bioregions and subregions. This structure is replicated in the document bases on SharePoint for authors to use as they write first drafts (see Section 2.2). *Product list and blurbs* is the point of truth for this structure. The most recent version is available on SharePoint

<https://teams.csiro.au/sites/BA/Lists/FromtheProductsTeam/AllItems.aspx>.

### References

Barrett DJ, Couch CA, Metcalfe DJ, Lytton L, Adhikary DP and Schmidt RK (2013) Methodology for bioregional assessments of the impacts of coal seam gas and coal mining development on water resources. A report prepared for the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development through the Department of the Environment. Department of the Environment, Australia. Viewed 31 July 2015, <http://www.iesc.environment.gov.au/publications/methodology-bioregional-assessments-impacts-coal-seam-gas-and-coal-mining-development-water>.

Moore B (ed.) (2004) Australian Oxford Dictionary (Second edition) Oxford University Press. Viewed 11 December 2018, <http://www.oxfordreference.com/view/10.1093/acref/9780195517965.001.0001/acref-9780195517965>.

Snooks & Co. (2002) Style manual for authors, editors and printers. Sixth edition. John Wiley & Sons, Canberra.

## 3 Excerpt from the Word template

This section is reproduced verbatim from the Microsoft Word template developed to provide stylistic consistency across the programme. All of the text in this section is illustrative of how to use Microsoft Word styles. For Microsoft Word documents to be successfully imported into the Bioregional Assessment Information Platform (BAIP), the following styles must be used. The BAIP team is now providing review comments to help teams better understand and use template styles.

The Project Agreement provides explicit guidance about branding.

### Item 9. Branding requirements

(a) All external communication products and presentations and reports will be branded under a Bioregional Assessments logo. The Department of the Environment and Energy will distribute a copy of the Bioregional Assessments logo to the Project Parties.

(b) Protocols outlining branding guidelines will be established by the Department of the Environment and Energy as part of the Stakeholder Engagement and Communication Strategy, for use by all Project Parties and will address the following topics:

- (i) Bioregional Assessments logo use;
- (ii) visual branding elements and their use in print and electronic media;
- (iii) report templates including specifications for heading, image, label, table, reference and map styles;
- (iv) guidance on how to acknowledge collaborative Australian Government partners;
- (v) guidance on how to acknowledge report authors; and
- (vi) presentation of Project Agreement Material to external bodies.

(c) The Implementation Board will approve the final branding guidelines.

### 3.1 Formatting [style = Heading 2]

This template uses the font Calibri. The styles of the headings vary in font size, weight and colour and provide options with and without numbers. There is a heading style specific for appendices – this style incorporates an alpha-numeric prefix in the automated numbering. Space before and after headings is included in the style, and blank lines (extra returns) should not be inserted between elements.

Main text is 12 pt Calibri, left aligned, 9 pt spacing before and after with line spacing multiple 1.1 [style = Body Text]. Main text must flow in one column spreading over the full width of the page. Space between paragraphs is included in the style, and no blank lines should be inserted between paragraphs.

Quotations that are shorter than 30 words should be formatted as Body Text and enclosed in single quote marks 'like this'. Quotations that are longer than 30 words should be formatted as a block quote and do not need to use quote marks. An example of a block quote is:

[style = Block Quote] This is what a block quote should look like. Note that while block quotes are typically longer than 30 words as per the Australian Government's *Style manual for authors, editors and printers*, this rule is flexible when multiple block quotes are used in a section and require parallel formatting.

Two examples of bulleted lists follow. If the dot points are full sentences:

- Each should start with a capital letter. [style = List Bullet]
- Each should end in a full stop.

If the dot points are sentence fragments, follow these conventions:

- no capitals at beginning
  - second level bullet [style = List Bullet 2]
  - second level bullet
- no 'and' after the second to last dot point
- no full stop at the end of each dot point (except for the last).

An example of a numbered list follows [style = List Number]. These are basic typographic rules for the reports as a whole.

1. In general, all text is aligned on the left, with ragged edges on the right. Do not justify or centre text (except in tables).
  - a. second level numbered list [style = List Number 2]
  - b. second level numbered list
2. Always use sentence case. Capitalise only the first letter of the sentence and proper nouns.
3. Between the full stop and the start of the next sentence, use only one space, not two.
4. Use single quotation marks, not double. Use single quotation marks for quoted speech, and to signal unusual usage.
5. Use an en dash to denote a range of values in references or tables, for example 'p. 35–50'. Do not add spaces on either side.
6. Use an en dash with a space on either side to indicate a break of thought or a side note, for example 'A mix of three of them – myristic, palmitic and palmitoleic acid – triggers a quick upsizing in heart muscle cells'.
7. Scientific names are set in italics of the same weight, for example '*Homo sapiens* first appeared ...'. [style = Italic]

### 3.1.1 Summary [style = Heading 3]

#### ***Summary [style = Summary heading component 1]***

In technical products for the Bioregional Assessment Programme, summaries are written for every 'chunk' of content as described in the Products list. These summaries use unnumbered headings and should be formatted using the following styles depending on which component they relate to. The background colour of the text lives in the style.

#### ***Summary [style = Summary heading component 2]***

Summary text [style = Summary component 2]

#### ***Summary [style = Summary heading component 3]***

Summary text [style = Summary component 3]

#### ***Summary [style = Summary heading component 4]***

Summary text [style = Summary component 4]

#### ***Summary [style = Summary heading component 5]***

Summary text [style = Summary component 5]

### 3.1.2 Hyperlinks [style = Heading 3]

All hyperlinks must include a ScreenTip. You can see the ScreenTip text if you hover over the hyperlink below. To enter the ScreenTip, right-click the hyperlink, click 'Edit Hyperlink', click the 'ScreenTip' button, and then enter '[Organisation Name] website'. For example <http://www.australia.gov.au> (ScreenTip text is 'Australian Government website') and <http://www.anu.edu.au> (ScreenTip is 'Australian National University website'). In reference lists, the ScreenTip for hyperlinks should be 'Hyperlink to: '[Title of report]''. For example <https://publications.csiro.au/rpr/download?pid=csiro:EP132686&dsid=DS5> (ScreenTip is 'Hyperlink to 'Water resource assessment for the Great Artesian Basin').

### 3.1.3 Equations [style = Heading 3]

Equations should be numbered consecutively as they appear in the text with Arabic numerals, for example '(1)'. Equations must be typed, not hand printed. Go to 'Insert' > 'Equation' to generate equations within Word. The style includes spacing above and below [style = Equation]. Alternative text must be inserted for equations. The WIRIS website should be used to generate alternative text for equations <http://www.wiris.net/demo/editor/demo/en/>.

$$r = \frac{\sum_{i=1}^I F_i * O_i}{\sigma_F * \sigma_O * (I - 1)} \quad (1)$$

### 3.1.4 Figures and photographs [style = Heading 3]

The resolution of figures should be minimum 300 dpi when placed at 100%. Do not compress images. Figures and images should use the 'Figures' style and the wrap text option should be set to 'inline with text'.

Figure numbers and captions appear at the bottom of the figures. Figures should be numbered consecutively with Arabic numerals in the order in which reference is made to them in the text, for example 'Figure 1', 'Figure 2', etc.

In the figure caption, the figure number is followed by a space. Captions do not end in a full stop, whether they are full sentences or sentence fragments. If required, insert a source reference or a note below the caption.

All figures require alternative text. To insert a description, right-click the figure, click 'Size', and then click the 'Alt Text' tab. In instances where it is not possible to provide alternative text, please use the disclaimer: 'For a description of this image contact [bioregionalassessments@bom.gov.au](mailto:bioregionalassessments@bom.gov.au).'



**Figure 3 Full width (170 mm) [use References > Insert Caption, label = Figure, style = Caption]**

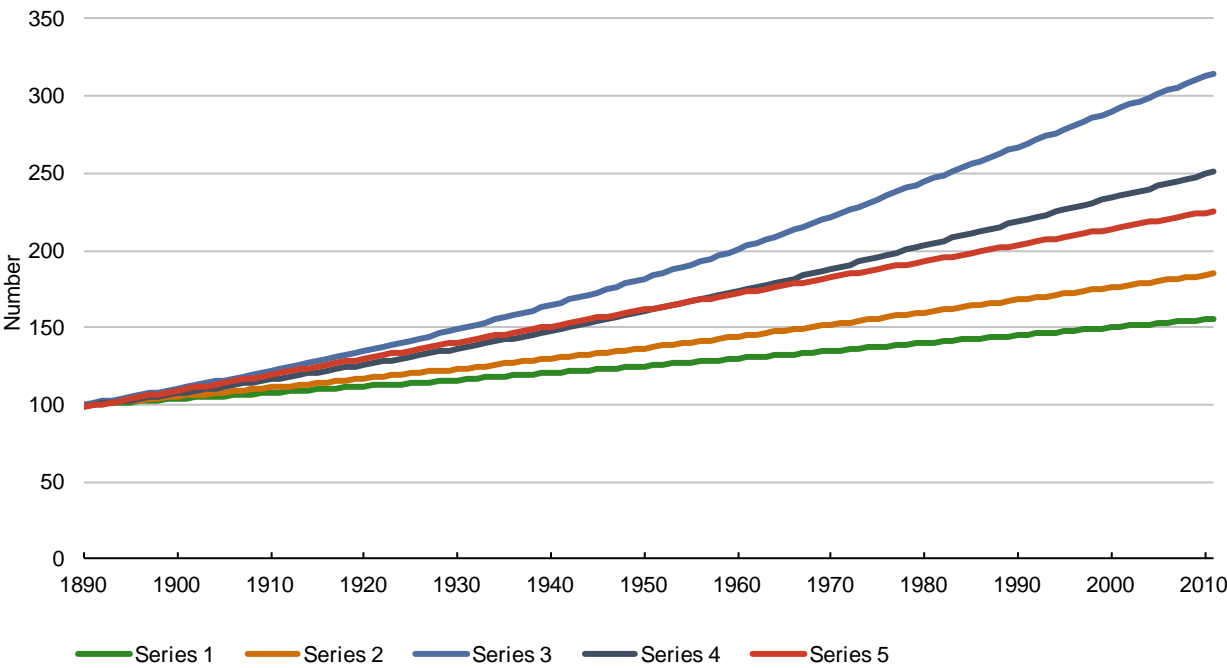


Figure 4 Full width (170 mm) [use References > Insert Caption, label = Figure, style = Caption]

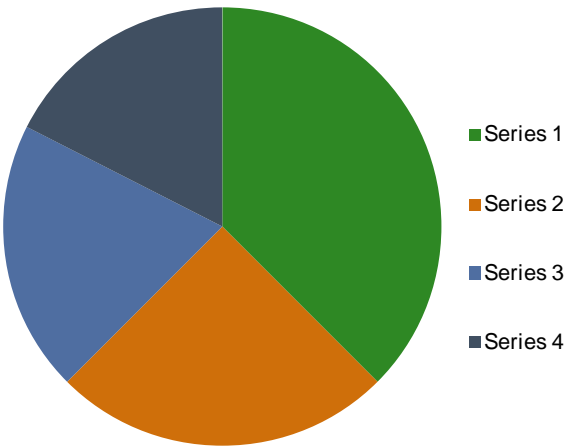
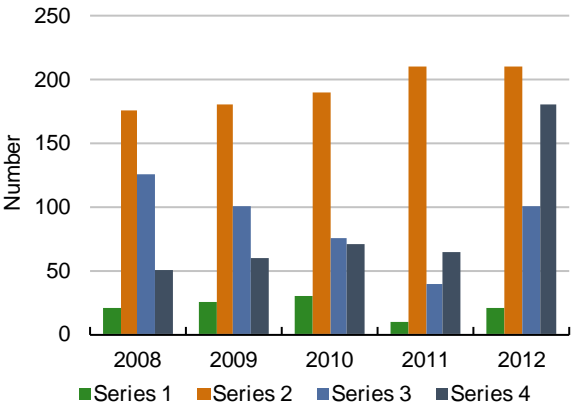


Figure 5 Half width (83 mm) [use References > Insert Caption, label = Figure, style = Caption]

(a)



(b)

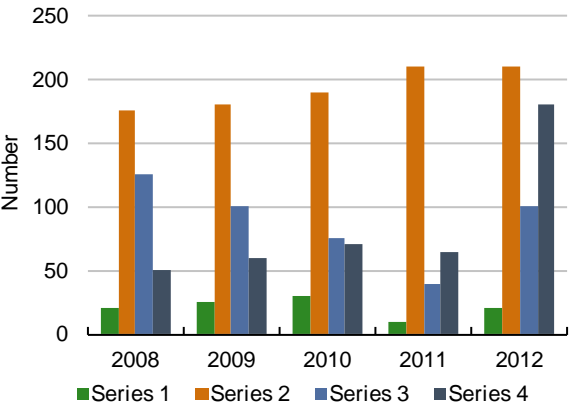


Figure 6 Half width (83 mm) [use References > Insert Caption, label = Figure, style = Caption]

### 3.1.5 Tables [style = Heading 3]

There are three table styles: Table BA Header Row, Table BA Header Column and Table BA Header Row and Column.

Table numbers and captions appear at the top of the tables. Tables should be numbered consecutively with Arabic numerals in the order in which reference is made to them in the text, for example 'Table 1', 'Table 2', etc.

The table itself is left aligned and should fit within the margins if it contains enough content to do so. Authors can choose how wide they wish their table(s) to be within the margin: either extending to the margins (170 mm), or narrower when there is less content.

In the table caption, the table number is followed by a space. Captions do not end in a full stop, whether they are full sentences or sentence fragments. If required, a source reference or a note should be inserted below the table or between the caption and the table.

All tables can use the paragraph styles 'TableText', 'TableTextCentred' or 'TableTextRight'. Where a column contains text (and is, therefore, left-aligned), the header is left-aligned, and where a column contains numbers (and is, therefore, right-aligned), the header is centre-aligned. If a column is ever centre-aligned for any reason, the header is also centre-aligned. Units are typed after the column header in brackets and should appear on a new line.

Note that pages should not be formatted as landscape to accommodate the layout of tables – instead the table should be redesigned to fit a portrait page. If appropriate, the table should be split into more than one table. This has the added benefit of making the document more accessible.

Table cells should never be empty. If the data is not applicable authors should use 'na', if the data is not available authors should use 'NA' and, in both cases, the short form should be defined under the table. If the data was requested and not provided and the authors wish to communicate that fact explicitly to the reader they can use 'np' for 'data not provided'. Note that 'np' is very rarely used.

When one column in a table lists dates, names of months can be shortened to the first three letters of the month. This does not apply to names of months in body text or in charts. Months should always be spelt out in full in body text. See Chapter 6 for names of months in charts.



**Table 4 Table style = Table BA Header Row, maximum width 170 mm [use References > Insert Caption, label = Table, style = caption]**

Column heading [style = TableText]	Column heading [style = TableTextCentred]	Column heading [style = TableTextCentred]
Text [style = TableText]	Text [style = TableTextCentred]	Text [style = TableTextRight]
Text [style = TableText]	Text [style = TableTextCentred]	Text [style = TableTextRight]
Text [style = TableText]	Text [style = TableTextCentred]	Text [style = TableTextRight]
Text [style = TableText]	Text [style = TableTextCentred]	Text [style = TableTextRight]

Source: Author (date) [style = Source or note for Table or Figure] (no full stop used since it is not a full sentence)

**Table 5 Table style = Table BA Header Row (with row headings), maximum width 170 mm [use References > Insert Caption, label = Table, style = caption]**

Column heading [style = TableText]	Column heading [style = TableText]	Column heading [style = TableText]
Row heading [style=RowHeading]	Text [style = TableText]	Text [style = TableText]
	Text [style = TableText]	Text [style = TableText]
Row heading [style=RowHeading]	Text [style = TableText]	Text [style = TableText]
	Text [style = TableText]	Text [style = TableText]

**Table 6 Table style = Table BA Header Column, maximum width 170 mm [use References > Insert Caption, label = Table, style = caption]**

Text [style = TableText]	Text [style = TableText]	Text [style = TableText]
Text [style = TableText]	Text [style = TableText]	Text [style = TableText]
Text [style = TableText]	Text [style = TableText]	Text [style = TableText]
Text [style = TableText]	Text [style = TableText]	Text [style = TableText]
Text [style = TableText]	Text [style = TableText]	Text [style = TableText]

**Table 7 Table style = Table BA Header Row and Column, maximum width 170 mm [use References > Insert Caption, label = Table, style = caption]**

	Column heading [style = TableText]	Column heading [style = TableText]	Column heading [style = TableText]
Column heading [style = TableText]	Text [style = Table text left]	Text [style = Table text left] • Bullet [style=TableBullet] • Bullet [style=TableBullet]	Text [style = Table text left] 1. Bullet numbered [style=TableBulletNumbered]
Column heading [style = TableText]	Text [style = Table text left]	Text [style = Table text left]	Text [style = Table text left]
Column heading style = TableText]	Text [style = Table text left]	Text [style = Table text left]	Text [style = Table text left]

This is a table note which ends with a full stop because it is a full sentence [style = Table/figure notes].

Source: if a table needs to use a note and a 'Source' or 'Data' reference, the 'Source' or 'Data' should always be at the very bottom.

### 3.1.6 Accessibility [style = Heading 3]

Documents that are to be published on the web are legally required to be accessible to Web Content Accessibility Guidelines (WCAG) 2.0 Level AA. Documents should be provided in both HTML and Adobe PDF format.

### 3.1.7 Insert heading [style = Heading 3]

#### ***Summary [style = Summary heading component 1]***

In technical products for the Bioregional Assessment Programme, summaries are written for every 'chunk' of content as described in the Products list. These summaries use unnumbered headings and should be formatted using the following styles depending on which component they relate to. The background colour of the text lives in the style.

#### ***3.1.7.1 Insert heading [style = Heading 4]***

##### 3.1.7.1.1 Insert heading [style = Heading 5]

##### ***Insert heading [style = Heading 6]***

Insert heading [style = Heading 7]

Paragraph text [style = Body Text]

#### ***References [style = Heading 4 not numbered]***

Insert list of references. [style = Reference].

CSIRO (2007) CSIRO PressurePlot™ software and PressureDB™ database. Viewed 1 August 2011, <http://www.csiro.au/products/pressureplot.html>.

CSIRO (2009) Water in the Gulf of Carpentaria Drainage Division. A report to the Australian Government from the CSIRO Northern Australia Sustainable Yields Project. CSIRO Water for a Healthy Country Flagship, Australia. Viewed 21 August 2012, <http://www.clw.csiro.au/publications/waterforahealthycountry/nasy/documents/GulfOfCarpentaria/NASY-Gulf-of-Carpentaria-Drainage-Division-Report.pdf>.

De Deckker P (1979) Ostracods from the mound springs area between Strangways and Curdimurka, South Australia. Transactions of the Royal Society of South Australia 103(6), 155–168.

Exon NF (1971) Roma, Queensland. Explanatory notes. 1:250,000 geological series – sheet SG55/12. Bureau of Mineral Resources, Geology and Geophysics, Canberra.

Healy RW (2010) Estimating groundwater recharge. Cambridge University Press, Cambridge.

- Ivkovic KMJ (2006) Modelling groundwater-river interactions for assessing water allocation options. PhD Thesis, Australian National University. Viewed 24 September 2012, <https://digitalcollections.anu.edu.au/handle/1885/49342>.
- Love AJ, Rosseau-Gueutin P, Simmons C, Karlstrom K, Crossey L, Shand P and Priestley S (2010) Toward a new paradigm for the Great Artesian Basin: hydrologic mixing, partitioned sub-basins, and mantle influences on groundwater quality. Groundwater 2010, Proceedings of National Groundwater Conference. International Association of Hydrogeologists, Australia.
- Love AJ, Wohling D, Fulton S, Rousseau-Gueutin P and De Ritter S (eds) (2012) Allocating water and maintaining springs in the Great Artesian Basin, Volume II: Groundwater recharge, hydrodynamics and hydrochemistry of the Western Great Artesian Basin. National Water Commission, Canberra.
- Quigley MC, Clark D and Sandiford M (2010) Tectonic geomorphology of Australia. In: Bishop P and Pillans B (eds) Australian landscapes. Geological Society, London, 243–265.
- Silcock JL (2010) Experiencing waterholes in an arid environment, with particular reference to the Lake Eyre Basin, Australia: a review. Geographical Research. DOI: 10.1111/j.1745-5871.2010.00642.x.



## 4 Language

### 4.1 General language specifications

The specifications listed below are based on:

- the *Methodology for bioregional assessments of the impacts of coal seam gas and coal mining development on water resources* (the BA methodology; Barrett et al., 2013)
- the *Australian Government's Style manual for authors, editors and printers* (Snooks & Co., 2002)
- the *Australian Oxford dictionary* (Moore, 2004).

For terms not listed here, use the Moore (2004). Electronic access is available within CSIRO <http://www.oxfordreference.com/view/10.1093/acref/9780195517965.001.0001/acref-9780195517965>. Bookmarking this hyperlink is recommended. If accessing <http://www.oxfordreference.com>, ensure that you are searching within the *Australian Oxford dictionary*.

In general, use '-our', '-ll-' and '-ise' spellings in words such as 'favourite', 'modelling' or 'organise'.

Items that are crossed out in the list below should not be used. Where an acronym is provided it may be used in text as long as it is spelt out in the first instance in each section (i.e. under each section heading, including summaries). Note that non-standard acronyms may be used in in-text citations where the authoring organisation's name is too long (with the exception of the Department of the Environment and Energy which should not be shortened).

Numbers	
<sup>18</sup> O	<del>3D</del> (use 'three-dimensional' instead)
<del>1D</del> (use 'one-dimensional' instead)	<sup>4</sup> He
1-second DEM (hyphen, note capitalisation)	<sup>86</sup> Sr
<sup>222</sup> Rn	<sup>87</sup> Sr
24–7 (short form for '24 hours a day, 7 days a week')	A
<del>2D</del> (use 'two-dimensional' instead)	<i>A directory of important wetlands in Australia (DIWA)</i>
<sup>2</sup> H	<del>Aboriginal</del> (use 'Indigenous' instead, except where 'Aboriginal' is part of an official name, or a local group requests the use of 'Aboriginal')
30 years (noun)	ACT (use 'ACT' not 'Australian Capital Territory', except when part of an official name)
30-year period ('30-year' is an adjective here)	

~~activities~~ (use ‘development’ instead in phrases such as ‘impacts of coal seam gas and large coal mining development on water resources’)

Acts (see ‘legislation’ in Table 10)

actual evapotranspiration (AET)

additional coal resource development (ACRD; see Section 4.2.8 for details)

airborne electromagnetic (AEM)

Alberton Seam

Allaru-Wallumbilla

alluvia

~~alluviums~~ (use ‘alluvia’ instead)

American Petroleum Institute units (API units)

animals: common names (lowercase, do not italicise in text, hyphen for names such as ‘white-bellied sea eagle’, on first mention include scientific name in brackets (e.g. ‘white-bellied sea eagle (*Haliaeetus leucogaster*)’) then subsequently just common name)

animals: scientific names (italicise in text)

~~annum~~ (use ‘year’ instead)

~~anthropogenic asset(s)~~ (obsolete – do not use. Use instead one of the three asset groups: ecological assets, economic assets or sociocultural assets)

Anthroposols (not ‘anthroposols’, not ‘Anthroposol soils’)

aquifer

aquitard

Aramac Trough

ArcGIS

Arckaringa Basin

Arckaringa subregion (in Lake Eyre Basin bioregion, do not shorten)

artesian aquifer

AS/NZS ISO 31000:2009 Risk management – principles and guidelines (on first mention, then subsequently ‘the ISO 31000:2009 standard’)

Assessment (when referring to a specific bioregional assessment, use the full name on first mention (e.g. ‘Lake Eyre Basin Bioregional Assessment’) then subsequently ‘the Assessment’; do not use ‘project’)

Assessment area (not ‘study area’)

Assessment extent

asset register (not ‘assets register’)

Assets and Receptors Project

*Atlas of living Australia*

Australia Pacific Liquefied Natural Gas (APLNG)

Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES; ABARE and BRS merged on 1 July 2010 and became ABARE–BRS until January 2011 when the name changed to ABARES)

Australian Collaborative Land Use and Management Program (ACLUMP)

Australian Government (not ‘federal government’; not ‘Commonwealth government’ (exception in legislation); not ‘Australian government’)

Australian Government Minister for the Environment (‘the Minister’; formal title of current Minister)

Australian Height Datum (AHD)

Australian Heritage Database

Australian Hydrological Geospatial Fabric (Geofabric)

Australian National Aquatic Ecosystems (ANAE)	Bandanna Formation
Australian Soil Classification	bankfull (one word)
Australian Soil Resource Information System (ASRIS)	<del>BAP</del> (spell out fully: 'Bioregional Assessment Programme')
Australian Spatial Data Infrastructure	Baralaba Coal Measures
Australian Water Resource Assessment Groundwater module (AWRA-G module)	Barcaldine Ridge
Australian Water Resource Assessment Landscape module (AWRA-L module)	BA (bioregional assessments)
Australian Water Resource Assessment Routing module (AWRA-R module)	base case (two words)
Australian Water Resource Assessment system (AWRA system)	baseflow (one word)
Australian Water Resources Council (AWRC)	baseline (one word; see Section 4.2.8 for details)
Authority to Prospect (ATP) XXX ('ATP XXX' on subsequent instance)	basic right (lowercase)
authority to prospect (ATP; lowercase when generic)	<del>basin</del> (when used generically, use 'river basin' or 'geological basin' instead. When used specifically, always use the specific name, e.g. 'Surat Basin')
average recurrence interval (do not shorten to 'ARI', not 'annual recurrence interval', usually expressed as, for example, '1-in-10 years'; do not use '1:10 years')	Basin Plan (first mention in section should be 'the Commonwealth's <i>Basin Plan 2012</i> ' then subsequently 'the Basin Plan'. See 'legislation' in Table 10 for more details. Note that there is no need to include the legislation in the reference list)
Avon Subgroup	basin scale (noun)
<b>B</b>	basin-scale (adjective)
	basin-wide (hyphen)
	Bellata Trough
	<del>benefit-cost analysis</del> (use 'cost-benefit analysis' instead)
	<del>benefits and costs</del> (use 'costs and benefits' instead)
BA (bioregional assessment)	benzene, toluene, ethylbenzene and xylene (BTEX)
BA methodology (shortened form for <i>Methodology for bioregional assessments of the impacts of coal seam gas and coal mining development on water resources</i> )	Beryl Ridge
BA website <a href="http://www.bioregionalassessments.gov.au">http://www.bioregionalassessments.gov.au</a>	
back-arc (hyphen)	
Balonne	



Betts Creek beds

bioregion (not ‘Bioregion’, not ‘bio-region’)

bioregional assessment (BA, not ‘BRA’, not ‘BRASS’. Lowercase unless part of an official name)

~~Bioregional Assessment~~ (do not capitalise unless part of an official name such as ‘Bioregional Assessment Programme’)

~~Bioregional Assessment Data Repository~~ (use ‘Bioregional Assessment Repository’ instead)

Bioregional Assessment Data Store

Bioregional Assessment Information Platform (BAIP; before 1 July 2013 was called the Information Platform for the Bioregional Assessments (IPBA))

Bioregional Assessment Metadata Catalogue

~~bioregional assessment methodology~~ (do not use; use ‘*Methodology for bioregional assessments of the impacts of coal seam gas and coal mining development on water resources*’ instead on first mention then subsequently ‘the BA methodology’)

Bioregional Assessment Programme (can shorten to ‘the Programme’)

Bioregional Assessment Programme Implementation Board

Bioregional Assessment Repository

Bioregional Assessment Technical Programme

bioregional assessments (BAs, not ‘BRAs’, lowercase unless part of an official name)

~~Bioregional Assessments~~ (do not capitalise unless part of an official name such as ‘Bioregional Assessment Programme’)

black box (two words, for *Eucalyptus largiflorens*; exception is if it is spelt differently in an official name)

Black Jack Group

Blackwater Group

blue-green algae (hyphen)

blue-green algal bloom (hyphen)

Blythesdale Group

Bohena Seam

Bohena Trough

~~BOM~~ (spell out fully: ‘Bureau of Meteorology’)

bord-and-pillar mining

bore (use ‘bore’ not ‘well’ in the context of groundwater. Do not use ‘bore’ to refer to oil or gas (hydrocarbon) – use ‘well’ instead)

bore yields (use ‘L/second’ for units and ‘L/s’ in tables and figures only)

borefield (one word)

borehole (one word)

Bottom Rider seam

Bowens Road Coal Member

~~BRA~~ (use ‘BA’ instead as shortened form for ‘bioregional assessment’)

~~BRAM~~ (use ‘*Methodology for bioregional assessments of the impacts of coal seam gas and coal mining development on water resources*’ instead)

~~BRAs~~ (use ‘BAs’ instead as shortened form for ‘bioregional assessments’)

~~BRASS~~ (use ‘BA’ instead as shortened form for ‘bioregional assessment’)

Braymont Coal Member

breakout (one word)

broadacre (one word)

Brown Seam

brownfield ('brownfield development' or 'brownfield developments')

Bundamba Group

Bungil Formation

~~Bureau~~ (spell out fully: 'Bureau of Meteorology', except in internal documents)

Bureau of Meteorology (use 'the Bureau' only on internal documents)

bushfire (one word)

bypass (one word)

by-product (hyphen)

## C

°C/km

Cadna-owie – Hooray Aquifer

Cadna-owie Formation

~~Cainozoic~~ (use 'Cenozoic' instead)

Calcarosols (not 'calcarosols', not 'Calcarosol soils')

callout (one word)

Canaway Fault

carbon capture and storage (CCS)

carbon dioxide (CO<sub>2</sub>) (include compound in brackets on first instance only, 'carbon dioxide' for subsequent instances)

Carpentaria Basin

Casino Trough

catchment management authorities (CMAs; capitalise if part of an official name; not capitalised if used generically)

catchment management authority (CMA; capitalise if part of an official name; not

capitalised if used generically; if using just 'authority' in text, use lowercase 'a')

cease-to-flow (adjective)

Cenozoic (do not use 'Cainozoic', note that the Cenozoic includes the Quaternary)

Central Eromanga Basin

Central West Catchment Management Authority (CWCMA)

Central West subregion (in Northern Inland Catchments bioregion, do not shorten)

~~chapter~~ (use 'section' instead)

Charbon Subgroup

Chromosols (not 'chromosols', not 'Chromosol soils')

Clarence-Moreton Basin (do not shorten)

Clarence-Moreton bioregion (not just 'Clarence-Moreton'; do not shorten)

Clarence-Moreton Bioregional Assessment (the Assessment)

~~Clarence-Moreton subregion~~ (use 'Clarence-Moreton bioregion' instead)

~~Clarence-Morton~~ (use 'Clarence-Moreton' instead)

Clareval Coal Member

Clareval Seam

Clean Water Plan (all capitalised)

Clematis-Warang Sandstone

climate (not 'climatic')

climate grid cells (spell out 'degrees' instead of using symbol '°'; e.g. 'parameter values for all 0.05 degree grids')

Cloncurry

Coal Lease (CL) XXX ('CL XXX' on subsequent instance)

coal lease (CL; lowercase when generic)

coal measures (plural, i.e. 'coal measures are ...')

~~coal mine~~ (use 'large coal mining' instead in phrases such as 'impacts of coal seam gas and large coal mining development on water resources')

~~coal mining~~ (use 'large coal mining' in phrases such as 'impacts of coal seam gas and large coal mining development on water resources')

coal resource development (do not shorten to 'CRD')

coal resource development pathway (CRDP; only one for each subregion, so do not use plural unless talking about several 'coal resource development pathways' from different subregions; see Section 4.2.8 for details)

coal seam gas (CSG; called 'coal bed methane' in US)

coal-bearing (adjective)

coefficient of variation (not 'coefficient of variability')

Colinlea Sandstone

Collaborative Australian Protected Area Database (CAPAD)

Collaborative Head Agreement

commercial forestry plantations

Commodore Seam

common names of plants and animals (lowercase, do not italicise in text, on first mention include scientific name in brackets then subsequently just common name, use

hyphens in common names such as 'white-bellied sea eagle')

~~Commonwealth Government~~ (use 'Australian Government' instead, except for legislation)

Commonwealth Heritage List (CHL)

Commonwealth heritage-listed (adjective)

Commonwealth Scientific and Industrial Research Organisation (CSIRO; does not need to be spelt out in full ever, except in table of abbreviations as desired)

the Commonwealth's *Basin Plan 2012* (first mention in section, then subsequently 'the Basin Plan'. See 'legislation' in Table 10 for more details)

the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (first mention in section, then subsequently 'EPBC Act'. See 'legislation' in Table 10 for more details)

Communications and Engagement Working Group (CEWG)

company names (standardised long forms and short forms of mining companies names are documented on SharePoint <https://teams.csiro.au/sites/BA/Products/Lists/CompanyNames/AllItems.aspx>. Use the long form at first instance and introduce short form in brackets as with acronyms. Companies should be referred to as 'it' not 'their', e.g. 'AGL will consider releasing its data.')

compass points (see 'hyphenating points of the compass' in Table 10)

component (not capitalised when used generically)

Component 2 and Component 3 (note: capitalisation for consistency with 'Section 4.2 and Section 4.3'; do not use 'components 2 and 3')

Component 1 (capitalised when an official name of a component)	Cooper subregion (in Lake Eyre Basin bioregion, do not shorten)
Component 1: Contextual information	co-produce (hyphen)
Component 1: Contextual information for the Namoi subregion	co-produced (hyphen)
Component 2: Model-data analysis	Coreena Member
Component 3: Impact analysis	Cork Fault
Component 4: Risk analysis	<del>corn</del> (use 'maize')
Component 5: Outcome synthesis	Corner Inlet (pertaining to the Gippsland Lakes)
Computable General Equilibrium (CGE)	cost–benefit analysis
conceptual model of causal pathways	costs and benefits (not 'benefits and costs')
conceptual modelling	Council of Australian Governments (COAG)
Condamine	cross-reference (hyphen)
Condamine Catchment Management Authority (CCMA)	cross-section (hyphen)
conductivity-depth	Crown Point Formation
connectivity	CSIRO ('CSIRO' should be acknowledged as the collaborator for bioregional assessments, not 'CSIRO Water for a Healthy Country')
consequences	CSIRO Data Access Portal
Consolidated Coal Lease (CCL) XXX ('CCL XXX' on subsequent instance)	Cubaroo Formation
consolidated coal lease (CCL; lowercase when generic)	Cullen Bullen Subgroup
context	<del>cume</del> (use 'm <sup>3</sup> /s' instead)
context statement (product 1.1) (when generic)	cumulative management area (CMA)
contextual information (Component 1) (when generic)	current resource development
conventional gas (about 1.5 km depth)	<b>D</b>
coolibah (for <i>Eucalyptus coolabah</i> ; exception is if it is spelt differently in an official name)	data (plural, i.e. 'the data are ...' not 'the data is ...')
Cooper Basin	data loggers
Cooper Creek – Bulloo river basin	Data Oversight Group (DOG)
	data, information and models
	database (one word)

dataset (one word)	dewatering
dates (use format '14 September 1996')	Dewrang Group
decision maker	Diamantina–Georgina river basin
decision making (noun)	Digby Formation
decision-making (adjective)	digital elevation model (DEM)
Department of Agriculture	digital soil mapping (do not shorten as 'DSM')
Department of Agriculture and Food Western Australia (DAFWA)	direct, indirect and cumulative impacts (do not change order of adjectives)
Department of Agriculture, Fisheries and Forestry (use 'Department of Agriculture' instead)	discharge
<del>Department of Sustainability, Environment, Water, Population and Communities</del> (use 'Department of the Environment and Energy' instead, unless citing publications published by SEWPaC prior to 18 September 2013)	diversion
Department of the Environment and Energy (do not use 'Department of Sustainability, Environment, Water, Population and Communities' from 18 September 2013)	Divertible Water Allocation Information Database (DWAID)
Department of Water (DoW; Government of Western Australia)	downhole (one word)
depressurisation	downstream (one word)
depressurise	drainage division (capitalised if part of a proper name; not capitalised if used generically)
depth to watertable	drawdown (one word)
Dermosols (not 'dermosols', not 'Dermosol soils')	drill stem test(s) (DST(s))
desktop (no hyphen)	drill-hole (hyphen)
development pathway (do not use 'scenario' unless referring to work external to the Technical Programme)	drought-proofing (hyphen)
<del>developments</del> (use 'development' instead in phrases such as 'impacts of coal seam gas and large coal mining development on water resources')	dry season (noun)
	dryland (one word)
	dry-season (adjective)
	Dunda Beds
	Dunda-Rewan
	Dunedoo Formation
	<b>E</b>
	e.g. (not 'eg' or 'eg.'; use only within brackets and spell out as 'for example' in text)
	earth (soil)

Earth (the planet)	environmentally relevant activities (ERA)
east–west cross-section	EPBC Act-listed (ensure that long form of ‘EPBC’ is used at first instance ‘the Commonwealth’s <i>Environment Protection and Biodiversity Conservation Act 1999</i> ’)
ecohydrology	et al. (not italicised, just one full stop)
ecological (not ‘ecologic’)	etc.
ecological asset(s) (one of the three asset groups)	Evans Head Coal Measures
ecology, hydrology, geology and hydrogeology (use this order whenever listing the disciplines in the BAs)	evapotranspiration (use ‘actual evapotranspiration’ or ‘potential evapotranspiration’ where possible. Use ‘evapotranspiration’ only when referring to the general process)
economic asset(s) (one of the three asset groups)	exceedance (not ‘exceedence’)
economic demonstrated resources (EDR)	Exploration Licence (EL) XXX (‘EL XXX’ on subsequent instance)
ecosystem	exploration licence (EL; lowercase when generic)
emphasis: use italics not bold	Exploration Licence Area (ELA) XXX (‘ELA XXX’ on subsequent instance)
end-of-system (EOS; use the abbreviation sparingly; use hyphens in the long form)	exploration licence area (ELA; lowercase when generic)
environmental authority (EA)	Exploration Permit for Coal (EPC) XXX (‘EPC XXX’ on subsequent instance)
environmental impact assessment (EIA; not capitalised when used generically; note that an environmental impact assessment is the process by which an environmental impact statement might be produced)	exploration permit for coal (EPC; lowercase when generic)
environmental impact statement (EIS; not capitalised when used generically; note that an environmental impact assessment is the process by which an environmental impact statement might be produced)	Exploration Permit for Petroleum (EPP) XXX (‘EPP XXX’ on subsequent instance)
the Commonwealth’s <i>Environment Protection and Biodiversity Conservation Act 1999</i> (first mention in section, then subsequently ‘EPBC Act’. See ‘legislation’ in Table 10 for more details)	exploration permit for petroleum (EPP; lowercase when generic)
Environmental Resources Information Network (ERIN)	extraction
Environmental Systems Research Institute (Esri)	the Commonwealth’s <i>Environment Protection and Biodiversity Conservation Act 1999</i> (first mention in section, then subsequently ‘EPBC Act’. See ‘legislation’ in Table 10 for more details)

## F

Farmers Creek Formation

~~Federal Government~~ (use 'Australian Government' instead)

feedback (one word)

Ferrosols (not 'ferrosols', not 'Ferrosol soils')

Figure 6 and Figure 7 (not 'figures 6 and 7')

financial years: '2006–07' (not '2006–2007', not '2006-07', not '2006/07')

fit for purpose (noun)

fit-for-purpose (adjective)

Flagship (capitalised)

flood runner (two words)

floodplain (one word)

flow path (two words)

Flyblowers Creek Coal

focused

focusing

fore-arc

formation

~~frace~~ (use 'hydraulic fracture' instead)~~fracing~~ (use 'hydraulic fracturing' instead)

fractions (spell out and hyphenate in text, e.g. 'three-quarters')

## G

~~GA~~ (spell out fully: 'Geoscience Australia')

GABFLOW

GABHYD

GABLOG (database)

GABMOD

GABSIM

GABtran

Galilee Basin

Galilee subregion (in Lake Eyre Basin bioregion, do not shorten)

gamma-ray spectroscopy

Gelliondale Seam

geographic information system (GIS)

Geological Survey of Queensland (GSQ)

GEOMET

Geoscience Australia (do not shorten as 'GA')

~~Geosciences Australia~~ (use 'Geoscience Australia' instead)

geostatistics

~~gigalitre or gigalitre/year~~ (water volume units; always use 'GL' and 'GL/year' in text but use 'GL/y' in tables and figures)

Gilgandra Trough

Gippsland Basin bioregion (do not shorten)

Gippsland Basin Bioregional Assessment (the Assessment)

~~Gippsland Basin subregion~~ (use 'Gippsland Basin bioregion' instead)

Gippsland Lakes

Gippsland Lakes and Corner Inlet (not 'Gippsland Lakes System')

~~Gippsland Lakes System~~ (use 'Gippsland Lakes and Corner Inlet' instead)

Gladstone Liquefied Natural Gas (GLNG)



global climate model (GCM; IPCC also defines as 'general circulation model' but use 'global climate model' which they use as well)

Gloucester Coal Measures

Gloucester subregion (in Northern Sydney Basin bioregion, do not shorten)

GMU(s) (groundwater management unit(s))

GoCADPressure QC (tool)

govdex (not capitalised)

Great Artesian Basin (GAB)

Great Artesian Basin Coordinating Committee (GABCC)

Great Artesian Basin Sustainability Initiative (GABSI)

Great Artesian Basin Water Resource Assessment

Great Barrier Reef (do not shorten to 'GBR')

greenfield ('greenfield development' or 'greenfield developments')

grid cell (not 'grid-cell')

ground cover (two words, no hyphen)

ground surface (two words, no hyphen)

groundwater (one word, not 'ground water')

groundwater access entitlements

~~groundwater head~~ (use 'groundwater level' instead)

groundwater level (elevation of the watertable or the elevation of groundwater that resides in a deeper layer)

groundwater management area (not capitalised when used generically)

groundwater management unit(s) (GMU(s))

groundwater recharge

Groundwater Resource Condition Indicator (GRCI)

~~groundwater table~~ (use 'watertable' instead)

groundwater-dependent ecosystem (GDE; hyphen)

groundwaters

Gunnedah Formation

GWMWater (now always referred to as GWMWater, previously known as Grampians Wimmera Mallee Water)

Gwydir subregion (in Northern Inland Catchments bioregion, do not shorten)

## H

half-graben(s) (hyphen)

harvestable right volume (this is the correct term; do not shorten to 'harvestable right')

hazard (okay to use at high level, but 'impact mode' is the preferable term in detailed analysis)

~~HD~~ (use 'hydrodynamic' instead)

headwaters (one word)

headworks (one word)

Healthy HeadWaters Program

Healthy Waterways

heathland(s) (one word)

Helidon Sandstone

hierarchical cluster analysis (HCA)

~~high and low~~ (use 'low and high' instead)

high flow (noun)

high speed processing (do not hyphenate)

high-flow (adjective)

high-flow period (hyphen)

highwall mining

historical (do not use ‘historic’ unless writing about an event which will make, or has made, history. Use ‘historical’ when discussing climate, time series or pathways)

hollow-bearing logs (hyphen)

Hon.

The Hon. Greg Hunt, MP, Minister for the Environment

Hooray Sandstone

Hoskissons Coal

<http://www.bioregionalassessments.gov.au>

Hulton-Rand Structure

Hunter subregion (in Northern Sydney Basin bioregion, do not shorten)

Hutton Sandstone

Hutton-Precipice

hydraulic connectivity

hydraulic fracturing (not ‘fracking’)

~~hydraulic head~~ (use ‘groundwater level’ instead)

hydroclimatological (not ‘hydro-climatological’)

~~hydro-climatological~~ (use ‘hydroclimatological’ instead)

hydrodynamic (do not shorten to ‘HD’)

hydro-electric

hydro-electricity

hydrogeology

hydrological (not ‘hydrologic’)

hydrological response variable (not ‘response variable’, do not shorten to ‘HRV’)

Hydrosols (not ‘hydrosols’, not ‘Hydrosol soils’)

hydrostratigraphy

hypersaline (one word)

## I

i.e. (not ‘ie’ or ‘ie.’; use only within brackets and spell out as ‘that is’ in text)

Illawarra Coal Measures

impact

impact analysis (Component 3)

impact mode (use instead of ‘hazard’ when reporting results. Okay to use ‘hazard’ in general communication)

impact of X on Y (not ‘upon’)

impacts of coal seam gas and large coal mining development on water resources (use this exact phrase, noting: ‘development’ not ‘activities’; ‘development’ not ‘developments’; ‘coal mining’ not ‘coal mine’; ‘coal seam gas’ first then ‘coal mining’; ‘large coal mining’ not ‘coal mining’)

Important Bird and Biodiversity Areas (IBAs) (not italicised) (note that this has superseded the Important Bird Areas (IBAs) in 2011)

in situ (not italicised)

Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC, after 27 November 2012)

Indigenous (not ‘Aboriginal’, except where ‘Aboriginal’ is part of an official name, or a local group requests the use of ‘Aboriginal’)

Indigenous Protected Area(s) (capitalise)

Industry & Investment NSW (I&I NSW; absorbed DPI)

inflow (one word)

Information Platform for the Bioregional Assessment (IPBA; after 1 July 2013 called the Bioregional Assessment Information Platform (BAIP))

infrared

Injune Creek Group

instream (one word)

intake (one word)

inter-aquifer (hyphen)

interconnectivity (one word, no hyphen)

Intergovernmental Panel on Climate Change (IPCC)

Interim Biogeographic Regionalisation of Australia (IBRA) (when named in text, ensure that it is clearly an IBRA bioregion or IBRA subregion, e.g. 'the South East Queensland IBRA bioregion' or 'the Moreton Basin IBRA subregion')

Interim Independent Expert Scientific Committee on Coal Seam Gas and Coal Mining (IIESC, before June 2012)

Interim Program Leadership Group (until 9 August 2013)

Ipswich Coal Measures

IQQM (Integrated Quantity-Quality Model)

Irondale Coal

irrigation area (use only when referring to a value in km<sup>2</sup>; if referring to location of an irrigation development use 'irrigation site')

irrigation site

the ISO 31000:2009 standard (on first mention use 'AS/NZS ISO 31000:2009 Risk management – principles and guidelines')

isosurface

## J

James Cook University (JCU)

Joe Joe Group

Juandah Coal Measures

~~judgement~~ (use 'judgment' instead)

judgment (not 'judgement')

## K

Kandosols (not 'kandosols', not 'Kandosol soils')

Kati Thanda – Lake Eyre (use instead of 'Lake Eyre' but note that the name of the bioregion has not changed)

Katoomba Coal Member

Kianga Formation

Kidston Dam (not 'Copperfield Dam')

Koburra Trough

Kooroongarra seam

Koukandowie Formation

kriging

Kurosols (not 'kurosols', not 'Kurosol soils')

## L

Lachlan Catchment Management Authority (LCMA)

~~Lake Eyre~~ ('Kati Thanda – Lake Eyre' instead but note that the name of the bioregion has not changed)

Lake Eyre Basin bioregion (do not shorten)

Lake Eyre Basin Bioregional Assessment (the Assessment)

lakebed (one word)

land system mapping

land use (two words, no hyphen even when adjective)

landholder (one word)

~~Landsat~~ (always specify which version of Landsat was used, e.g. 'Landsat TM' or 'Landsat MSS')

Landsat MSS

Landsat TM

Landsat 7 ETM+

Landscape Priority Areas (note: capitalisation)

large coal mining (use instead of 'coal mining' in phrases such as 'impacts of coal seam gas and large coal mining development on water resources')

Latrobe Seam

Leichhardt

Leloma Formation

licence (noun)

license (verb)

lidar

Lidsdale Coal

life cycle (two words)

likelihood

liquefied natural gas (LNG)

Lithgow Coal

local government areas (LGAs; not capitalised when used generically)

local land services (LLS; not capitalised when used generically)

local land services regions (LLS regions; not capitalised when used generically)

loggers

long-term average extraction limit (LTAEL)

longwall mining

Lovelle Depression

low and high (not 'high and low')

low flow (noun)

Lower Namoi Water Sharing Plan (water sharing plans are not italicised)

lowercase

low-flow (adjective)

lowland(s) (see <http://www.asris.csiro.au> for official names but when used generically use 'lowland' as a modifier and 'lowlands' as a noun)

## M

MacAlister seam

mAHD (not 'm AHD')

main stem (two words)

maize (do not use 'corn')

mangoes

Mann-Kendall tau statistic

map-maker

Maranoa

Maranoa-Balonne-Condamine subregion (in Northern Inland Catchments bioregion, do not shorten)

mASL (not 'm ASL')

material

materiality

Matters of National Environmental Significance (MNES)

Maules Creek Formation

mBGL	mining lease application (MLA; lowercase when generic)
McKinlay Shire Council	Mining Purpose Lease (MPL) XXX ('MPL XXX' on subsequent instance)
mean (use in an arithmetic sense when referring to something that has been calculated; do not use 'average')	mining purpose lease (MPL; lowercase when generic)
measurements (see 'units' in Table 11)	minus sign (use '−' not '-')
Melvilles Coal Member	model-data analysis (Component 2)
Mesozoic	<del>modeling</del> (use 'modelling' instead)
metadata (one word)	modelled
methane (CH <sub>4</sub> ) (include compound in brackets on first instance only, 'methane' for subsequent instances)	modelling
<i>Methodology for bioregional assessments of the impacts of coal seam gas and coal mining development on water resources</i> (on first mention, subsequently 'the BA methodology'; not 'BRAM')	Moolarben Coal Member
mid- (e.g. 'mid-system', 'mid-1940s', 'mid-stream', 'mid-river')	Moolayember Formation
mid infrared (do not shorten as 'MIR')	Morney Profile
mid infrared spectroscopy	Morwell Seam
Middle River Coal Member	Mount (not 'Mt')
mine (capitalise when part of an official name)	Mount Isa (not 'Mt Isa')
mine site (two words)	Mount Isa to Townsville Economic Development Zone (MITEZ)
Mineral Development Licence (MDL) XXX ('MDL XXX' on subsequent instance)	MSM-BigMod
mineral development licence (MDL; lowercase when generic)	<del>Mt</del> (do not use as a shortened form for 'Mount')
Mining Lease (ML) XXX ('ML XXX' on subsequent instance)	Mt/year
mining lease (ML; lowercase when generic)	<del>Mtpa</del> (use 'Mt/year' instead)
Mining Lease Application (MLA) XXX ('MLA XXX' on subsequent instance)	mungbean (one word)
	Murray–Darling Basin (MDB)
	Murray–Darling Basin Authority
	Murray–Darling Basin Commission
	Murray–Darling Basin Sustainable Yields Project

## N

n.d. (short form for 'no date' in in-text citations, e.g. (Aryal, n.d.))	near-shore (adjective)
Namoi Aboriginal Advisory Committee	near-surface (adjective)
Namoi river basin (not 'Namoi Catchment', not 'Namoi River Basin')	Nebine Ridge
Namoi subregion (in Northern Inland Catchments bioregion, do not shorten)	<del>New South Wales</del> (use 'NSW' instead unless part of an official name)
Napperby Formation	New South Wales Government (NSW Government)
Narrabri (not 'Narabri')	New South Wales Irrigators Council (NSWIC)
Narrabri Formation	New South Wales National Parks and Wildlife Service (NPWS)
Nash–Sutcliffe efficiency (NSE)	New South Wales Office of Water (NSW Office of Water)
<i>National atlas of groundwater dependent ecosystems</i> (GDE Atlas)	nitrogen (N <sub>2</sub> ) (include compound in brackets on first instance only, 'nitrogen' for subsequent instances)
National Geoscience Mapping Accord (NGMA)	no-flow period (hyphen)
National Groundwater Information System (NGIS)	non-aquatic
National Heritage List (NHL)	non-material
national heritage-listed	<del>north Australia</del> (use 'northern Australia' instead)
National Industrial Chemicals Notification and Assessment Scheme (NICNAS)	North Central Catchment Management Authority (North Central CMA; no hyphen)
national parks (lowercase when used generically)	north Queensland
National Partnership Agreement on Coal Seam Gas and Large Coal Mining Development (NPA)	northern Australia
National Vegetation Information System (NVIS)	Northern Inland Catchments bioregion (do not shorten)
National Water Commission (NWC)	Northern Inland Catchments Bioregional Assessment (the Assessment)
native title claims	Northern Sydney Basin bioregion (do not shorten)
natural resource management (NRM)	Northern Sydney Basin Bioregional Assessment (the Assessment)
natural resource management regions (NRM regions)	north–south cross-section
near infrared (do not shorten as 'NIR')	

not applicable (na; used in tables to mean ‘data not applicable’; always define abbreviation in table footnote)

not available (NA; used in tables to mean ‘data not available’; always define abbreviation in table footnote)

not provided (np; used in tables to mean ‘data not provided’; always define abbreviation in table footnote)

NRM regions (abbreviation for ‘natural resource management regions’)

NSW (use ‘NSW’ not ‘New South Wales’ except when part of an official name)

NT (use ‘NT’ not ‘Northern Territory’, except when part of an official name)

numerical modelling

Nymboida Coal Measures

~~open-pit mine~~ (use ‘open-cut mine’ instead)

Orallo Formation

Organosols (not ‘organosols’, not ‘Organosol soils’)

outcome synthesis (Component 5)

outcrop (noun and verb)

outflow (one word)

over estimate (verb)

overallocate

overallocation

overbank (one word)

overestimate (noun)

oxbow (one word)

OZMIN

## O

observations analysis

Office of Groundwater Impact Assessment (OGIA)

Office of Northern Australia (ONA)

offshore (one word)

offstream (one word)

oftake (one word)

one-dimensional (not ‘1D’)

on-farm (hyphenate)

ongoing (one word)

online

Oolloo Dolostone

open-cut mine

open-cut mining

## P

~~pa~~ (use ‘/year’ or ‘per year’ instead)

~~Palaeozoic~~ (use ‘Paleozoic’ instead)

paleochannel

paleontology

paleovalley

Paleozoic (do not use ‘Palaeozoic’)

pathway

Pedirka Basin

Pedirka subregion (in Lake Eyre Basin bioregion, do not shorten)

pedotransfer (do not shorten to ‘PTF’)

~~pedo-transfer~~ (no hyphen, use ‘pedotransfer’ instead)

Peel Harvey Regional Aquifer Modelling System (PHRAMS)

Pelham Seam

~~per annum~~ (use '/year' or 'per year' instead)

~~percent~~ (use symbol '%' instead. Always spell out 'percentile' and 'percentage')

percentage

percentile

permeability

Petroleum Assessment Lease (PAL) XXX ('PAL XXX' on subsequent instance)

petroleum assessment lease (PAL; lowercase when generic)

Petroleum Exploration Licence (PEL) XXX ('PEL XXX' on subsequent instance)

petroleum exploration licence (PEL; lowercase when generic)

Petroleum Exploration Licence Application (PELA) XXX ('PELA XXX' on subsequent instance)

petroleum exploration licence application (PELA; lowercase when generic)

Petroleum Lease (PL) XXX ('PL XXX' on subsequent instance)

petroleum lease (PL; lowercase when generic)

Petroleum Lease Application (PLA) XXX ('PLA XXX' on subsequent instance)

petroleum lease application (PLA; lowercase when generic)

Petroleum Production Lease (PPL) XXX ('PPL XXX' on subsequent instance)

petroleum production lease (PPL; lowercase when generic)

Petroleum Production Lease Application (PPLA) XXX ('PPLA XXX' on subsequent instance)

petroleum production lease application (PPLA; lowercase when generic)

Petroleum Special Prospecting Authority Application (PSPAPP) XXX ('PSPAPP XXX' on subsequent instance)

petroleum special prospecting authority application (PSPAPP; lowercase when generic)

~~phase~~ (use 'component' instead, when referring to the five components of a BA)

~~Phase 1~~ (use 'Component 1' instead when referring to the five components of a BA)

Pilliga Sandstone

Pinneena (sentence case, not all caps)

plant available water capacity (do not shorten to 'PAWC')

plants: common names (lowercase, do not italicise in text, hyphen for names such as 'juniper-leaved leucopogon', on first mention include scientific name in brackets (e.g. 'juniper-leaved leucopogon (*Leucopogon juniperinus*)') then subsequently just common name)

plants: scientific names (italicise in text)

plateaux (plural of 'plateau')

plural alternatives (use '(s)' instead of '/s', e.g. 'bore(s)' not 'bore/s')

Podosols (not 'podosols', not 'Podosol soils')

point source (no hyphen, even as an adjective)

Porcupine Formation

porosity

Port of Townsville (for others see [http://www.portsaustralia.com.au/members\\_list/map.htm](http://www.portsaustralia.com.au/members_list/map.htm).)

post-European

potential commercial area (PCA)

potential commercial area application (PCAA)



potential evapotranspiration (PET)

Powell Depression

pre-European

preliminary assessment extent (PAE)

Primary Industries and Resources South Australia (PIRSA)

principal component analysis (PCA)

produced water (water that is a by-product of oil and gas exploration and development)

producer

product

Product Coordinator

products (for standard text to refer to other products published by the Technical Programme see

<https://teams.csiro.au/sites/BA/Products/Lists/List%20of%20products%20and%20methodologies/AllItems.aspx>.)

Products team

Products Working Group (PWG)

~~program~~ (use 'programme' instead)

programme (not 'program')

the Programme (short form for the Bioregional Assessment Programme)

Programme Implementation Board

Programme Leadership Group  
(after 9 August 2013)

~~project~~ (when referring to a specific bioregional assessment, use the full name on first mention (e.g. 'Lake Eyre Basin Bioregional Assessment') then subsequently 'the Assessment'. Okay to use to refer to actual or potential CSG and coal developments.)

Project Agreement

Project Leaders

Projects Director

proponent

Proterozoic carbonates

proved and probable reserves (2P)

proved reserves (1P)

proved, probable and possible reserves (3P)

Pty Ltd

~~publicly~~ (use 'publicly' instead)

publicly

Purlawagh Formation

## Q

Queensland (not 'Qld', not 'QLD')

Queensland Curtis Liquefied Natural Gas (QCLNG)

Queensland Department of Agriculture, Fisheries and Forestry (QDAFF)

Queensland Department of Energy and Water Supply (DEWS)

Queensland Department of Natural Resources and Mines (DNRM)

Queensland Department of Science, Information Technology and Innovation (DSITI)

Queensland Department of State Development, Infrastructure and Planning (DSDIP)

Queensland Government

Queensland Murray-Darling Committee (QMDC; hyphen)

Queensland Petroleum Exploration Database (QPED)

Queensland's *Aboriginal Cultural Heritage Management Act 2003* (see 'legislation' in Table 10)

Queensland's *Environmental Protection Act 1994* (see 'legislation' in Table 10)

quickflow (okay to use, but use carefully; check usage with surface water discipline leader)

reserves (lowercase, as in 'national parks and reserves')

resource operations plan (ROP, not capitalised when used generically)

~~response variable~~ (use 'hydrological response variable' instead)

retro-arc

## R

R2P2 (Rapid Regional Prioritisation Process)

Raceview Formation

~~radon-222~~ (use '<sup>222</sup>Rn' instead)

rain gauge (two words)

rainfall (one word; generally singular, i.e. not 'rainfalls')

rainfall-runoff (hyphen)

Ramsar List of Wetlands of International Importance

Ramsar-listed

ratio (always spell out components, e.g. 'sand to shale ratio' or 'the ratio of sand to shale'.)

REALM

receptor

receptor impact modelling

receptor register (not 'receptors register')

recharge

Recharge Response Unit (RRU)

Red Cliff Coal Measures

redistribution (no hyphen)

refugia

Regional Development Australia

Register of the National Estate (RNE)

Rewan Formation

Richmond River

Richmond River alluvium

Richmond river basin

Richmond Seam

risk analysis (Component 4)

risk priority number (do not shorten to 'RPN')

risk score (do not shorten to 'RS')

river basin (standard hydrological unit used in BAs; use 'Namoi river basin', not 'Namoi River Basin', not 'Namoi Catchment', not 'Namoi Subcatchment')

river flow (two words)

river system(s)

Rolling Downs Group

root mean square (RMS)

Rudosols (not 'rudosols', not 'Rudosol soils')

runoff (one word)

run-of-mine (ROM)

## S

SA (use 'SA' not 'South Australia', except when part of an official name)

saturated zone

Savannah

~~scenario~~ (use 'coal resource development pathway' instead, unless referring to work external to the Technical Programme; see Section 4.2.8 for details)

scientific names of plants and animals (italicise in text, use common names generally but on first mention include scientific name in brackets)

sea-level rise

Section 4.2 and Section 4.3 (do not use 'sections 4.2 and 4.3')

Section 4.2.3 (capitalised 'Section')

semi-arid (hyphen)

Sen's slope estimate

shuffled complex evolution approach (SCE approach)

Shuttle Radar Topography Mission (SRTM)

SILO

SIMHYD

site-specific (hyphen)

Snowy Mountains Hydro-electric Scheme

social impact assessment (SIA)

~~social-economic~~ (use 'socio-economic' instead)

sociocultural

sociocultural asset(s) (one of the three asset groups)

socio-economic

socio-economic impact assessment (SEIA)

Sodosols (not 'sodosols', not 'Sodosol soils')

~~soil moisture~~ (use 'soil water' instead)

soil water (not 'soil moisture')

Source (capital 'S' when referring to the river modelling software)

South Australia Resources Information Geoserver (SARIG)

South Australian Department of Environment, Water and Natural Resources (DEWNR)

South Australian Government (SA Government)

South Australian Murray-Darling Basin Natural Resources Management Board (SAMDBNRMB)

South East Queensland

South East Queensland Water Grid

South West Natural Resource Management Group Inc (SWNRM)

South West Regional Aquifer Modelling System (SWAMS)

south-west Western Australia

Species Profile and Threats Database (SPRAT)

spring

Springsure Shelf

stand-alone (adjective)

state (not capitalised when used generically)

state and territory names: ACT, NSW, NT, Queensland, SA, Tasmania, Victoria, WA (spell out all state names in headings and captions)

state government (not capitalised when used generically)

state-based

statistical analysis

steady-state modelling (hyphenated)

Stormhill Fault

strategic agricultural land (SAL; NSW)

strategic cropping land (SCL; Queensland)

strategic management plan (SMP)	subtotal (one word)
stratigraphy	sugarcane
stream gauge (two words)	sulfate
streambed (one word)	sulfur
streamflow (one word; generally singular, i.e. not 'streamflows'; 'flow' on second mention in same paragraph is okay)	<del>sulphate</del> (use 'sulfate' instead)
streamflow gauge	<del>sulphur</del> (use 'sulfur' instead)
streamflow gauging station (not 'surface water gauge')	summer half (no hyphen)
<del>Strzelecki group</del>	SunWater
Strzelecki group	Surat Basin
<del>study area</del> (use 'Assessment area' instead)	Surat Siltstone
subalpine (no hyphen, unless listed otherwise in threatened species lists in state or Commonwealth legislature)	Surface and Groundwater Approved Work Locations database
sub-artesian (hyphen)	surface runoff (but 'runoff' on second mention in same paragraph is okay, unless talking about 'runoff coefficients')
sub-basin (hyphen)	surface water
<del>subbioregion</del> (use 'subregion' instead)	surface water – groundwater connectivity
subcatchment (one word)	surface water – groundwater interactions
subeconomic demonstrated resources (SDR)	surface water access entitlements
subgroup	surface water and groundwater (do not use 'surface and groundwater')
<del>sub-group</del> (use 'subgroup' instead)	<del>surface water balance</del>
submethodology	<del>surface water gauge</del> (use 'streamflow gauging station' instead)
<del>sub-methodology</del> (use 'submethodology' instead)	surface water system
subregion (one word, not 'subbioregion')	sustainable diversion limit resource unit (SDL resource unit)
<del>sub-region</del> (use 'subregion' instead)	sustainable yield
subsidence	Sydney Basin bioregion (do not shorten)
subsurface (one word)	Sydney Basin Bioregional Assessment (the Assessment)
subterranean	

## T

Table 6 and Table 7 (not 'tables 6 and 7')

Taroom Coal Measures

Taroom Trough

Tasmania (do not use 'Tas')

Tasmanian Government

Technical Assurance Reference Group (TARG)

Technical Programme (that part of the Bioregional Assessment Programme that is producing technical products for the first six bioregions, from 2013 to 2016)

ten (spell out in text; not '10')

Tenosols (not 'tenosols', not 'Tenosol soils')

Terms of Reference

territory (not capitalised when used generically)

~~Tertiary~~ (use 'Paleogene', 'Neogene' or 'Cenozoic' instead)

tested streamflow station (not 'validated streamflow station')

the Commonwealth's *Basin Plan 2012* (first mention in section, then subsequently 'the Basin Plan'. See 'legislation' in Table 10 for more details)

the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (first mention in section, then subsequently 'EPBC Act'. See 'legislation' in Table 10 for more details)

the Hon. Greg Hunt, MP, Minister for the Environment

~~the north~~ (use 'northern Australia' instead)

the Queensland *Aboriginal Cultural Heritage Management Act 2003* (see 'legislation' in Table 10) the Queensland *Environmental*

*Protection Act 1994* (see 'legislation' in Table 10)

Theil-Sen estimator

Thomson River Fault

threatened ecological communities (do not shorten to 'TEC')

three-dimensional (not '3D')

throughflow (one word)

time frame (two words)

time series (two words)

time step (two words)

timescale (one word)

Timor Sea Drainage Division

titles (book and report titles are italicised in text)

total dissolved solids (TDS)

total magnetic intensity (TMI)

total suspended solids (TSS)

trade-offs

Traditional Owners (both capitalised)

Traralgon Seam

Trinkey Formation

Tropical Rivers and Coastal Knowledge Research Hub (TraCK)

TropWATER (use instead of 'Centre for Tropical Water and Aquatic Ecosystem Research')

Turill Coal Member

two-dimensional (not '2D')

## U

Ulan Coal

Ulan Seam

uncertainty

unconventional gas (CSG and shale gas, about 0.5 km depth)

under estimate (verb)

underestimate (noun)

underlain (not 'underlaid' in sentences such as 'The area is underlain by the southern Bowen Basin.')

understorey

~~understories~~ (use 'understorey' as a plural instead)

units (see 'units' in Table 11)

unknown (use in tables when value is unknown)

unsaturated zone

unsupplemented (one word)

upland(s) (see <http://www.asris.csiro.au> for official names but when used generically use 'upland' as a modifier and 'uplands' as a noun)

upsidence

upstream (one word)

URLs (do not use angle brackets (<>), do ensure that text is hyperlinked and includes the protocol (usually 'http://' or 'https://', e.g. '<http://www.csiro.au>')

## V

~~validated streamflow station~~ (use 'tested streamflow station' instead)

Vertical Flux Model (VFM)

Vertosols (not 'vertosols', not 'Vertosol soils')

Victoria (do not use 'Vic')

Victorian Government

Victorian Rural Water Commission (RWC; Renamed in 1992, becoming the Rural Water Corporation. On 1 July 1994, it was separated into five independent rural water authorities)

## W

WA (use 'WA' not 'Western Australia' except when part of an official name)

Walloon Coal Measures

Walloon Subgroup

Wallumbilla Formation

Warang-Clematis Group

warm-up (hyphen)

Warrill creek basin

water access right (lowercase)

water allocation

water allocation plan (WAP)

Water Asset Information Tool (WAIT)

water balance (two words)

water bodies (two words)

water bores (two words)

Water Corporation (West Australian)

water dependent (noun)

Water for the Future initiative

Water Information (WIN; as in 'WIN database')

water quality analysis

water resource plan (WRP; not capitalised when used generically)

Water Resources Observation Network (WRON)

water sharing plan (WSP; not capitalised when used generically)

water system	well (use 'well' for oil wells or gas (hydrocarbon) wells; use 'bore' not 'well' in the context of groundwater)
water use	
<del>water-way</del> (use 'waterway' instead)	wellbeing
water year (two words, no hyphen)	wellfield (one word)
water-bearing (adjective)	wellhead (one word)
waterbird (one word)	Westbourne-Birkhead
watercourse (one word)	Western Eromanga Basin
WaterCress	wet season (noun)
water-dependent (adjective)	wet-season (adjective)
water-dependent asset (not 'water-related asset')	Whaka Coal Member
water-dependent asset register	white-bellied sea eagle (hyphen)
water-dependent ecosystem (hyphen)	whole-of-basin (hyphens)
waterhole (one word)	winter half (no hyphen)
Watermark Formation	Winton-Mackunda Formation
<del>water-related asset</del> (use 'water-dependent asset' instead)	wire-line logs (hyphen)
<del>watershed</del> (do not use this American term)	without development (noun)
watertable (one word)	without-development (adjective)
<del>watertable elevation</del> (use 'watertable level' instead)	World Heritage Convention
watertable level	World Heritage List (WHL)
waterway (one word)	World Heritage Site
WAVES	<a href="http://www.bioregionalassessments.gov.au">http://www.bioregionalassessments.gov.au</a>
webpage	Wyandra-Hooray Sandstone
website	
weir	
Weismantel Seam	

## X, Y and Z

Yallourn Seam

year (see Table 11 for details)

zero-flow (adjective)

## 4.2 Discipline language specifications

### 4.2.1 Geography

The Australian Soil Classification specifies the following soil order classification:

- Anthrosols
- Calcarosols
- Chromosols
- Dermosols
- Ferrosols
- Hydrosols
- Kandosols
- Kurosols
- Organosols
- Podosols
- Rudosols
- Sodosols
- Tenosols
- Vertosols.

### 4.2.2 Geology

When writing about geology, the following authorities on geological timescale, stratigraphic units and physiographic regions must be adhered to:

- Geological Timescale 2012 – this is the point of reference for age dates and correct spelling of geological time units to be used  
<https://engineering.purdue.edu/Stratigraphy/charts/chart.html>.
- Australian Stratigraphic Units Database – this database should be used to ensure correct and current formal names of all stratigraphic units <http://www.ga.gov.au/products-services/data-applications/reference-databases/stratigraphic-units.html>.
- ASRIS – Physiographic Regions of Australia – this is the most up-to-date guide to the national physiography <http://www.asris.csiro.au/themes/PhysioRegions.html>. It provides a nation-wide systematic classification scheme and is a useful reference point.



The geology discipline has agreed on the following conventions:

- for geological basins: use 'Surat Basin' and 'Bowen Basin' (with capitalised 'Basin') with official names and capitalisation as specified by GA <http://www.ga.gov.au/products-services/data-applications/australian-geological-provinces.html>.
- the first time geological basins are mentioned in a section specify it as a geological basin, for example 'the geological Surat Basin' and subsequently 'Surat Basin'. In sections that are not primarily about geology, 'geological Surat Basin' should be used more often depending on context, to avoid confusion with river basins.
- company names. A running list of company names is kept on SharePoint <https://teams.csiro.au/sites/BA/Products/Lists/CompanyNames/AllItems.aspx> for names of mining companies. Use long form at first instance and introduce short form in brackets as with acronyms. Companies should be referred to as 'it' not 'their', e.g. 'AGL will consider releasing its data.'

### 4.2.3 Hydrogeology

The hydrogeology discipline has agreed on the following conventions:

- depth to watertable (the distance between ground surface and the watertable)
- ~~groundwater head~~ (use 'groundwater level' instead)
- groundwater level (elevation of the watertable or the elevation of groundwater that resides in a deeper aquifer)
- ~~hydraulic head~~ (use 'groundwater level' instead)
- ~~watertable elevation~~ (use 'watertable level' instead)
- watertable level (the elevation of the watertable relative to the Australian Height Datum (AHD)).

### 4.2.4 Surface water hydrology

The surface water hydrology discipline has agreed on the following conventions:

- ‘river basin’ is the largest standard hydrological unit used in BAs; use ‘Namoi river basin’, not ‘Namoi River Basin’, not ‘Namoi Catchment’, not ‘Namoi Subcatchment’
- ‘quickflow’ – one word, no space, no hyphen – is okay to use but use carefully. Discipline leader to check usage
- upper and lower reaches, and upper, middle or lower catchment – these are all ‘fuzzy’ boundaries and will not have hard boundaries
- upland(s) and lowland(s) – always check <http://www.asris.csiro.au> for official names but when used generically use ‘upland’ and ‘lowland’ as a modifier and ‘uplands’ and ‘lowlands’ as a noun
- ‘stream’ is generic word for all watercourses – rivers, creeks and streams are types of streams
- ‘streamflow’ – but ‘flow’ on second mention in same paragraph is okay
- ‘surface runoff’ – but ‘runoff’ on second mention in same paragraph is okay (unless talking about ‘runoff coefficients’)
- ‘streamflow gauge’
- ‘streamflow’ is generally singular
- ‘rainfall’ is generally singular
- ‘surface water systems’
- ‘river systems’
- do not use ‘surface water balance’.

### 4.2.5 Ecology

The ecology discipline has agreed on the following conventions:

- coolibah (*Eucalyptus coolabah*)
- black box (*Eucalyptus largiflorens*)
- common names are used throughout but the first usage is followed by the scientific name, italicised and in brackets (e.g. ‘black box (*Eucalyptus largiflorens*)’)
- scientific names always in long form, not shortened (e.g. use ‘*Eucalyptus coolabah*’ not ‘*E. coolabah*’)
- ‘sp.’ or ‘spp.’ When not able to actually identify to species level – they are set in roman type not italics (e.g. ‘*Eucalyptus* sp.’ Or ‘*Eucalyptus* spp.’)
- only common names for vegetation communities (e.g. ‘coolibah – black box woodlands’, or ‘New England peppermint grassy woodlands’)
- names of threatened ecological communities should match <http://www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl>, following the capitalisation and punctuation exactly, for example ‘White Box-Yellow Box-

Blakely's Red Gum Grassy Woodland and Derived Native Grassland'. Use 'single quote marks' around names of threatened ecological communities in running text to offset them. Single quote marks are not needed around threatened ecological communities listed in tables.

- Spelling, capitalisation and hyphenation of species names should match the relevant legislation exactly (or in the case of assets, which should match the dataset they come from. See Section 4.2.7). Where species are compared across state and federal legislation side by side (in the same table, for instance) names should match federal legislation (e.g. 'Eastern Spider Orchid' as per the EPBC Act instead of 'Eastern Spider-orchid' as per the FFG Act).

Note the capitalisation and spelling of the following programs, databases, directories, registers and information systems relevant to ecology in BAs:

- The Australian Collaborative Land Use and Management Program (ACLUMP)
- Collaborative Australian Protected Area Database (CAPAD)
- *A directory of important wetlands in Australia* (DIWA)
- Interim Biogeographic Regionalisation for Australia (IBRA)
  - The latest version, IBRA7, classifies Australia's landscapes into 89 large geographically distinct bioregions based on common climate, geology, landform, native vegetation and species information. The 89 bioregions are further refined to form 419 subregions which are more localised and homogenous geomorphological units in each bioregion.
- The National Vegetation Information System (NVIS), check terminology and spelling:
  - sorted by code: <http://www.environment.gov.au/system/files/pages/ba1d4b30-d46f-42f7-bec2-fac391f26072/files/mvg-numeric.pdf>
  - NVIS preferred order: <http://www.environment.gov.au/system/files/pages/ba1d4b30-d46f-42f7-bec2-fac391f26072/files/mvg-preferred1.pdf>.
- The Register of the National Estate (RNE) (closed in 2007 and is no longer a statutory list). The RNE is now an archive of information about more than 13,000 places throughout Australia. It has been replaced with two other lists under the EPBC Act:
  - National Heritage List <http://www.environment.gov.au/topics/heritage/heritage-places/national-heritage-list>
  - Commonwealth Heritage List <http://www.environment.gov.au/topics/heritage/heritage-places/commonwealth-heritage-list>.
- Birds Australia (Important Bird Areas; IBA) ceased in 2011 Birdlife Australia (Important Bird and Biodiversity Areas; IBA) commenced in 2012. It is the result of a merger between Birds Australia and the Bird Observers' Club of Australia (BOCA). Note that Birdlife Australia also refer to Important Bird Areas. The dataset cited frequently in product 1.3s is from Birds Australia:
  - Birds Australia (2009) Birds Australia - Important Bird Areas (IBA) 2009. Bioregional Assessment Source Dataset. Viewed 19 April 2015, <http://data.bioregionalassessments.gov.au/dataset/5d488350-83b6-4e71-8d17-687ad8ff9941>.

#### 4.2.5.1.1 Checking terminology and names

For specifics, see:

- general website: <http://www.environment.gov.au/topics/land/national-reserve-system/science-maps-and-data/australias-bioregions-ibra>
- IBRA bioregions: <http://www.environment.gov.au/system/files/pages/5b3d2d31-2355-4b60-820c-e370572b2520/files/bioregions-new.pdf>
- IBRA subregions: <http://www.environment.gov.au/system/files/pages/5b3d2d31-2355-4b60-820c-e370572b2520/files/subregions-new.pdf>.

#### 4.2.5.1.2 Citing Interim Biogeographic Regionalisation for Australia

For anything generic, cite the website so the in-text citation is '(Department of the Environment, 2014)'. Citing more specific things depends on context, particularly on which version is being used (e.g. 'Environment Australia (2000) Revisions of the Interim Biogeographic Regionalisation Australia (IBRA) and development of version 5.1. Summary report. Environment Australia, ACT.')

Examples of usage to differentiate from BA's bioregions and subregions:

The major 'natural bioregions' of the CMA – as classified by the Interim Biogeographic Regionalisation of Australia (IBRA), (Environment Australia, 2000) – are NSW North Coast IBRA bioregion (47.4%), Sydney Basin IBRA bioregion (39.8%) and Brigalow Belt South IBRA bioregion (9.4%). Smaller areas of the CMA lie within the New England Tablelands, NSW South Western Slopes and Nandewar IBRA bioregions.

The main IBRA bioregions within the Hunter subregion are the Sydney Basin IBRA bioregion (mainly Hunter, Kerrabee, Wyong, Yengo and Wollemi IBRA subregions), which accounts for 77% of the subregion, and the Brigalow Belt South IBRA bioregion (mainly the Liverpool Range IBRA subregion), which accounts for 20% of the Hunter subregion.

Sometimes codes are used for IBRA bioregions and subregions (e.g. 'NNC' for NSW North Coast IBRA bioregion or 'NNC10' for the Upper Manning IBRA subregion of the NSW North Coast IBRA bioregion). These codes should not be used in BA products – use the full name instead.

#### 4.2.5.2 ***Moving from catchment management authorities to local land services regions in NSW***

To explain the shift from catchment management authorities to local land service regions (LLS) in NSW use text similar to the following examples:

Hunter-Central Rivers Catchment Management Authority (CMA) – note that from 1 January 2014, in NSW CMAs have transitioned into local land services (LLS) regions.

The Hunter-Central Rivers Catchment Management Authority (CMA) supplied asset data covering the entire CMA which includes the Gloucester subregion – note that from 1 January 2014, in NSW CMAs have transitioned into local land services (LLS) regions.

However, as this CMA operated within the Gloucester subregion when it was defined in 2012, these data have continued to be used.

The Hunter Central Coast surface water catchments conform to the boundary of the area previously managed by the Hunter-Central Rivers Catchment Management Authority (CMA). It was this CMA boundary that was used when the Hunter subregion was defined in 2012. From 1 January 2014, all CMAs in NSW transitioned into local land services (LSS) regions and part of the Central Coast portion of the Hunter subregion is now part of the Greater Sydney LLS region. However, as it was included in the Hunter-Central Rivers CMA boundary when the Hunter subregion was defined in 2012, it is maintained as part of the Hunter subregion.

## 4.2.6 Assets and receptors

When writing about assets and receptors, use the agreed terminology and understandings as set out in Section 1.3.1.1 in product 1.3. Note that asset names are always reproduced in technical products exactly as they appear in asset list (and, consequently, the asset database). The following standard footnote should be used under Tables and Figures when needed:

<sup>a</sup>Punctuation and typography appear as used in the asset database.

The assets and receptors discipline has agreed on the following conventions:

- entities
  - assets
  - elements
  - decisions
  - receptors
- databases
  - asset database (includes elements, assets and decisions)
  - Water Asset Information Tool (WAIT) database
- lists
  - asset list (lists all assets within a PAE)
  - element list (lists all elements within a PAE)
  - receptor list (lists all receptors within a PAE)
- registers
  - water-dependent asset register (a simple and authoritative listing of the assets within the preliminary assessment extent (PAE) that are potentially subject to water-related impacts)
  - receptor register (lists only those receptors included in the BA).

See Section 7.1 for the standard geographical coordinate system (GCS) for use in the receptor register.

## 4.2.7 Baseline and coal resource development pathway

Baseline and coal resource development pathway (CRDP) are defined as follows as of 7 August 2015:

- baseline: a future that includes all coal mines and coal seam gas (CSG) fields that were commercially producing under an operations plan approved as of December 2012
- coal resource development pathway (CRDP): a future that includes all coal mines and coal seam gas (CSG) fields that are in the baseline as well as those expected to be commercially producing under an operations plan approved after December 2012. Any coal mines or CSG fields where operations plans were approved before December 2012 but were not commercially producing at that time are in the CRDP but not the baseline
- additional coal resource development (ACRD): the difference between CRDP and baseline. This is the change that is primarily reported in the Bioregional Assessment Programme.

If the development is commercially producing before December 2012 but there are changes in an operations plan that is approved after December 2012, then the commercially producing portion (as of December 2012) goes in both baseline and CRDP but the future changes go into only the CRDP.

The wording of the definition may change slightly with time but the agreement is to use this terminology going forward.

Other conventions include:

- These terms should be defined at the beginning of all relevant products and used consistently throughout.
- The shortened form 'CRDP' should be used but define in first mention in each section, and spell out in full in the caption note of any figure or table where 'CRDP' is used.
- Do not use 'scenario'.
- The terms 'existing' and 'proposed' are problematic (because baseline includes both existing and proposed, and proposed is not just CRDP); therefore minimise their use and instead use 'baseline', 'CRDP' or 'ACRD' as appropriate.
- There is no need to use terms such as 'mCRDP' or 'CRDP (modelled)' or 'cCRDP' or 'CRDP (commentary)', as previously proposed. However, at the beginning of products where only modelled CRDP results are shown, a note to that effect will be included in the blurb. Also all tables, charts and maps should have a note underneath saying 'In this figure [or table], results are presented for only that part of the coal resource development pathway (CRDP) that can be modelled'.

## 4.2.8 Data

The Bioregional Assessment Repository consists of the following:

- Bioregional Assessment Data Store ('Data Store' on subsequent mention)
- Bioregional Assessment Metadata Catalogue ('Metadata Catalogue' on subsequent mention).

Do not use 'Bioregional Assessment Data Repository'.

## 4.3 Assessment language specifications

### 4.3.1 Lake Eyre Basin Bioregional Assessment

The Lake Eyre Basin Bioregional Assessment has agreed on the following conventions.

There are three distinct geographic extents:

- Lake Eyre Basin bioregion (which has been specified by the Assessment, not by any other official entity)
- Kati Thanda – Lake Eyre (the actual lake; this is the official name of it now)
- Lake Eyre drainage catchment (the land surface over which water drains into Kati Thanda – Lake Eyre).

Significant geological formations and structures in the Galilee subregion include:

- Allaru-Wallumbilla
- Allunga Trough
- Aramac Trough
- Barcaldine Ridge
- Beryl Ridge
- Betts Creek beds
- Cadna-owie Formation
- Canaway Fault
- Clematis-Warang Sandstone
- Colinlea Sandstone
- Cork Fault
- Dunda Beds
- Dunda-Rewan
- Hooray Sandstone
- Hulton-Rand Structure
- Hutton Sandstone
- Hutton-Precipice

- Injune Creek Group
- Joe Joe Group
- Koburra Trough
- Lovelle Depression
- Moolayember Formation
- Powell Depression
- Rewan Formation
- Springsure Shelf
- Stormhill Fault
- Thomson River Fault
- Wallumbilla Formation
- Warang-Clematis Group
- Weena Trough
- Westbourne-Birkhead
- Winton-Mackunda Formation
- Wyandra-Hooray Sandstone.

### **4.3.2 Northern Inland Catchments Bioregional Assessment**

The Northern Inland Catchments Bioregional Assessment has agreed on the following conventions.

Significant geological formations and structures in the Maranoa-Balonne-Condamine subregion include:

- Bandanna Formation
- Bottom Rider seam
- Commodore Seam
- Injune Creek Group
- Juandah Coal Measures
- Kooroongarra seam
- MacAlister seam
- Pelham Seam
- Taroom Coal Measures
- Taroom Trough
- Walloon Coal Measures
- Walloon Subgroup.

Significant geological formations and structures in the Gwydir subregion include:

- Baralaba Coal Measures



- Bellata Trough
- Black Jack Group
- Blackwater Group
- Blythesdale Group
- Bohena Seam
- Bungil Formation
- Hoskissons Coal
- Kianga Formation
- Maules Creek Formation
- Moolayember Formation
- Porcupine Formation
- Taroom Trough
- Walloon Coal Measures
- Watermark Formation.

Significant geological formations and structures in the Namoi subregion include:

- Black Jack Group
- Bohena Seam
- Bohena Trough
- Braymont Coal Member
- Brown Seam
- Cubaroo Formation
- Digby Formation
- Gunnedah Formation
- Hoskissons Coal
- Maules Creek Formation
- Melvilles Coal Member
- Napperby Formation
- Narrabri Formation
- Pilliga Sandstone
- Purlawagh Formation.

Significant geological formations and structures in the Central West subregion include:

- Black Jack Group
- Charbon Subgroup
- Cullen Bullen Subgroup
- Dunedoo Formation

- Farmers Creek Formation
- Flyblowers Creek Coal
- Gilgandra Trough
- Hoskissons Coal
- Illawarra Coal Measures
- Irondale Coal
- Katoomba Coal Member
- Lidsdale Coal
- Lithgow Coal
- Maules Creek Formation
- Middle River Coal Member
- Moolarben Coal Member
- Purlawagh Formation
- Rolling Downs Group
- Trinkey Formation
- Turill Coal Member
- Ulan Coal
- Ulan Seam
- Whaka Coal Member.

### **4.3.3 Clarence-Moreton Bioregional Assessment**

Significant geological formations and structures in the Clarence-Moreton bioregion include:

- Bundamba Group
- Casino Trough
- Evans Head Coal Measures
- Ipswich Coal Measures
- Juandah Coal Measures
- Koukandowie Formation
- Nymboida Coal Measures
- Raceview Formation
- Red Cliff Coal Measures
- Richmond Seam
- Walloon Coal Measures.

Other standards specific to the Clarence-Moreton bioregion are:

- Richmond River

- Richmond River alluvium
- Richmond river basin.

#### 4.3.4 Northern Sydney Basin Bioregional Assessment

Significant geological formations and structures in the Gloucester subregion include:

- Avon Subgroup
- Bowens Road Coal Member
- Clareval Coal Member
- Clareval Seam
- Dewrang Group
- Gloucester Coal Measures
- Leloma Formation
- Weismantel Seam.

#### 4.3.5 Gippsland Basin Bioregional Assessment

The Gippsland Basin Bioregional Assessment has agreed on the following conventions:

- Alberton Seam
- Gelliondale Seam
- Latrobe Seam
- Morwell Seam
- Traralgon Seam
- Yallourn Seam.

### 4.4 Lists

This section lists information about the context, structure, mechanism and governance of the Bioregional Assessment Programme.

#### 4.4.1 Name of the Programme and its elements

Among other things, the Bioregional Assessment Programme (Figure 7) includes:

- the Bioregional Assessment Technical Programme, which comprises Assessments (as listed in Section 4.4.2) that focus on bioregions and subregions (as listed in Section 4.4.3) as well as the Assets and Receptors Project and the Bioregional Assessment Information Platform
- projects being undertaken by the SA, Victorian and Queensland governments and natural resource management groups
- input projects commissioned by the Department of Environment and Energy.

The Bioregional Assessment Technical Programme is governed by the:

- Programme Director, Technical Programme Director, Projects Director, Principal Science Advisor, Science Directors and Integration Lead
- Programme Leadership Group (PLG)
- Science Leadership Group (SLG)
- Products Working Group (PWG)
- Data Oversight Group (DOG)
- Communications and Engagement Working Group (CEWG)
- Technical Assurance Reference Group (TARG)
- Bioregional Assessment Programme Implementation Board.

The Senior Science Leaders (as listed in acknowledgements) comprise:

- Projects Director
- Science Directors
- Products Manager.

The Bioregional Assessment Technical Programme includes the following six disciplines (which are not capitalised):

- ecology
- geology
- groundwater modelling
- hydrogeology
- risk and uncertainty
- surface water hydrology.

The Bioregional Assessment Technical Programme also includes the following cross-cutting activities:

- Assets and Receptors Project
- communication and engagement
- information management
- technical products.

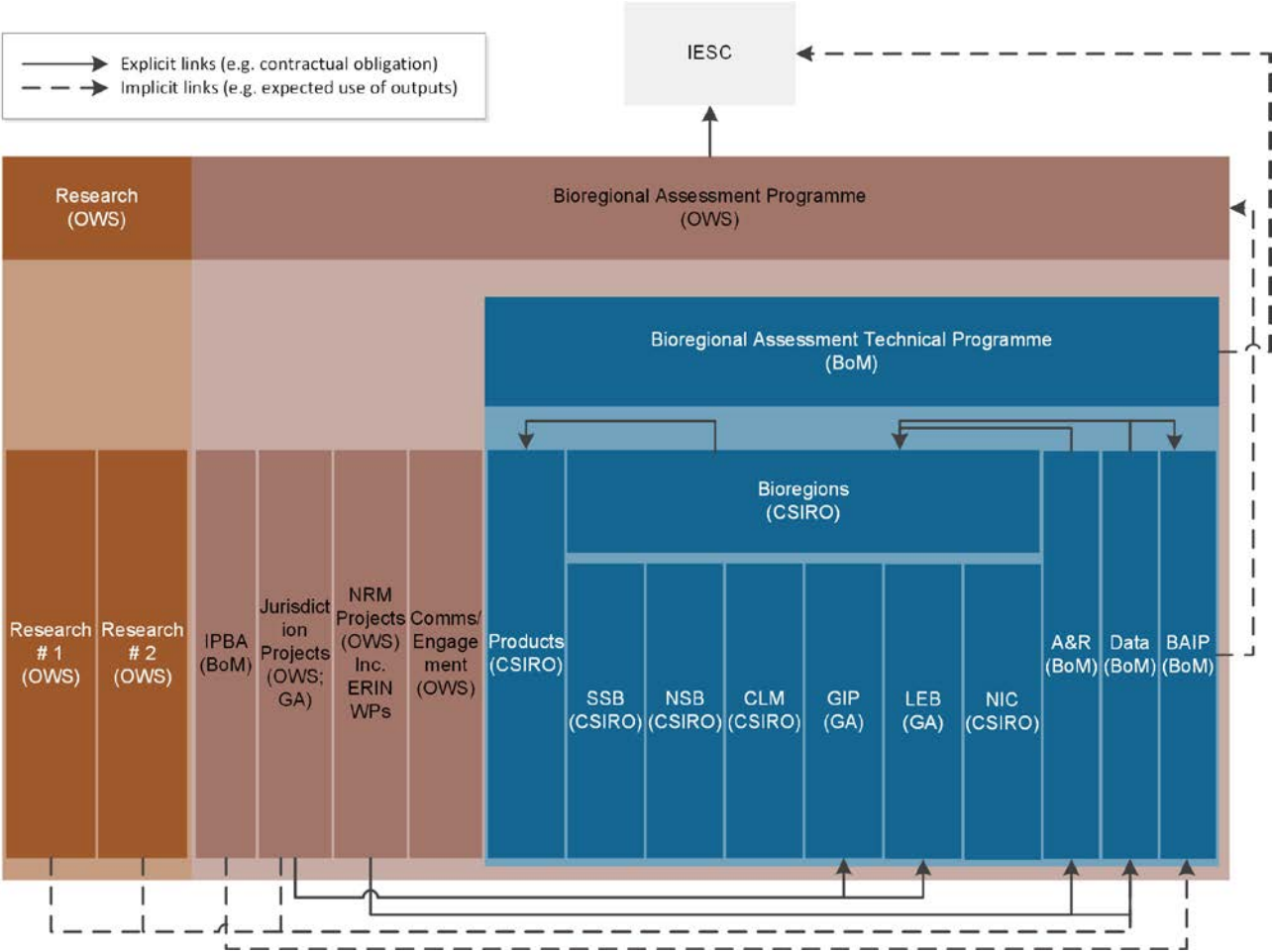


Figure 7 Elements of the Bioregional Assessment Programme

The Bioregional Assessment Technical Programme is coloured blue.

### 4.4.2 Names of the Assessments

The Assessments are always listed in the following order, from north to south:

- Lake Eyre Basin Bioregional Assessment
- Northern Inland Catchments Bioregional Assessment
- Clarence-Moreton Bioregional Assessment
- Northern Sydney Basin Bioregional Assessment
- Sydney Basin Bioregional Assessment
- Gippsland Basin Bioregional Assessment.

### 4.4.3 Names of the bioregions and subregions

The bioregions and subregions are always listed in the following order, from north to south.

Do not use abbreviations such as 'LEB' in text. Use the abbreviations only for filenames and data management (as per Chapter 2 and Table 4).

#### ***Lake Eyre Basin bioregion***

- Galilee subregion
- Cooper subregion
- Pedirka subregion
- Arckaringa subregion.

#### ***Northern Inland Catchments bioregion***

- Maranoa-Balonne-Condamine subregion
- Gwydir subregion
- Namoi subregion
- Central West subregion.

#### ***Clarence-Moreton bioregion***

This bioregion is not further divided into subregions.

#### ***Northern Sydney Basin bioregion***

- Hunter subregion
- Gloucester subregion.

#### ***Sydney Basin bioregion***

This bioregion is not further divided into subregions.

#### ***Gippsland Basin bioregion***

This bioregion is not further divided into subregions.

#### 4.4.4 Names of the five components of the methodology for bioregional assessments

- Component 1: Contextual information
- Component 2: Model-data analysis
- Component 3: Impact analysis
- Component 4: Risk analysis
- Component 5: Outcome synthesis.

#### 4.4.5 Vision and objectives

The Bioregional Assessment Programme is a transparent and accessible programme of baseline assessments that increases the available science for decision making associated with the impacts of large coal mines and coal seam gas developments on water resources.

#### 4.4.6 Types of products

Table 8 summarises the various types of products in the bioregional assessments.

**Table 8 Types of products in the bioregional assessments**

Type of product	What information do they include?	Who is the audience?	Who makes them?	In what form are they delivered?
Technical products	<ul style="list-style-type: none"> <li>• information about the ecology, hydrology, hydrogeology and geology of a subregion or bioregion and the potential direct, indirect and cumulative impacts of CSG and coal mining developments on water resources, both above and below ground</li> <li>• all unencumbered data syntheses and databases</li> <li>• unencumbered tools, model code, procedures, routines and algorithms</li> <li>• unencumbered forcing, boundary condition, parameter and initial condition datasets</li> <li>• the workflow, comprising a record of all decision points along the pathway towards completion of the BA, gaps in data and modelling capability, and provenance of data.</li> </ul>	<ul style="list-style-type: none"> <li>• technical: IESC, DoEE Advice team, regulators, environmental groups, industry</li> <li>• government regulators, industry, community and the general public.</li> </ul>	Scientists and Products team	<p>Phase 1: PDFs of reports and registers (as lists or Microsoft Excel spreadsheets)</p> <p>Phase 2 and beyond: datasets, web content, services, data libraries, user-led mapping and charting, stand-alone maps and charts, registers, glossary.</p>
Communication products	Public-audience summaries of the information generated in BAs	<ul style="list-style-type: none"> <li>• the general public</li> <li>• multiple audiences</li> </ul>	Communications staff (scientists and Products team to check)	Factsheets, media releases as PDFs

#### **4.4.6.1 Audience and division of content for submethodologies and technical products**

This section uses M02 and associated product 1.3 as examples throughout.

1. The audience and purpose of technical products such as product 1.3 are as follows:
  - a. The purpose of technical products is to provide scientific information to underpin the advice of the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC).
  - b. The main audience is the IESC, with secondary audiences of industry, regulators, community and general public.
  - c. Therefore: broader information is provided in the summaries (catering to the generalists on the IESC and the secondary audience of the community) and more specialised technical information in the body of the technical products (catering to the specialists in the IESC and industry).
2. The audience and purpose of submethodologies such as M02 are as follows:
  - a. The purpose of submethodologies is to provide sufficient technical detail to:
    - i. demonstrate a credible basis for the information reported in technical products
    - ii. enable people (both current and future) to undertake BAs consistently
    - iii. enable the Programme to meet its transparency objective by providing transparency of methodological approach.
  - b. The main audiences for submethodologies are as per product 1.3 (i.e. IESC, industry, regulators, community, general public) and are:
    - i. those regulators who would like more technical detail
    - ii. those who are undertaking BAs (either current or future).
  - c. Therefore: the information is more technical and detailed relative to technical products, and may refer generally to roles within the Programme.
3. The content is divided up between M02 and product 1.3 as follows:
  - a. M02 completely describes the submethodology underpinning product 1.3. It is released at the same time that the first product 1.3 is (GLO 1.3). The full details of the submethodology are not duplicated in every product:
    - i. 'Product 1.3 for each BA ... must document any deviations from the approach presented in this submethodology and the reasons why they were considered necessary.'
  - b. Product 1.3 gives a brief overview of this submethodology in Section 1.3.1.1.
  - c. Product 1.3 cites M02 (when appropriate) using the following standard phrase: '... companion submethodology M02 for compiling water-dependent assets (Mount et al., 2014)...'. A full list of standard references to other products and methodologies is available on SharePoint  
<https://teams.csiro.au/sites/BA/Products/Lists/List%20of%20products%20and%20methodologies/AllItems.aspx>



- d. Each product 1.3 after the first also documents where it deviates from M02 (in Section 1.3.1).

## 4.4.7 Checklists for Editors

When editing non-text elements, Editors should check the following.

### 4.4.7.1 Maps

Editors should check the following in maps:

- keep caption with figure: (i) select the image and the caption, (ii) right click on the caption, (iii) select 'Paragraph', (iv) select 'Line and Page Breaks', (v) ensure that 'Keep lines together' is selected
- do not use shortened forms unless absolutely necessary; if necessary, define in figure note
- 'Subregion' not 'Subregion boundary' in legend
- 'Bioregion' not 'Bioregion boundary' in legend
- sentence case for words, including town names (unless specified otherwise in Section 4.1)
- check the spelling, capitalisation and punctuation of all words on the map and the legend
- check that all geographic places mentioned in text are included in a map somewhere
- check that all the geographic place names are consistent between the text and the maps
- in legend, use 'Clarence-Moreton bioregion' not just 'Clarence-Moreton'
- ensure there are legends for colour ramps with numbers that show what each colour represents
- some units are different in maps to save space: 'year' in text but 'y' in maps; 'day' in text but 'd' in maps; 'second' in text but 's' in maps
- if both source (or data) and notes are provided, list the source (or data) at the end. Use a soft return between source and notes rather than a hard return ('shift' + 'enter' rather than just 'enter')
- check there is a line all the way around the map.

### 4.4.7.2 Charts

Editors should check the following in charts:

- keep caption with figure: (i) select the image and the caption, (ii) right click on the caption, (iii) select 'Paragraph', (iv) select 'Line and Page Breaks', (v) ensure that 'Keep lines together' is selected
- use sentence case for legends with units in bracket: 'Mean annual rainfall (m)'
- spell out words in full: 'Maximum' not 'max'
- do not use shortened forms unless absolutely necessary, but if necessary, ensure the figure note defines those shortened forms
- font is 8 pt Arial

- some units are different in charts to save space: 'year' in text but 'y' in charts; 'day' in text but 'd' in charts; 'second' in text but 's' in charts
- ensure that all other numbers and words are edited as per language standards contained in this chapter (including spelling and punctuation of words and numbers)
- if both source (or data) and notes are provided, list the source (or data) at the end. Use a soft return between source and notes rather than a hard return ('shift' + 'enter' rather than just 'enter')
- ensure that there's no line (i.e. a box) around the chart.

#### **4.4.7.3 Tables**

Editors should check the following in tables:

- keep caption with figure: (i) select the image and the caption, (ii) right click on the caption, (iii) select 'Paragraph', (iv) select 'Line and Page Breaks', (v) ensure that 'Keep lines together' is selected
- when a table breaks across pages, do not repeat the caption and do not break the table. Ensure that the header row is repeated
- align units in the heading row vertically, by including paragraph returns so that they are on their own line, and adding extra paragraph return(s) so that the units in the heading row are vertically aligned
- If there is no other good reason for a specific order of rows in tables, order either alphabetically or numerically so that readers can find things easily. Ordering numerically means choosing one important column and then order from highest to lowest, or from lowest to highest; ordering alphabetically means choosing one important column and then ordering from A to Z or from Z to A
- put brackets around units in the heading row
- for text: sentence case; no full stop for sentence fragments but full stop for full sentences
- right-justify all numbers, including subtotals and totals
- negative sign is en dash not hyphen
- all numbers with five or more digits need commas (i.e. '15,000' not '15000'); if there is one number in a column with commas, then all numbers (including four-digit numbers) need commas for comparison
- percentages should have the percent sign '%' following all the numbers in that column: '7.4%', '-10.3%', etc.
- column heading for percentages should be clear about what the percentage is, for example, 'Percentage of total area (%)' not just '%'
- dollar amounts should have the sign '\$' preceding all the numbers in that column ' \$7.40', '\$10.30', etc.
- if the dollar amount is in millions or billions it is okay to have only one significant figure after decimal point but otherwise go down to the cents (i.e. '\$7.5 million' but '\$7.50')

- punctuation for notes: do not use numerals; instead use superscripted lowercase letters of the alphabet. Use the style 'Superscript' to format the letter. Do not include a space between these letters and the text in the table or the text in the note, for example '234.0<sup>a</sup>' in the table and '<sup>a</sup>includes only Clematis Group aquifers' in the note
- landscape tables discouraged
- do not use shortened forms in tables unless absolutely necessary, but if necessary, spell out in full as note under table
- some units are different in tables to save space: 'year' in text but 'y' in tables; 'day' in text but 'd' in tables; 'second' in text but 's' in charts
- if both source (or data) and notes are provided, list the source (or data) at the end. Use a soft return between source and notes rather than a hard return ('shift' + 'enter' rather than just 'enter').

#### 4.4.7.4 Captions and caption notes

Editors should check the following in captions:

- do not use shortened forms in captions. If there is a shortened form in the figure which needs to be defined, define it in a figure or table note
- do not use shortened forms in figures if possible but if you have to then ensure it is defined in figure or table notes (e.g. 'digital elevation model (DEM)')
- ensure name of subregion (or bioregion when there is no subregion) is included only once at the very end of the caption
- do not include 'Note:' before a figure or table note
- captions should not end in a full stop. Caption notes may end in a full stop only when they are complete sentences. Caption notes that are not complete sentences (i.e. sentence fragments) should not end with a full stop.

#### 4.4.8 List of authorities

The following external sources should be consulted in BAs:

- for Commonwealth heritage-listed places, see Australia's Commonwealth Heritage List: <http://www.environment.gov.au/topics/heritage/heritage-places/commonwealth-heritage-list>
- for general spelling, see the *Australian Oxford dictionary*: <http://www.oxfordreference.com/view/10.1093/acref/9780195517965.001.0001/acref-9780195517965>
- for information about copyright, see Australian Government Attorney-General's Department: <http://www.ag.gov.au/RightsAndProtections/IntellectualProperty/Pages/Copyright-information.aspx>
- for further information about copyright, see Intellectual Property Australia: <http://www.ipaustralia.gov.au/get-the-right-ip/copyright/>

- for further information about copyright, see the Australian Copyright Council:  
<http://www.copyright.org.au/>
- for information about land use mapping, see the Australian Collaborative Land Use Management Program: <http://www.daff.gov.au/ABARES/aclump/Pages/default.aspx>
- for information about protected areas, see the Collaborative Australian Protected Area Database 2012: <http://www.environment.gov.au/node/34737>
- for information about the extent and distribution of vegetation types in Australian landscapes, see the National Vegetation Information System:  
<http://www.environment.gov.au/topics/science-and-research/databases-and-maps/national-vegetation-information-system>
- for national heritage-listed places, see Australia's National Heritage List:  
<http://www.environment.gov.au/topics/heritage/heritage-places/national-heritage-list>
- for nationally important wetlands, see *A directory of important wetlands in Australia*:  
<http://www.environment.gov.au/topics/water/water-our-environment/wetlands/australian-wetlands-database/directory-important>
- for official names and capitalisation of geological basins, see Geoscience Australia's geological provinces: <http://www.ga.gov.au/products-services/data-applications/australian-geological-provinces.html>
- for official names of geological time periods, see Geological Timescale 2012:  
<https://engineering.purdue.edu/Stratigraphy/charts/chart.html>
- for official names of Interim Biogeographic Regionalisation of Australia bioregions, see:  
<http://www.environment.gov.au/system/files/pages/5b3d2d31-2355-4b60-820c-e370572b2520/files/bioregions-new.pdf>
- for official names of Interim Biogeographic Regionalisation of Australia subregions:  
<http://www.environment.gov.au/system/files/pages/5b3d2d31-2355-4b60-820c-e370572b2520/files/subregions-new.pdf>
- for official names of physiographic regions, see Australian Soil Resource Information System (ASRIS) – Physiographic Regions of Australia:  
<http://www.asris.csiro.au/themes/PhysioRegions.html>
- for official names of ports, see Ports Australia:  
[http://www.portsaustralia.com.au/members\\_list/map.htm](http://www.portsaustralia.com.au/members_list/map.htm)
- for official names of stratigraphic units, see Australian Stratigraphic Units Database:  
<http://www.ga.gov.au/products-services/data-applications/reference-databases/stratigraphic-units.html>
- for official names of threatened ecological communities:  
<http://www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl>.

The following internal sources should be consulted in BAs:

- for names of mining companies:  
<https://teams.csiro.au/sites/BA/Products/Lists/CompanyNames/AllItems.aspx>

- for names of products, ISBN numbers, citations and standard text to refer to other products: <https://teams.csiro.au/sites/BA/Products/Lists/List%20of%20products%20and%20methodologies/AllItems.aspx>.

## 4.5 Third-person active voice

Avoid writing in first- or second-person voice in both public and technical reports. The words 'we', 'I', 'our' or 'you' are used in first- and second-person voice. Instead, use third-person voice. The words 'it', 'they' and 'them' are used in third-person voice.

[no] Our research shows that deep observation bores are never constructed for pump testing of artesian bores because of the costs involved.

[no] No matter how hard you try, you will not find deep observation bores that were drilled for pump testing of artesian bores in the GAB.

[yes] Because of the prohibitive cost of drilling deep observation bores, they are never constructed for pump testing of artesian bores in the GAB.

Active sentences are preferred to passive sentences. Some passive sentences, however, are unavoidable.

[no] The following outputs will be delivered by the Assessment.

[yes] The Assessment will deliver the following outputs.

## 4.6 Verb tense

Use present tense for:

- established knowledge
- presentation of results
- results (modelling) (with an occasional 'is projected to' or 'would' if you wish).

Use past tense for:

- description of methods (once they have been agreed or have occurred)
- historical data or information
- attribution of results (from previous studies).

Use future tense for:

- description of proposed methods (before they have been used).

Note: use caution when referring to potential mining developments. It is acceptable to use the word 'will' as long as it is sufficiently clear to the reader that outcomes will only ensue if the development is approved. Use caveat 'if approved' as needed.

## 4.7 Punctuation

See Table 9 for conventions and examples about punctuation and typography.

**Table 9 Specifications for punctuation and typography**

	Convention	Example
approximately (~)	Do not use '~' in text; use 'approximately', except within brackets. No space between '~' and the numeral.	It is approximately 5 km away. The distance (~5 km) is not large.
brackets (double brackets in citations)	When a phrase including an in-text citation of the variety 'As described by Cuddy (2007)' is itself in brackets, format as in the example. In other words, make sure there are two pairs of brackets.	The Ithaca model (modified from Bent (2004)) was used.
capitalisation	Sentence capitalisation for headings, captions and report titles (i.e. only capitalise first word and proper names). Note that titles are italicised in text.	Title: 'Water in the Gulf of Carpentaria Drainage Division' Subtitle: 'A report to the Australian Government from the CSIRO Northern Australia Sustainable Yields Project' [Northern Australia Sustainable Yields Project region report] Title: 'Water in the Ord-Bonaparte region of the Timor Sea Drainage Division' Subtitle: 'A report to the Australian Government from the CSIRO Northern Australia Sustainable Yields Project' [Northern Australia Sustainable Yields Project methods report] Title: 'Description of project methods' Subtitle: 'Northern Australia Sustainable Yields Project' [reference list] Cuddy SM (2007) <i>Styling for Australian princesses</i> . CSIRO Publishing, Canberra. [text] My copy of <i>Styling for Australian princesses</i> is on my bedside table.
	Geographical names are capitalised when they appear in full. Whenever two or more names are combined in a single expression, the generic part of the names is pluralised and kept in lowercase.	The river flows through the basin. The Murray River flows through the Murray–Darling Basin. The Murray, Murrumbidgee and Lachlan rivers are included in this analysis. The Clarence-Moreton Basin extends across NSW and Queensland. The Bowen, Surat and Clarence-Moreton basins are intracratonic sedimentary basins.
	Generally, capitalise the full official name and the abbreviated name when it retains some specific elements, but use lowercase when abbreviation is reduced to the generic element or for plural references.	The Australian Government is responsible for ... The government proposes to ... The Great Artesian Basin Sustainability Initiative ... the initiative The SA Government initiated the project ... the state government will meet regularly to review progress. The Australian and New Zealand governments

	Convention	Example
	Capitalise the second word in a hyphenated phrase.	South-West Western Australia Sustainable Yields Project
capitalisation (continued)	Capitalise the word 'Project' or 'Assessment' when referring to just the one, but use lowercase when referring to multiple ones.	The Murray-Darling Basin Sustainable Yields Project is only one of CSIRO's Sustainable Yields projects. The Great Artesian Basin Water Resource Assessment is only one of CSIRO's water resource assessments.
colons (:) )	A colon is used after an introduction to a series or list. For simple sentences a colon is generally not advisable, though it is grammatically correct (see example 1). A semicolon in this case is just plain wrong. A colon is possible (though certainly not mandatory) when the members of the list are more complicated (see examples 2 and 3).	(1) [preferred] The basket held apples, oranges and bananas. [grammatical but not advisable] The basket held: apples, oranges and bananas. [wrong] The basket held; apples, oranges and bananas.
	In example 2, a comma is added after the second to last item in the list ('organic oranges') to prevent misreading (i.e. so you do not wonder whether 'organic' applies to 'bananas' as well).	(2) Choose either: The basket held: apples from Woolworths, organic oranges, and bananas dipped in red wax. The basket held apples from Woolworths, organic oranges, and bananas dipped in red wax.
	If the members of the list have internal commas, then they should be separated with semicolons as in example 3. Once sentences start getting complicated, however, it is worth remembering that we are aiming for plain English. It is preferable to break long sentences into several shorter sentences.	(3) Choose either: The basket held: sweet, crunchy apples from Woolworths; organic oranges, which are expensive; and bananas dipped in red wax. The basket held sweet, crunchy apples from Woolworths; organic oranges, which are expensive; and bananas dipped in red wax.
commas (,)	No comma after second to last item in lists except where the lack of a comma makes the meaning ambiguous. For example, there is no comma after 'oranges' in example 1. In this case, omitting the comma is unambiguous and therefore correct. For (the classic example) 'I would like to thank my parents, God and Mary', is it assumed that the writer is Jesus, thanking two people? If not, then the extra comma (also known as the Oxford comma or serial comma) removes the ambiguity (example 2). For more complex lists (and particularly where the second to last item includes 'and'), this comma may be necessary for clarity (example 3).	(1) They ate apples, oranges and bananas. (2) I would like to thank my parents, God, and Mary. (3) They ate noodles, fish and chips, and pizza.
	Use commas to separate three-digit groups of numerals only for numbers with five or more digits, e.g. write '1000' but '10,000'. Exceptions: when this creates an alignment problem, for example where four- and five-digit numbers are found in the same column in a table or when four and five digit numbers are being directly compared in the same sentence.	

	Convention	Example
degree (°)	Use '°C' for temperature, with space between numeral and °C. Do not use en dash for ranges of temperatures (do not write '15–25 °C').	The temperature is 17 °C. The temperature range is 15 to 25 °C.
	Use degree symbol for compass bearings, without a space between numeral and symbol. Do not abbreviate compass point (do not write ° E). Capitalise 'North', 'East', 'South' and 'West'.	The area has a central meridian of 140.0° East.
	Use degree symbol, not superscripted letter 'o'. (To insert the degree (°) symbol, press and hold down ALT while typing 0176 on the numeric keypad, or Insert >Symbol > degree sign)	Set up the rainfall-runoff modelling ensemble to run at 0.05 x 0.05 degree (~5 x 5 km) grids. Each variant has 77 years of daily climate sequences for 0.05 x 0.05 degree (~25 km <sup>2</sup> ) grid cells.
	For climate grid cells, spell out 'degrees'.	Parameter values for all 0.05 degree grids were estimated.
dot point series: sentence fragments (incomplete sentences)	When the dot-point elements are sentence fragments, the introductory sentence should end in a colon. Ensure that the dot-point elements have parallel structure and complete the introductory sentence correctly. The dot-point elements start with lowercase letters and do not have any punctuation at the end except for the final element. Do not include 'and' in the second to last element. If a dot point consists of a fragment followed by a full sentence, include a full stop after the fragment but not at the end of the additional full sentence.	The Warrego river system model: <ul style="list-style-type: none"> <li>• includes the 8.1 GL of unallocated water to be auctioned in September 2007</li> <li>• is configured to represent the full utilisation of licences. Consequently the demands generated represent what could be diverted if licences were fully utilised. The observed history of use is considerably smaller than what is reflected in this configuration of the model</li> <li>• represents unsupplemented access as water extracted from the main river and modelled distributaries.</li> </ul>
dot-point series: complete sentences	The introductory sentence should end in a colon. The elements are capitalised and punctuated as for normal sentences.	The modelling for the Gloucester subregion differs from other regions in several ways: <ul style="list-style-type: none"> <li>• Recent climate modelling is not carried out for the Gloucester subregion.</li> <li>• Future development modelling is not carried out for the Gloucester subregion because the limited increase in commercial forestry plantations and farm dams in the region would have a negligible impact on runoff over the region.</li> </ul> The impact of future bushfires on runoff averaged over the entire Gloucester subregion has been broadly assessed to be negligible.



	Convention	Example
en dash (–) An en dash can be inserted in Microsoft Word by holding down Ctrl and pressing – on the numeric keypad (or Insert > Symbol > More symbols > Special Characters > en dash).	En dashes (also known as ‘en rules’) are used in the following cases: to show spans of numbers in tables, e.g. ‘1997–2006’, or in reference lists, e.g. ‘5–9’ for page numbers. In text, headings and captions use the word ‘to’ instead. to show an association between words that retain their separate identities and have equal weight.	[in text] Rainfall and runoff for 1997 to 2006 are not significantly different to the long-term historical averages. [table caption] Rainfall and runoff for 1997 to 2006 A Commonwealth–state agreement covers all ... There is an east–west gradient in rainfall across the Asia–Pacific region.
	A spaced en dash – an en dash with spaces on either side – is used to separate parenthetical phrases from the rest of a sentence. Avoid using brackets and semicolons where possible.	
	Note that the correct symbol for a minus sign in text is an en dash (not a hyphen).	
	Ensure that an en dash is not at the end of a line.	Determining whether these levels of development are sustainable requires greater supporting information – particularly of recharge sources – than is currently available.
forward slash (/)	A forward slash is usually used in ‘either/or’ alternatives, but its use is not encouraged.	
	No spaces are included on either side of the forward slash when there is only one word on either side of it.	
	It is preferable to avoid slashes altogether, writing the phrase in full instead if possible.	[no] recharge/discharge [yes] recharge or discharge
	Slashes can be used in official vegetation and landscape classifications.	
	Slashes can be used in units.	[yes] 400 GL/year
greater than (>)	Do not use ‘>’ in text; use ‘greater than’, except within brackets. No space between ‘>’ and the numeral, except when part of a mathematical expression.	The probability of runoff reductions is greater than 80%. The probability of runoff reductions is high (>80%). $2x \frac{4y}{3} > z^3$

	Convention	Example
hyphens (-)	As a general rule, minimise hyphens. See Section 4.1 for guidance on whether or not to use hyphens for particular words. For words not listed in Section 4.1, consult the <i>Australian Oxford dictionary</i> <a href="http://www.oxfordreference.com/view/10.1093/acref/9780195517965.001.0001/acref-9780195517965">http://www.oxfordreference.com/view/10.1093/acref/9780195517965.001.0001/acref-9780195517965</a> .	[compound adjectives] The agency has a long-term plan. The plan is long term. A well-known dancer performed an elegantly executed manoeuvre over a fast-flowing river.
	Hyphens are used for many compound adjectives or phrases which precede a noun. When these phrases or compound adjectives follow (not precede) a noun, do not hyphenate.	[phrases] The long-term implications are dire. The accounts look up to date. The up-to-date accounts were filed.
	No hyphen if the compound adjective includes an adverb ending in ‘-ly’ such as ‘an elegantly executed manoeuvre’.	
	Capitalise second word of hyphenated phrase (i.e. ‘South-West’ not ‘South-west’ in the example)	South-West Western Australia Sustainable Yields Project
hyphenating points of the compass	‘south-west’, ‘north-east’, etc. include hyphens except when part of an established name (e.g. ‘Southwest Rocks’). Adjectives such as ‘south-western’ or ‘north-eastern’ also include hyphens. Use multiple hyphens in longer compounds.	Yantabulla Swamp is the most important waterbird breeding site of 30 wetlands in north-west NSW. Yantabulla Swamp is the most important waterbird breeding site of 30 wetlands in north-western NSW. [yes] south-south-west [no] south-southwest
italics	Italics are used for: <ul style="list-style-type: none"> <li>• ‘<i>In prep.</i>’ in a reference list</li> <li>• scientific names – both in text and in reference lists. Note that common names should be lowercase.</li> <li>• the name of an Act or Ordinance (see ‘legislation’ in Table 10)</li> <li>• titles of reports and books in text (but they are not italicised in the reference list)</li> <li>• emphasis.</li> </ul>	A common forest tree in the Murray–Darling Basin is the river red gum ( <i>Eucalyptus camaldulensis</i> ).  the Commonwealth’s <i>Water Act 2007</i>
	When using italics, ensure that you use the Microsoft Word italics style in the template – do not format manually.	
	Do not italicise ‘in situ’.	
legislation	Most Acts and Ordinances have a short formal title that can be used for citation purposes. If this title is used accurately, there is no need to include the legislation in the reference list.	The Commonwealth’s <i>A New Tax System (Wine Equalisation Tax) Act 1999</i> makes provision for both red and white wine.
	Use italics for the short formal title on first instance, exactly and in full, with no comma separating the title and year. If an article (‘a’, ‘an’ or ‘the’) begins the title of an Act, do not omit the article.	
	‘Act’ and ‘Ordinance’ are always capitalised.	The Commonwealth’s <i>Water Act 2007</i> (Water Act) established the Murray–Darling Basin Authority.

	Convention	Example
	Do not include gazetted page numbers which change frequently and thus are not relevant.	
	Include the jurisdiction before the title of the Act or Ordinance on first instance, with a shortened, unitalicised form following in brackets. State names are as per Section 4.1 (short forms when more than one word but spelt out for Queensland, Victoria and Tasmania). Use apostrophes to show possession for all jurisdictions, (Commonwealth's, WA's, NT's, SA's, Queensland's, NSW's, ACT's, Victoria's and Tasmania's)	NSW's <i>Threatened Species Conservation Act 1995</i> (TSC Act) Commonwealth's <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) Queensland's <i>Nature Conservation Act 1992</i> (Nature Conservation Act) SA's <i>National Parks and Wildlife Act 1972</i> (National Parks and Wildlife Act)
	On second instance, use short form. Tables and maps may use short forms as long as they are spelt out in caption notes.	There are a number of important springs recognised by the Commonwealth's <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act). However, not all springs recognised under the EPBC Act are discussed in this product.
less than (<)	Do not use '<' in text; use 'less than', except within brackets. No space between '<' and the numeral, except when part of a mathematical expression.	The probability of runoff reductions is less than 20%. The probability of runoff reductions is low (<20%). $2x\frac{4y}{3} < z^3$
lists (in text)	Use lowercase roman numerals in brackets for in text lists.	The three mining methods used at this site are (i) longwall, (ii) bord-and-pillar and (iii) highwall.
quotation marks ('')	single quotation marks (not double)	The farmer said, 'We will not tolerate further cuts in water allocations'.
semicolons (;)	Acceptable uses of semicolons are to: (1) separate items in a series or list which contain internal commas (2) separate two parts of a sentence which are closely linked in meaning, provided there is a full sentence on either side of the semicolon. Our preference, however, is to separate into two sentences. (If you want to emphasise the closeness of the two sentences, another solution is to join them with a conjunction.)  Unacceptable use of semicolon: (3) Semicolons should not follow an introductory clause before a series or list. Instead use a colon (see 'colon' for more details).	(1) The results were surprising: adult males, 35%; adult females, 52%; and children, 13%.  (2) [grammatical but not preferred] Rain is forecast; however, there are no clouds to be seen. [preferred option 1] Rain is forecast. However, there are no clouds to be seen. [preferred option 2] Rain is forecast, but there are no clouds to be seen.  (3) [wrong] Three portfolios were represented; finance, health and defence. [right] Three portfolios were represented: finance, health and defence.

	Convention	Example
spacing	Use a single space between sentences, not a double space.	
subscript ( $T_{\min}$ )	Okay to use in chemical elements	$N_2$
	Okay to use in ' $T_{\min}$ ' and ' $T_{\min}$ '	
superscript ( $^{th}$ )	Do not use for numbers or percentiles.	Dwet, Dmid and Ddry are the variants displaying 90th, 50th and 10th percentile recharge or rainfall.
	Okay to use in chemical elements.	All other ions increase while $^{36}\text{Cl}$ and $^{36}\text{Cl}/\text{Cl}$ remain low.

## 4.8 Numbers

See Table 10 for conventions and examples about numbers.

**Table 10 Specifications for numbers**

	Convention	Example
chapter names	Technical products do not have chapters, because they fit into the five components and everything within that is referred to as a Section. Submethodologies and the <i>Product standards</i> , however, do have chapters.	
fractions	Spell out and hyphenate in text	three-quarters
section names	When referring to a different section capitalise 'Section' and use a numeral. If referring to the current section, do not capitalise 'section'. Note: a section is a slice of a chapter.	Details of other aquifers are discussed in Section 4.2.3. This section will focus on the Cadna-owie Formation – Hooray Sandstone aquifer.
significant figures	Report numbers to tenths (e.g. '25.3 GL') except when a water management plan (or any other legislation) states higher precision (e.g. '25.367 GL'). For 0.03 GL or 0.003 GL report one significant figure. If numbers start to get small consider changing units to ML. Use no more than three significant figures in latitudes and longitudes when referring to mine site locations.	
three-digit groups of numerals	Use commas to separate three-digit groups of numerals only for numbers with five or more digits, e.g. write '1000' but '10,000'. Exception: include a comma in four-digit numbers in text when comparing to a number with five or more digits in the same sentence.	CSIRO employs 1999 women. CSIRO employs 19,999 men. CSIRO employs 1,999 women and 19,999 men.
units	See Section 4.9 for details. Use SI units. 'ha' is a non-standard SI that is accepted. Use '°C' for temperature, with a space between the numeral and °C. Do not use en dash for ranges of temperatures (do not write '15–25 °C'). For climate grid cells, spell out 'degrees'. 'km <sup>2</sup> ' or 'm <sup>2</sup> ', not 'sq km' or 'sq m'. 'm <sup>3</sup> ' not 'cu m'. 'ML/m <sup>2</sup> ' not 'ML m <sup>-2</sup> '. Do not capitalise 'month', 'year' or 'ha' in table subheadings. Names of months can be shortened to their first three letters if needed in tables. Always spell out months in full in body text	The temperature is 17 °C. The temperature range is 15 to 25 °C.  Set up the rainfall-runoff modelling ensemble to run at 0.05 x 0.05 degree (~5 x 5 km) grids. Each variant has 77 years of daily climate sequences for 0.05 x 0.05 degree (~25 km <sup>2</sup> ) grid cells. Estimate parameter values for all 0.05 degree grids.
	'mm', 'm' and 'km' are always abbreviated with a space between numeral and unit.	The region reported on here ends at Fords Bridge, 87 km upstream of the junction with the Darling River.
	GL and ML are always capitalised and abbreviated.	
	Use 'GL/year' in text for readability, but 'GL/y' in tables and plots. Use 'days/year' and 'days' in text, but 'd/y' and 'y' in tables and plots. Use L/s (or L/second in text) for bore yields.	

	Convention	Example
	Do not repeat units in a list of numbers or in a range.	Several Cenozoic weathering events occurred at approximately 60, 30 and 7 Ma. The average increase ranges from 10 to 20%.
word or numeral?	For numbers less than and equal to ten in text, spell out fully (e.g. 'three'). Any 'real' numbers (i.e. anything requiring units and which might be a decimal) are numerals. All percentages are numerals except for 'zero %'. Always use 'zero' not '0'. When two numbers are in direct comparison with each other numerals should always be used, regardless of the size of the numbers involved. Exception: when a number starts a sentence always spell out. Hyphenate spelt out numbers that comprise of two words.	This study found ten species of native fish and three species of exotic fish. Projected future development would reduce inflows by 146 GL/year. The total modelled runoff over the calibration period is within 5% of the total recorded runoff. When corrected, the model behaved robustly even when allocations were at zero %. A total of 4 whole-of-GAB groundwater models and 16 notable part-GAB models have been developed during the past 40 years. Twenty scientists attended the briefing. Twenty-three, fifty-nine, ninety-nine One hundred and twenty-four
year	In body text, year is spelt out in full: 'GL/year'. In tables, year is abbreviated: 'GL/y'.  Always use numerals for numbers instead of words.  Hyphenate only if phrases act as an adjective.	The average annual flow over the modelling period is 423 GL/year. This Assessment will be completed in 1 year. The average annual rainfall over the 10-year period is around 8% lower. The water management plans were approved for 14 years. The scientist analysed the 111-year period. The models ran for 111 years.
years (apostrophe)	'1940s' and '1950s' are plural not possessive so no apostrophe needed (i.e. not '1940's').	In the 1980s he loved Madonna's music.
years (decades)	When referring to early, middle and late decades, the use of hyphens is variable. Follow the examples.	early 1940s; mid-1940s; late 1940s
years (financial)	'2006–07' (not '2006–2007', not '2006-07', not '2006/07') (note a financial year runs from 1 July to 30 June)	

## 4.9 Units

Table 11 outlines the standard units that should be used in technical products. Units should not be converted from original units in cited material, even if they are not standard. Do not use ‘annum’, ‘pa’ or ‘per annum’. Use ‘%’ not ‘percent’.

**Table 11 Standard units**

Unit	Description	Notes
°	degrees	Spell out for climate grid cells; e.g. ‘parameter values for all 0.05 degree grids’
°C/km	degrees Celsius per kilometre	
bcf	billion cubic feet	
Bt	billion tonnes	
Bt/year	billion tonnes per year	
D	Darcy	
GL	gigalitres	
GL/year	gigalitres per year	‘GL/y’ in tables and figures
GW	gigawatt	
GWh	gigawatt hours	
ha	hectares	
km	kilometres	
L	litres	
L/second	litres per second	‘L/s’ in tables and figures
m	metres	
Ma	million years	
mAHD	metres above Australian Height Datum	
mASL	metres above sea level	‘mAHD’ is the standard and should be used if possible
mBGL	metres below ground level	‘mAHD’ is the standard and should be used if possible
mcfd	thousand cubic feet per day	
mD	milliDarcy	
million ha	million hectares	
ML	megalitres	
ML/year	megalitres per year	‘ML/y’ in tables and figures
mm/year	millimetres per year	‘mm/y’ in tables and figures
Mt	million tonnes	
Mt/year	million tonnes per year (do not use ‘Mtpa’)	
MW	megawatt	
MWh	megawatt hours	
PJ	petajoules	

Unit	Description	Notes
ppm	parts per million	
t	tonne	
TW	terawatt	
TWh	terawatt hours	
W	watt	
Wh	watt hours	

## 4.10 Cross-referencing

Elements and datasets are cross-referenced using inbuilt auto-cross-referencing capabilities in Microsoft Word and are in the form 'Table 33', 'Figure 14' and 'Dataset 3'. Full captions should not be included in cross-references to elements and datasets. Do not use 'above' or 'below' in cross-references as content can sometimes move and these references may no longer be accurate.

Cross-references to sections of the same product or submethodology should take the form of 'Section 2.1.4.2.4'. Do not include headings in these cross-references. If the section is part of the Microsoft Word document you are working in, it should be auto-referenced, otherwise just type the cross-reference in as hard text and put a Microsoft Word comment around it with words to the effect 'this is a cross-reference to Section 2.1.4.2.4 which is 'Allocations' in the Word document for Section 2.1.4' to ensure that it can be updated (if necessary) at PDFing stage.

Specific tables, figures, sections and components should always be capitalised and singular even when part of a list, for instance, 'Section 4.2 and Section 4.3' instead of 'sections 4.2 and 4.3'. This is for consistency with tables and figures, which are listed in this way to ensure that they can be auto-cross-referenced.

To cross-reference another technical product or submethodology, use the text provided on the SharePoint list of products and submethodologies

<https://teams.csiro.au/sites/BA/Products/Lists/List%20of%20products%20and%20methodologies/AllItems.aspx>.

The standard cross-reference for a companion technical product is:

... companion product 1.1 for the Maranoa-Balonne-Condamine subregion (Welsh et al., 2014) ...

The standard cross-reference for a companion submethodology is:

... companion submethodology M02 (as listed in Table 1) for compiling water-dependent assets (Mount et al., 2015) ...

Remember to include a reference to the product or submethodology being cross-referenced in the reference list if it is published.



### 4.10.1 Uniform resource identifiers for technical products

Uniform resource identifiers (URIs) have been defined for each of the technical products. Because some products consist of more than just one file, there is more than just one standard URI for a product. While the landing page of the product is appropriate for use in an in-text citation, there may be instances where a specific version of a register may be needed. The following list of official URIs for products was developed by the Products team in conjunction with the BAIP team see <https://teams.csiro.au/sites/BA/Products/Lists/ProductURIs/AllItems.aspx>.

#### **References**

- Barrett DJ, Couch CA, Metcalfe DJ, Lytton L, Adhikary DP and Schmidt RK (2013) Methodology for bioregional assessments of the impacts of coal seam gas and coal mining development on water resources. A report prepared for the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development through the Department of the Environment, Department of the Environment, Australia. Viewed 31 July 2015, <http://www.iesc.environment.gov.au/publications/methodology-bioregional-assessments-impacts-coal-seam-gas-and-coal-mining-development-water>.
- Moore B (ed.) (2004) Australian Oxford dictionary (Second edition) Oxford University Press. Viewed 11 December 2018, <http://www.oxfordreference.com/view/10.1093/acref/9780195517965.001.0001/acref-9780195517965>.
- Snooks & Co. (2002) Style manual for authors, editors and printers. Sixth edition. John Wiley & Sons, Canberra.



## 5 Citation, attribution and copyright

This chapter covers citation and referencing for literature (Section 5.2), non-text elements (Section 5.4), data (Section 5.5) and photographs (Section 5.6). Specifications are given for the practice for citation and attribution for various cases, including detailed instructions for determining whether or not copyright permissions need to be sought for reproducing non-text elements.

All non-text elements and data used in producing a bioregional assessment (BA) are to be documented and published along with the BA products to enable transparency and repeatability of processes. As such, where possible, non-text elements and data should be acquired under a Creative Commons Attribution 3.0 Australia licence. Where this is not possible, another licence that allows for the full use and publication of the non-text element or data is required. Further information on copyright, and its application in the Bioregional Assessment Programme (the Programme), is provided in Section 5.3.

### 5.1 Quick reference

- Any literature (Section 5.2) or data (Section 5.5) used to inform a product should be cited in text.
- All inputs and outputs of modelling or analysis should be registered as a dataset and cited in text as data (Section 5.5).
- Any literature cited in text must have a matching reference in the reference list (Section 5.2).
- When reproducing material created external to the Programme, it is required that the Programme have copyright permissions to republish that material (Section 5.3).
- For reproduced material, documentation is stored in the Copyright Register (Section 5.3.2.1)
- ‘Source:’ statements are used when reproducing the work of others (external to the Programme; Section 5.4).
- ‘Data:’ statements are used when providing citations of datasets or literature used in making a figure or table (Section 5.5).
- Any data cited in text (including in a ‘Data:’ statement) must have a matching dataset reference in the dataset list (Section 5.5).
- Tables that present information from external sources use a ‘Source:’ statement when they are presented using the same format, structure or layout as the original cited table. When the table is significantly different, or is an amalgamation of more than one table, use a ‘Data:’ statement to cite the original(s).
- Attributions for photographs are handled differently to other types of figures (Section 5.6).

## 5.2 Citing literature

The Products team is not responsible for fact checking references. It is the authors' responsibility to ensure that they have provided adequate references to support their work and that they supply accurate and complete referencing information. Editors will check to ensure that (i) every in-text citation has a matching reference in the reference list; (ii) every reference in the reference list is cited; and (iii) every reference contains all of the necessary information. Editors will query authors where there is missing information.

Footnotes should never be used for referencing purposes. Use the modified author-date format described here instead.

### 5.2.1 Referencing best practice

The following notes are provided to assist authors meet standards of best practice – they draw heavily on the chapter about methods of citation in the Australian Government's *Style manual for authors, editors and printers* (Snooks & Co, 2002).

Referencing is all about acknowledging information that originally appeared in other works (the primary source), used to expand on or substantiate the content being presented in a publication. Good referencing secures the author's credibility, helps inform readers, addresses copyright issues and is a basic courtesy to the primary source author. This calls for clarity, accuracy, comprehensiveness and consistency – in other words: 'every citation must be meticulously prepared, to satisfy the objectives of clarity, accuracy and consistency' (Snooks & Co., 2002). Ultimately the main purpose of referencing is to carefully describe the pathway to the primary source material.

By drawing on the primary source it should be relatively easy to compile a quality citation. Yet many authors fall into the 'Chinese whispers' trap, simply using citation information contained in secondary (or worse) sources and not consulting primary source material directly. This often leads to the propagation of serious citation errors and is quite unprofessional – remember that the purpose of citation is to add credibility to an author's work which would seem a bit dubious if they have not actually consulted the primary source in the first place.

Other traps to avoid include self promotion (i.e. citing your own work too frequently), sloppy use of author lists (inaccuracy with name spellings and orders of authorship, omission of authors from works with a large authorship, etc.) and citing works that are not publicly available or difficult to procure, even with the aid of an experienced reference librarian (such as lecture notes from an obscure speaker's circuit).

### 5.2.2 In-text citations and the reference list

In-text citations should be consistent with the following examples: (Marston, 2007), (Marston and Cuddy, 2007), (Marston et al., 2007), (Marston, 2007; Cuddy, 2007), (Marston, 2007, p. 589), (Marston, 2007, p. 589–590), (Marston, 2007, Table 5), (Marston, 2007, p. 43, Table 5), or 'As described in Cuddy (2007)'. Note that including page numbers in in-text citations is useful but not mandatory. For two references with the same name and year, use citations such as '(Marston,

2007a)' and '(Marston, 2007b)' and ensure that the order in the text is the same as the order in the reference list – particularly if text has been edited substantially. For two references with the same name at the end of the same sentence, use this example: (Marston, 2007, 2009). The reference list at the end of each section should be alphabetised in ascending order, meaning that Marston (2007) will appear above Marston (2009). When the date of publication cannot be reliably established, use 'n.d.' as the short form for 'no date', for example: (Marston, n.d.).

When the author is an organisation, there are likely to be instances where spelling out the full name of the organisation is cumbersome and takes up too much space. In cases like this, it is acceptable to shorten the name of the organisation as long as it corresponds correctly with the reference list and as long as the name of the organisation is spelt out in full somewhere in the reference (often as the publisher or in the subtitle of the publication). An important exception is the Department of the Environment and Energy, which should never be shortened.

If you are using EndNote, please ensure that you use the EndNote style (see Section 5.2.5) as this will automate the formatting of in-text citations and reference lists.

A reference list should be included at the end of each section. General guidelines for reference lists follow:

- be consistent
- use minimal punctuation
- use 'and' not '&'
- spell out journal names in full (as the products have a potentially wide audience), e.g. 'Journal of Hydrology' not 'J. Hydro'
- do not italicise journal names or titles
- for three or more authors, the in-text citation is '(Author1 et al., 2000)' but all authors need to be listed in the reference list
- use an en dash for page ranges, e.g. '9–15'
- italics are only used in three cases:
  - to indicate that a publication is in preparation ('*In prep.*') (authors should avoid citing '*In prep.*' publications, particularly where a published source could be used instead)
  - for all scientific names (both in text and in the reference list; e.g. species names)
  - for titles of Acts and Ordinances. Most Acts and Ordinances have a short formal title that can be used for citation purposes. If this title is used accurately, there is no need to include the legislation in the reference list. Within the text use italics for the short formal title, exactly and in full, with no comma separating the title and year. If an article ('a', 'an' or 'the') begins the title of an Act, do not omit the article. Do not include gazetted page numbers which change frequently and thus are not relevant.
- in the reference list, use sentence case for titles (i.e. capitalise only first letter and any proper nouns)
- in some cases, the author is an organisation whose name has been shortened. For example, while 'Murray-Darling Basin Commission' should not be shortened in the text, the exception

is for in-text citations, where '(MDBC, 2007)' is recommended. In the reference list, ensure that the spelt out name is included in the publishing details, e.g. MDBC (2007) Report on groundwater yield. Murray-Darling Basin Commission, Canberra.

- do not use angle brackets (<>) around URLs. URLs should not be included in text – they should be cited as a reference. Include the access date. Note that a lot of reports are distributed electronically these days, so please try to include a URL where possible. Please ensure that your URLs are actually linked so that readers can click on the link rather than having to copy and paste it into their browser (e.g. <http://www.csiro.au> rather than <http://www.csiro.au>). A cautionary note: some electronic documents have a short life expectancy, so please cite documents which are likely to be available into the future.

### 5.2.3 Capitalisation of particles in last names

The Australian Government's *Style manual for authors, editors and printers* (Snooks & Co., 2002) suggests following the preference of individual authors for the capitalisation of particles in last names (e.g. whether they prefer 'de Decker' or 'De Decker'). Due to the impracticality of this suggestion (particularly in the case of sources that were published long ago) all references in the Assessment using a particle in the last name should be capitalised (i.e. 'De Decker').

### 5.2.4 Personal communications

In-text citations of personal communications should be in the form (S Cuddy, 2008, pers. comm.). If wishing to acknowledge the person's organisation the style is (S Cuddy (CSIRO), 2008, pers. comm.). It is generally a good idea to provide the organisation where possible. You must obtain the permission of the person being referred to. You must keep a record of this permission as well as the 'personal communication' being cited (i.e. a letter, email, or record of a conversation). All personal communications, along with documentation of the permissions thereof, must be included in the PersComm register on SharePoint (<https://teams.csiro.au/sites/BA/Lists/PersCommRegister>). Table 12 shows the fields, expected information and examples for entries in the PersComm register.

**Table 12 Fields, expected information and examples for entries in the PersComm register**

Field	Expected information	Example
Citation	The citation to be included in the product	Example (CSIRO, 2015, pers. comm.)
Date	The date of the communication	18/03/2015
Published in	A list of products in which this communication is cited	GIP 1.3, GAL 2.6.1
Record of communication	A record of the communication (email, transcript, etc.)	Text file containing transcript of Skype conversation attached to register item
Permission	A record of the permission given to publish the communication (in writing where possible)	Verbal permission given during conversation. Email confirmation attached

### 5.2.5 Using EndNote

An EndNote style file is available on govdex for authors wishing to use EndNote (<http://www.govdex.gov.au/confluence/display/BRAT/Technical+Product+Standards>). The Products team will not maintain EndNote databases. An output style is available for EndNote web users accessing EndNote web through CSIRO. The name of the style is 'CSIRO Sustainable Yields'.

### 5.2.6 Referencing examples

#### **Books**

Healy RW (2010) Estimating groundwater recharge. Cambridge University Press, Cambridge.

#### **Book section or chapter**

Quigley MC, Clark D and Sandiford M (2010) Tectonic geomorphology of Australia. In: Bishop P and Pillans B (eds) Australian landscapes. Geological Society, London, 243–265.

#### **Edited book**

Love AJ, Wohling D, Fulton S, Rousseau-Gueutin P and De Ritter S (eds) (2012) Allocating water and maintaining springs in the Great Artesian Basin, Volume II: Groundwater recharge, hydrodynamics and hydrochemistry of the Western Great Artesian Basin. National Water Commission, Canberra.

#### **Conference paper**

Love AJ, Rosseau-Gueutin P, Simmons C, Karlstrom K, Crossey L, Shand P and Priestley S (2010) Toward a new paradigm for the Great Artesian Basin; hydrologic mixing, partitioned sub-basins, and mantle influences on groundwater quality. Groundwater 2010, Proceedings of National Groundwater Conference. International Association of Hydrogeologists, Australia.

#### **Journal articles**

Journal articles must contain the issue number where possible, but it is not a mandatory requirement. Also, journal articles must either contain the volume number and page range, or the DOI. They may contain both where the information is available.

Silcock JL (2010) Experiencing waterholes in an arid environment, with particular reference to the Lake Eyre Basin, Australia: a review. Geographical Research. DOI: 10.1111/j.1745-5871.2010.00642.x.

De Deckker P (1979) Ostracods from the mound springs area between Strangways and Curdimurka, South Australia. Transactions of the Royal Society of South Australia 103(6), 155–168.

#### **Map**

Exon NF (1971) Roma, Queensland. Explanatory notes. 1:250,000 geological series – sheet SG55/12. Bureau of Mineral Resources, Geology and Geophysics, Canberra.

## **Reports**

The inclusion of a URL is not mandatory, but is preferable where sources are available online. However, if a URL is included, inclusion of the corresponding access date is mandatory.

CSIRO (2009) Water in the Gulf of Carpentaria Drainage Division. A report to the Australian Government from the CSIRO Northern Australia Sustainable Yields Project. CSIRO Water for a Healthy Country Flagship, Australia. Viewed 21 August 2012, <http://www.clw.csiro.au/publications/waterforahealthycountry/nasy/documents/GulfOfCarpentaria/NASY-Gulf-of-Carpentaria-Drainage-Division-Report.pdf>.

## **Thesis**

The inclusion of a URL is not mandatory, but is preferable where sources are available online. However, if a URL is included, inclusion of the corresponding access date is mandatory.

Ivkovic KMJ (2006) Modelling groundwater-river interactions for assessing water allocation options. PhD Thesis, Australian National University. Viewed 24 September 2012, <http://hdl.handle.net/1885/49342>.

## **Web page**

The inclusion of a URL and an access date is mandatory.

DPI (2014) Water Sharing Plans under development. New South Wales Department of Primary Industries, Office of Water. Viewed 27 October 2014, <http://www.water.nsw.gov.au/Water-management/Water-sharing-plans/plans-underdevelopment/default.aspx>.

## **Google Earth and Maps**

Google Earth images and Google Maps images are free to use under a relatively open (but not a Creative Commons) licence. For more detail on permissions see Section 5.1, and for the full details on Google permissions see <http://www.google.com.au/permissions/geoguidelines.html>

Non-text elements created with Google Earth or Maps data should include a citation with the syntax:

Source: Google ([date]). This figure is not covered by a Creative Commons Attribution licence. Map data © Google, [data provider(s)].

The Google earth software should then be referenced in the reference list using the syntax:

Google ([date]) Google earth version [x.x]. Google, California.

Where the date and version number come from Help > About in the figure creator's copy of the software.



## 5.3 Copyright

Copyright is a protection mechanism. It is free and automatically applied. Copyright is applied to the expression of ideas – all textual material (including computer programs) and artistic material (including all photographs, maps and plans), as well as artistic and dramatic works, are covered by copyright. Copyright of a work is recursive – for example, each map in a report is protected in its own right as well as being protected by the copyright of the whole report. In Australia, copyright does not need to be applied for, there is no registration system, and publication is not required for protection. All work is protected by copyright from the moment it is created.

Copyright does not apply to raw data, but begins to apply as soon as any human interaction occurs, including any manipulation of those data by software. The Programme has chosen to assume that all data is subject to copyright unless specified otherwise.

Australian copyright generally expires after 70 years from the date it is created. This rule only applies to works created in Australia, and not for works created elsewhere.

The implication of copyright protection for the Programme is that permission must be acquired to use any material that is or may be protected by copyright when creating any Programme products.

There are a large number of copyright-related legal minutiae which cannot be adequately explored here. For detailed information, refer to Australian Copyright Council (2015), Australian Government Attorney-General's Department (2015) and IP Australia (2015).

### 5.3.1 Copyright of Bioregional Assessment Programme products

The Programme contract notes that:

The Project Parties acknowledge that their intention is to make Project Agreement Material which forms 'public sector information' for the purpose of the Australian Government Intellectual Property Manual (version 2) available through the Creative Commons Licence.

'Creative Commons Licence' is defined in the contract as 'the form of licence known as CC BY 3.0 available at <http://creativecommons.org.au/>, as updated from time to time.' This means that while the material produced by the Programme is protected by copyright, others are free to republish and modify the material in any way, so long as they attribute the material in such a way that the creator can be identified – there is no need for them to ask for permission.

The Programme requests that material owned by the Programme is attributed as:

© Commonwealth of Australia (Bioregional Assessment Programme  
<http://www.bioregionalassessments.gov.au>)

All products produced by the Programme include text on the verso page to guide others.

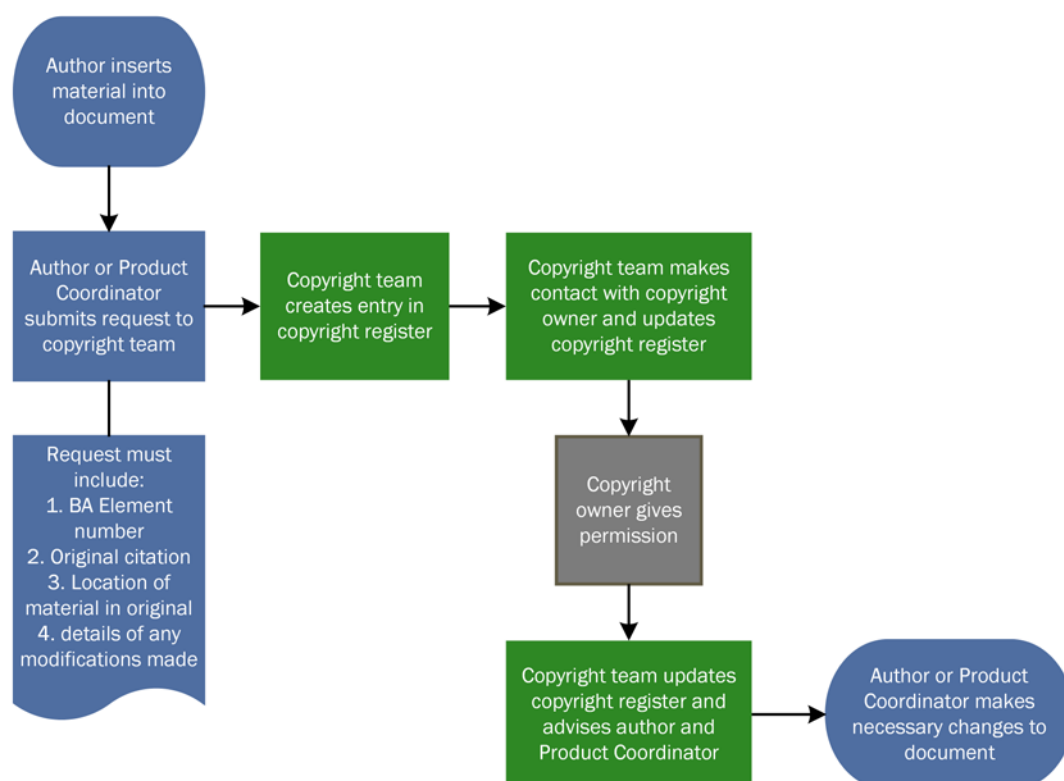
### 5.3.2 Getting copyright permission

As the writing of products in the Programme (particularly those in Component 1: Contextual information) is likely to involve the reproduction of others' work, it is important that authors realise that acquiring copyright permission is a necessary part of the production of technical products.

In general, the sourcing of copyright permissions in the Programme is handled by Bureau of Meteorology Copyright team, in close collaboration with authors. This process is shown in Figure 8. While the process is driven by the Copyright team, authors who gather material from third parties should liaise with the Copyright team to ensure that copyright issues are dealt with from the start, avoiding any 'double handling' on both the part of the Programme and the other organisations.

Note that technical products cannot be published without adequate copyright permissions for all reproduced material.

Section 5.3.2.1 describes the copyright register and the storage of copyright documentation pertinent to technical products. Section 5.3.2.2, Section 5.3.2.3 and Section 5.3.2.4 describe the processes of sourcing copyright permissions (which is undertaken by the Copyright team in the Bureau of Meteorology). Section 5.3.3 provides a brief introduction to Creative Commons licences which are the Programme's preference for licences.



**Figure 8 The process for acquiring copyright permission**

Blue boxes indicate the responsibilities of authors and Product Coordinators as part of writing a technical product, green boxes indicate the responsibilities of the Copyright team, and the grey box is external to the Programme.

### 5.3.2.1 *The copyright register*

A copyright register, where any and all documentation regarding the use of copyright material is stored, is available on SharePoint

<https://teams.csiro.au/sites/BA/Products/Lists/Copyright%20register/>.

Each non-text element that requires any form of permission has its own entry in this register. Entries in the register are set up to take comments and have attachments, so any communication and documentation can be recorded. This is the official store for copyright information. Any information not stored in this register cannot be considered.

If the same non-text element is published in multiple products it requires multiple entries in the copyright register, and the multiple entries should be cross-referenced using the 'Related items' field.

Table 13 shows the expected information for each field in the copyright register.

**Table 13 Copyright register fields, expected information and examples**

Copyright register field	Expected information	Example
Element number	The element number which identifies that element in the relevant non-text element workbook	NAM-120-001
Published in product	The name of the product(s) in which the non-text element has been or is expected to be published	NAM 1.2
Figure/table number	The Figure or Table number for the non-text element, which identifies the position of the non-text element in the product	Figure 7
Caption	The caption of the non-text element, exactly as found in the product	Isopach map of the Melvilles Coal Member in the Namoi subregion
Statement for text	The caption note, including citation	Source: Figure 12 in Tadros (1995). This figure is not covered by a Creative Commons licence. It has been reproduced with the permission of the Geological Society of Australia Incorporated.
Publication reference	The full reference to the original publication, as would appear in the reference list	Tadros NZ (1995) Gunnedah Basin in Ward CR, Harrington HJ, Mallett CW and Beeston JW (eds) Geology of Australian Coal Basins. Geological Society of Australia Incorporated Coal Geology Group. Special Publication No.1.
Publication link	The hyperlink to the original publication, where available	[none]
Licence	The text of the licence	© Geological Society of Australia Inc, all rights reserved
Difficulty	A guess at the difficulty (as a proxy for time taken)	Medium
Notes	Any notes	[none]
External request required	Is there a need to contact a third party to gain permission?	Yes
OK to publish?	Do we have permission to publish the non-text element	Yes
Related items	Cross-reference(s) to other instances of the same non-text element and/or non-text elements from the same source	NAM-120-002
Attachments	Attached files that demonstrate permission to publish	CSIRO-Copyright-GeologicalSociety.docx

### **5.3.2.2 *Identifying material that needs permission***

Where material is reproduced in whole or in part, with or without modification, copyright permission is required. Additionally, material which is ‘recognisably derived’ from a copyrighted work requires copyright permission. The majority of copyright law is ambiguous to allow case-by-case determinations. If in any doubt as to whether a work requires copyright permission, best practice is to seek that permission. Permission is often freely given, and does not require any formal process. It does, however, need to be in writing. Email is the most common media used to seek the granting of permission.

### **5.3.2.3 *Identifying the copyright owner***

The copyright owner is, in theory, the author of the material. In practice, most organisations sign agreements with their staff whereby material created in the course of their employment is owned by the organisation. Additionally, when work is performed by an organisation under a contract with a second organisation, it is the second organisation that usually claims ownership of the copyright. For instance, copyright for the majority of work done by consulting organisations will be owned by the organisation that contracted the consultants.

In the case of scientific journals, the journal (i.e. the publisher) tends to own the copyright, not the author. This is usually clearly articulated on the publisher’s website.

### **5.3.2.4 *Asking for permission***

Unless specified otherwise, it is necessary to get written permission to reproduce or modify copyrighted material. Some organisations charge fees for this permission to be given.

A standard pro forma (<https://teams.csiro.au/sites/BA/Products/Processes/Copyright/BA-element-permission-v11.docx>) is used to submit requests to copyright owners. It contains all the pertinent information regarding the purpose, reuse and proposed licence of the material. Once completed and returned by the copyright owner (granting permission or otherwise), it must be stored correctly in the Copyright Register (see Section 5.1). Many large organisations (state governments, publishing houses, etc.) will have their own documentation requirements in which case the same protocol applies – copies need to be made and stored in the Copyright Register, along with any recognition of receipt of the form.

## **5.3.3 Creative Commons licences**

The following information is for general guidance only, but may be useful for interpreting the information presented in Section 5.3 and Section 5.4. Detailed information about Creative Commons licences can be found in the Creative Commons Australia (2015).

Creative Commons licences are a simplified ‘some rights reserved’ copyright management regime which allow creators to provide users with standardised licences for re-use. These licenses are constructed in a layered fashion, whereby additional restrictions can be placed on the re-use of material. The basic Creative Commons licence is the Creative Commons Attribution licence, which allows users to do what they please with material so long as they attribute the owner. This is the licence used by the Programme when releasing material. Under this licence, material created by

the Programme can be re-used by any entity for any reason, so long as the Programme is identified as the owner of that material. The additional restrictions that can be placed on a Creative Commons Attribution licence are:

- **ShareAlike** – where material derived from the original must be published under the same licence as the original, including all conditions
- **NoDerivs** – where material may only be re-used in its original form. No modifications may be made and no derivatives created
- **NonCommercial** – where material may only be re-used for non-commercial purposes.

The name of the licence needs to include these restrictions in hyphens. For example, a photograph published originally on Wikipedia may be covered by a Creative Commons Attribution-ShareAlike-NonCommercial licence, where only users may use the material for non-commercial purposes so long as any derivative created are also published under by a Creative Commons Attribution-ShareAlike-NonCommercial licence.

## 5.4 Attributing external non-text elements

When non-text elements in technical products are reproductions or derivations of figures, tables, etc., from other sources, it is necessary to cite that source. In some cases, this material may be copyright, in which case permission needs to be given from the copyright owner. For overarching information on copyright, see Section 5.3. For instructions on getting copyright approval within the Programme, see Section 5.3.2.

The Programme aims to follow standard scientific citation practice and cite sources – such as other CSIRO, Geoscience Australia or Bureau of Meteorology publications that peers would want to know about in order to reproduce the work.

There are three separate copyright cases for attribution of external work:

- case 1 – the material is covered by a Creative Commons licence
- case 2 – the material is covered by a different open access licence
- case 3 – the material is covered by a restricted licence (often ‘All rights reserved’).

For each of these cases, a table is provided in Section 5.4.1, Section 5.4.2 and Section 5.4.3, respectively. These tables show a number of sub-cases with the syntax for attribution and an example. In these tables:

- **[name]** is the name of the material. For figures or tables, this is usually the caption in the original publication, but can be abbreviated to the figure or table number from the original publication. For datasets, this is the title as specified in the metadata for that dataset
- **[citation]** is the in-text citation for the material, specified according to Section 5.2.2
- **[owner]** is the official name (or requested shortened form thereof) of the copyright owner.

All material (figures, tables, etc.) that is (or use data that are) covered by a licence other than a Creative Commons Attribution licence (including other forms of Creative Commons licences) are to

be clearly identified using a note under the caption (style= Source or note for Table or Figure). This material shall also be listed in the introductory material of the product in which they appear. For technical products, these are to be listed on page 4, under the heading 'About this technical product'. This list should follow this syntax:

All reasonable efforts were made to provide all material under a Creative Commons Attribution 3.0 Australia Licence. The copyright owners of the following material, however, did not grant permission to do so: Figure [number], Figure [number] and Table [number]. It should be assumed that third parties are not entitled to use this material without permission from the copyright owner.

In the *Product standards*, the above is referred to as the 'exception paragraph'.

### 5.4.1 Case 1

In case 1, the material is covered by a Creative Commons licence. This is possible in two instances:

1. the Programme does not have to ask for permission to reproduce, because the copyright owner has explicitly stated in the source document or website that the material has been released under any Creative Commons licence.
2. The Programme asks for permission to re-publish the material, and the copyright owner releases that material under any Creative Commons licence.

Table 14 specifies the attribution syntax for copyright case 1. The attribution syntax for both instances of the above instances is the same, but differences arise where the material is released under a Creative Commons licence with additional restrictions (see Section 5.3.3) beyond those in the Creative Commons Attribution licence that is standard for the Programme.

**Table 14 Attribution syntax for copyright case 1**

Sub-case		Syntax	Example
The copyright owner has provided the material under a Creative Commons Attribution licence. Because all BA material is released under the same licence, no licence text is necessary.	The material is reproduced as is	Source: [name] in [citation]	Source: Figure 18-1 in Smith and Jones (1999)
	The material is altered	Source: derived from [name] in [citation]	Source: derived from Figure 18-1 in Smith and Jones (1999)
The copyright owner has released the material under a Creative Commons licence with additional restrictions. The attribution as specified by the alternative Creative Commons licence is used. The figure is listed in the exception paragraph on page 4 of the product as per Section 5.4.	The material is reproduced as is	Source: [name] in [citation]. This figure is covered by a Creative Commons [licence type] licence.	Source: Figure 18-1 in Gallant (1999). This figure is covered by a Creative Commons Attribution-ShareAlike licence.
	The material is altered	Source: derived from [name] in [citation]. This figure is covered by a Creative Commons [licence type] licence.	Source: derived from Figure 18-1 in Gallant (1999). This figure is covered by a Creative Commons Attribution-ShareAlike licence.

All in-text citations require a matching reference in the reference list, as per Section 5.2.

## 5.4.2 Case 2

In case 2, the material is covered by some other open access licence that needs to be maintained by the Programme. Table 15 shows the attribution syntax for copyright case 2.

**Table 15 Attribution syntax for copyright case 2**

Sub-case		Syntax	Example
The copyright owner has provided the material under an open access licence that is not a Creative Commons licence. The figure is listed in the exception paragraph on page 4 of the product.	The material is reproduced as is	Source: [name] in [citation]. This material is not covered by a Creative Commons Attribution licence as it is [other open access licence text].	Source: Figure 18-1 in Smith and Jones (1999). This material is not covered by a Creative Commons Attribution licence as it is in the US Public Domain.
	The material is altered	Source: derived from [name] in [citation]. This material is not covered by a Creative Commons Attribution licence as it is [other open access licence text].	Source: derived from Figure 18-1 in Smith and Jones (1999). This material is not covered by a Creative Commons Attribution licence as it is in the US Public Domain.

All in-text citations require a matching reference in the reference list, as per Section 5.2.

## 5.4.3 Case 3

In case 3, the Programme asks for permission to reproduce, and the copyright owner grants a licence which is *not* any Creative Commons licence. This licence will be specified in the documentation the Programme receives from the copyright owner. The documented licence needs to be retained by the Programme (see Section 5.3.2), but does not need to be published.



**Table 16 Attribution syntax for copyright case 3**

Sub-case		Syntax	Example
The copyright owner agrees to the standard attribution as specified by the Bioregional Assessment Programme. The figure is listed in the exception paragraph on page 4 of the product.	The material is reproduced as is	Source: [name] in [citation]. This figure is not covered by a Creative Commons Attribution licence. It has been reproduced with the permission of [owner].	Source: Figure 18-1 in Smith and Jones (1999). This figure is not covered by a Creative Commons Attribution licence. It has been reproduced with the permission of NSW Trade and Investment.
	The material is altered	Source: derived from [name] in [citation]. This figure is not covered by a Creative Commons Attribution licence. It has been published with the permission of [owner].	Source: derived from Figure 18-1 in Smith and Jones (1999). This figure is not covered by a Creative Commons Attribution licence. It has been published with the permission of NSW Trade and Investment.
The copyright owner specifies the attribution that they would like. The figure is listed in the exception paragraph on page 4 of the product as per Section 5.4.	The material is reproduced as is	Source: [name] in [citation]. This figure is not covered by a Creative Commons Attribution licence. [Owner's requested attribution.]	Source: Figure 18-1 in Smith and Jones (1999). This figure is not covered by a Creative Commons Attribution licence. © Generic Coal Company 1999
	The material is altered	Source: derived from [name] in [citation]. This figure is not covered by a Creative Commons Attribution licence. [Owner's requested attribution.]	Source: derived from Figure 18-1 in Smith and Jones (1999). This figure is not covered by a Creative Commons Attribution licence. © Generic Coal Company 1999

All in-text citations require a matching reference in the reference list, as per Section 5.2. The copyright notice ('© Generic Coal Company 1999' in the examples) does not require a separate reference, as this is the copyright of the work itself ('Smith and Jones (1999)') in the examples.

### 5.4.4 Examples

Three examples are provided here to demonstrate the style and syntax used for attribution.

Figure reproduced from an external source, released under a Creative Commons Attribution licence (case 1):

#### Figure 1 Image of landscape

Source: Figure 18-1 in Gallant (1999)

Figure reproduced from an external source, provided under a Creative Commons Attribution-ShareAlike licence (Case 1):

#### Figure 1 Image of landscape

Source: Figure 18-1 in Gallant (1999). This figure is covered by a Creative Commons Attribution-ShareAlike licence.

Figure modified from a figure from an external source, provided under a different open access licence (case 2):

**Figure 1 Image of landscape**

Source: derived from Figure 18-1 in Gallant (1999). This figure is not covered by a Creative Commons Attribution licence as it is in the US Public Domain.

Figure modified from a figure from an external source, not provided under any Creative Commons Attribution licence (Case 3):

**Figure 1 Image of landscape**

Source: derived from Figure 18-1 in Gallant (1999). This figure is not covered by a Creative Commons Attribution licence. © Generic Coal Company 1999

All in-text citations require a matching reference in the reference list as per Section 5.2.

## 5.5 Citing data

In BAs, authors are expected to be data aware. That is, authors should be aware of the data that is used in undertaking a BA and should expose these data to the readers. Follow the same principles as citing literature when citing datasets in text: for example, when quoting a number cite the dataset it comes from, or when describing a method cite the datasets that were used.

Datasets are referenced in a similar way to literature, in that there is a list of datasets following each list of references. The difference is that the dataset references are indexed for clarity. The dataset indices reset after each dataset list, which appears after each reference list. This way, each Word document has its own list, starting at 1, which is completely independent of any other list in the product. When a dataset is cited in more than one section of product, that dataset is likely to have a different index in each section. For example, the same dataset could be Dataset 2 in Section 1.3.1, Dataset 4 in Section 1.3.2, and Dataset 1 in Section 1.3.3.

There are two types of datasets:

- 'Bioregional Assessment Source Dataset'. These are datasets are pre-existing datasets sourced from outside the Bioregional Assessment Programme. This includes data sourced from the Programme partner organisations. In this document, these are referred to as 'source datasets' other than in examples.
- 'Bioregional Assessment Derived Dataset'. These are datasets created by the Bioregional Assessment Programme. In this document, these are referred to as 'derived datasets' other than in examples. Any change to a source dataset results in the creation of a derived dataset.

All the information used in citing datasets comes from the Bioregional Assessment Metadata Catalogue.

### 5.5.1 Citing data used in text

These in-text citations follow the model of in-text citations of references, but using 'Dataset X' instead of the year. For example: 'The water quality in these bores is good (NSW Office of Water,

Dataset 5).' or 'The Bureau of Meteorology (Dataset 3) provided bore locations.' These datasets would then have full references in the dataset list.

## 5.5.2 Citing data used in figures

There are two reasons data used in making a figure (for example, a map) might be cited. The first is to meet a licence condition, the second is to provide extra information to a reader.

- When the citation is to meet a licence condition, the licence itself should make it obvious how this data is to be cited. An attribution report is generated for each product by the Information Management team at pre-internal approval, and this report provides information on necessary citations to meet licence conditions.
- When the citation is to add extra information, this is information provided to assist readers who want to see quickly the primary source of pertinent data. The author uses their judgment to determine those data on the map in which a reader is most likely to be interested, and the original source of those data should be cited.

When datasets are cited for figures, use a 'Data:' statement, analogous to the 'Source:' statements described in Section 5.4, using a note under the caption in the style 'Source or note for Table or Figure'.

Note that all datasets used for figures will be available from the Bioregional Assessment Information Platform (once it is made public), not just those cited in the product.

### 5.5.2.1 *Worked example: which datasets should be cited?*

As an example, for a map showing a bioregion boundary, roads, rivers, towns and coal seam gas (CSG) well locations, it is only for the CSG well locations that a reader is likely to want to know the original source of those data.

This map would be made with the following datasets:

- **S1** – a source dataset of the bioregion boundaries as defined by the Programme
- **S2** – a source dataset of town and road locations
- **S3** – a source dataset of rivers and waterbodies
- **S4** – a source dataset of the continent of Australia with state borders
- **D5** – a derived dataset created by the Programme, showing CSG well locations, clipped to a single bioregion and re-projected so the spatial coordinates match with the Programme's other data.

In this example, **D5** is the only dataset that is not there as contextual information. However, **D5** is not the original source data. **D5** is a re-projection and clip of:

- **S6** – a source dataset of CSG wells across NSW, provided by the NSW Government.

Therefore the 'Data:' statement under the figure should cite only **S6**. Although **S6** was not used in making the map image itself, it is the original source of the pertinent data. Once the Bioregional Assessment Information Platform is operational, users will be able to link to the metadata of all

the datasets used for the map (**S1**, **S2**, **D5**, etc.) including links to parent datasets (**S6**). Therefore someone who wants to recreate the map exactly will have access to both the metadata plus the actual dataset **D5**.

This map would then have a caption and note:

**Figure 1 Map showing the location of coal seam gas wells in the Generic subregion**

Data: NSW Government (Dataset 1)

A complete reference for Dataset 1 would be included in the dataset list:

Dataset 1 NSW Government (2014) Location of coal seam gas wells across the generic part of New South Wales (updated 2014). Bioregional Assessment Source Dataset. Viewed 29 July 2015, <http://data.bioregionalassessments.gov.au/data/xxxx-xxxx-xxxx-xxxx>.

### 5.5.3 The dataset list

Details of any dataset that is cited (either in text or as a 'Data:' statement on a map) needs to be included as a full reference in the dataset list at the end of each section (i.e. following each reference list).

Each dataset reference must include:

- Organisation – the organisation the metadata author represents (organisation, agency, department, etc.); for derived datasets, this will always be 'Bioregional Assessment Programme'. This is equivalent to the 'organisation/entity that the author represents' in the Metadata Catalogue
- Year – for source datasets, the year the dataset was published; for derived datasets, the year the dataset was created
- Title – dataset title, as per entry in the Metadata Catalogue (these titles may or may not meet *Product standards* regarding capitalisation and punctuation)
- Type – dataset type, one of:
  - 'Bioregional Assessment Source Dataset' for source datasets
  - 'Bioregional Assessment Derived Dataset' for derived datasetsas determined by the 'Status' field from the Metadata Catalogue
- ViewedDate – the viewed date of the URI – this is the date that the product author or editor last checked or updated the reference, confirming the validity of the URI and the currency of the information
- URI – the URI.

This reference must follow the syntax [Organisation] ([Year]) [Title]. [Type]. Viewed [ViewedDate], [URI].

The URI is that which is provided for a registered dataset. URIs for datasets in the Data Store should always be 'http://' not 'https://'.

### 5.5.3.1 *Example dataset list*

#### **Datasets**

Dataset 1 Bioregional Assessment Programme (2015) Asset database for the Gloucester subregion on 27 May 2015. Bioregional Assessment Derived Dataset. Viewed 30 July 2015, <http://data.bioregionalassessments.gov.au/dataset/c3b43706-f483-4b8c-b6da-3c877cfeabc7>.

Dataset 2 NSW Department of Environment, Climate Change and Water (2007) Climate Change Corridors Coastal North East NSW. Bioregional Assessment Source Dataset. Viewed 30 July 2015, <http://data.bioregionalassessments.gov.au/dataset/0a1b4dc6-07a4-4f2b-acc2-000eed75db22>.

Dataset 4 Bioregional Assessment Programme (2014) National Groundwater Information System Victorian Extract (2014-03-21). Bioregional Assessment Derived Dataset. Viewed 30 July 2015, <http://data.bioregionalassessments.gov.au/dataset/fc6dbf39-d786-4412-b631-04695db4cc90>.

### 5.5.3.2 *Auto-generation of dataset references*

A tool that harvests information from the Metadata Catalogue has been developed for the Programme. This 'citation exporter' is available online <http://data.bioregionalassessments.gov.au/function/metadataexporter/citations>.

Enter the dataset's GUID (the 32-character ID in the URI) into the box and click the 'Make citations' button.

### 5.5.3.3 *Correcting dataset references*

The Metadata Catalogue is the official source for all information pertaining to datasets. When adding a dataset reference to a product, it may be discovered that there is an error in one of the reported fields (for example, a spelling error in the name of the organisation or title). As these references are automatically harvested from the Metadata Catalogue it is important that necessary changes be made in the Metadata Catalogue, not just in the citation. When changes need to be made to the Metadata Catalogue, contact the relevant Data Coordinator.

## 5.6 Attributing photographs

For photographs, ensure that the location and date taken are noted. Credit the photographer and photographer's affiliation.

For photographs in the body of products, a caption and note is used as per all non-text elements:

**Figure 1 Gulligal Lagoon, located about halfway between Gunnedah and Boggabri on the western side of the Namoi River, NSW, 2013**

Source: Neal Foster, NSW Department of Natural Resources

The below example shows how to attribute the cover photo on the verso page of products:

Gulligal Lagoon, located about halfway between Gunnedah and Boggabri on the western side of the Namoi River, NSW, 2013

Credit: Neal Foster, NSW Department of Natural Resources

### 5.6.1 Cover images

Cover images are stored in the cover image register (<https://teams.csiro.au/sites/BA/Products/Lists/CoverImages>). This is the official list of cover images and their attributions. Each image has an entry in copyright register, which is cross-referenced by the cover image register.

## 5.7 Lessons learned and specific organisation practices

This section is a collation of lessons learned and specific organisation practices during the Programme, and is updated regularly. Please make a note of these and modify work practices if necessary.

### 5.7.1 Journals

Journals tend to be reluctant to allow adaptation or modification of material, and will usually charge for reproduction.

### 5.7.2 Government

Many state and Australian government agencies are now publishing their outputs under Creative Commons Attribution licences, or a licence that extends many of the same privileges. Best practice is still to ask permission unless the material itself states that you do not have to.

### 5.7.3 Mining companies

Mining companies do not seem to be particularly protective of their copyright, however sometimes it can be difficult to elicit a response. Queries sent to addresses such as 'info@company' sometimes go unheeded.

For this reason, the Copyright team requests that, where possible, authors provide contacts within mining companies who are willing to communicate.

## References

- Australian Copyright Council (2015) Do I need permission to use copyright material. Viewed 30 July 2015, [http://www.copyright.org.au/acc\\_prod/ACC/Find\\_an\\_Answer/FAQ\\_\\_Do\\_I\\_need\\_permission\\_/ACC/FAQ/Do\\_I\\_need\\_permission\\_to\\_use\\_copyright\\_material.aspx?hkey=84c43943-b48d-406d-9ceb-9362f0e7951e](http://www.copyright.org.au/acc_prod/ACC/Find_an_Answer/FAQ__Do_I_need_permission_/ACC/FAQ/Do_I_need_permission_to_use_copyright_material.aspx?hkey=84c43943-b48d-406d-9ceb-9362f0e7951e).
- Australian Government Attorney-General's Department (2015) Copyright information | Attorney-General's Department. Viewed 30 July 2015, <http://www.ag.gov.au/RightsAndProtections/IntellectualProperty/Pages/Copyright-information.aspx>.
- Creative Commons Australia (2015) About the Licences | Creative Commons Australia. Viewed 30 July 2015, <http://creativecommons.org.au/learn/licences/>.
- IP Australia (2015) Copyright | IP Australia. Viewed 30 July 2015, <http://www.ipaustralia.gov.au/get-the-right-ip/copyright/>.
- Snooks & Co. (2002) Style manual for authors, editors and printers. Sixth edition. John Wiley & Sons, Canberra.





## 6 Charts

### 6.1 Introduction

The following specifications apply to charts produced in Microsoft Excel 2007. These specifications could be used as a guide for the creation of charts in professional graphics software such as Adobe Creative Suite, but are not intended for such use.

#### 6.1.1 Chart templates

Templates for the following charts are available in Microsoft Excel 2007 (.xlsx format). An Excel spreadsheet with these templates is available on SharePoint

<http://teams.csiro.au/sites/BA/Products/ProductStandards/BA-Excel-examples-v04.xlsx>.

### 6.2 Standards for all charts

#### 6.2.1 Chart sizes

Chart sizes are specified using Microsoft Excel column widths and row heights (not pixels). A full-width chart should fit inside an Excel column with a width of 90, while a half-width chart should fit inside an Excel column with a width of 45. Excel cell sizes are represented as ‘the number of characters that can be displayed in a cell that is formatted with the standard font’ (Microsoft, 2015). This means that the units ‘90’ and ‘45’ may look different for different people, but are a robust way of ensuring that the relationship between the size of graphics and text stays the same.

As a guide, the chart height should be approximately 70% of the width. In Excel, this works out to be equal to the height of 14 rows, where each row has a height of 11.25. However, some charts will need to be taller than this – for example Figure 18. Any chart that uses the same scale on the x- and y-axes should have axes of equal length (i.e. a 1:1 line is drawn at 45°). See Figure 28 for an example.

#### 6.2.2 Copying a chart into a Word document

With the chart selected in Excel, press copy (Ctrl+C). In Word, place the cursor where you wish the chart to appear. From the Paste drop-down menu on the Home tab of the Ribbon, select ‘Paste Special’. Paste the chart as a ‘Picture (Enhanced Metafile)’.

It is important to note that when copying charts from Excel into Word, the sizes can be inconsistent between different computers. This is due to individual machine setup, and correcting this is outside of the scope of this document. However, if the chart size is set correctly in Excel (see above), the chart copies in Word can be scaled to the appropriate size (8.5cm for half-width plots, 17cm for full width plots) without issue.

### 6.2.3 Colours

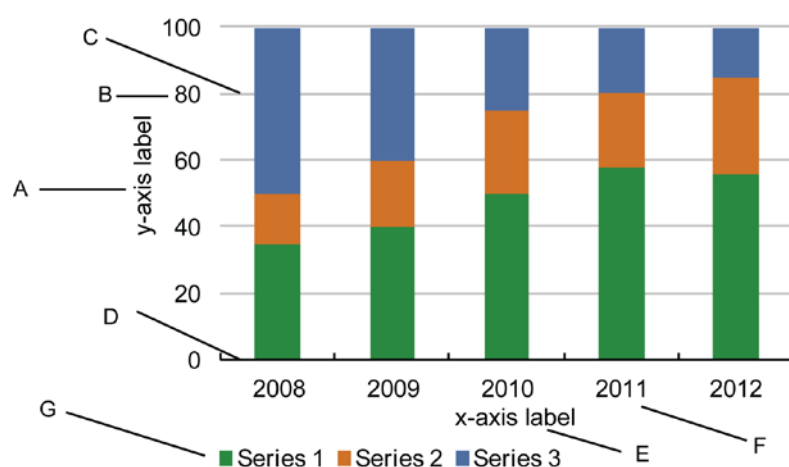
Six colours have been chosen as the principal colours for charts. In general, these should be used in the order presented in Table 17. However, there may be times where colours are avoided for clarity, or used across different charts in differing orders to show conceptual linkages.

**Table 17 Principal chart colours**

	R	G	B
Green	46	136	36
Dark orange	207	111	10
Dark blue	79	110	161
Slate	64	79	97
Red	204	62	42
Light blue	35	158	215

### 6.2.4 Common elements of a chart

Figure 9 shows the common elements of a chart, and Table 18 describes and gives specifications for these elements.



**Figure 9 Common elements of a chart. Refer to Table 18 for descriptions and specifications for indicated elements**

**Table 18 Specifications for common elements of charts**

Element	Name	Specifications
A	y-axis label	Arial, black, 8 pt. Sentence case, rotated 270° and centred vertically
B	y-axis text	Arial, black, 8 pt. Sentence case, right aligned
C	Gridlines	0.25 pt, grey (RGB: 194, 194, 194)
D	x-axis line	0.75 pt, black. Major tick marks inside
E	x-axis label	Arial, black, 8 pt. Sentence case, centred (Not all charts will require this.)
F	x-axis text	Arial, black, 8 pt. Sentence case, centred.
G	Legend	Arial, black, 8 pt. Sentence case. The first legend entry aligned with the left end of the x-axis

## 6.2.5 Charts on A3 pages

Certain situations may warrant the use of large-scale charts or diagrams on A3 paper. These situations are likely to be rare, in cases where additional detail may be of relevance. The following conventions apply to A3 charts or diagrams:

- They are included in situ in a product (i.e. as an A3 page in the middle of A4 pages, and not as an appendix). This is accomplished by having section breaks before and after the figure, with a different page size specified for the page. Contact the Product Coordinator for assistance.
- The caption of the A3 chart or diagram will contain the following note: 'This figure has been optimised for printing on A3 paper (297 mm x 420 mm).'
- A3 pages can be used in either portrait or landscape orientation depending on what best suits the chart or diagram.
- The A3 pages may have unusual characteristics regarding the placement and orientation of headers, footers and captions; this will vary and depends entirely on the specific figure and will require a case-by-case determination to ensure correct alignment of these features.

## 6.2.6 Multiple charts in one figure

When it is necessary to display more than one chart in a single figure:

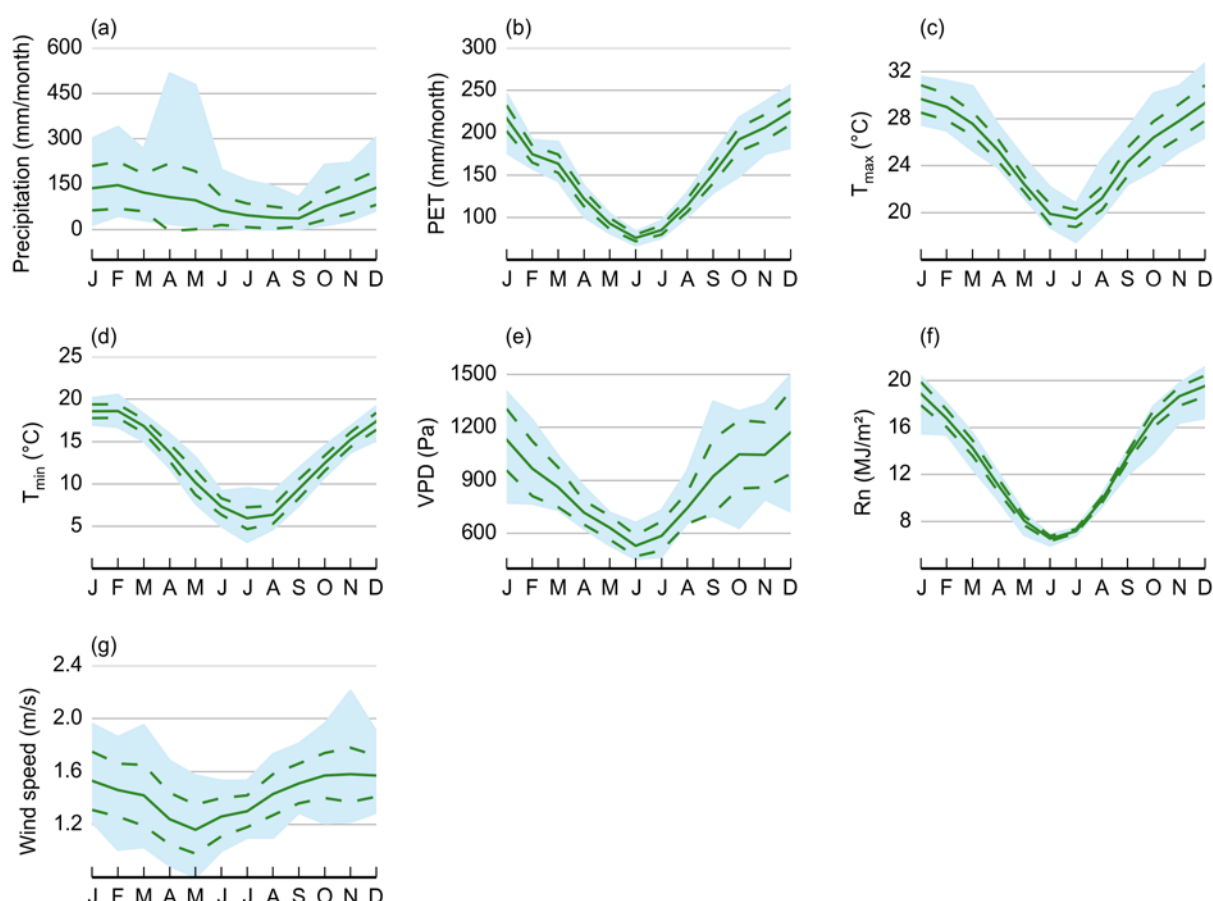
- each individual chart should be labelled using a lowercase letter in parentheses (i.e. '(a)', '(b)', etc.)
- the labels should be aligned with the left-hand vertical axis of each chart, and can either be entered in Word (for charts created in Excel) or embedded into the chart image (for charts created using scripts)
- do not include words after '(a)', '(b)', etc., unless absolutely necessary for easy communication
- the figure should have a single caption that covers all individual charts, with a caption note that specifies each, using the syntax:

**Figure 1 [Generic description of figure]**

(a) [specific item 1], (b) [specific item 2]

For an example of these standards see the figure and caption of Figure 10.

When entering a multiple-chart figure in Word, use tabs to position the figures and labels. Do not use a table to position the charts and labels as this reduces the document's accessibility.



**Figure 10 Monthly average values of climate variables for the Gloucester subregion**

(a) precipitation, (b) potential evapotranspiration (PET), (c) maximum temperature ( $T_{\max}$ ), (d) minimum temperature ( $T_{\min}$ ), (e) vapour pressure deficit (VPD), (f) net radiation (Rn) and (g) wind speed for the Gloucester subregion. The mean (solid line),  $\pm 1$  standard deviation (dashed lines) and the minimum to maximum range (blue shaded area) are shown. Values were calculated over the years 1981 to 2012 (inclusive)

## 6.2.7 Text in charts

Text in charts becomes rasterised (turned into dots) when the chart is inserted into a Microsoft Word document. This means that screen readers are unable to discern any text in the chart itself. For this reason, text in charts should be minimised where possible. For instance:

- months should be initialised (J, F, M, A, M... *not* JAN, FEB, MAR, APR, MAY)
- where annotation of individual data points is necessary (e.g., to show where one relevant point sits in a cluster), use labels to direct the reader to the caption, rather than including large blocks of text in the chart itself
- abbreviations in x- and y-axis labels are acceptable, so long as the abbreviation is spelt out in full in the caption (see Figure 10 for an example).

## 6.3 Column chart

Figure 11 and Figure 12 show examples of column charts. There is no gap between columns, and columns appear over the grid lines. A legend is usually unnecessary, as there is only one series shown.

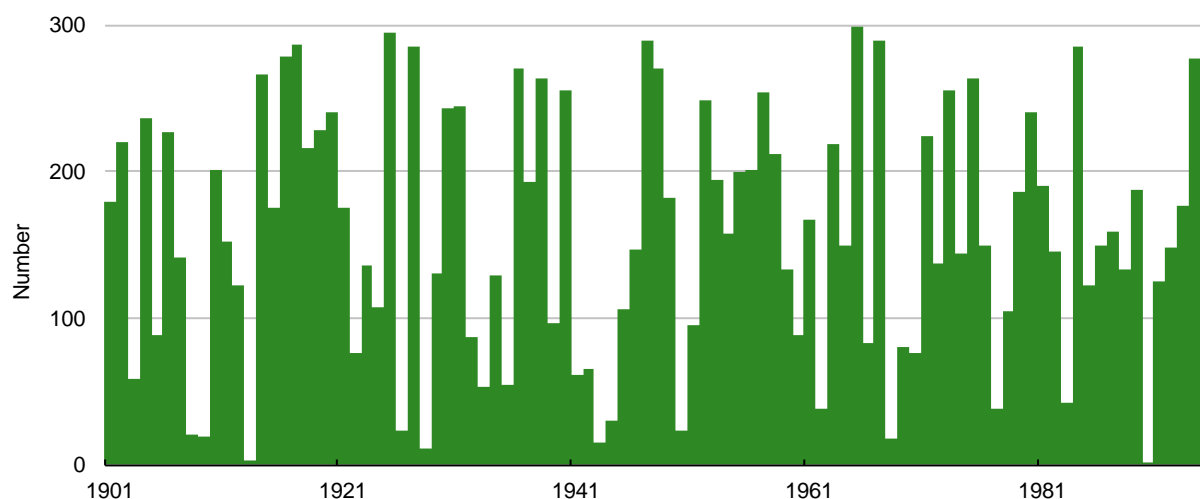


Figure 11 Full-width example of a column chart

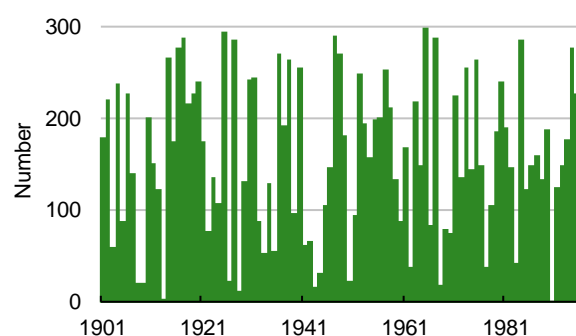


Figure 12 Half-width example of a column chart

## 6.4 Clustered column chart

Figure 13 and Figure 14 show examples of clustered column charts. There is no gap between columns in the same cluster, and columns appear over the grid lines. The legend is beneath the chart, with the first legend entry aligned with the left end of the x-axis.

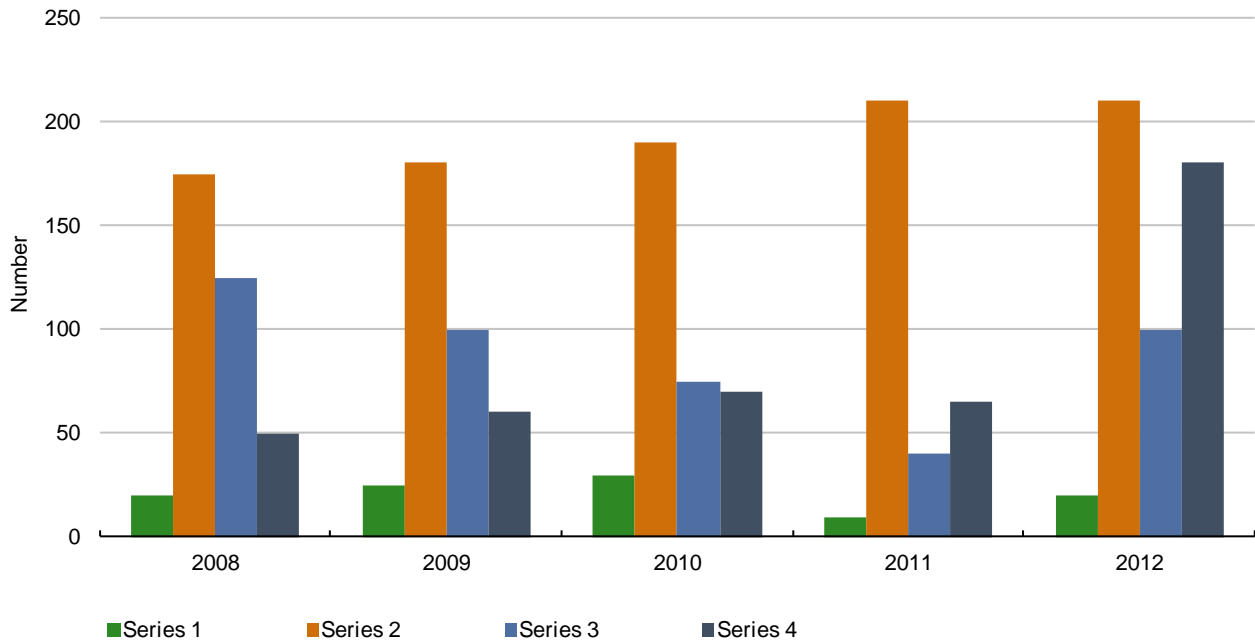


Figure 13 Full-width example of a clustered column chart

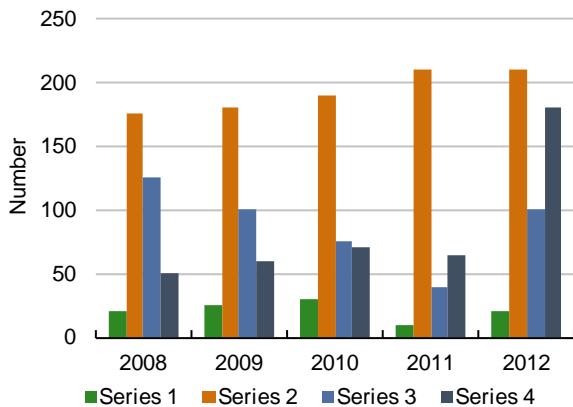


Figure 14 Half-width example of a clustered column chart

## 6.5 Stacked column chart

Figure 15 and Figure 16 show examples of stacked column charts. Columns appear over the grid lines. The legend is beneath the chart, with the first legend entry aligned with the left end of the x-axis.

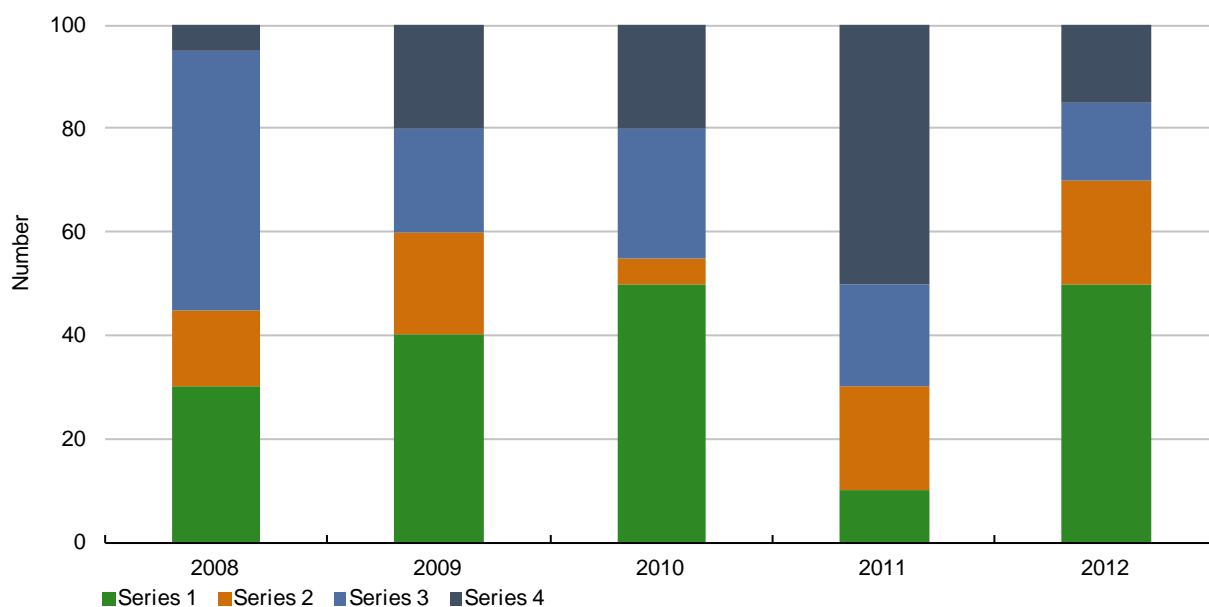


Figure 15 Full-width example of a stacked column chart

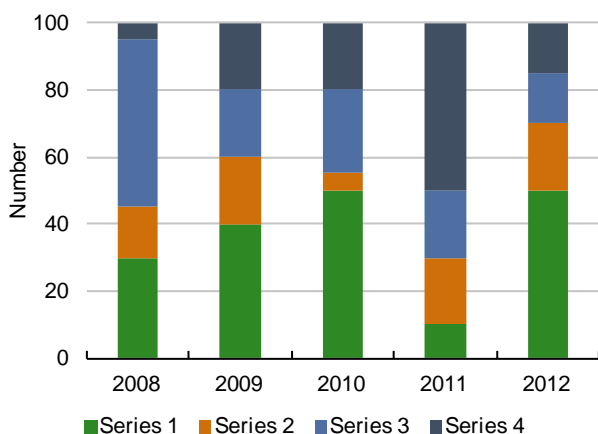
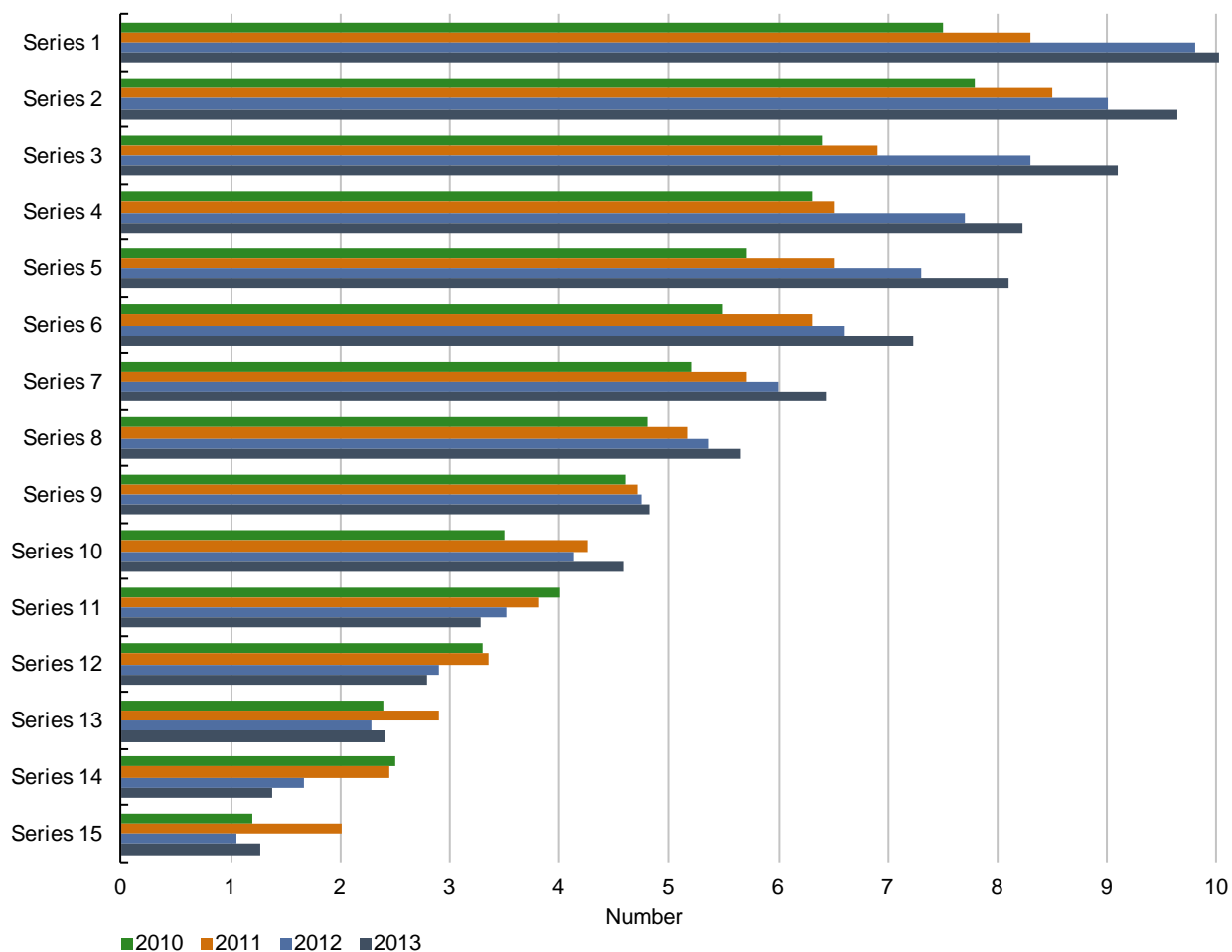


Figure 16 Half-width example of a stacked column chart

## 6.6 Clustered bar chart

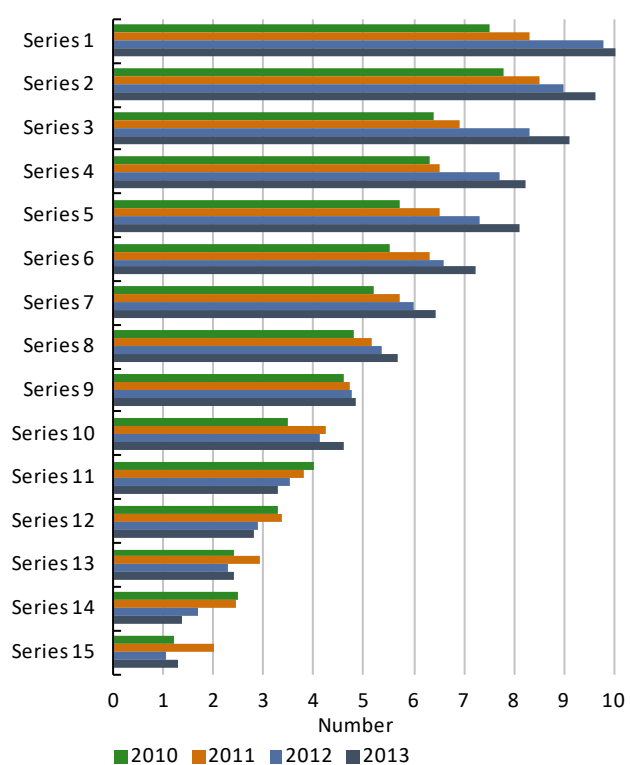
Figure 17 shows an example of a Full-width clustered bar chart. There is no gap between columns in the same cluster, and columns appear over the grid lines. The horizontal axis labels are at the bottom of the chart. The legend is beneath the chart, with the first legend entry aligned with the vertical axis.



**Figure 17 Full-width example of a clustered bar chart**

Figure 18 shows an example of a half-width clustered bar chart. There is no gap between columns in the same cluster, and columns appear over the grid lines. The horizontal axis labels are at the bottom of the chart. The legend is beneath the chart, with the first legend entry aligned with the vertical axis.





**Figure 18** Half-width example of a clustered bar chart

## 6.7 Line chart

Figure 19 and Figure 20 show examples of line charts. Lines are 2.25 pt, simple and unbroken, with round caps and joins, and appear over the gridlines. The legend is beneath the chart, with the first legend entry aligned with the left end of the x-axis.

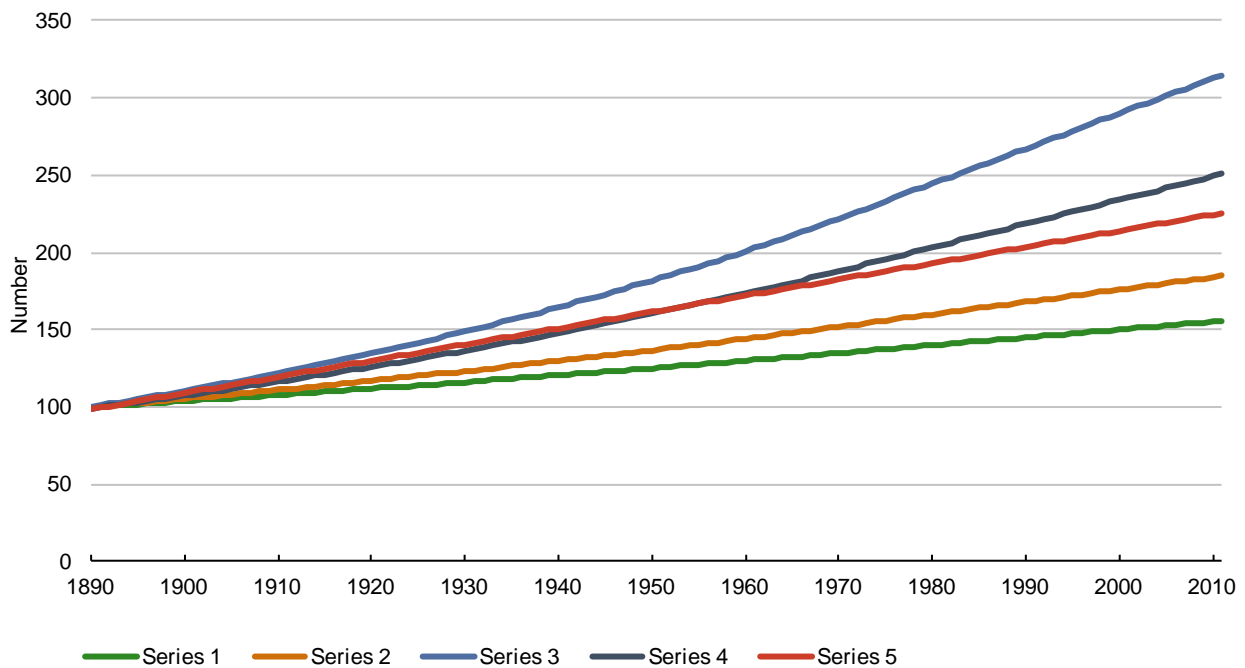


Figure 19 Full-width example of a line chart

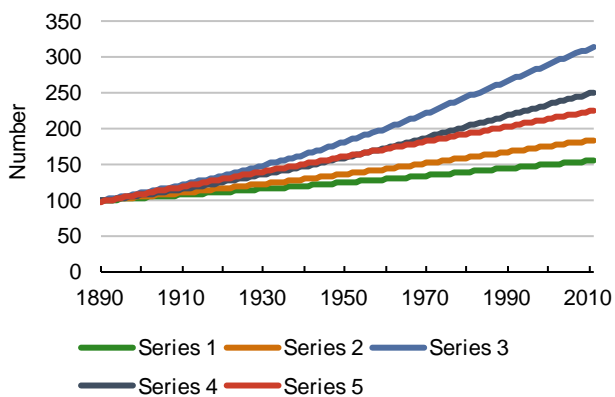


Figure 20 Half-width example of a line chart

## 6.8 Shaded line chart

Figure 21 and Figure 22 show examples of shaded line charts. Lines are 2.25 pt, simple and unbroken, with round caps and joins, and appear over the gridlines. Shading appears under data lines, has no border, and is filled with 'Very light blue' (R210, G236, B248). The legend is beneath the chart, with the first legend entry aligned with the left end of the x-axis.

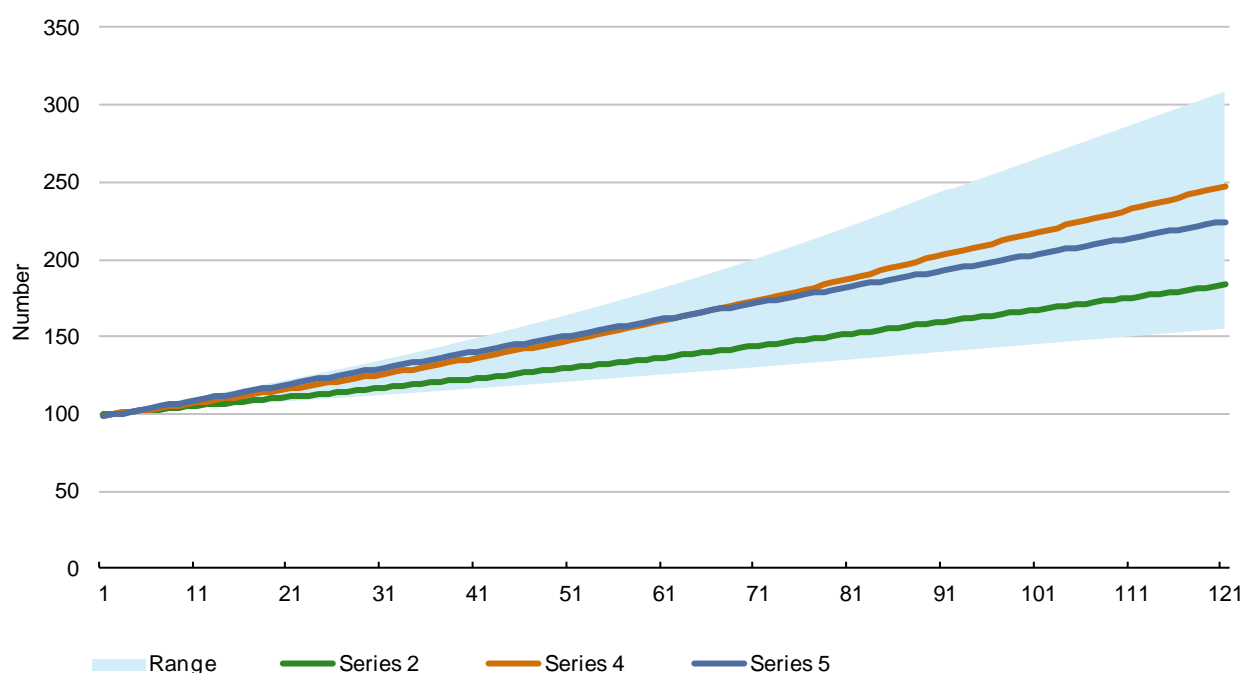


Figure 21 Full-width example of a shaded line chart

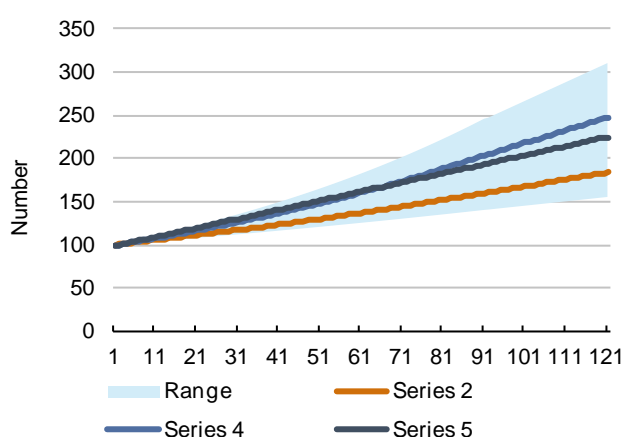


Figure 22 Half-width example of a shaded line chart

## 6.9 Box and whisker chart (no mean line)

Figure 23 and Figure 24 show examples of box and whisker charts that do not include mean lines. A legend is usually unnecessary. However, the ranges shown by the boxes and whiskers should be made explicit in either the caption or the text.

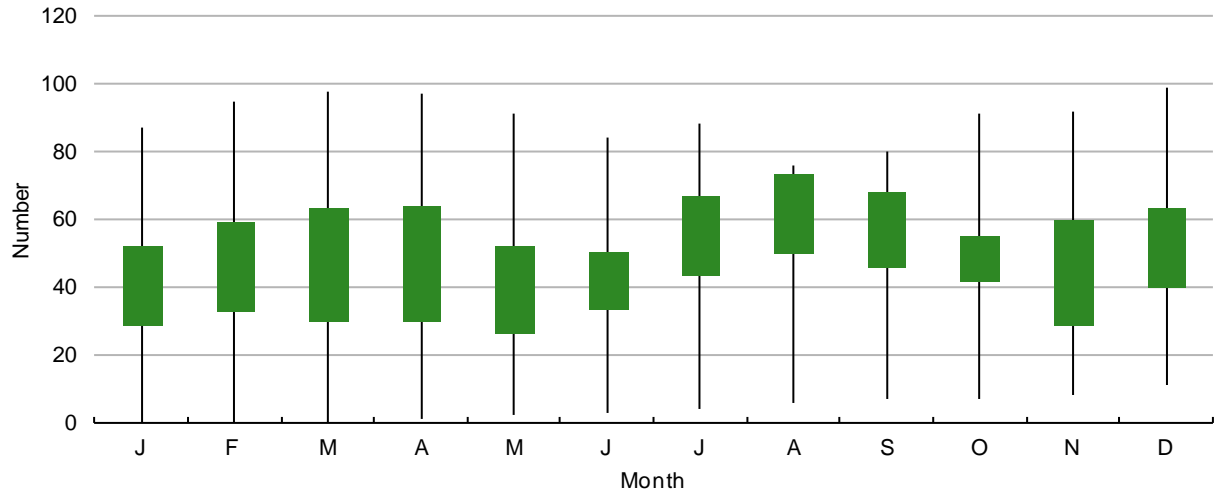


Figure 23 Full-width example of a box and whisker chart (no mean line)

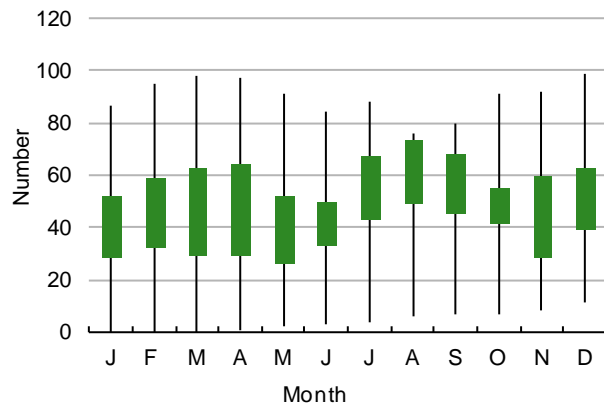


Figure 24 Half-width example of a box and whisker chart (no mean line)

## 6.10 Box and whisker plot (mean)

Figure 25 and Figure 26 show examples of box and whisker charts that include mean lines. A legend is usually unnecessary. However, the ranges shown by the boxes and whiskers should be made explicit in either the caption or the text.

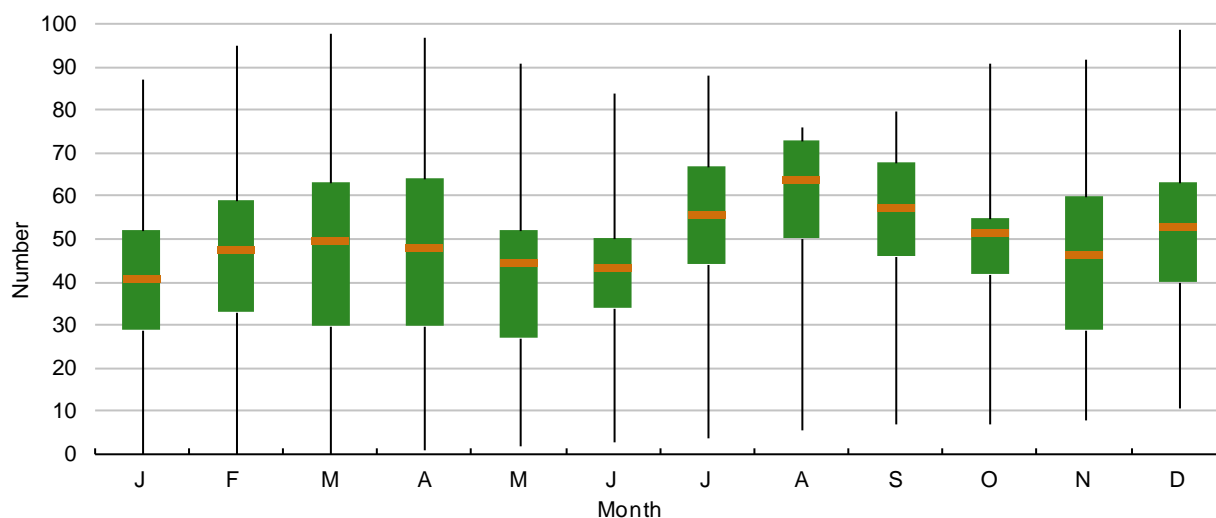


Figure 25 Full-width example of a box and whisker chart (mean line)

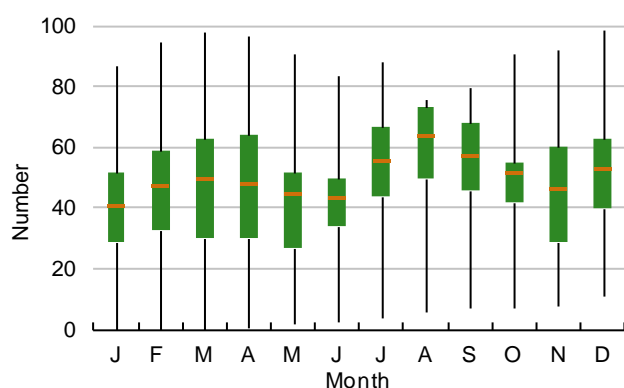
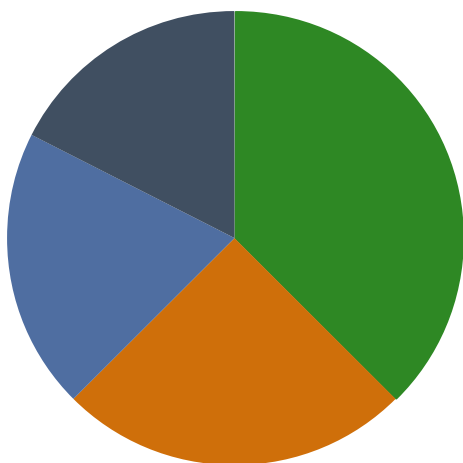


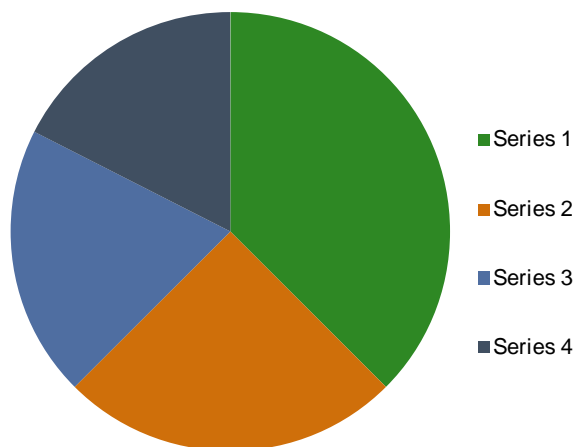
Figure 26 Half-width example of a box and whisker chart (mean line)

## 6.11 Pie chart

(a)



(b)



■ Series 1 ■ Series 2 ■ Series 3 ■ Series 4

**Figure 27 Example pie charts**

(a) vertically aligned, (b) horizontally aligned

Pie charts can be aligned vertically or horizontally as shown in Figure 27. For vertically aligned charts, the legend should be under the chart, centred along the chart's vertical axis. For horizontally aligned charts, the legend should be to the right of the chart, centred along the chart's horizontal axis.

# 6.12 Scatter chart

Figure 28 and Figure 29 show examples of scatter charts. Markers are circular, size 9 for full width or square charts and size 5 for half width charts. A legend is usually unnecessary.

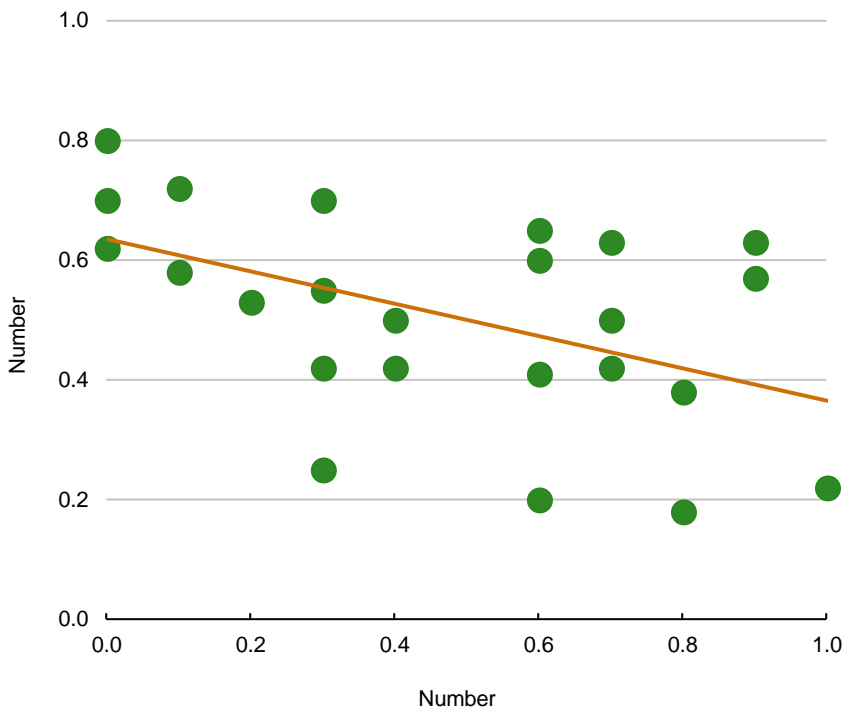


Figure 28 Square example of a scatter chart

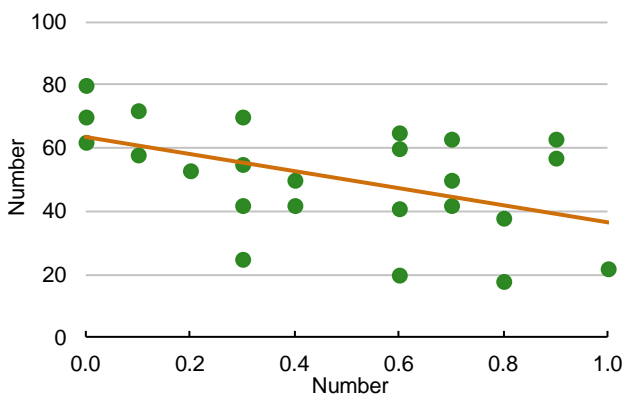


Figure 29 Half-width example of a scatter chart

### 6.13 Flow chart

Figure 30 shows an example of a flow chart built in Microsoft Excel. Note that this uses lighter shades of the official colours, as shown in Table 19.

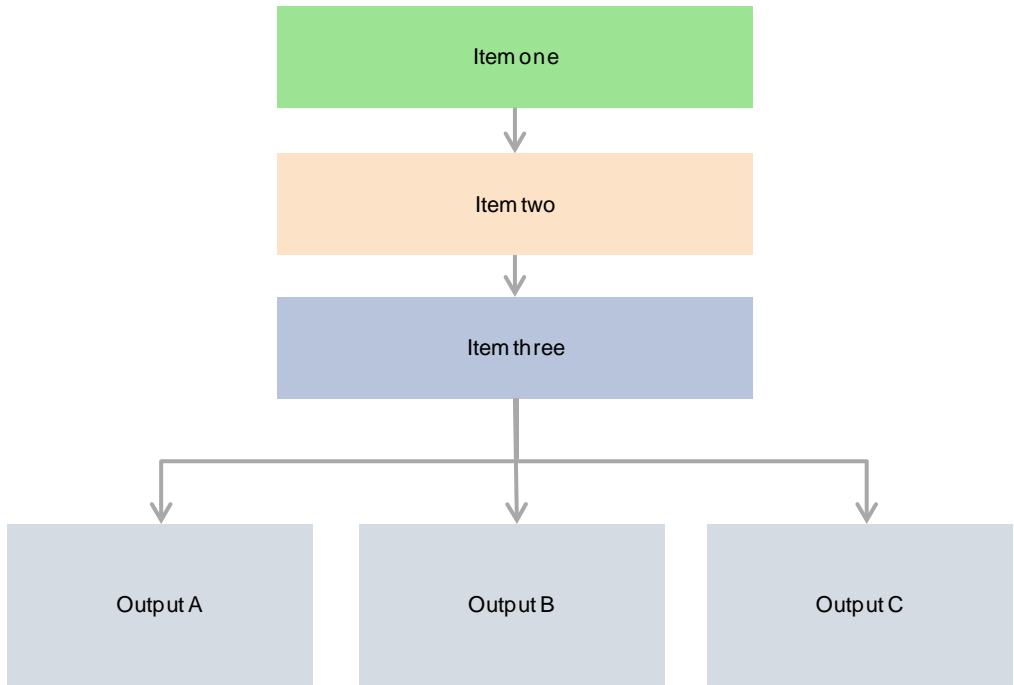


Figure 30 Example of a flow chart built in Microsoft Excel

Table 19 Lighter shades of the official colours

	R	G	B
Green lighter 60%	156	227	148
Dark orange lighter 60%	249	199	143
Dark blue lighter 60%	183	197	219
Slate lighter 60%	171	184	199
Red lighter 60%	237	175	167
Light blue lighter 60%	165	217	241



## 6.14 Conceptual models and coal resource development pathways

The development, visualisation and communication of conceptual models and coal resource development pathways will be a large part of BAs. At the time of writing, conceptual models have begun to be developed and utilised, including conceptual models of causal pathways and the Queensland GDE Atlas conceptual models.

### 6.14.1 Conceptual models of causal pathways

Causal pathways should be developed using Gliffy on Confluence

<https://confluence.csiro.au/display/BA/CausalPathways>.

This space includes template files for all bioregions and subregions, and is automatically version managed. All pathways will be visible to everyone in the programme. This will help with consistency in concepts, style and language. It is expected that the conceptual modellers for a given bioregional assessment will liaise with those from other assessments to ensure efficiency and consistency.

### 6.14.2 Queensland conceptual models for groundwater-dependent ecosystems

The Queensland government has released its library of conceptual models for groundwater-dependent ecosystems (GDEs). The library includes representations of a large number of GDEs.

Each model consists of:

- a set of raster images (.png)
- a set of vector graphic files (.ai)
- specification documents.

#### 6.14.2.1 Accessing the models

All the relevant files are available in subfolders of the following SharePoint folder

<https://teams.csiro.au/sites/BA/Ecology/ConceptualModels/QLD%20GDE%20models>.

This is the 'working' space for these files – you are free to do what you need to. We have another copy of all the originals in a separate, non-editable library on SharePoint, and we have registered the files as provided as a Source dataset (DISITI, Dataset 1).

#### 6.14.2.2 Using and modifying the models

For each model, there are two Adobe Illustrator files: one provided by the Queensland Government, one made by the Products team. The ones made by the Products team are down-graded versions, and are designed to work with older versions of Illustrator. These down-graded versions will also work well with Inkscape (The Inkscape Project, 2015), which is the recommended free program that will edit these files.

Each model includes a number of features and a legend entry for each feature type. If you wish to add different features, we recommend the IAN library of icons (University of Maryland Center for Environmental Science, 2015), which are royalty free so long as they are attributed (see Section 6.14.2.3).

The conceptual models are large images, and will not fit on an A4 page. For the purposes of BAs, we would prefer it if you make an effort to re-scale the important parts of an image so that it does fit on our standard A4 page (160 mm x 200 mm print area), using 10 pt font.

### **6.14.2.3 Licencing**

The raster images have been provided under a Creative Commons Attribution licence (see Chapter 5). However, the vector graphics files have been provided under a restricted licence that allows use but not publication. These vector files must not be distributed outside the Programme.

### **6.14.2.4 Attribution**

The Queensland GDE conceptual models will be attributed by adding a 'Source:' statement under the figure caption. As these conceptual models do not have simple citations (because they have not been individually published), the following attribution has been agreed.

#### **6.14.2.4.1 Unmodified models**

Unmodified models are models with no changes whatsoever, reproduced exactly as provided. For unmodified models, use a 'Source:' statement with this syntax:

Source: DSITI (Dataset [index]), [Name of model], © The State of Queensland (Department of Science, Information Technology and Innovation) 2015

For example:

Source: DSITI (Dataset 1), Low lying coastal swamps, © The State of Queensland (Department of Science, Information Technology and Innovation) 2015

#### **6.14.2.4.2 Modified models**

Any and all edits count as modifications. For modified models, use a 'Source:' statement with this syntax:

Source: Adapted from DSITI (Dataset [index]), [Name of model], © The State of Queensland (Department of Science, Information Technology and Innovation) 2015

For example:

Source: Adapted from DSITI (Dataset 1), Low lying coastal swamps, © The State of Queensland (Department of Science, Information Technology and Innovation) 2015

#### **6.14.2.4.3 Models that include additional icons from the IAN library**

If you include icons from the IAN library, you must include the following text:

Additional symbols courtesy of the Integration and Application Network, University of Maryland Center for Environmental Science ([ian.umces.edu/symbols/](http://ian.umces.edu/symbols/))

For example:

Source: Adapted from DSITI (Dataset 1), Low lying coastal swamps, © The State of Queensland (Department of Science, Information Technology and Innovation) 2015. Additional symbols courtesy of the Integration and Application Network, University of Maryland Center for Environmental Science ([ian.umces.edu/symbols/](http://ian.umces.edu/symbols/))

For each of the above examples, Dataset 1 requires a corresponding entry in the dataset list:

Dataset 1      Department of Science, Information Technology and Innovation (2015) GDE Conceptual Modelling DSITI QLD 20150701. Bioregional Assessment Source Dataset. Viewed 30 July 2015, <http://data.bioregionalassessments.gov.au/dataset/f07a43fd-7270-4f69-b606-c763428f6d7c>.

## References

The Inkscape Project (2015) Home | Inkscape. Viewed 30 July 2015, <https://inkscape.org/en/>.

Microsoft (2015) Change the column width and row height. Viewed 4 August 2015, <https://support.office.com/en-ca/article/Change-the-column-width-and-row-height-72f5e3cc-994d-43e8-ae58-9774a0905f46>.

University of Maryland Center for Environmental Science (2015) IAN symbol libraries (free vector symbols and icons) – Integration & Application Network. Viewed 30 July 2015, <http://ian.umces.edu/symbols/>.

## Datasets

Dataset 1      Department of Science, Information Technology and Innovation (2015) GDE Conceptual Modelling DSITI QLD 20150701. Bioregional Assessment Source Dataset. Viewed 30 July 2015, <http://data.bioregionalassessments.gov.au/dataset/f07a43fd-7270-4f69-b606-c763428f6d7c>.



## 7 Maps

These standards apply to all maps that are included in Bioregional Assessment (BA) technical products delivered as reports (mostly A4 pages, with A3 pages in exceptional circumstances). Note that maps included in this chapter are illustrative only and hence do not include attribution information.

### 7.1 Map templates

Map templates for bioregions and subregions are available in ESRI ArcGIS v10.0 mxd format. The templates have been designed for 1:1 reproduction to fit the A4 page print area (17 cm wide). The height of the map page has to be adjusted to tightly fit the legend and must not exceed 22.6 cm. A scale bar, the geographical grid marks with values, and some common base layers are included in the templates. Sets of thumbnail maps are also available; they too fit the A4 print area. Map templates of the individual bioregions and subregions are available on the BA working space for CSIRO [\\OSM-07-CDC.it.csiro.au\OSM\\_CBR\\_LW\\_BA\\_working\BA\\_ALL\map\\_templates](\\OSM-07-CDC.it.csiro.au\OSM_CBR_LW_BA_working\BA_ALL\map_templates) and for GA [\\nas\eg\ba\BA\\_ALL\Maps\Templates](\\nas\eg\ba\BA_ALL\Maps\Templates).

The standard geographical coordinate system (GCS) is:

1. The geographical coordinate system (GCS) to be used is the Geocentric Datum of Australia 1994 (GDA94) WKID (4283) Authority (EPSG), which is defined as follows:
  - a. Geographic Coordinate System: GCS\_GDA\_1994
  - b. Angular Unit: Degree (Radians per unit: 0.017453292519943295)
  - c. Prime Meridian: Greenwich (0.0)
  - d. Datum: D\_GDA\_1994
  - e. Spheroid: GRS\_1980
  - f. Semimajor Axis: 6378137.0
  - g. Semiminor Axis: 6356752.3141403561
  - h. Inverse Flattening: 298.25722210100002.
2. A GCS is required to produce the latitudes and longitudes required for the receptor register. The GCS should be described in any product with latitude and longitude data, including:
  - a. definitely in the first page of the Receptor Register spread sheet
    - “The coordinate system is the Geocentric Datum of Australia 1994 (GDA94)”
  - b. potentially, in product 1.4, the following could be added to the ‘About this technical product’ section:
    - The latitude and longitude coordinates in the receptor register are in the Geocentric Datum of Australia 1994 (GDA94) coordinate system.”

The map projection to be used is Albers equal area with a central meridian of 140.0° East for the Lake Eyre Basin bioregion and its subregions, and 151.0° East for all other bioregions and

subregions. The two standard parallels for all bioregions and subregions are  $-18.0^\circ$  and  $-36.0^\circ$ . The map templates include these projection specifications and reflect the conventions outlined in this chapter.

The map projection used needs to be specified at the beginning of each technical product.

The custom Projected Coordinate System (PCS) is:

1. for LEB bioregion and its subregions:
  - a. GDA\_1994\_Australia\_Albers\_140
  - b. Authority: Custom
  - c. Projection: Albers
  - d. False\_Easting: 0.0
  - e. False\_Northing: 0.0
  - f. Central\_Meridian: 140.0
  - g. Standard\_Parallel\_1: -18.0
  - h. Standard\_Parallel\_2: -36.0
  - i. Latitude\_Of\_Origin: 0.0
  - j. Linear Unit: Meter (1.0)
2. For all other bioregions and subregions:
  - a. GDA\_1994\_Australia\_Albers\_151
  - b. Authority: Custom
  - c. Projection: Albers
  - d. False\_Easting: 0.0
  - e. False\_Northing: 0.0
  - f. Central\_Meridian: 151.0
  - g. Standard\_Parallel\_1: -18.0
  - h. Standard\_Parallel\_2: -36.0
  - i. Latitude\_Of\_Origin: 0.0
  - j. Linear Unit: Meter (1.0).

## 7.2 General notes and layout

Some general 'rules of thumb' should be applied when creating maps for the Assessments:

- The mapping program for the Bioregional Assessment Programme is ESRI ArcGIS version 10.2.
- To save MXD files in an earlier version use (*File>Save A Copy>Save as type>ArcMap 10.0 Document*).
- All maps have a standard orientation with north pointing 'up'.
- All A4 maps use portrait orientation; do not rotate maps to landscape orientation. A3 maps may have landscape orientation.

- Full-size maps (A4 and A3) will have a black rectangular neatline (0.5 pt) bounding the map detail.
- A subregion in a context map may be highlighted by applying a light green colour (R201, G242, B208) to the subregion in focus and a light grey (R240, G240, B240) to neighbouring subregions in order to improve the legibility of the map.
- All maps will have a location map showing the region within Australia.
- Oceans are coloured light blue.
- 'Normal' font is used on maps; use bold only in exceptional circumstances.
- The legend is located at the bottom of the map outside the neatline; the word 'legend' is not used in the legend.
- The text in the legend is Arial narrow.
- A scale bar is shown below the map outside the neatline on all full-size maps.
- Geographic grid marks pointing inwards and values are provided with the map templates.
- No north point will be included on maps that have grid marks.
- North point and scale bars are not shown on thumbnail maps.
- City/town symbol and name is not shown in legend.
- A halo on text annotations should be used only if necessary for clarity (0.5 pt or maximum 1 pt white).
- Basic symbology is provided in a style sheet available on the BA working space for CSIRO [\\OSM-07-CDC.it.csiro.au\OSM\\_CBR\\_LW\\_BA\\_working\BA\\_ALL\map\\_templates](\\OSM-07-CDC.it.csiro.au\OSM_CBR_LW_BA_working\BA_ALL\map_templates) and for GA [\\nas\eg\ba\BA\\_ALL\Maps](\\nas\eg\ba\BA_ALL\Maps).  
New symbols will be added as and when required.
- Logos are not included on maps.
- Include element number on the bottom right, just outside the neatline using standard code subregion-product-element number (e.g. NAM-110-003).
- Captions are part of the text and are not shown on maps.

Detailed specifications for symbols used on maps are presented in the tables and associated map examples throughout this chapter.

### 7.2.1 Colour perception

Nearly one person out of ten has a deficiency in colour perception. Mostly it makes distinguishing red and green colours difficult. Map-makers need to avoid such combinations as much as possible. Therefore consider:

- avoiding red and green boundaries on the same map
- avoiding red and green area fills in combination (especially small polygons)
- choosing light colours for large areas, and intensively contrasting colours for smaller areas
- avoiding adjoining colours with similar grey values
- using symbology to differentiate lines if red and green can't be avoided.

The suitability of colour combinations can be tested at Vischeck

<http://www.vischeck.com/vischeck/>.

Help with selecting suitable colour combinations for mapping can be found at ColorBrewer

<http://colorbrewer2.org/>.

## 7.2.2 Using maps from other sources

When using maps from other sources it is always preferable to redraw them as they can be made to BA standard, provided:

- BA has the datasets
- the datasets may be used for BA purpose
- it can be done within a reasonable time and effort.

However, in instances where this is not possible, maps may be republished from other sources if copyright for doing so can be obtained. Republishing maps without redrawing them should be kept to a minimum.

## 7.3 Map formats and types

Three map formats are included in technical products that are delivered as reports:

- full-size maps – fitting the A4 page print area (17 cm wide and up to maximum of 22.6 cm height). The maps are bounded by a rectangular neatline and show information within a bioregion (or subregion) and extending beyond the bioregion (or subregion) boundary up to the neatline
- thumbnail maps – are a series of small-scale maps, two or more per page, arranged in a matrix showing modelled detail (usually in a grid cell format, e.g. rainfall or evaporation) within the bioregion or subregion. The bioregion or subregion boundary is snugly fitted inside a rectangular or square neatline which forms the extent of the map. Usually no other map detail is shown, however on larger thumbnail maps minimal information such as a few towns or a river may be shown for context.
- larger format maps fitting the A3 page print area. Such maps are used only in exceptional circumstances when more detail is required. The maps are bounded by a rectangular neatline and show information within a bioregion or subregion or extending beyond the bioregion or subregion boundary up to the neatline.

There may be a need for maps larger than A3 size. Such maps should comply with the specifications in *Product standards* as much as possible but can also include other information found on large maps.

This section outlines specific details for the most common types of maps anticipated to be included in technical products. It is expected that these definitions will be updated throughout the lifetime of the Programme and applied accordingly.



### 7.3.1 General maps

The map templates for the six bioregions are shown in Figure 31 to Figure 36. To save space, examples of the subregion map templates are not shown.

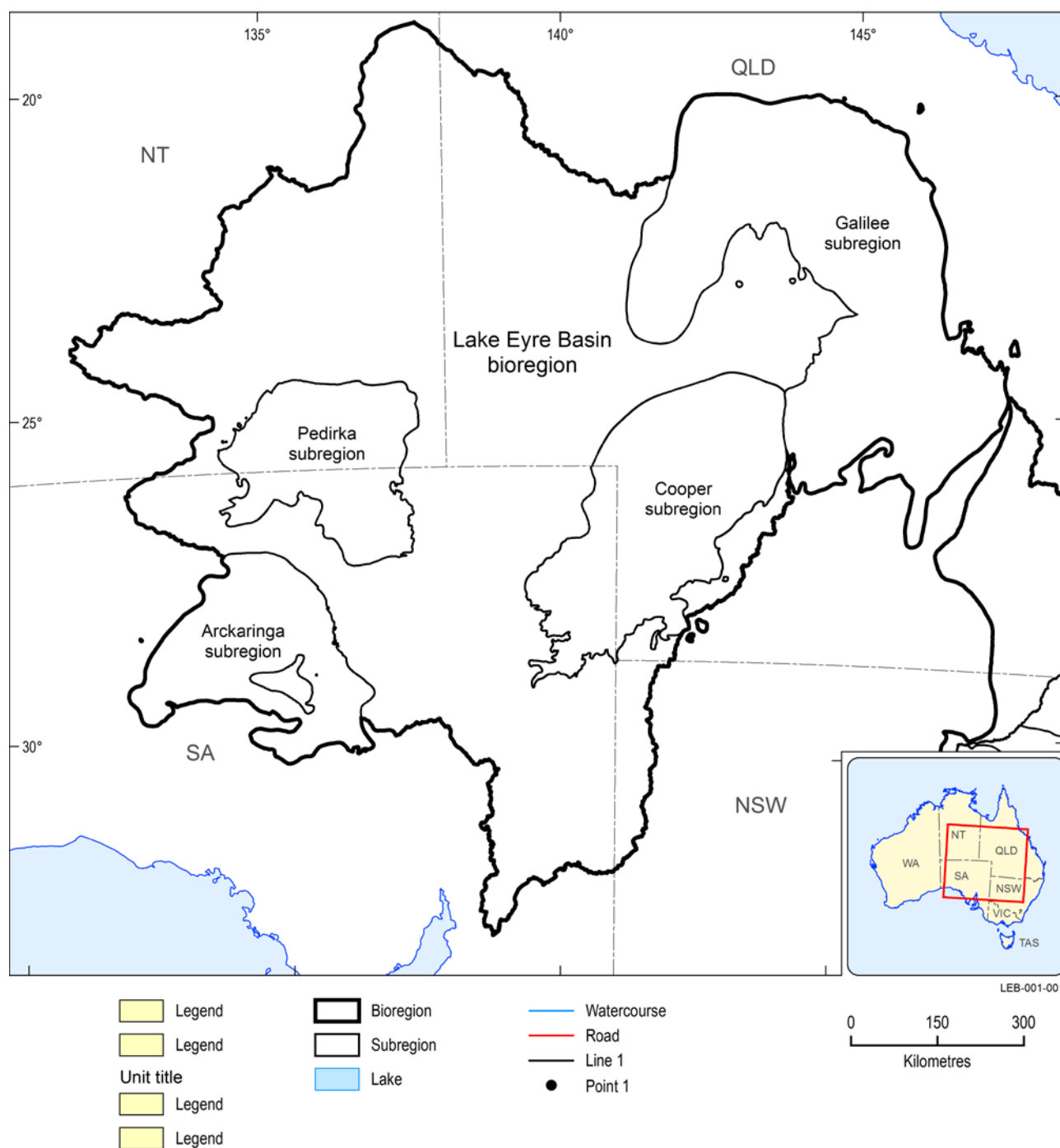


Figure 31 Map template for the Lake Eyre Basin bioregion

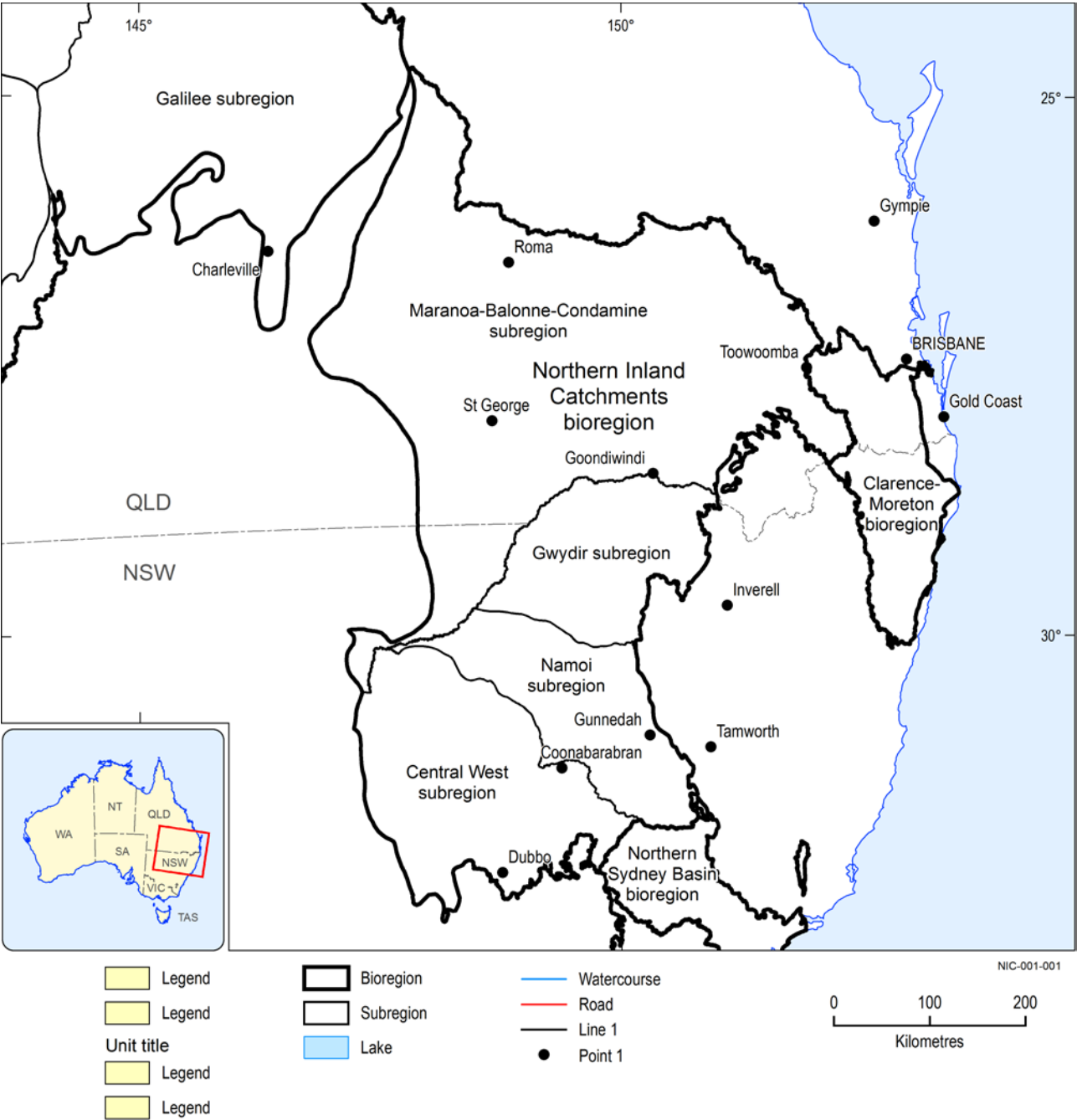
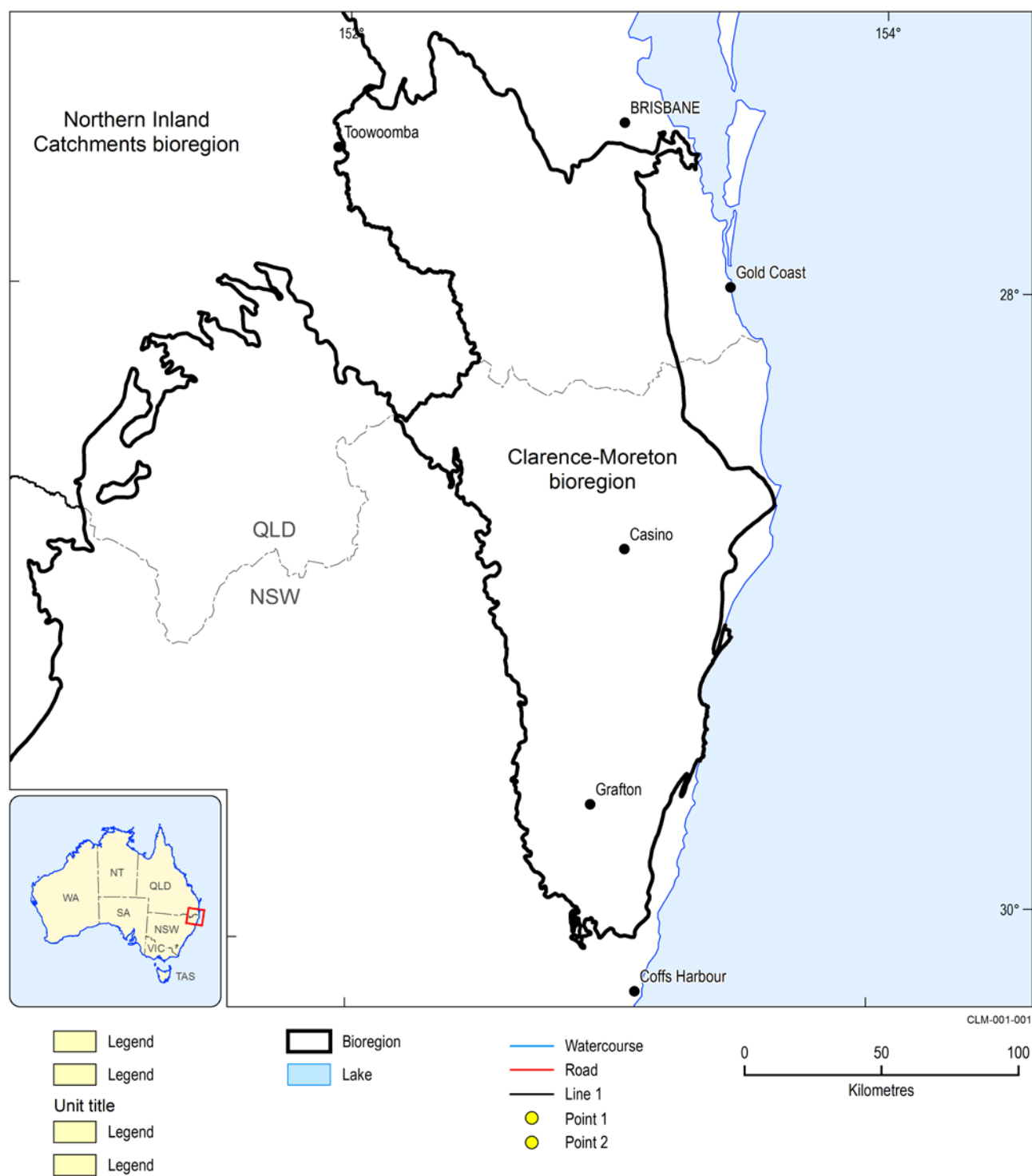


Figure 32 Map template for the Northern Inland Catchments bioregion



**Figure 33 Map template for the Clarence-Moreton bioregion**

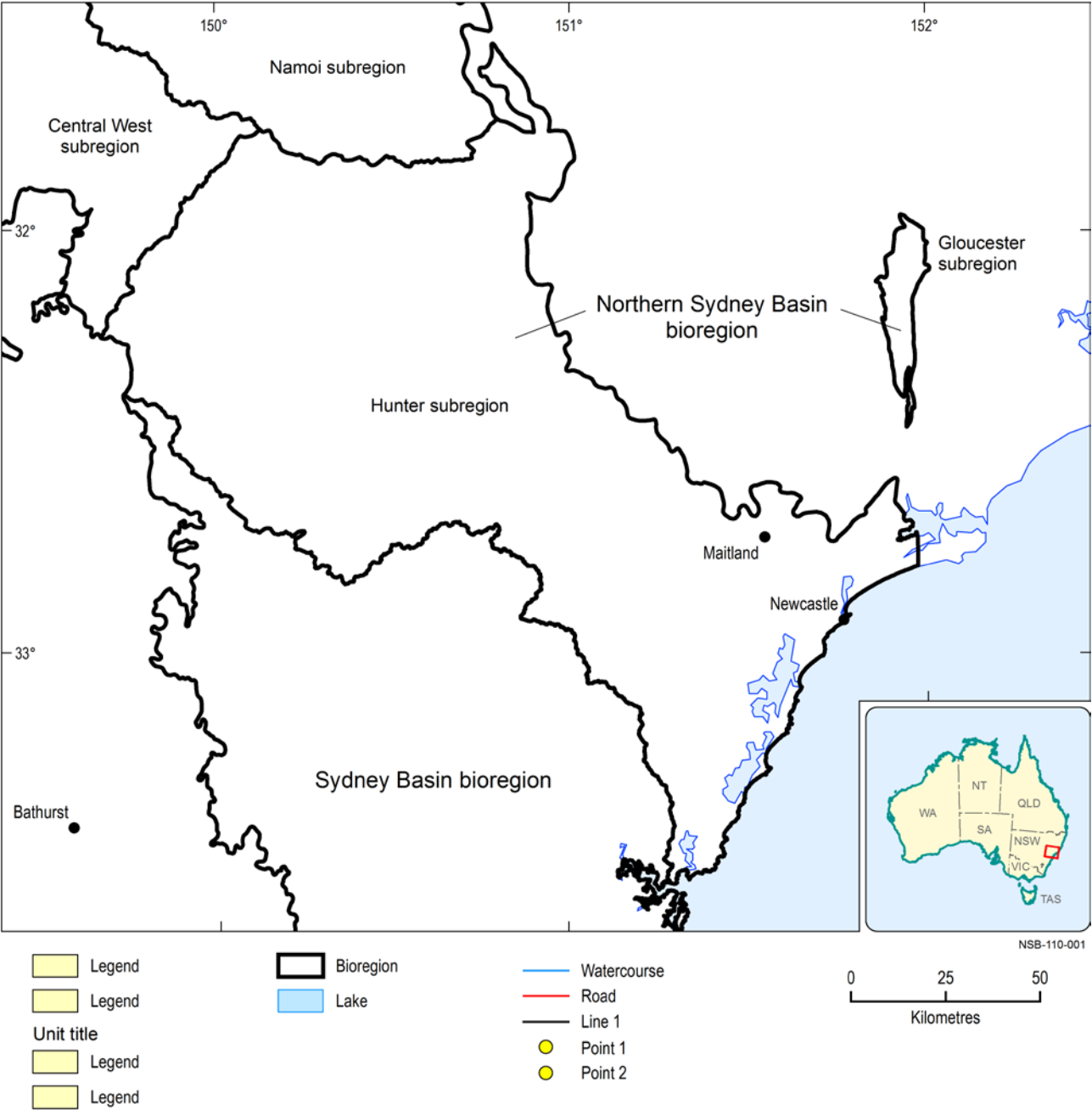
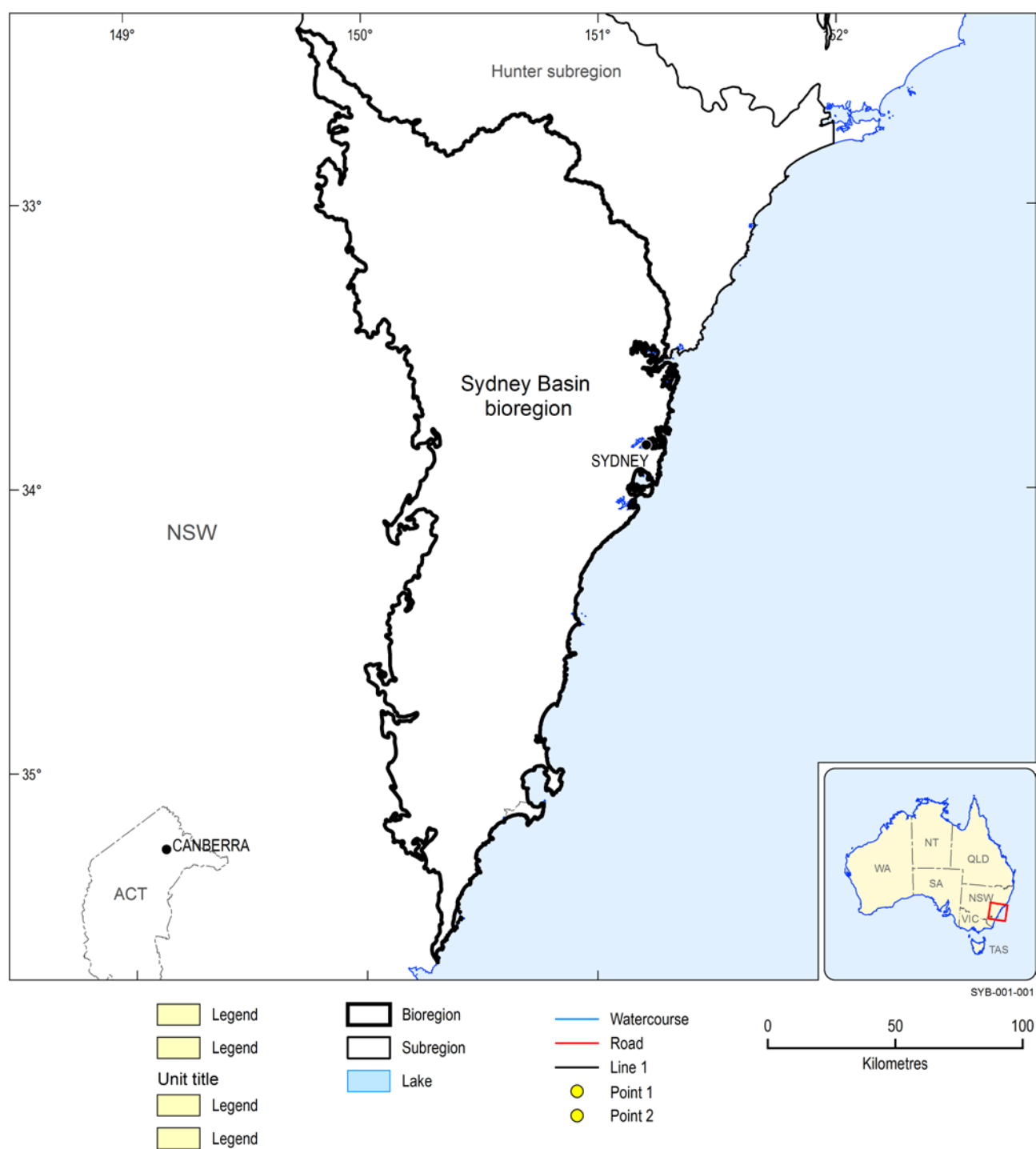


Figure 34 Map template for the Northern Sydney Basin bioregion



**Figure 35 Map template for the Sydney Basin bioregion**

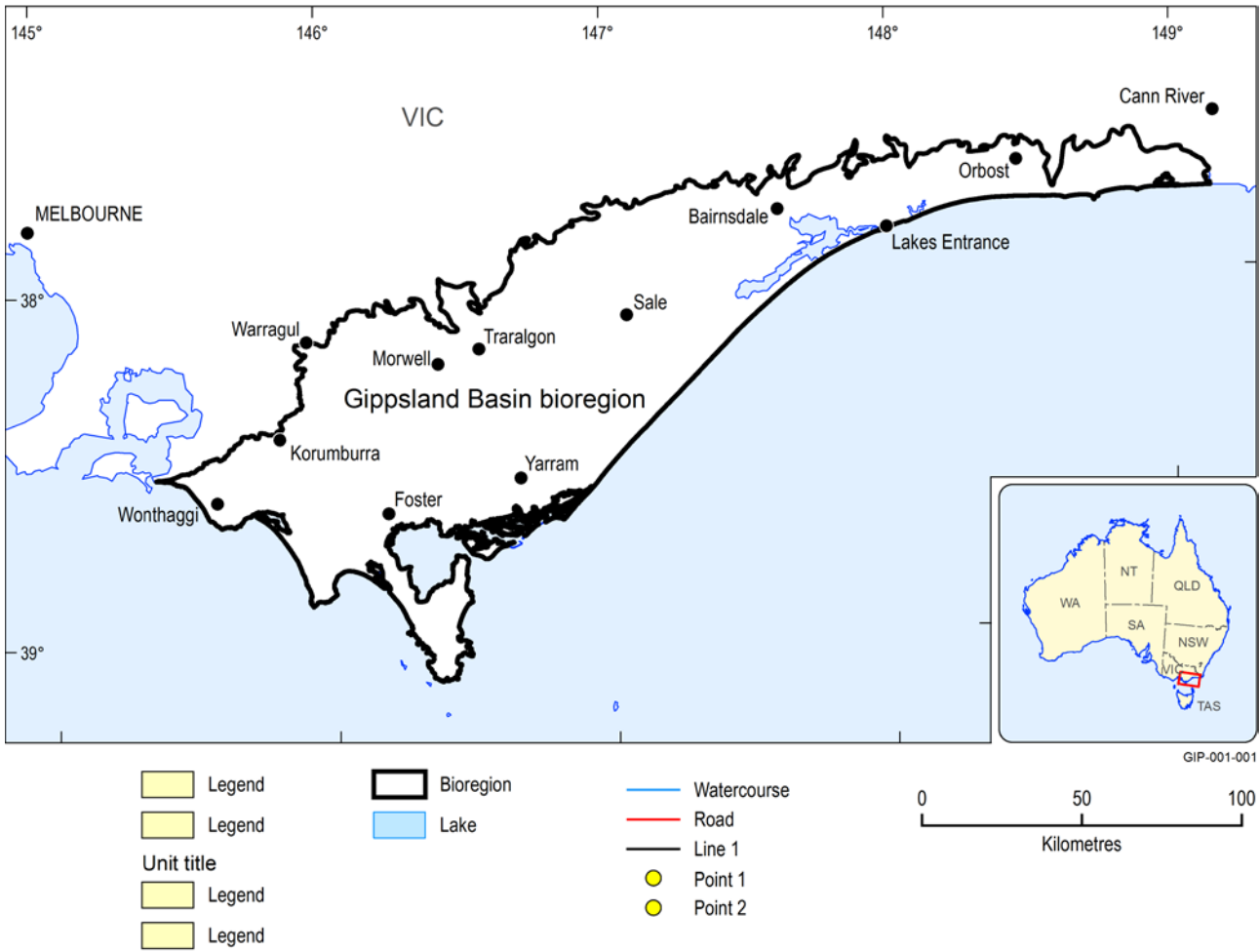

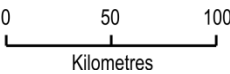

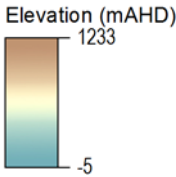


Figure 36 Map template for the Gippsland Basin bioregion

Table 20 General specifications for surrounding map detail

Feature	Description	Symbol	Specification	Colour (RGB)
	Neatline (border) for all maps	Continuous line	0.5 pt	Black
Arial narrow	Legend text	Arial Narrow	8 pt left justified, sentence case. The word 'Legend' is not shown.	Black
Arial	Legend unit titles	Arial	8 pt left justified	Black
	Scale bar	Arial Narrow black	8 pt, units below the bar, whole numbers only, one division with two sub-divisions, no divisions before 0, line thickness 1 pt, tick height 4 pt	Black
	Area feature	Patch size	20 × 10 pt (7.0 × 3.5 mm)	Variable
	Colour ramp for DEM	Size 7 mm × 20 mm	Stretch min-max values across data frame; round values to nearest 10. If standard display is too intensive then: <ul style="list-style-type: none"> <li>display DEM 35% transparent</li> <li>display dems_hillshade 75% transparent.</li> </ul>	ESRI: 'Brown to BlueGreen Diverging, Bright'
GLO-112-001	Element number	Arial 5 pt	Bottom right hand side, outside neatline and right justified	Black



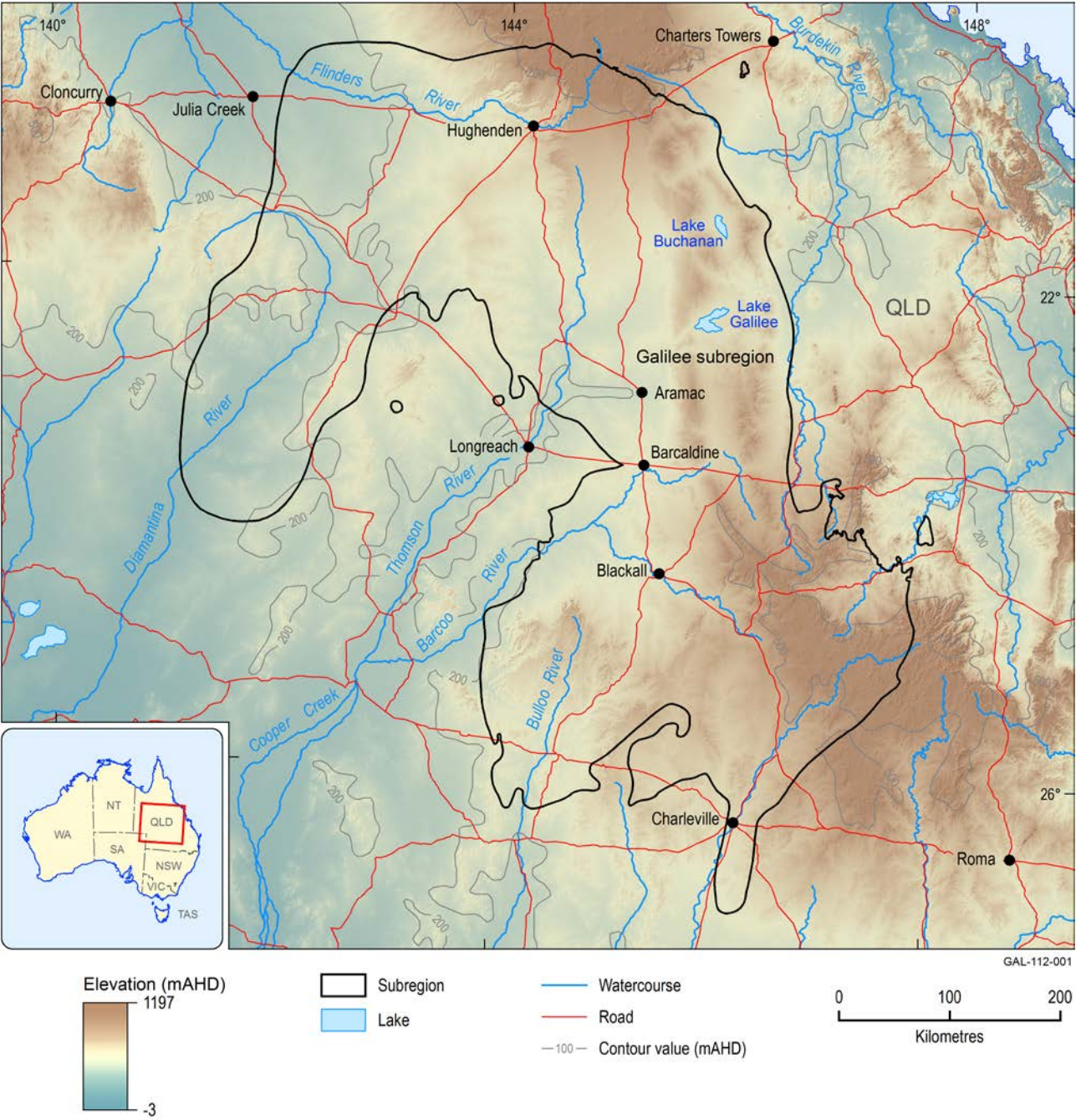














Figure 37 Topography of the Galilee subregion using the 3 second digital elevation model

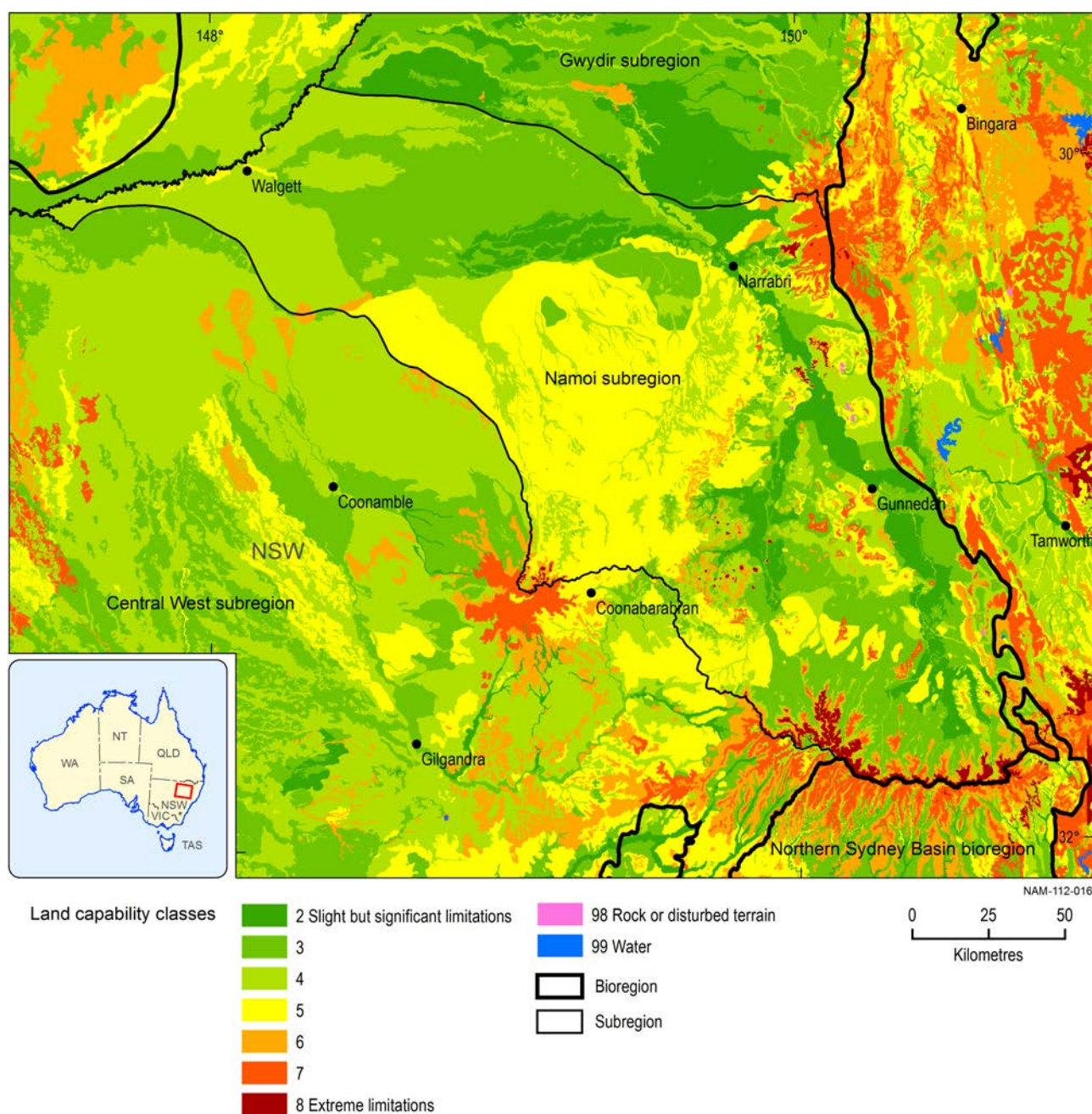


## 7.3.2 Geographic maps

Table 21 Specifications for the geographic map features

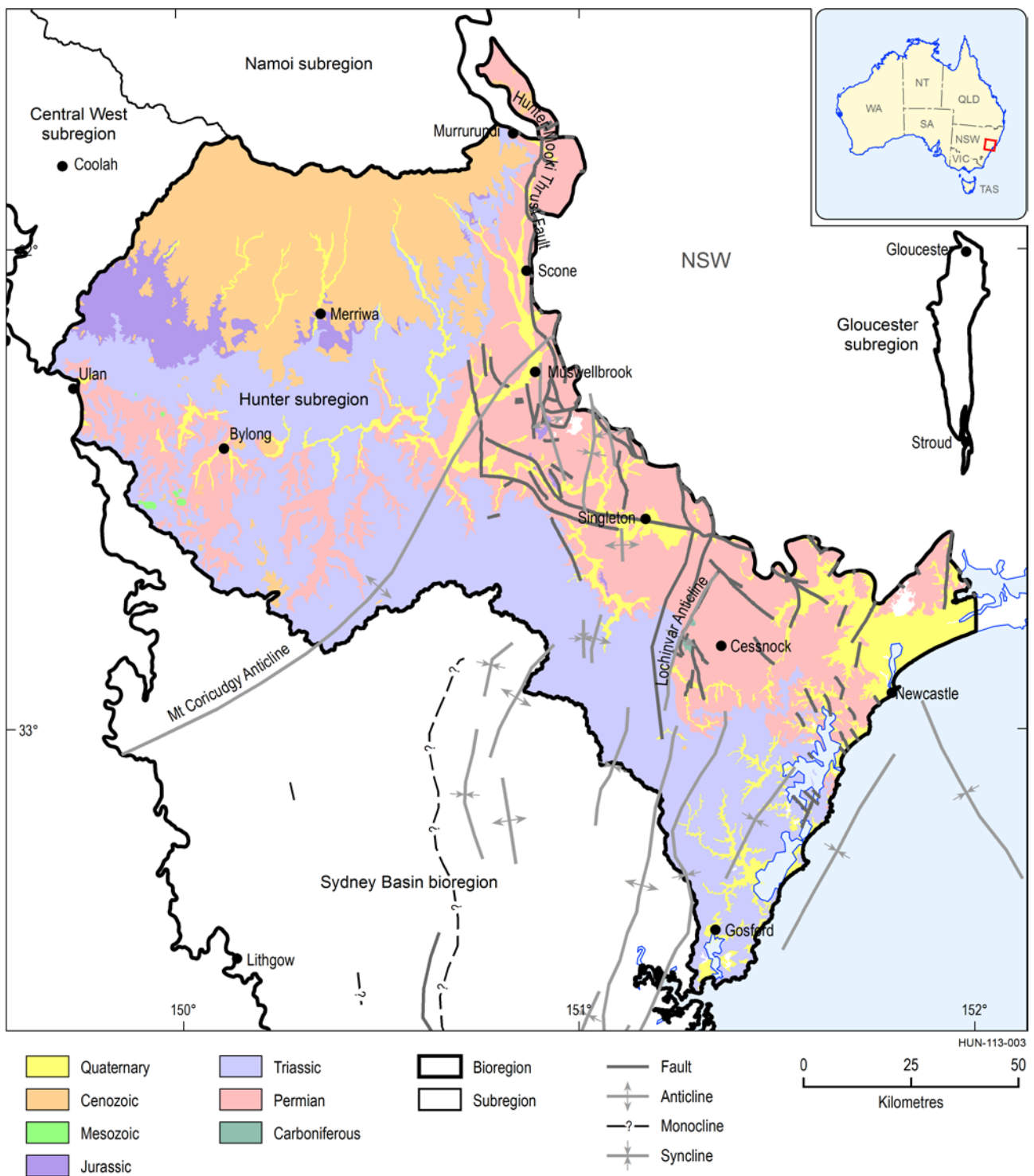
Feature	Description	Symbol	Specification	Colour (RGB)	Style
•	Town	Simple marker, circle no outline	5 pt	Black	
Ⓐ	Dam, large	Simple marker: filled triangle uni 35 circle uni 40 filled circle uni 33	8 pt (0.5 Y: offset) 12 pt 12 pt (mask)	Black Black White	
■	Dam	Simple marker filled square	5 pt	Blue 0, 54, 255	
🏭	Power station - coal fired	ESRI Business Unicode 67	12 pt	Black	
⚡	Power station - hydro	ESRI Default Unicode 100	14 pt	Lapis Lazuli 0, 92, 230	
-----	State border	Line, dash dot dash	0.8 pt	70% grey	dot = 1.0 mm, dash = 3.0 mm, gap = 0.5 mm
—————	Major road	Continuous line	0.8 pt	Red 255, 0, 0	
—————	Minor road	Continuous line	0.5 pt	Red 255, 0, 0	
+++++	Railway	ESRI Hash line symbol	0.4 pt	Black	
—————	Major watercourse	Blue continuous line	0.8 pt	10, 147, 252	
—————	Minor watercourse	Blue continuous line	0.5 pt	10, 147, 252	
□	Lake (large-scale)	Blue outline Light blue fill	0.5 pt tone	10, 147, 252 Fill 190, 232, 255	
■	Lakes and storages (small-scale)	Blue area	Blue	0, 54, 255	
—————	Coastline	Blue continuous line	0.5 pt	0, 54, 255	
□	Ocean tone	Light blue		225, 240, 255	
—————	Contour (index)	Brown continuous line	0.4 pt	209, 59, 0	
—————	Contour	Brown continuous line	0.2 pt	209, 59, 0	
—————	Catchment boundary	Continuous line	0.5 pt	Black	
—————	Bioregion boundary	Continuous line	1.8 pt 1.8 pt	Black; alternative leaf green 56, 168, 0	

Feature	Description	Symbol	Specification	Colour (RGB)	Style
 	Subregion boundary	Continuous line	1.0 pt 1.0 pt	Black; alternative leaf green 56, 168, 0	
	PAE or AE boundary	Continuous line	1.8 pt	Poinsettia red 230, 0, 0	
	Groundwater PAE	Continuous line	3.0 pt	Violet Dust 158, 170, 215	
	Surface water PAE	Continuous line with fill	0.4 pt	Black outline Yucca yellow 255, 255, 190	
	Bioregion boundary for thumbnail maps	Continuous line	0.6 pt	Black	
	Irrigation	Pink area	Medium Coral Light	255, 127, 127	
	Native vegetation	Green area	Macaw Green	152, 230, 0	
	Other	Light grey area tint	Grey 10%	225, 225, 225	
	Forestry	Dark green	Fir Green	38, 115, 0	
	Grazing and dryland cropping	Beige	Topaz Sand	255, 235, 175	
	Floodplains and coastal flats	Blue stripes	Line fill horizontal, separation 0.5, line weight 0.25	Blue 10, 147, 252	
Mildura	City/town name	Arial narrow for towns, caps only for capital cities	8 pt, proper case (e.g. 'Wee Waa' not 'Wee waa')	Black	
<i>River</i>	River names	Arial narrow	8 pt, Caps/Caps + lc, italic	Blue 10, 147, 252	
<b>Lake</b>	Lake, weir, dam names	Arial	8 pt, Caps + lc	Blue 0, 54, 255	
<i>Ocean</i>	Ocean names	Arial, blue	8 pt, Caps/Caps + lc, italic	Blue 0, 54, 255	
<b>Wetland</b>	Key wetland name	Arial	8 pt, Caps + lc, normal, Burnt Umber	115, 76, 0	
NSW	State names	Arial, abbreviated	10 pt, Caps normal	70% grey	



**Figure 38 Land use capability across the Namoi subregion**

### 7.3.3 Geological maps

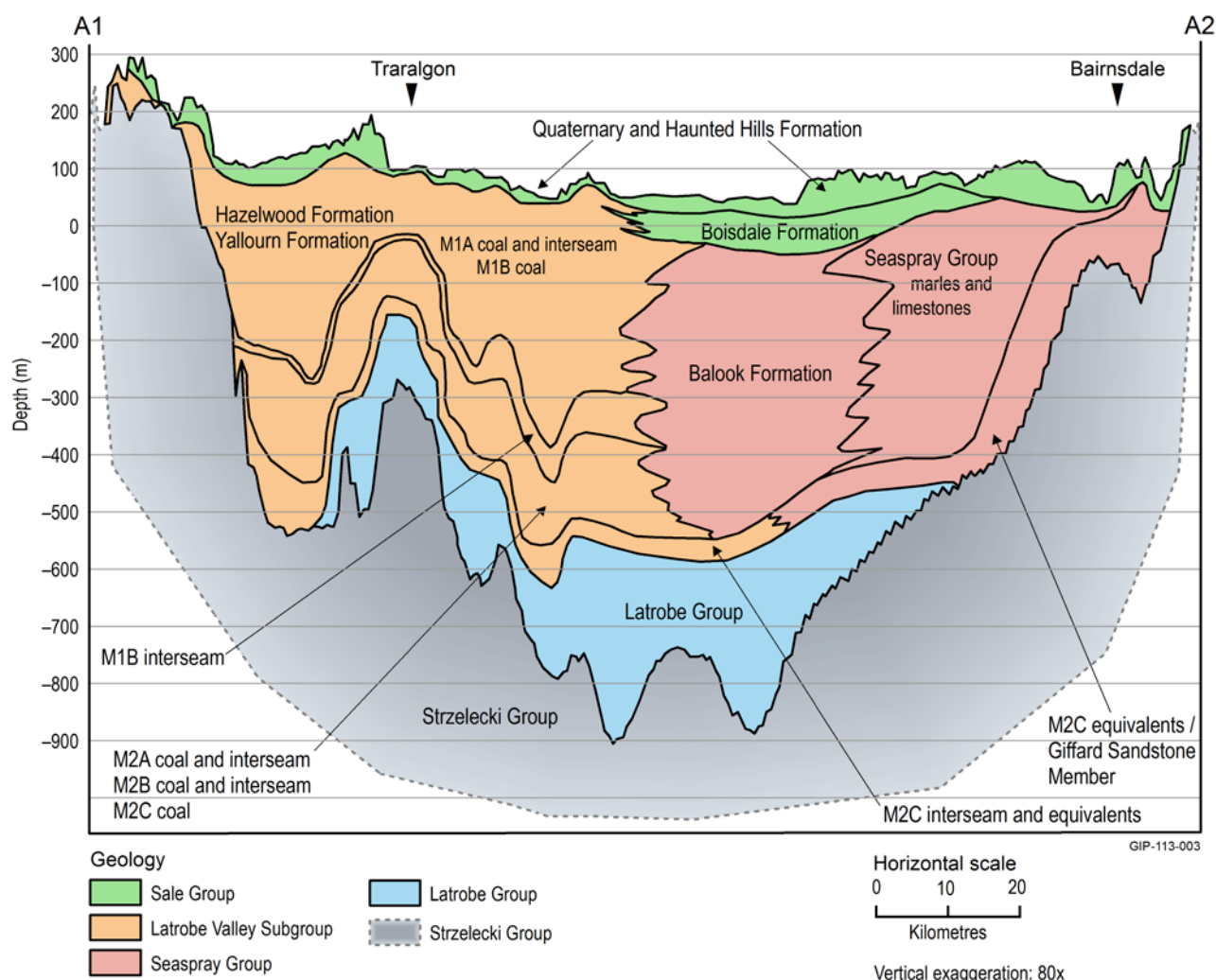


**Figure 39 Surface geological map of the Hunter subregion**

Figure 40 is an example of a cross-section, the position of which is indicated on a companion geology map (not shown) by a line from A1 to A2. The colour of features in the cross-section



should match the colour of the same features on the map. However if that is not possible, the lighter range of the official BA colours shown in Section 7.13 may be used.












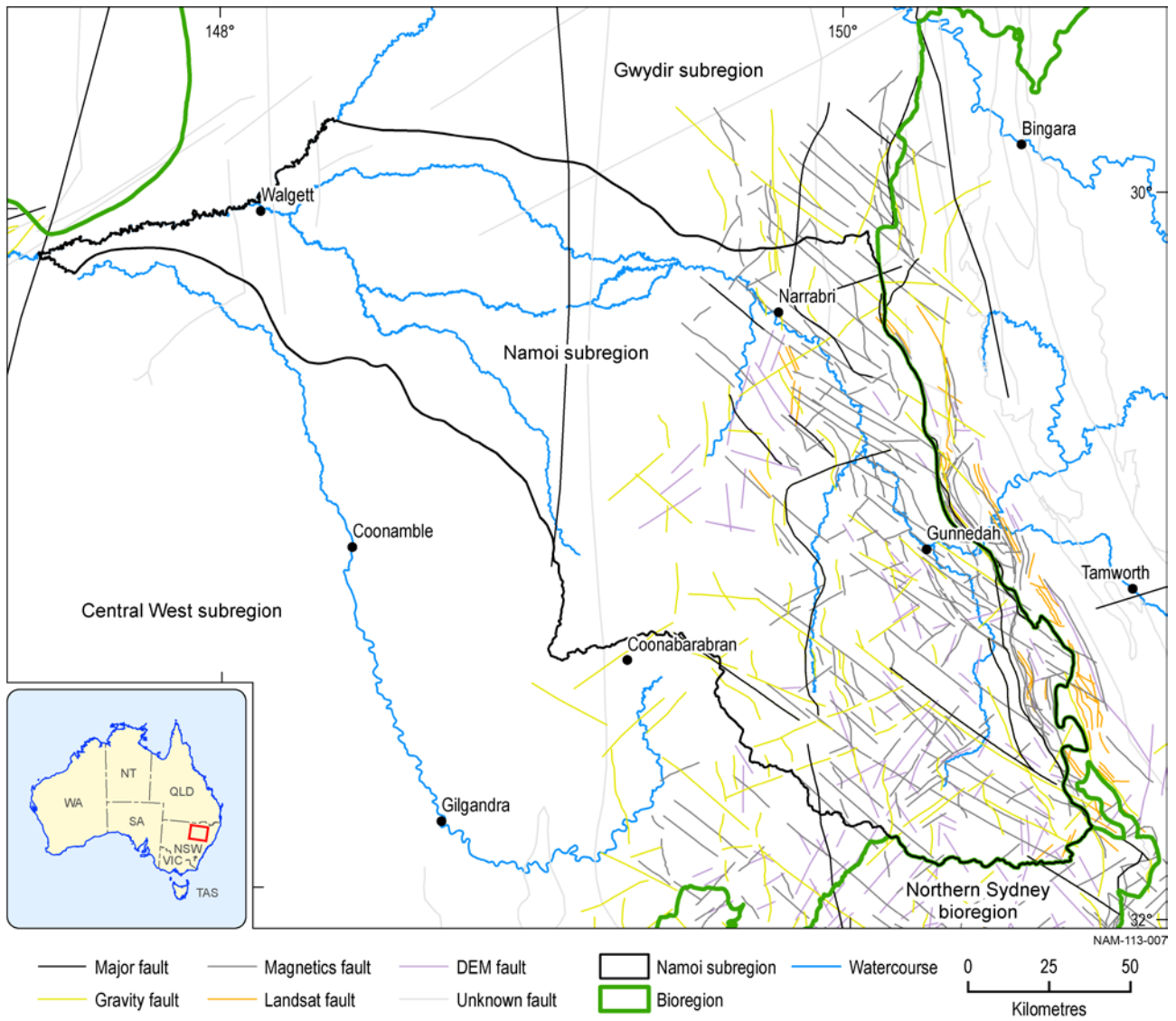
**Figure 40 Cross-section A1 to A2 showing geology in the Gippsland basin**

Symbols used in geological maps are shown in Table 22. In general, faults are shown with a black line. In cases where the fault network is very dense and black lines may overload the map, an alternative 50% grey may be used (Figure 41). For map with a very dense network of faults that need to be classified, a set of line colours is provided.

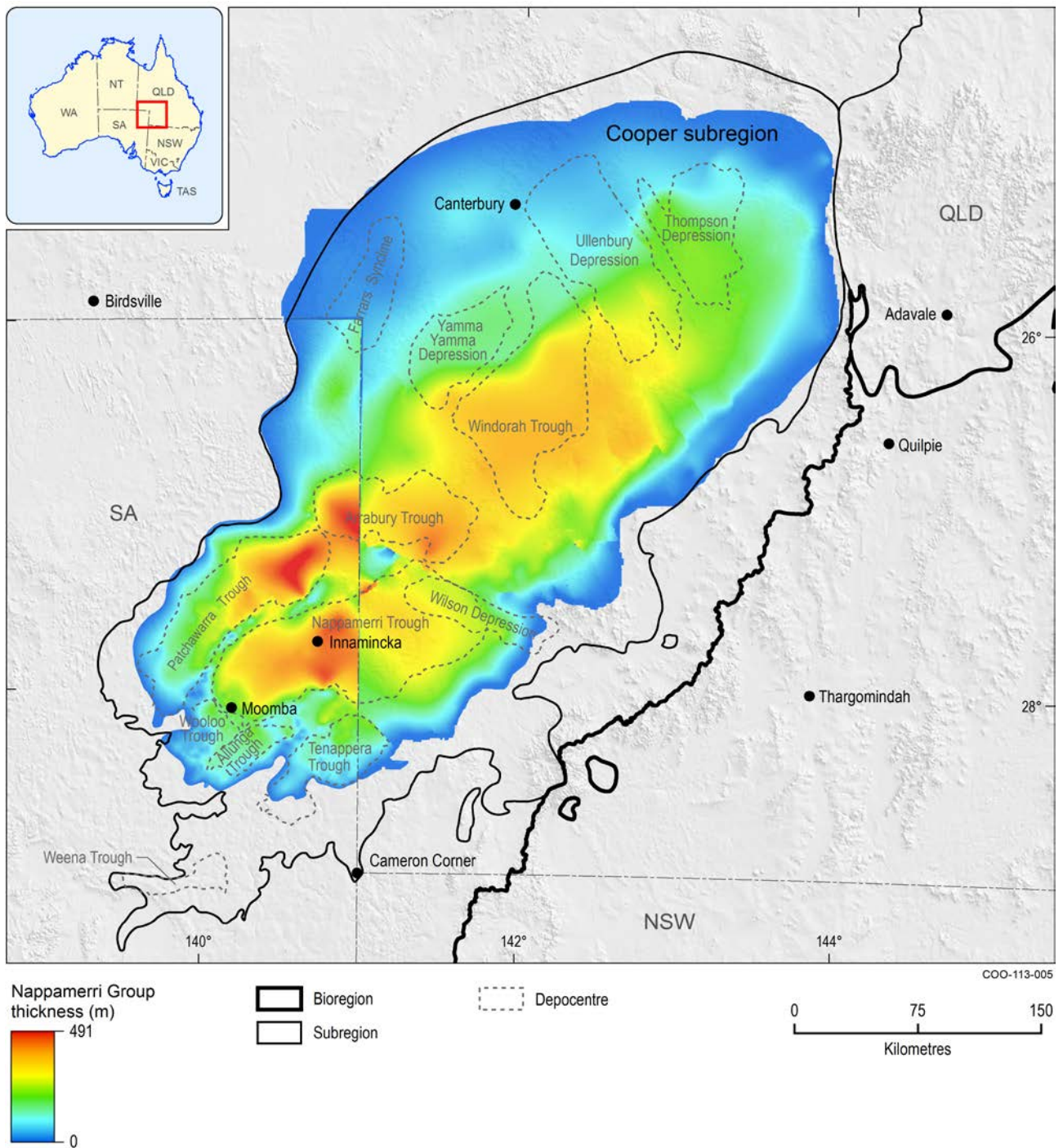
A colour ramp for maps showing geological surfaces is also provided (see Table 22 and Figure 42). It is recognised however that this colour range may not be suitable in all instances; therefore a different colour range may be acceptable.

Table 22 Symbols for geological maps

Feature	Description	Symbol
	Geological fault	Line 0.8 pt, Black
	Geological fault (visually subdued)	Line 0.8 pt, Grey 50%
	Classification of a dense fault network:	
	Major fault	Line 0.6 pt Black
	Gravity fault	Line 0.6 pt, Citron Yellow, 230, 230, 0
	Magnetic fault	Line 0.6 pt, Grey 50%, 130, 130, 130
	Landsat fault	Line 0.6 pt, Electron Gold, 255, 170, 0
	DEM fault	Line 0.6 pt, Lilac Dust, 194, 158, 215
	Unknown fault	Line 0.6 pt, Grey 10%, 225, 225, 225
	Alluvium (when shown on white background)	Citron yellow, 230, 230, 0
<div><div><div>Nappamerri Group thickness (m)</div><div><div></div><div>491</div><div>0</div></div></div></div>	Gradient colour scheme for geological surfaces	ESRI: 'Spectrum-Full Bright' colour ramp red = top or high blue = bottom or low



**Figure 41 Example of a dense network of classified geological faults in the Namoi subregion**




















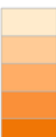
**Figure 42** Example of geological surfaces shown by a colour ramp in the Cooper subregion

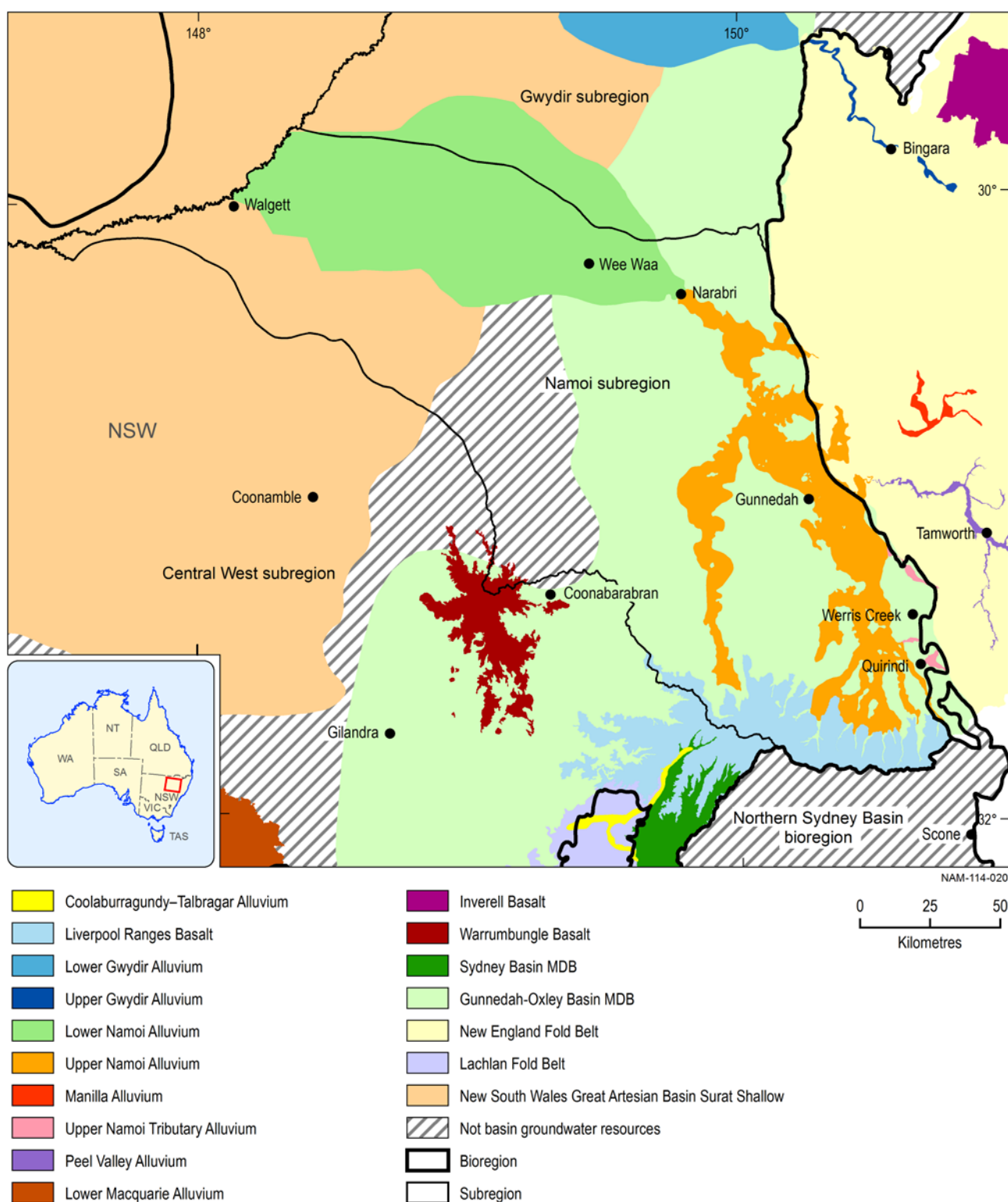


## 7.3.4 Groundwater and surface water – groundwater interaction maps

Table 23 Specifications for the groundwater map features

Feature	Description	Symbol	Specification	Colour (RGB)	Style
	Gaining stream – high	Continuous line	1.5 pt	65, 90, 217	
	Gaining stream – medium	Continuous line	1.5 pt	119, 135, 217	
	Gaining stream – low	Continuous line	1.5 pt	173, 181, 217	
	Losing stream – high	Continuous line	1.5 pt, Tuscan Red	168, 0, 0	
	Losing stream – medium	Continuous line	1.5 pt	217, 72, 0	
	Losing stream – low	Continuous line	1.5 pt	204, 106, 61	
	Losing stream – seasonally varying	Continuous line	1.5 pt, 60% Grey	104, 104, 104	
	Losing stream – maximum losing stream	Continuous line	1.7 pt, (0.6 and -0.6 offset) dark umber	115, 0, 0	
	Spring	Dot circle uni 33	5 pt Blue	0, 54, 255	
	Bore, monitoring	Partly coloured circle ESRI Env Haz Analys uni 65  white mask uni 64	8 pt	205, 46, 49	
	Bore	Dot circle uni 33	5 pt	205, 46, 49	
	Bore (second category)	Dot circle uni 33	5 pt	Electron gold 255, 170, 0	
	Borefield	Dashed line, 6:1	0.6 pt	204, 45, 48	
	Management unit	Arial, bold	8 pt, Malachite Green	0, 168, 132	
	Model colour 1	Outline width 0.4 pt Line width 1.2 pt Angle 45 degrees Separation 5 pt	Medium Coral Light	255, 127, 127	
	Model colour 2	Outline width 0.4 pt Line width 1.2 pt Angle 45 degrees Separation 5 pt	Electron Gold	255, 170, 0	
	Model colour 3	Outline width 0.4 pt Line width 1.2 pt Angle 45 degrees Separation 5 pt	Citroen Yellow	230, 230, 0	

Feature	Description	Symbol	Specification	Colour (RGB)	Style
 > 0 - 0.1 0.1 - 0.2 0.2 - 0.3 0.3 - 0.4 0.4 - 1.0	Groundwater drawdown Probability of exceeding 0.2 m drawdown	ESRI: 'Purple-Blue Bright' colour ramp	RGBs refer to 5 classes. Note: if number of classes change, so will the RGBs	223, 184, 230 199, 141, 235 172, 102, 237 145, 62, 240 112, 12, 242	
 > 0 - 0.1 0.1 - 0.2 0.2 - 0.3 0.3 - 0.4 0.4 - 1.0	Groundwater drawdown Probability of exceeding 5 m drawdown	ESRI: 'Orange Bright' colour ramp	RGBs refer to 5 classes. Note: if number of classes change, so will the RGBs	255, 235, 204 255, 203, 150 255, 173, 102 250, 144, 57 240, 118, 5	



**Figure 43 Groundwater management units across the Namoi subregion**

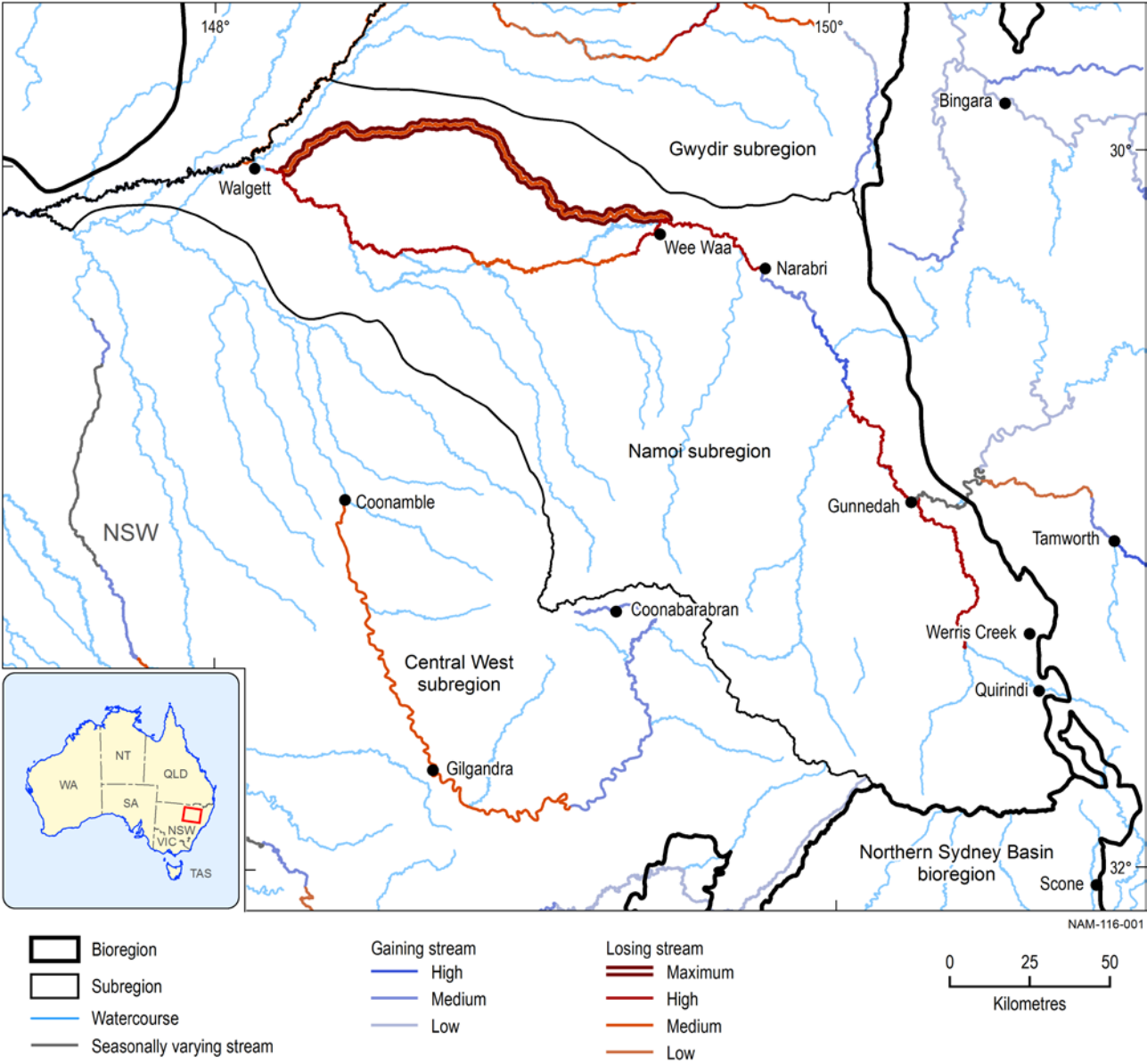


Figure 44 Surface water – groundwater interactions for specific watercourses

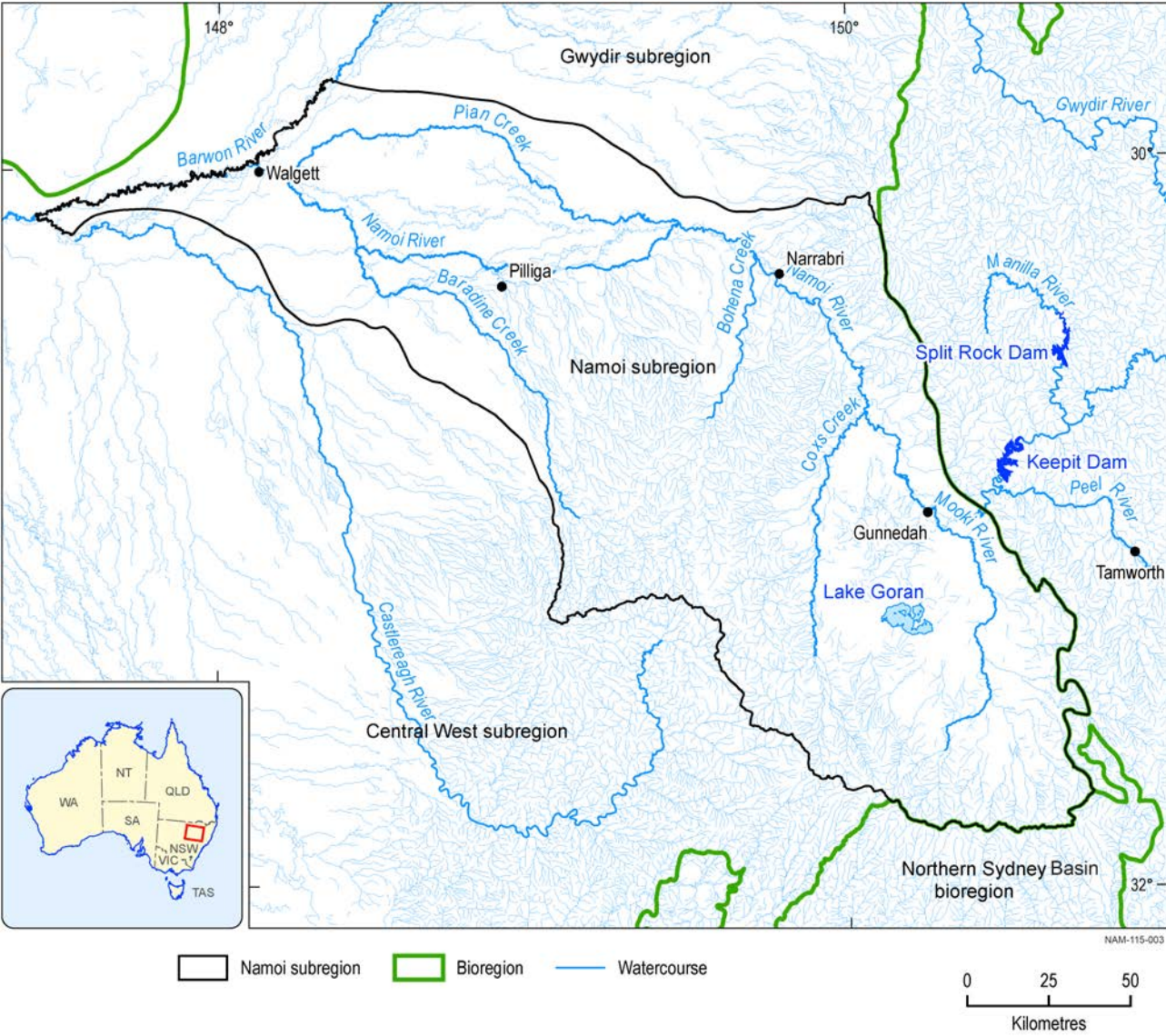
## 7.3.5 Surface water maps

Table 24 Specifications for the surface water map features

Feature	Description	Symbol	Specification	Colour (RGB)	Style
	Model subcatchments – no groundwater interaction	Light Green, with border	Fill colour: Olivine Yellow Outline: Black, 0.4 pt	233, 255, 190	
	Model subcatchments – modelled groundwater interaction	Pink, with border	Fill colour: Rose Quartz Outline: Black, 0.4 pt	255, 190, 190	
	Model subcatchments – lower priority groundwater interaction	Pale Blue, with border	Fill colour: Sugilite Sky Outline: Black, 0.4 pt	190, 210, 255	
	Model subcatchments – zero inflow	10% cross hatch	50% Grey, line width 0.4 pt	130, 130, 130	
	Storage	Surface impoundment	10 pt, Big Blue Sky	0, 197, 255	
	Demand	Circle 2, Yellow	8 pt	255, 255, 0	
	End-of-system	Square 1, solid fill	10 pt	0, 0, 0	
	Gauge	Triangle 2	12 pt, Cherry Cola	168, 56, 0	
	Inflow	Square rotated 45° to make a diamond	8 pt, Leaf Green	56, 168, 0	
	Weather station	Open diamond with cross	ESRI: Weather, Subset: Basic Latin, Unicode: 122, 18 pt	Black	
	Node linkage	Continuous line	1.7 pt, Ultra Blue	0, 77, 168	
Lock 9	Labels	Arial	8 pt <sup>a</sup>	Black	Style 0.5 pt white halo
	Basic water right (stock and domestic)	Dot, 5 pt	Character Marker, ESRI Default Marker, Basic Latin, Uni 33	Yogo blue 115, 178, 255	
	Water access right	Dot, 5 pt	Character Marker, ESRI Default Marker, Basic Latin, Uni 33	Citron yellow 230, 230, 0	

<sup>a</sup>If there are many labels on the map, 7 pt or 6 pt font may be used.










**Figure 45** Namoi subregion showing the drainage network with tributaries of the Namoi River, major dams and town centres

## 7.3.6 Catchment yield maps









Table 25 Specifications for the catchment yield map features

Feature	Description	Symbol	Specification	Colour (RGB)	Style
	Streamflow gauging station	Triangle 2	12 pt, Cherry Cola	168, 56, 0	
	Calibration catchment	Continuous line, border only, hollow inside	1.5 pt, Cherry Cola	168, 56, 0	
401230	Streamflow gauge numbers	Arial	8 pt <sup>a</sup> , Cherry Cola	168, 56, 0	Style 1.0 pt white halo
4120111	Subcatchment number	Arial	8 pt <sup>a</sup>	Black	Style 1.0 pt white halo
	Catchments	Pastel Terra tones (Earth colours), with border		Fill colour: Colour ramp – earth greens and browns. Outline: Black, 0.4 pt	30% transparency
	Inset map – region	Grey, with border	Fill colour: Grey 10% Outline: Black, 0.6 pt	225, 225, 225	
	Inset map – calibration catchment	Red, with border	Fill colour: Mars red Outline: Black, 0.6 pt	255, 0, 0	

<sup>a</sup>If there are many labels on the map, 7 pt or 6 pt font may be used.

### 7.3.7 Resources maps

Table 26 Specifications for resources map symbols

Feature	Description	Symbol	Specification	Colour (RGB)	Style
	Gas well	Dot, 8 pt	Character Marker ESRI Default Marker Basic Latin, Uni 33	Fuchsia pink 255, 115, 223	
	Oil well	Dot with cross, 18 pt	Character Marker ESRI Oil,Gas,Water Basic Latin, Uni 75	Cordovan brown 137, 68, 68	
	Mine (existing)	14 pt (may be 12 pt if lots, or 16 pt if only few mines on a map)	Character Marker	Black	
	Mine (proposed)		ESRI Cartography Latin-1 supplement Uni 204	Mars red 255, 0, 0	
	Coal mine (operating)	Dot, 6 pt black outline	Simple marker symbol	Mars red 255, 0, 0	
	Coal mine (proposed)	Dot, 6 pt black outline	Simple marker symbol	Quetzal green 76, 230, 0	
	Coal mine (historical)	Dot, 6 pt black outline	Simple marker symbol	Seville orange 230, 152, 0	
	Coal resource or Mineral deposit	Dot, 6 pt black outline	Simple marker symbol	Amethyst 197, 0, 255	



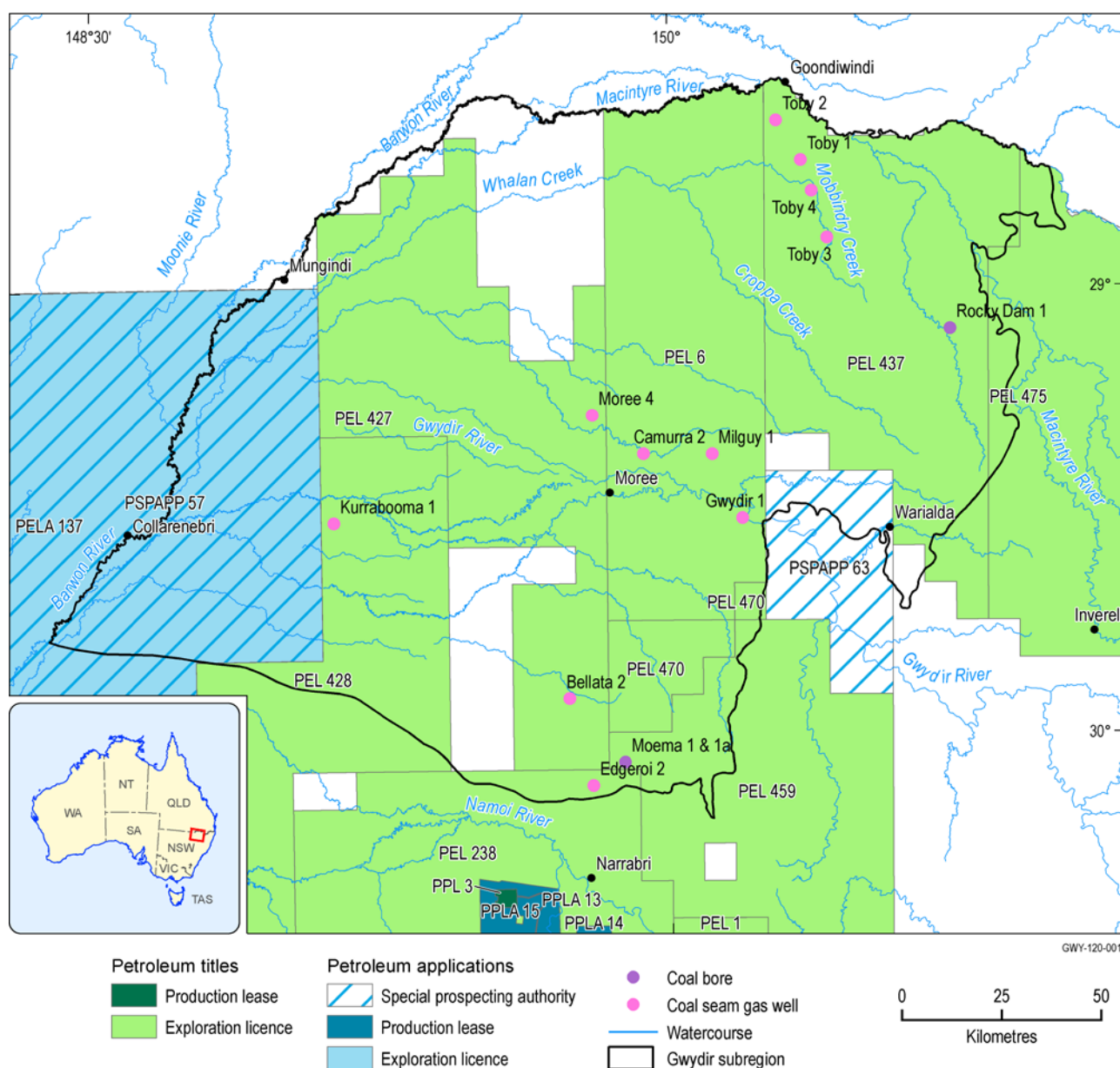





Figure 46 Example of a resources map showing petroleum and coal seam gas tenements

### 7.3.8 Thumbnail maps

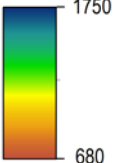
**Table 27 Specifications for the thumbnail map features**

Feature	Description	Symbol	Specification	Colour (RGB)
	Neatline (map frame)	Continuous line	0.5 pt	Black
	Bioregion or subregion boundary	Continuous line	1.0 pt	Black
	Colour ramp horizontal, height	4 mm		

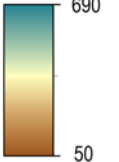
An example of thumbnail maps is shown in Figure 47. Simple thumbnail map templates in a 1 × 2 configuration are available and others will be made up as required (Figure 48).

Gradient colour schemes for rainfall and runoff maps and potential evaporation maps used with thumbnail templates are shown in Table 28, Table 29 and Table 30, respectively.

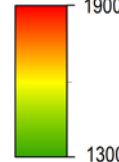
**Table 28 Gradient colour scheme for rainfall maps**

Feature	Description
Precipitation (mm/y) 	ESRI: 'Precipitation' colour ramp

**Table 29 Gradient colour scheme for runoff maps**

Feature	Description
Runoff (mm/y) 	ESRI: 'Brown to BlueGreen Diverging, Bright' colour ramp

**Table 30 Gradient colour scheme for potential evapotranspiration maps**

Feature	Description
Potential Evapotranspiration (mm/y) 	ESRI: 'Slope' colour ramp



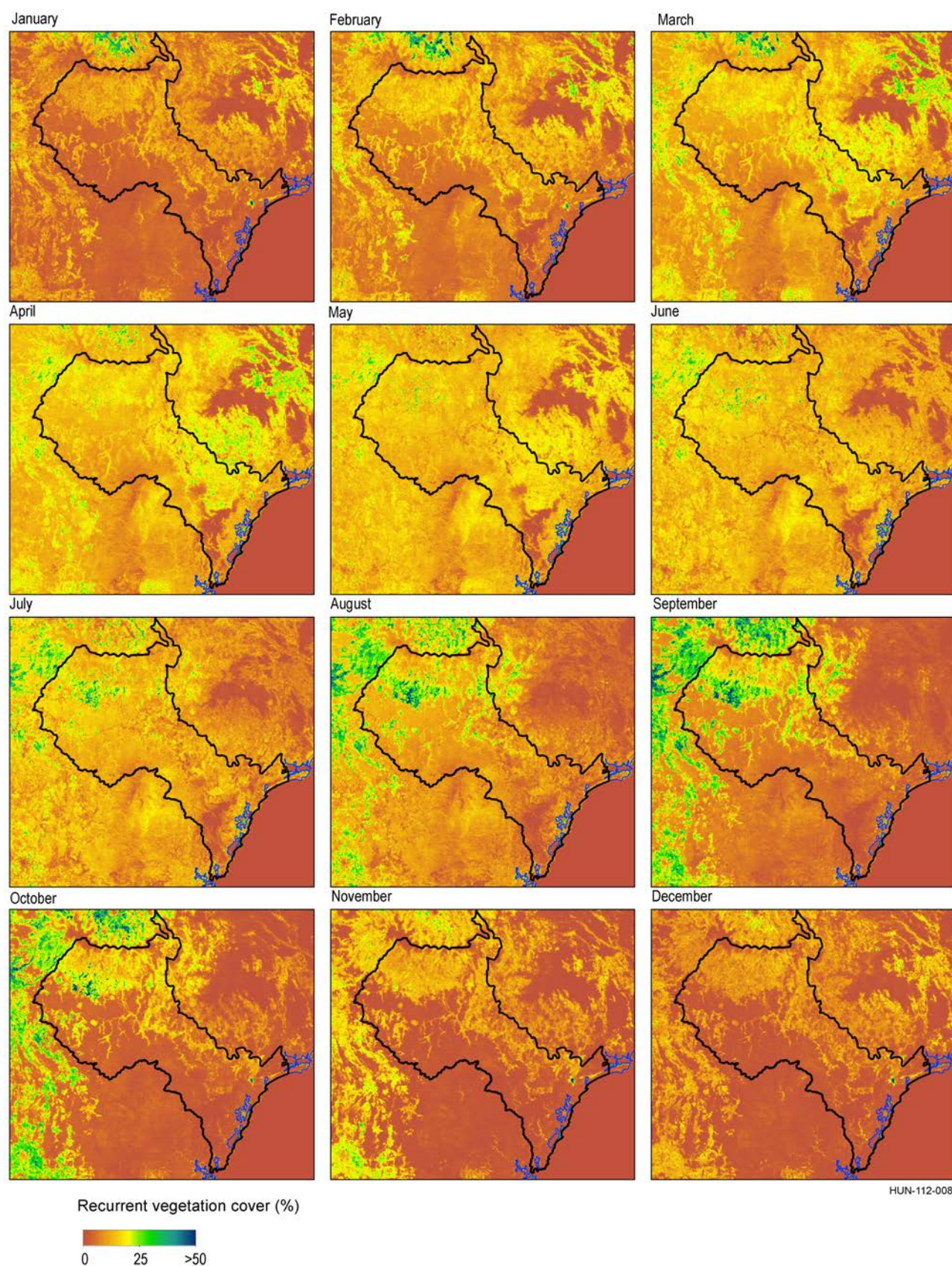


Figure 47 Example of thumbnail maps using a 3 × 4 configuration for the Hunter subregion



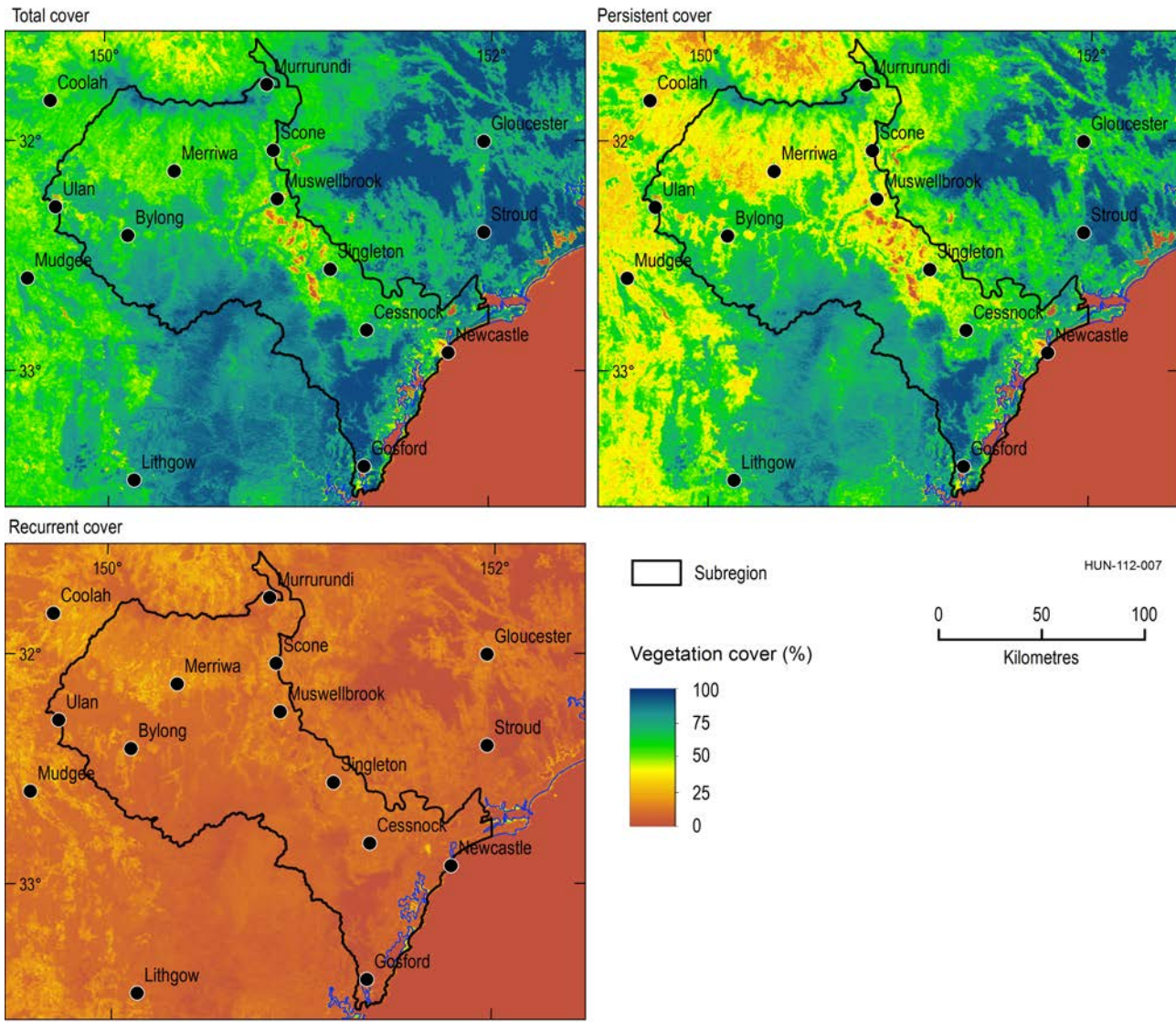






Figure 48 Example of a thumbnail map showing selected extra detail for context

## 7.3.9 Environment maps

Table 31 Specifications for environment map symbols

Feature	Description	Symbol	Specification	Colour (RGB)	Style
	Key wetland – polygon	Green area, black bird symbol ESRI Env Hazard uni 165 yellow fill uni 91	Green  Solar Yellow	82, 179, 166 Black  255, 255, 0	
	Ramsar-listed wetland	Yellow area, green outline black bird symbol ESRI Env Hazard uni 165 with fill	0.4 pt Green  Electron Gold	82, 179, 166  255, 170, 0	
	Environmental site	Yellow area with letter E	Simple marker Circle 9 pt, Solar Yellow Letter E 7 pt, Black	Yellow 255, 255, 0	
	Karst				

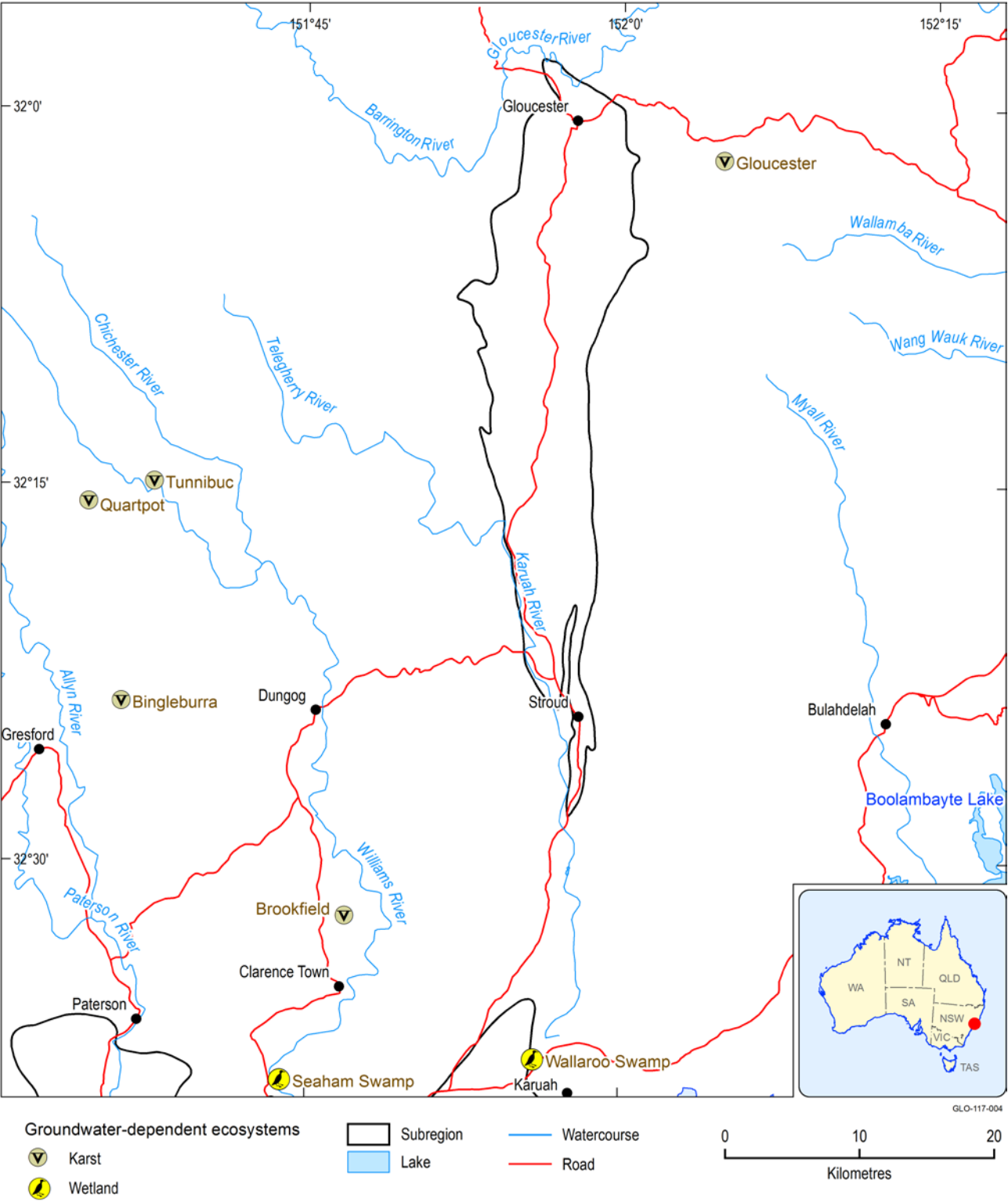


Figure 49 Example of an environmental assets map, showing groundwater-dependent ecosystems in the subregion

## 7.3.10 Hydrological modelling maps

Table ?? Symbology for hydrological modelling maps

Feature	Description	Symbol	Specification	Colour (RGB)
	Surface water zone of potential hydrological change	Outline 0.8 pt, or none if areas are very small	Raw Umber Fill Apatite Blue	168, 112, 0 115, 223, 255
	Groundwater zone of potential hydrological change	Outline 0.8 pt, or none if areas are very small	Raw Umber Fill Rose Quartz	168, 112, 0 232, 190, 255
	Zone of potential hydrological change	Outline 0.8 pt	Raw Umber Fill Lepidolite Lilac	168, 112, 0 232, 190, 255
	Baseline mine	No outline	Gray	40%
	ACRD mine	No outline	Black	100%
	Mine pit exclusion zone	No outline	Quetzal Green	67, 230, 0
	River flows with surface water model node Flow rate >50	Line 1.0 pt and filled 5 pt circle with 0.5 pt black outline	Poinsettia Red	230, 0, 0
	Flow rate 20-50	Line 1.0 pt and filled 5 pt circle with 0.5 pt black outline	Seville Orange	230, 152, 0
	Flow rate 5-20	Line 1.0 pt and filled 5 pt circle with 0.5 pt black outline	Citron Yellow	230, 230, 0
	Flow rate 1-5	Line 1.0 pt and filled 5 pt circle with 0.5 pt black outline	Blue	40, 146, 199
	Flow rate <1	Line 1.0 pt and filled 5 pt circle with 0.5 pt black outline	Blue Gray Dust	158, 187, 215
	Groundwater drawdown (m) 0.2 - 0.5	'Spectrum-Full Light' colour ramp	Classified (7 classes)	153, 153, 255
	0.5 - 1	Fill		156, 204, 255
	1 - 2	Fill		153, 255, 255
	2 - 5	Fill		212, 255, 204
	5 - 10	Fill		255, 255, 153
	10 - 20	Fill		255, 202, 153
	>20	Fill		255, 153, 153

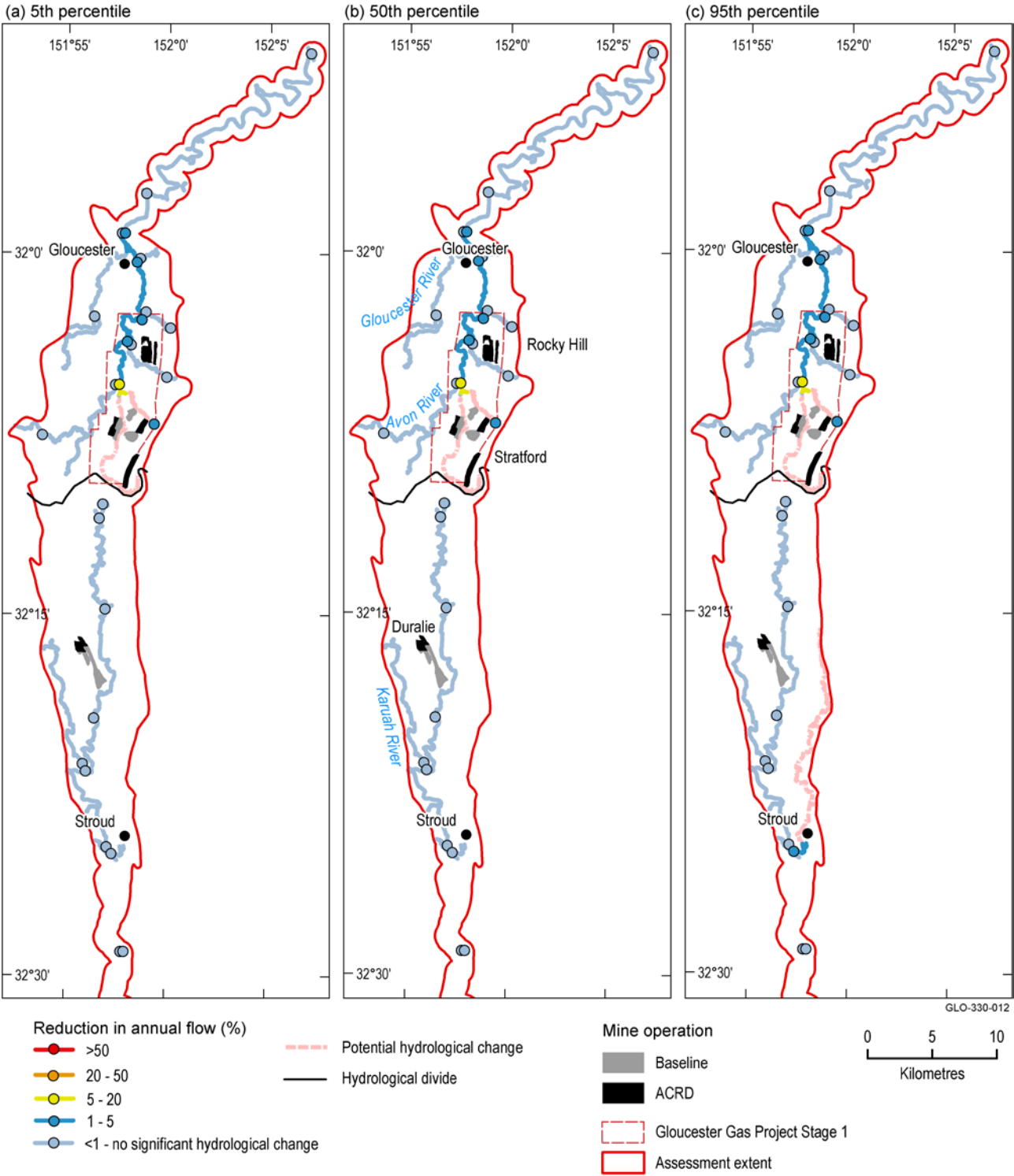
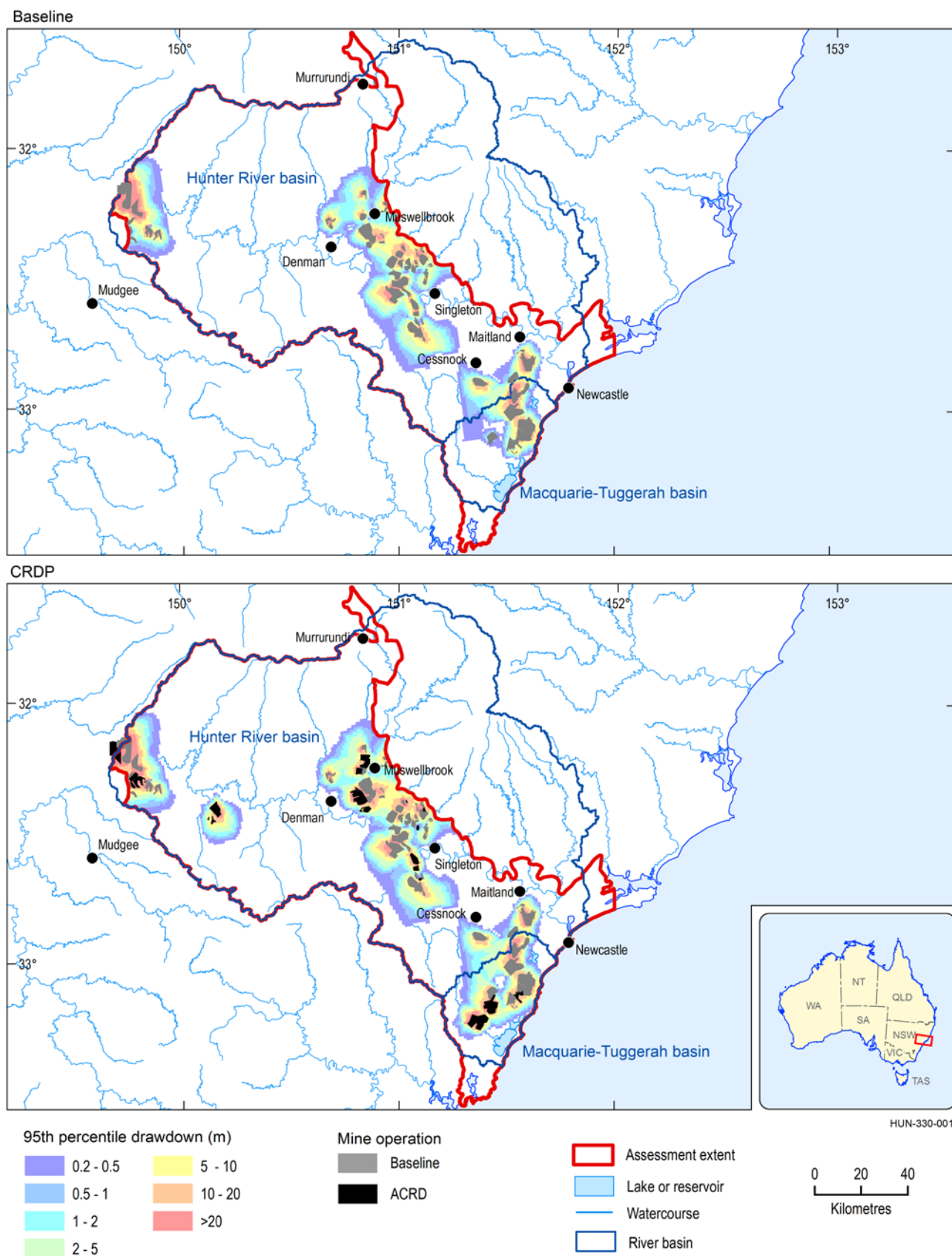


Figure ?? Decrease in annual flow (AF) due to additional coal resource development (ACRD)






**Figure ?? Areas with at least a 5% chance of drawdown exceeding 0.2 m under (a) the baseline and (b) the coal resource development pathway**

### 7.3.11 Satellite images

Satellite images should be treated like maps. They should have a neatline and geographical grid marks and values. They should have a scale bar in the legend below the image. Labels should follow the conventions as specified for map features. Captions are part of the text and should not be included on the image. A satellite image should be exported as 600 ppi JPG file using least compression (best quality). The size of the image should be produced for 1:1 reproduction and not exceed the A4 print area width of 17 cm.

**Table 32 Specifications for satellite images**

Feature	Description	Symbol	Specification	Colour (RGB)
	Area of interest	Continuous line 1.5 pt	Solar yellow or Black or White	255, 255, 0

### 7.3.12 Maps on A3 pages

Certain situations may warrant the use of large-scale maps on A3 pages. These situations are likely to be rare, in cases where additional detail may be of relevance. The following conventions apply to A3 maps:

- They are included in situ in a product (i.e. as an A3 page in the middle of A4 pages, and not as an appendix). This is accomplished by having section breaks before and after the figure, with a different page size specified for the page. Contact the Product Coordinator for assistance.
- The caption of the A3 map will contain the following note: ‘This figure has been optimised for printing on A3 paper (297 mm × 420 mm).’
- A3 pages can be used in either portrait or landscape orientation depending on what best suits the map.
- The A3 pages may have unusual characteristics regarding the placement and orientation of headers, footers and captions; this will vary and depends entirely on the specific figure and will require a case-by-case determination to ensure correct alignment of these features.

## 7.4 Mapping annotations and symbology

This section covers the selection of line styles and line weights, text styles and placement and other miscellaneous specifications for the construction and production of maps for technical products.

In general, map labels are black and water feature labels are blue. In exceptional circumstances, labels may be used in the same colour as the boundary symbol they describe. In dark map areas where black text labels may get lost, the colour of the label may be changed to white.

### 7.4.1 Line styles and weights

In the first instance please use the symbology provided with the BA style sheet (see Section 7.2).

**Table 33 Specifications for line weight**

Feature	Line type	Line weight (mm)	Line weight (pt)	Specification
Neatline	Solid	0.18	0.5	Black
Graticule	Solid	0.18	0.5	Black, tick length 1.5 mm
Graph axis	Solid	0.18	0.5	Black, tick length major 1.5 mm, minor 1.0 mm
Geological boundary	Solid	0.15	0.4	Black
Fault	Solid	0.30	0.8	Black or Grey 50%
Trend line	Solid	0.10	0.3	Black
Reference box	Solid	0.18	0.5	Black, legend box 20x10 pt (7x3.5 mm)
Area on locality map	Solid	0.40	1.0	Mars red (RGB 255, 0, 0)

These are the preferred specifications for the feature as used for A4 formats – other formats may differ.

## 7.4.2 Type styles and sizes

The specified fonts should be adhered to wherever possible. Where emphasis of a map feature is required, a **bold** face of the specified type style can be used.

**Table 34 Comparison of Arial type font with alternative font Helvetica used by other applications**

Suggested	Alternative
Use Arial Narrow	Helvetica Narrow
<i>Use Arial Narrow Italic</i>	<i>Helvetica Narrow Italic</i>
Arial	Helvetica
<i>Arial Italic</i>	<i>Helvetica Italic</i>
<b>Arial Bold</b>	<b>Helvetica Bold</b>
<b><i>Arial Bold Italic</i></b>	<b><i>Helvetica Bold Italic</i></b>
Arial Narrow Bold	Helvetica Bold Condensed
<i>Arial Narrow Bold Italic</i>	<i>Helvetica Bold Condensed Italic</i>

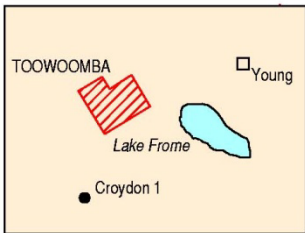
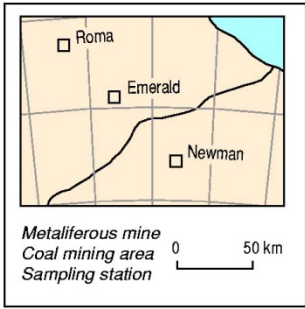
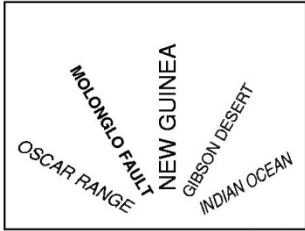
**Table 35 Type specifications for miscellaneous feature labels**

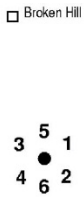



Feature	Arial	Case	Size (pt)
<b>Hydrographic, foreshore and offshore features</b>			
Bay, bight, cove, harbour, inlet, port	<i>Arial Narrow Italic</i>	Caps/Caps+lc	8
Gulf, sea, strait	<i>Arial Narrow Italic</i>	Caps	8
Beach, cape, headland, peninsula, point, promontory	<i>Arial Italic</i>	Caps/Caps+lc	8
Island	Arial	Caps/Caps+lc	8
Reef, rock	Arial Narrow	Caps+lc	8
<b>Relief feature (onshore and offshore)</b>			
Arch, canyon, channel, chasm, cliff, crest, deep, desert	<i>Arial Italic</i>	Caps/Caps+lc	8
Embayment, glacier, gorge, graben, high, nunatak, plain	<i>Arial Italic</i>	Caps/Caps+lc	8
Plateau, platform, ravine, ridge, rise, shelf, shoal, slope	<i>Arial Italic</i>	Caps/Caps+lc	8
Spur, terrace, trench, trough, valley	<i>Arial Italic</i>	Caps/Caps+lc	8
Massif, mountain range	<i>Arial Italic</i>	Caps+lc	8
Dome, guyot, hill, knob, mountain, peak, seamount, tablemount	Arial	Caps/Caps+lc	8
<b>Geological and geophysical features</b>			
Block, foldbelt, geosynclines	Arial	Caps/Caps+lc	8
Basin	Arial	Caps+lc	10
Dip value	<i>Arial Narrow Italic</i>		8
Drillhole, mine, oil and gas wells	Arial	Caps+lc	8
Fault, scarp	<b>Arial Bold</b>	Caps	8
Fold	Arial	Caps	8
Gravity province	<i>Arial Bold Italic</i>	Caps	8
Letter symbol, spot height	Arial Narrow	Caps+lc	8
<b>Miscellaneous</b>			
City, town	Arial Narrow	Caps/Caps+lc	8
Contour value	<i>Arial Narrow Italic</i>	RGB 209, 59, 0	6
Country, state name	Arial	Caps	8
Graph, graticule, scale bar values	Arial Narrow		8
Graph value description (e.g. Depth (m))	Arial Narrow	Caps+lc	8
Highway, road	<i>Arial Italic</i>	Caps	8
Homestead	Arial Narrow	Caps+lc	8
Landing ground	<i>Arial Narrow Italic</i>	Caps+lc	8
Reference descriptions	<i>Arial Italic</i>	Caps+lc	8
Formation descriptions	Arial	Caps+lc	8
Geological age (Epoch)	<b>Arial Bold</b>	Caps+lc	8

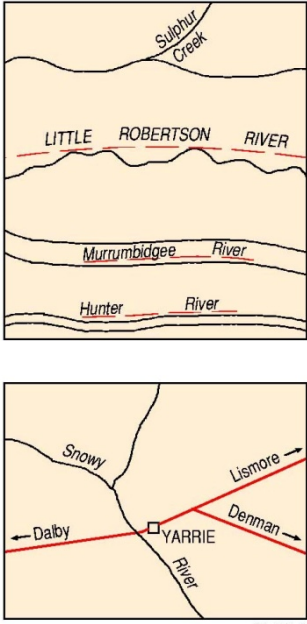
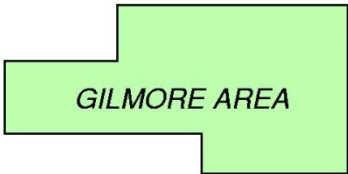

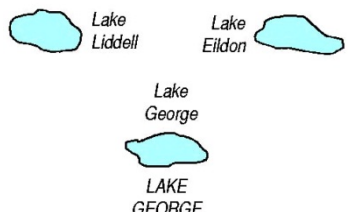
Feature	Arial	Case	Size (pt)
Geological age (Stage)	Arial	Caps+lc	8
Conodont description	<i>Arial Narrow Italic</i>	Caps+lc	8
Element number	Arial		4

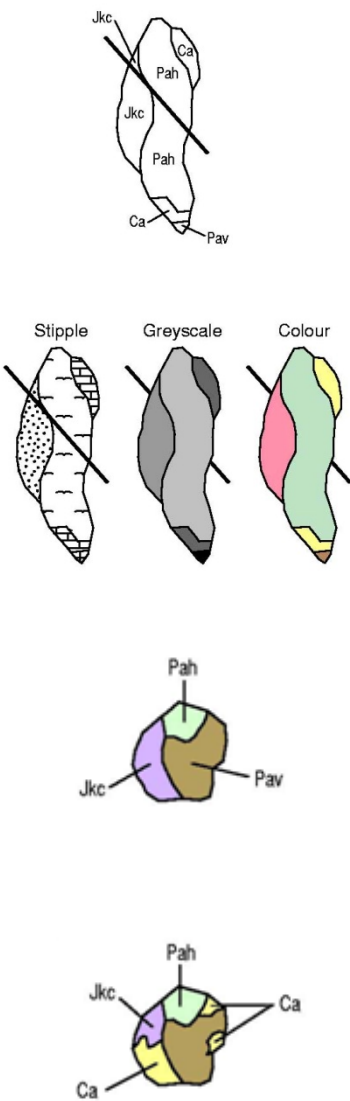
### 7.4.3 Text placement

Table 36 Specifications for text placement

Situation	Example
<b>General</b>	
When the geographical reference grid (graticule) is parallel to the frame around the illustration (neatline), text should be positioned horizontally.	
When the illustration has a full curved graticule, text should follow the parallels of latitude. Once the angle of curvature approaches 100 it may be preferable to position text horizontally. If graticule ticks only are used, the text should be positioned parallel to the neatline. References, scales, titles etc. should always be parallel to the neatline.	
When a name is placed parallel to the vertical neatline it should always read up. If it diverges from the vertical it should always be readable from the bottom or right-hand side of the illustration. Point features, such as towns or mountain peaks, should be named first and other text fitted in remaining space. Multiple names and descriptive notes should not be too widely separated so that they appear to be unrelated. They should be in blocks, straight lines or long simple curves. In complex areas, start naming features from the centre of the area and then work outward.	

Situation	Example
<b>Point features</b>	
<p>For small features or symbols, the preferred text placement should be on the upper right-hand side (Point 1 of a).</p> <p>If this position is not practicable, other choices of text position, in order of preference, are: Point 2 of (a) – lower right; Point 3 of (a) – upper left; Point 4 of (a) – lower left; Point 5 of (a) – centred above; and Point 6 of (a) – centred below.</p> <p>If it is not possible to place text parallel to the top and bottom neatlines or the parallels of the graticule, the feature may be named diagonally, but the text should be curved and not straight (b).</p> <p>If a land feature occupies a position near the coastline, the name should be generally positioned on the landward side (c).</p> <p>However, if there are numerous features to be named, those right on the coastline may have their names placed on the seaward side (d).</p> <p>Names should not obscure topographical detail (coastlines, rivers, etc).</p>	(a) 
	(b) 
	(c) 
	(d) 

Situation	Example
<p><b>Line features</b></p> <p>For linear features, text is placed on one side of the feature, preferably above it, reading from left to right. If a feature is very short and must be labelled, as a last resort the label may be split above and below.</p> <p>Linear labelling should follow an imaginary smooth line, even when the feature has numerous bends. Avoid 'balancing' text on a point. Double-line streams should be named between the shorelines, unless there is insufficient space. Names of long linear features can be repeated for clarity.</p> <p>The destination of a road or railway which continues beyond the illustration edge should be positioned parallel to the feature inside the illustration and an arrow used to indicate the direction. The word 'To' should not be used</p>	 <p>04-071-3</p>
<p><b>Area features</b></p> <p>Wherever possible, area features should be labelled parallel to the top and bottom neatlines (a). Large area features may be labelled using letter-spaced text.</p> <p>If space permits, text should be placed within the feature boundary; preferably centred and on one line. When state names are placed parallel to boundaries, they should be centred opposite each other (b). When positioning two or more lines of text on a feature, left-justify or right-justify the text next to the feature. If text is placed above or below the feature, centre-justify it (c).</p>	<p>(a)</p>  <p>(b)</p>  <p>(c)</p>  <p>04-071-4</p>

Situation	Example
<p><b>Geological letter symbols</b></p> <p>Letter symbols should be placed so that it is not necessary to search for the identification of each unit and should preferably be centred within the area (top).</p> <p>Fewer letter-symbols, if any, will be needed if the units are shown as patterns, greyscale or in colour (bottom).</p> <p>When the letter symbol will not fit within the area, it should be placed outside and a lead line drawn into the area.</p> <p>Lead-lines should point from an imaginary dot in the centre of the first or last letter of the symbol.</p> <p>Lead-lines should not, as a rule, be placed vertically, but when vertical leaders are necessary, they should point from the centre of the symbol.</p> <p>Lead lines should cross into an area at close to a right angle to the boundary, and one-third of the lead line should be within the area.</p>	 <p>04-071-5</p>

## 7.5 Numbers and international system of metric units

Specifications for these are covered in detail in Table 11 and Table 12 (Chapter 4).



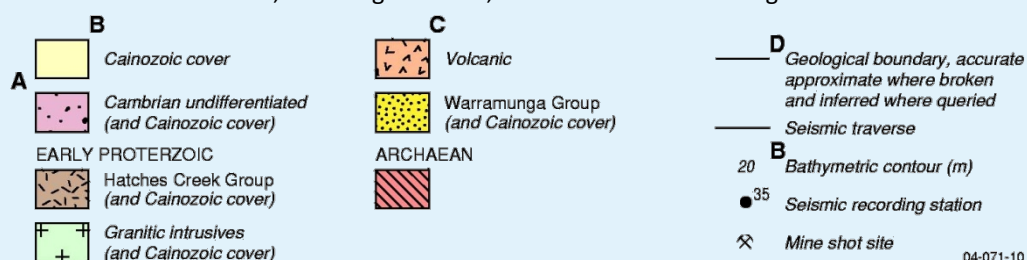
## 7.6 Miscellaneous publication specifications

Table 37 Miscellaneous publication specifications

### Feature and description

#### References on maps

Ideally, reference (colour and pattern) boxes should be 7 mm × 3.5 mm for column width, page width and A4 size illustrations. Linear features, including contours, should be shown as straight lines.



Where:

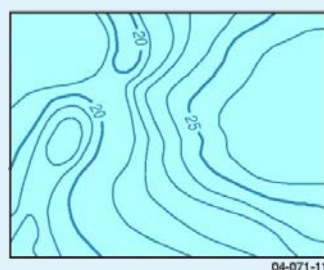
- 2 mm vertical gap between boxes, provided the number of the lines of description allows
- 2 mm horizontal gap between box and/or linear feature and the descriptive text
- Descriptive text centred on the depth of the box
- Linear and other symbols centred on first line of descriptive text

#### Reference hierarchy

- Reference boxes
- Linear features
- Point features

#### Contours

All contours should have line weights in the ratio of 2:1 for index contours over other contours. Contour values should be in FT = 63 (Arial narrow italic 6 pt).



#### Location diagram

The location diagram should be 35 mm square with a white mask to allow 1 mm gap between data frame and location diagram. The neatline should coincide with the illustration border.

When the area of interest can be plotted, use 1.0 pt red line RGB 255, 0, 0.

However, when the area is too small to be plotted, use 6 pt diameter dot (RGB 255, 0, 0).

Ocean tone RGB = 225, 240, 255. Land tone RGB = 255, 250, 212.



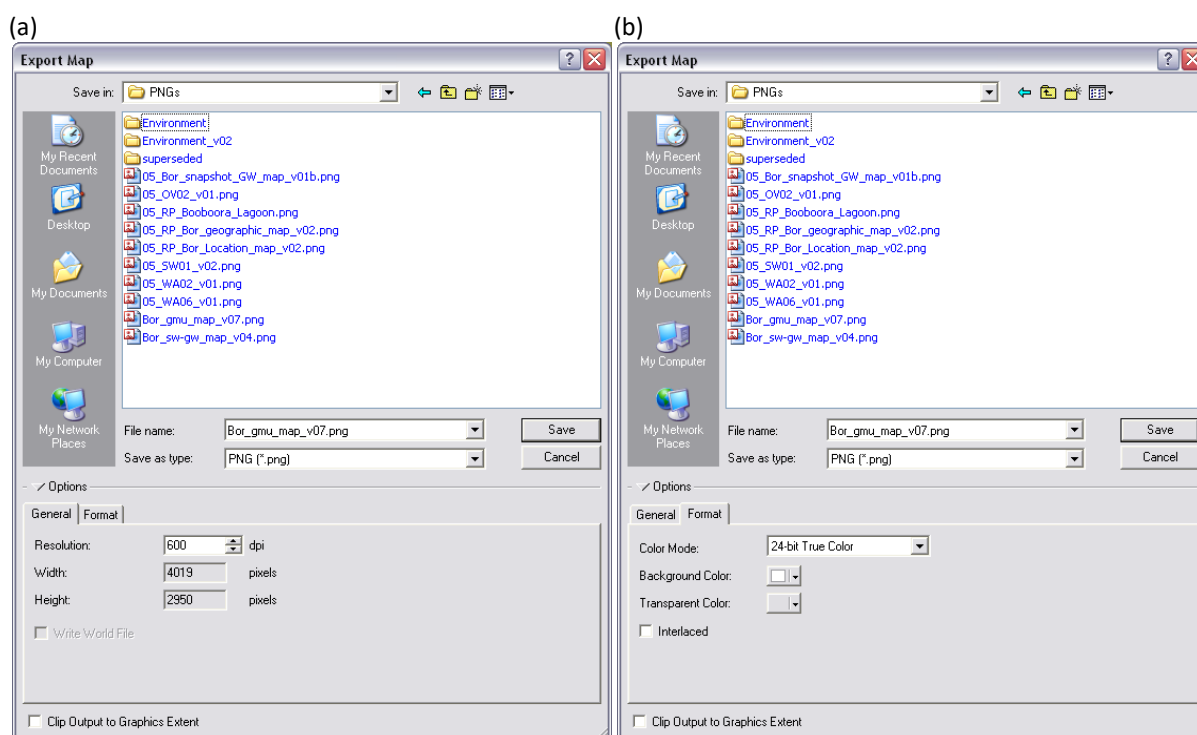
## 7.7 Exporting maps from ArcMap

The final ArcGIS maps will be exported as PNG files (with a '.png' file extension) and PDF files (with a '.pdf' file extension). The PNG files are to be inserted in the workbooks and the Microsoft Word documents. PDF files may be requested for high-quality printing such as brochures.

If the map is a continuous tone image, (i.e. with a gradual change of colours such as a satellite images or a DEM) then the JPG file format is preferred. The JPG file should be exported at 600 ppi, at best quality (least compression).

### 7.7.1 Specifications for PNG files

The resolution for PNG files is 600 ppi, with the colour mode in 24 bit true colour.

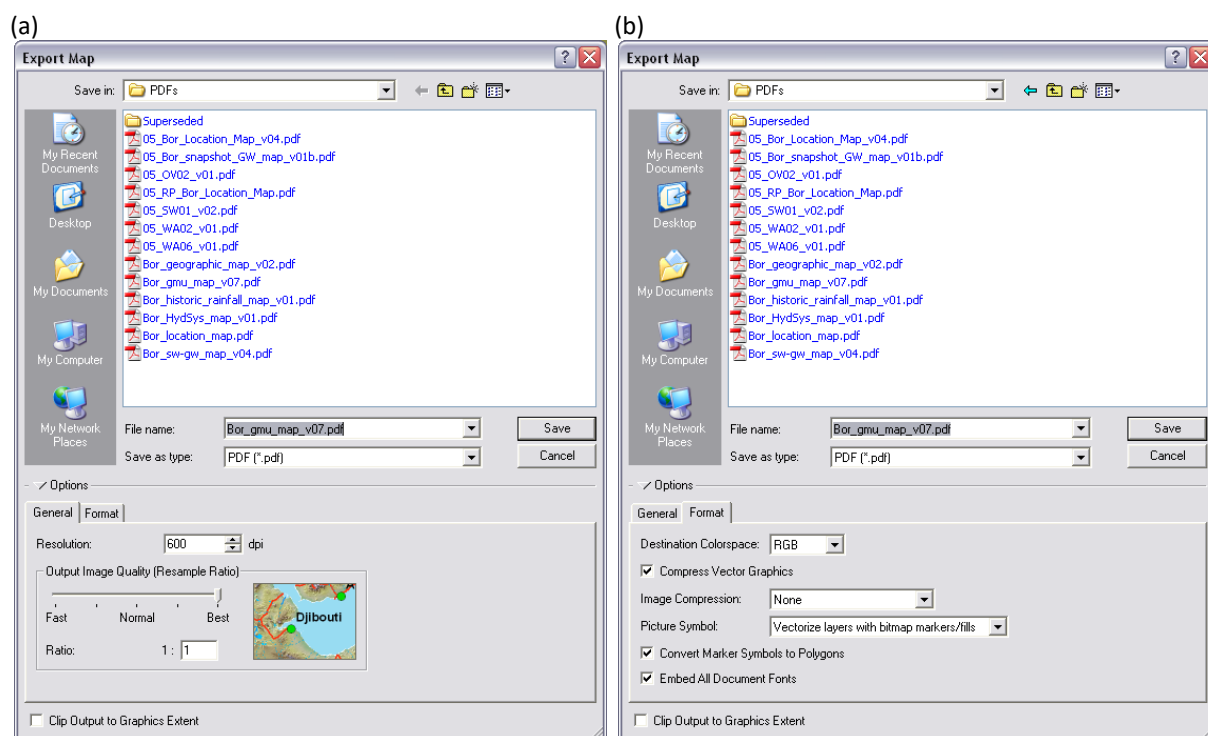


**Figure 50 Settings for exporting PNG maps from ArcGIS**

(a) the resolution in general settings and (b) the colour mode in format settings

## 7.7.2 Specifications for PDF files

The resolution for PDF files is 600 dpi and the colour space is RGB.



**Figure 51 Settings for exporting PDF maps from ArcGIS**

(a) the resolution in general settings and (b) the colour space and image compression in format settings

## 7.8 Uploading maps to SharePoint

Once a map has been completed the process is not finished until the element has been inserted in the relevant workbook on SharePoint. Each product section has a companion workbook to store the non-text elements and the related metadata.

To upload non-text elements to SharePoint, please follow the check out procedures of documents described in Section 2.2.

Insert the map image in the first available worksheet. Ensure that the element number on the map matches the element number on the tab of the worksheet. If it doesn't match, change the one on the map. Fill in the details in the table of the worksheet.

Information about using SharePoint is available on govdx

<http://www.govdex.gov.au/confluence/display/BRAT/User+Guides+and+Infosheets>.

[www.bioregionalassessments.gov.au](http://www.bioregionalassessments.gov.au)



**Australian Government**

**Department of the Environment and Energy**

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**Geoscience Australia**

